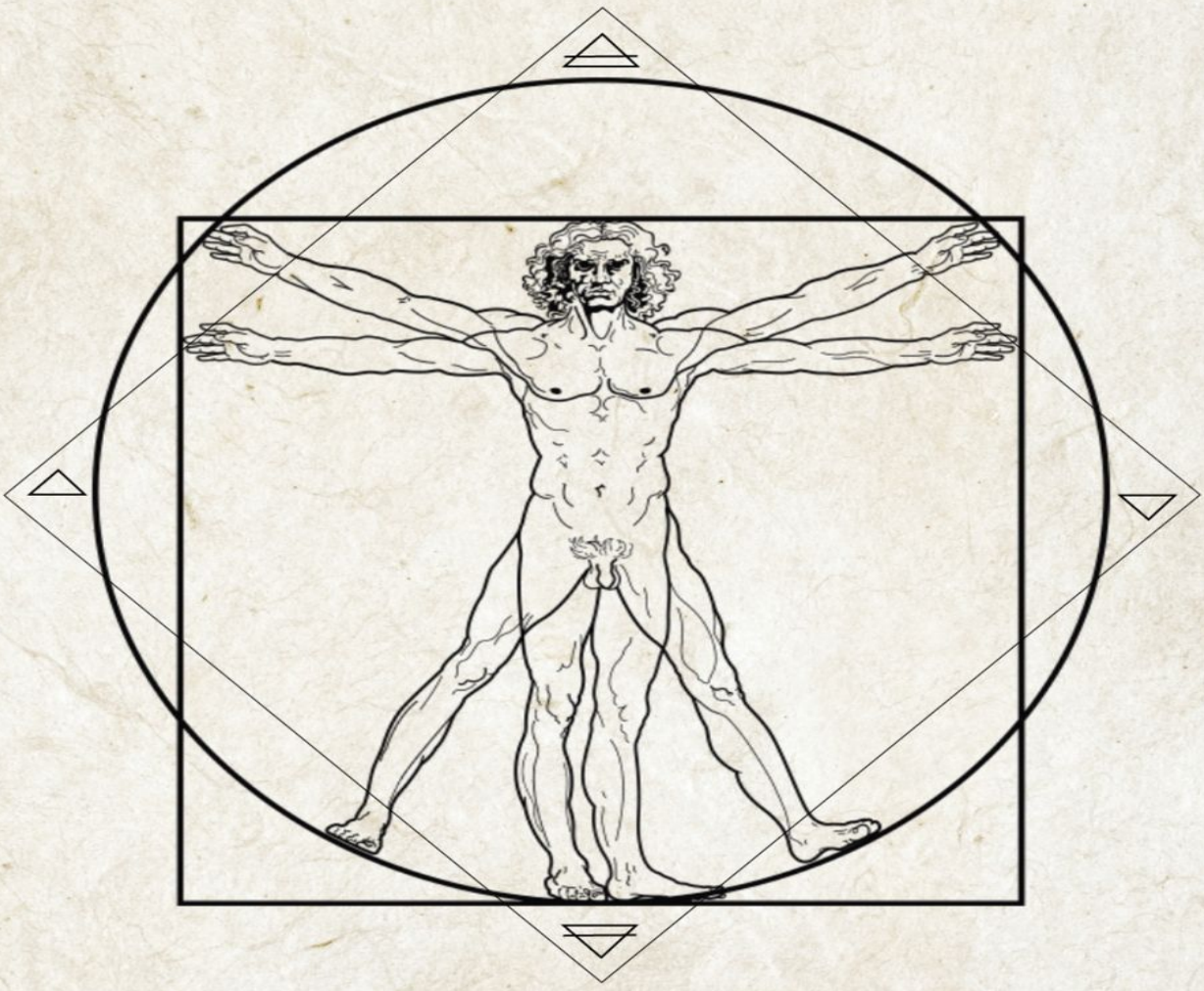
Human Mechanics

Unleashing the Potential of a Highly Advanced Species



Mads Tőmőrkènyi

Foreword by Dr. Steven Lin

MADS TÖMÖRKÈNYI

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HUMAN MECHANICS

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If you or any other person has a medical concern, you should consult with your health care provider or seek other professional medical treatment. Never disregard professional medical advice or delay in seeking it because of something that you have read in this book or in any linked materials. If you think you may have a medical emergency, call your doctor or emergency services immediately.

The opinions and views expressed in this book have no relation to those of any academic, hospital, health practice or other institution.

"No citizen has a right to be an amateur in the matter of physical training. What a disgrace it is for a man to grow old without ever seeing the beauty and strength of which his body is capable"

— SOCRATES

Foreword By Dr. Steven Lin

I've had the privilege to train and practice as a dental practitioner.

While University education gives depth to understand of the human condition, I've found that treating patients has provided the richest learning experience. What people experience in the real world is often curiously different to what we are taught in textbooks and lectures. Personally, the highlight of my career has been the past few years as I've both integrated and experienced the deepening understanding of the human body in a professional and societal context.

In short, many people are far too disconnected to the actual capabilities of what their body is designed to do. When we live without this knowledge of ourselves, or separated from nature, we get sick. Through oral disease, I've witnessed the early markers of life-threatening conditions appear in the mouth. Tooth decay, bleeding gums, and crooked teeth are all first stages for metabolic disease, heart disease, and neurodegeneration. They are also easily reversible with the right lifestyle approaches the target the root causes of why we get sick.

The problem is most are unaware there are avenues to heal themselves and improve their lives. One of the bodies of information that most people would benefit from reading, is covered in this book.

HUMAN MECHANICS is a compendium on the human body that draws from references spanning thousands of years. There are two principles that Mads has used to write this book that are of particular value that the reader should appreciate.

1) Ancient knowledge – Through the drawing on historical texts, we find information obscured from modern understandings. Of all scientific advances today, the most exciting are those previously attributed to older sources. They have the most profound implications, in particular those of the human body, where we are discovering more about ourselves than previously thought possible

2) Movement – The body is a finely tuned machine. We can put the pieces together, oil and service them but ultimately, it has to function. A missing piece the healthcare system suffers from today is the lack of direction on how to move effectively. Such valuable information will, in my opinion, fill the medical textbooks of the future, and you, the lucky reader will be getting a sneak-peak, right here.

As a practitioner, I have found invaluable to the patient experience is the prescription of movement. In the oral cavity, tongue strengthening could prevent mouth breathing and sleep disorders, but also can reshape the pediatric and adult palate. It connects to postural, spinal, and breathing issues that are covered in far more detail in this book. In the real world, patients are often given advice, or treatments and then go back to their daily life without any real direction on how to apply these things.

I don't think we can discount the importance of an aligned body in being resilient and allowing the organ systems to work in correct proportions. For example, the heart is a muscular system uses pressures and tensions to carefully weave oxygen through to every cell in the body. You can imagine if the wires are tangled off in the periphery, it makes your heart's job more difficult.

However, before continuing, there is a quick warning. As someone who has tried the principles outlined in this book, I can attest that they are not easy. These principles take discipline, time, and dedication. I can also say they work, and the sacrifices are worth the investment.

Human Mechanics is an excellent tool for the everyday person to get much needed, more detailed approach to their own health.

I hope you enjoy reading it as much as I did.

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Introduction

As *Human Mechanics* is being written, we, the human species find ourselves in a global pandemic. Like the buildup towards the point of no return phase in a Hollywood movie, we face a new world with new challenges as if our poor choices, imbalances, and flight from nature have accumulated like the inflammation in an organism. Although this situation to the majority of the world's population most likely was unexpected, to me it was an obvious and necessary destiny.

You may have noticed the four icons on the cover of the book. Each icon represents the four elements of life: Earth, water, wind, and fire. Without these elements, life on planet Earth cannot evolve. Paradoxically, but not surprisingly, all four elements have become highly distorted in our modern way of occupying this beautiful planet.

One of the icons that represents Earth being the soil, the foundation of our food. Another, being water, representing hydration and water, the substance from which the human being is primarily made. The third, wind, represents air, the oxygen we breath into our lungs. And finally, fire, representing the sun, the enormous battery that we are highly dependent on to live and thrive as an organism.

We have chosen to contaminate the soil with chemicals that create short-term 'benefits', and we now face an irreversible threat in our ability to grow foods the natural way. The same chemicals are spilled out in our water supply, which we further use as a source of mass medication by adding artificial substances. The consequence is that less and less natural springs are accessible for us to receive water in its pure form. Larger and larger cities have caused increasingly more pollution. The normalization of cigarette smoking has damaged and polluted our respiratory system that relies on clean oxygen to maintain an optimal respiratory exchange. Finally, we live in boxes, work at offices, drive cars, and spend more and more time indoors. Even when we go outdoor, we cover ourselves with shoes, gloves, layers of clothes, and wear

sunglasses to distance us further from the natural, life-giving rays of the sun.

We are not in harmony with Mother Earth. The way we are designed is to live in symbiotic relationship with her. This global karma acts as a catalyst forcing us to face times of extremes like the current. Because, without a wake-up call, we won't make up for the harm we have done.

And when I say we, I will emphasize that I do not necessarily mean you and I. Society is based on a layered structure, where more power and influence is given to those at the top of the hierarchy, where money is a determining factor of freedom. The people are governed by politics, who are governed by someone, who are governed by someone. We do not necessarily create the poor choices. Often, we react rather than act.

I have created *Human Mechanics* to enlighten you with information and tools, and to trigger your awareness towards yourself and the ever-evolving world around you. All changes start within us; and we cannot clean up the mess in the world before we clean up the mess in ourselves.

We are living in times of extremes. Overwhelmed with information, things to consider and analyze, filled with despair and stress of what to do and think, and who to be.

Information has never been more available to the eye of the public, which not only results in confusion and anxiety, due to the fact that everything is happening so fast, but on the other hand, knowledge has never been more accessible.

Information can more easily be accessed, and misinformation and propaganda are being spread in exponential rates. The increase of information brings forth the increase of stimuli we constantly face throughout the day. This has created a culture in which boredom no longer exists. Boredom is the place of creativity, intuitive thinking, and the opening of the subconscious mind to evolve and create the life that's best suited for you.

Realizing this issue and being conscious concerning it should make you reconsider the number of daily distractions in your life which, no matter who you are, are incredibly high in today's society. Video games, television, social media, etc. There is always something to do. Unless you are fully aware of these distractions, they will create a dependency upon constant stimulation, that will keep your focus distanced from what's important.

Distraction and materialism go hand in hand.

As our attention span is now shorter than ever, our ego — who we think we are and what the world wants us to be — is more than ever searching for new short-term comfort in fashion, gadgets, jewelries, cars, etc. Things that have no value or serve no greater long-term benefits to the true self.

The true self is the epicenter of a person's entire being. It's the total sum of everything we are. The false ego — on the other hand — is the ideas and concepts we create about ourselves from our lives, which typically excludes any quality we don't want to accept about ourselves. However, humanity has been endowed with the freedom to choose, either to obey the true self, or to give into the temptation of the vanity and materialism of the false ego.

This is the most notable trade that separates man from animal, our freedom of choice. The choice to fall over fake concepts and ideas or to respect our natural impulses. The choice to sustain nature, or to destroy it.

Freedom of choice weighs on the fate on the entire organism that we call humanity.

Cancer begins with a group of cells within a community that fails to communicate with the conscious signal of the organism. Those cells begin to grow out of control and spread to other areas of the organism. This disease is evident in our world today. The cancer upon our earth is mirrored in the domination of our false ego and our divorce from nature.

Collectively, among every human, vanity leads to segregation and competition. Competition leads to fear and greed. Greed leads to disease and immorality. And immorality is the breeding ground for illness. Every act of hatred and destructiveness in our world, begins with self-hate and self-destructiveness. And it all begins with the breakdown of communication.

Navigating in this modern, industrialized world can be hard for anyone. Remembering life is a long process of ups and downs providing us with challenges that we grow from on a beautiful earth with numerous lifeforms in a symbiotic relationship with our nature, could and should create a sensation of gratitude of being allowed to incarnate in is astonishing world as a human being.

We all carry each our personal responsibilities and missions on this earth. If you sometimes get caught up in the feeling that you don't fit it to this world, then maybe it's because you're here to change it.

Personally, I've always felt this way.

Being raised in what I would call a completely normal family in Denmark, not poor nor rich, no religious background whatsoever, I've been perfectly suited from childhood to go through the accepted societal wheel of education, marriage, 9-5 jobs, retirement and dying at 75, never really becoming awake, but staying asleep for a lifetime.

Luckily, this didn't happen.

I've always considered myself a daydreamer, adventurous and feeling capable of way more than what I really was. Yet, I slowly slipped into the educational system. Graduated from primary school, went directly to high school, mainly because everyone else did. Never really fitting in and constantly wondering why success was determined by how well you could memorize what you had read in a book.

I quickly realized that it didn't matter what I knew, but rather how well I could explain what I had read in the books we were mandated to read. First, when I learned this strategy, my grades began to rise. Not because I became smarter, but because I learned a strategy. Learning this new way of working felt extremely odd and far from optimal.

This strategy was my first wakeup call of being occupied in a society based on insufficient values and made me question whether real knowledge was in fact taught, as well as, how easy it is to manipulate the human brain by freezing out all sense of critical thinking by rewarding those who are able to best repeat what is told in books and in the news.

Nonetheless, I graduated with a decent average. Not bad, but not even close to being good enough to reach the sublimity of higher educations.

Still a teenager, uncertain about life, and uncertain about myself, I learned the social skills of

smoking cigarettes to socialize, partying every weekend and engaging in other types of activities, not for the sake of having fun, but rather to fit in. I guess this period will be present is most people's lives today, who find themselves to be somewhat introverted and antisocial by nature, or even having tendencies of insecurity. I never saw this path of life as being my true path, but as a human being, we sometimes need serious wake up calls to force us to change our paths.

By coincidence — which by the way doesn't exist, we choose to call it coincidence because of our inability to comprehend pattern – I chose, after a sabbatical year, to sign up for education as a personal trainer. I wasn't really healthy. Although, my body looked like a statue from ancient Greece. I got good grades and learned from the education what I was supposed to learn—health and physical training.

Students of such educations must be the healthiest, must they not?

Nevertheless, this might have been the period where I was mentally most asleep. Having the wrong values, still smoking, consuming large amounts of alcohol in the weekends, and regularly enjoying marihuana. Not to talk about being ignorant to the real health issues of emotional trauma, pharmaceutical abuse, pollution, pesticides, and other exposure to toxins. These are all issues we are never taught about. I accuse all this of being the reason why I was not in touch with my higher self at that point in life.

During this period everything began to change.

In hindsight, it seemed like a karmic reaction, or a force put down on me to change my inappropriate path on this journey. During another intense New Year's Eve with a lot of alcohol, partying, and careless conversations I got into an accident, which changed my life completely. I ended up at the hospital, beaten half to death with no memory of that entire night or the following hours whatsoever. I was diagnosed with a severe concussion, a broken nose and looked like a caricature of myself.

It was during the same period that I was about to finish my education without any clue of what I should do with this new diploma and no job to occupy after the education. At this moment, my world fell apart. I developed anxiety and depression with regular panic attacks, most likely due to the accumulation of bad habits and poor decisions over many years, which got me paralyzed. This was far from anything I had ever experienced before, and I was no longer a mindless and fearless young man.

When most people reach this point in life, it triggers something deep inside them, that shake them apart and make them either want to end their journey or do something about it.

It's important to emphasize that I deeply believe that everything happens for a reason. I was buried in bad life decisions and since I was unconscious about these, I was not going to change it.

Once again, we can call it coincidence or we can believe that it happens for a reason, but these events triggered something in me, and made me obsessed with my life mission: to discover the history of the mankind, who we are, where we come from and what we're capable of.

To those who are not familiar with states of anxiety and depression, it's a paralyzing fear of everything, mostly irrational fears that, to others, seem completely irrelevant, but your mind keeps revolving around. You see the negative consequences in everything, and your brain shuts down the rationality of possibilities and positiveness of life. In this state, it's impossible to be optimistic, and forcing yourself to be, often makes

it worse. The anxiety and depression create a sense of anti-sociality and depleted energy preventing you from being able to work, exercise or socialize.

I isolated from my surroundings. This isolation created an enormous space for me to work on myself, my thought patterns and trying to fix my life. All previous distortions were forcefully removed from my life. A toxic social environment, being stuck in the educational system and going out were on forced hold. Every piece of distraction was no longer available, as I could now enter my subconscious mind for the first time in many years.

I began researching human history. Often wondering about topics such as the big bang, Darwin's theory of evolution, history of civilization and all the other regular topics that were taught in school.

Everything revolving around the materialistic doctrine about randomness in nature, coincidences of human evolution, that we are flesh and blood that reproduce and terminate into a nonexistence of a big black eternity.

Materialism is the opposing part to spirituality. I often wonder why spirituality is so quickly labeled as 'madness' in the westernized world, when the odds of human evolution as being non-random in the end is equal to being random, because in the end we know nothing. Yet, it's like spirituality and the belief in a deeper meaning is purposefully being disgraced from public awareness.

I came across some teachings of the history of the great pyramid in Giza, which I recalled having been taught was built by slaves 4500 years ago. The remarkability of the pyramids struck me as a lightning. That a species reportedly way less advanced that we would be today 4500 years later, were able to build a pyramid in the height of 146 meters out of 2,300.000 blocks, these blocks weighing as much as 80 tons equivalent to roughly 53 cars in one stone with a placement of the blocks in millimeter precision so perfect, that even a piece of paper would not fit in between the blocks.

The construction of the pyramids was presumably done with no technology or machinery, and it has been discovered that even with the technology we possess today, we'd have a very hard time recreating these pyramids.

My astonishment in the untold human history only evolved when I discovered that this extraordinary monument wasn't a unique case. No, they were spread across the earth with the same similarities and remarkability across of cultures, which at that time, should not be able to be in contact with each other across of continents and enormous oceans.

I then discovered the English journalist and archeologist Graham Hancock who had published many groundbreaking discoveries in archeology and history of mankind. He theorizes that we as a species are not at the pinnacle of our evolution and that we have been way more advanced as a civilization than we are today. Paradoxically, these discoveries were diametrically opposites of the contemporary knowledge of human history, that we are taught in school. Not unexpectedly – I'm tempted to say — has he been an unpopular figure and the media and skeptics have attempted to censure and debunk his findings for years.

The mystified reality of the human species and a history that seemed either forgotten or deeply falsified, was what triggered me into the obsession of wanting to learn everything about the human being, both physically and mentally.

Without this personal breakdown forcing me to reconstruct my life, I would probably still be in the same drowsy state of poor choices. I discovered a fundamentally deeper meaning with existence and recognized my mission in life. I believe that once we discover our individual life mission, fear and unhappiness can no longer thrive.

I founded my company MT Performance and since then it's been an ever-evolving journey in the search of unleashing the human potential.

Over the past eight years, I've built on the knowledge from methods in ancient cultures, studying Sanskrit, contemporary neuroscience, nutrition from various cultures around the globe, sport science, orthodontics, biomechanics, therapy sorts, epigenetics, breath-work, and psychology in the pursuit of covering the human mechanism from as broad a spectrum as possible.

These are the sum of the foundation of this company, which provides a large spectrum of methodologies and practices, that have worked and currently works with success, into a single system, which respects the whole.

Thousands of people from more than 140 countries have taken advantage of MT Performance's holistic health system improving their performance, health, and wellbeing, both mentally and physically. I have worked in person with both men and women, unemployed, businessmen, old and young people, skinny and obese to the elite athlete across of a variety of sports to soccer players from the best leagues in the world to improve their fitness and sustainability, but most importantly, to provide them with valuable tools to their bodies and minds, so they are better equipped and more resilient in an existence filled with challenges, uncertainty and a large number of distractions from the foundation of life being taking care of their body and spirit.

Part One

I. MAN

The human body consists of trillions of cells making up the foundation of man. With a circulatory system responsible of moving blood, nutrients and oxygen throughout the body, a digestive system absorbing food and removing waste through the organs, an endocrine system responsible for your hormonal balance, an immune system; the body's defense shield, the respiratory system that exchanges oxygen and carbon dioxide as well as a nervous system, muscular system, skeletal system and many more complex organizations with the main goal of achieving homeostasis to remain in balance and, ultimately, survive. The human is a deeply advanced machine.

Intangible Powers

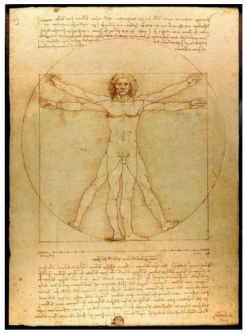
Everything your eyes allow you to see is based on geometry and mathematics; it seems as if we are governed by a set of mathematical rules that must be met in a carefully constructed universe. Just like the rules applied in a computer program.

Everything from the smallest atom to the DNA strands in your body, monuments, planets, animals, flowers, music and even the human body. We find these mathematical patterns everywhere in nature. Many of the flowers you find in nature either consists of 3, 5, 8 or 13 leaves and the geometry of a snail's shell, the human ear, a galaxy, the tail of a chameleon, an egg, among many others, all share the same proportions of the *Fibonacci sequence*, which is a sequence of numbers (1, 1, 2, 3, 8, 13, 21 and so forth) gradually expanding by adding the two preceding numbers together.[1] Creating a geometrical pattern from this sequence of numbers will create a continuously expanding spiral, which shape is identical to an incredible number of patterns in our universe.

The Italian engineer and painter Leonardo DaVinci was obsessed with the perfection of the human body and the uniqueness it consisted of. He made incredible discoveries of the human anatomy roughly 500 years ago by dissecting dead bodies and creating drawings out of these discoveries and produced the first accurate depiction of the human spine.

His most famous work, and maybe the most famous work ever, became The Vitruvian Man, which is much more than merely a symbolic artwork of the proportional human body. It also contains the exact proportions of the great pyramid in Giza, for reasons we can only wonder about.

From the text he wrote to describe the Vitruvian Man, he came to the conclusion that the human body was just as mathematical, and rule based as the rest of the universe.



"From the roots of the hair to the bottom of the chin is the tenth of a man's height; from the bottom of the chin to the top of his head is one-eighth of his height; from the top of the breast to the top of his head will be one-sixth of a man. From the top of the breast to the roots of the hair will be the seventh part of the whole man. From the nipples to the top of the head will be the fourth part of a man. The greatest width of the shoulders contains in itself the fourth part of the man. From the elbow to the tip of the hand will be the fifth part of a man; and from the elbow to the angle of the armpit will be the eighth part of the man. The whole hand will be the tenth part of the man; the beginning of the genitals marks the middle of the man. The foot is the seventh part of the man. From the sole of the foot to below the knee will be the fourth part of the man. From below the knee to the beginning of the genitals will be the fourth part of the man. The distance from the bottom of the chin to the nose and from the roots of the hair to the eyebrows is, in each case the same, and like the ear, a third of the face."[2]

Art is much more than creative expressions. It's a way of expressing symbolism and messages to be analyzed and comprehended. The deep astonishment and great symbolic meaning in an artwork that turned out to be one of the most famous of all time, which is based upon the human body, is the reason why I chose the Vitruvian Man for the cover of this book. As Da Vinci once said: "Learn how to see. Realize that everything connects to everything else [3]."

In nature, all that we perceive with our five senses is a result of two fundamental principles. Everything in existence is made up of a relationship between vibration and matter. Even language, the communication of any and all things in nature depend upon this principle.

Experiments have been conducted to try and prove that language, once spoken, creates a vibratory frequency that moves matter into sacred geometrical patterns. To put it simpler; that the immaterial can affect and manipulate the material. Such as when a person chants a specific word in Sanskrit while filming a burning candle, the intensity and color of the flame would change due to the frequency that the word would omit.

Masaru Emoto has carried out interesting experiments with water at critical point for freezing. He claims that words expressing emotions have effect on the crystals formed in the process. Emoto reports that words with positive emotional contents produce beautiful crystals and those with negative emotional content generate ugly ones. Also, music and even pictures are reported to have similar effect [4].

The Japanese doctor Masaru Emoto conducted several experiments where he argued that human consciousness can affect the molecular structure of water and hypothesized that water reacts and differentiates between positive and negative thoughts and words, and that polluted water could be cleaned through prayer and positive visualization.

In the first of the two most remarkable experiments Dr. Emoto conducted, he made three samples of rice in water. The first water sample was affected with words of positive emotional meaning, and the second sample with words of negative emotional meaning. The third sample was serving as control sample. The experiment showed that the rice in the first water sample, which was subjected to words of positive emotional content began to ferment, whereas the rice subjected to words expressing negative emotions began to rotten. The control sample also began to rotten, but not as fast as the second sample.

Essentially, Dr. Emoto captured the water's expressions by developing a technique using a very powerful microscope to photograph newly formed crystals of frozen water samples. He exposed water in the glasses to different words and sounds, and then froze and examined the aesthetic properties of the forming crystals. He found that water from clear springs and water that had been exposed to loving words showed brilliant, complex, and colorful snowflake patterns. In contrast, polluted water, or water exposed to negative words formed incomplete, asymmetrical patterns with dull colors. The geometry of the water molecules seemed to be directly influenced by the stimuli that were exposed to the water [5].

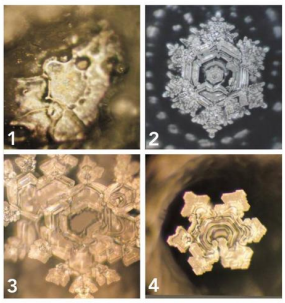


Fig. 1.1 Different images showing the alteration of the water after exposed to different stimuli. After the exposure one water drop was freeze at -20°C and then examined under a microscope.
1: Before Buddhist prayer. 2: After Buddhist prayer. 3: Music by J.S .Bach. 4: Music by Mozart.
Source: The Miracle of Water by Dr. Emoto.

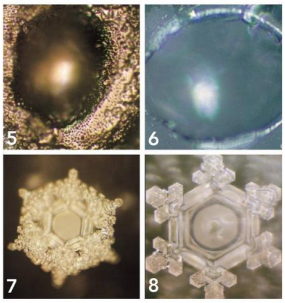


Fig. 1.2 5: The word “evil”. 6: After being microwaved. 7: The words “love and gratitude”. 8: The sentence: “thank you”. Source: The Miracle of Water by Dr. Emoto.

These experiments should at least make you reconsider what type of water you expose your body to. Since both humans and the Earth are composed mostly of water, it is the source of life. Water is even intimately associated with our DNA, since this is the substance that holds our DNA together. Therefore, if sound affects water, it may also affect our DNA. Unless we drink and shower from natural spring water, which is not

filtered and cleansed through machines, then we must take notion of the water we consume. Since our skin also acts as an absorption gateway for external substances, we should likewise consider what water we use when showering.

Most of the global water supply runs through dirty, rusty pipes with sharp turns and edges below our increasingly contaminated soil, which ends up in our tap water. Furthermore, a large number of countries globally are adding fluoride and chlorine to the water supply, as well as pesticide remains, pharmaceuticals and toxic heavy metals are also regularly leached into the same water. I will go into much greater detail of this topic later in the book.

If the term *water memory* that Dr. Emoto suggests is real, and water is conscious in such a way that he describes, then a primal source of health should be considered in the type of water we choose to consume.

Even plants carry out this same kind of conscious, intelligent force. Several studies have been conducted on plants, that i.e., responded to physical contact due to a defense mechanism towards insects. Exposing the plants to the drug Ether that knock out humans due to the stopping of cell signal transmitting, resulted in the exact same effect in the plants, even though plants have no nerves, which humans have. Another experiment was conducted where the plants got wired to electrical signals to measure their responds to stimuli. When touching or pushing to the leaves of the plant, it forced a retraction in the plants, and it changed its shape while a sudden reaction occurred in the electrical signal. The same type of signal from the brain to the body in a human being when wanting to make a movement. This study strongly suggested that plants contain some sort of consciousness that cannot be explained by the same mechanisms that we use to explain the consciousness of a human being [6].

For generations we've been led to believe that we are doomed by our genes and are forced to accept this reality. Whatever our parents, grandparents or great grant parents might have had genetic illness, we might be predisposed with too. This is also called genetic determinism; the idea that our genes are fixed, immutable, and outside of our conscious control.

So, if we share the same damaged genes with family members, we will also expect and fear these genes to cause damage to our own DNA. This was the prevailing view of the scientific community.

However, researchers, scientists, and biologists, such as Dr. Bruce Lipton, have found that DNA is controlled by signals that come from outside of the cell, meaning that the present an environment of the cell has much greater independent influence [7]. Rather than genes deciding our destiny, it has been discovered that our environment also plays a key role. So, if we want to change and influence the environment of the cell, we will have to change ourselves.

Bruce Lipton found that our thoughts are deeply connected to our cells and the environment in our bodies. That the 6000 thoughts than runs through our brains on a daily basis are deeply connected and can affect our physical health and wellbeing. And as with so many other misconstrued aspects of human life, the cells are not competing in a hostile environment against each other for resources, rather do they work collaboratively to evolve and thrive in an ever-changing environment.

This new field of biology is known as epigenetics. A new reality of discoveries on how the mind is deeply connected to the body and how both nutrition, stress and emotions can modify our genes, and that these gene

modifications are heritable.

To put it simple, you would be capable of stopping the chain of repeated disease and illness through your generation of family members by changing your mind and the way you live; by changing the environment of the host. Even further, this transformation in gene expression that you are able to create, you will bring forth when you reproduce in order to break the circle of say disease.

Placebo is one of the known terms, that proves the mystified power of the mind to affect the body, that shows our innate capability of healing ourselves. Placebo is the scientific proof of self-healing; a healing capability acting as a chemical drug, but without any side effects. Studies done to examine the effectiveness of antidepressants are even indicating that most of the experienced effect from the drug potentially only originates from the placebo effect.

Scientist Candace Pert discovered one such way in which the mind is fascinatingly powerful. She discovered that the mind is not just contained in our heads but dispersed throughout our bodies through signal molecules. While these signal molecules send information to the brain, the brain can also subvert them and transfer information in the other direction, which means that they there is essentially is not body without the mind and vice versa. Treating the body holistically is the only recipe in the pursuit of optimum health; a recipe we will spend this entire book uncovering.

In an experiment conducted by Alia J. Crum in 2007 [8], our basic notions of the relationship between the body and the mind were challenged, testing the current theory of the objective and unaffected reality we live in.

Most people know how hard hotel maids work and how most of their waking hours are spent in motion. Yet, many hotel maids don't consider themselves as physically active. A perspective was shared of the hotel maid used in the study, who did neither physically seem to benefit from their high levels of physical activity. In the experiment, 84 hotel maids were asked about their level of physical activity. Here, most of the respondents answered that they did not find themselves physically active nor trained, and despite their current activity level exceeding any recommendation for daily activity, most of the women were obese.

The women were measured in their body fat, waist-to-hip ratio, blood pressure, weight and body mass index, after which they were divided into two groups. One group was made aware of all the benefits of their physically hard work, as well as how many calories they in fact burned during work, and that they already met all the goals of level of physical activity.

The second group continued working in uncertainty. There weren't any other factors affected in any of the two experimental groups' lives.

After just one month, the women, in the first experimental group had, to their great astonishment, lost weight, lowered their blood pressure by 10% and lowered their girth measurements. This happened without any change in lifestyle or activity levels, but merely by becoming conscious of their actual activity level and the health benefits it would provide.

Instead of any real change, or chemical drug to change the chemistry of the body, the faith and intention of the mind created the change. A change that affected the women positively. Obviously, the power

of the mind works in both directions; tell yourself enough how unworthy you are, and somehow you will feel that negative consequence.

The implication that the objective reality we live in is unaffectable and immovable by the immaterial gradually seems more outdated than current.

The English geologist Charles Darwin became famous for the theory of evolution. A theory that changed the perception of a species in how we live, thrive, and socialize today. The theory taught us that we – as a species - are merely the product of random mutations, essentially an accident of biology. In such a world, we would be insignificant and powerless beings.

This theory gave rise to the idea that the best solution to a problem is found through competition rather than through cooperation. The emergence of life should therefore be based on the fact that individualistic competitiveness would be the most important trait if a species wanted to survive.

We have evolved into becoming each other's opponents in a world that suggests that the strongest will succeed. A part of Darwin's theory became known as *Survival of the Fittest*, which was based upon the organism's ability to adapt in an environment of competition and fight for survival [9]. This perspective gave rise to the idea that life would ultimately be based upon competition. Proposing a theory like this, that determines a species' behavior and its absolute role in the food chain can be dangerous to publish. Especially if it's not necessarily true, but rather observations based on subjective eyes. It was even known that Darwin had his own doubts about his theory of evolution because of the missing links it contained.

Even though Charles Darwin was the one becoming famous because of the theory, it was actually a French biologist named Jean-Baptiste Lamarck who initially made these discoveries a few decades before. His ideas and philosophies behind the theory were quite different though. As Darwin based his ideas upon competition and the battling between species, Lamarck conceptualized evolution in kinder terms. To Lamarck, it was indeed cooperation between the species and individuals that was essential to evolution, not competition. Yet, there are simply not enough evidence to definitively conclude humans descended from the monkeys and that all species share the same evolutionary road. As we are still only suggesting rather than definitively determining, we should be cautious about to what degree we base our society on theories like these, as we have done with Darwin's viewpoint on survival. DNA gathered from the bones of a Neanderthal baby who died 29,000 years ago further points us in a direction of Neanderthals being our cousins rather than ancestors. Similar to the offspring of a horse and a donkey [18].

The human being hasn't virtually changed for 200,000 years. A rapid change occurred in our DNA 200,000 years ago when the *anatomically modern human* with an advanced brain appeared on Earth. A species that differentiated by miles from most other animals due to their innate capabilities of sympathy, empathy, deep intuition, self-regulating ability to control emotions, physical health, self-healing, and manipulation of immune function. A growing number of scientists call these abilities beyond what would be possible to be created through evolution alone as we know it.

Basing human history upon insignificance and competition blindly without considering any other possibilities gives the consequence of contributing to a more violent and competitive society, where a negatively based global consciousness is destined to be the norm. This current global consciousness is driven

by fear, violence, greed, and competition. Part of the consequence of this state is the foundation for a world living in mental states of survival, commonly known as stress, anxiety, and depression. There is increasingly only right and wrong. You opinion or mine. It's either left or right, black, or white, good, or bad.

Individuals not sharing the same ideological opinion has no middle ground. There's no longer space for discussion and compromising, instead we are shaming people not sharing the same ideas as ourselves. Maybe part of the reason is found in an old theory that once came to life. Harmless and based on subjective thoughts. But consistent enough to shape future societies in the survival of the fittest. I propose that we instead acknowledge that nature is fundamentally based upon collaboration and symbiotic relationships for survival and the passing on of strong genes.

A complex relationship across of species is known as *symbiosis*. Here, different types of species live or cooperate together to benefit from each other's shelter and protection to achieve a beneficial outcome for both. We see this relationship everywhere in nature across of a variety of species from the bacteria in our own digestive system helping our bodies to break down food molecules into useable fuel to the African oxpecker that feed on the backs of zebras, elephants or hippopotamuses by sucking blood out of open tick-wounds, and to the tarantula that lives in symbiotic harmony with the frog, where the frog protects the eggs of the spider in exchange for the spider's shielding and protection.

Mycelium is the enormous underground network of fungi, which is a vast system that connects the fungi and let them interact and communicate with one another as the underground system of trees in symbiotic relationship with microorganisms in the soil for interaction and nutrient exchange. Trees give carbon to the fungi in the form of sugar and in return fungi give the trees essential minerals such as nitrogen and phosphorus.

On all levels, our entire universe is governed by these networks and mutualistic relationships. It is not any different for humans, not even in our physical bodies. From the internal structures that binds us together in an interconnecting system of brain and motor function, nervous system and organs transmitting signals and information back and forth in a continuous loop, to the external systems of vastly connected networks of fascia enclosing the body and connecting all elements of the entire body.

As the Greek philosopher Plato once stated: "This world is indeed a living being endowed with a soul and intelligence. A single visible living entity containing all other living entities, which by their nature are all related."

Just like Darwin taught us that we are a species dependent upon competition, modern science is teaching us that we are separated entities merely made of meat and blood with a temporary sensation of consciousness that governs a materialistic existence unable to affect one another or the space that surrounds us. Quantum physics, on the other hand, are the laws that bridge science with spirituality and teach us a fundamentally other reality.

One of the strangest aspects of quantum physics is what is known as *entanglement*. Entanglement is the concept that describes that once something begins as a whole, it will forever be connected. Even if separated, it will always stay connected energetically. If observing one particle in one place, another particle - even if light-years away — will instantly change its properties, as if the two were connected by a mysterious

communication channel. Albert Einstein called this phenomenon *spooky action at a distance*.

Back in the 20th century scientists performed an experiment in which a photon got split in two. Photons are particles that exists in the human body. Here, these photons were separated by such a large distance that they had no chance of interacting with each other in any way. In one of the photons, they continuously exposed it to different stimuli. Much to their surprise, these stimuli resulted in the separated photon reacting in the exact same way as the photon that was exposed to the stimuli. This ended up becoming a groundbreaking experiment for quantum physics indicating that matter can be energetically connected although physically separated [11].

One can say that once something begins as a whole, it will forever be connected. These are the fundamental concepts behind quantum physics; our new way of perceiving reality, which is a different reality to the Newtonian science that has governed our understanding since the 17th century. Whether the human being is pure chemistry, flesh and blood or it in fact is made up of energy only to appear physical, like everything else in its reality, with a higher electrical potential than what is acknowledged, it is actually a big deal whether we choose to continue to purely treat it with drugs to change it chemistry or whether treating the body more from an energetically and emotionally perspective will provide us with more efficient solutions to our problems without the hazardous side effects on our physical bodies.

The human body and Earth share several similarities with each other. The human body is a bioelectrical entity; an entity which numerous ancient cultures considered containing a magnetic field with meridians covering the entire body. Some cultures defined this energy as kundalini, some as Qi and some as prana. The Buddhists called the energy fields the seven Chakras. No matter the term, our ancestors have practiced the manipulation of this energy system for millennia. Not by the utilization of chemical drugs, but by the force of the human body itself.

The Earth shares the same electromagnetic field, which is the same force that causes a compass needle to orient in a North-South direction, and that is used by birds and fish for navigation. When pulsating out, this natural heartbeat of Mother Earth becomes a frequency of 7.83 Hz, also known as the “Schumann Resonance”[12]. What’s both magnificent and mysterious is the fact that ancient monuments around the earth are placed with such precision and similarity to one another that when being mapped and linked together by dots and lines, they create a pattern of similar appearance that the meridians do on the human body, like an energy grid mapping the electromagnetic potential of the Earth.

A Forgotten History

Comprehending the true nature of reality can be difficult due to our limitation of language. Philosophy and religion across the world have provided us with mythology and histories that cover the secrets of life through symbolism and art. Every religion, every ancient philosopher or culture share the same messages and the same stories, which show up in cultures that supposedly had no contact with one another due to distance, geography, and time.

So, who are we and where do we come from? That is the most important question to make and seek answer to. Because, without knowledge of the past, we are unable to create a desirable future for humanity.

And if the stories we are told about our past are not true, then we are designing a future that does not fit the human species. A future divorced from nature, dependent upon materialism, with technology and AI as the foundation that governs our world.

Back in 1992, the American lecturer John Anthony West argued that the famous, ancient civilization of Egypt was much older than what we are led to believe. This was based on the idea that the body of the Great Sphinx shows clear signs of water erosion rather than wind erosion. Since Giza is, as has been for at least 10,000 years, a dry land without significant rainfalls, this would at least indicate that this site, and the civilization who built it, is much older than we think[13].

The Egyptian civilization further possessed a profound knowledge of astronomy, a sophisticated system of encoding knowledge, and highly advanced architectural techniques shown by having built earthquake proof pyramids with blocks aligned to perfection thousands of years before even the metric system was invented. These ancient cultures also seemed to have been seafarers and had spread their knowledge across the oceans long before Columbus's voyage, which reflects on the astonishment and similarities between several ancient sites spread all over the world.

It's also essential to emphasize that if the pyramids of Giza existed at 10,500 BC, they would be perfectly aligned with the star constellation known as Orion's Belt. And when I say perfectly aligned, I mean perfectly aligned. If this was the case, it would be difficult to imagine it as being pure coincidence. This would make brilliant sense since the Egyptian Books of the Dead talk of the need for the soul to ascend a ladder reaching to Orion.

Since John Anthony West's discoveries, many geologists and archeologists have followed his footsteps and made further intensive research theorizing, based on decades of study, that the current dating of several ancient sites should be thousands of years older than we are told. That the great pyramid of Giza and the Sphinx are not 4,500, but at least 12,000 years old.

Many things are pointing in a direction of an ancient civilization in the distant past leaving markers and clear messages in form of hieroglyphics, art and several various ancient sites spread out over the globe for the later generations to discover. And since shaping the future is based upon understating our past, the decoding of our true ancestral history is paramount for the optimum evolution of Man.



The pyramids of Giza and the Sphinx are far from the only mysterious places on Earth that provides us with a blurred picture of our past and ancestors.

More than 12,000 kilometers away from Giza, an ancient site in Teotihuacan, Mexico, a pyramid almost identical to the one in Giza is placed intricately aligned to the positions of the stars and the cardinal directions with so strong interconnections, that the likelihood that they occurred independently of each other is close to zero[14].

On Easter Island, a tiny island in the Pacific Ocean several statues of bodies with carved faces, called the Moai, are lined up at the coast of the island each weighing an average of 14 tons and are four meters in height. Completely isolated from the rest of the world with 3,700 kilometers to the nearest coast, it should be considered impossible that these statues were transported from elsewhere.

From the ground of Peru's west coast, the Nazca Lines would seem everything but spectacular to the naked eye. However, ascending from ground level observing the lines from above, such as in an aircraft, leaves the observer with astonishment of the lines. Enormous figures of everything from birds to spiders, monkeys and other various animals and motives gives us a wonder of why and how these gigantic, figures were made and why you are only able to make sense of the full figure by seeing them from the sky.

Ground Yourself

We are a species with amnesia that don't know where we come from and where we are heading.

We have created a culture divorced from nature, living in enormous cities house by house with no space, no plants, and no clean water. Cities with noise pollution from traffic that produces the air pollution we chronically inhale as well as the light pollution that lights up the earth day and night inhibiting our natural circadian rhythms to function optimally and prevents us from perceiving the stars in the sky.

We cover ourselves up with layers of clothing because we now view the cold as hostile and use shoes and socks in every circumstance distancing us from the energy of Earth and the soil, which we are deeply connected to.

Grounding, or Earthing, is another natural-occurring mechanism that shows how deeply connected we are to Earth. Luckily, it's a mechanism getting increasingly more attention, and research in the field is expanding. Research has revealed that when this vital energy is transferred from the Earth and into the human body, it creates an uplifting shift in the physiology of the human being, which promotes health, vitality, and better sleep. It also harmonizes the biological rhythms in the body, such as the circadian rhythm, wound healing, and recovery, including a reduction in chronic inflammation and pain.

Consider planet Earth as a huge battery becoming replenished by the sun and its radiation. And like a battery in a car that keeps the car functioning, the same does the battery of the Earth with its rhythmic pulsation of natural energy flowing and emanating from the surface of the Earth to balance all life on the land, in the sea and in the sky. This includes both people, animals, plants, trees, bugs, bacteria, and viruses.

As earlier mentioned, the Earth and humans share a vast number of similarities as if we were the same species. Just like a mother sharing similarities and a special bond with her child. Some of these similarities are our bioelectrical nature and the energetic connection we share with Mother Earth.

Our ancestors hunted and walked barefooted unless they were wearing shoes made from animal skin that only shielded a limited portion of the foot's contact with Earth. They slept directly on the ground, which provided their whole bodies with the ground's abundant free electrons. Through this mechanism, every part of the body could equilibrate with the electrical potential of the Earth, thereby stabilizing the electrical environment of all organs, tissues, and cells [15].

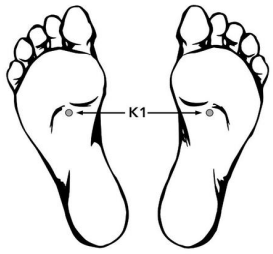


Fig. 1.3 Acupuncture point K1 in traditional Chinese medicine.

In acupuncture, the first part of the kidney meridian is named Kidney 1 or K1 and is located just below the ball of the foot as illustrated in figure 1.3. This is a major entryway of what's called Qi in Chinese medicine, and the first part of a meridian that also connects with the urinary bladder meridian and reaches many of the most important organs in the human body, including the liver, diaphragm, heart, lungs, and brain. According to Chinese medicine, the acupuncture point K1 helps prevent headaches, dizziness, pharyngitis, laryngitis, replenishes the kidneys and liver, and finally enriches the Yin. Yin is the flow of energy from down and upwards—the opposite of Yang. Exactly the same flow direction that Grounding creates when the foot comes in connection with the Earth [16].

As an electrical being occupying an electrical planet, our trillions of cells are constantly transmitting and receiving energy through biochemical reactions. Movement of water and nutrients into our cells is regulated by electrical fields. Both our hearts, brains, nervous systems, muscles, and immune systems are examples of electrical subsystems operating within our bioelectrical bodies.

Not only do these natural occurring effects benefit the regular individual. Even athletes that operate at the most intense level of physical performance may benefit tremendously from the gifts that Earth provides us with.

An experiment was done by a cycling team of the Tour de France to study the effects of their athletes when utilizing Grounding as a tool for recovery. Tour de France is one of the most, if not the most, challenging competition that puts the cyclist under extreme physical and mental stress during its three-week duration, which often causes sickness, tendonitis, and poor sleep, and further affects and limits their wound healing phases.

During the experiment [17], the cyclists were grounded after each of their daily races instead of their normal procedures. After the new recovery procedures with Grounding the cyclists reported better sleep, and the research showed a significant drop in illness, almost no tendonitis, accelerated recovery and faster wound healing of injuries. Today Grounding is used in a wide range of sports, including NFL, swimming, triathlon

among others.

In electricity, all electrical systems are "grounded" and stabilized by the electrical energy of the surface of the Earth. Without a ground, these systems would not work properly. Similarly, when the human body is connected to the Earth, it receives an electrical signal that stabilizes its many biological systems and mechanisms.

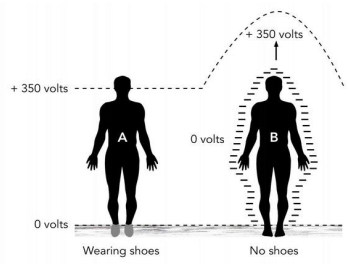


Fig. 1.4 shows the protective effect of grounding against environmental electrical fields, which can be called *the Umbrella Effect.*

The natural surface of Earth has an abundance of electrons, which gives a negative charge. If you are standing outside on a clear day, wearing shoes, or standing on another 'artificial' surface that disengages your contact with Earth, there is an electrical charge of some 350 volts between the Earth and the top of your head. When standing outside barefooted and being grounded, the whole body is in electrical contact with the Earth's surface, since your skin and the Earth's surface creates a continuous charge surface with the same electrical potential, hence the charged area get pushed up and away from your head when grounded. Any object in direct contact with the Earth creates this protective shielding effect of the Earth's natural electrical field [18].

The possible benefits of Grounding include improvement in inflammation-related disorders, reduction or elimination of chronic pain, improved sleep, increased energy, less stress hormones, improved nervous system response, stabilization of biological rhythms, thinner blood and improved blood pressure, relief of muscle tension and headaches, lessened hormonal and menstrual symptoms, accelerated healing and recovery and protection against harmful EMFs and other types of pollution that emits positively charged ions.

EMFs contribute to an abundance of these positively charged ions. The same ions that are present in traffic pollution, dust, cigarette smoke, radiation, electricity, etc. Excess exposure to positive ions is linked to disease, aging and impaired immune function. Short-term, exposure may give you a feeling of headaches, irritation, tension, and dizziness. We therefore need exposure to negative ions, also to counteract this harmful

abundance very present in modern culture. Nature has an overflow of negative ions. These are emitted near waterfalls, natural spring, the surface of the Earth, which is the mechanism behind Grounding, but also during thunderstorms and in the woods. They therefore protect us against the hazardous EMFs and give a sensation of joy and energy. This is part of the reason why you feel joyful after being in nature, walking on the beach or in any way being in contact with an abundance of negatively charged ions.

Today we barely touch the earth, neither with our hands or our feet. This tendency can be a contributor to physiological dysfunction and unwellness as well as poor sleep and increased pain. Grounding is the scientific proof that human beings are deeply connected to our home and is yet another example of the innate trade and communication system that connects all organisms on the planet. Yet, we are buying bigger and larger beds in even taller apartments removing us farther away from earth. This principle of Grounding not only applies to the feet, but for the entire body.

Finally, we have made the sun our enemy, while the fact that we are only alive because of the sun, should make it our best friend. However, we use sunglasses in every circumstance to avoid the sharp, yet natural light rays from the sun while covering up in sunscreen to not get sun burned. While the purpose of sunscreen is a good thing, many sunscreens contain chemicals that are linked to cancer [19] [20]; the same thing that is tried to become avoided by wearing it. Instead, skin health and skin resilience can be built by good diet, where a key factor to not getting a burn is to alternate between the sun and the shadow, while consuming adequate amounts of micronutrients that are beneficial to your skin health. This includes natural occurring vitamin D that comes from real foods and not synthetically created [21].

The skin is the surface organ of our bodies; the external organ that absorbs what it gets exposed to. When using sunscreen, we may not only prevent the vitamin D from getting absorbed through the skin, but we also allow the skin to instead absorb the potential hazardous chemicals contained in the sunscreen. This happens while we shield our eye neurons from receiving the natural occurring light the sun provides, which contributes to regulating our circadian rhythm and the melatonin cycle that is a byproduct our biological clock responding to daylight. This will of course be covered in much greater detail later in the book.

The first step of unleashing our full potential as human beings and evolve as a species rather than devolve, is to reverse the shielding culture we are about to create and reconnect to our Earth instead of perceiving these varieties of natural forces as hostile.

II. KEY NUTRITION

For millennia food has been synonymous with health. Most living organisms are relying on food as fuel like the gas that make the car drive. Food was once considered being medicine since we were utilizing its healing properties to prevent and cure illnesses. Today, it's more appropriate to consider a large portion of our food industry as poison. The exact opposite of the healing force we once considered it to be.

There's a direct correlation between poverty and poor health. Few people can't afford candy, chocolate, chips, fast-food and alcohol, which feeds the sugar industry and, in the end, the pharmaceutical industry. The cost of groceries doubles or triples if you want natural, organic grown foods. And really, we need to be properly educated to navigate in this world when considering soil quality, animal welfare and clean drinking water.

In 2018, an estimated 8.6 percent of the world's population was living in extreme poverty, and if you make more than $34,000 a year, you're among the world's richest [22].

Each year, two million children die from preventable diseases because families can't afford treatment. Three out of every ten people live without safe and sanitary drinking water, and globally there are around two billion adults overweight, which equates to 39% of all adults over 18 being overweight [23].

When we think about health today, it's primarily revolving around nutrition and physical activity, which has created a culture relying on one magical diet after the other, quick fixes, and training routines that may cause more harm than it benefits.

What we tend to forget it, that these are a few branches on an exceptionally large tree. We need to consider health on a much larger scale.

The quality of our soil is worse than ever, toxifying every organism that grows and thrives in it. Sugar has

become our reward of finishing an exhausting workday. This inappropriate habit has since become a normalized solution, even for our children. We've become dependent upon caffeine to get out of bed in the morning and additional caffeine throughout the rest of the day to keep our eyes opened. Alcohol has become the accepted drug to calm us down and make us forget the things we don't want to accept and has become the source many rely on to fall asleep at night.

If you live for 90 years, you spend roughly 30 of them asleep. It's a third of our entire lifetime that is spend in bed. This knowledge alone emphasizes the utter importance of proper sleep as the foundation of human health. This essential component of human health will be discussed in depth in the last chapter.

So, if you seek true health, seek beyond nutrition and physical activity. As long as sugar is a business, as long as alcohol is a business, and as long as the pharmaceutical industry is a business, the public will never know what true health is. It will be up to the individual to seek knowledge and educate oneself to live a long life without disease, which, in fact, every human being should be capable of.

A leading 19th century nutritionist, Atwater, once wrote: "In our practice of eating, we are apt to be influenced too much by taste [and] the dictates of the palate; we are prone to let natural instinct be overruled by acquired appetite. We need to observe our diet and regulate appetite by reason. In doing so, we may be greatly aided by the knowledge of what our food contains and how it serves its purpose in nutrition." Today we are facing an obesity pandemic, which is causing a dramatic rise in chronic age-related diseases. In fact, individuals who are overweight are now outnumbering those that are undernourished.

Modern day's nutritionists tend to be much more concerned about calories in and out, rather than the nutritional quality of what we are eating. Apart from the quality of what we are putting into our bodies, quantity does also play a role since caloric restriction typically seems to delay diseases of aging and extends lifespan. But this mechanism presupposes that the nutritional quality is also optimal. No matter if in yeast or mammals, a reduction in calories by 30-40 percent trigger genes that evolved to protect the organism during times of food scarcity. These are the longevity genes. Oppositely, excessive intake of food is negatively correlated with longevity.

Sirtuins are proteins that function to maintain an organism's homeostasis and secure its survival when exposed to internal or external threats, and seem to play an important role in obesity, metabolic syndrome, diabetes, cancer, inflammation, and cardiovascular disease. One of these proteins are called SIRT1, which is a key regulator of energy homeostasis and metabolism via. two factors known as PGC-1α and HIF-1α[24]. I don't expect you to know these but know they are possibly responsible for many of the health benefits that come from proper nutrition and exercise.

Another main function of PGC-1α involves another innate survival trait, which is non-shivering thermogenesis; a mechanism which replaces the immediate response to cold in shivering with a mechanism that instead produces heat directly through the recruitment of mitochondria.

It seems that humans evolved through their evolutionary journey to cope with seasonally cold temperatures and periods of food scarcity. Cold exposure and fasting may therefore serve as resilience providing stress factors taught to us by evolution to increase our chances of survival.

Up until the 20th century, winter was characterized by long and dark nights without artificial light and cooler sleeping conditions. Today, we understand cooling down core body temperature and darkness are critical for optimal sleep. Much of the mechanisms allowing winter adaptation for cool environments are overlapping the metabolic mechanisms involved in adaptation to calorie scarcity, since sleeping in cool environments in absence of artificial light and warmth may work synergistically to promote conservation of valuable calories during seasons where they might have been difficult to collect.

It appears that we have evolved to counteract our natural biological mechanisms of caloric restriction and cold stress into an abundance of food, comfort, and excess warmth. In nature, animals do not aim to participate in high levels of physical activity as we do today to seek health, unless it supports their chances of survival. Available calories are limited, why they conserve activity. In fact, the main factors that influence their energy expenditure are body mass and ambient temperature, not activity. So, the whole idea of defining health as intense physical activity and quantity of calories, rather than quality, is an obscured idea we have developed.

Hippocrates once wrote, “We must consider [whether] food is to be given once or twice a day, in greater or smaller quantities, and at intervals. Something must be conceded to habit, to season, to country and to age.”

Exploring and knowing the origin of our animal life and crops is essential in the uncovering of the most efficient and natural human diet. Before today’s agricultural era we adapted to only eat what was available from location and season. Today most food sources from various continents and climates are easily available.

One can raise the question that if how and what we ate was sufficient once, wouldn’t it still be that way. Here the matter of adaptation must be considered. The evolutionary history of man is characterized by significant dietary changes, which includes the introduction of meat eating, cooking foods, and the domesticating of plants and animals into a new era of agriculture. This evolution has brought forth many changes that can be described as adaptive forces, which is a prime survival force of the human species, and species in general. Be aware that the force of adaptation does not necessarily mean progression, health, and strength. Adaptation can move in the other direction as well, as we see many examples of in modern industrialized society.



We faced both anatomical and cultural changes due to the adaptations in human diet.

One of the traits that separates monkey from man is posture. The ability to walk upright with a straight spine. This ability is a huge advantage in terms of hunting and travelling. With an anatomy of the modern human being, it costs way less energy to travel longer distances in order to gather and collect food or to hunt a prey for longer distances.

The first sign of a similar ancestor to the modern human appeared around 1.9 million years ago in the form of *Homo erectus*, that were known for hunting and gathering meat and edible plants. Anatomically modern humans, or what's known as *homo sapiens*, appeared in Africa some 200,000 years ago [21] and seemed to have rapidly and significantly changed behavior and intelligence, and looked like no other species on the planet, although we like to draw parallels to the monkeys. In fact, we haven't changed much overall since.

When the last ice age ended some 12,000 years ago, a new era of agriculture amerced. Farming and domestication of plants and animals meant less hunting. The animal and plant domestication provided a significant change in the human diet, and although it became easier to consume more calories, agriculture was not necessarily a positive change in evolution. Our bodies are currently struggling to keep pace with the speed of social change, which is caused by the conflict between modern life and prehistoric bodies. One of these issues are recognized in today's society by wisdom teeth not fitting into the human mouth, due to a lack of proper stimulation of the jaw.

As a result of becoming smarter and learning new tools, such as lightening a fire to cook meat to better process it, our brains have expanded in size. As positive as this might sound, the lower part of our heads then decreased in size. Our lower facial bones, such as the jaw including our teeth have become smaller.

Becoming able to cook the food forced us to chew less as the raw food now became softer and easier to chew and digest. Furthermore, cooking our food seems to have been contributed to a decrease in our gut size, which suggests an improvement in the dietary quality.

Humans seem to innately eat by instinct. From the early days more than 1.7 million years ago, when we didn't know how to control a fire, we ate what was available and what would contribute to keeping us alive. Then cooking became possible and the digestion of meat was now more accessible, suggesting a diet that was general and mixed rather than specialized on one food component. Today, we have all choices and no longer eat by instinct. We can afford to be picky.

This has led to a new chapter in human history of devolution rather than evolution where our nutritious habits, breathing habits and day-to-day environment have made us more compressed and constricted than ever, which has brought forth a wide variety of lifestyle diseases and other defects.

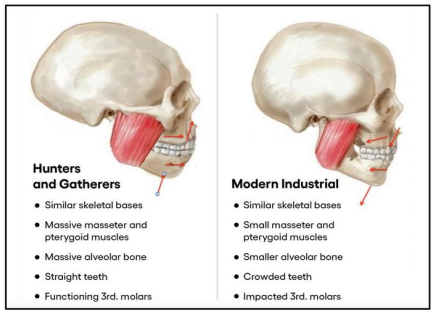


Fig. 3.1 The anatomical changes caused by evolutionary adaptative factors from the hunters and gatherers to the modern industrial human. Illustration courtesy: Dr. Kevin Boyd.

Need For Meat?

In the beginning of the 20th century, the Canadian dentist Dr. Weston A. Price did extensive studies on various indigenous tribes, who he each followed over periods of time and analyzed in detail their diets, dental health, overall health, and their rituals. The most noteworthy detail about these tribes was that they were lived isolated in abundance with nature and cut off from western society and modern culture.

Dr. Price's discoveries led him to the indication that processed food is often stripped of nutrients, why we should completely avoid eating these. Instead, real health would be found in foods that are whole, natural, unprocessed, and locally sourced in order to provide the body with the most minerals and vitamins

essential to maintaining a healthy body and strong teeth.

Based on the indigenous tribes' diets he proposed that we should include way more animal organs, particularly liver, as they store vital fat-soluble vitamins as well as the marrow from bones, the eggs from birds, and fish, etc.

Dr. Price worked with tribes from several continents of the world and repeatedly came to the same conclusions across of these tribes: they ate mainly animal foods. Organic, wild animals and not just their muscle meat, but instead many parts of the animal, including their blood. One of these tribes were the African Maasai, known for jumping extremely high, being extraordinarily strong, and growing taller than six feet in height. They ate no plant foods at all, only beef, raw milk, organ meats and the animal's blood because of its high minerals contains.

Another tribe he studied was the Swiss. They were eating mainly dairy, such as raw butter, raw milk, raw cheese, whole grains, and oat porridge, while only consuming meat on weekends. He observed little tooth decay and not a single sign of tuberculosis or any other disease [26]. When the children grew older and left the tribe to study in other cities for three or four years, they all came back with tooth decay and other diseases because they were introduced to refined foods outside of their community.

The North American Indian tribe's diet consisted almost entirely of their wild animal prey. They had superb health, no heart disease or high cholesterol and no tooth decay even though they only ate animals, and red meat in particular. When they began trading foods, such as refined sugar, with other communities, they started developing diseases like tuberculosis [27].

The diet of the Western world is largely made up of processed, inorganic foods, which are often almost completely stripped of their nutrients. As a result, we will have to consume more than 20 one-pound jars of marmalade to fulfill our required daily intake of phosphorus. This would amount to 20,000 calories, far higher than our recommended daily allowance. We are not able to absorb as many of the minerals from processed, inorganic foods as we are from natural, organic foods.

And unlike the food of the indigenous tribes, processed food doesn't contain enough fat-soluble vitamins, such as vitamin D and A, which is required to prevent tooth decay.

When looking at your supermarket receipt, notice how many of your items are locally produced. Often, it's very few, and most of us buy products that are transported from the other side of the world of where we live, meaning that the nutrient value of the source has declined since it was harvested.

Even without help from dentists and toothbrushes, these people lived by diets in its natural form providing them with massive health benefits and healthy teeth into old age. This natural byproduct was, among others, due to the high content of minerals that generated saliva, which hardens the teeth and protects against bacteria responsible for tooth decay.



Fig. 3.2 Isolated communities who lived on what is considered primitive diets had near perfect health. Rates of caries were close to zero, and modern diseases were rare. The pictures show a sample of indigenous people from various locations around the world. © Price-Pottenger Nutrition Foundation, Inc. All rights reserved.

Another benefit of their diets was that their bodies and organs were strong and resilient to illness. Ancient skulls found in the Andes and in France further showed that almost all had excellent teeth, and few had tooth decay.

Although, it's important for me to underline those plants that may contain nutrients that can be essential to some populations or type of individuals. However, it would seem difficult to sustain solely on vegetables, since the essential benefits of, for example, sufficient vitamin D levels in a bioavailable form, is only provided in animal products. This also includes vitamin B's and Zinc among others. But what if it what the other way around, and you were living on a carnivore diet, which is characterized by only consuming meat or animal products? In this case, vitamin C could be one that would need conscious consideration. However, eating a nose-to-tail diet, the same way our ancestors and contemporary indigenous tribes are known for, will provide you with an adequate amount of vitamin C.

Eating nose-to-tail means eating every single part of the animal, including testicles, blood, bone marrow, etc. This diet is not only beneficial for the environment, but also highly nourishing. Common on the menu in several ancient cultures was organ meat.

Liver, in particular, was popular among these tribes and cultures, and is extremely nutrient-dense containing both vitamin A, B_2, B_9, B_{12}, Iron and Copper. In fact, beef liver is rich in almost all micronutrients. Today, it's recognized as a very potent superfood. Which — by the way — presupposes that the liver should originate from an organic, grass-fed animal, like any other piece of meat should. Organ meats, and animal foods in general, can be extremely nutritious and essential for good health. But if oppositely the animal has lived under poor conditions, been medicated, and fed with foods that don't resemble their natural way of eating, the meat might harm more than do good.

One of the main thoughts revolving in my mind is whether there is an optimal diet for us; a way we

were designed to eat based on our geographical location on Earth. Turning it to a public discussion, it tends to end up in two opposing groups with political biases rather than rationale, similar to the social warfare induced during an American election.

So, I decided to create the table above to make an attempt to figure out whether it - from a nutritional standpoint - is possible to exclude one type of food from the diet and sustain solely on the other. I chose the most micronutrient animal source and compared it to three of the most micronutrient plant sources and marked the box of which the value was highest.

Per 100 grams	**Broccoli**	**Spinach**	**Kale**	**Beef liver**
Vitamin A	186.9 mcg	843.9 mcg	4612.8 mcg	5069.7 mcg
Thiamin (B1)	0.1 mg	0.1 mg	0.1 mg	0.2 mg
Riboflavin (B2)	0.1 mg	0.2 mg	0.1 mg	2.8 mg
Niacin (B3)	0.6 mg	0.7 mg	1 mg	13.2 mg
Vitamin B6	0.2 mg	0.2 mg	0.3 mg	1.1 mg
Biotin (B7)	1.1 mcg	1 mcg	0	42 mcg
Folate (B9)	63 mcg	194 mcg	29 mcg	290 mcg
Vitamin B12	0	0	0	59.3 mcg
Vitamin C	89.2 mg	28.1 mg	120 mg	26.3 mg
Vitamin D	~	~	~	4.8 mcg
Vitamin E	0.8 mg	2 mg	~	0.4 mg
Vitamin K	102 mcg	483 mcg	817 mcg	106 mcg
Calcium	47 mg	99 mg	135 mg	5 mg
Choline	18.7 mg	18 mg	~	333 mg
Copper	0	0.1 mg	0.3 mg	9.8 mg
Iron	0.7 mg	2.7 mg	1.7 mg	4.9 mg
Magnesium	21 mg	79 mg	34 mg	18 mg
Phosphorous	66 mg	49 mg	56 mg	387 mg
Potassium	316 mg	558 mg	447 mg	313 mg
Selenium	2.5 mcg	1 mcg	0.9 mcg	39.7 mcg
Zinc	0.4 mg	0.5 mg	0.4 mg	4 mg

Table 3.1 A comparison between three of the most nutrient-dense foods from the plant kingdom and one from the animal kingdom.

Almost no matter what plant source I typed in; beef liver remained the winner of the particular micronutrient. This not only applies to liver, but animal foods in general as they — from a purely objective perspective — can provide all your necessary nutrients in more bioavailable form (meaning more easily absorbed); especially when eating nose-to-tail of an animal that has lived a joyful life. The few values beef liver was missing was able to be found in other animal sources as explained above, whereas some sources, such as

vitamin B^{12} and D is incredibly difficult to find in the plant kingdom.

For plants to match the nutritional value of, say, beef liver, the quantity needed to be consumed would be unrealistically high levels. When micronutrient levels are higher, the necessary consumption of that food source will therefore be lower in order to meet the nutritional needs. Based on this information, I find an animal-based diet much more sustainable in terms of individual health - if definitively having to create a dividing line between the plant and animal kingdom. For this reason, there is a chance that our ancestors may have been able to thrive primarily on animal foods since the effort-reward balance would be much more efficient in terms of covering the nutritional needs for a community of people merely by taking down a single animal.

At least, this was how the Eskimo's survived with severe plant scarcity. And no — they wouldn't have died from cancer, clogged arteries or heart attacks caused by the great intake of cholesterol and saturated fat, because these are simply essential sources of the human diet. Cholesterol consumption is not directly correlated to cholesterol levels in the body. In fact, cholesterol helps defending the body in a variety of ways, including damage repair, creation of steroid hormones, cognitive function and lastly highly responsible for your sex hormones. So, imagine what happens when cutting cholesterol completely out of your diet. The low-fat, low-cholesterol recommendation was originally intended for adult at risk of heart disease. Today it's recommended to everyone. And a low-fat diet is just as bad; especially if you believe it will make you healthier or lose weight. Saturated fat is important for the function of the brain, heart, kidney, lungs, and hormonal production, and supports healthy growth and development. Your cells need that fat. If wanting to lose weight, there may in fact not be a better option than going high-fat low-carb.

Official nutritional guidelines today endorse meat consumption to be as little as 350 grams per week, is the same as recommending people to be stripped of essential nutrients on global scale. I'm not anti-vegetables by nature, just the way we politically are pushing society towards a vegetarian-dominated diet seems ridiculously unsustainable in terms of being able to cover essential parameters of micronutrients.

It is estimated that around 88% of the Westernized population currently have a form of metabolic disease, pre-diabetes, and insulin resistance. In short, we are not progressing in providing the optimal health information to the public. And why is that? There are more reasons than can be counted on 50 hands.

What if I told you that plants don't want to be eaten? We all know that you should be cautious with picking up any type of mushroom from the woods. Choosing the wrong sort may be fatal for you. Or onion that instantly, when cut open, burst out a chemical called syn-Propanethial-S-oxide that makes every grown man cry.

Would you be surprised to know that most plants and vegetables share a similar chemical attack, that may not be as acutely damaging, but instead cause troubles over the course of years of ingestion? When humans and animals are facing danger, they are intelligently designed to respond through a fight/flight response in their nervous system to help them ward off the danger. They sure as hell don't want to be eaten. But what about plants? A life form more vulnerable to being attacked by predators. Herbivores (plant-eating animals) are a threat for plants as they destroy the vegetative and generative parts of the plant. As a defense mechanism, plants have developed chemical defense to survive in their ecosystem, similar to that of a human being or animal responding using the fight/flight system. Through this chemical defense mechanism, low

molecular weight compounds such as alkaloids, terpenes, glucosinolates or cyanogenic glucosides, act to repel the potential predator of the animal to cause it harm upon ingestion [28]. Because of frequent confrontation and nutrients vital for survival in the animal kingdom, some animals have developed an efficient cyanide detoxification mechanism to shield off the chemical defense mechanism in plants. Animals such as moose and other grazers have developed enzymes in their saliva that deactivate plant toxins from causing harm [29].

However, humans haven't adapted to this mechanism the same way. Cyanide toxicity causes harm to cellular metabolism and vasoconstriction of main arteries which may lead to cardiac shock in vertebrates, whereas even small doses of exposure in insects result in immediate paralysis of the animals by reduced respiration.

Even more, when plants are stressed or damaged — such as during a pest attack — they may greatly increase their natural pesticide levels, occasionally to levels that can be acutely toxic to humans [30]. Estimations suggest that typical Americans eat about 1.5 g of natural pesticides per day, which is about 10,000 times more than they eat of synthetic pesticide residues from inorganic plant cultivation. Some examples are coffee containing neochlorogenic acid, chlorogenic acid and caffeic acid, whereas lectins, oxalate, phenolics, flavonoids, and glucosinolates from other plants contribute to several hundred milligrams of toxins. Some of these sinners are leafy greens such as broccoli, and kale containing oxalates. Others are spinach, potato, tomato, legumes, beans, nuts, seeds, whole wheat, brown rice, and corn. Some of the plants lowest in toxins (defense chemicals) are fruits, berries, and non-sweet fruits such as avocado, olives and squash [31].

The bottom line is eating too many (and the wrong) plants may wreak havoc on biological processes in your body. Contrary to the mainstream belief that we — oppositely — should live primarily by plants. Instead, this could contribute to digestive problems, autoimmune diseases, hormonal imbalance, and inflammation. This mechanism is especially applicable when the toxic plants are not cooked before ingested.

I remember my teacher in Eastern Medicine, back in the day, used to teach us that one of the main practices of Chinese Medicine in terms of their nutritional habits was that vegetables should always be lightly prepared. Not much, but definitely not eaten raw, as we so stupidly did here in the West. Which is funny, because every single summer, when the Danish traditions of eating raw summer salads begin, my own tradition begins of sprinting to the toilet after every dinner caused by a severe diarrhea, that I was aware came from me eating raw vegetables; I had no idea that the diarrhea was a bad thing. But of course, it is.

Plants are highly intelligent, and they don't want to be eaten. The same way that humans and animals don't want to be eaten. Defense mechanisms are embedded in all life forms on Earth; it is an innate survival trait necessary for life to evolve.

So where does it leave us? Does it mean that vegetables are bad for us? No, not necessarily. Especially when eating those that are lowest is toxins. But living on a vegan diet, where food intake solely revolves around vegetables in the high toxicity scale, is from my perspective unsustainable.

Over the last 250 years, our skulls have morphed in dangerous and troubling ways.

Skeletal remains show that less than 300 years ago, it was common for humans to have straight, aligned teeth, wide jaws, flat palates, and large nasal passages which are signs of healthy breathing patterns.

There is a rapid decline in the development of the mandible structure of modern man compared to the structure of ancient skulls. This change seems to be caused by societal habits which happen from the beginning of a child's life with the widespread adoption of bottle feeding, processed foods, and an early inability and lack of focus on breathing through the nose. Today, our palates are narrowing in, our jaws have become short, and backward grown with insufficient space to properly fit all teeth. We see this more commonly than ever with an epidemiology in braces in children and crooked teeth that don't know how to fit into a mouth decreasing in size. This evolution results in a domino effect of health-related issues. When our facial structure decreases in size, our necks and jaw become compressed, our airways become constricted, and we end up breathing involuntarily through the mouth.

This compromised airway may further lead to snoring, or worse, sleep apnea, where you're literally stopping breathing on and off through the night. Bad breathing and sleeping may harm the individual, especially in the developing years of a child to cause behavioral changes, headaches, allergies, asthma, anxiety, and cognitive issues.

Humans draw 28,000 breaths each day and sleep for one-third of our life. Changing our postural structure, diet, sleeping and breathing habits can transform our physical and mental health. It all begins in our skull, which shapes the path of each breath. How breathing has become a critical distortion today and how to change it for yourself and future generations will be discussed in the next chapter.

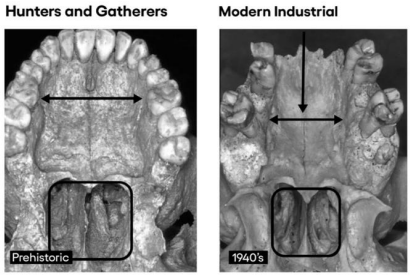


Fig. 3.3 The comparison in the structure of the mouth between our ancestors and modern human beings. First picture shows a wider palate, aligned teeth, and opened cavities. Picture two shows a compressed palate too little to fit all teeth and constricted cavities. Illustration courtesy: Dr. Kevin Boyd.

Skeletal records of animals show the same structural differences in skull shape between those raised in the wild versus those raised in captivity, suggesting that the influence of human environment and diet plays a critical role across of species [32].

Sufficient development of these issues would mean the tongue stimulates and moves along the roof of the mouth to push nutrients towards the esophagus to improve swallowing mechanisms, gently expanding the palate, and exercising the lower jaw, which may lengthen and widen over time. If the jaw is too short and the palate is too narrow, the tongue is not able to rest again the roof of the mouth but will instead rest against the lower teeth. This then contributes to habitual mouth breathing and as you go to sleep, the tongue might fall back to block the throat and cause snoring or apnea.

Communities Of Longevity

In the beginning of the 21st century, a new discovery arrived at the public's attention when specific regions of the world became known as 'Blue Zones'. Blue Zones are defined as regions of the world where a higher than usual number of people lived much longer than average. These zones exhibit that the people lived longer, were less prone to typical diseases, and were happier. Researchers excitedly began studying their secrets in the pursuit of new tools for uncovering the key to extended lifespans.

The regions were located at five different places around the globe. One in Okinawa, Japan. Another in Sardinia in Italy, The rest in Nicoya, Costa Rica, Icaria, Greece and Loma Linda, California. A common denominator for the different communities was that they lived as isolated populations with a somewhat-related gene pool. Take the people in Icaria, Greece for example, who are almost entirely free of dementia and other chronic diseases that plague modern society. One in three of the people make it to their 90s. What characterizes them is their relaxed lives with clean air and an active outdoor lifestyle. They prioritize napping throughout the day and fast regularly by restricting their caloric intake.

The different communities in the Blue Zones cared for their families and community and were highly engaged in social activities and integrated into their communities. The percentage of smokers were lower than the rest of the population and they were regularly engaged in moderate physical activity. These people's stress levels were lower, so therefore, they were considered to have a large degree of life purpose.

Most notable about these communities was their diets—was mainly plant based with a large consumption of garden vegetables. Plants were cultivated by themselves as part of their daily physical activity, which included kale, spinach, beets, and collards combined with seasonal fruits and whole grains. Oils, and especially olive oil, were preferred over animal-based oils. They ate meat, but small portions, often only covering a few percentages of their total intake of food. Their protein intake was instead based on fish, beans, and nuts. Their fish intake was often limited to consist of sardines, anchovies, and cod; species not exposed to the high levels of mercury and chemicals such as Polychlorinated biphenyls (PCBs). They had a reduced consumption of dairy and only ate eggs occasionally. Their sugar consumption was high, but mostly sugar from natural sources like fruits. Bread was consumed, but only whole grain or sourdough bread instead of bread made on white flour. In general, they used whole foods and stayed away from processed food. They hydrated on water, but also consumed coffee, tea, and red wine. Red wine was consumed as a part of social interaction, which they typically enjoyed one to three small glasses of per day.

Research has since found associations between a healthy, Mediterranean diet and chances of living

longer lives with decreased chances of disease, as they are shown to slow the ticking of the biological clock by, for example, slower changes to the SOCS3 inflammation gene which predict a much lower risk of death in old age[33].

So, now plants are the key to health and longevity? A common, rapid conclusion of the Blue Zones' successful lifestyles tends to be: "Well, they eat mostly plants and live long, so why don't we all just go vegan?" The fact is, communities of the Blue Zones drink cleaner water, live in less polluted areas, eat a lot of seafoods, are in close touch with nature, cultivate their own food, are physical active several hours a day, are not stressed out, have close relations to their families, get exposure to the sun and numerous other parameters that differs from the traditional dirty and lazy Westernized culture.

We should, however, take note of the developing problem with marine animals. A man-made problem, which has forced health risks upon us from ingesting them. One should be careful what fish they are eating, including how many. Alone in the past decade, the proportion of fish consuming plastic has doubled across all species, and studies published between 2017 and 2019 found that an average of 33 percent of the fish sampled contained plastic[34]. Plastic accumulates in the oceans when objects break down. This becomes micro-plastic, which is trillions of barely visible pieces of plastic floating in the world's oceans to be absorbed by the fish. Larger fish eating smaller fish are then carrying the smaller fish's plastic consumption into its own body. As the Blue Zone communities do, prioritizing fish with the smallest risks of plastic consumption is best to do if wanting to enjoy its health-related benefits. These include Wild Alaskan salmon or farmed salmon, pacific sardines, cod, trout, herring, and squid, whereas tuna and swordfish should be avoided or only ingested on rare occasions.

Although there are certain common rules across the human species in terms of nutrition, it is noticed that individuals respond differently to food, and metabolisms are not identical. From where I stand in this moment, I won't say with confidence that one single diet is the optimal for every human on Earth. That would be a naive and insufficient statement.

If I should provide you with one guideline that I consider fundamentally true to all individuals on Earth, it would be thriving by local, wild, clean, and organic foods that haven't been affected by pesticides, chemicals, medicine, and disease. If not cultivating your own food, then buying organic and from local farms are some of the best procedures that can be made in today's world to consume foods that are as close to its natural, original condition as possible. Apart from this, what I have come to realize throughout my life is, that limitation is imbalance. If we limit ourselves too much, we are simply out of balance. Because what is basically most healthy? Eating extremely strictly and clean to such an extent that you compromise your joy by following too many rules, or eating more or less what you want and enjoying every meal with all your heart? I've had this discussion with myself and colleagues repeatedly throughout my life, and I think it's important to emphasize that your mind, and your emotions in particular, are playing a huge role in your metabolism and overall health.

In fact, a study by William Corbin was conducted in 2011 that ended up becoming quite famous; simply because it was able to examine the physical response from a psychological reaction[35]. In the study, two participants were asked to consume a 380-calorie identical milkshake, whereas one of the participants was told it was an indulgent 620-calorie shake, and the other was told it was a sensible 140-calorie shake.

In parallel, these are the same psychological responses we face before consuming a meal with our consideration to whether the meal is healthy or not.

The scientist measured the ghrelin response in the gut of the participants. This turned out to be of dramatical decline in the participant believing the shake was unhealthy, whereas the ghrelin response of the participant believing having consumed a healthy shake turned out to be relatively flat. In other words, the satiety of the participants was highly determined by what they perceived of the meal they consumed.

Maybe this is why some people are able to live a long life without disease, while smoking a package of cigarettes every day for their entire life. Not that I would every recommend that, but to perspective I believe we should find peace and balance in a healthy diet without hardcore limitations for a long and sustainable life.



Ancient Medicine

A couple thousand years ago, Hippocrates stated: "Everyone has a physician inside him or her; we just have to help it in its work. The natural healing force within each one of us is the greatest force in getting well. Our food should be our medicine. Our medicine should be our food. But to eat when you are sick is to feed your sickness."

In ancient cultures, across the continents of the world, food was medicine in times where no such thing as a pharmaceutical industry existed.

Instead, they utilized the healing properties that each variety fruit, vegetable, oil, or part of the animal contained to regain the health from a source way less contaminated than many of them are today. Fasting

was a common ritual, especially in ancient Greece and Egypt where fasting was arguably a method of healing and longevity. When a person becomes ill today, modern treatment targets the specific pathogen or bacterium to "kill" out the disease. In ancient medicine they considered disease as physical imbalance, why their treatment was to be understood as restoration of harmony rather than creating a war against the disease.

The Greek physician and "Father of Medicine" Hippocrates believed illness stemmed from inadequate nutrition and bad eating habits and nature was the healer; health would be restored in the patient through diet.

From Genesis 1 in the Bible to ancient Chinese Sanskrit's, sacred alchemy, and various other legends we know the four elements which are the prerequisite for life and survival: earth, wind, fire, and water. Earth being the soil, providing our crops, and food as the fuel to our system. Wind being breath, the oxygen essential for all species to thrive on the planet. Fire is the energy from the sun, which is the essential source for all living organisms. Water is hydration, which makes up 60% of the human body and where life emerge. These are, in essence, everything necessary for organisms to thrive, and health is to be restored through these four sacred parts of life.

Hippocrates was the early founder of western medical science. His philosophy was that food was the real medicine, and the first commonly used drugs were water and honey. Herbal teas, barley, lentils, and whole milk were also used in this period. In cases of disease, the belief was that solid food should be prohibited for the first seven days to make the body fight the illness instead of using energy on digesting the food. It was recommended to stay on a light diet or fast at the initial stage of disease.

The philosophy was overeating, and unhealthy eating wasn't balanced and was unhealthy to the body. Today, it's no secret to most unhealthy foods are bad, but science has now recognized the harmful effects of overeating, where caloric intake is linked to changes in lifespan.

Hippocrates also preached the importance of eating from the seasons and further considered astrology and place of residence of significance for health. "The changes of the seasons produce changes in diseases," he wrote. In the same text, the author goes on to explain that villages facing east and being exposed to winds from the north-east, south-east, and west tended to be healthiest, and "The climate in such a district may be compared with the spring in that there are no extremes of heat and cold. As a consequence, diseases in such a district are few and not severe [36]."

Inspired by Hippocrates, the Greek physician, philosopher, and medical researcher Galen influenced the development of various scientific disciplines, including anatomy, physiology, and neurology in Ancient Rome. He believed health was not merely a matter of diet, but also physical exercise, baths, massage, climate, and temperament (emotions).

They believed health was determined by a complex series of *four humors*, being fluids produced in organs in the body, that were said to influence health, disease, temperament and personality.



The four fluids were known as blood, phlegm, black bile, and yellow bile. Each humor would increase and decrease depending on many factors, such as what you ate, the time of year, the temperature, your gender, and the time of day. In essence, the goal was to achieve balance between these four elements to improve health. Getting too much of something, for example a specific type of food, would create imbalances between the four humors, which would create disease.

The development of disease could be put into six stages:

The first stage is accumulation. You accumulate too much of one humor, being one quality of energy, in your system and begin to develop seemingly careless symptoms of irritations. This process may come from too much spicy food accumulating the hot, the fire. Next stage is aggravation. Now these small problems become irritating to the system, which would lead to the next stage of spread. Now, the excess heat that hasn't been addressed in the system to the individual still eating too much spicy food, drinking too much alcohol, and keep worsening the heat imbalance, leading to the next stage of localization. This excess heat that's in the system and started with accumulation now finds a weak spot in the system where we've lost some integrity. So, this progresses over time to become arthritis for example. It becomes manifested as disease into the stage where it becomes diversified, which alters the tissue system itself and may now become rheumatoid arthritis.

To prevent disease, the individual should prevent accumulation and reintegrate balance, which further drew parallels to the practice of ancient Chinese medicine with the fundamental acknowledgement of the principle of balance and polarity through Yin and Yang.

Table 3.2 Ancient medicine, their origin and healing properties

COMMON NAME	LINNEAN NAME	ORIGIN*	FIRST RECORDED USE*	PROPERTIES
apple	*Malus sylvestris*	Central Asia	1300 BC	· Nutritious, weight control, gut health
apple cider vinegar	*Malus pumila Mill*	Ancient Babylonians	5000 BC	· Detoxification, digestion, skin health
blueberries	*Cyanococcus*	North America	8000 BC	· Antioxidant boost, DNA repair, cognition
castor oil	*Ricinus communis*	East Africa	4000 BC	· Anti-inflammatory, pain relief, natural laxative, wound healing
cayenne pepper	*Capsicum annuum*	Central America	7000 BC	· Metabolism, digestion, pain relief
cinnamon	*Cinnamomum zeylanicum*	Sri Lanka	2800 BC	· Anti-inflammatory, gut health, heart health
coriander	*Coriandrum sativum*	Italy	5000 BC	· Antioxidant boost, brain, heart, bone and gut health
cumin	*Cuminum cyminum*	Mediterranean area	3000 BC	· Memory, cancer prevention, anti-inflammatory
date	*Ficus carica*	Middle East	6000 BC	· Nutritious, digestion, brain, bone and skin health
fig	*Phoenix dactylifera*	West Asia	9000 BC	· Nutritious, heart health, digestion
garlic	*Allium sativum*	Central Asia	4000 BC	· Detoxification, sickness prevention, cancer prevention, heart health
ginger	*Zingiber officinale*	Southeast Asia	3000 BC	· Medicinal properties, anti-inflammatory, blood sugar control, heart health
grapes	*Vitis vinifera*	South Caucasus	6000 BC	· Nutritious, heart + eye health, Antioxidant boost
herbal teas	*Camellia sinensis*	East Asia	3000 BC	· Sickness prevention, digestion, immune system, stress relief
honey	*Apis mellifera*	Asia	8000 BC	· Antioxidant boost, antibacterial, wound healing, digestion
lemon	*Citrus × limon*	Asia	2500 BC	· Heart health, cancer prevention, digestion
olive oil	*Olea europaea L*	Eastern Mediterranean area	6000 BC	· Antioxidant boost, anti-inflammatory, heart + brain health, cancer prevention

organ meat	-	-	-	· Nutritious, brain health, cognition, immune function, heart health
pomegranate	*Punica granatum*	Iran	5000 BC	· Medicinal properties, cancer prevention, antioxidant boost
thyme	*Thymus vulgaris*	South Europe	3000 BC	· Immune function, blood pressure lowering, anti-coughing

[a] In near history. (Dating is estimation, not necessarily conclusion).

Many of the food sources considered medicine with healing properties in ancient cultures, are today recognized as "superfoods" and backed by science in improving health in various ways and containing numerous medicinal properties.

Try – for instance — to utilize the healing properties of lemon by, each morning on an empty stomach, drinking a glass of lukewarm water with a slice of lemon made the night before to promote your hydration from the beginning of the day.

You can use honey in various unheated ways, such as in your breakfast meal, eat dates, figs, apples, and blueberries for snacks throughout the day and gain the healing effect on your immune system by adding ginger and garlic as spices to your meals. Olive oil can be used non-heated such as a dressing, as well as apple cider vinegar can be used for the same purpose to aid the detoxification process of the body.

Organ meats, like liver, can be consumed as addition to muscle meat to receive a boost of its rich nutrient profile. My recommendation is frequent consumption that amounts to 100 grams +/- per week.

Castor oil can be used for massage to be absorbed through the skin and aid in wound healing processes, while herbal teas can be consumed throughout the day and night to ease the body and relief stress and anxieties.

Several of the food sources were considered medicine in ancient cultures were similar across countries and continents and were mentioned in both ancient Rome, Greece, Egypt, and China among others. Even the Bible contains many of the mentioned foods, where olives, grapes, pomegranate, flax seeds, herbs, and honey are mentioned. From Deuteronomy 8:7-8 in the Bible it says: "For the Lord your God is bringing you into a good land, a land of brooks of water, of fountains and springs, flowing forth in valleys and hills; a land of wheat and barley, of vines (grapes) and fig trees and pomegranates, a land of olive oil and honey."

Fast!

Up until a few hundred years ago, involuntary caloric restriction was the norm amongst humans as there would only be food to consume if we actively made an effort in hunting, farming, or gathering. In more hostile climates, a larger effort to cover this need is required.

Today, it's easier to exceed our daily need for calories, and would require at least a minimum level of discipline to abstain from food. This tendency has brought forth one of the biggest myths within human nutrition: breakfast is the most important meal of the day. Although, the luxury of eating upon waking up may to many individuals be the least important meal of the day. But due to the food industry, and the cereal industry in particular, the myth keeps thriving.

Restricting ourselves from calories seems to be a natural part of existence, not only to humans, but to many mammals on Earth. But within the last 100 years the comfort of modern life is pushing us farther away from this practice.

The purpose of fasting can be divided into two components: a spiritual practice or a practice of achieving physiological benefits.

Under a religious aspect, periodic fasting (PF) has been practiced by humans as a crucial spiritual purification pathway. And apart from spiritual purposes, religious fasting also influences physical health. In table 3.3, you will learn about some of the different types of fasting, briefly mentioned in this section. Take the Islamic Ramadan as an example. The holy month for Muslims during which they refrain from eating, drinking, and smoking from sunrise to sunset. The Ramadan fasting is similar to Alternate-Day Fasting (ADF) because the 12-hour fasting period is alternated with a 12-hour eating window. It differs from traditional ADF because here drinking water is allowed during the 12-hour fast. Considering the physiological influences, Ramadan brings biochemical changes, primarily consisting of daily intermittent liver glycogen depletion and repletion. In the morning, carbohydrates are the main energy source, whereas towards the afternoon, lipids become more important. The practice leads to changes in sleeping and activity patterns, the circadian rhythm and hormone release (cortisol, insulin, leptin, ghrelin, growth hormone, prolactin, sex hormones, and adiponectin).

Other types of religious fasting traditions, from a historical perspective, refrained from eating periodically came from Christianity, Buddhism, Judaism and Hinduism. Jesus was said to fast for 40 days to get closer to God in his search for guidance. Gandhi fasted each year for up to 21 days at a time to achieve the foundation of youth and longevity. And still today, Muslims refrain from eating during the hours of daytime for one month every year.

These are widely used in religious contexts to become closer in touch with God or to gain spiritual or personal development in the strive for discipline and gratitude.

In ancient Greece, Plato acknowledged the benefits of fasting as the basic foundation in obtaining discipline. An ancient Egyptian proverb further states: "one quarter of what you eat keeps you alive. The other three-quarters keeps your doctor alive."

It's easier to measure the physiological benefits of fasting, science will have a more difficult time in conducting quantifiable data on the spiritual and cognitive parts of the discipline. During some types of fasts cognitive abilities may in fact improve, contrary to the belief the brain needs constant fuel to work. From an evolutionary perspective it would make sense, since if it were the opposite, we would have become mentally dull when hungry, which would have resulted in us not catching food and then promptly dying out.

Buddhist monks and nuns commonly didn't eat each day after the noon meal. This practice was not

considered a fast but rather a disciplined regimen aiding in meditation and good health. It would somehow make perfect sense in practicing spiritual procedures without food in the body, since there would be more space for focus to be directed to the mind instead of the digestion process when consuming food. This is also the reason why I advise my students to practice breathing and meditation on an empty stomach, and many respond with the greatest gains in these practices during a fast due to a clearer mind and thereby stronger spiritual awareness. Since meditation and breath-work are not about concentration and conscious thinking by the analytical mind, one does not need nutrition to fuel the brain under these circumstances.

Science is increasingly publishing more promising results in the potential of fasting. There are different types of fasting, and different stimuli occurring from each type. The most well-known and documented are Time Restricted Feeding (TRF), where the time of eating is limited to a specific number of hours each day. Intermittent Fasting (IF) is a prescription of a diet approach that alternates between a period of eating and fasting, usually not more than 24 hours. Inside this category, Alternate Day Fasting (ADF) and Modified Alternate Day Fasting (MADF) are to be found. Finally, Prolonged Fasting (PF) is fasting for an extended period, usually expanding over more than two days.

Cleansing diets can be a subcategory of PF, where a prolonged and strict fast is performed in the strive for detoxification and purification and includes only allowing certain foods that are light, natural, balanced, and easy to digest. In the aiding process, various methods can be included to enhance the cleanse, such as consuming apple cider vinegar, herbal teas, applying tissue massage to improve circulation and detoxification or even enemas to clean the intestinal system.

Recent discoveries point out how caloric restriction could attenuate age-associated epigenetic alterations and may have a protective effect against cellular alterations, promoting longevity and health span among others. Research in humans and animals have shown the potential health-promoting physiological responses to fasting, which includes ketogenesis, hormone modulation, reduced oxidative stress and inflammation, and increased stress resistance, lipolysis, and autophagy.

An article published May 2021 by Alda Attinà, proposed how specific types of fasting might support critical biological processes of the human body. Here Attinà elaborated on the mechanics behind the potentials in cancer prevention and DNA repair: “Several human studies have focused on potential perspectives on fasting in DNA damage and Insulin Growth Factor 1 (IGF-1) level [37]. Elevated circulating IGF-1 levels are associated with an increased risk of developing cancers. People with genetically severe IGF-1 deficiency caused by the deficiency of growth hormone receptor rarely develop cancer because their cells are protected from oxidative stress-induced DNA damage. Moreover, DNA damage highly promotes programmed cell death. Hence, fasting may protect from cancer by enhancing the death of pre-cancerous cells and reducing cellular and DNA damage.”

It has further been documented that caloric restriction may help improve inflammatory and autoimmune diseases.

Another example of how the mechanisms of fasting, or caloric restriction works on lifetime extension gets elaborated in the study: “Caloric Restriction (CR) inhibits the mechanistic target of rapamycin (mTOR) activity. mTOR is a kinase composed of two complexes with different physiological functions, mTORC1 and mTORC2. Pharmacological or genetic inhibition of mTORC1 signaling results in increased lifespan.

High activity of mTORC1 is a major impulse for aging, while its suppression contributes to the many benefits of CR, including lifetime extension. mTORC1 and mTORC2 are regulated by nutrients, hormones, and growth factors. In humans, mTORC1 activity reduces during fasting and increases after feeding."

	Time Restricted Feeding (TRF)	Intermittent Fasting (IF)		Prolonged Fasting (PF)
		Alternate Day Fasting (ADF)	Modified Alternate Day Fasting (MADF)	
Definition	This is an eating pattern in which the food intake is restricted to a time window of 8–12 h or less every day [1].	This form of IF involves fasting every other day or on certain days of the week. Ad libitum caloric intake is followed on non-fasting days [66].	This is a form of IF, similar to ADF, with a severe and specific caloric restriction on fasting days. During fasting days, the caloric intake consists of 15–25% of the dietary needs. Ad libitum diet is followed on non-fasting days [67].	PF consists in fasting for an extended period, from 4 to 7 days. It has been less commonly studied for longer periods in humans [68].
Characteristics	Limiting the eating duration may be an effective strategy to reduce the overall caloric intake. It does not necessarily have to involve caloric restriction [69].	Starving one day, feasting the next. Only during the fasting days is a caloric restriction expected [66].	Restriction days are non-consecutive and include only a small introduction of food. During non-fasting days the intake of food is at leisure [65].	During consecutive fasting days usually only water is permitted [70].
Commonly Practiced Method	16/8: feeding window of 8 h/day in which it is allow to consume food and 16 h of fasting [71]. 12/12: feeding and fasting windows last the same. This is claimed to be the simplest type of TRF to improve health and to maintain weight [72].	5/2: This is the most common example of ADF. Calories are severely restricted for 2 days (preferably non-consecutive), and then normal eating occurs for the other 5 days in the week [73].	5/2: 15%–25% of Total Daily Energy expenditure (TDEE) is suggested during 2 non-consecutive fasting days a week. Ad libitum food intake for the resting 5 days [74].	No commonly practices methods are defined. Periods of deliberate fasting with restrictions on intake of solid food are practiced [75].

Table 3.3 Different types of Fasting: A basic definition of Time Restricted Feeding (TRF) is limiting the time of eating to a specific number of hours each day. Intermittent Fasting (IF) is a prescription of a diet approach that alternates between a period of eating and fasting, usually not more than 24 h. Inside this category, Alternate Day Fasting (ADF) and Modified Alternate Day Fasting (MADF) are to be found. Finally, Prolonged Fasting (PF) is fasting for an extended period, usually, more than 2 days.
Source: Attinà A. et al., 2021, Fasting: How to Guide.

Precautions: A general advice would be to exclude children and adolescents from any types of fasting as they are highly dependent on proper and enough nutrition in their phases of growth. The same goes for pregnant and breastfeeding women, underweight people in terms of their Body Mass Index (BMI), people with serious illness, diabetics, and elderly people.

How to initialize and break the fast: Prior to (< one week) the beginning of the fast processed food and hypercaloric meals should be avoided to prevent a negative metabolic response. Soda, sugar, and alcohol should be avoided in the immediate period up to the fast. Caffeine is allowed (but not necessarily recommended) before and during the fast if it's within 200 mg/day, which corresponds to circa three cups of coffee. Caffeine from beverages and other artificial sources are not included.

Fasting should be prepared with a balanced diet, rich in plants, and water with foods that are easy

on the digestive system. The Mediterranean-based diet is a good example of a fitting diet. The Mediterranean-based diet characterizes the diets of the longevity communities known as the Blue Zones, covered later in this chapter.

Prior to the fast, food can be divided in up to five meals per day: breakfast, lunch, dinner and two snacks. If following the Mediterranean version include then fresh fruits, vegetables (in all meals), legumes, nuts, and daily use of olive oil. For protein fresh fish is preferred in the Mediterranean diet. A small amount (125 g) of red wine is allowed, once a day. Be aware that this advice is primarily based on longer fasting durations and not daily fasts such as Intermittent Fasting, where you still eat regularly on a daily basis.

Follow the same guidelines when breaking the fast.

There is an instinct in animals, such as cats and dogs, which makes them refuse food when they are sick. When the sickness is over, the internal healing work has been accomplished and the appetite will return naturally. The human organism shares the same fasting instinct, just like that of other animals. Evolutionary adaptation has made our bodies efficient at storing energy reserves, which can make us go surprisingly long without consuming a single calorie.

Spiritual masters such as Pythagoras didn't allow any of his disciples into his teachings unless they had first purified themselves through fasting[38]. They had to free themselves from satisfying the hunger for food, so they could then turn their attention to feeding the mind and spirit instead.

Once a year, I'm spending between three to five days without consuming a single calorie, only living by water. This concept is also known as water fasting and belongs in the category of Prolonged Fasting. To further reduce the number of stimuli and substances entering my body, I have been filtering my water through a water distiller to the rid of all excess substances including fluoride, chlorine, and excess pesticides to receive H_2O in its pure form. The potential downside of distilling the tap water is that it does not only get rid of the potential bad substances in the water, but also the essential minerals, which will need to be manually added to the water.

Water fasting is not merely a process of physiological healing, but to a great extent also a matter of personal development. Therefore, I spend the entire period without any form of stimuli in almost complete absence of television, social media, sex, social engagement, or anything else that would cause the mind and body to become distracted and utilize energy and focus on anything else than the internal process of the mind and emotional system.

When stripping of one of the main human qualities of life, i.e., food, the body is left with an enormous amount of time not to think about what to eat, when to eat, and the process of digesting the food you've been eating. The discipline gained from deviating from the process of constant hunger is unique. If you can go on without eating, even if your mind keeps revolving around food, then there's extraordinarily little you can't do in life.

The gratitude gained from knowing you have access to food every second of your life is unique, when you let your taste buds crave for a prolonged period. The sense of tasting food and physically feeling the nutrients being absorbed and transformed into energy, a feeling highly absent in the Western world, leaves you with gratitude of the abundance of food in our existence. After all, gratitude is key to an enlightened life.

I'm of the belief that when we fast regularly, eat properly, and have an optimal detoxification process in the body, we are more tuned, open-minded, in touch with our innate state of intuition and less susceptible to manipulation and false information. This is a state one is able to enter, when limiting the toxification accumulation in the body; especially those that can break the blood-brain barrier. To put it into perspective and consider how many people are living a poor, unhealthy and unconscious life, it is no surprise many people today act as obedient robots only living for the weekends and saving for retirement.

The common theme for my annual water fast has been an extreme hunger and intense need for food for the first few days of the fast. Abstracting this need is nearly impossible as the mind keeps revolving around food, while the stomach is noisy and complaining every few minute. On the third day and forward it becomes easier. The body gets into a state of surrender and accepts and adapts to the fact that there is no food incoming. This increase focus and physical energy levels to a point where physical activity is possible again — even without nutrients available the body.

What has surprised me the most has been my mood changes during these periods of fasting. It can be described as a mood in a constant neutral state, moving less through the extremes. As a person tending to be extreme in moods, being optimistic in positive situations and pessimistic in negative situations, the feeling of being completely calm and careless was odd.

The best type of water to consume in general and during a fast, is natural spring water. Unfortunately, there aren't as many natural springs left as there has been due to industrialization, although it should be possible, no matter location, to find a local spring to get your water. Visit the website findaspring.com to search for local water springs near your location.

A local spring contains all the essential minerals provided from its natural source in water that hasn't been contaminated by humans, such as pesticide remains from the soil. Also, it does not contain any chlorine or fluoride which is inserted in the water supply around the world.

If you don't have access to such a spring, another solution is to distill the water, if the proper minerals are either supplemented or, at best, absorbed from food in a sufficient diet. During a fast, ensure to follow these guidelines in relation to water intake:

- Consume approximately two to three liters of water, depending on your level of activity.
- Add ½-1 tsp of sea salt in your morning water to prevent electrolyte depletion.
- Squeeze or add slices of lemon to your water.
- Supplement with magnesium (L-Threonate, taurinate or glycinate) during the morning and night.

To achieve more healing and detoxification properties, drink herbal teas throughout the day and mix a glass of one tbsp. apple cider vinegar with hot water, ¼ tsp. turmeric and a pinch of cayenne pepper powder every day. Everything obviously being organic.

Remember when no calories are coming in, there is no fuel in the system, why one should be cautious with any type of physical activity. Hunger is normal, but illness is not, so stop if feeling unwell.

A prolonged fast, such as a water fast, should be broken with light unprocessed foods low in fibers. Use at least the first day or two make the digestive system adapt to calories as you start with a handful of light foods and slowly increase the amounts.

In ancient Greek medicine, Hippocrates spoke about the Inner Physician. Normally, what he considered the innate heat, or metabolic fire, is fed by receiving nutrients from the food we eat. When we then stop eating, we cut off the supply of fuel and the metabolic fire begins to feed on the body's inner reserves. This should then awaken the so-called Inner Physician, and the body would then begin healing and "clearing the house."

This is a term science has later acknowledged as *autophagy*. Autophagy, meaning self-eating, is the innate healing mechanism that kicks in when the body is left without food to rejuvenate its cells and tissues. When the body recognizes it's not going to receive any nutrition and glucose levels drop, an evolutionary self-preservation mechanism occurs through which the body then removes the dysfunctional cells and recycle parts of them toward cellular repair. In simple terms, it's the body's way of cleaning out damaged cells in order to recreate newer and healthier cells.

It's uncertain precisely when autophagy kicks in in humans, but studies have argued it to be around the 24-hour mark, magnifying after 48 to 72 hours. The healing effects of autophagy will therefore be limited during daily fasts, such as Intermittent Fasting, compared to prolonged fasts.

At the same time, during the fast, the levels of the molecule NAD+ begin to rise. It's the same molecule that reduces in number as we age, hence boosting its levels may lead to an extended lifespan. NAD+ is known as the "longevity molecule" that helps turn nutrients into energy and works like a personal assistant for proteins such as Sirtuins. Cold exposure, such as ice baths, is another method of activating Sirtuins, covered in later chapters.

After 12 hours of fasting, the body enters a metabolic state called *ketosis*, where it starts to break down and burn fat, which serves as an alternative energy source when glucose isn't available. This leads to a usage of ketones in the brain, which is one of the reasons why fasting seems to promote mental clarity and calm moods, as I observed myself during my periods of fasting.

By the 48-hour mark growth hormone level rises and helps preserving muscle mass and reduces fat tissue accumulation, why this self-preserving mechanism of the body seems to provide little to no negative influence on muscle mass, depending on duration of the fast, while fat mass seems to reduce.

Overall, science has conducted a wide range of scientific studies in mice and humans, all pointing to the same conclusions: caloric restriction activates longevity genes and seems promising in extending lifespans. The anti-aging principle of fasting have been followed by research further pointing toward possible benefits in the prevention of diseases such as cancer and Alzheimer's disease.

As Dr. David Sinclair, a very bright man within the longevity field who I admire tremendously, once told me: "Reaching 90 in good health is achievable for most of us. With intermittent fasting, a good diet, exercise, and supplements that turn on the body's defenses, recent science predict your chances of living a long healthy life go up considerably."

I honestly believe this was a humble understatement from him. Taking responsibility of your own health and optimizing where you can, should be able to get you way past 100 years of age; and good quality

years. In fact, if you were born in 1960, you had 13 percent chance of living to be 100 years of age. Fast forward to today, and that number has expanded to 50 percent, and will continue to climb. In the last century and a half, we have doubled our lifespans.

The Killers

Human health can be tracked and linked directly to the health of the soil of mother earth. Environmental pollution is a contributor to disease, and unless we are aware of these issues, we will remain in stagnation of saving the future of our planet including our own wealth being, which go hand in hand.

The use of pesticides in the new culture of agricultural intensification is polluting the soil in rapid speed. The soil of microorganisms that serves the crops and plant life, which we, among all other species, are dependent upon to be able to thrive on earth [39].

A game changer in the pesticide culture occurred in 1942, when chemist Paul Hermann Müller discovered the synthetic chlorinated chemical dichlorodiphenyltrichloroethane, which led to a profoundly increased usage of a wide variety of pesticides—despite wide evidence showing the serious issues of pesticides entering the bodies of humans as well as wildlife, which can be entered by either breathing, eating, and drinking, or absorbed through the skin [40].

Pesticide spraying machines developed from small garden engines to immensely powerful auto blast machines capable of applying up to 4,000 liters per hectare and aircrafts spraying vast amounts of pesticides invisible to the naked eye. These chemicals then end up being absorbed by the plants as well as the soil they grow in, and even the groundwater. This further concludes the critical importance of choosing sustainable solutions when it comes to food and water intake, to prevent our own bodies of becoming contaminated; a process that begins in the soil.

Most soil creatures help protect and maintain human health. Plants and organisms have a rich exchange of nutrients, which enable them to capture essential minerals and manufacture antioxidants. When we consume these plants, these antioxidants benefit us by stimulating our immune system, regulating our hormones, and slowing the growth of human cancer cells. Several studies point to the fact organic farming methods produce plants with a higher concentration and variety of these antioxidants.

Of course, those who carry the responsibility of most of these issues are governments and powerful organizations, who often consider the economic value to be more than the risk of our health. This fact does not mean that we can’t do an active effort ourselves. Unless you are growing your own food or have a voice in the agricultural industry, the least one can do to achieve healthier and more sustainable benefits is to buy organically grown foods locally and from the seasons. The concept of buying tropical fruits such as mangoes, melons, and pineapples, when, for instance, living in the northern hemisphere, is a luxury. By that time the foods arrive they will become depleted of the rich nutrients it contained when originally gathered. This timing is the same reason why buying foods from the seasons allow you to consume natural, rich nutrients from the present season at your location.

Environmental exposures are responsible for 70 percent of morbidity and mortality worldwide.

Allergies, chronic lung diseases and other conditions caused or triggered by environmental factors are all attributable to a person's genetic responsiveness to distinct environmental stressors.

Every day, these environmental factors are damaging our DNA, and it is almost entirely impossible to live on earth in the 21st century without exposure. Daily, humans are exposed to massive air pollution, especially if you live in urbanized areas with large populations and lots of traffic. Radiation is constantly penetrating our bodies from the intense exposure of harmful electromagnetic fields (EMFs) day in and day out. This exposure includes cellphones, power lines, Wi-Fi, microwaves, televisions, computers among others.

Electromagnetic fields are not all potentially hazardous, since the visible light, UV light and infrared light are also electromagnetic fields considered less or not dangerous at all. To what degree the potential danger of being chronically exposed to this type of radiation is not yet known, but an increasing number of studies indicate that the hazards from non-ionizing radiation sources may be a bigger threat than what we make of them. A common practice such as keeping a phone in your pocket near the genitals, resting the phone on the stomach when being pregnant, or long phone calls with the phone critically close to the brain while transmitting signals are all examples of frequent non-ionizing exposures for a great number of hours per day, that occurs every single day of a person's life.

Earlier in *Human Mechanics,* I presented pictures of Dr. Emoto's experiments of stimulating water differently. One of these stimuli was the exposure of the radiation from a microwave oven, showing how the radiation altered the molecular structure of the water. In 2019, a group of 9th graders from a school in Denmark reported having trouble focusing the days after they had slept with their phones next to their heads [41]. This information led Dr. Emoto to wanting to conduct an experiment to examine why, but they lacked the resources of measuring brain activity. Instead, the research team decided to monitor the growth of plants near Wi-Fi routers. After 12 days, the seeds in the tray kept away from the Wi-Fi routers grew normally, while the seeds next to the routers did not grow at all.

In fact, the photos of the project showed how many of the seeds placed near the routers turned brown and died. This small study was not the first. The radiation hazards have been studied and documented for more than 40 years. The study inspired researchers to continue study the potential hazards on the human body in depth. This has led to numerous studies in Wi-Fi showing that the radiation emitted causes oxidative stress, sperm and testicular damage, neuropsychiatric effects including EEG changes, apoptosis, cellular DNA damage, endocrine changes, and calcium overload [42].

Oxidative stress has a causal role in most chronic human diseases, whereas cellular DNA damage can cause cancer. One study conducted as early as 1971 reported a total of 35 neurological and neuropsychiatric effects of EMF exposure as well as seven types of chromosomal aberrations, several of which are known to be caused by chromosomal double stranded DNA breaks, eight types of endocrine changes, and cell death, which can also be called apoptosis, a process that has an important causal role in neurodegenerative disease [43]. Each of these effects would also be able to be caused by exposures to other microwave frequency EMFs, such as cell phones.

Most arguments are pointing toward the fact that microwave frequency EMFs seems to be much more

damaging to young children, since the radiation have a much easier way penetrating their smaller and thinner skulls, which increases their exposure to EMFs.

Fortunately, protective tools exist which can shield from EMFs, apart from the obvious tools of turning off the Wi-Fi router, putting the phone on airplane mode, etc. Not long ago, I was studying the potential of silver fiber fabric and its role in radiation. In the experiment, I had produced a blanket made of these silver fibers, I had an iPhone, and an EMF meter. When turning on the phone while having Wi-Fi turned on, radiation levels were the highest reaching a level of more than 450 mW/m^2. Without Wi-Fi turned on, radiation levels were steady near 60 mW/m^2. When activating airplane mode, the radiation level instantly dropped to around 5 mW/m^2.

In the end of the experiment, I had the phone turned on with Wi-Fi emitting as much radiation as possible. The EMF meter was aggressively beeping, while I gently covered the surface of the phone with the silver fiber sheet. Instantly, the levels dropped to from 450 to 3 mW/m^2. My experiment with silver fibers proved that silver can be effectively used as a source of EMF blockage from the large number of non-ionizing sources that surround us. Since then, I have been developing special blankets made up of these same silver fibers and will continue studying the potential of silver as an effective measure against radiation.

Some safety recommendations suggest that being exposed to less than 10 mW/m^2 is considered to be safe, one should be careful when being exposed to between 10 and 100 mW/m^2. It should not be recommended to stay a long time in exposure of between 100 and 1000 mW/m^2; complete avoidance is recommended for staying in areas of more than 1000 mW/m^2.

Fertility rates worldwide are dropping with dramatic rates to be roughly 50 percent of what it was in 1950 [44]. Reproductive abilities are getting worse year by year, and estimates suggest that nearly 72.4 million couples globally experience fertility problems, whereas according to the WHO 60-80 million couples worldwide currently suffer from infertility. In total, it is estimated to affect up to 12% of couples worldwide.

Recent studies have found correlations between exposure to micro-plastic and male fertility linking our increased exposure and ingestion to a potential hazard to reproductive success. Humans are exposed to numerous kinds of toxic chemicals and micro-plastics through ingestion, inhalation, and direct skin contact; when entering the body it accumulates in the tissues, including the testis, with outcome in semen quality as a consequence of inflammatory state and oxidative stress damage. Perhaps there are in fact numerous pollutant factors which are affecting the fertility rates and men's sperm count.

Generally speaking, World War II was a critical turning point, and a point in human history where new inventions and laws pushed more environmental pollution out to the public. The pesticide culture began and fluoride insertion in tap water likewise. It was during the same period that doctors were publicly recommending and speaking for the smoking of cigarettes.

Somethings have luckily changed, but many things haven't.

Light pollution has also developed to become a big contributor to the new age of environmental pollution. We have developed a permanent artificial daytime on Earth impairing the circadian rhythms of all species

relying upon darkness to induce sleep. This rhythm change is a consequence of the business of LED lights. No matter where you go, you will be exposed to a large spotlight from above, even in the streets, in the supermarkets or on the parking lot. It is everywhere. Your pineal gland needs darkness to secrete melatonin, which makes you sleepy. In a world which is never dark, the essential process becomes inhibited and negatively affects one of the most important qualities of life: sleep. We will go more in depth with this topic in the last chapter.

Noise pollution is especially present in larger cities, constant noise from sources that are not part of nature, and therefore not adapted to comfort the human brain causing disruptions and distractions from focus and sleep. To make the situation worse, we spend the first second upon waking, signaling fight and flight by waking up by an alarm clock.

Even the way we clean our homes and cook our food provides exposure to hazardous chemicals that may be potentially extremely harmful. The use of aluminum, either from body products such deodorants and creams, or from cooking by using tin foil in the food to using specific pots and pans to cook, may lead to the aluminum leaching into the food, since it is a highly reactive toxic metal [45]. Examples of hazardous cookware includes nonstick cookware coated with Teflon, which is linked to the outgassing of toxic chemicals that can cause disturbances in the human body and may lead to cancer development [46]. Alternatively, lead-free ceramics and glass are considered to be the safest choices of cookware.

Other types of toxic burdens to be avoided or replaced in your home due to their hazardous potentials include air fresheners, perfume, cologne, aftershave, hairspray, conventional house cleaning products, conventional makeup, conventional shampoos and other hair products, and candle lights.

Aluminum is furthermore highly present in body products, where it is applied directly to the skin which absorbs it into the body. It is often applied in places where the skin layer is thinnest, which makes it an extra vulnerable gateway for unwelcomed guests. Toxic heavy metals are easily accumulative, one reason of many for always choosing organic, quality, and certified products. But toxic heavy metals are also in our jewelry, pharmaceuticals, vaccines, cosmetics, and household products.

There's enough evidence to suggest that toxic metals either cause, contribute to or accelerate the development of chronic illness [47]. Acute metal toxicity shows with symptoms such as cramping, nausea, vomiting, sweating, headaches, breathing difficulties, convulsions, and impaired cognitive, motor and language skills. It can lead to oxidative stress, inhibit antioxidant production, and adversely affect the function of every cell, tissue, and organ in the body.

Improper diet lacking quality micronutrients will lead to a deficiency of the good metals, i.e., magnesium and copper, which should replace the bad ones. High quality animal products rich in zinc can protect us from the toxic metal cadmium [48] and are critical in our metabolism. While many fish are rich in healthy fat-soluble activators and omega 3, consuming more than two fish meals per week gives a developing risk of heavy metal accumulation, for instance mercury, from the fish consumed—especially tuna.

Obviously, meat needs to be organic and free-range since organs like the livers and kidneys of factory-farmed animals contain a significant amount of the toxic metal cadmium. Processed foods are a contributor to metal toxicity. Having a good gastrointestinal health lead to a better gut-brain axis, which

helps handling exposure to toxic metals. At the end of this chapter, I will give you concrete tools in how to support your gut microbiome and digestion.

It is not merely a matter of our own individual health. The mother brings a lot through to the fetus, and this includes the substances that may cause harm in her own body. Blood samples taken from the blood of a newborn child have shown to contain an average of 287 toxins, including mercury, pesticides, and Teflon [49]. Babies are coming into this world with compromised digestive and immune systems as a direct result of the exposure and diets of their parents.

Many vaccinations contain both mercury and aluminum. Whether little exposure makes a difference, the intense exposure that humans are dealing with can only make you question whether the mixture of a wide variety of toxic metals and chemicals contribute to the development of allergies, autoimmune disease, autism, ADHD, and other diseases.

Although it's almost inevitable to be in complete absence of exposure to pollution and heavy metals, there are in fact many procedures that can be followed to avoid it from accumulating. The first one is you becoming aware of their sources.

On the 25th of January 1945, Grand Rapids, Michigan, became the first town in the world to be artificially fluoridated [50]. This meant that fluoride inserted to the water supply affected all the people in the town. In the following years, more cities and countries followed along and did the same. In 2021, almost 400,000,000 people from at least 25 countries drink artificially fluoridated water and in the United States alone there are more people drinking fluoridated water than the rest of the world combined [51].

Sodium fluoride is an inorganic compound, which is best known as the substance being inserted to the water supply all around the globe. It's also present in beverages, toothpaste and even in rat poison. The controversy over fluoride does not mainly come from the fact, that there's a long list of health-related issues linked to the consumption of fluoride, but merely a matter of its use as mandatory mass medication, which the people do not have a free choice to deselect.

The main reason for it being inserted into worldwide water supply is to prevent tooth decay for the safety of the public. However, sodium fluoride is an extremely toxic substance. Only 200 mg. of fluoride ion is enough to kill a child, and just 3-5 grams is enough to kill an adult [52].

There have been more than 23 human studies and 100 animal studies linking fluoride to brain damage, and more than 450 studies in total linking fluoride to serious health related issues. In the 1990's a British scientist named Jennifer Luke discovered that fluoride accumulates in the pineal gland. There seems to be a direct link between fluoride and the pineal gland, which is located at the center of your brain [53].

Fluoride further attracts both aluminum and calcium, which enables all three substances to cross the blood-brain barrier and enter the brain. Aluminum can participate in the development of cancer and Alzheimer's, and when calcium accumulates in the body, it calcifies. When accumulating in the brain, it can calcify and enclose the pineal gland. This action is called pineal gland calcification and inhibits the function of the gland. It is commonly known that the pineal gland calcifies with age, and children have the least calcified glands. Maybe this is part of the reason why they perceive space and time so differently from adults, and as

they grow up, more toxins accumulate in their brain which causes their pineal glands to gradually calcify, and its function becomes impaired.

The primary and acknowledged function of the pineal gland is melatonin production, which plays a critical role in our sleep and circadian rhythm. Extraordinarily little is known and documented about the full function of the pineal gland, but the little organ has been linked to much greater influences, such as consciousness itself.

In 2006, the National Research Council of the National Academies of Science released a 450-page review of fluoride toxicity. The researchers concluded that the drinking water standard for fluoride causes significant damage to teeth, increases risk of bone damage, brain damage and disruption of the endocrine system [34].

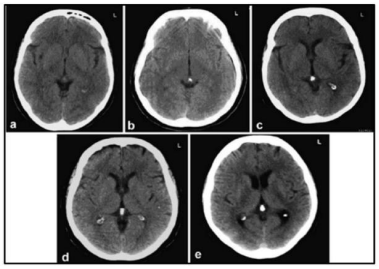


Fig. 3.4 The images show different levels of pineal gland calcification severity. The small wide dot at the center between the two brain hemispheres is where the pineal gland is located.
Source: Turgut et al. (2008)

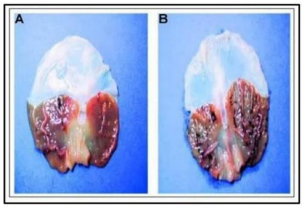


Fig. 3.5 The images show real pictures of pineal glands with a visible shell of calcium surrounding the gland, caused by the process of calcification.

Further studies found a correlation between fluoride consumption in children and significantly lowered IQ scores. Other studies have reported on the effects of fluoride consumption to include damage to the hippocampus, formation of beta-amyloid plaques, which is the brain abnormality in Alzheimer's disease, and impaired antioxidant defense system [55,56].

The claims made by those opposing the fluoride debate is that there are only few studies finding harm, or that they are only from areas with naturally high fluoride levels. This is no longer relevant as the scientific evidence is getting increasingly more overwhelming and undeniable. Harvard professor and neurotoxicity expert, Philippe Grandjean, says, "There is little doubt that developmental neurotoxicity is a serious risk associated with elevated fluoride exposure, whether due to community water fluoridation, natural fluoride release from soil minerals, or tea consumption, especially when the exposure occurs during early development [57]."

The whole original concept of fluoride as a tooth protector seems rather misleading. Since humans can have perfectly good teeth without fluoride consumption. Note that countries that do not fluoridate the water also experience big drops in cavity rates, while indigenous tribes, as earlier covered, experience great dental health without exposure to fluoridated water or contemporary toothpastes. This finding can further lead to a discussion about for what reason fluoride should be swallowed through water consumption, since the usage is supposed to be for tooth protection. If fluoride is used to support tooth health, it would seem irrational to swallow it since this is the direct pathway into the body by the bloodstream, and into the brain.

In the end, it's merely a philosophical question as much as it's a scientific and medical issue. What is the reason for the governments' eagerness to protect the tooth health of the public by force, when much greater health issues are blindly being ignored? We face serious poverty, starvation, drug and alcohol abuse, tobacco among others, but no laws are forced down on us to resolve these issues.

It seems obvious that the risks outweigh the benefits, if any, with fluoridation, and it's been studied and highly discussed for decades. The average puberty age for girls is getting lower and lower, and the same goes for men's level of testosterone and sperm counts. As you know by now, this seems to affect global fertility rates. Cases of mental illness are at explosively high rates, and people are less in touch with who they are and what they want. Whether these are the biproducts of intense fluoride consumption, heavy metal toxicity or a combination of environmental pollution in general, they are undeniable issues we are facing.

Fluoride is easy to exclude when one is conscious about its sources. Toothpastes can be homemade or bought without fluoride included, while water can be filtered or consumed from natural springs. As water is also absorbed through the skin, water filters can be installed in the shower, which filter out the fluoride and the rest of the bad stuff, just like a regular water distiller does. These solutions are known as whole house water filters for, either the whole house, or reverse osmosis systems, which are installed to a single faucet with higher efficiency than a whole house filter is capable of.

In terms of pollutants and contaminants, tap water is a major component. This is both sad and ironic, since we occupy the 21st century and should be technologically advanced to a degree where we have developed a global water supply, which is clean and unpolluted. Just as water fluoridation is done by intention, the same is the insertion of chlorine into the water supply. This insertion is done to disinfect the

water that ends up in our bodies. However, quantities vary from country to country, which is general no matter what type of contaminants I expose here. Apart from fluoride and chlorine intentionally inserted to the water, pharmaceuticals, pesticides, nitrates, and toxic metals are also unintentionally regularly leached into the water. This can happen when pesticides or nitrates used for fertilizers in agriculture leach into the ground water that feeds the water supply. Or when pharmaceuticals are released into the sink or toilet and consequently make their way into the water supply. Toxic metals including aluminum, arsenic, lead, copper, and uranium may also unfortunately leach into the water supply from their roadway into the tap water system. These metals leach from pipes and plumping features, improper waste storage and so forth, and again, end up in the water supply that nourishes us.

Depending on quantity and duration of consumption, these mentioned substances present in a large portion of the global water supply, are linked to brain toxicity, brain disease such as dementia, negative environmental health, chronic disease, cancer, fertility issues, harm in pregnant women and infants, organ damage and more.

The Saviors

Underneath the ground is a vast ecological network, infusing the landscape and holding soil together. It is a cellular network that has a far-reaching and significant impact on everything in its path and channels nutrients and information back and forth. This is mycelium. “Mycelium is Earth’s natural internet,” Paul Stamets, an American mycologist calls it [58]. The underground network of mycelium forms a multidirectional transfer of nutrients between the plants mitigated by the mycelium underground. By cycling these nutrients through the food chain, mycelial networks are benefitting from the soil and allowing surrounding networks of plants and animals to survive and thrive. As much as 90 percent of land plants are in a mutually beneficial relationship with the mycelial networks. Without it, all ecosystems would fail.

Mycelium inhales oxygen and exhales carbon dioxide just like you and me. It is the vegetative part of a fungus that consists of a mass of branching, thread-like hyphae. Mycelium acts as one of the first processes in the development of mushrooms; an elegant compound with tons of natural medicinal benefits on health, not only for humans, but also the Earth.

Mushrooms produce strong antibiotics and have been used for medical purpose for thousands of years to support human health. This benefit includes everything from cognition to memory, energy, stamina, sleep, cardiovascular and liver support, and the microbiome. One thing all mushrooms have in common is that the mushroom mycelium has been shown to support an engaged immune response. Part of the immunological activity is caused by several variables, such as ergothioneines, antioxidants, sterols, lipids, terpenes, glycosides, and mycoflavonoids; many of which are working cooperatively to optimize multiple aspects of human health and wellness, which has been confirmed by scientific literature. Generally speaking, mushrooms are rich in fiber, D2, B1, B2, B3, selenium and antioxidants and are associated with antiinflammation and cell and DNA protection. Many essential medicines such as penicillin, griseofulvin, erythromycin and cyclosporin are even isolated from fungi [59].

They have become widely known as medicinal mushrooms, which are the types of mushrooms without psychedelic effects on the brain.

The general immunological effects in mushrooms can be gained by the different sorts from stress to recovery, cognition, hormones, nervous system, respiratory capabilities and more.

Mycelium does not only support our precious soil that we are in danger of losing within our lifetime, but also the human body in ways, which seems to come without significant chances of side effects. Mycelium is the internet of the Earth, which shares the secret to saving the soil and human health. It is the lungs of the Earth.

Table 3.4 Medicinal Mushroom Sources and Benefits

	Agarikon	Chaga	Cordyceps	Lion's Mane	Maitake	Reishi	Turkey Tail
Antioxidant and DNA support							
Blood sugar support†							
Breathing							
Digestion and microbiome							
Energy and stamina							
Heart support							
Immune response							
Liver and detox support							
Memory, clarity and cognition							
Mood, stress and sleep support							
Nerve support							
Performance and recovery							

* These statements have not been evaluated by the Food and Drug Administration

† For blood sugar levels already within the normal range

Your body is full of trillions of bacteria, viruses, and fungi. Collectively, these are known as the gut microbiome mentioned earlier. Some bacteria are harmful and associated with disease, while these bacteria are central for our health and extremely critical for your immune function, heart health and brain, to mention a few. These bacteria, viruses and fungi are microscopic things that can be referred to as microbes. Most of these microbes in your intestines are found in the large intestine called the cecum, and they are referred to as the gut microbiome. With roughly 40 trillion of bacterial cells, there are more bacterial cells in your body than there are human cells, which add up to roughly 30 trillion. Out of this number, there are up to 1,000 species of bacteria in the gut microbiome, each playing a different role in your body and gut health [60]. In may therefore be stated that most disease can be tracked down to the health of your gut, and in essence, bacteria are ultra-vital for human health.

Guidelines to support your gut microbiome:

1. Prioritize:

- 2-3 servings daily of fermented foods such as kombucha, kimchi and others (dramatically reduces inflammatory cytokines for the body to heal faster)
- Fermentable fibers (prebiotics) such as inulin, pectin and oligofructose
- Resistant starch (for example present in in green bananas)
- Probiotics from certain bacterial soil-based strains

2. Avoid:

- Pesticides (both in meat, plants, etc.)
- Processed food
- Antibiotics (unless absolutely necessary)
- Smoking (for numerous reasons)
- Alcohol consumption
- Negative loop of stress and bad emotions

3. Support your digestion by:

- Chewing carefully until the food has been broken properly down in the mouth
- Avoiding stressors during eating, such as eating while working, etc.
- Spending enough time eating
- Drinking organic carrot juice to support the intestinal mucous membranes
- Staying hydrated

PROTEIN	CARBS	FAT
30% of calories Wild, grass-fed, pastured	*20% of calories* Organic and seasonal	*50% of calories* Organic (,wild, grass-fed)
Steak/beef	Honey	Butter
Salmon	Pineapple	Cheese
Poultry	Melon	Suet
Lamb	Dates	Lard
Bone broth	Berries	Avocado
Eggs	Squash	Bone marrow
Organ meats	Oranges	Fatty fish
Sardines	Zucchini	Tallow
Oysters/mussels	Sweet potato	Olives
Deer	Cucumber	Bacon

Table 3.6 Use this low-toxic, nutrient-dense food table in your meal preparation by picking one food source from each category, and you have a meal. All in all, this food matrix provides you with 1000 different meal variations. Create your own table or replace any food source if you have certain allergies.

III. RESPIRATION

The act of breathing oxygen into our lungs and exchanging it with excess carbon dioxide is an essential process of life; a process which is unconscious and automated, and what we call the respiration cycle. It is the only one of the four elements of life, one can go a lifetime without consciously thinking about and still survive.

A human being can go for approximately one or two months without eating until they eventually die of starvation. Without consuming water, humans die from dehydration after roughly ten days. There must be a conscious effort made in meeting the essential needs to provide calories and hydration as fuel for survival. When it comes to the element of air, a human does not need to consciously consider the act of an inhalation and exhalation to survive. This lack of consideration can easily and has led to a neglect of the optimization of one's ability to maximize the respiration cycle.

The animals that live the longest have the lowest heart rates in general, which is associated with a lower respiration rate. Hence, the animals that breathe the least are living the longest, while those breathing more frequently are living much shorter lives. This principle is applicable across the animal kingdom. Elephants are some of the longest living animals and take *only* four to five breaths per minute, and the same goes with alligators who take no more than one breath per minute. Similarly, the general heart rate of a whale is extremely low, and they can hold their breath for 90 minutes at a time. In comparison, dogs, cats, and mice take many more breaths per minute and live much shorter lives.

Somewhere in between are humans, who on average take up to 18 breaths per minute with a resting heart rate in around 70 beats per minute. Presumed we live for 70 years or so, being the estimated average, this number of heart beats adds up to a few billion beats over a lifetime. In fact, despite seemingly being the species on Earth earning most heart beats during a lifetime, most species get around a billion heart beats

during life.

A few others are luckier, as us humans. However, despite the lifespan length of a species, it appears that many species receive the same total number of heart beats, where they can choose to use them at a rate of 1200 per minute, like the hummingbird, or space them out into eight slow, ponderous beats per minute over numerous years, as is the case for the blue whale. An average whale, however, has around 20 beats per minute, and lives only slightly longer than us, which gets just under a billion heart beats. An elephant has 30 beats per minute for around 70 years, which adds up to roughly a billion as well, whereas the little skittish hamster has a rapid-fire pulse of 450 beats per minute in a short life of three years, also adding up to little under a billion beats.

These numbers aren't a hard rule, but a phenomenon common across many species, which may hold a secret of longevity if we learn to master our respiration to spread out those few billion heart beats on to a longer duration.

Then there is the Greenland shark. An impressive animal living in the deep dark ocean on depths of several thousand kilometers. The spectacular shark has an estimated lifespan of up to 512 years, with 390 as the likeliest average. And even if the Greenland shark only lived to the lower range of that estimate, it would still be the longest living vertebrae known to science. So, what characterizes the animal that is said to outlive humans by several hundred years? The shark lives a slow and calm life in the cold water with an average pace at no more than 1,5 kilometers per hour. On rare occasions, they'll increase their speed for short bursts. Their hearts only beat once every twelve seconds, which adds up to five beats per minute. In comparison, the human heart beats averagely 60 beats per minute; and this is at rest.

There seems to be a direct correlation across of species between one's ability to keep a low heart rate, breath less and live long lives. However, humans are facing evolutionary troubles that animals are not. Due to the ability to live a life without consciously considering our breathing patterns, modern influences of work occupations, eating habits and even training routines have inhibited our ability to breathe properly. Psychological influences have further affected our ability to breathe deeply and calmly, and keeping a frequent, low heart rate.

Nose for Breathing, Mouth for Eating

It's no longer merely a matter of conscious awareness when it comes to optimizing the pattern of breathing. Anatomical changes have occurred during the last few decades, which have decreased the size of our jaws. The industrialization and modern agricultural changes provide easily accessible foods, which are processed, soft and easy to chew. Our ancestors chewed for hours a day, every day, and because they did so, their mouths, teeth, throats, and faces grew to be wide, strong, and profound. We no longer chew as much as we once did. This lack of chewing has affected the structure around our chin and the space around our teeth to result in a tendency where all teeth no longer fit naturally into the human mouth, which has become a widespread epidemiology of wisdom teeth removal. Chewing is directly linked to an increase in stem cells, more bone growth, looking younger and better breathing, so this adds to the negative causes of eating

processed foods, instead of raw and solid foods.

Out of 5400 mammal species, humans are the only ones who suffer from misaligned jaws. Our airways are continually getting more obstructed and constricted, resulting in the nasal cavities to decrease in size. When nasal cavities become smaller and more constricted, we end up relying on the mouth for breathing. The human species was smartly designed with two sources of breathing: a nose and a mouth. When one gets inhibited, we can then change to a secondary source. This ability to change is an effective survival skill. But when one of these sources end up being chronically inhibited, it causes troubles. Asthma, exercised induced asthma, snoring, and sleep apnea are a few of these issues related to inhibited respiration and constricted airways.

Today, we don't recognize snoring as the real issue it essentially is. Snoring is often referred to as something funny and cute, especially when it occurs in children. When our partner or parent snore, it gets subject to laughter and entertainment. On the contrary, snoring is a sign of an evolving, deeper lying issue that is both unnatural and should be fixed. When snoring, our airways are partially constricted and often occurs when sleeping with the mouth opened. The inability and lack of strength for the tongue to remain in a proper posture, creates a partial suffocation, which induces a hunger for air and an unnatural breathing rhythm.

Some further develop sleep apnea, which is becoming widely more common amongst many people on a global scale. Sleep apnea is a potentially serious sleep disorder in which breathing repeatedly stops and starts. A person is out of breath for certain periods repeatedly throughout the night. The symptoms are often loud snoring and an intense feeling of tiredness when waking up.

In ancient times and in indigenous people today, this problem has been well known. They knew the importance of nose breathing and were aware of the signs and abnormality of mouth breathing. At night, when the children went to sleep, the mother would gently place her fingers on the mouth of the child to ensure that the lips were sealed when the child fell asleep [61]. Closing the lips would provide the children with an early, unconscious habit of keeping the mouth shut through the night to freely utilize the nose for breathing and prevent the troubles that comes with mouth breathing.

Breathing problems seems to be yet another issue created by society in evolution, which gives us more signs of a species rather in devolution. The knowledge of breathing seems to have only survived with those who stayed in touch with nature and stayed isolated from modern culture. The primary source of breathing is even mentioned in the Bible, which gives rise to the idea of an essential, forgotten piece of knowledge. In Genesis 2:7 it says: "Then the lord God formed the man of dust from the ground and breathed into his nostrils the breath of life, and the man became a living creature."

It seems our ancestors used their nose for breathing and also during physical exercise. The same goes for indigenous tribes today, including the Tarahumara tribe from Northern Mexico. Researchers studied the breathing pattern in the tribes and found that they used nasal breathing over the very long runs, they regularly covered. They found to their surprise that the average heart rates of the running people were as low as 130 beats per minute. In comparison, the regular Western marathon runner has an average heart rate on 160-180 beats per minute. This indicates the beneficial calming effect on breathing when nasal-breathing has been adopted as a habit, which is utilized in all situations [62]. This breathing through the nose was an

innate trade that both our ancestors and present-day indigenous tribes were aware of to cover large distances of physical activity with their mouths closed.

Although, nearly half of people in the world are habitual mouth breathers, chronically breathing through the mouth either by habit, or because their nasal cavities have not been stimulated enough to become properly opened. Luckily, this process can be reversed.

The mouth is designed for the purpose of eating and speaking. Speaking which, in fact, only happens on exhalations. Inhalations, on the other hand, and respiration in general, should happen through the nose, which acts as the primary source of breathing. When the nasal airways become restricted or, inhibited, the mouth acts as a backup for the uptake of oxygen.

Ancient cultures seemed to possess a deep level of understanding, which science is now beginning to confirm. To most people it would seem most obvious that oxygen absorption was highest when breathing though the mouth. To some people, it might even be. But this is because of an inability to freely breathe through the nostril caused by adopted poor habits.

Because of the way nasal breathing purifies, heats, moistens and pressurizes the air, an increase in oxygen absorption of approximately 10-15% compared to mouth breathing. This is one of many benefits of nasal breathing. Chronically breathing through the nose can lower blood pressure, maintain a steady and low heart rate and thereby improve heart rate variability, also called HRV. It also reduces lactic acid as oxygen is delivered to working muscles, which causes a reduction in the sensation of fatigue. Nasal breathing can boost nitric oxide sixfold. Nitric oxide is a molecule that plays an essential role in increasing blood circulation and delivering oxygen to cells. The amount of nitric oxide in the body influences immune function, weight, circulation, mood, and sexual function, and can be increased by humming on the exhalation or making a small noise in the back of the throat when breathing, also stimulating your vagus nerve.

When breathing through the mouth, pressure decreases, which causes the soft tissue in the back of the mouth to become loose, creating less space and making breathing more difficult. Oppositely, when breathing through the nose, airways become wider, the lungs can extract more oxygen. When the airways are too narrow, our ability to perform physical exercise gets inhibited. Imagine completing a football game or a marathon while breathing through airways the size of a very narrow straw. It doesn't matter how good shape you are in or how determined you are; if your airways are obstructed, you will not be able to take in enough air to properly oxygenate your body.

Mouth breathing also results in a mild form of dehydration. Waking up with a dry mouth and an intense feeling of thirst is a sign of mouth breathing throughout the night. When we breathe through the nose during physical activity, we maintain our level of hydration more efficiently in comparison to inhaling through the mouth.

Test this for yourself. Take a glass and place it in front of your mouth. Exhale into the glass. Watch how the glass is accumulating dew on the inside. Now do the same by exhaling with your nose into the glass and watch the difference.

In 2018, George Dallam, a professor of sport science and Olympic triathlon coach conducted a study to test the effects of nasal breathing during high intensity training on recreational runners compared to how

they responded to their habitual patterns of oral breathing [63].

I believe it's safe to say that one of the main reasons for the extensive use of oral breathing is, obviously because of the ignorance to the potentials of nasal breathing, but also because of the uncomfortable sensation of air hunger that follows with physical exercise, which forces the individual to reject the efficiency of such methods during high intensity exercise.

The study examined ten recreational runners; five males and five females, who were first tested in their traditional approaches of oral breathing during high intensity exercise, which was followed by an alteration of the breathing pattern from oral to nasal strictly for the next six months.

The results of the study might be of surprise to some. The research showed the recreational runners were able to utilize nasal breathing in all levels of running intensity, and without loss in VO2 Max or time-to-exhaustion. The data showed superior physiological economy and ventilatory efficiency, which suggests the runners would be able to improve health and fitness without sacrificing performance abilities by nasal restricted breathing.

Their performance data weren't even status quo comparison to their data during oral breathing. Respiration rates dropped from 49 breaths per minute to 39, corresponding to a reduction in roughly 20 percent, whereas the ventilation was reduced by 22 percent. What this means in practice is, that during exhalations there will be lower levels of oxygen and higher levels of carbon dioxide, meaning more oxygen is being kept in the body as well as a higher level of carbon dioxide are being tolerated.

The study should give us an indication for the potential benefits we can achieve by adapting to nasal breathing without compromising performance, and leaves us with the questions:

Does nasal breathing during high intensity exercise sacrifice VO2 max and physiological economy like we used to believe? Nope!

Does it take conscious effort to learn and adapt to it? Indeed!

And Dallam's study shows that it can be achieved within only six months of training, so the vast number of potential benefits in nasal breathing can be brought into physical exercising.

When we take fewer breaths per minute, we accumulate more carbon dioxide, which is associated with a greater oxygen absorption. This mechanism is because oxygen molecules are traveling in the red blood cells, which wants to travel to the parts of the body with a high concentration of carbon dioxide. It's always a matter of the right concentration and balance of oxygen and carbon dioxide. Too much carbon dioxide can be toxic, and the same goes for too much oxygen.

An optimal level of carbon dioxide encourages an optimal level of oxygen absorption. The easiest way to ensure optimization is simply by breathing lighter and breathing less. The average human is breathing more than twice as much of what is most appropriate to achieve balance. When breathing too much, we expel too much carbon dioxide, and the blood pH rises to become more alkaline. Instead, slower breathing provides the ability to hold in more carbon dioxide, which lowers pH levels to make the blood more acidic. All cellular functions take place at a blood pH of 7,4, which is the optimal place between alkaline and acidic.

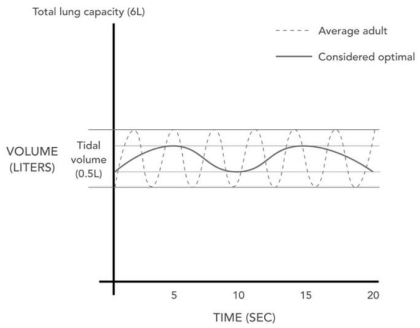


Fig. 4.1 shows an average total lung capacity in liters on the vertical axis, and time measured in seconds on the horizontal. Tidal volume is the amount of air being inhaled in a regular breath, corresponding to roughly 1/12 of our full capacity. We can see that circa during every 5 seconds 1.5 breaths have been taken within the tidal volume of 0.5 liters (dotted line). When I say that we need to breathe less, I mean both lighter and slower. Meaning expanding the duration of each breath, but also decreasing the amount of air being inhaled per breath (bold line).

We may consider the optimal breathing rate to be 5.5 breaths per minute, being 5.5 inhales and 5.5 exhales, which corresponds to a duration of 5.5 seconds for both inhales and exhales. This pattern results in a more coherent heartbeat as well as a blood circulation and nervous system to enter a more consistent state. This breathing practice is also remarkably similar to those used in religious chants, such as in Buddhism. When wanting to ease the nervous system and slow down the heartbeat, for instance after physical activity, exhaling for longer durations than inhaling initializes a process of calmness and slows down the heartbeat.

If you notice your heartbeat when inhaling, you will recognize that it speeds up. During an exhalation, it slows down. The longer we can hold the exhalation, the more the heartbeat is able to slow down and enter a state of coherence due to its response to the parasympathetic nervous system, known as the rest/digest response. This state is highly effective for recovery and maintaining a low heart rate in general. The less we hyperventilate and the faster we can go into a state of rest, the shorter the duration of recovery. This will be discussed in depth in last chapter.

Test for yourself:

- Place your finger on your pulse and take in a long and deep inhalation through your nose. Notice your heartrate.

- Now exhale as slow as you can. Preferably for at least 9 seconds. Now notice your heartrate again.

Shallow and improper breathing results in infrequent heartbeat trigger anxiety and stress and limit our ability to utilize the function of our lungs and diaphragm. The average adult only utilizes 10 percent of their diaphragm, which is deeply connected to your posture and respiratory system in general. Breathing is essential for all areas of our lives. It is deeply connected to all systems and bodily functions, and yet the importance of breathing has been neglected for so long. It is the one tool that does not require anything but yourself.

Athletes spend huge amounts of money on the optimal diets, physical training, and mental preparedness to achieve the few percentages of extra gains. People buy personal trainers, psychotherapists or get prescribed medicine to fix their health issues. Although the simple act of fixing one's breathing pattern is an easy, accessible, and free method to fix a large problem of health-related issue and maximizing performance to a level that wasn't possible by only focusing on other parameters. The work of the best psychologists, psychotherapists and other coaches will be limited, unless they first help their patients to address their dysfunctional breathing.

If you consider yourself a mouth breather or are in any doubts whether or not you breathe freely through the nose during night, there are certain actions to take to reverse this process and gradually change your breathing habits to become a chronic nose breather. The vast majority of my clients report difficulties breathing freely through the nose, especially during physical activity. In this process, we screen how severe their issues are. Severe issues include mouth breathing during night and day. At these instances, the nasal airways might be obstructed to such a degree that air is almost completely inhibited from being entered through the nose. In severe cases like these, it's best to start lightly to gradually force the nasal cavity to open.

Begin in situations of rest and recovery. When the heart rate is low, less oxygen is required, and the nose can be utilized for oxygen uptake. During the night, I tell my clients to make sure that their mouth is closed whenever they fall asleep and ask them to notice if they wake up during the night or the morning after, if the mouth is still closed. If it is, it's a good sign. If not, active measurements such as mouth tape can be done. Here, the lips are gently pinched together, and a piece of tape is placed on the lips to force all oxygen to only enter the body through the nose. If noticing sighing throughout the day, this is a sign of shallow and improper breathing. Some sighing is normal, but when it gets regular, it should be a warning signal. If you notice yourself sighing, then consciously regulate your breathing by slowing it down or even holding the breath for a short duration after the sigh to create a compensation. The issue of sighing will disappear as the breathing pattern gets corrected.

Most of my athletes, who compete at a high level and already contain a certain level of respiratory functionality, feel the restrictions at a higher intensity. This restriction usually happens during any type of physical activity, such as in the gym, during a cardio session or at the game. Here, I advise them to begin the process of adaptation at the lowest possible level, meaning at the point where the heart rate is lowest and the feel the first eager to breathe through the mouth. In these cases, nose breathing should be forced.

Especially in the periods after a completed set or strength training or a sprint, hyperventilation unconsciously occurs through the mouth when the hunger of air kicks in. Here, they are required to gain control over their breathing to overcome the sensation and forcefully breath through the nose at a controlled pace. It is merely a matter of adaptation, which goes with anything else in the world of sports and physical activity. Muscles grow gradually, strength improves over time and the same goes with nasal breathing. When adaptation has been achieved during daily activities, sleep, and gym training, one should move on to nose breathing during a run or, at the highest level, during competitive games or any other high intensity training. Use the mouth for backup until you have gained the control over your nose.

Do More with Less

To optimize the results gained from physical activity, one needs to learn how to do more with less. When we do more with less, we consciously breathe fewer times per minute and take in a smaller volume of air when we breathe. This forces us to take in less oxygen, and as a result offload less carbon dioxide. As a part of the process, we adapt to tolerate higher concentrations of CO2, and thereby a smaller need to breathe

You need to learn how to reduce air intake, even in situations where you feel an intense hunger for air. Learning this ability will result in an improved breathing economy, increase in athletic performance, and reduce the accumulation of lactic acid. A typical sign after an intense workout, a sprint, or any other type of activity that requires a high heart rate, is uncontrollable hyperventilation, and for most people, through the mouth. Although it is merely a sign of exhaustion, forcing the breathlessness away by fighting the hunger for air, shutting the mouth, and gaining control over the breath by slow nasal breaths, might not surprisingly seem difficult but results in a lowering of heart rate and speeds up the recovery towards the next set, sprint, or activity.

This is a segment of the breath retention technique, which can be highly beneficial in various ways. When breathing in thinner air, the kidney increases its production of erythropoietin (EPO), a hormone that promotes formation of red blood cells into the blood circulation and thereby improves the oxygen delivery to working muscles during exercise. This is the same method, which is done via blood doping, which has been widely used in the Tour de France. However, high altitude training, which is training at higher altitudes than sea level, is the natural way to achieve these stimuli. High altitude training also promotes this process by adapting the body to exercising with less oxygen, where one is living and training in specific places high above sea level.

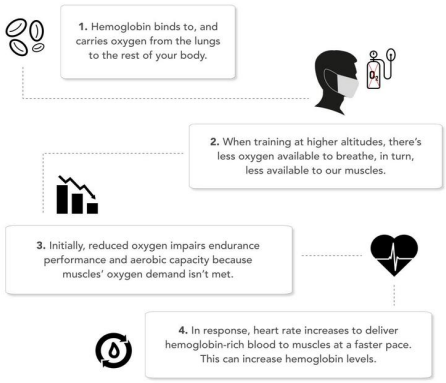


Fig. 4.2 The hemoglobin process.

These principles are based on the Bohr effect and are the principles the Danish physiologist Christian Bohr taught us on how to manipulate our own respiratory system back in the early 1900s. Through the Bohr effect the efficiency of oxygen delivery gets enhanced throughout the blood, where hemoglobin binds to the oxygen in the lungs and releases it to those tissues in the most need of oxygen. The enzyme carbonic anhydrase, which is present in red blood cells, then speeds up its conversion to bicarbonate and protons. The conversion process causes the pH of the blood to decrease and promotes the dissociation of oxygen from hemoglobin. This mechanism then allows the surrounding tissues to obtain enough oxygen to meet their demands.

The Bohr effect enables the body to adapt to changing conditions, such as exercising in higher altitudes, and makes it possible to supply extra oxygen to tissues that need it the most.

Breath retention training is another similar breathing protocol, then can be performed actively or passively. Passive breath retention techniques have been used for thousands of years in ancient traditions, such as variations of the Tummo Meditation. I will teach you this technique. Adapting the body to be able to work with less oxygen with breath retentions during physical activity, where breath holds are performed during training is one way of practicing active breath retention techniques. The Brazilian track coach Valério Luiz de Oliveira got known for his special techniques [64] in the training of his athletes to set several world records. The exact protocol of the technique included:

- A 400-meter run on a straight line is performed just around maximum velocity, where the breath is hold on an inhalation for the last 30 meters.

- A 3-minute rest is spent recovering before repeating.

In total, three sets are performed.

This protocol was done to simulate the fatigue occurring in the end of a race, where the hunger for air would be highest to ensure a more efficient finish pace.

In my work with athletes, we simulate this type of active breath retention training by doing breath holds for short durations during high intensity work followed by forcing slow and controlled breathing to prevent compensating for the lack of oxygen consumed during the process. It's a very exhausting process and would seem impossible to most people, but it's a matter of adaptation to teach the body how to cope with less oxygen and more CO2. To make the process of adaptation easier, practice breath retention either during walking until feeling a moderate hunger for air, or during warmups to gradually teach the body at a more humane level how to do more with less.

Konstantin Buteyko, a Soviet doctor and physiologist, became known for his controversial methodologies in treating asthma and other respiratory conditions by correcting the breathing pattern. He observed that unhealthy people had a different breathing pattern during rest, which was often through the mouth into the upper chest with a respiratory rate and volume greater than normal. His treatments included a series of reduced-breathing exercises which focused on nasal-breathing, breath-retention, and relaxation, focused on treating hyperventilation related issues, that led to low carbon dioxide levels in the blood and thereby lowering disturbances of the acid-balance in the blood and lowering of tissue oxygen levels [65]. His exercises included diaphragmatic activation during walking, breath-retention during walking, a series of small breath holds and nose unblocking exercises.

The foundation of his technique was based on nasal breathing, which was linked to increased oxygen uptake, improved sleep quality and preventing poor posture by breathing through the mouth. Strictly breathing through the nose during physical activity was one of the key elements in the Buteyko method. At night, it was emphasized that his clients would sleep with a tongue resting at the roof of the mouth to open the airways and prevent sleep apnea and other sleep related problems.

Another core element of Buteyko's practice was breath control, which involved consciously reducing either breathing rate or breathing volume. Here, he used a measurement called Control Pause, which was defined by the amount of time the individual could hold their breath between breaths after an exhalation. People who suffered from asthma would experience an increase in the Control Pause measurement and a decrease in pulse rate, which corresponds to decreased asthma symptoms, by using his methods. If the control pause was less than 25 seconds it was poor, while 25-35 was moderate with room for improvement. The goal was to reach a score of 40 seconds, which defined an optimal lung function that would help fixing respiratory issues indicating a good lunge volume [66]. The measurement of the Control Pause can be performed of every individual at any time and provides at good indication of a person's current condition. This method has later been known as the BOLT score, shortening for Body Oxygen Level Test. The test is based on how long an individual can hold their breath until feeling the first sensation of air hunger. This provides a test objectivity, which isn't affected by determination and willpower from trying to withhold the eager.

The lower a score, the more breathlessness one will experience during physical activity. To obtain an as accurate measurement as possible, be sure than you are in a state of rest or have been for at least ten minutes.

- Take a normal breath in through your nose followed by a normal exhalation out of your nose.
- After the exhalation, hold your fingers on your nose to ensure that no air will enter the lungs, and start the timer.
- When the first desire to breathe occurs, you stop the timer. These desires include a need to swallow, a constriction of airways or involuntary contractions of your breathing muscles.

Your first inhalation after the test should be calmed and controlled. If not, you may have held the breath for too long.

Other oxygen tests include devices that can track your inhalation as well as exhalation strength including lung volume, as well as a pulse oximeter that measures your blood-oxygen level through your fingertip. Though these tools require devices whereas tests such as the BOLT score requires nothing but your lungs.

The Ancient Way

Buteyko's breathing method is similar to ancient practices of breathing and meditation practiced by Yogis. Just as I have discovered myself, turning to Eastern practices to combine it with Western science shows you the vast number of similarities and provides you with tools that can improve health and life quality in humans.

Ancient traditions, Yogis and other masters claim to have known the one optimal way of breathing. They describe the contemporary norm of breathing as a disease of civilized man and a disgusting and barbarian way of breathing that isolates us from nature and results in more diseases that we would be able to comprehend. This barbarian breathing pattern has been adopted by the majority of people today resulting in contracted chests and sloping shoulders, which I have observed myself as poor postures and compressed bodies in my practices with people.

Torso compression especially in the area of the chest and ribcage is a clear indicator of poorly adopted breathing patterns. In fact, observing a mouth breather and a person not being able to utilize deep, diaphragmatic breathing reflects in both their face and overall posture. You will learn more about these mechanisms later in this chapter.

The ancient traditions were aware of an element of breathing which the western society was ignorant of. They believed the air contained more than just oxygen, and this vital force was essential for life. This was called "prana". Prana being energy, an intangible force neglected by western world. A healing force that every human should be able to achieve, but most are ignorant to. Some students and masters were able to master this force, but only if they were willing to learn. By rhythmical breathing, an individual would be

able to bring himself into harmonious vibration with nature and aid the unfoldment of his latent powers. Not only would he be able to cure diseases in himself and others, but he would also learn to master fear and worry-based emotions. Perfecting breathing resulted in an ability to withstand the cold, due to plenty of good warm blood, which enabled him to resist the changes of the outer temperatures [67].

They believed respiratory problems and particularly colds would be cured by the combination of optimal breathing practices and partial fasting for a day. Breathing also has a major influence on the nervous system, which affects and influences all organs including the reproductive organs. They were advocates of continence and chastity and emphasized the importance of controlling animal passions by controlling sexual desires, which, in the western world, is often an unknown term with the porn industry, cheating and high divorce rates. Sex-energy should be conserved and used for the development of the body and mind, instead of being dissipated in unnatural excesses.

This energy is prana, and this was the Sanskrit term of Absolute Energy. Prana manifested through the nervous system, which perfect breathing would be able to manipulate.

Yogi Ramacharaka was the pseudonym of the writer who wrote the work *The Science of Breath*. Here, breathing was classified into four methods:

1. High Breathing
2. Mid Breathing
3. Low Breathing
4. Yogi Complete Breathing

High breathing was the lowest ranking of the respiration methods. This method was what western civilization had adopted to and was often connected to mouth breathing. It was the barbarous method of breathing, which was the cause of many diseases, and required the greatest amount of energy with the smallest amount of benefit. Here, the upper part of the chest and lungs are used to consume a minimum amount of air, whereas the diaphragm is raised and unable to expand properly.

Mid breathing was referred to as ribcage breathing or intercostal breathing. Here, the diaphragm is pushed upward, and abdominals drawn in. The ribs are raised, and chest partially expanded. This method was better than the previous but far worse than the others.

Paradoxically enough, this method is similar to the one I practice and teach in breathing during physical engagement. Here, abdominals are drawn in and ribcage expanded. We will discuss this later in the chapter, so that you will learn when it is advantageous and when it is disadvantageous to avoid any misconceptions.

Low breathing is also known as abdominal breathing, deep breathing, diaphragmatic breathing, etc. In low breathing, the lungs are being given more space to operate, so that more air can be inhaled. To Western science, this method is known to be the supreme way of breathing. Although the yogis didn't consider low

abdominal breathing as the supreme. Yogi Complete Breathing was, to them, the perfect way of breathing. It included all the benefits from both high breathing, mid breathing, and low breathing to activate the full function of the respiratory system and the muscles involved. They saw Yogi Complete Breathing as how nature designed us to breath. To do the method, the individual must follow the following guidelines:

Breathing Exercise I: Yogi Complete Breath

1. Stand or sit tall. Breath through the nostrils, inhale steadily, first through the lower parts of the lungs pushing forward the front wall of the abdomen. Then the middle part of the lungs is filled pushing out the lower ribs, breastbone, and chest. Then fill the high part of the lungs into the upper chest which is lifted including the upper seven pairs of ribs. In the final part, the lower part of the abdomen gets slightly drawn in, which gives the lungs support and helps fill the highest part of the lungs. These are not separate movements. Instead, it consists of one flowing, circular motion moving from down to up. The inhalation should be performed for a couple of seconds, which is possible after a little training.

2. Hold the breath for a few seconds.

3. Then exhale slowly, while holding the chest in a firm position and slowly lifting the abdomen upwards as the air leaves the lungs. When all air is exhaled, relax the chest and abdomen.

The Yogi Complete Breathing guideline is a great tool of gaining control over one's breathing and correcting the patterns by exercising. Just like you would do with any other type of exercising towards correcting a dysfunction. If you are not sure whether or not you breathe correctly throughout the day and night, do this assessment, and see how many of the following questions that fit you:

1. Consider your breathing at this moment:

- Is there movement in your chest or abdomen when you inhale?
- How much movement do you notice in the given place?
- Can you hear your own breath?

At the majority of the day, especially during rest, you should be able to feel your breathing moving into the abdomen. Although, the more movement you notice during your breathing, the more heavily you tend to breathe. The same goes for noisy breathing. Breathing should be light and silent and move through the abdomen.

2. Do you notice yourself breathe through the mouth during daily activities?

3. Do you breathe through the mouth when you sleep?

Tiredness and dryness in the mouth upon waking up during the night or in the morning are signs of mouth breathing during the night.

4. Do you snore or periodically hold your breath during sleep?

5. Do you regularly sigh throughout the day?

Sighing now and then is normal for most people, but when it becomes regular, it may signal symptoms of over breathing.

6. Do you regularly experience nasal congestion, restriction of the airways, fatigue, dizziness, or light-headedness?

As discussed in the introduction to *Human Mechanics*, all matter in the universe is made of vibration, even from the tiniest atom. Everything is in rhythmic, dynamic motion creating constant change. Rhythm applies to everything you see as balance is a universal key element. This is what creates the circulation of planets around the sun, the rise and fall of the sea to the beat of the heart.

These rhythmic laws were understood by the Yogis as a principle and were applicable to breathing in order of the human body to match the frequency of nature and obtain balance, increase the amount of prana, and improve psychic abilities and mental healing.

The Yogis based the rhythmic breathing methods on matching the rhythm of the heartbeat with the rhythm of the breath.

Ascertain your normal heartbeat by placing your finger on your pulse and count the beats six times: 1, 2, 3, 4, 5, 6 and over again. Continue counting six beats until the rhythm becomes fixed in your mind. As a beginner, one inhales about six pulse units, but as one progress in practice, the number of units should be greatly increased.

The number of units should be the same in inhalations as well as exhalations, while the units during breath retention should be the half.

Breathing Exercise II: Rhythmic Breathing

1. Sit tall in an easy posture, while holding the chest, neck, and head in an as straight line as possible with the shoulders slightly held back and hand resting on the lap. This provides a body, which is largely supported by the ribs and opens up the movement of the diaphragm.

2. Inhale a full breath and count the six pulse units.

3. Hold the breath and count half of the units, in this case being three.

4. Exhale slowly through the nostrils and count six pulse units.

5. Again, hold the breath for three pulse units.

6. Repeat for the number of times you wish but avoid fatiguing yourself.

7. When you are ready to finish the exercise, practice the Cleansing Breath which will rest you and cleanse the lungs.

Yoga and breathing go hand in hand. These are parts of ancient traditions several thousand years old. The oldest branches of yoga were known as Mantra Yoga, Prana Yoga and Dhyana Yoga. They all share the same common aspects of getting the body and mind in sync to improve the vitality of the soul by relaxation, deep breathing, posture, and prana. When yoga originated as a spiritual practice its foundation in breathing primarily; it has since been adopted in the western world and evolved to something new.

This is why I, in some cases, do not recommend yoga as a practice. It has neglected focus on breathing and psychology in the western world, has changed into a practice that revolves much more on static stretches and long poses, that do not respect the deeper layers of the practice, and instead risks causing more harm than benefits. When yoga becomes a physical practice, such as in form for a flexibility workout, it tends to cause hyper flaccidity and more joint pain due to too long stretches that do not rightfully include proper breathing and the end goal of relaxation. This is a distorted form of what yoga originated as.

Yoga is proper posture and proper posture is perfect breathing. Posture and breathing affect each other both ways around and one does not exclude the other. Trying to breath freely with a compressed torso is like trying to fill a balloon in a water carafe. Improving mobility is influenced by the nervous system to a large degree. So, if yoga is to be made sense of, it would include proper positions or stretches that respect a perfect breathing pattern, which would manipulate the nervous system to relax and ease the connection between the brain and the body to let go and be able to move in broader directions, as a relaxed mind will result in a relaxed body.

Qi Gong is another branch of yoga which origin is from ancient China. The practice combines elements of movement, consciousness, and breath work. Qi is the cosmic energy, the vital force which is similar to prana and can further be described as an unlimited universal energy supply, frequently mentioned in Chinese literature. The health-oriented practice involves flowing movements to support willpower, focus and the channeling of energy through the meridians of the body by specialized breathing in symbiotic harmony with the coordination of eyes and focus of the mind.

They consider the eye as a direct gateway to the soul, the eye acts as the control center to guide the flow of qi throughout the body. The mental focus is a key element in the practice as the power of visualization is the driven force in the internal work of qi. The vital breath is not merely a matter of oxygen absorption, but rather the absorption of energy, which, in combination with proper diet, would circulate through the meridians to create functional energy. This combination of the vital breath with body movements and attention would drive the energy throughout the body to open blockages as well as gather and store energy in the body. Tai Chi is yet another similar practice that involves flowing bodily movements combined with a meditative mental state and the focus of perfect breathing to improve the energy flow through the meridian lines in the body. The meridian lines have been acknowledged since the distance past as an internal system of tracks by which the energy flows, like internal tracks of the circulatory system. These energy meridians have been manipulated through movement concepts as just mentioned, acupuncture, cupping therapy and massages and is widely used in Traditional Chinese Medicine where treatment of the energy flow also includes herbal teas and the utilization of food as medicine.

Any indication of energy blockage was considered the root cause of health issues in the human body,

which could be caused from bad nutrition, poor breathing, drug or alcohol abuse, psychological issues, trauma, injuries and more. The flow of energy was, and is still in the tradition, strongly believed to determine our overall existence, such as how we think, feel, and move.

This may be one of the reasons why the human body and mind can go enter a highly emotional sensitive state just from getting therapy, such as massages.

When I work with my clients on various therapeutic techniques, they often report a released state of trapped emotions when manipulating certain areas of deep and locked tension. Sometimes, people even break out in tears. Specific body areas carry specific emotions hidden in the dry fascia, and maybe bioelectric meridian lines. One specific body area that carries information and can be a predictor of specific conditions is the gut. This is due to the gut-brain axis. From my practice with clients, one thing that always helps me assess the state of the client is the fascia around the intestinal and digestion system in the abdominal region. The more tension and resistance this area of fascia expresses, the more it indicates an underlying condition of a sense of insecurity, anxiety, or trauma. Organ sensitivity in this area seems to mirror trapped emotions which gives expression in the way we react in the superficial layers of the muscles and fascia tends to lock up and refuse to let go.

Through our upbringing we learn how to suppress our emotions, manipulate ourselves to forget trauma, deny and exaggerate our fears, and avoid crying until the day it all accumulates and we collapse. These are examples of stored energy that can cause pain, dysfunction and someday illness. Emotion and energy are stored in the body where we feel them.

It doesn't matter whether we call it the chakras, the meridian lines, or fascial areas around the organs. If for instance, having been sexually assaulted, energy is blocked and trauma stored in the reproductive area, which can be expressed in different ways, such as the inability to express yourself sexually. Guilt, shame and fear are often experienced as being stored in the lower part of the stomach; hence anxiety and fear often result in stomach aches.

Muscles contain memory and tissues do the same. How we think, feel, and act tends to express itself in our posture through our neuromuscular response to our emotions. You can easily tell from the posture of an individual if they are depressed or happy. They seem to be "stuck" in their emotional state. For the same reason, all negative emotion is expressed as flexion as our innate response to fear and anxiety is to protect our vulnerable parts of the body. This emotional state is not only expressed in our posture, but also transferred to the way we move in our biomechanics.

Memory is stored in the body by the recognition of past events prompted by certain stimuli from the peripheral nervous system. Just like sensing a certain smell that instantly sends you back to your childhood by highly clear memories you had forgotten until the moment when you recognized the exact smell. And as we tend to suppress our fears and anxieties, our brains react to pain and discomfort in the body by neglecting and escaping them. By accepting the pain and learning how to move through it, we let go and release the accumulated trauma. This both applies physiologically and psychologically, and this is why I always teach my students to embrace the pain until it is gone. This is an exciting area, that we will work through in depth in the next chapter.

The strong belief of a human being based on energy and electricity rather than being pure flesh, blood and chemistry runs across of cultures, and religions and is widely acknowledged in the religions of Hinduism and Buddhism. Here, the internal energy system of the body is described as the seven chakras, which run in a vertical line from the base of the spine to the top of the skull. The concept is yet the same: for the human being to remain healthy and balanced, all seven chakras must be in harmony and prevent polarizing. With the ability to control one's emotional system and nervous system by breathing, mindfulness, movement and proper diet, the chakras will balance towards the spine and create wellbeing and longevity. This energetic spinal activation is also known as *Kundalini*, the inner fire, which is exercised through yoga, breath-work and meditation. When kundalini is activated correctly, the practitioner will experience profound experiences, increased creativity, and a state of expanded consciousness.

Pranayama is the term of special breathing techniques that can invoke kundalini, which ancient yogis have practiced for thousands of years to control this force. To make the intangible concepts more tangible and thereby easier to digest, various scientific studies have been conducted to examine the existence of qi, prana, energy, or whatever you choose to call it. One Chinese study examined the physical interaction of the external qi with substances at various levels from molecular to nuclear and found that the emitted qi interacted with and affected matter at different levels, specifically affected the molecular structure of liquid water significantly [68]. This study can be related to what was discussed earlier in this book about the work of Dr. Emoto on the effect on water by the usage of different words.

Another exciting experiment was published by the CIA, which has later been removed from their own webpage, observed the influence of qi on the molecular structure of matter.

Since all living organisms are composed of molecules, the study would create a better understanding of the biological effects of qi. Their experiment showed that qi had real physical effects on the non-living molecules they examined, why they concluded that qi gong therapy should not be considered merely a psychotherapy, but something with more significant physical influence.

The meridians were discovered by the Chinese thousands of years ago, reportedly simply by observing the human body. Since recently, the prevailing view in the West has been that the effects from acupuncture was nothing more than placebo.

Robert Otto Becker, an orthopedic surgeon and researcher of bioelectricity, hypothesized that these acupuncture meridians instead were electrical conductors that carried an injury message to the brain, which responded by sending back the appropriate level of direct current to stimulate healing in the troubled area. A system which the Chinese had somehow found and explored by trial and error with allegedly much less knowledge about the human body than we have today.

Becker coupled up with a biophysicist to study his hypothesis of the possible bioelectric nature of the meridians, where they not only found that different acupuncture points showed an increase in electrical conductance compared to places where there were no acupuncture points, they also found that the electrical conductance in the points followed a 15-minute rhythm in the current strength, superimposed on the circadian rhythm [69].

In Tibetan Buddhism a practice known as Tummo Meditation, meaning "inner fire," was a regularly

used practice that would awaken the inner fire and kundalini. This meditation is a breathing technique combined with visualization. It was practiced by monks in the Himalayas to enter a deep mental state and increase the inner heat, or what Western science describes as the body's core temperature. The meditation would enable the individual to control their nervous system and thereby body temperature. Everyone possesses the skill of awakening this inner fire by gaining control over their own body temperature. Although, Western civilization has adopted the idea that cold is hostile and should be avoided or, at the very least, should be entered covered in thick layers of clothing. In fact, the human body seems to be able to withstand the cold to a larger degree than we allow today.

In the 1980s, the doctor and professor Herbert Benson studied monks, while they practiced the Tummo Meditation to examine if any measurable changes occurred in their bodies.

Dr. Benson had the monks sit in a chilled room of 40 degrees Fahrenheit or 4 degrees Celsius, where they would enter a deep meditative state by using the Tummo practice. Other monks would be covered in sheets soaked in ice cold water. Normally, when the body is exposed to these temperatures, it doesn't take long before the core temperature drops to such a degree that death occurs. But after short time, the measured body temperatures of the monks began increasing. Those covered in the sheets would experience the sheets drying completely out in just an hour.

Herbert Benson concluded and added: "Buddhists feel the reality we live in is not the ultimate one. There's another reality we can tap into that's unaffected by our emotions, by our everyday world. Buddhists believe this state of mind can be achieved by doing good for others and by meditation. The heat they generate during the process is just a by-product of Tummo meditation [70]."

These Buddhist monks and our ancestors were aware of a simple technique, distant from the Western man's reality, which only required the attention of the mind and breath that would create a deep state of calmness, stress relief and the ultimate control of the body temperature and nervous system. Addressing issues like these in the Western world would often require medication to try and solve it from a chemical perspective. Could these simple techniques, or uncovering the power of breath, be a key solution and a healthier alternative in solving a wide range of health-related problems, that in the West are addressed with medicine and risks of a domino effect of side-effects it includes?

The original Eastern version of the Tummo practice includes consciously reducing oxygen levels in the blood by breath holding along with muscle contractions and visualization. The body and mind should be in complete sync, why the technique requires practice to enter a state of flow. The practice involves rigorous breathing, also known as vase breathing, where muscle contractions are performed during the breath holds. This creates the inner heat and the mastering of visualization allow the individual to control their body temperature. The visualization involves imagining a hollow channel within the body, where the buildup of heat is imagined. By pairing the breathing technique with an intense focus on the sensation of heat, the body temperature begins rising.

Breathing Exercise III: Tummo Breathing

1. Sit tall in a calm and quiet place.

2. Close your eyes and relax your mind removing any thoughts popping up. Imagine the thoughts passing by like the clouds on the sky. You don't have to consider them; they will slip by.

3. Keep your focus on your breath as you inhale and exhale. Start by keeping it slow, deep, and calm.

4. Begin the practice by taking big, heavy breaths in through the nostrils and exhale fully either through the nostrils or the mouth. After each exhale contract your abdominal and pelvic muscles while imagining a read hot ball near the navel are. Visualize the heat of the ball growing and spreading.

5. After some time, take a big inhale through the nose and hold the breath, gently swallowing and pushing the diaphragm down to push the oxygen down towards the glowing hot ball while lightly contracting the internal muscles of the pelvic floor.

Hold the breath for as long as you can, keeping the muscles contractions and imagining the inner heat growing and spreading.

6. Then slowly exhale relaxing the muscles, keep visualizing the heat growing.

7. Continue the practice and work on improving the inner heat and body control.

The ancient religious Tummo practice of growing the inner fire is similar to the practice by which the Dutch pioneer Wim Hof became famous for. Wim Hof is a man whom I respect and admire for his humility and passion. Also known as "The Iceman," Wim has achieved extraordinary achievements in the cold by breath control, which was earlier thought to be impossible. His achievements include climbing Kilimanjaro in nothing but shorts, running a half marathon above the Arctic Circle barefooted, and being covered in ice for more than 112 minutes. All by the power of the breath to control the core temperature of the body. He later taught this method to the public to prove that it is not a unique capability, but merely a practice everyone is capable of.

Scientists have conducted a wide range of scientific studies on Wim Hof to discover whether or not the practice actually creates any biological changes and have concluded that through practicing those techniques, the sympathetic nervous system, and immune system can be voluntarily influenced, which was recently thought impossible. One study aimed to test if the results of the first study could be reproduced, so they injected 12 random practitioners with an endotoxin [71]. The results showed that they, via controlling the nervous system and immune response, were able to increase the anti-inflammatory mediators by 200% and decrease pro-inflammatory mediators with 50%, important factors in inflammation and autoimmune diseases. Another study, aimed to test the cognitive changes that occurred during the breath techniques, where they placed Wim Hof in a temperature-controlled suit and through an fMRI and a PET scanner. Results showed activation in the brain areas associated with pain suppression, self-reflection, and wellbeing [72].

During the Christmas holidays of 2021, one of my clients and friend of mine, fighter Alistair

Overeem, invited me to visit Wim Hof at his residence in the Netherlands. Alistair and Wim had worked together for several years to create an enhanced baseline for Alistair's manipulation of calming the nervous system during fights through breath-work. I remember the cold, dark December morning walking into an enormous yard, immediately spotting a wavering flag stating "The Wim Hof Method." Isolated from the rest of the town, I felt an intense calmness arising despite the unknowingness of what was about to happen. We walked through a long driveway until a huge cigar shaped sauna came into sight. Just in front of that, a large nine-foot stone wall appeared with a waterfall dripping into the icy water below. Despite my current ambitious level of doing cold exposure and advanced breath-work techniques, I immediately knew that this was going to challenge my mental baseline.

We entered an enormous greenhouse with enough plants and trees to fill a tropical forest. On the ground numerous mats, blankets, and pillows were placed for us. Hearing the soothing background noise of water dripping into the sea and the palm trees wavering inside the greenhouse, I could not help but feeling the calming presence of nature.

Suddenly the door opened, and a loud, energetic, "HELLOOOO GUYS" entered the space. "GOOD SHIT," he then shouted.

There wasn't a moment of doubt that Wim has entered the room. Wim had us sit down in a cross-legged position presenting ourselves. As the entertainer he truly is, he grabbed his African hand drum and started drumming wildly, shouting, and humming hymns that could easily have been a Viking war theme from 1000 years ago. If you weren't in the mood by that point, this piece formed the atmosphere for what was about to take place. He asked us to lie down flat on the ground and cover ourselves up with blankets. Prior to this, he emphasized the importance of "peeing and pooping everything out," because the body would be letting go of everything. "What is going to happen will shake your entire organism," he added.

We began the breathing session, and nothing was new to me. I felt a bit disappointed as the breathing technique was similar to what I had already practiced for years. If you wonder by now: "yeah, but I don't know these techniques – they could be useful for me!" Then hang on tight - they will be outlined in detail.

However, I decided to let go and follow along.

Wim shouted, "BREATHE ALL THE WAY IN. AND LET GO."

This deep and rapid hyperventilation went on for minutes. My hands and feet began tickling intensely and I got increasingly lightheaded. Intense sensation, but still nothing new to me. After a couple of minutes of hyperventilation, Wim asked us to take a last big inhalation and almost let everything out to then hold our breaths.

First round of breath hold lasted 90 seconds. Due to the blood oxygenation, 90 seconds turned out to be quite easy. Approaching the end of the 90 seconds, he shouted "BIG INHALATION AND HOLD. NOW SQUEEZE YOUR BUTTHOLE AND ABDOMINALS…. AND LET GO."

Round two came, followed by round three, four and five. After roughly 45 minutes things began to change. What started out as small tickling in hands and feet now surrounded the entire body. You could feel your entire layer of skin electrically vibrating as the sensation of time and space began disappearing.

Suddenly, I could not stop smiling. I had no idea why, whatsoever, but I felt an intense rush of joy that then developed into uncontrollable laughing. I was aware and conscious, but I wasn't. As the body felt like it was wavering through space, vivid colors came into appearance. After the last breath hold of the exercise, which lasted four minutes, we were then again asked to take a last deep inhalation and squeeze our intrinsic muscles. At this point the 'trip' peaked. A deep ringing appeared to my ears removing all other sounds. I was no longer able to hear Wim's voice, nor the water hitting the sea. Anxiety suddenly arrived at the surface of my mind as I immediately opened my eyes widely. I was calm, yet terrified.

In the aftermath of the experience, everyone shared similar stories. Wim explained to us how contracting the intrinsic muscles after the breath-work pushes spinal fluid up towards the brain being responsible for the individual experiences we all felt. Now everything made sense. Not long before, I had studied the science behind what some people tends to call the *Kundalini awakening* or *pineal gland activation*. What I came to learn was that if you do specific breath-work, while you squeeze the intrinsic muscles of the pelvis floor and deep abdominals, you push cerebrospinal fluid from the base of your spine up towards the brain (where the pineal gland is located), which then transports the DMT in your body to the brain, said to cause a psychedelic experience. The exact mechanics behind this concept will be explained in detail.

Could this have caused my uncontrollable laughter? And later the hidden trauma appearing as anxiety moving to the surface of my mind wanting to be processed?

As we took a break from the intense trip inside the deepest parts of our minds, I stumbled upon a young British guy, probably in his mid 20s. We shared our experiences and histories about ourselves, when I asked him how he knew about Wim. He told me how he, a couple of years before, met his girlfriend and decided to move to the Netherlands together. Short time after she was diagnosed with stage three cancer. As their world fell apart, she went directly to chemotherapy. He was desperate for a solution that could at least help her to recover faster. He reorganized her diet, studied sleep optimization, and purchased CBD oil for her. He distantly knew about Wim Hof and what he had achieved with his own body, and in a desperate attempt he texted him on Instagram.

To his surprise, Wim responded. He wanted to meet him and his girlfriend to talk to them and get a clear sense of her diagnosis. Wim invited them to a retreat, where they spent four days doing all kinds of breath-work and cold exposure. After the four days, she was appointed to the hospital to get more tests and a status on the chemotherapy. To the doctor's surprise, her numbers had significantly declined, and he asked her how this could possibly be true. What had caused the rapid improvement in her cancer diagnose will never truly be known. But she continued meeting with Wim, they both got close to him, and she has now fully recovered from cancer.

"FIVE MINUTES INTO THE ICY WATER! BUT FIRST - SAUNA", Wim suddenly shouted.

We walked outside from the comfortable greenhouse through the grey, rainy, Dutch winter weather before entering the longest sauna, I have ever seen. Wim poured water onto the hot stones as the calm, claustrophobic environment settled the atmosphere.

I decided to ask Wim a question I'd detained for hours: "How the hell did you even achieve all

this?!"

He then became quiet, before he replied: "Years ago, when me and my wife had our four young children, my wife became depressed. At one night, she went to our children's rooms, kissed them goodbye, and then jumped from the fifth floor. I developed severe depression and went through the most traumatic emotional state a man can go through, while having to take care of our four babies. I couldn't handle it. The only thing I could think about at that point was going to nature. Nature showed me the cold water. I went in."

The cold water gave him a few minutes of rest from the ongoing painful emotional trauma that repeatedly went on in his mind.

"When you have experienced the worst thing a man can face, five minutes in ice cold water is NOTHING."

This became the start of his journey, where a horrible event years later forced him to achieve things that science thought impossible.

In the end, Wim's hypothesis was simply that inflammation, bacteria, and virus - even cancer - primarily thrive in an acidic body. Therefore, the body would need to be more alkaline to stop the development of disease. And by doing his breath-work techniques, pH levels of the body were said to rise. Wim Hof isn't the first to describe disease development and acidity. Back in 1931, Dr. Otto Warburg won the Nobel Prize for his research in the cause of cancer, where he claimed that it was caused by a lack of cellular oxygenation resulting from acidosis in the body.

There's not that much of a difference between the Tummo meditation practice and Wim Hof's breathing techniques. In the end the message is clear: the human being is capable of altering a wide range of internal mechanics by the act of willpower and breath-work. By manipulating our nervous system, we can alter the way we feel, our blood circulation, body temperature and much more. By going into the cold, we can consciously stimulate stress responses through the sympathetic nervous system to reach and control calmness by the parasympathetic nervous system. This mechanism is known as "hormetic stress," where the act of going through low doses of stress can make us healthier and stronger through the changes occurring in the cells.

Cold exposure or cold therapy has been used for millennia in the ancient past. When the body is able to adapt to extreme temperatures, a lot of extraordinary benefits can be achieved. In contrast, if the body is not yet adapted to it, and the individual has no practical knowledge whatsoever in breath-work and control of the internal mechanisms, cold shock exposure can occur, which can be life threatening. During cold exposure, the body is able to increase brown fat tissues, which can turn calories from food into heat and increase the levels of adiponectin, which is linked to the aiding of fat burning. This process is also connected to the increase in anti-inflammatory response, which helps fight inflammation. Brown fat is rich at locations such as the lower neck, the upper and middle back. When you are young you have plenty of brown fat, but as you age it declines. But it can be brought back. This is because brown fat is thermogenic and activates when getting cold.

Cold exposure is one method to help increasing the amount of brown fat. This is done through a process where the exposure of the cold can lead to shivering of the muscles as response. This leads to the release of

a molecule called succinate, which travels by the blood stream to the brown fat that then increases the overall metabolism of your body, which results is fat loss, our white fat [73]. These are the more metabolic effects cold exposure has on our bodies. But the reason for its efficiency and popularity may be found another place. The wellbeing and sensation of unconditional joy. Roughly 15 minutes after being in the cold, the hormone dopamine begins to increase. Dopamine is the pleasure-hormone that makes us feel good, happy, and comfortable. Like the reward of doing something good. It continues to increase for up to three hours after exiting the cold.

When exposed to the cold, the blood flow and vascular system are activated and exercised. Other studies have shown beneficial effects on both longevity, the strengthening of the nervous system, improved recovery time, sleep quality, immune system, and pain reduction. We will cover programs for cold exposure and how to gradually adapt to the cold later in this chapter.

What is the physiological secret to these effects? One of the answers may be found in the vagus nerve. The vagus nerve is the longest cranial nerve running from the brain stem to the colon and connects to and interact with all major internal organs. Enlightenment can be described as our ability to control our own nervous system. With this ability the need for doctors would be drastically minimized. This is exactly what the monks and Wim Hof have proven to the public by their achievements in the cold. Even in ancient times, the greatest athletes were often represented as those with the best ability to control their vagus nerve.

The nerve sends information throughout the body into all major organs, basically telling them how to act. The outcome of the act depends on whether you respond to your parasympathetic nervous system, rest and digest, or your sympathetic nervous system being fight and flight. High stress levels result in lowering of circulation and organ function, and when it becomes a chronic condition, it leads to an under stimulated vagus nerve, which affects the organ function and may result in inhibition of erectile function, heart rate among others. This is also why there is a direct link between the stimulation level of the vagus nerve and our Heart Rate Variability (HRV), which measures the rhythm and time between each heartbeat [74].

Voluntary, short duration stress exposure can be greatly beneficial for human development, but when it becomes more or less chronic, we degenerate and stop functioning. The vagus nerve responds well to acute stress, and thrives in the parasympathetic nervous system, whereas staying in the sympathetic nervous system for too long is damaging. In the modern society of 9-5 jobs, noise pollution, social media scrolling, mainstream media fear manipulation, and general high stress and anxiety levels, human beings are left with little space in the harmonic parasympathetic state. The vagus nerve can be stimulated well enough to create coherence in the nervous system and throughout the organs.

Consider our early ancestors approaching a lion on the savanna. Fear signals to their brain to turn on the primitive fight or flight system, and energy gets mobilized to prepare for a threat, so the body can adapt to these conditions. Signals then travel down the spinal cord to the adrenal glands, squirting out adrenalin, which results in a sudden rush of energy and alertness. High awareness kicks in, the pupils dilate, the salivary juices begin to shut down, and as a result the heart rate and respiratory rate begin to increase, and blood gets send to the extremities because they have to either fight or flight. This is a very normal, and an extremely useful state which is our unique survival gene. The problem is, however, that when living in a society where

we are confronted with stressors and situations to react to repeatedly day in and day out, we begin to autosuggest and think about problems and things that might or might not happen. As a result, there's no energy left for you to do anything else than analyzing potential problems.

The individual's innate capability of controlling one's nervous system, and thereby the response to stress, has also huge impact on the organs responsible for digestion, a connection also known as the gut-brain axis. The vagus nerve is the direct link between the brain, mouth, and gut. Proper stimulation sends signals to the digestion system to cooperate and function optimally. This stimulation happens when we respect our mouth posture and function by repeatedly ensuring that the tongue is stimulated well enough, as well as the soft palate in the roof of the mouth, which are connected to the vagus nerve. Proper swallowing and the enabling of the tongue to rest in the roof of the mouth are parts of the first processes in digestion and stimulation of the nerve. Therefore posture, breathing, eating and mouth function, in general, are highly connected to one another. We will come back to this.

As we now know, both proper breathing and cold exposure are highly beneficial for the function of the vagus nerve. By forcingly breathing slow the communication along the vagal network opens to put us into the relaxed, parasympathetic state. In contrast, fast and heavy breathing reverses the vagal response and puts us into a state of stress. Especially practicing long exhalations, as earlier mentioned, improves the function of the vagus nerve, and slows down heart rate.

One study asked a group of participants to perform two minutes of vagus nerve breathing before taking a 30-minute decision-making test. Another group was not asked to focus on their breathing patterns prior to the test. Notably, the participants in the group focused on the vagus nerve breathing technique with long exhalations reported lower levels of stress and provided a significantly higher percentage of correct answers to the test than the control group. The authors of the study concluded that: "these studies show that brief vagal breathing patterns reliably increase HRV and improve decision-making [75]." A mechanism that ensures that you can control thought processes and improve focus as a biproduct of you breathing. I would tell you the same thing if you told me that you were anxious before an exam. Likewise, I'm teaching these techniques to my athletes, especially those in position to take potential penalty kicks. Gaining control over their breath significantly increases their chances of success in the following task in contrast to keep breathing fast and heavily, which will keep them stuck in their sympathetic response.

Clearing the mind through meditation regularly is also a great method in stimulating the vagus nerve. Chanting or humming, which is known through ancient meditative and yoga practice, are also great techniques in the stimulation of the nerve from the entrance of the mouth. You may have heard of the "aum" chanting before as special mantras during yoga sessions or meditations. On the exhalation of a breath, a long and deep *aaauuuummmmm* is chanted to prolong the phase of the exhalation and calm the body by holding this light, but intense noise in the back of your throat. This is an ancient practice with the roots in Hinduism and has been practiced for years to gain the benefits of the vagus nerve, only recently adopted in the West. When chanted, the "aum" vibrates at the frequency of 432 Hz, which is the same vibrational frequency that vibrates throughout most parts of nature. Therefore, it is known as the sound of the universe.

Great similarities can be observed when considering the vagus nerve and its influence on the various organs of the body compared to how our ancestors and considered the seven chakras in the human body.

The seven chakras represented each their body part in a vertical line from the root chakra at the base of the spine to the crown chakra at the top of the skull. Ideally, all chakras should be balanced for the human to function optimally. Likewise, the vagus nerve is running along a vertical pathway from the brain and throughout the spinal cord, where it connects to the different levels where the organs are located. Like the chakras must be in balance, the job of the vagus nerve is also to achieve coherence in the organs, a state known as homeostasis in the West.

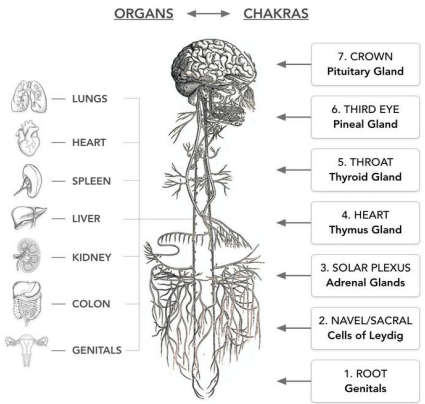


Fig. 4.3 A human brain and vagus nerve, and the potential similarities between its effects on the organs (left) and chakras (right).

The pineal gland is a neuroendocrine transducer secreting melatonin and plays a critical role in our circadian rhythm. Crystals in the pineal gland are found to be responsible for electromechanical biological transduction mechanisms due to the structure and piezoelectric properties [76]. The piezoelectric effect in the gland occurs when mechanical stress is changed into an electrical charge. The word piezoelectric is derived from the Greek work piezein meaning "to squeeze." And as we squeeze our intrinsic muscles during breath-work, cerebrospinal fluid gets pushed up towards the pineal gland, creating the mechanical charge that translates into an electrical charge and compresses the crystals in the gland to create the piezoelectric effect. When we inhale, the sacrum slightly flexes back while the sutures of the skull expand. When exhaling, the sacrum slightly flexes forward while the sutures close. This is the mechanical action propagates the movement of cerebrospinal fluid up and down the spinal cord and into the brain and pineal gland. So, when

we contract our intrinsic muscles of the lower body while inhaling slowly through the nose, we accelerate the movement of the fluid towards the brain, and we receive what our ancestors may have called the kundalini effect ending at the pineal gland.

Just like an antenna, the pineal gland is able to become electrically activated and generate electromagnetic fields. As told, science has yet to finally conclude the gland's full function in the human body apart from the melatonin it produces in our sleep cycle. But when someone sits with their eyes closed during a meditation and reports significantly heightened sensory experiences without activity of their senses, it begs the question on what is causing this complex inner sensory effect, that seems more profound than the external world, when the senses are not engaged. Could it carry frequencies of invisible information and be responsible for our consciousness, like a TV, an antenna or the invisible Wi-Fi signal that can be tuned in to? I will try to answer these questions later in the book, when we zoom in on the pineal gland.

These effects can be engaged and enabled by special breathing techniques, which brings cerebrospinal fluid toward your brain and accelerates the activity of the pineal gland. Not surprisingly they are similar to what you have already learned from ancient yogi practices. All it takes is awareness, visualization, breathing, muscle contractions and, of course, a lot of practice.

Breathing Exercise IV: Pineal Gland Activation

1. Start by sitting tall with your hands placed on the lap and close your eyes.

2. Lift up your pelvic floor by squeezing and breath normally. Squeeze the muscles as tight as you can and hold it for five seconds. Then let go.

3. Repeat this three times in total to gain conscious control over the muscles.

4. On the next round you contract the same muscles while contracting the lower abdomen by pulling it up and in. Hold for five seconds and relax.

5. Repeat this sequence three times in total as well and remember to keep breathing and don't do any breath holds.

6. On the next round you squeeze the muscles in the pelvic floor while drawing the lower abdomen in, and now also contracting the muscles of the upper abdomen to tightening the entire core. Hold the pressure for five seconds again and relax.

7. Repeat this sequence three times in total and progressively squeezing them a little tighter round by round.

8. Now take your finger and place it on the top of your head and push the fingertip into the center of the scalp, so you will remember the point when you take away the finger. Your attention and energy must be focused on this point.

9. Put your hands back in the lap, and without contracting any muscles, take a slow breath through the nose, and follow the breath from the pelvic floor, through the lower abdomen, upper abdomen, the chest, the throat, into the brain and all the way to the top, where you pointed your finger. When you reach the top, hold

your breath, and keep your attention on the point to focus your energy to the spot. Hold for ten seconds and relax.

10. Repeat this for one more round. Make sure you remember the spot, and otherwise you can point your fingertip into the spot once again. Imagine the energy flowing up through the vertical axis like drawing fluid up a straw.

11. Now it is time to pull it all together. On the next breath, when inhaling through the nose, you lock the muscles of the pelvic floor while engaging the muscles of your lower abdomen as well as the muscles in your upper abdomen, pulling them all up and in at the same time. With the intention of pulling the energy from the lower part up and into the brain. Follow the breath though each of the centers as it enters the top of the brain. Keep your attention here and hold your breath while squeezing these core muscles. Hold for ten seconds and relax as you exhale.

12. Repeat this round for three times in total.

Muscles of Breathing

Recognizing breathing as being more complex than merely a respiration cycle of inhalation of oxygen into our lungs as exhaling of carbon dioxide is not common knowledge. The fact is the act of breathing carries a vast range of responsibilities through our muscular system, which is similar to the way most other muscles function. It is well known that when we grab a dumbbell, flex our elbow, and lift it upwards we must engage our biceps to execute this action. Or when we bend down to lift an object from the floor, we automatically engage our hamstrings and gluteus muscles to fight gravity and stand up. The same applies whenever an inhalation is made to fuel the body with oxygen and again when exhaling to remove the waste. These muscles are less visible to the naked eye, and it is easy to become ignorant to the fact they exist and play an essential role.

In fact, they need as much care in form of exercise and therapy as any other muscle does. Just like exercising for a stronger core, a bigger biceps or a more defined butt, the respiratory muscular system, as well as the bones they surround, must be exercised for improved functionality and strength to carry, and lift, for instance the ribcage, which acts as the shield surrounding our lungs.

When I assess my students and ask them the initial question of standing in their preferred neutral stance while breathing normally, the outcome is often the same. If you imagine a solid, vertical, and strong pillar with great stability able to withstand a hurricane, and a good flow of air running up and down of the inside of the pillar, and then compare it to a deformed rubber pipe shaking as the wind blows, being so curved and compressed that air flow encounters resistance inside the pipe, then the latter is usually the natural position people tend to fall into by automation.

A pelvis out of optimal position; often tilted anteriorly with a curved and compressed lower back and a stomach popping out making them look obese even though their percentage of fat is less than ten. As a result of a lack of core stability from the pelvic muscles and the abdominal muscles, the structure of the pelvis become weak, unstable, and unbalanced, often resulting in the abdominal to be drawn in as the person

inhales and pops back our whenever they exhale. Although in fact, the optimal pattern of breathing should result in the exact opposite.

At the top of the pillar, I often recognize a curved upper back with arms and shoulders in a protracted position closing and compressing both the chest and the ribcage. Since these areas are responsible for the upper movement of the breathing, they rarely get engaged, since they are in a chronically compressed position, where the opening of the ribcage and chest because of oxygen being inhaled to the lungs, is profoundly inhibited.

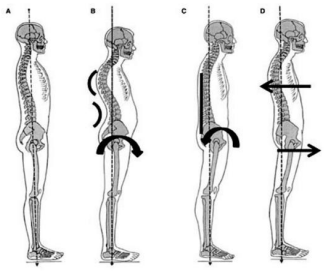


Fig. 4.4.1 Examples of postural issues, where A indicates a solid foundation for breathing, whereas B, C and D are examples of dysfunctions in the spinal cord and pelvis.

When I ask them to inhale, this often happens through the mouth, which signals movement into the upper chest. Because of the habit of chronic mouth breathing, the airways are often constricted, which not only inhibits their ability to breathe freely through the nostrils, but also reflects in the structure of their face and cervical spine. In this case, the neck is often locked in an improper position, forward flexed, and compressed, creating less space for the flow of air to run through the airways provoking a habit of opening the mouth as a gasp of air. As soon as I ask them to place the neck in a proper position by pushing the back of the neck backwards while lowering the chin, they report feelings of suffocation and a severely decreased ability to breath freely. This is one of the reasons why proper posture is paramount to the art of optimal breathing and why both must be correctly equally as they work inter-connectedly.

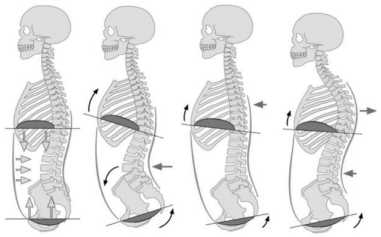


Fig. 4.4.2 How posture affects breathing. When the spinal cord is aligned and almost perfectly vertical with a neutral pelvis, the diaphragm can expand and support the lungs optimally without compromising posture. If pelvis is locked in a tilt, if there is a lordosis or kyphosis on the spine associated with weakness and dysfunction, the breathing mechanics may be compromised.

Optimization of the breathing anatomy, both muscular and skeletal means the improvement of gluteal engagement to lift the pelvis along with the internal pressure of the pelvic floor and abdominal core muscles that should know when to engage and when to relax. This is applicable in the section of abdominal breathing, where the mechanisms require them to relax on the inhalation and contract on the exhalation, whereas breathing types such as ribcage breathing might require them to be constantly contracted.

Traditional approaches of exercising the core abdominals in planks, ab crunches, leg raises, ab wheels among others do not improve your core muscles and may be a complete waste of time. Apart from this it may work counteracting to your breathing. And often, toned abdominals, appearing as a sixpack, may indicate a stressed muscular area that lacks mobility and the ability to relax. Tense, immobile areas like these will impair the mechanisms of breathing. If, oppositely, the sixpack is a biproduct of great breathing mechanics and functional core muscles, then you are gifted with function and aesthetics. What defines functional cores muscles will be covered later.

When breathing is optimal the diaphragm, the main muscle of your breathing, has great strength and mobility to expand the ribcage that surrounds it and increase the amount of air being pushed down into the lungs. When inhaling, the intercostals elevates the ribs along with the pectoralis minor and scalenus, that results is a wide and expanded ribcage. Meanwhile the Sternocleidomastoid assists by lifting the sternum. Therefore, a muscular system free of compression, tension and trauma can provide a greater foundation for the respiratory muscles and bones to assist each other and expand this ‘internal balloon.’ The bigger an internal balloon you are able to create, the better.

When then making an exhalation, the intercostals act by depressing the ribs, whereas the diaphragm moves up and encloses the ribcage and thoracic cavity, where parts of your abdominals also help to depress the ribs to now decrease the size of the internal balloon. Everything begins in the area of the cervical spine, the neck, which optimally runs in an almost vertical line through the rest of the spine, where air can freely

flow up and down without restriction and ‘bumps on its way’.

My initial approach is therefore always to decompress their entire structure to create a better flow of air through the vertical axis as well as opening the posture to improve the function of the internal and external mechanics.

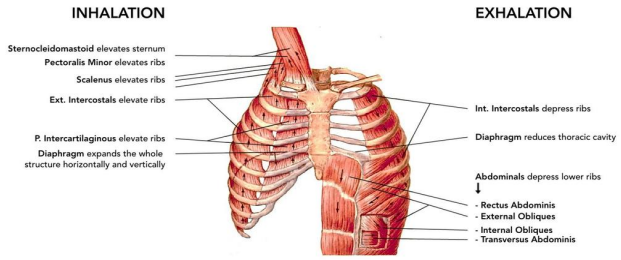


Fig. 4.5 The respiratory muscular system.

The mechanics of respiration manifest through the elastic movements of the lungs and the activity of the thoracic cavity that expands in all directions in which the lungs are contained. The thoracic cavity is also known as the thorax and is the bony structure that acts as the flexible container with the diaphragm at the bottom and accessory muscles attached to it, which guides and directs breathing. It consists mainly of the sternum, the ribs, and the spinal column, which as a complex act like a box. The ribs are moving during inhalations and exhalations by the two muscular layers, known as the internal and external intercostals. The diaphragm separates the chest box from the abdominals and is the umbrella-shaped muscle that attaches to the spine and below the. The diaphragm is not present in figure 4.5.

During the inhalation process the respiratory muscles expand the lungs so that a vacuum is created as air rushes in. Without the aid of the respiratory muscles, the lungs cannot expand properly why the caretaking of this internal muscular system is just as important as any other muscle and tissue in the body. This will result in the ability to attain the maximum degree of lung expansion and thereby oxygen absorption into the bloodstream.

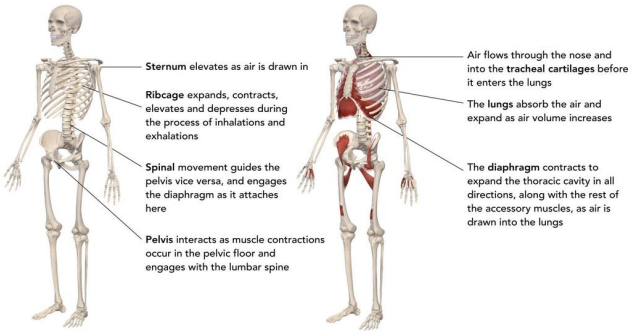


Fig. 4.6 The process of breathing related to some of the important bones and muscles in action.

It's a misconception that the lungs cannot be changed and manipulated with. The fact is, that they can actually be strengthened like muscles. We see this in free divers who have a much greater lung capacity than the average person and can contain a much larger volume of air. Among healthy adults, the average capacity is around six liters of air contained in the lungs, whereas free divers are often able to contain 14 liters of air due to their great specialized respiratory training in improving their capacity by strengthening the lungs. Divers are not born with large lungs, but instead they train them through freediving and breath retention work. Partaking in moderate exercise consistently like walking, running, or cycling as well as practicing breath holds is beneficial for the improvement of lung capacity. Even these small changes will enable deep breathing and improvements in air uptake in the lungs by up to 15 percent.

In figure 4.6, you see an overview of the main skeletal influence of breathing with the center of the thorax guided from the inhalation of air through the nasal cavities. Adding the first layers of deep tissues gives you an understanding of the lungs' role in the thorax as their movement are guided by some of these tissues and respiratory accessory muscles. This is part of what I define as the "true core," hence these deep muscles and tissues stabilizes and mobilizes the entire structure responsible for breathing.

This is the less visible structure of your body, which is therefore easier neglected due to its invisibility to the naked eye. I strongly believe that it is these deep and invisible structures that carry the most information in unlocking the traumas of the human body, which is why I work inside and out with my students, instead of the other way around. In the modern era of fitness, we are schooled to work the other way, which often only makes the job half done and does not uncover the real core of the issues. If an engine of a car does not work, replacing the tires won't get you far. The aesthetic appearance may be improved, but the function unchanged.

When we add heavy weights and high intensity training to a physical structure that is deeply unstable and insecure, it is a matter of time before that structure collapses. The structure might appear stronger on the outside from those heavy weights; however, the foundation remains unchanged. When we are not taught these principles from childhood, irritation and inflammation will keep accumulating until the limit has been reached and injuries come rushing in.

The majority of the time, my students and clients come to me with the same issues. If they are lucky enough to haven't got themselves a serious injury yet, then they never feel like they are moving optimally or performing on 100%. Inflammation keeps accumulating and recurrent irritations keep occurring. As the core mechanics of their physical engine does not know how to operate optimally, their biomechanics gets more and more inhibited caused by compensational patterns all around the body, which creates imbalanced and overstressed tissues affecting the structure and movement of the skeleton. This is why we are approaching a majority of the population in the Western world who experience pain during movement.

Working with high performance athletes competing on the biggest stages week by week, my assessment is always based on finding the root cause of the problem in a jungle of returning issues. They always ask me the same: "Why do I never feel like I'm performing at my best? I never really feel ready for the games! It's like my body keeps compensating and pain keeps occurring in different parts of my body."

These athletes have been raised in a culture where load and intensity are more important than biomechanics and functionality. The athlete needs to be stronger and more massive to become able to compete at the highest levels as quick as possible. When they come to me, we are forced to reverse this cycle. To get back to basics, back to where they had to be in the earliest years of life. I ask them to stand in front of me with nothing but underwear and relax.

In most cases, I'm able to spot their physical and emotional trauma as they are expressed in their neutral posture. I can roughly tell which muscles are compensating and falling out of the interconnecting lines. To support my assumptions, I have them lay down. I ask them to close their eyes, relax, and place their focus on where I touch them. Then I gently apply pressure on the spots which I assume are doing the compensational work and are overstressed. If they react with clear discomfort, I know we're on the right path and I know where their traumas are stored. If they run around every day with physical trauma and deep tissues that lacks an ability to relax and thereby function, then their injuries will keep returning. From here, we work intensely to transfer them from a default state of fight/flight to a state of rest/digest. Only then - and it will take time - can we fix their biomechanics and movement patterns to optimize their respiratory system, joint functionality, and tissue balance to reintegrate the functionality, a process they should have learned much earlier in life. I call this the initial levels of my assessment. No heavy weights, no high intensity exercising, and no stress whatsoever is performed for the first long periods of our cooperation. These are parameters that are only allowed at the "last levels," since everyone should possess some knowledge to intelligently use their bodies before even considering adding load or intensity to them. Because, if you can't do it slow, then how would you supposed to be able to do it fast? After all, modern fitness culture only schools us in the last levels.

Postural assessment backs up our progress and provide us with data to analyze the progression of the individual. Whenever my patient can stand in a relaxed position without the joints falling out of optimal

biomechanical position, then they are most likely also able to perform and move dynamically in these positions. As functionality and mechanics at that point are reintegrated in the body, the interconnections and innate cooperation of joints and tissues can now work smoothly. This process is the biproduct of the integration of the body's response to operate between relaxation and tension as well as knowing when to relax and when to stress. Knowing when to put the pedal to the metal and when to recover.

Accessing the deepest layers of the respiratory muscle system can be divided into two groups: therapy and exercising. Like any other muscle in the muscular system, a respiratory muscle needs care in the form of massage and tissue manipulation, as well as strength and functionality in the form of exercising.

Myofascial release is a form of therapy that we will cover much more in detail in the next chapter. During this manipulation of the fascia, pressure is applied to pump hydration back into the tissue, release its accumulated trauma work to reintegrate its function in assisting the muscles' movement and the operation of the connecting joints. This is critically important concept that applies to the whole body in general, but when revolving around the concepts of respiration, one must think in terms of manipulating the fasciae that are responsible for the muscle movement in the respiratory work. Therefore, this is the first layer of reengineering functionality and biomechanics. Manipulating the fascia can be done through pressure from the fingers, either your own or your therapist's. It can also be done through specific tools, such as a stick, a lacrosse ball, or a medicine ball. It all comes down to the area of the body, it's size and how aggressively you should access it.

Overview of relevant respiratory muscles:

1. Diaphragm
2. Pectoralis Minor
3. Sternocleidomastoid
4. Internal & External Obliques
5. Rectus Abdominis

Pain experience and tissue resistance often indicates an underlying issue. The more pain, and the more resistance the tissue expresses in form of thickness, the bigger a potential problem. A rule of thumb is that you either apply static pressure by actively relaxing the muscle as much as possible while applying as much pressure as you can tolerate without movement, or you apply dynamic pressure by very lightly moving the pressure back and forth through a few millimeters of movement. Hold the pressure for at least 120 seconds per spot. This time is the appropriate duration for the muscle and fascia to learn how to tolerate the pain, let go and relax.

You will discover, over time, that the pain is slowly dissolving as the tissues become more released and your brain learns how to control the sensation of pain. The bigger a muscle and area of fascia, the bigger an area and more potential spots you would need to cover on this location. When there is no more pain left

on the spot, this will likely indicate that the area has become released properly.

In the following phases of exercising, the strength and functionality, proper biomechanics will ensure that the pain will never return to the same degree again, since the biomechanics will improve, and the movement pattern of the muscle starts working optimally. Myofascial releases should only be necessary to be focused intensely on once and when the functionality of the fascia is then reintegrated, it should be used only as an assisting tool for future means. If it happens that the severe pain levels and sense of restrictions return, this should be a warning sign of continuous improper biomechanics.

In relation to the muscles around the thorax, which guide the respiratory function, stress and restriction here tend to compress the whole thorax and limit its mobility. We see this clearly in the posture that reflects as a closed ribcage, rounded shoulders that enclose the chest, tight abdominals (like being stuck on the exhalation), a rounded upper back, and a forward flexed neck where the cervical spine in falling out of alignment with the rest of the spine. This posture impairs breathing by restricting the air flow from the nasal cavity into the lungs and further restricting the movement of the thorax in breathing.

Opening this “box” therefore requires release of the responsible muscles and tissues. It can easily be done by yourself with nothing but your hands or a few essential tools. Five of the most important areas of respiratory muscles are illustrated in the following guidelines in how to assess yourself in this initial process.



Fig. 4.7 Sitting Diaphragm Release

Sit erect and relax. Ensure that your abdominals are fully relaxed so you're able to properly dig through these superficial layers and hit the diaphragm beneath. Sitting relaxed in this position requires a certain level of flexibility, so if feeling unable to sit in this pose, choose then the next variation. As the abdominals are fully relaxed, gently hold on your ribs while pressing four fingers of each hand underneath the ribcage while applying pressure. Either hold a static pressure or softly move around or slide your fingers in a gliding downward movement along the ribs. In this case, oil can be beneficial to support the massage technique.

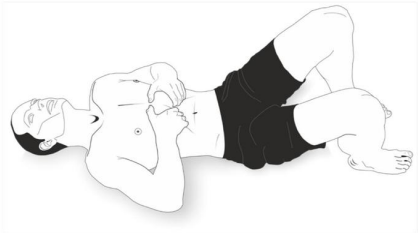


Fig. 4.8 Lying Diaphragm Release

This variation can be done as an alternative to the first variant, or if your level of flexibility makes you unable to perform the first. Lie down supine with the feet supporting in the ground to support the relaxation of the abdominals. The guidelines are the same here as you hold on your ribs and use four finger of each hand to gently apply pressure underneath the ribs to hit the diaphragm.



Fig. 4.9 Pectoralis Minor Release w/Lacrosse Ball

Locate the position of your Pec. Minor and make sure to have a sort of small and hard ball, such as a lacrosse ball. Use the end of a wall, a pole or anything like that, which you can lean yourself up upon. Place the ball on the Pec. Minor and lean against the wall while using the lower body to create the pressure.

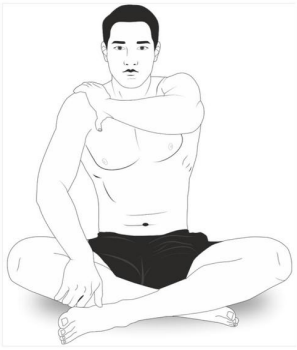


Fig. 4.10 Pectoralis Minor Release w/Finger

Use this version as a secondary and alternative one for the Pec. Minor release, as the usage of your finger will enable to create a lighter pressure. It is also more versatile as it can be performed no matter where you are and what you're occupied with. Although this must be considered as secondary, since it acts very superficial in relation to the first version.

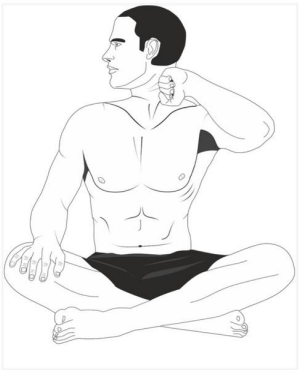


Fig. 4.11 Sitting SCM Release w/Fist

Sit erect and relax. Place your fist with the palm of your hand facing outwards and the knuckles touching the SCM. As you apply pressure with the fist, gently turn your head away from the fist while pressing the fist the opposite way. When the head has turned 90 degrees, release the pressure and start over. - Massage oil can be beneficial to use in this technique.

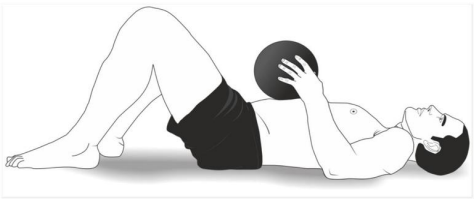


Fig. 4.12 Lying SCM Release w/Soft Ball

This variation is not a level up or down of the first one, but rather an alternative version. So do both, or do the variation that fits you best. Lie down and place the soft ball on one area of the sternocleidomastoid (SCM). The ball must be approximately the size of a lacrosse ball but softer, such as a tennis ball. Rest the neck as good as possible and gently apply, either static pressure, or dynamically roll across the SCM by slowly moving the area of the neck and face.

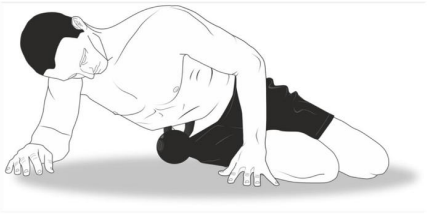


Fig. 4.13 Lying Oblique Release w/Kettlebell

Lie down over the handle of a kettlebell. The handle must not be too thick. Make sure the handle is placed on one side of the abdominals somewhere in between the ribs and the pelvis. Release all tension from the superficial layers, being the abdominals, and let the kettlebell work its way as deep as possible. With no muscle contractions and complete relaxation, hold the pressure and let the kettlebell gradually move deeper and deeper.



Fig. 4.14 Sitting Oblique Release w/Finger

This version of the releases of the obliques is a lighter version, where you will not be able to go as deep as in the first one but works like a more accessible and versatile variation. Sit tall and relax the abdominals completely. Hold with one hand just above the pelvis and push with your thumb as hard possible. You can either hold a static pressure, or lightly move your thumb around, while keeping a good pressure.

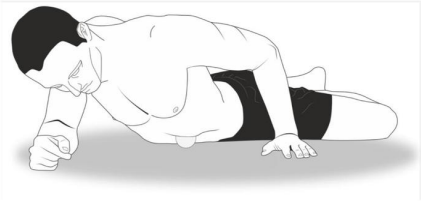


Fig. 4.15 Lying Upper Abdominal Release w/Lacrosse Ball

Sit erect and relax. Ensure that your abdominals are fully relaxed so you're able to properly dig through these superficial layers and hit the diaphragm beneath. Sitting relaxed in this position requires a certain level of flexibility, so if feeling unable to sit in this pose, choose then the next variation. As the abdominals are fully relaxed, gently hold on your ribs while pressing four fingers of each hand underneath the ribcage while applying pressure. Either hold a static pressure or softly move around or slide your fingers in a gliding downward movement along the ribs. In this case, oil can be beneficial to support the massage technique.

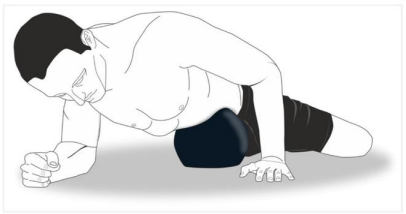


Fig. 4.16 Lying Lower Abdominal Release w/Soft Medicine Ball

This variation can be done as an alternative to the first variant, or if your level of flexibility makes you unable to perform the first. Lie down supine with the feet supporting in the ground to support the relaxation of the abdominals. The guidelines are the same here as you hold on your ribs and use four finger of each hand to gently apply pressure underneath the ribs to hit the diaphragm.

In today's fitness culture, these initial levels of trauma release and tissue balancing is a neglected practice. A visit in the commercial gyms, clearly shows a culture of "hard workers" that care more about — and probably only know about — the external layers of the body in how it looks and how much it can lift. Many of those people are in pain; a pain that does not disappear merely from lifting weights and pulling machines. They are working at a level that does not match their condition. Based on years of practicing, studying, and experimenting on myself and thousands of clients and practitioners, I have come to the conclusion the act of treating the body from inside and out, and not the other way around, creates the most profound results in relation to health, well-being, and performance.

When you have been fixing the first layers of your mechanics with regard to your respiration, you are ready to take the step towards the next level, which is the exercising of functionality in the same muscles that you have released and reintegrated. Applying load to the respiratory muscles is everything but simple as they attach to places most people don't know how to consciously move. Muscles that are attached to the shoulder joint, elbow joint, or knee joint would make better sense as they are responsible for conscious movement patterns that we perform every day. In fact, you can exercise your respiratory muscles in various ways, such as the pectoralis minor or abdominals merely by doing push-ups and sit-ups, but this has no relation whatsoever to the functionality of your breathing.

If we want to improve the functionality of breathing by the responsibility that the respiratory muscles carry, then we simply must breathe! Since the act of breathing alone would correspond to exercising the biceps by flexing the arm, it would make sense to add external load onto separate parts of the ribcage to improve the process of exercising those respiratory muscles. When I first became aware of this issue, that nobody seemed to talk about, I began wrapping my body up with several elastic bands in various ways to test how to approach the thorax most efficiently.

In the beginning, people believed that I thought I was Spiderman. People tend to not react nicely to such unseen concepts. By placing light weights on different body parts and wrapping bands to certain and specific parts of my body I became aware of a hidden treasure in applying load to the exact muscles that carried the responsibility of my breathing. I then initialized the phase of implementing the techniques on my clients, which showed remarkable effects on their respiratory function, lung volume and posture. As all parts of my training methodologies are executed half naked in nothing but shorts, due to the visibility of the integrity of posture during movement, I quickly realized that regular rubber bands found on the internet and in the gyms, was neither functional nor comfortable to wear. Neither were they healthy to the skin, or the environment for that sake. As I implemented the techniques to my training system, I customized and produced bands for the purpose of respiratory strength training in a material and thickness that was perfectly suited for the case. Comfortable to wear and a resistance that fitted the purpose optimally. I chose to call them Biofeedback Bands as they signal feedback to the biology of the body in response to our posture and how we should breathe. The Biofeedback Bands are available for purchase on my website on mtperformance.co

The following section of exercises can appropriately be called corrective exercises as their purpose of execution is to correct bodily functions, which is the next step of the layers of training. The bands should not be seen as replacements for breathing training but instead as add-ons like the Olympians runner's strength training is an add-on to their sprint training. One serves the purpose of exercising the skillset and

whereas the other provides the load and feedback that gives strength to improve the functionality.

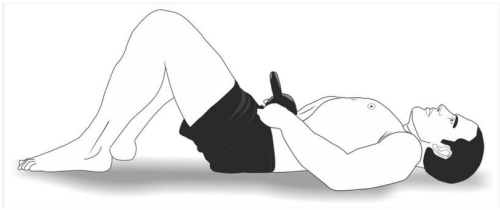


Fig. 4.17 Lying Diaphragm Breathing w/Kettlebell Navel Retraction

This corrective breathing version helps you open up the ribcage by isolated breathing into this area, where the diaphragm is located. Lie down with bended knees and the feet resting in the ground. Place a kettlebell or any other type of weight on your abdominals at the region around your navel to ensure abdominals constantly retracted and inactive. Take a deep inhalation through the nose and into the ribcage. Let the ribcage expand as much as possible during the inhalation without any movement from the belly.

Do 3 sets of 30 inhalations.

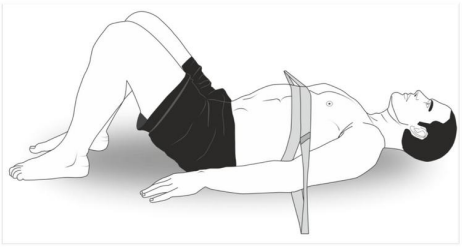


Fig. 4.18 Lying Diaphragm Breathing w/Biofeedback Band Resistance

Where the version above can be considered an assisted version, this one will be a resisted version of diaphragm breathing. Take two Biofeedback bands, or regular bands alternatively, of the same resistance level and tie each end of the two bands to a solid structure or two heavy weights, so they won't move. Move into the bands so that each end of both bands is placed on the middle of each side of the ribcage applying medium resistance. Take in a deep inhalation through the nose and breath solely into the area where you can feel the tension from the bands. Let the bands expand in a horizontal direction as much as possible as you inhale.

Do 3 sets of 20 inhalations.

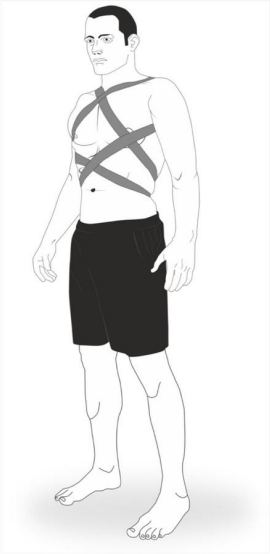


Fig. 4.19 Standing Breathing w/Biofeedback Thorax Resistance

This is the first version of learning how to implement and engage an active proper posture, while breathing with resistance from the Biofeedback bands. To wear the band as illustrated on the picture, tuck one end of the band on one shoulder by putting the arm into it. Then pull pretty hard on the band and drag it down through the chest and abdominals and all the way behind the body through the lumbar spine and continue the pull to the abdominals again and put then the opposite arm into the other end of the band. This should give you a symmetrical and equal forward-pull on both shoulders. To fight this resistance and ensure a proper posture, stand hip-width with toes pointing straight forward, tilt your pelvis posteriorly while activating the glutes and retracting the navel to engage the abdominals. Retract both shoulders while spreading the lats and elevating the scapulae. From a lateral view, the spine should be completely straight. While maintaining this posture, take deep inhalations through the nose and breathe through all of the resistance to expand the band, and thereby the whole thorax, in all directions.

Do 3 sets of 15-20 inhalations.



Fig. 4.20 Standing Breathing w/Biofeedback Vertical Resistance

This corrective variation is providing you vertical resistance and applies a force of compression from above. Stand - again - in a hip-width stance with the toes pointing straight forward. Tilt your pelvis posteriorly while engaging the glutes and abdominals by retracting the navel. Flex the elbows in front of the body, either with no external weight, or with a pair of light dumbbells in the hands. Retract the shoulders while spreading the lats and elevating the scapulae. Make sure to fight this vertical resistance as you keep the muscle contractions, while breathing deeply through the nose and into the diaphragm by expanding the upper abdominals and ribcage in a horizontal direction on the inhalations. As the resistance band wants to pull you down, make sure that you stay upright with a perfectly aligned spine through the whole process.

Do 3 sets of 20 inhalations.

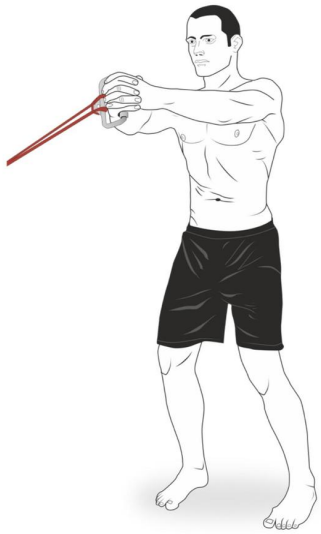


Fig. 4.21 Applied Breathing: Transverse Hold

This technique teaches you the practical application of implementing diaphragmatic breathing into your physical activity. As taught earlier, when having to engage the deep abdominals during physical activity, breathing freely into this area becomes inhibited. Hence, you'd have to learn how to breathe into the upper abdominals and ribcage to ensure diaphragmatic engagement. Stand laterally towards a cable/band and hold the handle with your hands. Stand in the same neutral stance as previously mentioned, but with the exception that the knees are allowed to be slightly flexed. Extend the arms in front of the chest with a slight flexion on the elbows. Keep a perfectly straight spine and open up the chest by retracting the shoulders. As you stand is this position, you should feel an engagement in the oblique abdominals, which should force the navel to retract. Maintain the posture and muscle contractions and begin breathing deeply through the nose and into the area of the upper abdominals and ribcage, while keeping the lower abdominals engaged and retracted.

Do 3 sets of 10-15 inhalations.

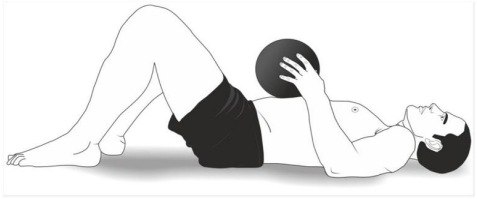


Fig. 4.22 Lying Abdominal Breathing w/Medicine Ball Resistance

Lie down and flex your knees with the feet supporting in the ground. Make sure that the lumbar spine stays in touch with the ground during the whole process. Place a medicine ball, or any other light weight resistance, on the mid part of your abdominals. As you breathe, inhale softly a full inhalation through the nose and into the area where you feel the resistance. Move the ball as much upward as possible during the inhalation to ensure an air volume as high as possible.

Do 3 sets of 20-30 inhalations.

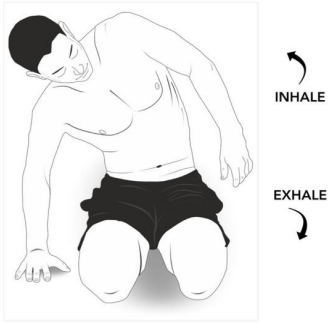


Fig. 4.23 Kneeling Unilateral Breathing

In this technique you learn how to emphasize the concept of compressing one side to expand the opposite. Sit in a kneeling position and place one hand in the ground just next to one of your glutes. As you take a gentle but big inhalation through the nose, you expand the opposite side of the hand at the area of the ribcage and abdominals, while visualizing the air flow primarily moving through one lung and one side of the body in general. Hold your breath for a few moments while keeping the single-sided expansion. As you exhale, gently come up to neutral and straighten the spine again, while keeping the hand in the ground.

Do 3 sets of 10-15 inhalations.

When we talk unilateral breathing, we emphasize the importance of “flattening out” any inequalities of the posture, which may further affect breathing. Less severe issues include lateral pelvic tilts and one-sided ribcage collapse/compressions. More severe issues include scoliosis or kyphosis, which are highly visible spinal curvatures that be devastating for functionality and life quality. When I assess clients with issues like these, I treat them with the combination of tissue manipulation to balance out inequalities of the tissues, use postural correction exercises and unilateral breathing techniques to expand the cavities of the compressed sides. Since the structure of our skeleton is a biproduct of its shell, being the muscles and tissues, we are not doomed by the way of skeleton is constructed. But in contrast, it’s a biproduct of the functionality of our tissues, which indeed can be manipulated.

In 1894, the rehabilitation specialist and schoolteacher Katharina Schroth was born. She was suffering herself from a moderate scoliosis and underwent the traditional treatment of steel braces before she decided to develop a more functional approach to fix the issue herself. Her approach got great success, which has been further developed and is still used as treatment therapy today. She helped her patients out of severe scoliosis, and people who were bedridden could walk again. Inspired by the concept of a balloon, she started by correcting her own posture by “breathing away” the deformities of her body by inflating the concavities of her body in front of the mirror. She discovered that the combination of specific breathing and postural control would change the structure of the skeleton [77] . She raised question to the traditional approaches of fixing a layer of the human’s mechanics by force rather than by functionality and movement; the same approaches performed today when dentists are trying to fix crooked teeth with braces just to let the teeth return to their normal position after the braces are removed. In this case, breathing and eating habits are the functional solution to fix crooked teeth, since the reintegrated functionality ensures that the teeth can retreat to their normal position and stay there due to structural changes rather than forced movement in a system that does not function optimally.

The Diaphragm

Imagine an umbrella with its handle attaching to your spine separating the chest from the abdomen. Every time you breathe in, the umbrella folds out and widens to expand your whole thoracic cavity and create space for the air absorption in the lungs. When you then exhale, the diaphragm contracts and withdraw to minimize the space created. During the expansion on the inhalation, the ribcage and abdominals are pushed out due to the diaphragm's downward movement. Oppositely, when the exhalation is made, the ribcage contracts and the abdominals are drawn in as a result of the decreased amount of air in the vacuum.

The diaphragm is the main muscle of the respiratory muscular system and proper deep breathing is often considered as a diaphragm fully engaged, whereas poor breathing does not properly activate the diaphragm. To locate your diaphragm, place your hands on both sides of the ribcage and take a deep breath. You should feel the upper abdominals moving outward as well as the ribcage expanding laterally. During the exhalation you should feel the whole cavity shrinking in and compressing as the abdominals tightens over the ribcage. Deep diaphragmatic breathing should not be confused with big and heavy breaths.

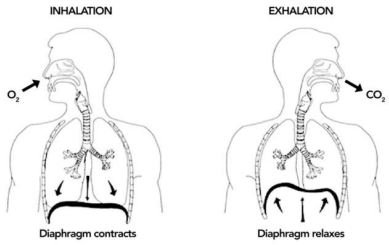


Fig. 4.24 The movement of the diaphragm respectively during an inhalation and an exhalation.

In fact, engaging the diaphragm works much more efficiently if the deep breathing is silent and slow in motion.

I use the analogy of a balloon when trying to visually explain the engagement of the diaphragm to patients who lack the ability to correctly visualize its movement. Consider a large balloon separating the lower parts of the upper body from the upper parts of the upper body. As you inhale and draw air into the lungs, the balloon is gently being filled up expanding in all directions. This means vertically, horizontally, and laterally in all possible directions. From an anterior (front) view, you should be able to watch yourself become wider and taller, where a lateral view will show you your anterior side of the abdomen and ribcage "popping out" with the exact same thing happening on the posterior (back) side of the area of the thoracic

spine and lumbar spine, which expand and pop out. The bigger a balloon you are able to create during the inhalation, the more oxygen you're able to transport into the body and the greater a utilization of the respiratory muscular system. Try for yourself and stand in front of the mirror, both anteriorly and laterally. How big a balloon are you able to create?

In general, abdominal breathing is the most efficient breathing method. Not only does is engage the diaphragm profoundly, but it also concerns the shape of the lungs. Since the lungs are narrow at the top and wider at the bottom, the amount of blood flow is greater in the lower parts of the lungs than the upper parts. This is why fast and heavy breathing into the top of the upper body, being the chest, does not take full advantage of the lungs, which limits the amount of oxygen transferred into the bloodstream. Apart from that, chest breathing activates the sympathetic nervous system, putting you into you fight or flight response, which supports stress and heavy breathing. Observe yourself, or your relatives, when being stressed or anxious. You will find there are visible heavy movements of the upper chest that often involves sighing as well. This state will put you into the negative cycle of never really overcoming the stress response by staying in the heavy and shallow breathing. By breathing through the nose and into the abdominals for the majority of the day, the quality of the blood flow will improve, along with the oxygen delivery to working muscles, stress and anxiety symptoms associated with over breathing will be reduced and better health and sports performance will become possible.

Proper diaphragmatic breathing is often confused with solely breathing into the abdomen. Correct abdominal breathing often provides an efficient utilization of the diaphragm. But the fact is, that the diaphragm can also be engaged without isolating the breath to the abdominals. The ability to properly expand the ribcage will also engage the diaphragm to a satisfying degree, since this is where the majority of the diaphragm expands during movement. This is a critical component, since abdominal breathing becomes an obstacle during physical activity that very few people are aware about.

During my experience with patients, I see the same issue again and again. They simply don't know how to breathe into the abdomen without losing the tension of their abdominal core muscles. This tendency is a huge issue relative to physical activity and sports performance. If your stomach keeps popping in and out during competition or regular physical activity, where it in contrast needs to stay retracted to properly engage the core, then is this the optimal time for abdominal breathing?

At occasions like these, you need to learn how to engage the diaphragm without relying on heavy movements from the abdomen. Therefore, I teach them how to contract the pelvic muscles while retracting the navel, which provides a solid structure that will ensure proper utilization of the core and glutes, and still enable them to fully expand the ribcage with the upper abdominals, so the diaphragm still engages.

Merely telling athletes to breathe through the abdominals through the entire day, does not provide the full aspect of proper breathing. Instead, it will keep them inhibited in the dysfunctional biomechanical patterns they always move in, where the abdomen pops out, and as a byproduct, the opposite side of the abdomen, being the lumbar spine will likewise move in the same direction, locking them in the so-called anterior pelvic tilt, which removes any stability from the core or the glutes.

Try for yourself: stand tall in a strong position. Slightly posteriorly tilt your pelvis, which is the clockwise rotation of the pelvis, while activating the glutes. When doing this, the lower abdominals along

with the navel should automatically get drawn in. You should feel tension in this lower part of the abdomen along with the glutes. Hold the tension and breathe freely into the area of the upper abdominals and the ribcage. From this position you're able to perform strong rotations, heavy lifts, and rapid movements without compromising the core stability or optimal diaphragmatic breathing. Of course, when relaxing and having no muscular engagement whatsoever, you are able to breathe freely into the whole area of the abdominals, since they are no longer dependent upon the core to stay stable.

I understand that this may be very confusing in the beginning, but when considering breathing in correlation to biomechanics, the rules are not as simple as when merely talking about breathing. And from years of experience, I've recognized that we must take both aspects into consideration to gain full profit from moving and breathing properly.

Impaired mobility and posture also tend to have a negative influence on breathing. As you know by now the diaphragm attaches to the ribcage, why a compressed thorax will negatively influence the functionality of breathing. Since the diaphragm also attaches to the lumbar vertebrae of the spine, then having a spine in proper alignment will aid and optimize the way the diaphragm operates and functions. Posture and breathing are interconnected to such a degree, as the ability to stand tall with a balanced front and back line creates the proper alignment for the spine to effectively make internal space for the diaphragm to move.

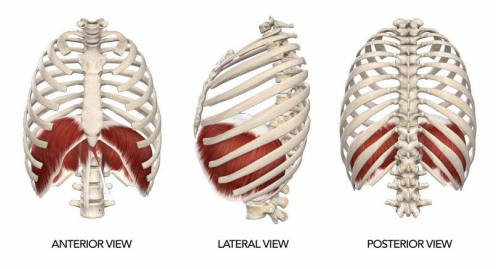


Fig. 4.25 The diaphragm shown from an anterior, lateral, and posterior perspective.

For thousands of years yogis and monks have mastered and emphasized the importance of being able to sit in a lotus pose with a straight spine to practice various breathing methods. Impaired mobility and poor posture have resulted in a culture, where more and more people are not even able to sit in this position. To gain the full profit from breathing exercising, posture must therefore be taken into account before being able to exercise breathing optimally. Manipulating the diaphragm during breathing can therefore also occur through movement or even breath retention.

When sitting in a lotus position, try and gently flex your spine during the exhalation by pushing the

spine backwards while compressing the ribcage and the abdominals. Depress your chin and look down to integrate the cervical spine as well. While inhaling, the spine is pushed back forward into extension where all parts of the spine become perfectly aligned in a vertical position. The chest is opening along with the ribcage and upper abdominals. The duration of the movement follows the duration of the breath in a perfect flow. This is aiding the natural process of the diaphragm's role in the thoracic cavity in the compressing phase of the exhalation into the expanding phase of the inhalation. Not being able to sit fully upright in a lotus position, or even erected in a standing neutral, will keep the thoracic cavity compressed not being able to expand properly during inhalation and staying stuck on the exhalation phase.

Practicing breath retention by breath holds, is another effective protocol for strengthening the diaphragm as well as the lungs. This practice will manipulate the intra-abdominal pressure, hence an increase in breath hold time, and thereby diaphragm strength, correlates to an increase in core strength.

Breathing And Posture

The one thing that separates man from the animal kingdom in posture. Through the phases of the newborn child into adolescence and adulthood we gradually expand from a quadruped position into a strong and tall posture. The innate response of posture in most animals, especially the quadruped species, is to stay close to the ground where the limbs serve as protectors of their most vulnerable organs, such as the heart, the stomach, and the genitals. This protective gene gives the animals protection, but also disadvantages. Disadvantages that humans have conversed to advantages.

As a compromise of not being able to protect our organs with a closed posture, the human species are able to walk for vast distances, run, hunt and being very agile in the multidimensional plane. But due to modern industrialization, sitting work occupations, inactivity, and psychological stress feeds poor breathing habits, we are slowly devolving into the protective forward bended position that reflects our state of mind.

If we look at any ancient statue or artwork, such as the famous anatomical paintings of Leonardo da Vinci, we find almost perfectly straight spines that can be considered as perfectly aligned in a posture that is innate to humans. These ancient figures showed a J-shaped spine with natural curvatures from the base of the spine to the top that intertwines with the cranium.

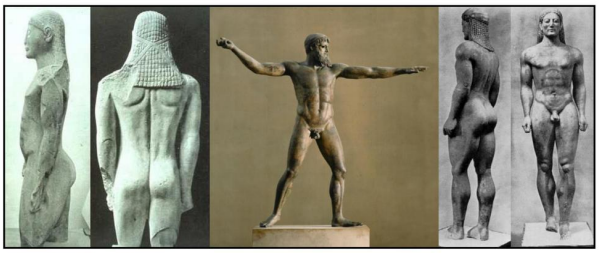


Fig. 4.26 Three different ancient Greek statues all displaying symmetric and aligned proportions and straight J-shaped spines dating back more than 2000 years.

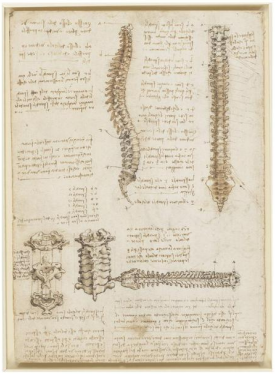


Fig. 4.27 Leonardo da Vinci's painting of the human vertebral column based on his own dissections of dead bodies (c.1510).

The spine of Western man has evolved to be somewhat S-shaped, where the curvatures have evolved to become much more severe, which reflects an overall compression from the top to the base with shoulders hunched forward, a forward flexed neck and a large inward curve at the lumbar region. One of the reasons why we have adopted this weak and curved posture is because of a mouth that is chronically opened to inhale air and tongues that no longer fits properly into our too small mouths. As space in the mandible is

decreasing, the tongue falls back into the throat and creates a mild suffocation, which at night creates choking and shoring in the attempt of pushing air in and out of obstructed airways.

During the day, the unconscious response of these obstructed airways is to slop our shoulders, push our neck forward and tilt the chin up to get the efficient amount of air into our locked airways. Consider again breathing through a straw. This restricted breathing is what it feels like for a mouth breather when correcting their posture instantly and asking them to breathe through the nose.

I see this pattern every day in my patients who have adopted these improper breathing patterns, which have affected their posture. In these cases, I always use a wall to correct their dysfunctions. When having the individual to face the wall standing tall with all part of their back touching the wall from the glutes to the lumbar spine, thoracic spine and back of the cranium, while keeping their chin low and breathing freely through the nose, the same issue keeps occurring.

I now force them into a position where their S-shaped spine is temporarily transformed into a J-shape. They can barely breathe. This is a major paradox, since this posture is the optimal, innate posture to humans. But since they have adapted to devolve away from it, by asking them to correct it then puts their cervical spine in a position that suffocates them and impairs their breathing. This response forces them to fall back into their S-shaped posture with the heads chronically facing the sky to get the amount of air needed to breathe freely. Correcting this dysfunctional pattern is therefore a process, which should be performed over time by both taking posture and breathing into consideration.

Our bodies hate *this* posture. The weight of the head in this sloping position stresses the back muscles, which leads to back pain, while the kink in our necks is adding pressure to the brains stem, that triggers headaches and other neurological issues. The tilted angle of our face forces the eyes to change its neutral plane of vision from looking straight forward into a depressed angle, where the eyes are forced to look downward to look straight forward as a result of the neck's position that elevates the entire head.

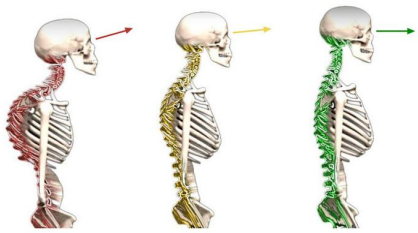


Fig. 4.28 How posture affects vision. The more severe a curvature on the spinal cord, especially in the cervical region, the more tilted a head. This tilt forces the eyes to change their natural plane of vision.

Proper posture begins in our mouths. Tongue posture, swallowing dynamics, chewing, and breathing are all determining how we stand, and essentially how we perform. It also has a direct influence on our mandible structure in how many teeth are fitting our mouths, the removal of wisdom teeth and whether or not we have crooked teeth.

Correcting the tongue posture is an ancient yogic practice. From earlier chapters, we covered how mothers in indigenous cultures sealed the lips of the children before they went to sleep to teach them the mechanisms of nose breathing. The same importance can be considered when it comes to the posture of the tongue. The function of the tongue is to guide swallowing, breathing, chewing, and speaking as well as it supports the airway in air delivery into the lungs and guides the digestive process. Through its fascial connection it affects the posture of the lower limbs. Incorrect swallowing deforms the dental arch, which in kids results in open bites and high arched palates, which indicates the tongue does not properly stimulate the roof of the mouth, which can further lead to the habit of mouth breathing and a vagus nerve not being properly stimulated. Correcting the tongue posture to rest in the roof of the mouth will provide support to the neck and will be a contributor to fixing parts of the issue of both the Postural and the breathing pattern.

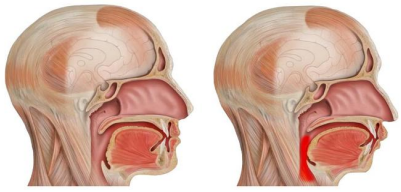


Fig. 4.29 Tongue posture, mandible and facial structure are all connected to the breathing. Crooked teeth and chin withdrawal are often associated with a dysfunctional tongue and obstructed airways.

In figure 4.29, you are seeing a cross-section of the head in respectively a typical nose breather (left) and a typical mouth breather (right). The read area highlights the airway passage and how the rest of the structure effects and becomes affected by the type of breathing pattern. As the jaw and chin withdraws and the mandible changes its structure, the amount of space in the mouth decreases and the tongue has no longer space to rest properly in the soft palate. This pattern is often reflected in the structure of the nose, that tends to be crooked and depressed, whereas the eyes (not visible in figure) become tired in appearance due to the postural alterations. As the facial structure is withdrawing caused by the decrease in internal space, the airways become blocked impairing nose breathing even more.

The optimal mechanics of tongue posture and breathing is not extraordinary and unnatural, but an

innate and forgotten human mechanism. Ideally, you should gently seal your lips with the teeth lightly touching each other. All parts of the tongue must rest in the roof of the mouth as its neutral position, with the tip of the tongue behind the front teeth, but without touching them, and the rest of the tongue resting at the back roof of the mouth. Along with these default placements, nose breathing should be performed.

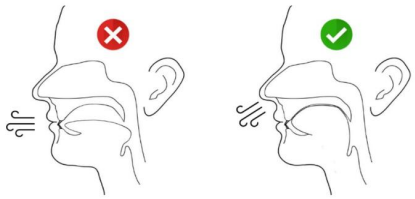


Fig. 4.30 The entire tongue must rest at the roof of the mouth to keep the tongue and palate stimulated. Meanwhile air is entered through the nose.

Dr. John Mew, a British dentist and facial surgeon recognized the link between children who were put on braces in childhood, the development of poor breathing and the facial changes that occurred because of this. Mew conducted his own studies of his patients, taking hundreds of before-after pictures along with biochemical analysis that showed the structural facial changes occurring in his patients, which became highly controversial. His conclusion was clear: traditional orthodontics were impairing breathing in many of his patients and braces weren't allowing the natural growth of the face and mandible. Mew wasn't alone on this claim.

Several other leading orthodontists and dentist supported him and came to the same conclusion. They were of the clear belief that improving airway obstruction and fixing crooked teeth should not be resolved by orthodontics, but by maintaining correct oral posture by holding the lips together, letting the teeth lightly touch each other and resting the tongue in the roof of the mouth, while holding the head up perpendicular to the body and not kinking the neck. The spine should be formed like a J-shape with slow breathing through the nose and into the abdomen.

While there is nothing exceptional about this method, it should merely be considered a standard way of living for humans, it has become a popular adopted trend known as "Mewing," where numerous people repeatedly reporting having great success with breathing improvement and structural facial changes.

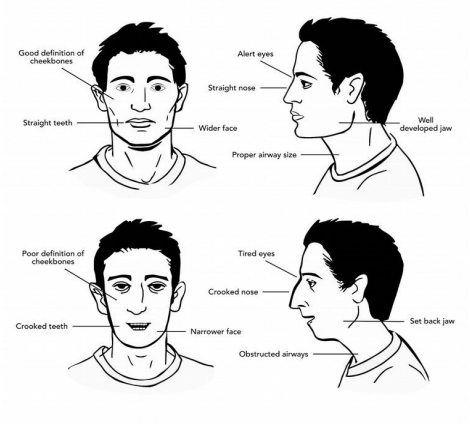


Fig. 4.31 There seems to be a strong correlation between the facial appearance of a person and their breathing capabilities. Often, faces and necks are narrower, jaws smaller and teeth crooked as a biproduct of less internal space. The opposite is applicable to those with proper airway sizes and good breathing capabilities.

Per definition when something gets labeled and becomes a trend, I'm off. And I suppose I'm not alone in sharing this attitude. Maybe this is the reason for some of the controversy of "Mewing." But studying the science behind and trying to practically understand the ideology of the practice sometimes makes me change my mind. If science is somehow able to back up the underlying mechanisms of stopping the natural growth of the face, as in this case, by locking it with braces instead of examining the mechanisms that cause the problem, we might again be trying to fix a problem by scratching the surface instead of finding the natural solution to a problem that is not innate to humans. This principle is what I consider to be human mechanics.

When I became aware of Dr. Mew's discoveries, I could not stop recognizing the same underlying issues in roughly half of my clients. They reported to me that they either have had braces, or they were suffering from crooked teeth, have had removed wisdom teeth, weren't able to breathe freely through the nostrils or their facial structure would visibly indicate too little space in their mouths with setback jaws. My clients who showed these symptoms also had several other symptoms including bad posture, poor sleeping, asthma etc. Since then, oral posture became a regular part of my routine in accessing and working with clients. They were no longer only taught about breathing, posture, and biomechanics, but also the layers of how to stimulate the tongue and the roof of the mouth, how to use their teeth and lips. This implementation seemed to accelerate the rate of health and performance gains being measured, where their breathing capabilities improved quicker and postural assessments on those of my long-term clients also began showing

structural changes in their facial areas.

A Complete Guide: Breathing Methods

I have created a complete guide of 15 breathing practices, which can be exercised during any time of the day and any time of the life. Each one serves a specific purpose and influences different parts of the mind and body.

The common denominator for all the practices is that they must be practiced on an empty stomach to gain the most benefits from the techniques. Practicing the breathing methods is most efficient during the morning hours before eating your first meal, since this is often the time of the day where it has been the longest time since the last meal. If practicing on other times of the day, strive to do it at least two hours after eating a meal. This will ensure the best focus and concentration of energy upon the practice instead of on the process of digestion.

Breathing Exercise I: The Cleansing Breath

The Cleansing Breath is an ancient yogic breathing technique, which purpose is to ventilate and cleanse the lungs, stimulate the cells and the respiratory organs to improve their conditions of health and refresh the entire system.

The technique is appropriate to perform when feeling tired and used up. One should practice hard on this one until a sensation of naturality and ease has been achieved to gain the most relaxing benefits of the technique.

1. Inhale a complete breath through the nostrils.

2. Retain the air for a few seconds.

3. Gently pucker up the lips as if for a whistle and exhale a little air through the opening with considerable power. Then stop and retain the air once again and then exhale a little more air. Repeat this until the air is completely exhaled.

4. When all air has been exhaled, take another inhaling and repeat. To this for as many times necessary to achieve the desired calmness.

Breathing Exercise II: Alternate Nose Breathing

This pranayama technique improves the lung function, lowers blood pressure and sympathetic stress, and helps engage both nostril passages in nose breathing. As each inhalation is made, the opposite brain hemisphere of the nostril being inhaled to, will activate. It is also an effective technique to perform when wanting to relax or sleep.

1. Place your thumb of the right hand at the right nostril and the ring finger of the same hand near the left nostril. The forefinger should passively rest between them in the area between the eyebrows.

2. Close your right nostril with your thumb and gently inhale a slow breath through the left nostril.

3. At the top of the breath, pause briefly by closing both nostrils. Then lift your right thumb again and exhale gently through the right nostril.

4. At the end of the exhalation close both nostrils again and hold for a moment.

5. Now lift the ring finger of the left nostril and take a gentle inhalation here.

6. Continue the practice by inhaling and exhaling alternating between the right and the left nostril.

Breathing Exercise III: Coherent Breathing

Coherent Breathing is what can be called the optimal breathing rate of 5,5 breaths per minute with 5,5 seconds of inhalation and 5,5 seconds of exhalations. The more you practice this during every hour of the day, the closer you will get to standardize this breath as your natural breathing pattern.

The technique is quite simple and allows the heart, lungs and circulation to enter a state of coherence, where the systems of the body is working most efficiently and providing improvements to your HRV score.

1. Sit tall, or lie down alternatively, and relax any muscle in the body; especially the abdomen.

2. Inhale gently for 5,5 seconds and expand the abdomen and the lower parts of the lungs are filled with air.

3. Immediately after with no pausing, exhale then gently for another 5,5 seconds, emptying the abdomen and lungs. The breaths should feel circular as there is no pause, but rather a never-ending cycle of inhalation onto exhalation.

4. Repeat at least 10 times and if possible, more

Breathing Exercise IV: Wim Hof Breathing

This method teaches you how to access your stress response via the sympathetic nervous system by conscious control to enter a state of calmness in the parasympathetic nervous system. It is Wim Hof's interpretation of the Tummo practice. As the practice encourages you to oxygenate your blood, you will over time experience great improvements in your breath retention time. When performed properly you might feel yourself enter a transcendental state, where the absence of thoughts will make you enter a sense of a heightened state of consciousness. It is normal to become dizzy and lightheaded, so do not perform the exercise while driving, taking a shower, or any activity that can harm you. The dizziness is normal and will eventually pass during the exercise, and if being pregnant or having any health condition you should consult with your doctor first.

1. Sit tall in a lotus pose or in a chair, or alternatively lie down. Relax all parts of the body.

2. Take 30-40 big and heavy breaths with as much air volume on the inhalation as possible. The inhalation is either made via. the nose or the mouth. The exhalation is made through the mouth by letting go of the air and not forcing it out. The duration of the inhalations and exhalations should be 2 seconds each, which makes it pretty fast breaths while getting as much air in as possible to oxygenate the blood.

3. Make it circular. Fill up the abdomen, then ribcage and chest in a flowing movement with no pause after neither inhalation nor exhalation.

4. After the 30-40 breaths you hold your breath on the exhalation. Do not exhale fully but leave about a quarter of the air in the lungs. Hold the breath for as long as possible. Use for instance a stopwatch to note your time.

5. Once you've reached your breath hold limit, take an additional big inhalation before exhaling and hold this for 15 seconds.

6. Then gently let go and exhale all the air out, and immediately after start over again.

7. Repeat this practice for at least 3 times. I'd recommend you note your time after each round to see how it progresses, both practice by practice, but also in the long run.

Breathing Exercise V: The Kundalini Breath

This technique is based on spinal movements and visualization to support the breathing pattern. Kundalini is the prana and the chi, the life force energy that awakens what is known as the chakras from ancient traditions. It's important to keep the mind clear of thoughts to gain the best profit from the exercise as this is as much a spiritual practice as it's a physical.

1. Sit tall in a lotus position.

2. Inhale fully through the nose and let the air flow from the belly and upward. As you inhale, extend the spine to a complete vertical position, while keeping the chin low, so that all parts of the spine are in complete alignment. On every inhalation, visualize the life force energy spiraling upward from the base of the spine and into the brain.

3. Exhale fully through the mouth. As you exhale, you push back the spine into a fully flexed position, while looking downwards to engage the cervical spine in the movement.

4. Hands might be rested on the knees during the whole practice and can be used to pull yourself up during the inhalation and push yourself back during the exhalation.

5. Repeat for a desired number of times and emphasize the visualization of energy during the whole practice. Breath retentions can be implemented during any time of the practice to pause the breath-work and meditate.

Breathing Exercise VI: Buteyko Breathing

Buteyko had a wide range of different breathing methods, so I'll give you two of those which I find most important and most accessible.

The first technique is based on installing proper breathing in the body which, for most people, means breathing less and extending the time between inhalations and exhalations and holding the breath. The following exercise should be performed in a relaxed state.

Control Pause

1. Have a stopwatch ready to note your time.

2. Sit tall with a straight spine.

3. Take a normal breath in through your nose and do a normal exhalation out through the nose.

4. Pinch both nostrils closed with the thumb and the forefinger at the end of the exhalation.

5. Start the stopwatch and hold your breath.

6. When feeling the first potent desire to breathe, note the time and take in a normal inhalation.

If the first inhalation after the breath hold is not calm and controlled, you've held your breath for too long. Wait for several minutes and repeat the exercise.

Mini Breath-holds

It's emphasized to breath less throughout the whole day, since most people suffer from some form of over breathing. This exercise will aid this process and should be done several times a day, such as every 15 minutes. Buteyko was of the belief that this is a big contributor to the prevention of asthma and anxiety attacks.

1. On a gentle exhalation, hold the breath for half of the time of your BOLT score or your Control Pause and continue controlled and calm breathing.

2. Repeat from 100 to 500 times a day.

Breathing Exercise VII: OM Chanting

This breathing technique is very ancient and is known from Eastern yoga traditions and monks chanting specific frequencies to manipulate sound and vibration.

When chanting a mantra on the exhalation, you are prolonging the exhalation phase of the breath and stimulating the vagus nerve response throughout the body to create calmness by manipulating the nervous system. When chanted it vibrates at the frequency of 432 Hz, which is the same vibrational frequency found throughout everything in nature.

1. Sit tall in a Sukhasana pose. Keep the spine erect and the shoulders relaxed.

2. Keep your eyes closed during the practice to enter a meditative state.

3. Take a long, deep and gentle inhalation through the nose.

4. On the whole phase of the exhalation, you chant “aaa-uuu-mmm”. Keep the exhalation as long as possible, preferably at least 10 seconds.

5. Keep your attention on the breath during the whole practice.

6. Repeat for at least 10 minutes.

Breathing Exercise VIII: Walk/Run Breath Retention

One of the ways to simulate high altitude training is by performing breath holding during light physical activity. This is what is known as hypoventilation exercising, where oxygen delivery is reduced to the alveoli in the lungs, which decreased the amount of oxygen and increases the amount of carbon dioxide in the blood. When performed with conscious control it can be greatly beneficial, whereas when it happens unconsciously and habitually throughout the day, it can be devastating.

1. Walk or run for about a minute. Breath normally through the nose.

2. Then you exhale and either pinch the nose closed or just hold your breath, while keeping the same pace.

3. When you sense a moderate hunger for air, then release the breath hold and begin breathing gently and lighter than normal, for 10 to 15 seconds.

4. For the following 30 seconds you return to your normal breath.

5. Repeat this cycle for ten times.

Breathing Exercise IX: The Recovery Breath

I have used this method for a long time with great success in those of my patients, who wishes to enter a state of recovery or relaxation, as the calm and prolonged exhalations stimulate the rest/digest response in the parasympathetic nervous system, improve circulation and decrease heartrate.

The technique could and should be performed after each training session, where the heart rate is, or have just been, elevated. The faster you are able to make your heart rate drop, the faster you are able to go to recovery mode. So, instead of going on with your daily activities, taking a car ride with loud music or anything else that maintains your elevated heart rate, do this technique to calm the body and mind first.

It's also remarkably effective when wanting to fall asleep or relax.

1. Lay down flat on your back with the feet in the ground or elevated on, for instance, a wall to manipulate blood circulation after exercising.

2. Place both hands on the abdomen and close your eyes.

3. Take in a silent inhalation through the nose and into the abdomen. Feel the abdominals elevate.

4. Exhale gently and very slowly for a duration which is three times longer than the inhalation. Feel the abdomen retract.

5. The count range could for instance be 4 seconds of inhalation and 12 seconds of exhalation, or 5/15 etc.

You should feel your heart rate drop instantly as a prolonged and controlled exhalation has a calming effect. Do this for at least 5-10 minutes or until you've reached your desired conclusion.

Breathing Exercise X: Box Breathing

Box Breathing is another breathing technique with the purpose of quieting the mind and body to enter a state of relaxation through the parasympathetic nervous system and is especially good to practice before going to sleep.

This is done through the combination of inhalations, exhalations and breath holds, all with the same duration. NAVY seals are known for practicing this technique to stay calm and focused on tense situations.

1. Choose your wished position.

2. Inhale through the nose for four seconds.

3. Hold your breath for four seconds.

4. Exhale through the nose for four seconds.

5. Hold your breath for four seconds.

6. This cycle of 4-4-4-4 can be repeated for as many times as feeling needed.

Breathing Exercise XI: Cold Exposure Program

This method is teaching how you to gain control over your nervous system through the breath to activate the parasympathetic response. Wim Hof has taught the world that this is no extraordinary capability, but rather one that every human being is in possession of.

To gain the best profit from exposing yourself to the cold, the practice must be done in stages to adapt to increasing durations or decreasing temperatures to gradually get used to the cold water. If practicing ice baths in nature, it's extra important you've gradually adapted and trained for it, since the unconscious cold shock that may occur can be fatal if being on your own.

Cold exposure can be both be done in the shower or in an ice bath and should be a lifelong practice to continually gain its benefits. There will be a difference in the sensation of the temperature of the water depending on what type of exposure, since the sensation of the temperature depends on several factors, such as movement in the water like during a shower.

Water temperature must be between 0 and 15 degrees Celsius. If a beginner, start high and gradually decrease the temperature.

Use your breath to engage the parasympathetic response. Gain control over the shivering and cold shock, close the mouth and practice deep and calm breathing through the nose. This is a hard process but will improve week by week as you adapt to the cold.

Beginner	Intermediate	Experienced
Week 1: 15 secs.	Week 1: 1 min. 15 secs.	Week 1: 2 min. 15 secs.
Week 2: 30 secs.	Week 2: 1 min. 30 secs.	Week 2: 2 min. 30 secs.
Week 3: 45 secs.	Week 3: 1 min. 45 secs.	Week 3: 2 min. 55 secs.
Week 4: 60 secs.	Week 4: 2 minutes	Week 4: 3 min. 10 secs.

Breathing Exercise XII: Yogi Complete Breath

This method was taught by the ancient yogis to be the optimum default way of breathing. They divided breathing into four components of high breathing, mid breathing, low breathing and the Yogi Complete Breath and was made up of the previous three components to utilize the full spectrum of the lungs and diaphragm.

This technique will improve your natural breathing capabilities over time to engage deep and proper breathing and can be used as an active measure to increase this capability of correcting the breathing pattern. It is also great to use during meditations.

1. Stand or sit tall. Breath through the nostrils, inhale steadily, first through the lower parts of the lungs pushing forward the front wall of the abdomen. Then the middle part of the lungs is filled pushing out the lower ribs, breastbone, and chest. The fill the high part of the lungs into the upper chest which is lifted including the upper seven pairs of ribs. In the final part, the lower part of the abdomen gets slightly drawn in, which gives the lungs support and helps fill the highest part of the lungs.

These are not separate movements. Instead, it consists of one flowing, circular motion moving from down to up. The inhalation should be performed in a couple of seconds, which is possible after a little training.

2. Hold the breath for a few seconds.

3. Then exhale slowly, while holding the chest in a firm position and slowly lifting the abdomen upwards as the air leaves the lungs. When all air is exhaled, relax the chest and abdomen.

Breathing Exercise XIII: Rhythmic Breathing

Rhythmic breathing was another ancient breathing practice. This practice was made to synchronize the rhythm and vibration from every part of nature with the human body to obtain balance and thereby improve the energy flow in the body.

Start by ascertaining your normal heartbeat by placing your finger on your pulse and count the beats six times: 1, 2, 3, 4, 5, 6 and over again. Continue counting six beats until the rhythm becomes fixed in your mind. As a beginner, one inhales six pulse units, but as one progress in practice, the number of units should be greatly increased.

The number of units should be the same in inhalations as well as exhalations, while the units during breath retention should be the half.

1. Sit tall in an easy posture, while holding the chest, neck, and head in an as straight line as possible with the shoulders slightly held back and hand resting on the lap. This provides a body, which is largely supported by the ribs and opens the movement of the diaphragm.

2. Inhale a full breath and count the six pulse units.

3. Hold the breath and count half of the units, in this case being three.

4. Exhale slowly through the nostrils and count six pulse units.

5. Again, hold the breath for three pulse units.

6. Repeat for the number of times you wish but avoid fatiguing yourself.

7. When you are ready to finish the exercise, practice the Cleansing Breath which will rest you and cleanse the lungs.

Breathing Exercise XIV: Tummo Breathing

This technique is the original version of Wim Hof's interpretation of the Tummo Breathing, or Tummo Meditation. It includes more detailed focus on muscle contractions during the breath and the visualization of the inner heat that contributes to an increase in body temperature.

The benefits from the Wim Hof method are more of gaining control over the nervous system from consciously going through the sympathetic response to activate the parasympathetic response, this technique is more based on how to increase body temperature by the act and control of the breath.

1. Sit tall in a calm and quiet place.

2. Close your eyes and relax your mind while removing any thoughts popping up. Imagine the thoughts passing by like the clouds on the sky. You don't have to consider them; they will slip by.

3. Keep your focus on your breath as you inhale and exhale. Start by keeping it slow, deep, and calm.

4. Begin the practice by taking big, heavy breaths in through the nostrils and exhale fully either through the nostrils or the mouth. After each exhale contract your abdominal and pelvic muscles while imagining a read hot ball near the navel are. Visualize the heat of the ball growing and spreading.

5. After some time, take a big inhale through the nose and hold the breath, while gently swallowing and pushing the diaphragm down to push the oxygen down towards the glowing hot ball while lightly contracting the internal muscles of the pelvic floor.

Hold the breath for as long as you can, while keeping the muscles contractions and imagining the inner heat growing and spreading.

6. Then slowly exhale relaxing the muscles, while keep visualizing the heat growing.

7. Continue the practice and work on improving the inner heat and body control.

Breathing Exercise XV: Pineal Gland Activation

This last breathing technique emphasizes the exercising of the mind through the breath to actively engage the pineal gland, located between your brain hemispheres, to a higher degree. Perfecting this breathing method will demand much practice before the practitioner may be able to enter a transcendental mental state.

By the combination of intrinsic muscle contractions and breath-work, cerebrospinal fluid gets transported up towards the pineal gland to create the so-called piezoelectric effect.

Many environmental factors are playing a role in the function and engagement of our pineal glands, which may be very inhibited due to a vast range of environmental pollutive factors that we get exposed to in our contemporary world. These are already contributing to the impairment of the function of the pineal gland, why this technique may further require additional measures to gain the full benefit, but nevertheless aids in the process of opening up the gland.

1. Start by sitting tall with your hands placed on the lap and close your eyes.

2. Lift up your pelvic floor by squeezing and breath normally. Squeeze the muscles as tight as you can and hold it for five seconds. Then let go.

3. Repeat this three times in total to gain conscious control over the muscles.

4. On the next round you contract the same muscles while contracting the lower abdomen by pulling it up and in. Hold for five seconds and relax.

5. Repeat this sequence three times in total as well and remember to keep breathing and don't do any breath holds.

6. On the next round you squeeze the muscles in the pelvic floor while drawing the lower abdomen in, and now also contracting the muscles of the upper abdomen to tightening the entire core. Hold the pressure for five seconds again and relax.

7. Repeat this sequence three times in total and progressively squeezing them a little tighter round by round.

8. Now take your finger and place it on the top of your head and push the fingertip into the center of the scalp, so you will remember the point when you take away the finger. Your attention and energy must be focused on this point.

9. Put your hands back in the lap, and without contracting any muscles, take a slow breath through the nose, and follow the breath from the pelvic floor, through the lower abdomen, upper abdomen, the chest, the throat, into the brain and all the way to the top, where you pointed your finger. When you reach the top, hold your breath, and keep your attention on the point to focus your energy to the spot. Hold for ten seconds and relax.

10. Repeat this for one more round. Make sure you remember the spot, and otherwise you can point your fingertip into the spot once again. Imagine the energy flowing up through the vertical axis like drawing fluid up a straw.

11. Now it is time to pull it all together. On the next breath, when inhaling through the nose, you lock the muscles of the pelvic floor while engaging the muscles of your lower abdomen as well as the muscles in your upper abdomen, pulling them all up and in at the same time. With the intention of pulling the energy from the lower part up and into the brain. Follow the breath though each of the centers as it enters the top of the brain. Keep your attention here and hold your breath while squeezing these core muscles. Hold for ten seconds and relax as you exhale.

12. Repeat this round for three times in total.

Summary

- There seems to be a direct correlation across of species between one's ability to keep a low heart rate, breathe less and live long lives.
- Improper chewing and breathing patterns may affect your entire facial structure, cause snoring, exercise induced asthma and sleep apnea.
- Stop eating too much soft and processed foods.
- Breathe through the nose. As simple as that. The mouth is designed as a back-up passage primarily used for speaking and eating.
- Adapting to nasal breathing may take time, but it will gradually improve.
- Using mouth tape is a tool that can be utilized to force adaptation to nasal breathing.
- Breathe less and breathe lighter. This means fewer breaths per minute and smaller volumes of air. 5.5 breaths per minute is a good goal to aim for.
- What part of the body moves after air being inhaled helps determines how your nervous system responds.
- Low and mid breathing, being abdominal and ribcage breathing is associated with a parasympathetic (rest) response, whereas high breathing, being chest breathing, is associated with a sympathetic (fight) response.
- Extended exhalations are especially associated with a parasympathetic response.
- Training at higher altitudes may stimulate hemoglobin delivery to your muscles, and thereby improve aerobic performance.
- Breath retention training is a great tool to let your body tolerate CO2 more efficiently.
- There's increasing evidence that you can control and manipulate your nervous system, body core temperature and immune response by specific breathing techniques.
- Trauma can also accumulate in the respiratory muscles; hence myofascial release techniques and corrective exercising can be used to release and train those muscles.

Part Two

IV. THE MYOFASCIAL NETWORK

The fascial system can be defined as a three-dimensional continuum of soft collagen containing, loose and dense fibrous connective tissues, which incorporates elements such as adipose tissues, neurovascular sheaths, aponeuroses, deep and superficial fascia, joint capsules, ligaments, membranes, tendons, visceral fascia, all the intramuscular and inter-muscular connective tissues with more. The system surrounds, interweaves between, and interpenetrates all the organs, muscles, bones, and nerve fibers acting as a functional structure around for the body; providing an environment all the body systems to operate in an integrated manner.

Myofascia is the connection between muscle and fascial tissue and is used as a term whenever muscle is present (myo = muscle, and fascia = fascial tissue). Fascia appears in the body in many places where muscles are not present, so to call it myofascia, there must be a muscle connection to direct its contractile strength and attach it to a bone, cartilage or some other fascial structure for stability and movement.

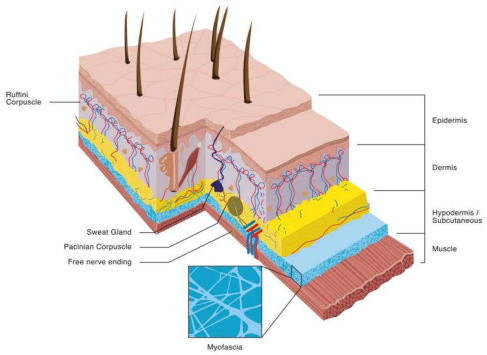


Fig. 5.1 The layered structure of the myofascia

So, when describing the myofascial network, we are really emphasizing the vast web of connective tissues that encloses the body and somehow connects to the function of the muscles.

Consider the fascial web as a thin layer of "plastic" surrounding the whole outer surface of the body with no separation. Every part of fascia is directly and physically connected to every other part of fascia in the body. Like when tugging one area of a tablecloth, it changes the position of every other object on the table. The fascia therefore plays an important role in the support of our bodies, since bodies since it surrounds and attaches to all its structures and provide stability by a constant "pull.". As it acts like a shallow container of the body, all internal structures, including the bones, are directly influences by the function and balance of the fascia.

This is why profound postural changes can occur just by the treatment and manipulation of the fascia. Think of the bones as tent poles supported by wires, being the fascia. You'd need an adequate amount of balanced tension from the wires to allow the entire structure of the tent to remain upright with proper equilibrium. If dysfunctions and knots are occurring on the wires (fascia), the tent poles (bones) will change their position and thereby the whole structure.

The fascia contains nerves that make it sensitive. When being stressed, it tightens up. This mechanism is forming trigger points in the stressed areas that appears as knots which gives a sensation of tightness and pain. It Fascia is made up of multiple layers in between the layers of skin, fat, and muscle. Between these layers are liquid called hyaluronan. As we move, the fascia stretches.

The balance and functionality of the tissues are just as important as every other tissue and organ in the body. If not treated properly, it becomes knotty and sticky, which impairs its glide of movement and thereby muscle function. This is what appears as the forming of trigger points, which causes pain and biomechanical dysfunctions. Some of the causes of this is the consequence of poor biomechanics, over-stressed individual areas of the body and too much physical activity, too little physical activity, trauma, or injury creating adhesion in the fascia. Oppositely, when the fascia is treated properly, it is hydrated, smooth and flexible in movement.

At the cellular level, the most important components of the fascia are the nerve elements with the sensory nerves in the neuro-fascial network, that includes the *nociceptive*, which is the sensing of pain and discomfort, *proprioceptive* being the dynamically sensing of the body position in space and *interoceptive*, which is the sensing of the internal state of the body—. This is the state of sensing physical and emotional feeling of self-awareness. It can be theorized that this is where trauma and emotional pain are stored as tissue memory, as discussed earlier, which can lead to and be stored as physical trauma. These physical traumas are often further reflected in the posture, how we move and how we feel, which at least I'm convinced are highly connected to one another.

Other components of the fascia are the cells and the extracellular matrix (ECM) including collagen fibers and ground substance. The fascia holds water in like a sponge, and if not being treated well it can dehydrate and become sticky. When pressure is applied to the fascia it pulls back in water to rehydrate the tissues and glide better. This pressure also produces a small electrical charge which is due to the piezoelectric effect, which we covered earlier also occurring in the pineal gland when creating internal pressure. This myofascial pressure increases the electrical potential, which attracts water molecules and thereby rehydrate the ground substance in the fascia, which can be referred to as the first effect of a myofascial release.

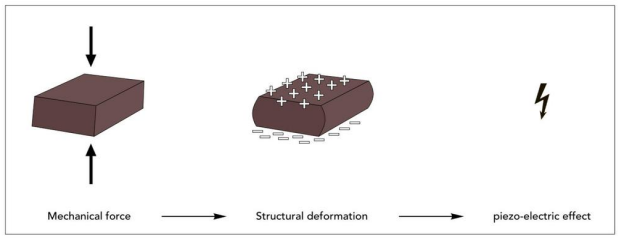


Fig. 5.2 showing how any mechanical force (such as applying pressure on an area of tissues) which creates structural deformation then create a piezo-electric effect, and effect and gets distributed around the connective tissue system. Virtually all tissues of the body generate electrical fields when they are stretched or compressed.

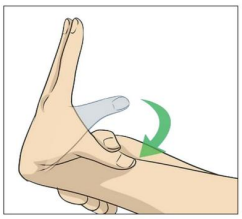
To summarize, the connective tissue is the kingdom of cells, including all the blood and immune cells. The fascial system is the structure of the connective tissue kingdom, covering all the cells and their products. A fascia is a single part of the fascial system that covers individual areas, such as the "plantar fascia." The extracellular matrix (ECM) consists of cell products, including the fibrous net, ground substance and the water bound into it.

Fascia is similar to the onion's skins. If the bag is the fasciae and the onion is the muscle, then the goal is to allow the muscle to contract or stretch without being limited by the surrounding fascia. This arrangement and cooperative force is lost if the muscle is not exercised, loaded, and stretched properly on a regular basis. Without proper exercising, the inner fascia becomes randomly directed and loses some of its efficiency for transmitting force faithfully, which is caused by an inhibited ability to glide. The stickiness from a lack of hydration and movement that will compromise movement efficiency.

Be aware that when we talk about the fascia becoming dehydrated, we do not necessarily mean that you don't drink enough water. Rather, do we mean that the water supply in your body is not directed properly towards the fascia. So, to hydrate the fascia sufficiently one must, of course, be hydrated, but also move regularly, move well, and get the therapy necessary for the fascia to glide better, such as by applying pressure through, for instance, myofascial releases.

All humans are sharing the same template but can in essence be vastly different. These differences can be genetic such as blood types, allergies and immune reactions, and the same genetic variations are present in the fascia. This fascial variation can be seen in the stiffness of the fascial net, which can be divided into two groups: the 'Northern' fascia and the 'Southern' fascia. The Northern type of fascia is probably created in more Arctic climates, is denser and more stable and quicker to repair. Whereas the Southern type is probably created in more tropical climates and is elastic, bendy, less stable and slower to repair.

The Northern type may primarily be found in the weight room lifting heavy weights, whereas the Southern type may be doing their physical activity in the Yoga room doing stretches only improving the specific innate fascial trade in both of the types.



You can do a quick assessment to test what type of fascia might be present in your body.

Flex your wrist to 90° and use the other hand to bend your thumb down toward the flexor side of your forearm. The closer the thumb gets to the forearm, the more you appear to share the Southern type of fascia. If you have the Northern type of fascia, your thumb will not be able to get anywhere close.

This is also called 'ligamentous laxity' and testes the genetic expression in the fascia. Those with the Northern expressions tend to be characterized by less range of motion, stable joints, and fast wound healing, where those with the Southern expressions have a wider range of motion, less stable joints and slower injury repair.

The fascial net covering the whole body acting as a single unit can be divided into groups and components that interact and counteract with one another. These groups are affecting and influencing the muscles and

tissues that they surround. This is why we in this case, we are thinking in terms of myofascia rather than fascia.

These groups consist of 'tracks and stations' where the stations act as the bone attachments and the tracks are myofascial tracks of the fascia running in lines over specific muscle groups that have a direct influence on one another. We can call these the Myofascial Meridians. These meridians of fascia have been discovered by human dissections showing how some parts of the body are connected by the fascia, hence their name myofascial meridians. They may seem similar to the acupuncture meridians known from Chinese medicine, but yet are they very different.

Meridians in Chinese medicine emphasize the bioelectric and bioenergetic potential of the human body, where the myofascial meridians emphasize connecting lines of muscles and fasciae. Discovered completely independent from each other in two different cultures and two different periods of time, they somehow appear to be almost identical in patterns.

The myofascial meridians have been popularized by the therapist and author Thomas Myers, who discovered and did extensive work on the fascial system and categorized it into tracks and stations, which he theorizes is the basis of the inter-connective body acting as a whole instead of by isolation [28]. This is what he calls Anatomy Trains, and I owe him a lot of appreciation for teaching me this new world of assessing the body, which led me to a new understanding and foundation of treating myself and my patients.

Myofascial Manipulation

Treating and manipulating the body from a perspective of a holistic interconnected system is still an approach that is unorthodox in the 21st century. Even though most people today are well aware of the fascia, the accepted approach is still stretching and loading the muscles within isolating parts.

However, the fascia does not know of isolation, and it does not respond well to it. This is where it becomes overworked and 'sticky,' and forms knots that appear as trigger points. The reason for this and how to approach these issues will be covered later in this chapter.

We can manipulate the tracks and stations of the fascia in two ways: through trigger point treatment and through physical training. The interconnections of the myofascia teaches us that pain appearance in one area of the body does not mean that this is the causal location of the pain and irritation. The main issue may originate from any other area of the particular myofascial meridian.

Take the Superficial Back Line as an example that runs from the plantar fascia at the surface of your foot all the way across the calves, hamstrings, spinal muscles, neck and onto the forehead. What this means in essence is, that headaches and pain in the region of your forehead may even originate from the surface of the foot. Solely treating the region that expresses the pain may therefore be a complete waste of time when taking the myofascial meridians into the equation.

When I assess the pain and dysfunction of a patient, I consider the entire pattern and treat every part of it instead of only treating it locally. An example given to this case is an athlete of mine who expressed severe

restriction in the left part of his lumbar spine. He had received several forms of treatment to try and resolve the pain, that were mainly focused on the area of the pain, but with no luck.

When he came to me, the pain had begun wandering towards the top of the left hamstring and felt no longer pain in the area of the lumbar spine. Instead of treating the hamstring, we assessed the entire pattern of fascia of which the lumbar spine and hamstring were connected to. We quickly discovered that the pain was not only measurable in the hamstring, but also in the left part of the occipital ridge (the neck muscles just below the back of your skull). A severe sensation of pain was present only in the left part of this region, which might have been the place of origin for his issue. Releasing this area almost dissolved the issue of the hamstring without having spent a minute on the hamstring. This was due to the connection and correspondence of the myofascial layers of this track. After a few sessions of assessing and treating the whole track, the restriction and irritation disappeared.

This is one example of how to treat the body in respect to its vast web of interconnections instead of by isolating bits. Treatment can be executed by applying pressure to the tissues like as a manual therapists would do. The same approach is applicable through acupressure and self-myofascial releases, which is done with either your hands or specific tools to create pressure on myofascia, or it can be done by decompressing the fascia, which in essence is the opposite of applying pressure, but will results in the same effects.

Decompressing the fascia can be done through cupping, an ancient Eastern approach lately becoming widely popular in the Western world. Here, the layers of tissues are sucked up into the cup to create space between the fascial layers with the end goal of creating better glide, which is also the purpose and benefit of applying pressure to the fascia from massage.

Another way of manipulating the myofascia is through physical training. As you know by now, overworked and overloaded muscles are just as harmful to the fascia as physical inactivity. Since the fascia does not know about isolation, it needs stimuli through and in connection with all its parts. Separating and isolating too much creates adherence and knots to its formation.

A simple solution to preventing this issue to occur is by avoiding exercising single muscles at once. Yet, this is the norm and the accepted approach in the traditional world of fitness, where fitness and bodybuilding are more or less based on isolating body parts to create the most benefits in hypertrophy, which is the work to increase muscle size and tone, or the popular trend of women striving to fat burn in isolated areas of the body, which in essence is simply not possible.

To avoid these stressors forced down on separate areas of the body and prevent trigger points of develop and evolve, we need to think in terms of training within the tracks and stations of the fasciae. This is where it gets tricky for the untrained or uninformed.

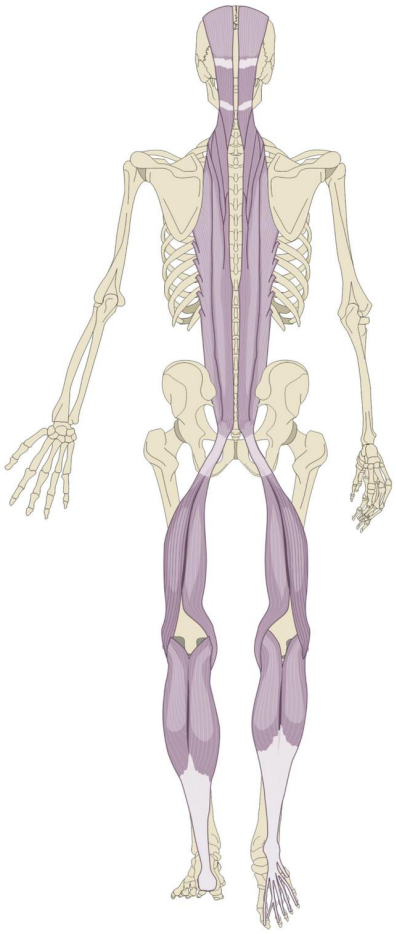
Manipulating the fascial tracks through physical training would therefore mean that you'd have to stimulate several, if not all, of the muscles correlated to the fascial tracks at once. So, merely doing push-ups, sit-ups or biceps curls would be the simple solution to the uninformed and a solution that can easily be executed in the gym, but nevertheless acts as isolated motions with one or very few muscles in action.

When I train an athlete to increase their muscle mass in a given region or create more strength to say the upper body, I ensure a proper activation of at least several of the muscles that are present in the specific

myofascial meridian through one single motion. If considering one of the Arm Lines in relation to creating stimuli to the upper body, then instead of doing regular biceps curls, that solely exercises the biceps, I would make sure to engage all muscles of the Deep Front Arm Line at once, including both the pectoralis minor, biceps brachii and the muscles of the forearm to create an interconnecting working pattern. Obviously, this approach may seem advanced, but nevertheless ensures an optimal communication between the muscles to interact and counteract instead of relying on a single muscle to work in a loaded isolated motion.

To me, this is functionality.

Creating the innate muscular intelligence to support one another in movement and knowing when to engage and when to relax to create the optimum outcome of a movement. Like the extremely complex flow of muscular engagement during a sprint, which alternates between the oblique abdominals on one side of the upper body that cooperates with the hip flexors and adductors on the other side of the lower body to then relax and leave the engagement to the latissimus dorsi in one side of the posterior chain meanwhile the glutes, hamstrings and calves are working on the other side of the posterior chain. This muscle connection and alternation of engagement is an innate capability of which the human body is designed to move.



THE SUPERFICIAL BACK LINE

The first of the myofascial meridians we are going to cover is the Superficial Back Line (SBL).

This meridian covers the whole posterior surface of the body running from the plantar fascia below the foot to the frontal bone at your forehead. Consider this line as a track. Everything occurring on this track may be interconnected to any station placed on the track.

From a perspective of treatment, this is where one may consider treating different places on the track rather than just the specific area of occurrence. From a perspective of training, one would think in terms of stimulating the whole track, even if talking stretching or loaded physical exercise.

There are two meridians of the SBL, which run across both sides of the body. Below is the table presenting all the line's tracks and stations.

Bony stations		Myofascial tracks
Frontal bone, supraorbital ridge	13	
	12	Galea aponeurotica/epicranial fascia
Occipital ridge	11	
	10	Sacrolumbar fascia/erector spinae
Sacrum	9	
	8	Sacrotuberous ligament
Ischial tuberosity	7	
	6	Hamstrings
Condyles of femur	5	
	4	Gastrocnemius/Achilles tendon
Calcaneus	3	
	2	Plantar fascia and short toe flexors
Plantar surface of toe phalanges	1	

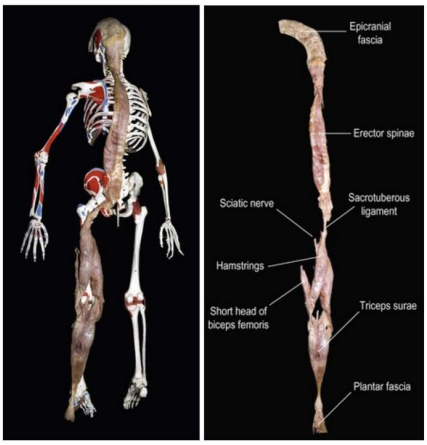
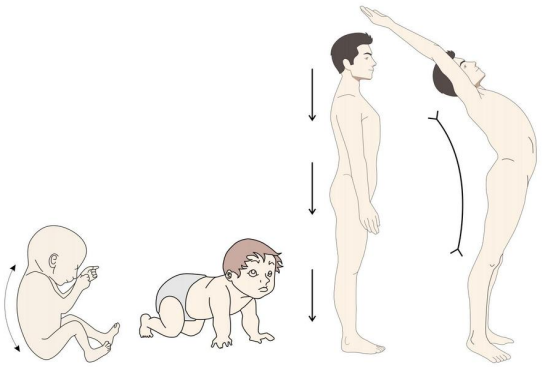


Fig. 5.3 These pictures show a real dissection of the fascial tracks of the SBL, showing the significance of the connected track, which should make one reconsider any terminology involving separation of anatomical parts.

The postural function of the Superficial Back Line is to keep your upright in a full extension. The meridian is acting as support for the front lines to keep you balanced as a stable structure like a tight string attached to the front and the back of your skull. It's primarily mediating posture and movement in the sagittal plane, and restriction in these meridians either limit forward movement (flexion) or backward movement (extension).

From an evolutionary perspective human rose from the protective embryological flexion position into the crawling quadruped position to the strong, erected posture that has given us the many advantages in survival skills of running, walking for extreme distances and hunting. None of this would have been possible without the exact function that the SBL provides.



With the exception of the knees that create flexion during contraction of the myofascial layers of the SBL, the overall movement function is to create extension or hyperextension.

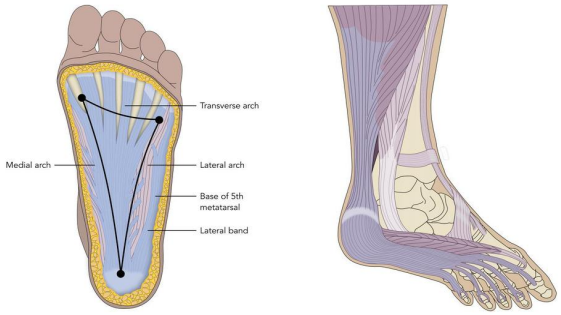
During our evolutionary development the Superficial Back Line becomes shortened to engage the development of a standing posture. The postural goal of the SBL is to keep a balanced relationship between tension and relaxation.

The SBL from Bottom to Top

From a bottom to top approach, we begin the journey below the fascia of the surface of the foot being the plantar fascia, which is the triangular shape from the five toe bands to the front of the heal bone including the separated, but related, lateral band. Any release of restrictions must primarily be manipulated through these areas marked within the triangular shape.

As briefly mentioned earlier, when treating issues in any part of the myofascial meridians one should keep in mind that all parts may somehow be connected to one another.

The area of the plantar fascia is often a source of troubles that reflects through the rest of the line, and limitations are therefore often correlated to other parts of the SBL, such as the sensation of tight hamstrings, lordosis in the lumbar spine or hyperextension in the cervical spine.



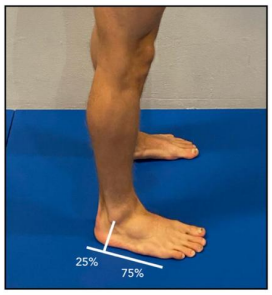
Continuing the line up the track, the fascia moves through the heal bone surrounding it like a plastic wrapping in the continuity with the strong Achilles' tendon. From here it continues and moves through the gastrocnemius.

Movement function:

Movement functions of the gastrocnemius are knee flexion and foot plantar flexion.

Restriction potential:

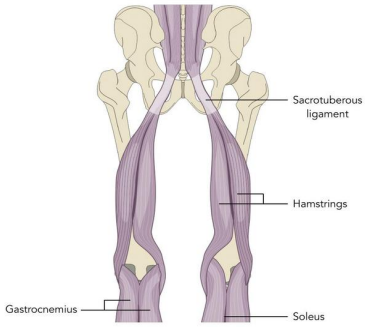
Restrictions or trigger points in the area of the gastrocnemius and Achilles' tendon often tend to reflect as a knot acting as a clamp in the tissues affecting the ankle mobility to be restricted in the dorsiflexion or even affecting toe mobility to become inhibited to such a degree that the ability to extend your toes away from the surface of the foot is very limiting in the individual.



From a postural perspective, restriction may appear as knee hyperextension. This is also often reflected in the lateral perspective of the foot, where restrictions tend to cause the amount of foot in front of the malleolus to 'increase'.

The optimal ratio, however, corresponds to approximately 25% of foot behind the malleolus and 75% of foot in front. Restrictions tend to appear as an imbalanced ratio, where more than 75% of the foot is distributed in front of the malleolus, which causes sagittal imbalance by the upper body leaning forward to compensate for the lower part of the lower body being pushed back.

Through the kneecap the line continues via the dual medial hamstrings, the semimembranosus and semitendinosus, and are complemented by the biceps femoris. The glutes are disconnected and have no relation to the Superficial Back Line due to its direction of muscle fibers, which makes its meridian influence more non-linear, which you will learn when covering the other meridians.



Movement function:

The movement function of the semitendinosus and semimembranosus is to create medial (internal) knee and tibial rotation when the knee is flexed. Oppositely, the biceps femoris creates lateral (external) rotation of the knee and tibia when the knee is flexed. Apart from this function all three of the hamstring muscles create knee flexion and hip extension.

This separation of movement requires that those muscles are able to work separately, which is most common in sporting activities or movements of non-linear emphasis where the hips are rotating or moving sideways, while there is pressure on the knee. In linear activities such as a sprint, this separated muscle activity is not required, as all the hamstrings work in cooperation during pure hip flexion and hip extension.

Restriction potential:

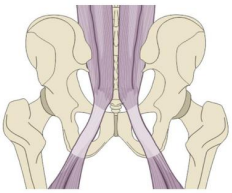
Restrictions in the hamstrings may inhibit this separation of muscle action in non-linear work and inhibit the mobility of the hamstrings, which may affect both hip extension and hip flexion, and the stride length which is paramount in linear situations such as during a sprint.

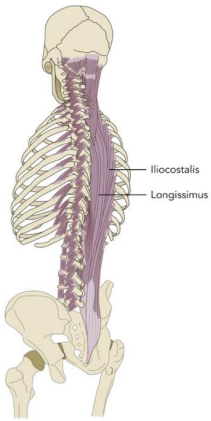
In the posture the restrictions may be expressed as knees being locked in a hyperextension or, in some cases, being over-flexed depending on whether they are locked long or locked short (eccentrically loaded or concentrically loaded); a concept we will discuss in detail later in this book.

As the hamstrings attach to the pelvis, the restrictions are not localized to the areas of the hamstrings and knees solely, but they also have a direct influence on the position of the pelvis, where restricted hamstrings that are locked short may contribute to a pelvis being posteriorly tilted, whereas hamstrings being locked long may contribute to a pelvis being anteriorly tilted.

If the tibia is locked in a medial rotation, then therapy should be focused on the medial set of hamstrings, being the semi-tendinous and semi-membranous. If the tibia is locked laterally, work on the biceps femoris is necessary.

Continuing the track up through the pelvis, we are forced to go below the gluteus muscles that are located more superficially compared to the tracks and stations of the Superficial Back Line.





From the hamstrings the line continues via the ischial tuberosity through the Sacro-tuberous ligament, the sacrum and into the Sacro-lumbar fascia and erector spinae running on both sides of the spinal cord.

The connection between the sacrum of the ischial tuberosity is a very strong and almost a bone-like tensile connection, that is paramount for upright human posture and pelvic integrity.

The erector spinae form the next track of the SBL. These spinal muscles run from the sacrum to the occiput, being from the base of your pelvis to the bottom of your neck.

The erector spinae is also absolute important for human posture and are the muscles that are responsible for our upright spine that got us from the embryological flexed position to the strong, erected posture through our development in life.

When assessing the erector spinae, the considerations should be whether there are curves on the spine. Is there a lumbar or cervical lordosis? Is there a thoracic kyphosis? This is often reflected as an S-shaped spine with ‘mountains’ and ‘valleys.’.

When the erector spinae is properly engaged and balanced, the spine must instead be more J-shaped without extreme curvatures, which are known as lordosis or kyphosis.

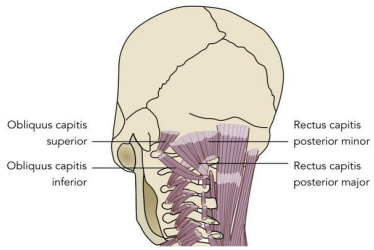
Movement function:

The movement function of the erector spinae is to flex and extend the spine.

Restriction potential:

Restrictions in this group of muscles tend to inhibit the spine's ability to move freely in a flexion and extension phase.

From a postural perspective, restrictions and trigger points inhibit the spinal engagement and are often reflected as big curvatures in the region of the lumbar spine, thoracic spine, or cervical spine, which have a big influence on the rest of the posture.



Following the rest of the track, we approach the end at the sub-occipital muscles located at the base of the back of your skull, which is a group of muscles covering both the narrow area of your neck as well as the wider area of the neck. The muscles are a functional centerpiece of the SBL and have an essential link from the eye movements to coordination of the rest of the back musculature.

Retracting the neck and contracting the sub-occipitals muscles are a fundamental part of our fear response. Both animals and humans respond to fear with a retraction of the head. When we drive car, play video games, or scroll on our phones on social media, we are negatively affecting the posture of our necks. With stress signals received through the eyes and into the brains, these postural changes send signals to the body that responds by contraction. Over time, these day-to-day stressors becomes a pattern locked into our postural structure that is visibly reflected in our neck.

Movement function:

The movement function of the sub-occipital muscles (obliquus capitis superior, obliquus capitis inferior, rectus capitis posterior minor, rectus capitis posterior major) is to extend, hyperextend and rotate the head.

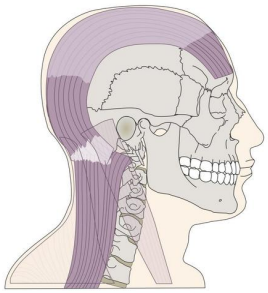
Restriction potential:

The restriction potential and its potential causes can be more problematic in this area of the track than any other. Since locked and restricted sub-occipital muscles tend to hyperextend the neck, and thereby elevate the chin along with the rest of the head, the eyes will be forced to change its position in order to keep its straightforward plane of vision as touched upon earlier.

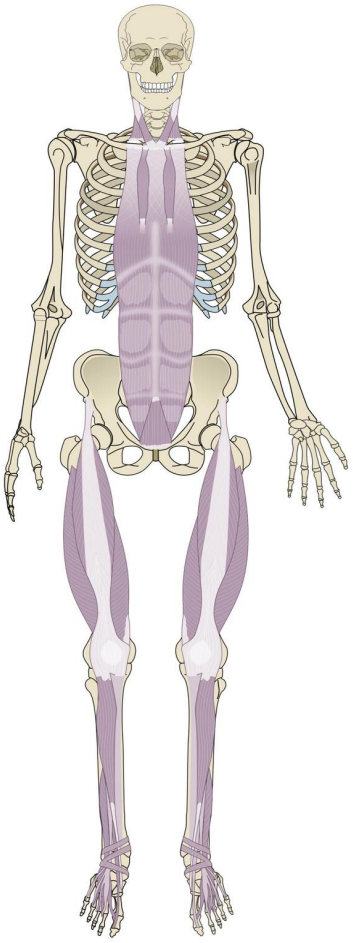
The muscles' deep connection to the vision can further be evaluated by an easy self-assessment:

Rest your head in a neutral position and close your eyes. Now place your thumbs on the soft spot below the base of the cranium where the neck muscles are located. With your eyes closed now look to the left and look to the right. With this eye movement you should be able to sense movements in the sub-occipital muscles. Restrictions in this area may influence the function of your vision.

A sign of restriction in this area may appear in the form of pain when applying pressure on the spot. Pain may be local, but in some cases the pain may even wander to the front face, where the track is ending appearing as a sensation of headache during the applying of pressure. Not only does this indicate the strong correlation between the stations of the track, but also indicates a correlation between headaches and restriction in the sub-occipital muscles.



From the erector fascia and occipital ridge, the SBL travels over the top of the skull on the galea aponeurotica, or scalp fascia, to attach firmly onto the frontal brow ridge at the end station of the Superficial Back Line.



THE SUPERFICIAL FRONT LINE

The next myofascial meridian is the Superficial Front Line (SFL), which is the opposite and balancing line to the SBL that likewise runs on both sides of the body covering the superficial sheets of the front.

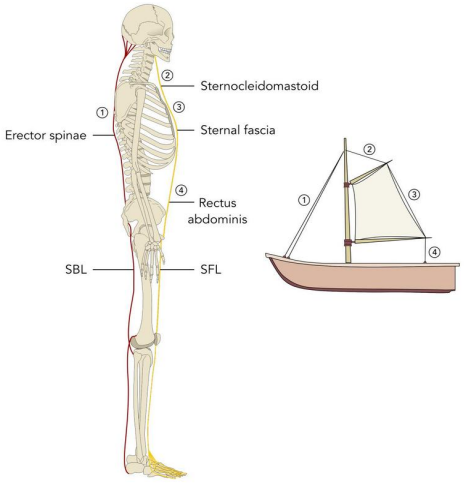
The overall postural function of the SFL is to balance the SBL and provide tensile support from the top to lift the parts of the skeleton, which extend forward of the gravity line from the pubis to the ribcage and face, as well as maintaining postural extension of the knees.

The muscles of the SFL act as defense to the sensitive and protective parts of the surface of the human body, such as the face, throat, breast, belly and organs, and the genitals. This is unique for the human species and the compromise and consequence we are designed to face to provide us with the advantages of our strong and erected posture.

Bony stations		Myofascial tracks
	15	Scalp fascia
Mastoid process	14	
	13	Sternocleidomastoid
Sternal manubrium	12	
	11	Sternalis/sternochondral fascia
5th rib	10	
	9	Rectus abdominis
Pubic tubercle	8	
Anterior inferior iliac spine	7	
	6	Rectus femoris/quadriceps
Patella	5	
	4	Subpatellar tendon
Tibial tuberosity	3	
	2	Short and long toe extensors, tibialis anterior, anterior crural compartment
Dorsal surface of toe phalanges	1	

Essentially, the SFL is acting oppositely to the SBL. Beginning at the toes, the SFL is responsible for extending the toes, whereas the job of the SBL is to flex the toes, which continues up the chain.

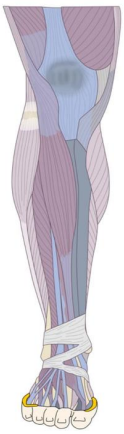
This sagittal postural balance is created by maintaining a tension/relaxation relationship between the two opposing lines. This relationship can be explained in a more understandable way by using the analogy of a sailboat. The SBL is designed to pull down the back from the bottom to the top, where the SFL is designed to pull up the front from the neck and pelvis to create balance and vertical alignment like the sail of a ship. Any little imbalance in this relationship will either pull too much on the front or on the back, which forces the structure out of alignment, and thereby out of balance.



The movement function of the SFL is to create flexion of the trunk and hips, extension of the knees and dorsiflexion of the ankle.

The reciprocal relationship between the SBL and SFL provides both lines with the responsibility for movement in the sagittal plane, and when malfunctioning, movement and posture will be inhibited in this plane that acts as restriction in forward flexion or backward extension.

Common dysfunctions in the SFL include *limited ankle plantarflexion, knee hyperextension, anterior pelvic tilt, anterior pelvic shift, breathing restriction in the anterior part of the ribcage and head locked in a forward flexed position*.



The SFL from Bottom to Top

We begin the journey of the SFL from the top of the toes, the dorsal surface of the foot, that consists of seven tendons running under the even more superficial retinacula to combine into the anterior compartment of the leg.

From here it continues up the shin bone following the tibialis anterior muscle.

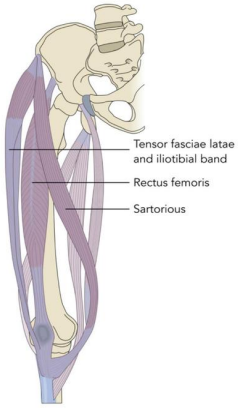
Movement function:

The movement function of the dorsal surface of the foot and the tibialis anterior in the lower compartment of the leg is primarily to create foot dorsiflexion.

Restriction potential:

As the compartment as a whole produces dorsiflexion and resists plantar flexion, restrictions and trigger points in this fascial area often leave the individual with an inhibited range of motion in the ankle joint, both during the faces of dorsiflexion and plantar flexion.

Continuing the SFL, we reach the next part of the track, the tibial tuberosity before reaching the quadriceps, where the rectus femoris, that runs on the inside of the tensor fascia latae (TFL), connects and carries the SFL to the pelvis.



Movement function:

The job of rectus femoris is to extend the knee, and due to its pelvic attachment also to flex the hip.

Restriction potential:

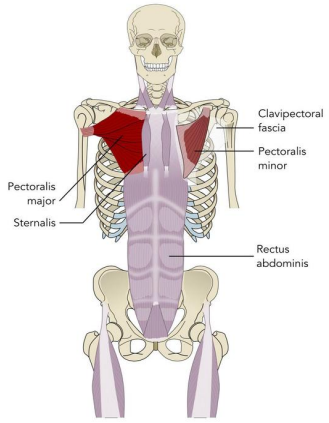
Movement restrictions in the rectus femoris include an inhibited range of motion in hip flexion and extension, present in lots of linear work, such as the stride length in sprinting.

Restrictions also tend to leave some individuals with an inhibited ability to fully flex the knee joint, which may also be reflected in the person's ability to sit relaxed in a kneeling position.

From a postural perspective, knots and trigger points on the rectus femoris may tilt the individual's pelvis anteriorly if the rectus femoris is locked short, creating a downward pull on the

top of the pelvis. Some cases of postural restrictions also include knee hyperextension.

At the upper end of the rectus femoris we reach a destination with no continuation to the rest of the stations on the track.



On this next station of the track, we reach the abdominal fascia of the rectus abdominis, which we find between the pubic bone and the 5th rib. The rectus abdominis is the most superficial muscle of the abdominal group and is therefore not considered to be a part of your core muscles.

Movement function:

Its movement function is simply to flex the trunk to let the knees approach the ribs.

Restriction potential:

Rectus abdominis is the famous and maybe most overworked muscle, as this is what is also referred to as your 'six-pack'. It is therefore often majorly over-exercised and under-treated, and in many cases locked short/concentrically.

Restrictions in the rectus abdominis may inhibit the elastic potential in the area. As the rectus abdominis is also a muscle responsible for, and part of your breathing mechanics, dysfunctionality in the muscle or in its facia may inhibit breathing capabilities, the expansion of the thoracic cavity and elevation of the ribs.

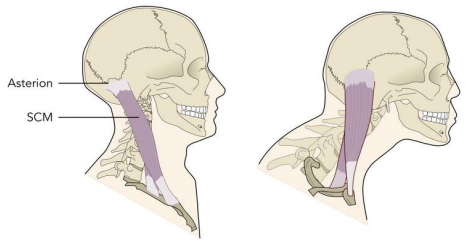
Posturally, trigger points in these fascial layers may cause enclosing of the ribcage and the thoracic

cavity as it attaches to the 5th rib, and the rib responsible for the trunk being flexed forward. It may also have an influence on pelvic tilts, and in particular a pelvis being locked posteriorly.

From the 5th rib we continue through the small sternalis muscle and its associated fascia, before its line continues through the sternocleidomastoid (SCM).

The SCM myofascia is the upper portion of the SFL that attaches to the top of the sternum. It runs laterally across the neck onto the posterior portion of the temporal bone and the asterion on the back of the skull.

To locate the SCM, gently place your fist on your frontal bone (front of face) and apply a pressure while pushing the head forward against the pressure of your fist. Use the other hand to locate the muscular tension on the lateral portion of the neck, where the SCM is located.



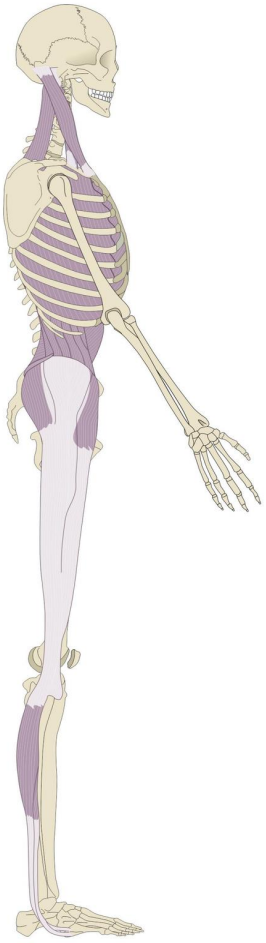
Movement function:

The movement function of the SCM is to create lateral flexion of the head and cervical spine, cervical spine flexion, and head and cervical spine rotation.

Restriction potential:

Restrictions in the SCM inhibits mobility and movement potential around the head and neck.

From a postural perspective, restrictions in the SCM produce hyperextension at the top of the neck, because its attachment causes the back of the skull to become pulled downward, while the entirety of the head becomes pushed forward. This is a common postural dysfunction we see a lot in modern society, where the head is locked in front of the body, and cervical spine falls out of alignment from the rest of the spine. Together with the occipitals, which were covered in the SBL, they share the same responsibilities of the postural influence in the area of the neck and head and may also contribute to the obstruction of the airway passage in the throat.



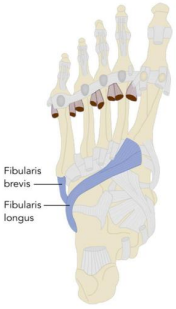
THE LATERAL LINE

The third and next myofascial meridian is called the Lateral Line (LL), which covers both lateral sides of the body all the way from the medial and lateral mid-point of the foot to the skull in the region of the ear.

Overall, the function of the LL is to balance the front and the back from the perspective of its lateral pull in balancing the left and right bilaterally. Primarily, the movement function of the LL is to create lateral bending in the body, which includes lateral flexion of the trunk, abduction at the hip and eversion at the foot. At the same time, it functions like as a brake for any lateral and rotational movements of the trunk.

Bony stations		Myofascial tracks
Occipital ridge/mastoid process	19	
	17,18	Splenius capitis/sternocleidomastoid
1st and 2nd ribs	16	
	14,15	External and internal intercostals
Ribs	13	
	11,12	Lateral abdominal obliques
Iliac crest, ASIS, PSIS	9,10	
	8	Gluteus maximus
	7	Tensor fasciae latae
	6	Iliotibial tract/abductor muscles
Lateral tibial condyle	5	
	4	Anterior ligament of head of fibula
Fibular head	3	
	2	Fibulari muscles, lateral crural compartment
1st and 5th metatarsal bases	1	

Common dysfunctions in the LL include *ankle pronation or supination, limited ankle dorsiflexion, knee varus or valgus, locked hip abduction, restricted hip adduction, lateral pelvic tilt, lumbar side-bend, lumbar compression (if both sides of LL are restricted), lateral ribcage shift and shoulder restriction.*



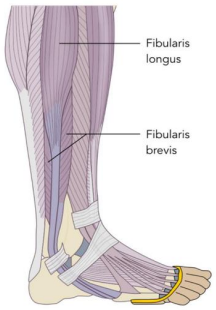
The LL from Bottom to Top

We begin our next journey about halfway down the foot on its medial side with the insertion of the tendon fibularis longus. Following this, we travel laterally under the foot and turn up toward the lateral aspect of the ankle.

From here it picks up another connection through the fibularis brevis about halfway down the lateral part of the foot. From its insertion at the base of the 5th metatarsal, it passes up via the fibularis longus in the lateral compartment of the lower leg.

Movement function:

The movement function of the first part of the Lateral Line, and the fibularis longus muscle in particular, is muscle to create foot eversion.



Restriction potential:

Movement restriction may inhibit both ankle pronation and ankle supination as well as it tends to limit the mobility in the ankle dorsiflexion.

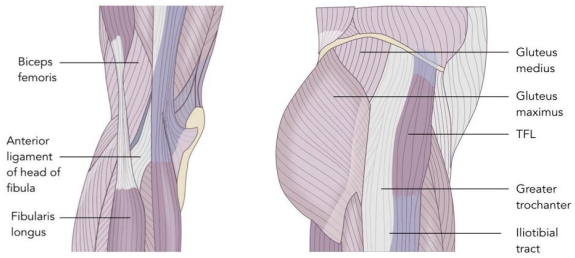
From a postural perspective, depending on whether the muscle is locked long or locked short, the individual may be restricted in the whole lateral compartment from the foot to the

knee, which may be expressed as knee valgus or knee varus, where the knees are either respectively dropping inwards toward each other or pushed outwards away from each other.

The line continues via the fibularis longus. Here, it continues through the iliotibial tract (ITT/IT band) and abductor muscles. The iliotibial tract begins it journey here and can be felt as a thick and strong band on the lateral aspect of the lower thigh, similar to the Achilles tendon.

Here it continues through the associated muscles of the adductors and runs through the tensor fasciae latae (TFL), the Gluteus Medius and the superior fibers of the gluteus maximus.

This complex series of muscles are used during steps on the weighted leg to keep the trunk from falling forward toward the unweighted leg and maintaining a strong a stable base for unilateral work, whereas the abductors act as stabilizers to prevent hip adduction.



Movement function:

Both the TFL and IT band share the same movement functions. The movement functions are hip abduction, hip flexion, and hip medial rotation when the knee is flexed, whereas the Gluteus Medius is involved in hip medial rotation when the knee is flexed and hip abduction. So, it's safe to say that both the glutes, TFL and IT band complement each other and contribute to the same types of motion in a cooperative manner.

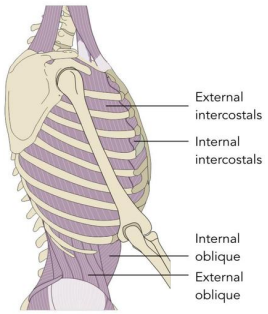
Restriction potential:

Restrictions in any of these myofascial areas may inhibit the movement potential of the individual in a lot lateral and side-to-side work, which includes risk of limitation in the ability to obtain optimal mobility in hip abduction, hip adduction, and hip flexion.

From a postural perspective, restrictions may affect the position of the femur in a standing posture, but also during movement. In one-sided restrictions, these often appear as a pelvis locked in a lateral tilt or a lateral shift. When restrictions occur on both sides, it may potentially appear as a pelvis locked in an

anterior tilt.

Continuous to the IT band through the pelvis, iliac crest, the ribs, and the intercostal muscles including the abdominal obliques, we form the next part of the pathway through the LL on the lateral portion of the upper body.



The abdominal obliques attach to the lower portion of the ribs, whereas the intercostal muscles attach to and are placed between the ribs to create movement of the ribcage.

Movement function:

The movement function of the internal and external intercostals is to elevate the ribs, which is especially present during inhalations. The movement may also be involved in running, where they wind and unwind the ribcage reciprocally with each step taken. When taking a step forward with one foot, the ribcage rotates to the same side, and the external intercostals on the opposite side and internal intercostals on the same side contract to create the counter rotational movement.

The movement functions of the internal and external abdominal obliques are to laterally flex the trunk, rotate and flex the trunk. The same mechanics are also applied to these muscles during rotational actions, such as running, where contraction is causing the trunk to rotate oppositely of the pelvis and lower body to create the forward drive.

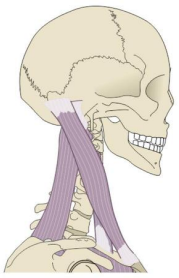
Restriction potential:

Restrictions in the area in the intercostal muscles appear as an inhibited ability to properly elevate the ribs during breathing and may cause enclosing of the ribcage and thoracic cavity. Restricted abdominal obliques tend to impair the ‘core’-function of the individual and provide limited movement range in rotation and flexion of the trunk.

From a postural perspective, trigger points in these myofascial layers may cause lateral pelvic tilting

(if appearing one of the sides only), ribcage collapse or compress the lower part of the trunk.

Through the ribs, the line continues through a two-way path in the neck through the sternocleidomastoid muscle on the outside with the splenius capitis muscle forming underneath, including the occipital ridge. Since the SCM participates in both the Superficial Front Line and the Lateral Line, if the SFL is locked in a downward pull, the LL will be adversely affected.



Movement function:

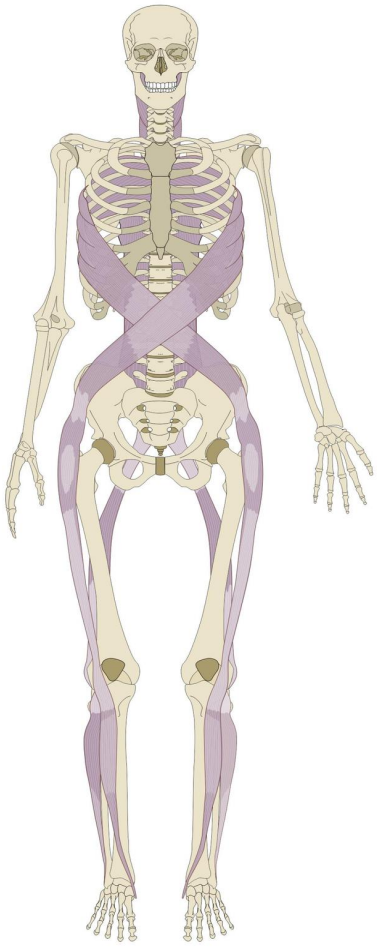
Similar to what you have learned from the SBL and the SFL where both the occipital ridge and SCM are represented, the movement functions of the occipital ridge are to extend, hyperextend and rotate the head, whereas the SCM creates lateral flexion of the head, neck flexion, and neck and head rotation.

Their participation in the LL is primarily to perform lateral flexions or rotations.

Restriction potential:

Restrictions in these myofascial areas often appear as an inhibited ability to fully rotate or flex the neck.

The forward head posture is often a compensational pattern of postural restrictions in these areas, as well as a neck being hyperextended, or even rotated or laterally flexed to one of the sides.



THE SPIRAL LINE

We continue our myofascial exploration through the Spinal Line (SPL), the first myofascial meridian crossing the sagittal midline of the body.

This line loops around the body, left and right, joining each side of the skull across the upper back to the opposite shoulder, and then around the ribs to cross again over the navel to the hip. From the hip it passes the anterolateral thigh, across the shin, under the foot through the posterolateral side of the leg to one side of the erector spinae myofascia to end close to where it began.

The postural function of the SPL is to enclose and wrap the body to help maintain stability in all planes. As it connects the foot to the pelvis, it helps determine knee-tracking during walking, where the SPL also participates in creating twists and rotations, known from various contralateral movements, including running and walking.

Bony stations		Myofascial tracks
Occipital ridge/mastoid process/axis TPs	1	
	2	Splenius capitis and cervicis
Lower cervical/upper thoracic SPs	3	
	4	Rhomboids major and minor
Medial border of scapula	5	
	6	Serratus anterior
Lateral ribs	7	
	8	External obliques
	9	Abdominal aponeurosis, linea alba
	10	Internal obliques
Iliac crest/ASIS	11	
	12	Tensor fascia latae, iliotibial tract
Lateral tibial condyle	13	
	14	Tibialis anterior
1st metatarsal base	15	
	16	Fibularis longus
Fibular head	17	
	18	Biceps femoris
Ischial tuberosity	19	
	20	Sacrotuberous ligament
Sacrum	21	
	22	Sacrolumbar fascia, erector spinae
Occipital ridge	23	

Many of the myofascial parts of the SPL are also present in both the SBL, SFL and LL, which we have already covered. As a consequence of this, any dysfunctions in the Spiral Line may as well affect the functionality of other meridians. And as most people have a dominant side of respectively the lower and upper body, the SPL is rarely in perfect balance, but is still functionally adaptable.

The primary movement function of the SPL is to create spirals and rotations in the body, whereas in eccentric and isometric work, it acts as a stabilizer for the trunk and leg.

In all aspects of existence, spirals occur, even from the tiniest atom to the human body and in space. The vast majority of human movement happens in spirals or rotations. The animal kingdom is not excepted from this principle. Take for instance the movement of a lizard utilizing spiral motion in every stride it performs to propel its body forward, which creates a flowing wave in its locomotion. The same is occurring in the human body when the trunk rotates counter wise of the pelvis and lower body by the help of the abdominal obliques, which ends up creating the linear drive.

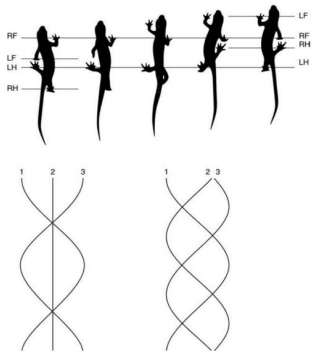


Fig. 5.4 The locomotion of a lizard utilizing spiral motion to create linear drive just like humans.

Source: Principles of Animal Locomotion, McNeill A. (2006).

Common dysfunctions in the SPL include *ankle pronation or supination, knee rotation, pelvic rotation, ribcage rotation, one shoulder being lifted, anteriorly shifted shoulder, head tilt or rotation.*

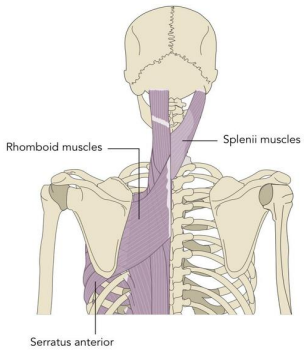
The SPL from Bottom to Top

The Spiral Line begins and ends at the top as it spirals through the body. It begins on the posterior side of the skull between the occiput and temporal bone, through the splenius capitis muscle, before meeting the

spinous processes from C6 to T5. Running symmetrically on both side it forms an 'X.'

Starting on one side of the posterior part of the body, it crosses the midline where it meets the rhomboids major and minor and connects to the medial border of the scapula. This mechanical proportion of the myofascial meridian connects the left side of the skull to the right scapula and vice versa.

From the scapula the line continues through its fascial connection to the serratus anterior moving the line to the front side of the body. This natural fascial connection call be called or the 'rhombo-serratus muscle,' as it acts and counteracts during spiral movement.



Movement function:

Separating the fascial interconnection between the rhomboid muscles and serratus anterior, each muscle serves a different and opposing purpose in movement to each other.

The movement function of the rhomboid major and minor is to retract the shoulder by adducting (moving together) the scapula, whereas the movement function of the serratus anterior is to protract the shoulder and thereby abduct the scapula.

Restriction potential:

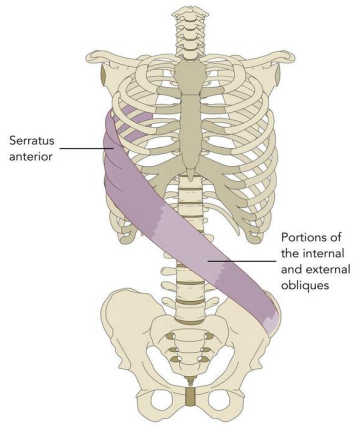
Restrictions in any of these myofascial areas inhibit the mobility and movement range around the shoulder and scapula. Posturally, it locks the scapula, depending on the type of lock, which is reflected in the position of the shoulder.

The typical and most common pattern is seen when the rhomboids are locked long, while the serratus anterior is locked short. This pattern is protracting the shoulders, pushing them in front of the body, while the scapulae are pulled out and away from the spine. This pattern is also known as 'rounded shoulders', which is also often reflected on the thoracic spine that tends to become kyphotic.

The opposite pattern can of course also occur but is seen quite less frequently in society today. Here, the rhomboids are locked short, where the serratus anterior is locked long causing the scapulae to being pulled up and back towards the spine, where the opposite posture occurs to create flatness in the thoracic spine.

From the serratus anterior there's a strong and visible connection to the next part of the track, being the external obliques that follow the lines of the fibers. From the external oblique it carries on through the linea alba, to the opposite internal obliques before it reaches the ASIS.

Again, the pattern forms an 'X' running through the sagittal midline of the body.



Movement function:

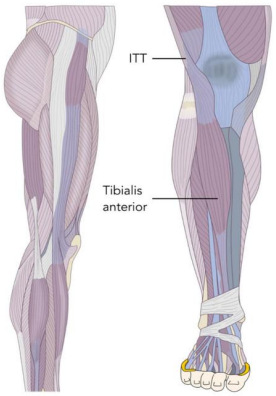
The movement function of this exact pattern of myofascia is to create pelvic counterrotation of the trunk. As the muscles contract, one side of the ribcage will be rotated inward towards the opposite side of the pelvis, that likewise will be rotated inward. This is present is many types of contralateral movements, where lower body and upper body mechanics act opposingly to each other, such as running and walking, where arms and legs move oppositely in synchronicity to create balance and forward drive.

Restriction potential:

Restriction in these parts of the myofascia may inhibit the ability to fully utilize the trunk-pelvis counterrotation and limit the range of motion in these core-rotations. We find examples of this restriction in individuals who tend to be 'stiff' and locked in the torso during, for example, running or walking. Here, rotational movement in the spine is often restricted, where trunk may move along with the pelvis, or not

move at all, instead of moving counter rotational to the pelvis.

From a postural viewpoint, trigger points in any of these myofascial layers may leave the individual with pain in the area of the abdominals or in the layers between the ribcage and pelvis. This tends to either laterally tilt the pelvis on one side or collapse the ribcage and shoulder on the opposite side, or even both at the same time.

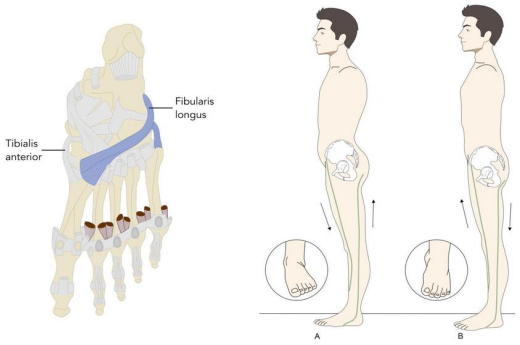


From here the meridian follows through the continuity of the anterior superior iliac spine (ASIS) before is passes down to the leg through the tensor fascia latae (TFL) and the anterior edge of the IT band (ITT). From here, the tibialis anterior takes over and draws the line to the inside of the ankle.

Instead of ending here, the fascial connection continues through the other side of the ankle in direct fascial connection with the fibularis longus, where the tibialis anterior clearly connects fascially to fibularis longus that forms a ‘sling’.

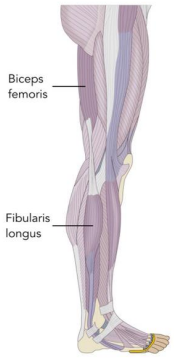
The postural connection between fibularis longus and tibialis anterior is often seen during restrictions and dysfunctions in the foot, where the foot is either locked in a pronation or supination.

In most cases, we find the foot being locked in a pronation, which is often caused by the tibialis anterior being locked long, where the fibularis longus is locked short. Here, the fascia of the tibialis anterior needs to be released and engaged, whereas the fascia of the fibularis longus must be released and lengthened to resolve this postural dysfunction.



The interplay between the tibialis anterior and fibularis longus works so the tibialis pulls up on the medial longitudinal arch, where the fibularis supports the lateral arch. This sling connection affects the foot, where the combination between the tibialis being locked long and fibularis being locked short contributes to a pronated foot with a drop in the medial arch. The opposite is also true, where tibialis anterior being locked short and fibularis being locked long tends to create foot supination with a high arch and weight shifted laterally on the foot.

When considering the entire SPL in the equation, more postural dysfunction may follow along the line with referral to figure A and B. Since the tibialis anterior connects to both rectus femoris, Sartorius, IT band and TFL, which are all connected to the front of the hip bone (ASIS or AIIS), this connection may also affect the pelvis position, where this forward pull anteriorly tilts the pelvis including potentially also a drop in the medial arch.



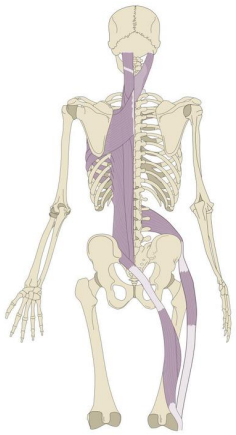
On the other hand, the fibularis connects through the back with biceps femoris to the ischial tuberosity, which are connected to the back of the hip bone. Restriction in this pattern may, conversely, pull the back of the pelvis down into a posterior pelvic tilt creating a tendency of an inverted foot.

Although these are not general rules, they may be considered frequent occurring patterns.

From here we pass along from the fibularis longus onto the biceps femoris; the lateral hamstring that continues up to the ischial tuberosity.

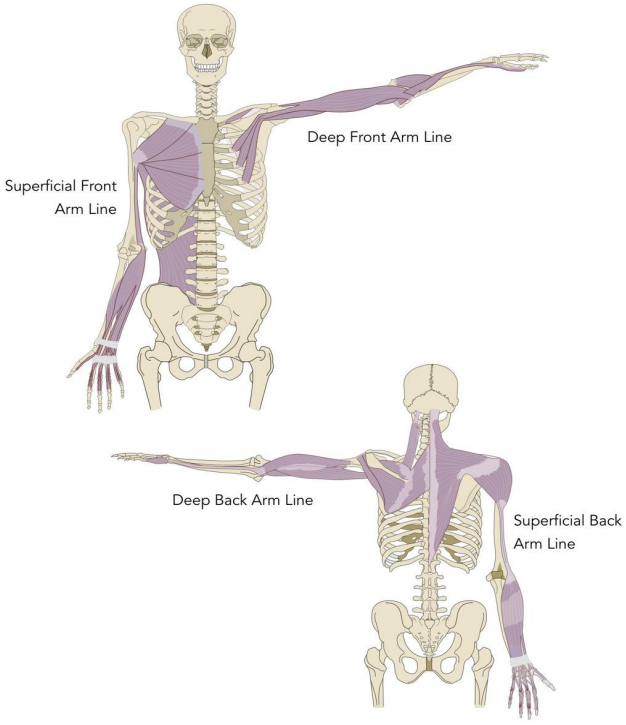
Beneath the long head of the biceps femoris lies a set of two locals, which we call the 4th hamstring, that connects the middle part of the adductor magnus and linea aspera with the hamstring.

Signs of overactivity in the biceps femoris are knees that are chronically flexed to some degree, or tibia that are laterally rotated (which is often reflected as external foot rotation). When the adductor magnus is overworked or stressed it may contribute to a pelvis locked in a posterior tilt or an inhibited ability for the hip joints to properly flex.



From the biceps femoris we continue through a road already similar to us, which we covered in the SBL. The Sacro tuberous ligament takes over and runs across the sacral fascia and on up the erector spinae on the contralateral side, where the line ends at the occipital ridge. This part of the line is responsible for lateral pelvic tilts, differences in leg length, or what appears so, including the weight distribution on the legs.

Twisting and rotating movements are responsibly for stretching and engaging the SPL, since its curls and spirals across the sagittal plane of the body.


Deep Front Arm Line
Superficial Front
Arm Line
Deep Back Arm Line
Superficial Back
Arm Line

THE ARM LINES

The next of the myofascial meridians is divided into four subcomponents of the Arm Lines, each representing a superficial and deep part of the front, as well as a superficial and deep part of the back. All running through four layers of the shoulder, four quadrants of the arm and four sides of the hand (thumb, little finger, palm, back of the hand).

Due to the complexity of the arms in contrast to the legs in terms of level of mobility and movement range, the requirements and complexity of the Arm Lines are therefore greater.

The overall postural function of the lines is limited in relation to the trunk and legs, since they hang from the upper skeleton, and act more separately, conversely to the legs. Although, some of the postural functions include strain from the elbows affecting the mid-back, whereas dysfunctions and restrictions in shoulders may affect both the neck, ribcage, and thoracic cavity in general, which may impair and limit breathing capabilities.

Some of the movement functions include our close interconnection between the eyes and hands and their reciprocal relationship in the flow of proprioceptive movement, where the hands respond by doing what the eyes perceive and brain demands. Apart from that, they are used to grab things, push, or pull things including throwing, punching, and stabilizing our body in certain positions.

Deep Front Arm Line (DFAL)		
Bony stations		**Myofascial tracks**
3rd, 4th and 5th ribs	1	
	2	Pectoralis minor, clavipectoral fascia
Coracoid process	3	
	4	Biceps brachii
Radial tuberosity	5	
	6	Radial periosteum, anterior border
Styloid process of radius	7	
	8	Radial collateral ligaments, thenar muscles
Scaphoid, trapezium	9	
Outside of thumb	10	

Superficial Front Arm Line (SFAL)		
Bony stations		**Myofascial tracks**
Medial third of clavicle, costal cartilages, lower ribs, thoracolumbar fascia, iliac crest	1	
	2	Pectoralis major, latissimus dorsi
Medial humeral line	3	
	4	Medial intermuscular septum
Medial humeral epicondyle	5	
	6	Flexor group
	7	Carpal tunnel
Palmar surface of fingers	8	

Deep Back Arm Line (DBAL)		
Bony stations		Myofascial tracks
Spinous process of lower cervicals and upper thoracic, C1-4 TPs	1	
	2	Rhomboids and levator scapulae
Medial border of scapulae	3	
	4	Rotator cuff muscles
Head of humerus	5	
	6	Triceps brachii
Olecranon of ulna	7	
	8	Fascia along ulnar periosteum
Styloid process of ulna	9	
	10	Ulnar collateral ligaments
Triquetrum, hamate	11	
	12	Hypothenar muscles
Outside of little finger	13	

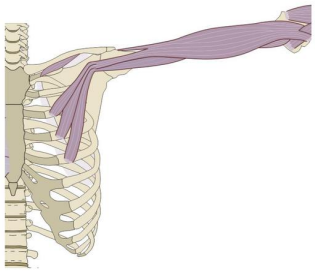
Superficial Back Arm Line (SBAL)		
Bony stations		Myofascial tracks
Occipital ridge, nuchal ligament, thoracic spinous processes	1,2,3	
	4	Trapezius
Spine of scapula, acromion, lateral third of clavicle	5	
	6	Deltoid
Deltoid tubercle of humerus	7	
	8	Lateral intermuscular septum
Lateral epicondyle of humerus	9	
	10	Extensor group
Dorsal surface of fingers	11	

Common dysfunctions in the Arm Lines include *all kinds of shoulder and hand inabilities and issues, protracted (rounded) shoulders or retracted shoulders, and scapula mis-positioning ('winging,' tilted or rotated).*

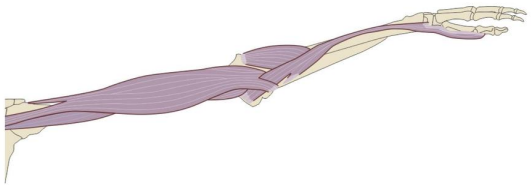
The Deep Front Arm Line (DFAL)

The DFAL begins at the 3rd, 4th and 5th rib at the pectoralis minor muscle that runs underneath the pectoralis major, where it connects to the short head of the biceps brachii and coracobrachialis at the coracoid process.

In a normal relaxed posture, shortness in this upper region of the DFAL pulls the coracoid process down to create an anterior tilt in the scapula, which is contributing to the tendency of rounded shoulders. Due to its size and deep location, the pectoralis minor muscle can be very difficult to locate, and thereby treat, although not impossible. It has a great responsibility as it affects your breathing as well your neck posture, head posture and shoulder functionality.



Indications of dysfunctions in the pectoralis minor include restriction in upper rib movement during inhalations, troubles flexing the arm and lifting the shoulder, and scapulae being anteriorly tilted, or shoulders being rounded.



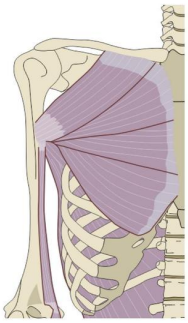
The next part of the track is the short head of the biceps running down from the coracoid to the radial tuberosity, covering three joints and responsible of supinating the forearm, flexing the elbow, and diagonally flexing the upper arm.

From the upper arm the track continues through the lower arm, where both the short head of the biceps and the supinator attach to the radius. From here it crosses over the inside of the wrist to join the thumb, where the station ends.

The Superficial Front Arm Line (SFAL)

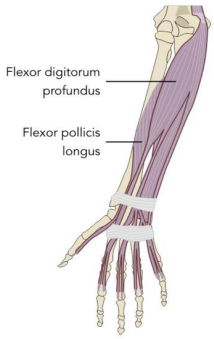
The next of the arm lines overlies the DFAL in the shoulder and is more superficial to the DFAL. The SFAL controls the wide range of movement of the arm with the large and potent muscles of the pectoralis major and latissimus dorsi, which provide the motive force in movements such as a smash, a throw, or a swimming

stroke. In the animal kingdom the SFAL is responsible for the wing beat in most birds and forward motion drive of the forelegs for quadruped species.



The pectoralis major is the first stop on the road with its sets of attachments from the clavicle to the middle ribs as well as the latissimus dorsi, creating a vast responsibility for the movement of the arms both in front, behind and to the sides of the body.

Both the pectoralis major and latissimus dorsi serve several of the same movement functions despite their location of each side of the body, thus both highly connected to and correlated with the shoulder joint. They both participate in shoulder adduction, arm medial rotation and shoulder depression. Apart from that, the pectoralis major is also responsible for shoulder flexion, whereas latissimus dorsi is responsible for shoulder retraction and shoulder extension.



Their huge influence in moving the arm in vast ranges creates just as big a restriction potential in relation to these movements, if trigger points and dysfunction is developing in these myofascial areas.

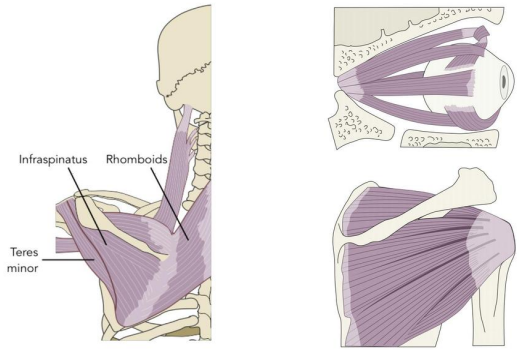
The SFAL connects the pectoralis major and latissimus dorsi to the medial humerus through the medial inter-muscular septum to the medial humeral epicondyle on the inner side of the elbow.

From here, the track follows through the flexor group down from the epicondyle. These muscles continue to the fingers through the carpal tunnel to reach the palmar surface of the fingers.

The Deep Back Arm Line (DBAL)

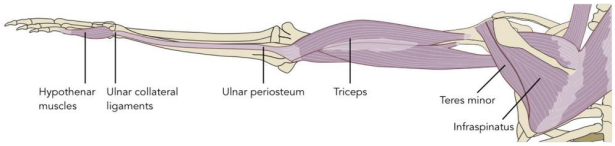
We begin the DBAL at the spinous processes of the upper thoracic and 7th cervical vertebrae through the rhomboid muscles and scapula, where it picks up the rotator cuff muscles before approaching the humerus.

The rotator cuff muscles act as a sandwich covering and supporting the humerus in the same way that the ocular muscles control the orbit of the eye, where each 'string' serves a functional purpose in the movement of the whole.



On the next station of the track, we approach the long head of the triceps brachii, that leads us further down to the tip of the elbow to the olecranon of the ulna where it continues fascially to the entire length of the outside of the lower arm.

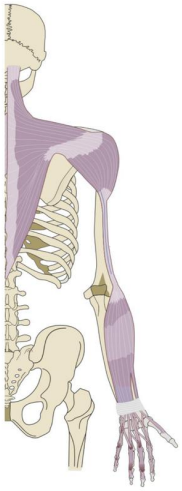
Due to the fascial connection between the rotator cuff muscles and triceps brachii, the arm must be in a horizontal line or above in order toto engage this connection.



The DBAL can be considered as equivalent to the Lateral Line's job in the leg, which is to limit side to side

movement (only relevant when moving with the hands, such as during a crawl), and provide stability from the outside of the hand to the back of the shoulder.

The Superficial Back Arm Line (SBAL)



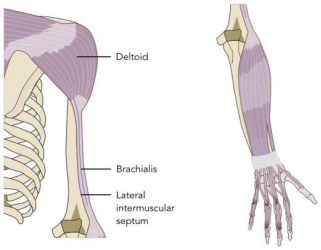
The last of the four arm lines, the SBAL, begins at the wide surface of the trapezius, from the occipital ridge through the spinous process of T12 forming a trapezius-deltoid complex at the top.

The relationship between the trapezius and deltoids is complex, since the thoracic fibers of the trapezius are connected to the posterior fibers of the deltoids, while the cervical fibers of the trapezius are linked to the middle deltoid and the occipital fibers of the trapezius link to the anterior deltoid.

These connections must be taken into consideration when treating the shoulder joint, since solutions to issues may be found in these connections.

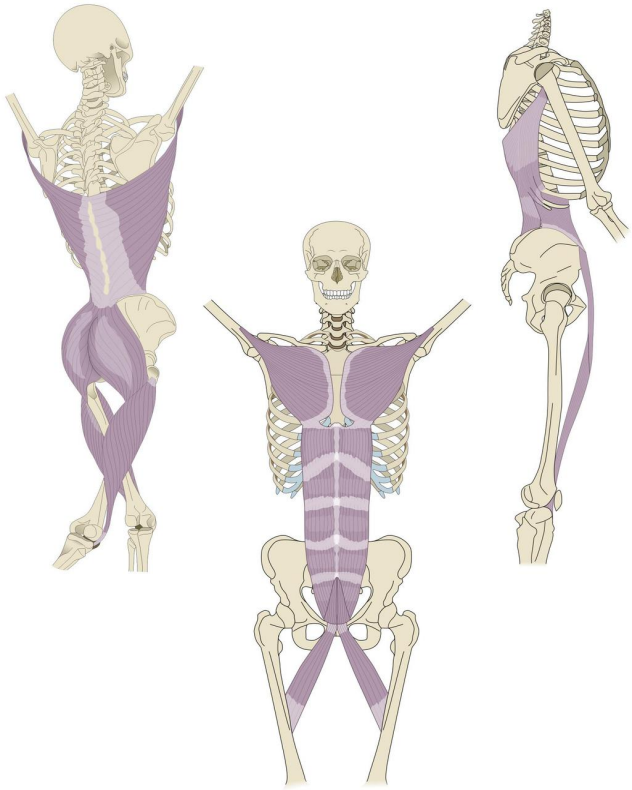
The line continues through the humerus where the fascial connection passes under the brachialis muscle to blend with the fibers of the lateral intermuscular septum before reaching the lateral humeral epicondyle.

From the lateral epicondyle, the extensors bring the SBAL down to the back of the hand, where the muscles are incompletely separated at their proximal end.



The SBAL forms a single fascial unit from the spine to the fingertips.

The line is responsible for posterior or backward arm motions such as the badminton backhand shot, as well as it controls arm



THE FUNCTIONAL LINES

Bony stations		Myofascial tracks
Back Functional Line		
Shaft of humerus	1	
	2	Latissimus dorsi
	3	Lumbodorsal fascia
	4	Sacral fascia
Sacrum	5	
	6	Gluteus maximus
Shaft of femur	7	
	8	Vastus lateralis
Patella	9	
	10	Subpatellar tendon
Tuberosity of tibia	11	
Front Functional Line		
Shaft of humerus	1	
	2	Lower edge of pectoralis major
5th rib and 6th rib cartilage	3	
	4	Lateral sheath of rectus abdominis
Pubic tubercle and symphysis	5	
	6	Adductor longus
Linea aspera of femur	7	
Ipsilateral Functional Line		
Shaft of humerus	1	
	2	Latissimus dorsi, outer edge
End of ribs 10-12	3	
	4	External oblique
Anterior Superior Iliac Spine	5	
	6	Sartorius
Pes anserinus, medial tibial condyle	7	

Our functional lines can be divided into three.

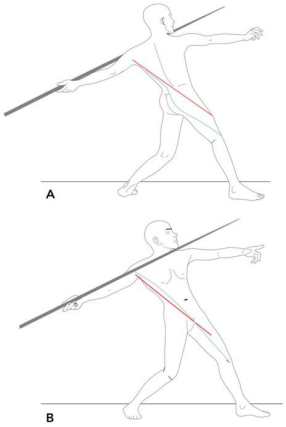
The front and back work together to participate in contralateral movement and form an ‘X’ across the torso similar to the Spiral Line, but a bit more complex. The third line, the Ipsilateral Functional Line, runs from the shoulder to the inside of the same knee.

These lines are called functional since they participate in movement and are rarely employed in standing posture. Movement that is mostly contralateral, and many known motions from sports, such as the baseball pitch, the javelin throw or the football kick.

The movement functions of the functional lines are to provide elegant, powerful, and stable motions to optimize and balance our contralateral movements.

These lines are an excellent example of the interconnecting and cooperating roles the muscles and fascia serve in the human body. When muscles innately cooperate to create a desired action, the movement often become fluid, strong and powerful.

The postural functions of the Functional Lines are, as mentioned, very limited. Although they may serve a distorting factor, such as bringing the shoulder closer to its opposite hip, either across the front or the back. Most of the time, this pattern is present at the front, but does not necessarily originate from the Functional Lines, but may as well be from the Spiral Line.



A very common postural compensational pattern is when the stronger side is exercised more frequently than the weaker, which is especially present in sports, where one leg is primarily used for the kicking, or one arm is primarily used for the throwing. Often, this creates a postural rotation or drop, that is more extreme on the commonly used side than the other.

In figure A and B, you see the functional lines in action. In this javelin throw, one side is acting as contralateral stabilization to complement the opposite side's execution of movement. The figure illustrates how one side stretches to prepare for the movement, while the other side contracts. As the movement is executed, this condition is reversed to create the movement.

The Back Functional Line (BFL)

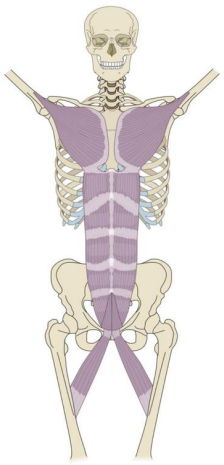


The BFL begins at the top of the humerus to continue through the latissimus dorsi, before dorsi before it runs through the opposite side of the body to the sacral fascia to reach the sacrum and gluteus maximus. From here it passes down to the posterior edge of the IT band, where it reaches the vastus lateralis.

To put it simple, this myofascial track is connecting the upper posterior part of your body to the opposite side of the lower posterior part of your body.

This connection makes contralateral movement extremely essential, such as a running stride where one contralateral part is in front of the body, while the other part is behind the body, say right leg and left arm. The parts in front of the body are preparing for ground contact, where this exact myofascial track will be engaged during the next stride, that will create forward drive.

The Front Functional Line (FFL)



The FFL originates from the same place, at the humerus, before it enters the same path, but oppositely, through the pectoralis major, before it reaches the 5th and 6th rib, where it continues through the rectus abdominis on the same side of the body. From here it crosses the sagittal midline of the body where it passes through to reach the adductors on the opposite side of the body.

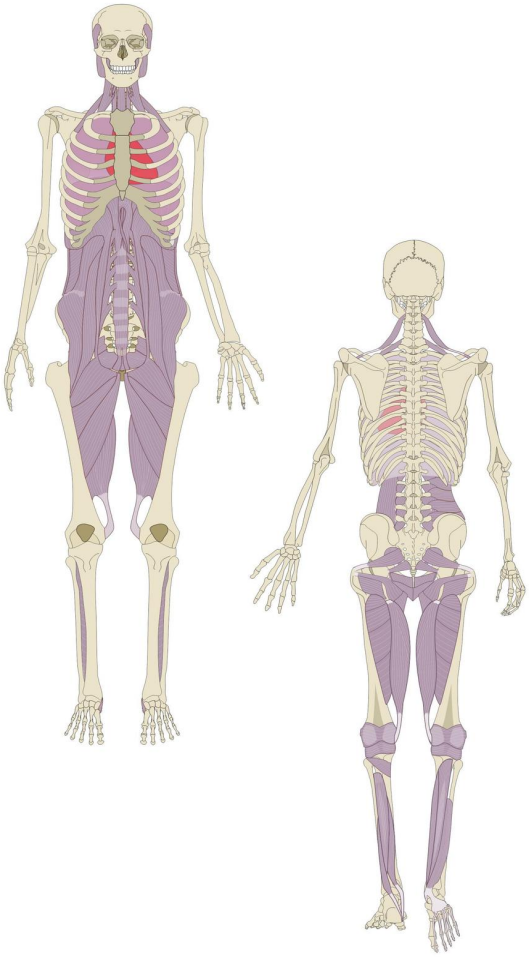
This functional line seems very similar to the upper anterior part of the Spiral Line but is nonetheless not the same. Although the myofascial track participates in some of the same actions, which would also be present during the stride in running, but this time occurring at the front of the body instead of on the back. So, when one posterior contralateral part has been propelled you forward, the opposite anterior parts contract and take over, where you will bring one shoulder closer to the opposite side of the pelvis, before getting ground contact to create another stride forward.

The Ipsilateral Functional Line (IFL)



The IFL follows a more lateral path, where it originates from the same source as all three, the humerus, where it once again passes through the latissimus dorsi, but this time moves through the obliques on the same side of the body via the ribs, where it ends near the sartorius, still on the same side of the body.

As previously explained, this line participates in some athletic movement, such as during throwing or kicking. Here, one side of the IFL is stretched to prepare for the action, whereas the opposite side contracts. Whenever the movement is executed, the stretched side contracts to create the force production in the throw or kick.



THE DEEP FRONT LINE

Bony stations		Myofascial tracks
Lowest common		
Plantar tarsal bones, plantar surface of toes	1	
	2	Tibialis posterior, long toe flexors
Superior/posterior tibia/fibula	3	
	4	Fascia of popliteus, knee capsule
Medial femoral epicondyle	5	
Lower posterior		
Medial femoral epicondyle	5	
	6	Posterior intermuscular septum, adductor magnus and minimus
Ischial ramus	7	
	8	Pelvic floor fascia, levator ani, obturator internus fascia
Coccyx	9	
	10	Anterior sacral fascia and anterior longitudinal ligament
Lumbar vertebral bodies	11	
Lower anterior		
Medial femoral epicondyle	5	
Linea aspera of femur	12	
	13	Medial intermuscular septum, adductor brevis, longus
Lesser trochanter of femur	14	
	15	Psoas, iliacus, pectineus, femoral triangle
Lumbar vertebral bodies and TPs	11	
Upper posterior		
Lumbar vertebral bodies	11	
	16	Anterior longitudinal ligament, longus colli and capitis
Basilar portion of occiput	17	
Upper middle		
Lumbar vertebral bodies	11	
	18	Posterior diaphragm, crura of diaphragm, central tendon
	19	Pericardium, mediastinum, parietal pleura
	20	Fascia prevertebralis, pharyngeal raphe, scalene muscles, medial scalene fascia
Basilar portion of occiput, cervical TPs	17	
Upper anterior		
Lumbar vertebral bodies	11	
	21	Anterior diaphragm

Posterior surface of subcostals, cartilages, xiphoid process	22	
	23	Fascia endothoracica, transversus thoracis
Posterior manubrium	24	
	25	Infrahyoid muscles, fascia pretrachialis
Hyoid bone	26	
	27	Suprahyoid muscles
Mandible	28	

The last of the myofascial meridians is the Deep Front Line (DFL). A complex and incredibly important line, which I personally define as our true core, when considering our core from a holistic perspective covering various aspects and responsibilities of our deepest myofascial structures.

The DFL is located between the left and right Lateral Line and between the Superficial Front Line and the Superficial Back Line surrounded by the Spiral Line and Functional Lines.

Beginning from deep in the underside of the foot, the line passes up through the lower leg, behind the knee through the pelvis and lumbar spine, and with an alternate track passes up through the pelvic floor and rejoins at the lumbar spine. Through the psoas-diaphragm interface the DFL passes through the ribcage along several other alternate tracks before it ends at the underside of the neuro- and viscerocranium.

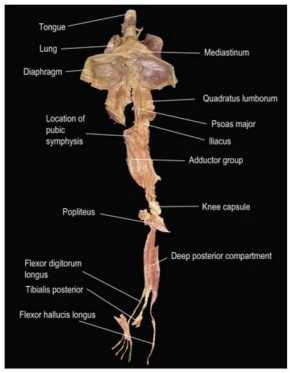


Fig. 5.5 A dissection of the Deep Front Line showing the deep fascial connections from the head to the toes.

One of the complex parts of the DFL is that it clearly occupies three-dimensional space in the body. Compared to the other myofascial meridians, this track demands more space, rather than just being a line.

Figure 5.5 shows an attempt of dissecting the DFL, which shows a large track connecting everything from the tongue to the foot via the pelvis, lungs, and diaphragm.

The postural function of the DFL is to provide support to bodily parts and act as the stabilizing deep core that holds everything together and connecting several functions. This includes lifting the inner arch, stabilizing the pelvis and legs, providing support to the lumbar spine from the front, forming the abdomino-pelvic balloon, stabilizing the chest during the expansion and relaxation of breathing, and balancing the head and neck.

Imbalance and dysfunction in the DFL may lead to what I choose to call a compressive state, where the core of your structure does not work optimally and with this lack of stability and support, it the DFL produces an overall shortening in the body, which collapses the ribcage, pelvis and spine and may contribute to why some people appear shorter than what they really are.

For the other lines to function at efficient levels, the core, being the DFL, needs to work optimally to prevent negative compensatory reactions in the other lines.

The primary movement function of the DFL is to stabilize the body, which is not really movement, or at least closer to isometric movement. Although it participates in hip adduction and the flow of the breath through the diaphragm.

It's mostly the superficial myofascial layers that are responsible for the dynamic movement, whereas the DFL lays the groundwork for the superficial layers to function optimally. Although these are changes that are difficult to be perceived with the naked eye, the function of the DFL is critical in the prevention of injury and degeneration. The issues that are often difficult to recognize and fix may be hidden in the core, being the DFL.

The role of the DFL sums up my philosophies and perspectives on human health very well. If wanting the visible, outer layers to function at optimum levels, the core must be treated just as with the engine of a car. Because even the nicest and most expensive car needs an engine, gas, and maintenance to even being able to drive. We can't reverse engineer if we want to fix the root causes of the issues.

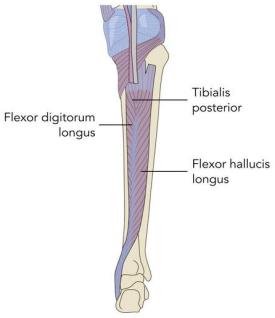
Common dysfunctions in the DFL include *ankle pronation or supination, high or fallen arch, chronic ankle plantar flexion, knee varus or valgus, anterior pelvic tilt, pelvic floor issues, lumbar malalignment, dysfunctional breathing mechanics, flexed or hyperextended cervical spine, TMJ syndrome, swallowing difficulties, language difficulties and overall compression (which indicates an overall dysfunctional DFL which no 'core strength' or support).*

The DFL from Bottom to Top

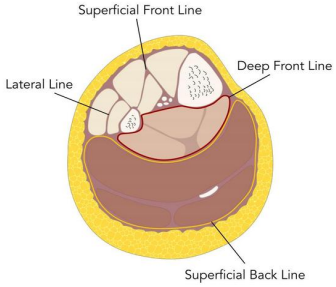
The DFL begins deep in the bottom of the foot with attachments to the tibialis posterior including the two long flexors of the toes: the flexor hallucis and digitorum longus.

The three major tendons pass up inside the ankle in the medial malleolus deep in the middle between where the SBL and SFL are located.

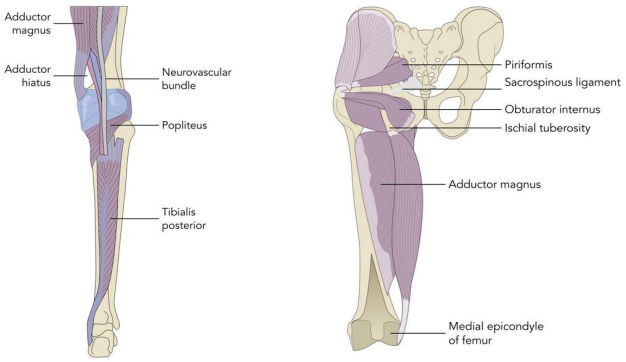


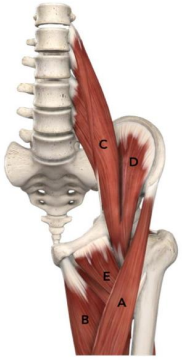


To make it easier to visualize the location and participation of the DFL, the picture below is a great way to comprehend this better. The LL, SBL and SFL are all located and function as superficial layers of myofascia, which provide them with more movement function and less stability demands. At the core and in the middle of those, the myofascial meridian of the DFL is located to stabilize the whole structure. Although it's unseen, it's incredibly important to human mechanics.



The line then passes from the deep compartment of the lower leg through the knee with the popliteus, neurovascular bundle, and fascia on the back of the knee capsule. At the medial side of the top of the knee joint, the track continues through the adductor group. Here the fascial continuity runs through to the pelvis from the posterior inter-muscular septum and adductor magnus, the track moves up inside the ischial tuberosity on the obturator internus fascia to contact the pelvic floor. The pelvic floor is an extremely complex structure that forms the bottom of the trunk portion of the DFL with connections around the abdominopelvic cavity.



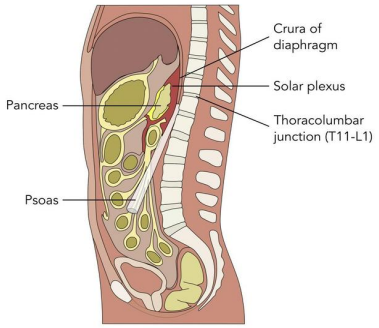


Another track can be taken in the DFL, moving down to begin in the lower anterior track on the inside of the thigh, just above the knee where the inter-muscular septum lies deep. From here it continues through the psoas and its associated fascia joining the femoral triangle before it dives backwards behind the organs to catch up with the lumbar spine.

The femoral triangle is the complex series of muscles and ligaments located in the pelvic region and top of the femur. It is equivalent to the armpit and includes the sartorius (**A**) and the adductor longus (**B**) that passes with the psoas (**C**), iliacus (**D**), pectineus (**E**), and neurovascular bundle under the inguinal ligament (both not pictured) into the abdominal cavity.

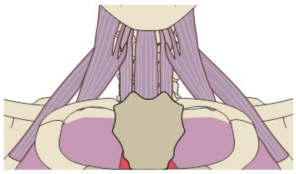
Length, balance, ease, and freedom of movement freedom is especially important in this series as it is highly responsible for most movement in the human body with the pelvic area acting as stabilizer and structural midpoint.

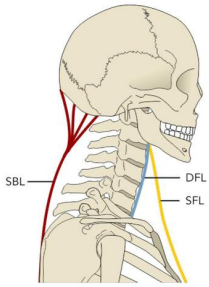
The upper end of the psoas then blends fascially with the crura and posterior part of the diaphragm before continuing with the anterior longitudinal ligament (ALL). This is where we meet the first highly essential connection in this track. The psoas-diaphragm connection, which bridges the lower body with the upper body, connects breathing to walking and running, and is through the celiac plexus a center of 'gut reaction.'



In the lower body region, the DFL follows the traditional 'rules' of the myofascial meridian by covering each side of the body. But from the point of the lumbar spine and up, these rules change, where it joins into a central line from the front to the back. From here, the diaphragm lets us travel upward through the thoracic cavity via one of three potential ways: either anteriorly, posteriorly or at the middle.

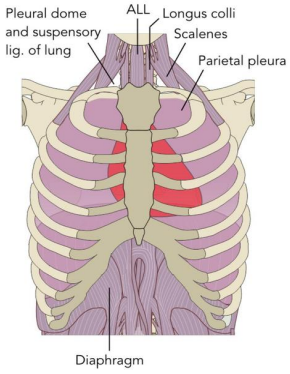
The **upper posterior track** travels through the anterior longitudinal ligament (ALL) onto the basilar portion of the occiput, which includes the longus capitis, longus colli, and the rectus capitis anterior muscles.





Associated with this track are the scalene muscles acting as head stabilizers during lateral flexion just like the quadratus lumborum does for the ribcage and participates in the forward head posture during postural restriction.

Not only the DFL is involved in cervical hyperextension, which is responsible for the forward head posture, but so is the SBL and SFL. However, the DFL is responsible for providing a counterbalance to the upper cervical to balance the participation of the SBL and SFL.



Moving now to the second upper track, the **upper middle track**, the line moves via the diaphragm through the pericardium and parietal pleura of the lungs.

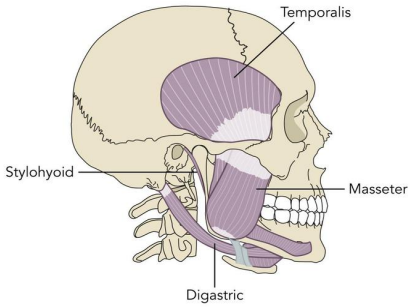
A part of the thorax, shown on the next illustration, shows how the mediastinum between the hearth and lungs connects the diaphragm to the thoracic inlet.

From the pleura of the lungs, it then reaches up to the TPs of the lower cervical vertebrae, which then again brings the line back in contact with the ALL. Through this part of the track, it also reaches the pharynx, the back of the throat that both participates in our digestive system and respiratory system.

The third and last track of the upper part of the DFL is the **upper anterior track,** it follows the curve of the diaphragm all the way over to its anterior attachment in

the xiphoid process at the bottom of the sternum, where the fascia connects. This myofascial line then continues from this station with the infrahyoid muscles, which emerges from behind the sternum and joins inside of the ribs to the front of the throat and hyoid bone.

Here they are joined by the omohyoid, participating in speaking and swallowing before this part of the myofascial track ends at the mandible.



Fascia Hydration

At the cellular level, the most important components of fascia are the collagen and the ground substance, where collagen as the main component represents 40% of the body's fascia.

Consider a sponge holding in water. The same does the fascia in the body. And just like a sponge, when put under duress, it may dehydrate and become hard and sticky, which indicates a loss of mobility and glide.

As figure 5.6 illustrates, when a lack of stimuli or even too many stimuli occurring as over-stressed individual areas of the body, its fascia becomes hard and dry, and loses its hydration.

When instead being properly stimulated, for example through movement with optimal biomechanics or treatment of say, massage or other myofascial release techniques, this stimuli or pressure assures that the fascial layers get hydrated, since water is pumped back into the tissues that and acts as a decompressive force for the components of the fascia.

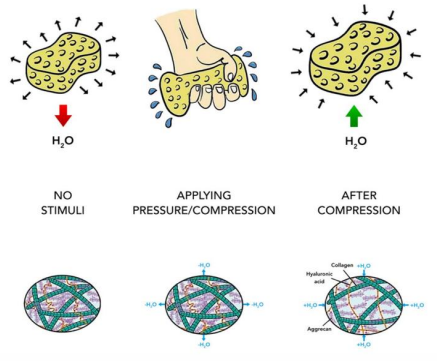


Fig. 5.6 A metaphoric perspective on how the fascia is hydrated and dehydrated.

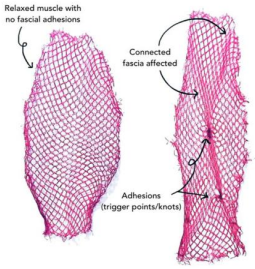
It is essential to notice that roughly 60% of the human body consists of water, and the same goes for 70% of the muscle that likewise consists of water. The ground substance in the fascia that surrounds the collagen fibers is made up of glycosaminoglycans (GAG) and is also 70% water. These two components act as a lubricant and help to maintain a critical fiber distance between the collagen fibers.

So, it shouldn't be any surprise that the human body in essence is very fluid, and mostly consists of

water. This is why we are schooled our whole life with the importance of optimal hydration. Yet in fact, hydration is not just how much you drink, and what you drink. Hydration is also your body's capability to absorb the water into its tissues.

So, you can drink as much water as you like, but if you don't treat your body properly, the fascia won't benefit from your water ingestion, but will instead lack the essential level of hydration. When the fascia dehydrates, caused by either physical or emotional trauma, water gets squeezed out of the tissue reversing the process of how the fascial components act as lubricants to instead become more gel-like and sticky, impairing the glide of its layers, which is caused by a reduction in the critical fiber distance.

We then go into a compressive state, which in detail is caused by the layers of the fascia being dehydrated, sticky and thereby compressed. As a side effect the fascial compression also places excessive compression on the capillaries, which may further impair the cardiovascular flow of the body. These effects on the fascia then ends up appearing as faulty biomechanics, poor posture and decreased cellular communication. All will become expressed as pain in the body.



To visualize this process, consider two fish nets. One clean and smooth with no knots or twists. Whereas the other one is full of these adhesions. This process is similar to what appears in the myofascia as trigger points caused by dehydrated fascia, inactivity, poor biomechanics etc.

When this is the cause of the dysfunction, pain, or immobility, one can stretch and do yoga as much as they like, but the stretching will never make the knot disappear. Neither will it create noticeable gains in the muscle's level of flexibility. Only myofascial treatment will solve the issue.

Imagine tying a knot on an elastic band and then pulling at both ends of the band to make it stretch and become longer. The knot will act as an inhibition in this process of stretching, just like the mechanics of stretching an area with myofascial adhesions.

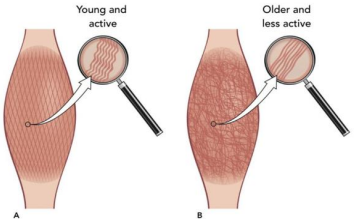


Fig. 5.7 Similar to the example with the fish nets, this figure shows how the myofascia structures in young and active individuals versus older and inactive individuals. The fascia of a healthy and active individual will form a clean and regular pattern (**A**), whereas the fascia inactive individual will orient twisted and randomly (**B**).

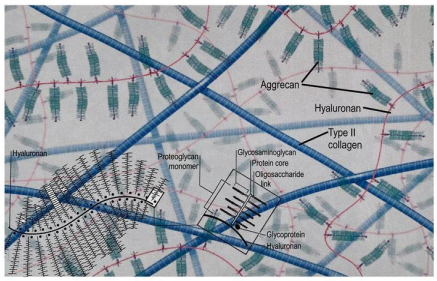


Fig. 5.8 illustrates how flexible strands of type II collagen trap proteoglycans, which then attracts large amounts of water. Trapped water resists compression, because compression because the network of collagen fibrils, being its container, does not stretch.

Another analogy to the concepts of fascial hydration to simplify this area and easier comprehend, is to visualize an empty uncapped bottle of water. Place your foot on the bottle and it compresses and collapses. Now instead take a full bottle of water and stand on it. The bottle will resist the compression since it's already pumped up with hydration. The same mechanisms are applied in the extracellular matrix that resists compression when water is trapped in it.

Myofascial therapy and movement within optimal biomechanics participate in the process of rehydrating the fascia to a fluid and flexible state resulting in visible improvements in movement and posture, and eliminates the pain associated with the knots and trigger points caused by the fascial dehydration. This process also tends to rearrange and reorganize the collagen fibers to an improved pattern.

Fascial Recoil

Contemporary discoveries are teaching us an interesting part of the function of the fascia that may greatly advance our physical performance economy.

Tendons, ligaments, and aponeuroses have shown to possess elastic properties that allow for brief storage of significant energy in short ranges of extension followed by a shortening, acting as an 'elastic recoil', where the stored energy is executed and given back. This is a concept of movement that muscles primarily have been given all the acknowledgement for being able to possess. A concept that also is present in the fascia.

An example given could be during forefoot running, which is the foundation of a sprint, the calves (soleus

and gastrocnemii) would then basically contract isometrically, while the tendon would cycle through the process of stretching and shortening.

Taking a trip to the animal kingdom, most people may be aware of the remarkable elastic force of a kangaroo. In fact, they are able to hop much longer and faster than can be explained by the force of contraction of their leg muscles.

In 1998, scientists discovered the action behind this ability, which was called the catapult mechanism [79]. Through this unique capability, the tendons and the fascia of the legs are tensioned like elastic bands, and when the stored energy is released, the extraordinary elastic hop can be produced.

Not only was this mechanism found in kangaroos, but also in gazelles who are known for their unique power and pace, can achieve a speed of up to 90 km/h and outrun strong and muscular predators like cheetahs and lions [80]. Even though the gazelle's musculature is far from significant, nor powerful, its elasticity and jumping capabilities are noteworthy.

This mechanism is not just unique to animals, but a similar orchestration of loading between muscle and fascia is also to be found in human movement, where is has been discovered that humans have a similar kinetic storage capacity as kangaroos and gazelles.

The mechanism is not only made use of when we jump or run, but also during simple movements like walking, which alters the energy usage to come from the muscles.

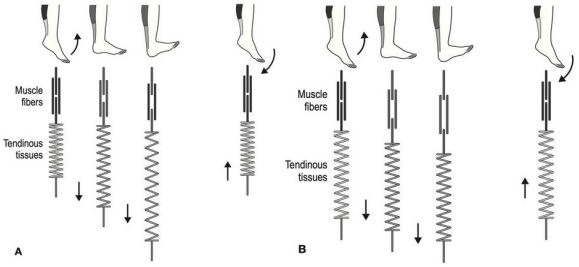
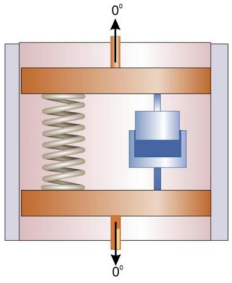
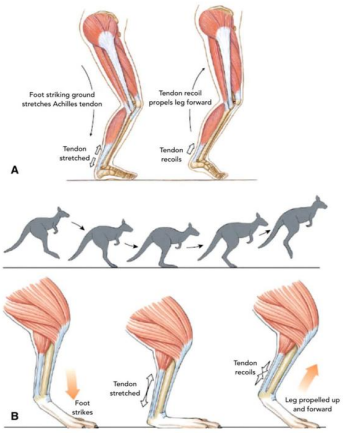


Fig. 5.9 Length changes of fascial elements and muscle fibers during movement with 'elastic recoil' properties (**A**) and with conventional muscle training (**B**). During a conventional movement (**B**) the length of the fascial elements does not change significantly, while the length of the muscle fibers clearly changes. During elastic recoil movements however (**A**), like running or jumping, the muscle fibers contract almost isometrically, meaning that their length almost doesn't change, while the fascial elements lengthen and shorten.
Illustration source: Kawakami Y, Kubo K, et al. 2002.

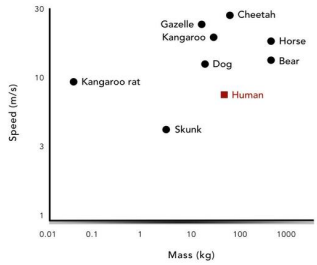


Consider the fascia being a suspension machine, or at least tissues sharing the mechanisms. Fascia contains both elastic spring and visco-elastic properties; visco-elastic being shock absorption. Both are essential mechanisms during a jump and its landing, or a running offset followed by the landing of the foot.

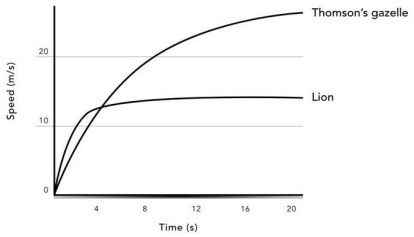
A concrete example could be the barefoot runner taking advantage of ranges of motion and the elastic recoil in this type of movement. The tibialis posterior muscle on his body will remain in isometric contraction and not change its length appreciably. Instead, the musculotendinous unit is stretched and lengthened, whereafter it recoils back like the movement of a yoyo, propelling the runner forward in a more economic manner and at a less cost than the act of lengthening and shortening the muscle.



In fact, animals share the same economic power output source, and kangaroos in particular. When its foot strikes the ground, shock absorption properties engage, and the tendon stretches. This action is followed by the tendon recoiling and the foot rapidly leaves the ground. Kangaroos are experts at this type of locomotion, which makes them be able of moving with a speed of up to 80 km/h.



Plotted against their body mass, the table above shows the speed of different mammals in comparison with a human being. The farther to the left, the more efficient and economic source of power can be achieved, since the lower a body weight and the higher a maximum speed often equals a faster acceleration. The chances of the animal relying more upon elastic properties in its fascia rather than big and powerful muscles, seems therefore more likely to occur at the left part of the table. Humans can be considered to be somewhere in the middle.



Take for instance the gazelle. A slender and elegant animal constantly on guard from predators. Its bodyweight is light and its maximum speed extremely fast. In fact, the gazelle can reach a speed of up to 90 km/h. Whereas the lion relies more on its powerful, yet heavy muscles, the gazelle utilizes another source of power mainly being produced by its fascia. The lion is often the fastest in the first burst of acceleration but will be defeated in the speed contest after a few seconds to the advantage of the gazelle, that often ends up outrunning the lion to survive another day.

One study looked at the elastic force stored and released in the ankle joint and compared it with the

work of its cooperative components, being the knee and the hip [81]. What's significant to notice is that the ankle joint does not consist of any remarkable muscles, but rather an Achilles' tendon, which is responsible for a lot of the recoiling work being make during running, walking, jumping, etc., whereas the hip and knee are primarily being driven by large compound muscles, such as the quadriceps, glutes, hamstrings, etc.

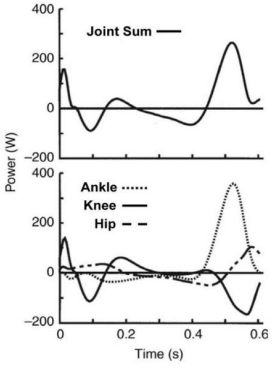


Fig. 5.10 Source: Devita et al

A participant was asked to walk at a pace of 1.52 m/h. His mechanical energy production was measured in Watts and distributed into each of the lower limb joints of the ankle, knee, and hip. Whereas the positive values indicate energy generation, the negative values indicate energy absorption during every phase of the step.

The Achilles' tendon therefore slowly stores the elastic energy during the majority of the step, only to release it at the right moment to produce a rapid recoil to powerfully propel the body forward. This extraordinary catapult mechanism of the ankle and the stretch/recoil process of the Achilles' tendon allows the muscle fibers to remain almost isometric, which produces high forces with very little mechanical work. The muscles therefore spend remarkably less metabolic energy to produce isometric force compared to shortening and contraction them during muscle-dominant work.

At this figure the data shows the difference of mechanical energy production for the gastrocnemius (calf muscles) and the Achilles' tendon separately, whereas the muscle-tendon line marks the sum of the power of the gastrocnemius and the Achilles' tendon. Again, it is clear how the muscle fibers contribute very little to the total muscle-tendon power output, but the Achilles' tendon alone stores and returns a significant amount of mechanical energy.

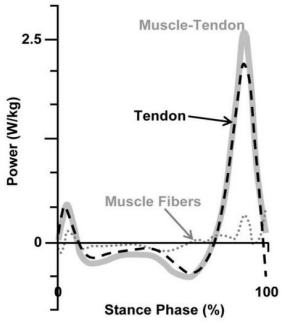


Fig. 5.11 Source: Ishikawa et al.

Plasticity In Fascia

Not only does fascia have elastic properties as presented, but it also possesses plastic properties.

When being stretched, the myotatic reflex of a muscle will attempt to contract it to get it back to its resting length as an automatic response. If the fascia is stretched rapidly, it will tear, which is actually the most frequent type of connective tissue injury but if the fascia is, oppositely, stretched slowly and gradually, it will deform plastically. Imagine having a plastic bag, and slowly pulling in both ends. The plastic will deform and lengthen. But, if you instead pull aggressively in both ends, it will tear. That's the same mechanism occurring in your fascia.

The goal of 'fascial fitness' is therefore to stimulate the fascia properly to engage its plastic and elastic properties, which for example is done by doing loaded stretches instead of passive stretches, where the muscles and tissues move through their end ranges with load (or movement) to become stimulated while being stretched. The same affects can be created by moving slowly towards or staying at end ranges where the stretch is kept long enough to make the muscle relax and stretch the fascia, but the majority of the time I would recommend solution number one. I will explain why later.

The fascial fibroblasts must therefore be stimulated to appear healthier and more youthful similarly to the kangaroos. Movement must be considered and involved, where elastic springiness is utilized, and the fascial tissues are loaded over multiple extension ranges.

Spatial Medicine

Fascia is an interactive connective system, and we now know that nothing, in essence, functions optimally in isolation, so is the interaction between the consciousness, and the body and how these cooperate in the treatment of the fascia.

The mindful part of assessing and treating the fascia can be defined as awareness. Awareness draws up to the relationship between the nervous system and the fascial system. Without the mindful part, the fascia is nothing but a dead piece of tissue. It's like running on a treadmill while watching the television. Indeed, you will move forward. But your lack of awareness and sense of presence in the action will impair several of the benefitting factors of your run, both physically and mentally.

Spatial Medicine is a term that can be defined as the relationship between emotion and physicality, or the mind/body connection.

We find examples of a depressed how a person's state of mind is expressed through their body when we approach a depressed relative. They can smile as much as they like, but their bodies rarely lie. A depressed person is often 'stuck on the exhale' as explained earlier. As the mind is depressed, so does the body tend to be with a sunken chest, sloped shoulders and in general stuck in a flexion.

This depressed posture, as a reflection of the mind, starts as a perception of a nervous representation of oneself, which involves shame, guilt, pain, etc.; emotions that are located, felt, and stored in the stomach.

These stuck emotions get expressed through the motor system as a recurrent pattern of contraction and flexion that sends the body into a compressive and 'heavy' state. As these postural tendencies become chronic, they become locked, and thereby gets adopted by the fascial system, where it is stored. As the emotion is what causes the postural dysfunction, releasing and treating the physical dysfunction may bring forth a stream of emotions that represents the emotion(s) being stuck in that bodily area. In these cases, treating posture is not only a matter of physical treatment, but also psychological. These mechanics of stored emotions can be called *tissue memory*.

The posture then becomes self-protective, which is an instinctive reaction where we close our front and flex forward to protect our organs and vulnerable parts of the body; a defense mode we access when we become depressed, that requires compensation through the legs, neck, shoulders, ribs, and the ventral cavity's pressure, creating a chain-reaction of tension of restriction throughout the body.

As the posture has a direct influence on breathing, it further alters the balance of chemistry in the blood and body fluids, which lowers oxygen levels and raises cortisol levels.

A standard approach to this common issue in the Westernized world is the prescription of antidepressants or meetings with the psychotherapist in the approach of changing the internal perceptions, which may be perceived as another shallow approach that does not fix the core of the issue or in any case just fixes parts of the issue. Changing the whole pattern and getting to the core of the problem would rather include correcting breathing and biomechanics, because the pattern of the problem is also written into a habit of movement and posture, which is also affected into the fascial net. This is what can be described as Spatial Medicine, which is still too often unacknowledged and ignored.

The Formation of Trigger Points

We have already covered most aspects of the myofascial system and how accumulated stress, trauma and tension happen to end up forming as myofascial trigger points.

So, let's sum it all up.

A trigger point often appears on the body as pain. It's not always the rule, as a trigger point can indeed also be "silent," but most of the time, the area that holds the trigger point will be in big pain when pressure is applied to it. The individual may feel a swell or a knot in the area of the pain, that may feel like a swollen muscle or a knot on the muscle.

Since the entire body works in cooperation and interaction, myofascial trigger point not only affect locally, but they also tend to 'wander' to the nearest destinations or through the myofascial lines and affect other parts of the body. An example given can be a trigger point forming in the gluteus muscle, which is common, especially for athletes or people running a lot. The trigger point may wander up and down, from the hamstring to the lumbar spine where the pain and restrictions will alter between. It may even appear as restriction in the hip flexors, being on the opposite side of the body of where the trigger point really is. Because, if the trigger point restricts the glute, it may send a compensational movement pattern to the opposite part of the body, that will react with inhibited biomechanics and ranges of motion.

The trigger point may also have formed in the neck, at the trapezius or maybe in the occipital ridge below the back of the skull. Also, two common locations for people tending to be psychologically stressed or sitting a lot, in office work, driving car or similar. As these myofascial areas are deeply connected to our heads, and heads and may be the biproducts of the combination of mental stress and poor posture, tension and headaches will often be the result. A result that may disappear just as easy as it occurred by releasing the tension in the area of the formed trigger point.

Trigger points form because of poor biomechanics. Not the other way around. This can be inactivity, poor posture, repetitive mechanical stress, trauma, muscle tension/clenching due to say emotional stress, which causes the fascia to become dry, sticky, and immobile, and is experienced as pain, stiffness, and physical limitation. When these knots (trigger points) occur in the fascia, it limits the muscle in the responsible area.



As illustrated in the figure to the left, the fascia is the superficial layer enclosing the whole body including the muscles. When the fascia in one area becomes restricted and inhibited, it not only affects the fascia, but also the corresponding muscles, joints, capillaries, nerves, etc., leading to other secondary set of symptoms.

If unaddressed or ineffectively treated, eventually, other muscles around the dysfunctional area may be required to compensate, becoming stressed and developing secondary trigger points.

When treating the fascia, an important part to keep in mind in the antagonistic relationship the muscles and its related fascia possesses. Understanding this concept will simplify the way we assess the body.

An antagonistic relationship is when two sets of muscles participate in this opposite movement of the other. Say the gluteus maximus being responsible for hip extension, while the tensor fascia latae is being responsible for hip flexion. They share an antagonistic relationship. This means, that if we were somehow locked in a hip flexion, our hip extension would also be inhibited, and they place to be released would likely be found in the region of the hip flexors of the body.

The same antagonistic concept is applicable for all other dysfunctions of the body. Postural dysfunction is simply a matter of imbalances between the muscles and tissue. A balance that should be reintegrated to neutralize the antagonistic relationship.

Another example could be what is known as rounded shoulders or kyphosis. This is often caused by the serratus anterior being tight or locked; the muscles participating in shoulder protraction, whereas the rhomboid muscles, which are responsible for the exact opposite movement, being shoulder retraction, are prolonged and disengaged.

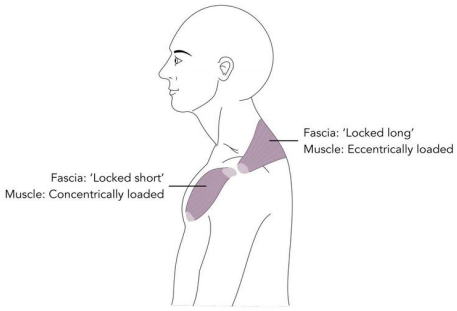


Fig. 5.12 An antagonistic relationship out of balance, that which shows how one part is restricted by being locked long and eccentrically loaded, whereas its opposite part is locked short and concentrically loaded causing the postural dysfunction.

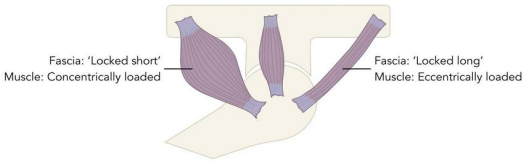


Fig. 5.13 An example of the relationship between muscles and bones and how the function and tension of a muscle may affect the position of the bone. In terms of trigger points and pain, the eccentrically loaded muscles are often the worst, whereas the concentrically loaded muscles are often more silent.

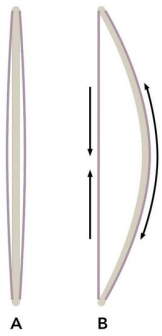


Fig. 5.14 An analogy of the antagonistic relationship between the myofascial units can be presented by visualizing a bow. When there's a balanced and integrated relationship between the two parts of the antagonistic pair (**A**), postural balance will be present. But if one part of the antagonistic pairs shortens and develops trigger points (**B**) the opposite side will stretch and change the position of the bone.

This architectural foundation of the body can be defined as tensegrity; the combination of tension of integrity, where a structure maintains its integrity due to balance of tensile forces continual through the structure. This is both applicable to constructing a building, but indeed also the integrity of the human body.

To create a correlation, structures like spiderwebs and trampolines are anchored to the outside, to something external, and are thus not finitely closed. Oppositely, both humans and animals, including atoms, molecules, protein, viruses, and cells are constructed by tensegrity, held together by integrated forces, not external.



Fig. 5.15 A concept of a structure that utilizes tensegrity forces to remain stable, balanced and upright. Two solid parts are held together solely by three strings (not hard wires, but soft strings!). Any imbalance or dysfunction in any of the string will make the whole structure fall apart.

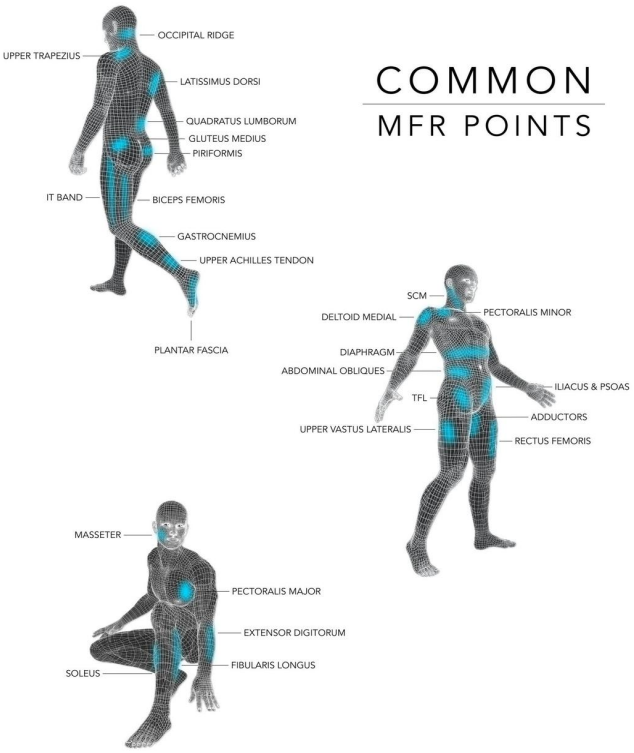


Fig. 5.16 In the human body the concept of tensegrity is applied by the muscles and tissues acting as the strings, while the bones are the sticks, the hard and heavy foundation of the structure. When being balanced, the structure is stabilized and well-functioning, but any knot or restrictions in the soft parts, being the muscles and tissues, will change the position of the bones and thereby the foundation of the entire structure.

Summary

- Myofascia is defined as the connection between muscle and fascia.
- The fascia can dehydrate.
- Fascia can hold tissue-memory and store emotions.
- The structure of the fascia will be damaged and randomly oriented with age or during inactivity.
- The fascia contains both elastic and plastic properties.
- The fascia can develop adhesions appearing as trigger points, which impair its connection to the muscle.
- Trigger points not only affect locally, but locally but may 'wander' to different regions of the body.
- Trigger point often appear as pain but can also be 'silent.'
- Trigger points form because of poor biomechanics. Not the other way around.
- Other important factors in the development of myofascial trigger points are *inactivity, poor posture, repetitive mechanical stress and isolating work, trauma (physically and emotionally), muscle tension/clenching due to emotional stress.*
- The fascia then becomes dry, sticky, and immobile.
- Except from pain, fascial restriction can also be experienced as stiffness, and physical and emotional limitation.
- Trigger points can be resolved by manual therapy or myofascial self-massage.
- Tools or the hands are utilized to apply pressure directly on the trigger point; either statically, or with very small movements.
- Tools include lacrosse balls, Thera canes, kettlebells, medicine balls, etc.
- Pressure must be as hard as possible, and pain (often) as big as possible for the mind and awareness to consciously work its way through it.
- Relevant muscle must be soft as butter during the work. Any tension will only inhibit the process.
- Pressure is held for 2-10 minutes to let the trigger point 'accept and let go'.

COMMON MFR POINTS



V. MECHANICS

When we cover mechanics, we cover the human being's ability to move, and its inabilities influenced by modern culture. Just as with a car or a robot, if the different parts of the structure are not aligned and installed properly, the machinery will not function optimally and at some point, it will break down.

The same principle is applicable to the human body, where locomotion and biomechanics can only function at an optimum level if the different parts, which include the joints and their belonging muscles and tissues, know how to operate within correct ranges. If not, the potential capabilities of the physical vehicle of the body first and for all can never be achieved, but the inhibited movement pattern will further accumulate over time to cause trigger points, inflammation, and injury.

Mechanical Principles

There's a parallel between the mechanics of a human being to the mechanics of solids and objects. Firstly, everyone and everything are under constant compression from the involuntary gravitational force holding us down. Our main focus is to keep fighting gravity to the best of our ability by an elastic and decompressed body. This constant load that is on our bodies can be called compression. And just like compression, there are other types of loads and motions that defines a set of rules in our reality, which is also applicable to the human body.

According to Newton's third law, if you push on a brick wall with the force of 100 N, the brick wall pushes back with the exact same force. The muscles used for the movement consume energy to generate that force, but where does the 100 N force of the brick wall come from?

In simple terms, this is caused by deformation.

Solids can be deformed in different ways. If you take a rope to hang a heavy bucket of rocks from a tree branch, the rope is loaded in *tension* (Fig. 6.1). The opposite and equal force in both ends of the rope which resist the weight and downward force stretches and elongates the rope, hence this principle is called *tension*. If you place a bucket on the floor and you stand on that bucket, the bucket is loaded in *compression*. Here, the top and the bottom of the object are being pushed and forced a tiny bit together.

And as we know, every mechanism in this universe has similarities to another and reflects another part of the universe, just like the human body can move and deform like any other physical object. Therefore, I have mainly chosen to focus on each principle in relation to the human body in the following section.

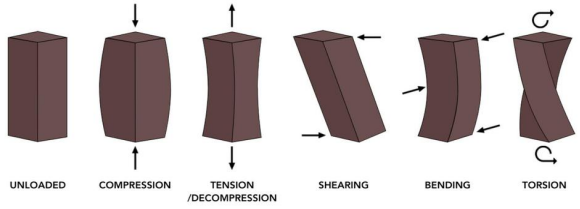


Fig. 6.1 The different types of deformations that solids can undergo.

I. Compression

Compression is the act of a push from above and below, which to some degree makes the object smaller and more compact. As stated, gravity is the constant force that creates constant compression on the human body. Even sitting or standing-- there is a force from above holding you down, and a surface below pushing you up. This compression is causing your joints, including the discs of the spine, to experience compressive

stress. This natural stress is exaggerated to more than what is necessary when we move poorly, and inefficiently load parts of our bodies up with even more compressive forces than what they are capable of handling.

Training that includes compressive stress is especially training that revolves around heavy external loads and lifts. A classic example is a back squat, where a heavy barbell is placed on top of the spine at the area of the cervical spine while squats are performed. Here, axial stress defines the extreme force on the longitudinal axis along the structure, which in this case is the spinal cord of the human body.

This is a type of compressive stress, which is exaggerated to the discs of the spine. Compression can also occur internally, also caused by bad habits. Here, a muscle can undergo chronic stress by being restricted and locked short, or the fascia being filled with adhesions and unable to glide. These factors can participate in the knee or hips becoming locked in a flexion, the spine becoming kyphotic or the rib cage collapsing. These internal changes force the structure, both internally and externally, to become more compressed. From an external perspective, the compressive forces have changed the body in appearance to such a degree that is has actually become shorter.

II. Tension/Decompression

Tension, or decompression, is the opposite force to compression. Tensile stress occurs when forces pull on both ends of an object to make it longer, and thereby decompressed. This is the state we strive to achieve for our bodies, and our spinal cord in particular. A decompressed structure more efficiently deals with the capability to express elastic potential, withstand natural compressive forces, and fight gravity.

In this default bodily state, muscles do not experience being chronically concentrically loaded, and fascia does not experience being locked short. This is the state that I strive to master for myself and my practitioners. I believe that a great gap in our athletic standpoint abilities will occur once we fully discover and master this concept. This would mean that traditional weightlifting would play a much smaller role than it does today, while fascial recoil, balanced muscles and tissues, and movement within the multidimensional plane would be the primary components in the practice.

An example of a decompressive force could be the hanging from a pullup bar stretching the body from the hands through the arms and torso. However, this is the only thing it does. If you were to decompress the entire torso, including the spine, you would have to hang from the neck, so that the spine would be directly involved in the tensile stress. This is obviously not recommended.

III. Shearing

Shear stress occurs when two opposite sides of an object are displaced relative to each other and pushed in opposite directions, just like the mechanism behind how scissors work, which results in friction.

Shear stress happens when we take a step during walking or running for example. As one leg is propelling you forward onto the next step, it creates a shearing effect in the pelvis as one leg is supporting in the ground pushing up the pelvis, while gravity is pulling down on the unsupported leg.

Exercises utilizing this concept include any forward driven motion such as a cable step press. Here, a step is taken forward, while holding the handle of the cable machine in the opposite hand of the leg. While the step is being taken forward, the cable is likewise being pushed forward simulating the motion of a step in a walk or a run.

IV. Bending

During bending load, one side will always face tensile/decompressive stress while the opposite is facing compressive stress. This is what happens when we bend over, or flex forward, where one side becomes flexed, while the other becomes extended. A bend can also occur sideways, where one side, also known and taught earlier as the Lateral Line, becomes extended/decompressed, while the opposite side becomes flexed/compressed.

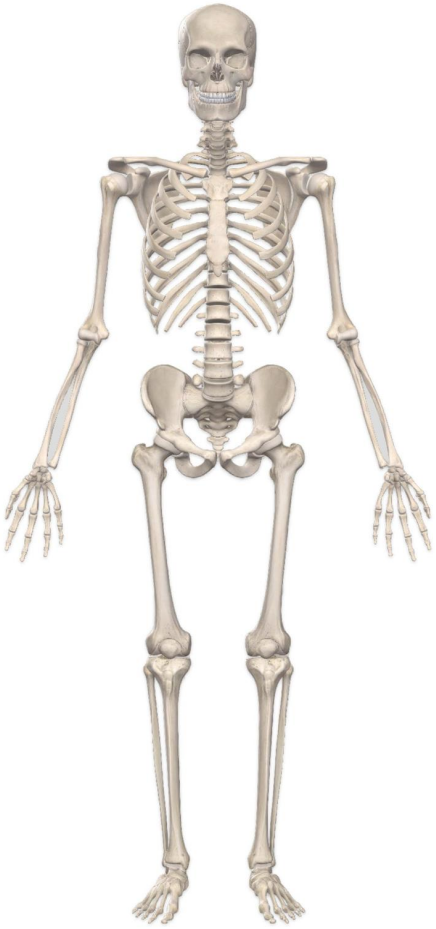
V. Torsion

During torsional load, forces are acting on a structure to cause a twist/rotation on its longitudinal axis. Like when standing on two feet and rotating your spine from side to side.

This motion is both common and essential in sports and is what drives human movement in general when we talk about movement in the three-dimensional plane.

During for example running, throwing, or punching, the torso and spine will rotate counter wise to the pelvis and legs creating a torsion. It's the same purpose the Spiral Line and Functional Lines are highly involved in.

An exercise involved in this mechanic would be by standing laterally next to a cable pulley machine holding the handle with both hands in extended arms, while the lower body is stabilized in the ground and torso rotating the cable away from the machine to create the torsion.



This is your skeletal system as it looks like beneath the numerous layers of skin, fat, tissues, muscles, blood vessels, nerves, organs, etc. Marked and explained are some of the most important parts of the skeleton; parts that way too often become restricted and dysfunctional causing pain and inhibiting biomechanics. During this section we will zoom in on these critical components.

The common version of how the skeleton works, and how I remember I've been taught throughout my anatomical educational process, is that the skeleton is merely just there. It is how it is, and that's unchangeable. What we can change are the surface layers which include the muscular system and its components. This would mean that the structure of the skeleton would determine the rest of the body. However, what I have come to discover is, that this is actually the other way around.

While I was taught that the skeleton determines the rest of the body, the rest of the body in fact determines the skeleton. Such as how the foundation of the muscles and fascia is extremely critical to how the structure and formation of your bones are. Since muscles are attached to the bones via tendons, which are all surrounded by fascia, the bones can be affected in two ways: muscle contraction causes the bone to change its position, while fascial adhesions inhibit the movement of the muscle that further affects the structure and mobility of the bone.

This concept is the foundation for my work and the direct explanation for how, say, scoliosis can be fixed to an aligned spine, how knee pain caused by collapsed arches can be fixed by changing the skeletal position of the foot, how a leg appearing longer than the other can be 'shortened' by fixing a pelvis tilting laterally and so forth. This is only possible because muscles and tissues can be manipulated to such a degree, where the change in their structure changes their connection to the bones and thereby the bones' positions in your body.

On the following pages I'll let you dive into some examples of my work processes with patients showing how the positioning of their bones in the skeleton has been manipulated with and changed into a more efficient place to support their biomechanics.

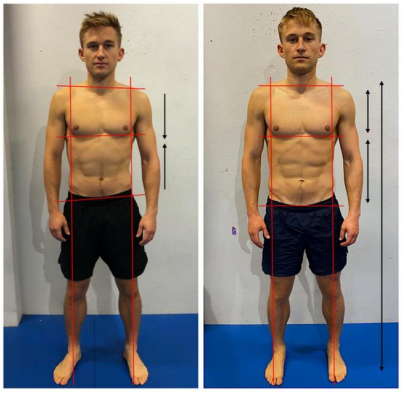
The work is based on the concept previously mentioned as tensegrity, where the structure of the human body is considered to be balanced between tension and integrity, and where the antagonistic connections in the body work optimally to enhance the balance between muscles and tissues, and in the end, the bones.



Postural correction 1

This postural process with my patient of mine lasted 16 days and was solely focused solely on the concept known as ‘scapula winging,’ which is a postural and biomechanical dysfunction where the position of the scapula is displaced from its original and optimal position in the skeleton. This not only locally affects the scapula, but also the shoulder joint and arms which change their position, and in the end their biomechanics.

The reintegration took place by changing the tensional relationship through the muscles and tissues to become more balanced, adjusting the antagonist relationships and manipulating muscle engagement to the outcome of changing scapular positioning.



Postural correction 2

This process was quite more complex, involving several dysfunctions and lasting roughly five months. As you can see through the marked lines on the picture on the left, the main issues were on lateral imbalances, which become visible through the marked horizontal lines, where pelvis is tilted laterally, which affects the same side of the chest to tilt as well, further affecting his left side of the ribcage to collapse and enclose, while the left shoulder also makes a drop.

Side note: he had always been complaining over his left leg being much longer than the right. Sometimes it may in fact be. However, in this case, fixing a lateral pelvic tilt aligned the position of the lower extremities to appear equally long.

Through the vertical lines it becomes clear that feet, knees, and hips didn't fit into that alignment, which is often the byproduct of the femurs being externally rotated affecting both the tibia and feet.

On the right you can see how these imbalances became almost fixed resulting in a more decompressed structure, an opened ribcage and two legs that appears to have become equally long.



Postural correction 3

This ongoing process had a duration of approximately three months, where the main focus was on improved respiratory mechanics through postural work. This client of mine suffered from severe asthma and had a difficult time retaining oxygen in his body.

Placing the attention on the ribcage on the picture to the left, it should be clear that the ribcage seems pretty compressed and narrow inhibiting the space for the lungs and diaphragm to operate properly in the respiratory cycle. Other postural dysfunctions are also visible such as a lateral pelvic tilt and a shoulder tilt, which is causing structural changes in the position of the neck and head.

On the right you can see a ribcage clearly expanded and opened up to an improved mobility of the diaphragm, and lungs that can expand to obtain more air, which was also reflected in respiratory testing performed concurrently with the postural process. The lateral pelvic tilt was almost entirely fixed, while some shoulder imbalances yet remained unfixed, although the tilts and rotations of the neck and head were completely gone.



Postural correction 4

This case was a very special an incredibly special case. A case that only lasted 18 days with six sessions to reach as beneficial an outcome as possible.

This guy is a 6'10"(208 centimeters tall) basketball player who had very little focus on his biomechanical potential and stored physical trauma. His body was screaming as ongoing issues kept returning. Apart from a posture that seemed very compressed when assessing his body from a lateral perspective, such as appearing shorter than he really was, another major sign of tension and compression was expressed through a non-congenital scoliosis. A postural dysfunction that may provoke pain and physical impairment. In this case, it was the hidden trauma expressing itself in his tissues.

Although the entirety of issues and dysfunctions required way more than merely six sessions of treatment, we managed to fully resolve his pattern of scoliosis in a short duration of time.

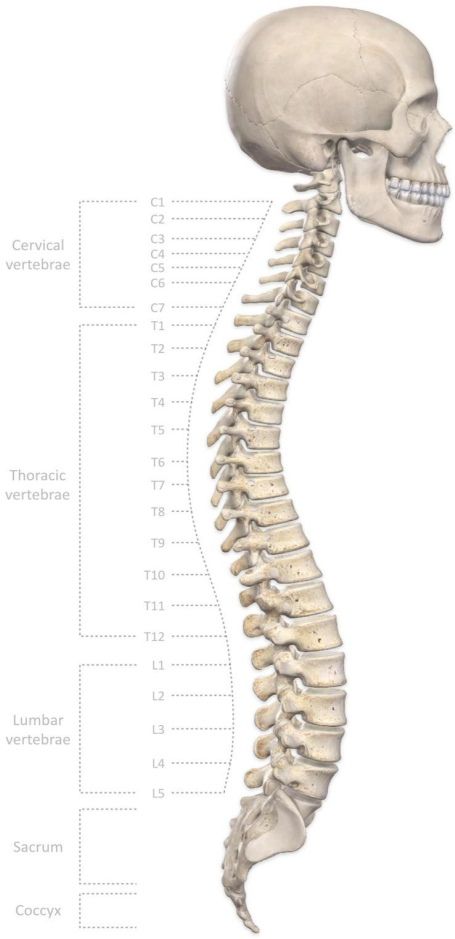
Causes and Solutions to Dysfunctions

On the following pages, I'm going to cover the most essential parts of the skeletal system and how common postural dysfunctions appear and affect biomechanics.

I will provide you with the most common causes and the solutions to the problems. A common cause often appears to be an imbalanced relationship between the muscles and tissues in the body. However, it is critical for me to address that if I, say, explain that the adductors may be too tight and the hamstrings may be weak and disengaged, it doesn't mean that you'll have to approach the two groups of muscles separately by releasing the adductors and then strengthening the hamstrings. This would work against my philosophy and only contribute to more dysfunctions. Unfortunately, if you ask me, this is the part of the traditional methodology and how we often try to solve biomechanical issues today.

Instead, the solution will always be the same: move with optimal biomechanics that respects the inter-connectiveness in the body, by which you're able to approach muscles in their connections, and by this mechanical teaching, they will eventually learn exactly how to engage properly. Then sometimes, overly engaged, or tight muscles need to be released separately to "reset" as part of the process.

Think in terms of creating cooperation and connection between the muscles and fascia and create an inter-connective biomechanical pattern. Then dysfunction won't thrive and exist.


Cervical vertebrae
C1
C2
C3
C4
C5
C6
C7
Thoracic vertebrae
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
Lumbar vertebrae
L1
L2
L3
L4
L5
Sacrum
Coccyx

I. Function

The spinal cord is the pathway from the brain to the body, and the structure that connects the lower body with the upper body.

The spine is made up of 33 vertebrae stacked on top of each other to create a stable and mobile foundation of the body. It is distributed into five parts, which include the three larger parts of the cervical spine (neck area), the thoracic spine (upper back) and lumbar spine (lower back), and the two smaller parts of the sacrum and coccyx (tail bone) at the bottom at the pelvis.

The spinal cord and the function of its muscles is what makes humans unique with our standing, strong and upright posture allowing for walking and running on two feet only, while the arms individually can be utilized.

Strong muscles, flexible tendons and ligaments and sensitive nerves participate and contribute to a healthy spine. With the help of a long list of muscles, the spine is able to flex, extend, and rotate, with the main muscles of the extensors and flexors, which primary functions are to let us stand up, lift objects and bend forward or balance its opposite side.

Although these are the main spinal muscles, nearly the entire torso participates in the movement of the spine, why dysfunctional and inhibited muscles and tissues often cause the spine to fall out of proper alignment.

II. Dysfunction potential

- Lordosis (inward curve)— Lumbar, Cervical
- Thoracic kyphosis (outward curve)
- Scoliosis (sideway curve)

III. Biomechanical Inhibition

Lordosis, kyphosis, and scoliosis can be defined as extreme curvatures on the spine. A spine in perfect alignment shows no to little sideway curves, which indicates either a mild form or scoliosis or non, and only little inward curves in the cervical and lumbar spine, and a little outward curve on the thoracic spine, which are natural and define a healthy and decompressed J-shaped spine.

The more of an S-shaped spine, the more severe curves and the more one leans toward cases like kyphosis and lordosis.

The typical spine for a modern man is anyhow the S-shaped spine with little alignment and inter-connectiveness in its different parts. The obvious parts of the biomechanical risk factors of not treating the spine properly are inhibited factors in its movement range, which includes the ability to rotate, bend and extend.

Beginning from the bottom, a pattern of lumbar lordosis is extremely normal in today’s society, and easily

recognized by the sway lower back, showing an inward curve in the lumbar spine, protruding buttocks, and abdominals that appear to be “popping out,” which can make a regular size person, or even an athlete, look like they’ve gained too many extra pounds. This is the indication of weak glutes not being able to engage, inhibiting any drive and action required from them. The lumbar spine is compensating by taking all the load, often, being severely compressed and overworked, resulting in pain, in either the lower back, glutes or even hamstrings or calves.

As with the glutes, the abdominals, or deep core muscles, are not capable of engaging properly and support, which should be done both by the glutes and core muscles. This is resulting in the stomach to ‘pop out,’ with the primary reason for weak abdominals and not overweight. This pattern is often connected to the anterior pelvic tilt, which will be covered in the pelvis section.

The thoracic kyphosis leaves the individual with a curved upper back, which may also be reflected as rounded shoulders sloping forward inhibiting support for mobility and movement in the upper spine and shoulder joints. Moving up to the cervical spine, a typical pattern is the inward curve here as well, which often makes the chin elevate and head being pushed and locked in front of the body. As this is the area of the first part of our respiratory system, airways may become narrowed and restricted for optimal oxygen intake. In severe cases of scoliosis, respiratory problems can also occur as the sideway curve may put pressure on one of the lungs, or even the heart, while pain and aches in the back may also be a biproduct.

To sum up and simplify, the entire spine should be in a state of decompression, where its prolonged state is capable of moving and supporting the body, instead of being compressed and shortened.

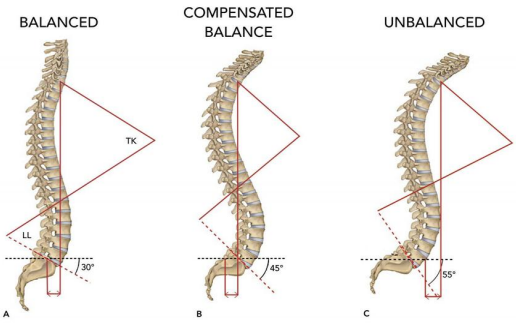


Fig. 6.2 Common consequences of exaggerated curvatures on the spinal cord also include the risk of the spinal cord falling out sagittal balance. When sagittal imbalance occurs, the issue is often connected to a forward lean of the top of the spine forcing the lower limbs to compensate and change their weight distribution.

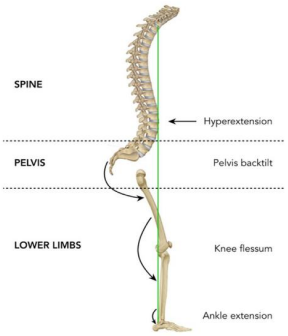
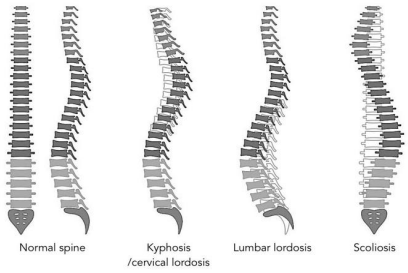


Fig. 6.3 As the common pattern of thoracic and cervical spine tending to lean forward and get "dragged" down, different compensatory mechanisms initiate in the spine, pelvis, and lower limbs. To counterbalance the thoracic and cervical spine, lumbar spine hyperextends, which forces the pelvis to change its position by shifting or tilting back. The hips must flex to balance the body; a pattern that likewise occurs in the knees. As the leg get locked forward, ankle must change its position from a neutral position to a phase of extension (plantar flexion), which then becomes its new neutral

IV. Cause and Solution

The cause for the postural dysfunctions and biomechanical issues are often the same: an imbalance in the relationships between the muscles and tissues in the body, which in turn need reintegration to function and support each other optimally.



Here is a list of the areas that are often causing the postural dysfunctions by being either too tight or too weak, and thereby need to be either released or engaged:

KYPHOSIS & CERVICAL LORDOSIS	
RELEASE	**ENGAGE**
• Pectoralis major and minor	• Middle part of trapezius
• Serratus anterior	• Rhomboids
• Sternocleidomastoid	• Erector spinae muscles
• Upper part of trapezius	

LUMBAR LORDOSIS	
RELEASE	**ENGAGE**
• Quadratus lumborum	• Gluteus maximus, Medius and Minimus
• Psoas	• Abdominal obliques, transversus abdominis (deep abdominals)
• Rectus femoris	

SCOLIOSIS

Since degrees and types of scoliosis vary to a great extend from individual to individual, a simplified protocol to how to resolve such a postural pattern will be difficult, if not impossible.

However, approaching the issue the same way that lordosis and kyphosis are approached can be a good starting point.

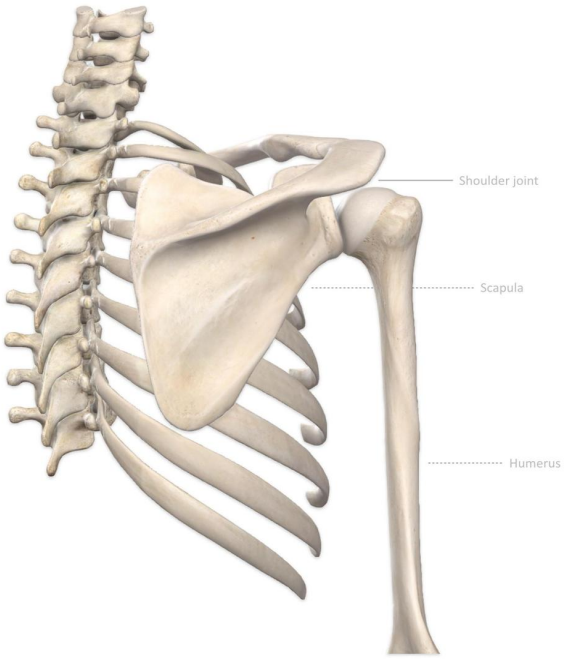
Considering the lateral curvatures occurring in a scoliosis, consider the following observations: is the area of the spine pushed to the left or to the right?

The area where the spine is pushed towards may often be the area that needs to be released. This is both applicable to the anterior side of the body as to the posterior side. Oppositely, the area that the spine is

pushed away from, often needs to be engaged. However, this perspective will not be as critical as the initial observation of releasing the area where the spine is pushed towards.

The relationship between tension and relaxation through the muscles and tissues may in advanced cases such as scoliosis vary to a great degree throughout the spine, hence this explanation is still merely a simplified and general one.

Releasing stored physical trauma throughout the entire torso is therefore paramount in the process of trying to fix the issue.


Shoulder joint
Scapula
Humerus

I. Function

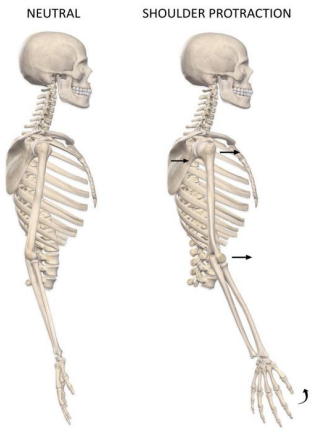
The scapula, also called the shoulder blade, is located on each side of the spine, and is the bone that connects the humerus with the clavicle to form the shoulder joint.

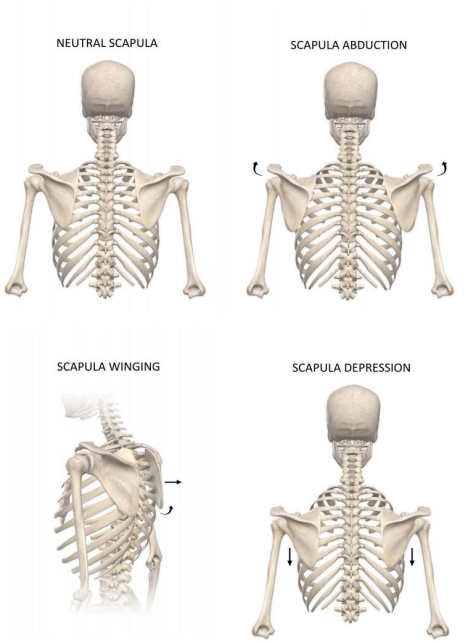
It's a flat bone lying on the ribcage of the thoracic wall with attachment of three groups of muscles that include the intrinsic, extrinsic, stabilizing, and rotating muscles. These muscles can create movement of the scapula, which includes elevation, depression, adduction (moving closer to spine), abduction (moving away from spine), upward rotation and downward rotation.

The intrinsic muscles are also known as the rotator cuff muscles and are responsible for internal and external shoulder rotations, while the extrinsic muscles, that which include the biceps, triceps and deltoids are also responsible for movement of the glenohumeral joint (shoulder joint). The third group being the trapezius, rhomboids, serratus anterior, and levator scapulae are mainly responsible for stabilization and rotation of the scapula, which includes adduction and abduction.

II. Dysfunction potential

- Shoulder protraction (rounded shoulders)—Often connected to scapula abduction
- Scapula winging
- Scapula depression





III. Biomechanical Inhibition

All dysfunction of posture and movement of the scapula has a direct influence on the movement function of the shoulder joint. No matter the cause, the shoulder joint will directly or indirectly be affected, which may further influence the biomechanics of the arm on the affected side.

Neutral, undistorted scapulae are clearly visible in babies and young children, where there is distance between its medial borders and the spine, but not so much distance that the shoulders protract and become pushed forward from the rib cage, when perceiving them laterally. The scapulae are located on top of the back of the rib cage and does not wing out, but instead lie flat against the thoracic wall to be more or less invisible.

When we stop moving well, our upper body biomechanics becomes inhibited which may be reflected in the positioning of the scapulae.

One common dysfunction is the scapula abduction, where the scapulae travel away from the spine. When this occurs, it pushes the shoulder joint and the humerus in front of the body. From a lateral view this is reflected by the shoulder joint no longer being aligned with the ear and the mid part of the rib cage. This is also known as rounded shoulders and may be connected to kyphosis in the spine.

During this pattern it is also typical for the humerus to internally rotate, which appears as the thumb rotating inwards. Here, we want the scapula to adduct and move closer to the spine, which would bring back the shoulder joint in optimal position, while muscles in the posterior chain would need engagement if the humerus had become internally rotated. But remember, we do not want scapulae in an adducted position. We want scapulae in a neutral position, otherwise you may end up with other issues.

So, instead of overexerting scapula adduction, focus instead of keeping them distanced to the spine while externally rotating the humerus and retracting the shoulders. This would ensure a flat, wide upper back with shoulders aligned with the rest of the body.

Scapular winging is an issue that differs from the others, since it is often caused by damage to the nerves that control the muscles in the arm, back and neck, which is either the long thoracic nerve, that controls the serratus anterior, the dorsal scapular nerve, which controls the rhomboids or the spinal accessory nerve, that which controls the trapezius.

This neuro-muscular issue creates an imbalance between these three essential muscles which leads to a rotational pattern in the scapula and makes it ‘wing out’.

The dysfunction may originate from causes such as trauma and repetitive motions, non-traumatic causes, or mechanical issues such as poor biomechanics, and may lead to pain, discomfort, and dysfunction in the shoulder area.

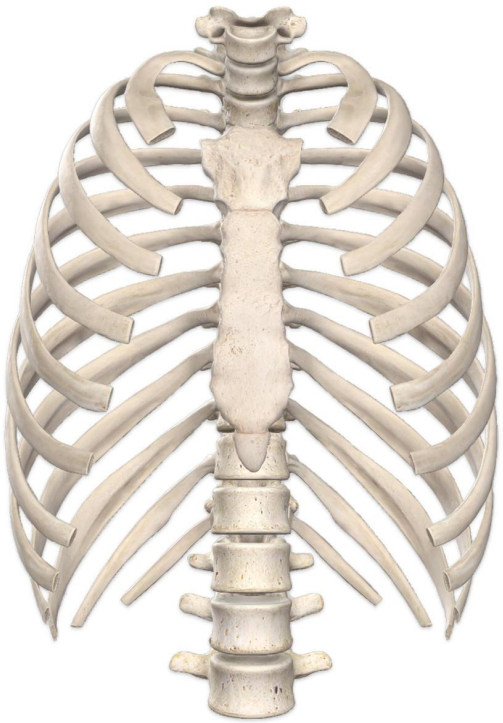
Scapula depression and shoulder depression define the same thing, since the scapula controls the shoulder joint, and vice versa. This pattern is often a part of the compressive tendencies in the modern human body. It is often caused by mechanical issues and is a typical pattern of the modern gym guy lifting and carrying objects as heavy as possible while neglecting proper biomechanics. Having shoulder and scapula locked in a depressed position may contribute to inhibited shoulder range of motion and cause pain.

IV. Cause and Solution

SHOULDER PROTRACTION/SCAPULA ABDUCTION	
RELEASE	**ENGAGE**
• Serratus anterior	• Rhomboids
• Pectoralis minor	• Middle trapezius
	• Latissimus dorsi

SCAPULA WINGING
ENGAGE (to reintegrate a balanced tension between the stabilizers)
• Trapezius
• Serratus anterior
• Rhomboids

SCAPULA DEPRESSION	
RELEASE	**ENGAGE**
• Lower trapezius	• Upper trapezius
• Latissimus dorsi	• Middle trapezius
• Pectoralis major	• Latissimus dorsi
• Pectoralis minor	• Latissimus dorsi



I. Function

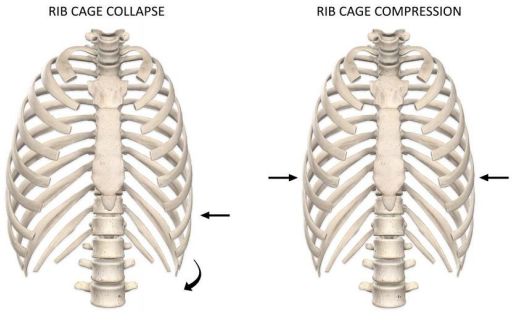
The rib cage acts as the cage and protector of organs such as the lungs and the heart. It's making up the largest part of the thorax/thoracic cavity, which is the entire structure of the rib cage and sternum that supports the core of the human skeleton.

Arranged by 12 ribs on each side, the function of the rib cage is divided into two: one that participates in protection and another that greatly participates in respiration. When air is inhaled through the lungs, the responsible muscles that attach to the rib cage ensure expansion of the rib cage to support the expanding lungs, until the exhalation where the lungs enclose the rib cage.

This means that the better these muscles are at moving freely without restriction, the better we are at expanding our rib cage to support the air uptake in the lungs.

II. Dysfunction Potential

- Rib cage collapse (unilateral)
- Rib cage compression (bilateral)



III. Biomechanical Inhibition

Since the main biomechanical purpose of the rib cage is to support our respiratory abilities, the potential of inhibition in our movement with a dysfunctional rib cage remains clear. However, keeping the function of the rib cage optimized may be one of the most, if not the most, important components of the human body.

In some cases, the lateral pelvic tilt is connected to a unilateral compressed rib cage, which sometimes tends to drop or collapse towards the side, where the pelvis is tilting upwards. No matter if this is the case or not, a unilaterally collapsed rib cage may impair parts of the function and mobility of the lungs and inhibit the volume of air being inhaled.

During a bilateral compressed rib cage, the same is applicable for both sides, and thereby both lungs. The resistance in the ability to expand the rib cage results in the lungs not being able to become filled up to their max capacity, which ends up limiting the oxygenation of the body.

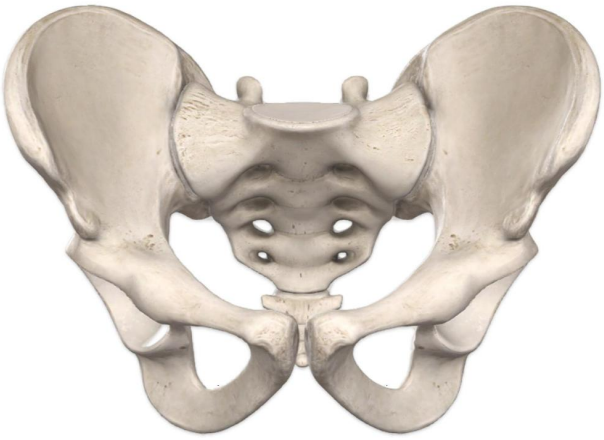
IV. Cause and Solution

In general, it's a good idea to release all the main muscles responsible for rib cage movement during respiration. If a unilateral rib cage collapse is the case, then the collapsed side would obviously have to be prioritized more.

The only way to engage the respiratory muscles in relation to improved breathing mechanics is by breathing and breathing optimally. Deep diaphragmatic breathing with focus on the volume of air will exercise the muscles properly. Adding external load to the rib cage as explained in the chapter of "Respiration" will only improve the stimuli added to the respiratory muscles.

Release:

- Pectoralis minor
- Rectus abdominis
- Abdominal obliques
- Diaphragm
- Sternocleidomastoid



I. Function

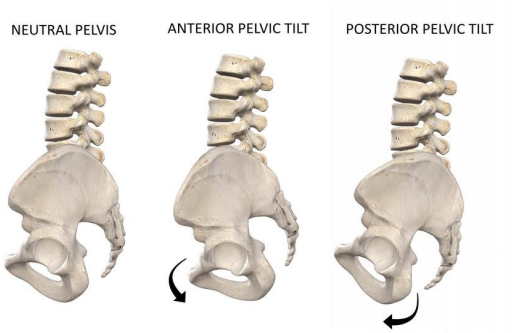
The pelvis connects the upper body to the lower body, and together with the spine it ensures interconnective movement throughout all parts of the body. Apart from the spine it also holds the two femurs forming the two hip joints.

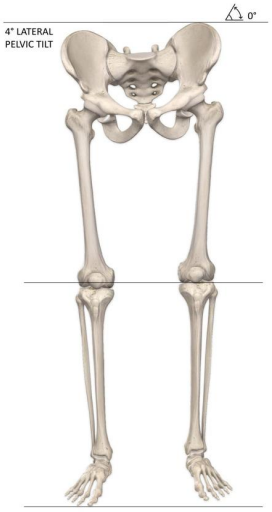
The pelvis' connection to the spine is based on our deep core muscles responsible for rotational work, whereas the hip flexors are also present in this area. A long list of muscles create movement around the pelvis, such as intrinsic muscles at the pelvic floor responsible for our reproductive organs, or larger muscles such as the glutes driving pelvic movement.

To summarize, the pelvis bears the weight of the upper body when sitting and standing and transfers that weight from the axial skeleton to the lower skeleton when standing and walking. It's able to rotate and tilt in all directions and involves many muscles both participating in upper body and lower body movement. Therefore, it is essential to have a balanced and well-functioning pelvis, but at the same time, why it's a typical place for dysfunction development.

II. Dysfunction Potential

- Pelvic tilt (anterior, posterior, lateral)



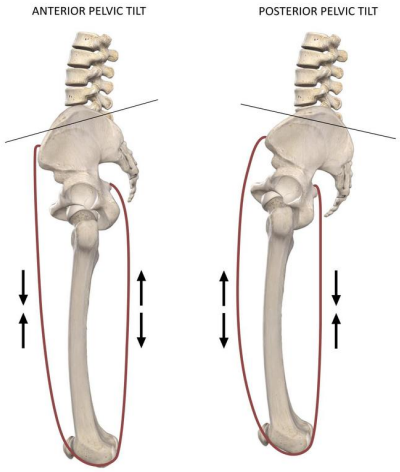


III. Biomechanical Inhibition

We typically find patterns of pelvic tilts in modern humans, either anteriorly, posteriorly, or laterally. The pelvis is meant to be able to move and tilt in these directions, but isn't meant to be locked, which in contrast will impair optimal movement patterns of the pelvis.

During the anterior pelvic tilt, possibly the most common postural pelvic disposition, the top of the pelvic tilts forward (anteriorly). This is caused by the muscles attached to the front of the pelvis being locked and restricted, pulling the top of the pelvis down. Meanwhile their antagonists on the backside become long and disengaged.

During the posterior pelvic tilt, the opposite is applicable. Since the top of the pelvis gets tilted backwards (posteriorly), the muscles attached to the top of the posterior side of the pelvis are short and may be knotty, which creates a pull in the pelvis, whereas the opposite side at their antagonists are prolonged.



In our modern world, everything is happening in front of us. Eating, desk work, driving, cycling, gaming and so forth. Things that happen in a flexed position, and some with stress responses from our brains to our bodies. I theorize that this is why the majority are locked in some degree of an anterior pelvic tilt.

In general, we should avoid the tissue imbalances that pull us toward the extremes. Although being capable of moving through the extremes is beneficial, being stuck in the extremes, such as a pelvic tilt, is what creates compensatory movement patterns throughout the body that inhibits the interconnectedness leading to inflammation and irritation, which affects our biomechanical pattern at best, or ends up developing injuries.

In the posterior pelvic tilt, the glutes and hamstrings are doing the pull on the pelvis and may be overused or irritated, whereas the hip flexors are pulling the pelvis in the anterior pelvic tilt, where the hamstrings oppositely are usually long, and the glutes are disengaged. This pattern may also be connected to a weak core, which in some people makes the stomach pop out as discussed earlier. It's often a lack of support from the core and glutes that helps create the tilt and may prevent stability and optimal forward drive during running.

In the lateral pelvic tilt, the muscles on the lateral side are doing the 'pull' and are restricted, either below the pelvis, pulling it down, or above the pelvis, pulling it up. This is highly connected to leg length

discrepancy, which is often merely caused by the pelvis being laterally tilted making the leg on the side where the pelvis drops appear longer than the opposite. As the lateral lines of the human body are designed for stability, losing their support by being locked into a lateral tilt, creates issues in forward drive during walking or running, as we want a pelvis rotating to create the linear drive instead of dropping laterally, which may act as an inhibition for this drive.

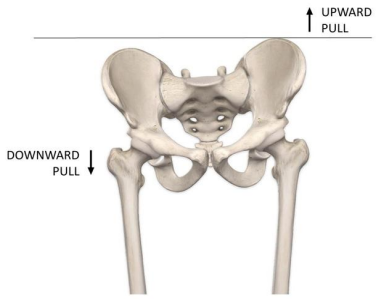
IV. Cause and Solution

ANTERIOR PELVIC TILT	
RELEASE	**ENGAGE**
• Iliacus	• Gluteus Medius + Maximus
• Rectus femoris	• Hamstrings
• Sartorius	• Abdominal obliques, transversus abdominis (deep abdominals)
• Quadratus Lumborum	

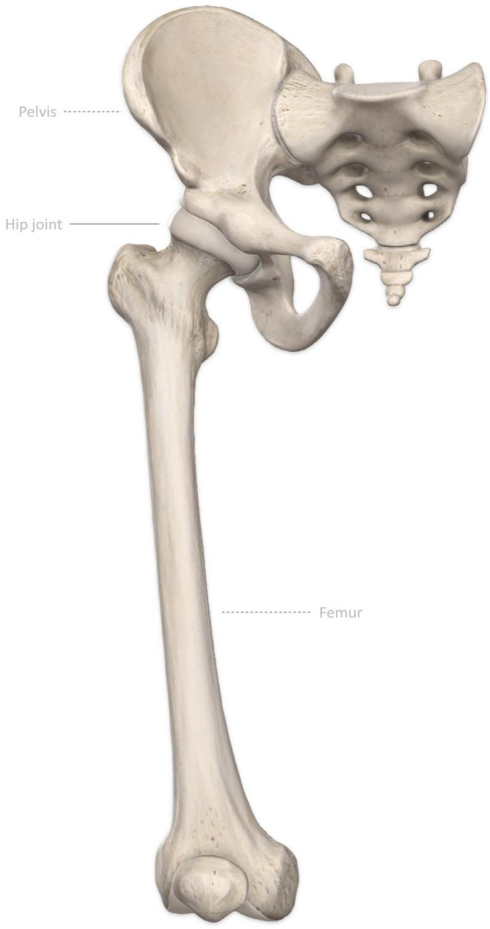
POSTERIOR PELVIC TILT	
RELEASE	**ENGAGE**
• Gluteus Medius (+ Maximus)	• Iliacus
• Hamstrings (semitendinosus, semimembranosus, biceps femoris)	• Sartorius
	• Rectus femoris

When we talk about a lateral pelvic tilt, assess your pelvis, and ask the questions: is the pelvic tilt caused by a downward pull or an upward pull? What part of the pelvis is neutral and what part may be pulled out of alignment? Is it both being pulled up in one side and pulled down in the other?

If you're not sure, it's always a good idea to treat it both ways to ensure you're not missing a point.



LATERAL PELVIC TILT
RELEASE/ENGAGE (depending on the desired outcome of the pelvis)
• Internal abdominal oblique (upward pull)
• Quadratus lumborum (upward pull)
• Gluteus Medius (downward pull)
• Tensor fascia latae (downward pull)
• IT Band (downward pull)


Pelvis
Hip joint
Femur

I. Function

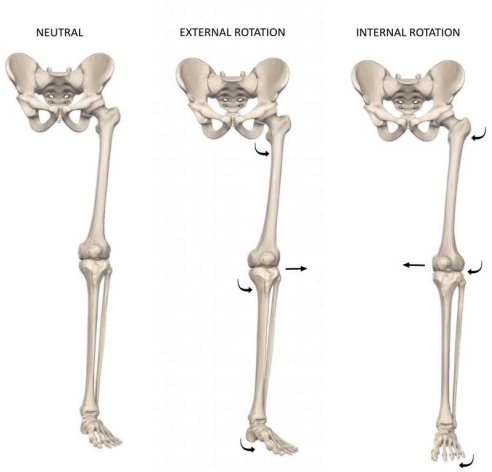
The femur connects to the pelvis to create one of the two hip joints, or scientifically referred to as the acetabulofemoral joints.

The hip joint participates in everything our lower body is responsible for, either statically such as standing or dynamically such as jumping.

The femur can flex and extend inside the joint, or it can rotate both inward and outward. Muscles such as the gluteus group and hamstring are responsible for it being extended, like during a step or a sprint where forward drive is needed. The hip flexors create flexion in the joint like when kicking to a ball or taking a step forward. The adductors and gluteus are partially responsible for any stabilization and rotation of the femur, which makes it essential to obtain an optimal relationship between the two groups of muscles to not being locked and restricted in any internal or external rotation, just as well as the relationship between the muscles on the front and back of the hip joint needs to be in balance to rest in the sweet spot between flexion and extension.

II. Dysfunction potential

- Femur rotation
    - Internal (medial)
    - External (lateral)



III. Biomechanical Inhibition

Since the hip joint is involved in every part of movement occurring in the lower body, and supports the movement from the knee and ankle, maximizing its ability to move both linearly and rotationally requires a free range of motion without restrictions inhibiting any types of these movement potentials.

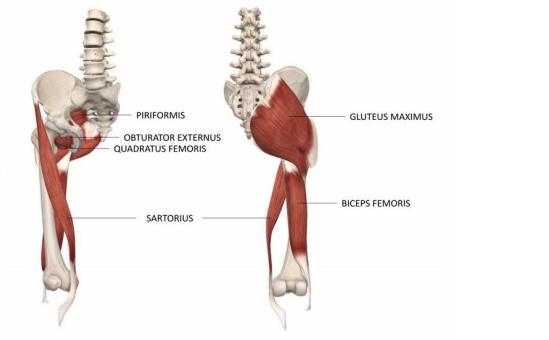
If the hip joint locked internally/medially, movement will be restricted in the opposite direction, being the external/lateral rotation. This movement is essential in the multidimensional movement plane essential in cuts, turns and rotations. The same movement requirements are essential in the opposite pattern of the internal rotation, which may even have an impact on linear drive since the hip/femur may counter rotate the upper body to some degree to create linear motion. Being locked in the external rotation may therefore compromise, not only linear drive, but also rotational movements in the multidimensional plane.

A rotationally locked femur is often reflected in the foot and tibia that may rotate in the same direction. At the majority of the time, we will experience a pattern of the feet being locked in an external rotation, which is not necessarily caused by the femur, as the cause can also originate from the tibia. A thorough assessment must be made to determine where the locked rotation originates from.

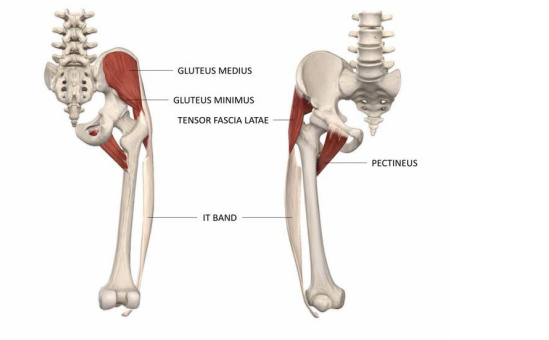
Since the IT band participates in stabilization through linear drive, whereas the glutes and biceps femoris participate in the hip extension and the tensor fascia latae participates in hip flexion, being locked either internally or externally in the hip joint, will affect any linear drive, such as walking and running.

IV. Cause and Solution

Muscles responsible for external hip rotation are *gluteus maximus, obturator internus, obturator externus, piriformis, biceps femoris, inferior gemellus, quadratus femoris, superior gemellus, and sartorius.*



Muscles responsible for internal hip rotations are *Gluteus Medius, Gluteus Minimus, tensor fascia latae, pectineus and IT band.*

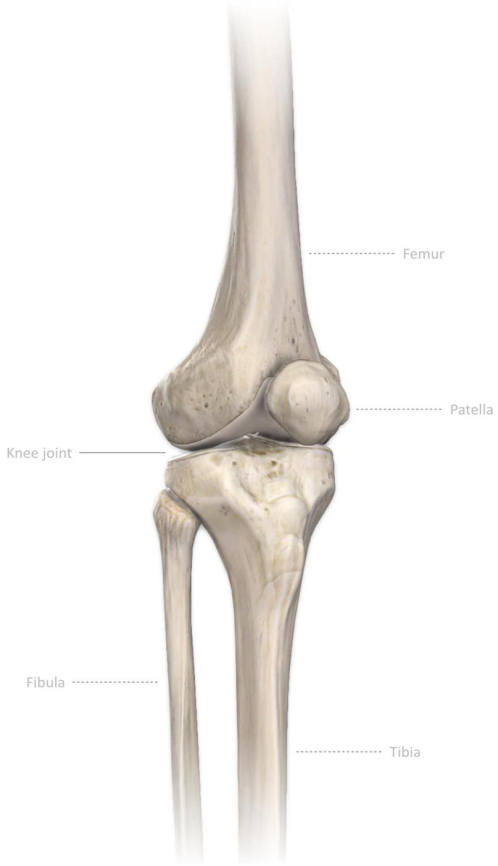


Since some of the explained muscles are small, underlying, and located deep, they will be difficult to directly influence by myofascial releases. The most efficient way to influence those will instead be by engaging

them when moving with optimal biomechanics. Instead, the larger and more superficial muscles are listed in the release sections, which are easier to manipulate.

LOCKED IN EXTERNAL ROTATION	
RELEASE	**ENGAGE**
• Gluteus maximus	• Gluteus Medius
• Biceps femoris	• Tensor fascia latae
• Piriformis	• IT band
• Sartoris	• Pectineus
	• Gluteus Minimus

LOCKED IN INTERNAL ROTATION	
RELEASE	**ENGAGE**
• Gluteus Medius	• Gluteus maximus
• Tensor fascia latae	• Tensor fascia latae
• IT band	• Biceps femoris
• Sartoris	• Piriformis
• Pectineus	• Sartoris


Femur
Patella
Knee joint
Fibula
Tibia

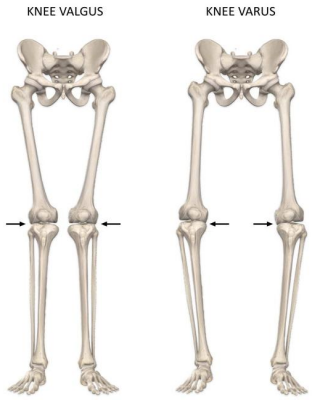
I. Function

The knee joint joins the femur with the tibia and fibula via the patella. The function of the knee is primarily to move through flexions and extensions and acts as a shock absorber in the lower body. The knee joint also supports movement and power production that comes from the ankles and hips, such as during running, jumping, and walking.

When the femur and tibia become misaligned in the knee joint, postural dysfunctions may occur. Some of the most common are knee varus and knee valgus, where the knee joint respectively drops outward or inward.

II. Dysfunction Potential

- Knee varus
- Knee valgus



III. Biomechanical Inhibition

During knee varus the misalignment is causing the top of the tibia and bottom of the femur to turn outward creating a bow shape in the legs. During knee valgus, the opposite is occurring, where the top of the tibia and bottom of the femur is turning inward. The pattern is highly associated to mechanical patterns in the ankles, where people with knee varus tend to have high arches and are forced to the outside of the foot, whereas people with knee valgus often experience the opposite of dropped arches resting on the inside of

the foot.

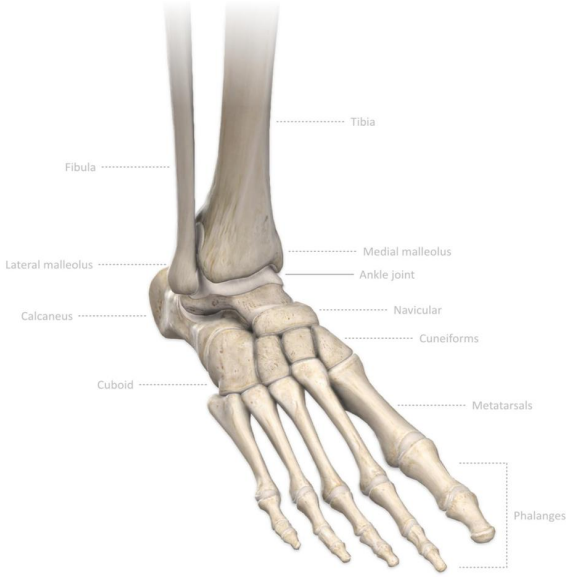
This dysfunctional postural pattern is mainly a process of an impaired ability to move through the flexion and extension (linear) plane. This inhibited ability forces the body to compensate through the lateral plane to drop inward or outward. You'll experience this during a squat or a shock absorption, where the position of the knee determines the degree of the dysfunction depending on whether it remains linear or turns inward or outward. This pattern is also affecting the pelvis to compensate along with the knee, where it will shift laterally during every step to the same side the knee is moving.

To put it simple: optimizing biomechanics will solve the issue. When the adductors are balanced with the glutes, nothing is pulling the knees inward or outward. When the quadriceps are balanced with the hamstrings, the flexion and extension phase will work optimally without compensating laterally or rotationally. But most importantly, when the oblique slings are functional and optimized, there will exist no such thing as a dysfunctional pattern in the hip and knees, because then the linear phase, which is a mix of the flexion/extension in the hips and knees, and the torso rotation, will function to perfection.

The oblique slings are similar to what has been covered earlier in the Spiral Line or Functional Lines, where the gluteus muscles on one side are cooperating with the latissimus dorsi on the opposite side, while the quadriceps and adductors on one side are cooperating with the abdominal obliques and serratus anterior on the other side to generate linear motion.

IV. Cause and solution

<table>
<tr><th colspan="2">KNEE VARUS & VALGUS</th></tr>
<tr><td colspan="2">ENGAGE:
• Ankle mobility in dorsiflexion
• Anterior oblique sling (diagonal fascial line from the adductors to the abdominal obliques and serratus anterior)
• Posterior oblique sling (diagonal fascial line from gluteus maximus through the thoracolumbar fascia to the latissimus dorsi)</td></tr>
<tr><th>RELEASE (FOR VARUS)</th><th>RELEASE (FOR VALGUS)</th></tr>
<tr><td>• Gluteus Medius</td><td>• Adductors</td></tr>
<tr><td>• IT Band</td><td>• Fibularis longus</td></tr>
<tr><td>• Tibialis anterior</td><td></td></tr>
</table>


Tibia
Fibula
Medial malleolus
Lateral malleolus
Ankle joint
Navicular
Calcaneus
Cuneiforms
Cuboid
Metatarsals
Phalanges

I. Function

Ending our way through the mechanical work of each bodily section at the remarkable structure of the foot, which is essential to such a degree that it bears each other component of the body and shapes how every other part functions.

The foot contains 26 bones, 33 joints and more than a hundred muscles, ligaments, and tendons. It can be divided into hindfoot (calcaneus), midfoot (cuboid, navicular, etc.), and the forefoot composed of the various joints making up the toes. Connected to the tibia and fibula it makes up the ankle joint.

The plantar fascia connects and encloses every part of the foot. The main movement functions of the ankle are plantar flexion (pushing the toes away from yourself), dorsi flexion (pulling the toes closer to yourself), eversion (rotating the inside of the foot down) and inversion (rotation the inside of the foot up).

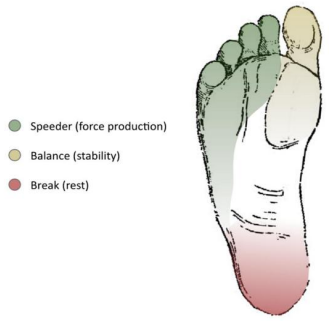
The foot can be divided into three, or four, main components, that we may call the balance points, or pressure points of the foot. Understanding and practicing these principles will get you a long part of the way in your foot biomechanics optimization.

The great toe, or the 1st phalange, including the part of the foot pad that is located just below can be defined as our defined balance point. This is the area that creates stability during standing and moving. Try for a moment considering yourself without your great toe trying to balance yourself. It also participates greatly in movement drive.

The 2nd to the 5th phalanges and the part ball of the foot located just below, as well some parts of the lateral arch, are mainly responsible for movement drive. This is the main ‘speeder’ that propels us forward, or sideways, during motion with the help from the great toe.

The area of the calcaneus is our break or, our resting point. It can deal with a great amount of pressure compared to other parts of the foot and slows us down during movement. This is also why sprinting with heels in ground contact inhibits acceleration.

These are the three pressure points that should always remain in ground contact during standing, and alternate in their symbiotic pressure during movement.



The joker, and the fourth part, is the medial arche that act as shock absorber. Ideally the medial arch should be elevated from the ground and not be in contact during standing. For many people though, their medial arches may drop, which is also known as flat feet or fallen arches. Flat feet in itself aren’t necessarily an issue but may likely become problematic when it forms compensatory patterns throughout the nearest joints in the ankle, knees and hips (and so

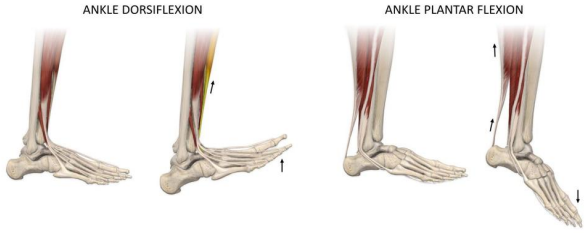
forth), which normally respond and adapt to the structure of the foot. This often occurs from a disturbed developmental phase during childhood, where the arches did not develop optimally.

The same goes for hollow or high arches, which in essence in just the opposite. Here, too little of the foot is in contact with the ground.

II. Dysfunction Potential

- Limited ankle mobility (plantar and dorsi flexion)
- Pes valgus (ankle eversion)
- Pes varus (ankle inversion)
- Hollow arches
- Fallen arches

III. Biomechanical Inhibition



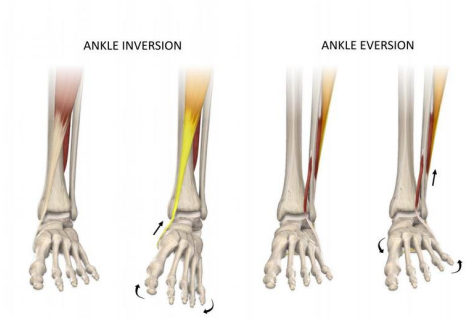
The most common sign of limited ankle mobility is either to be found in the dorsi flexion or plantar flexion. Limitations here are extremely critical to movement and peak performance. Again – because the rest of the body is affected by how well the feet are moving.

The plantar flexion is driving us forward, whereas the dorsi flexion is responsible for shock absorption in the landing of a jump, or in anything as simple as sitting or squatting down. The worse a dorsi flexion, the higher you are forced to stop descending when sitting or squatting, before having to compensate by elevating the heels because the movement range of the ankle are not able to support the rest of the body.

If the plantar flexion is somehow limited, the forward drive that is supported by the hip extension for instance will be limited to a degree where the calves do not support at their optimal level, since the ankle isn't able to plantar flex fully.

I used to teach that optimal levels within the dorsi flexion can be measured by standing with your foot facing a wall. The entire foot must be placed in the ground during the whole procedure. Then the knee should be flexed until it touches the wall. If this is possible without any parts of the foot elevating from the ground, then the foot can be moved farther from the wall, and it can be measured again. This is repeated until the exact distance is found to the wall, where the knee is just able to touch the wall without the foot elevating from the ground. Optimal ranges here correspond to roughly 14 centimeters or more of distance between the knee and the wall.

When assessing your plantar flexion, just sit down and take a look at your foot. Now extend (plantar flex) it as much as possible. Are you able to draw an almost parallel line from the shin bone to the top of the foot and the toes? Or will the top of the foot and toes be closer to the shin bone than what fits the parallel line? If you're able to extend the foot to at least fit the parallel line (or below), then the plantar flexion can be considered optimal.



When the inside of the foot rotates up and away from the ground you will have some degree of pes varus, where the ankle inverts and rests more on its lateral edge.

When the outside of the foot rotates up and away from the ground, there will be some degree of pes valgus, where the ankle eversion will leave you with more pressure on the foot's medial edge.

These symptoms seem to go hand in hand with knee valgus and varus, where one affects the other and vice versa. Feet dropping inside, knees dropping inside, feet pushed outside, knees pushed outside.

The answer often lies in the lateral lines which may be impaired. Because the lateral line is impaired, the stability that is provided for linear motion is inhibited, as the individual may even rock from side to side during linear movement, or continually drop inward with the foot or knee as each step is being taken.

As the pressure points of the foot alternates from what can be considered optimal, to become dominated on either the inner or outer edge, the rest of the body becomes affected by this pattern that reacts to where the foot holds the balance.

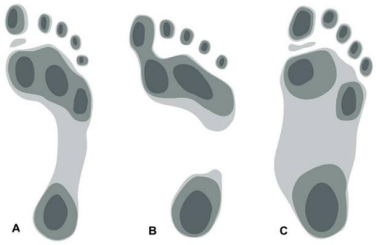


Fig. 6.4 Podogram of the foot's balance point of three different individuals. Can you spot the optimal one? (**A**) shows a person with equal pressure on the entire ball of the foot, toes and heel including the lateral arch resting in the ground. (**B**) shows a person where the pressure points have altered, and neither the medial nor lateral arch are touching the ground. (**C**) has got the widest foot mark, where both the lateral arch and medial arch clearly rest I on the ground.

A podogram can tell us a lot about our posture. It can tell us how we as a pillar approach ground contact and stabilize in the ground.

The correct answer is obviously A. The podogram of B is typically an individual with hollow arches, where all the weight is distributed to the toes, foot pad and heel, and where none of the arches are able to approach the ground. C is a typical sign of fallen arches, or flat feet, where the medial arch has no support and chronically drops to the ground to take the pressure from the rest of the foot.

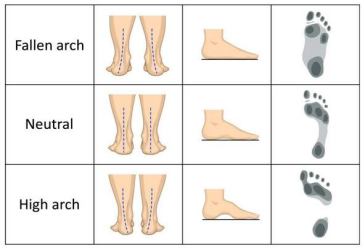


Fig. 6.5 shows the typical signs of the structure of the arches and how it affects the rest of the foot and ankle. The Achilles tendon may give the individual an indication of whether the foot rests neutrally or drops either inward or outward. A more or less vertical line should be able to be drawn from the middle of the calves through the Achilles tendon and on to the calcaneus (heel), while the lateral arch should touch the ground, but the majority of the pressure should come from an equal distribution of the heel, ball of foot and toes.

Another major issue we face in modern society is the "shoe foot epidemic." Although we were never designed to wear shoes, the human species adapted to this tendency of covering the foot to protect it from

hazards. In essence, this the idea isn't bad. But throughout the past 40 years, this protective concept has converted more into a matter of fashion rather than functionality, where high heels and sneakers have become a normality. Office workers, lawyers and real estate agents are just a few examples of people spending the majority of their days with shoes that does not fit all five toes to say the least.

And as the foot adapts to its severely compressed environment, the complex structure of bones moves together to simulate its outer environment. Over time, the metatarsals have completely changed their positions, the arches have developed to fit the environment of the shoe and the Achilles tendon has become underdeveloped from the constant support in the shoe.

Consequently, the balance points of the foot alter, and as we know by now, our entire bodies are shaped by our feet, hence our postures and biomechanics become completely dependent on how our feet function.

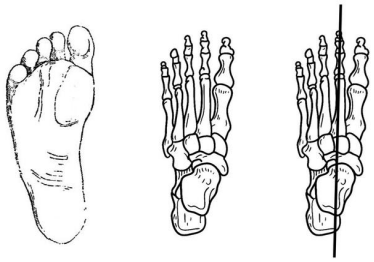


Fig. 6.6 A foot that shows little to no indication of compression, and the structure of its bones including the midline of the foot.

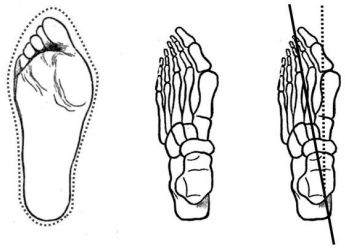


Fig. 6.7 A foot in a severely compressed environment. This is how all human feet looks inside a traditional shoe. Repeat this pattern enough, and you'll end up with the bone structure that reflects the foot pattern. As the bone structure changes, so does the midline of the foot, and thereby any other pattern inside the foot and above.

One of the main questions you are always left with when trying to uncover human origin is: how quantifiable is this? How close can we come to the truth without just guessing? The same goes when we theorize about how the optimal and original shape of the human foot should look like.

At some point, what we need is real evidence, but it is not always possible to get that. However, in the middle of 2021 scientists reported astonishing discoveries, which in many ways were fascinating to me.

Footprints were found in New Mexico, which forced us to push back the date of human arrival to long before the Ice Age's glaciers melted. By carbon dating the footprints, they were estimated to be about 23,000 years old, which is remarkably older than what has previously been thought [82]. To me, this publication was astonishing in two ways.



Fig. 6.8 23,000-year-old fossilized human footprint that a White Sands National Park program manager first discovered. Photo credit: Dan Odess.

One: do we finally begin to acknowledge that human origin is much older that than what is taught in the mainstream media and in schools? At least, this is yet another proof.

Two: the footprints discovered show exactly how the human foot is designed to be shaped. It is the closest we get to real evidence of how the origin of the human foot looks like. And fortunately, it consists of all the characteristics, which you up until now have learned, that the optimal foot should have.

Study carefully the footprint below and you will discover that the foot is triangular shaped with the heel as the narrowest part and the toes as the widest. Look closely and you will see the natural decompression of the toes and how the elevation of ground between each toes indicates that there was space between each of them. From the toes and down, the ball of the foot follows a natural shape that is slightly narrower than the width of the toes. Approaching the medial arch, you are once again able to see how the ground elevates. This is clearly indicating that the medial part of the arch is naturally lifted, while the foot rests on its center,

lateral arch, heal and toes.

IV. Cause and Solution

Begin walking barefooted. As simple as that. Obviously, you should protect yourself when walking outside in environments that aren't pure nature or can be hazardous. Here, pick shoe choices that provide the foot with an open environment where the toes avoid being compressed.

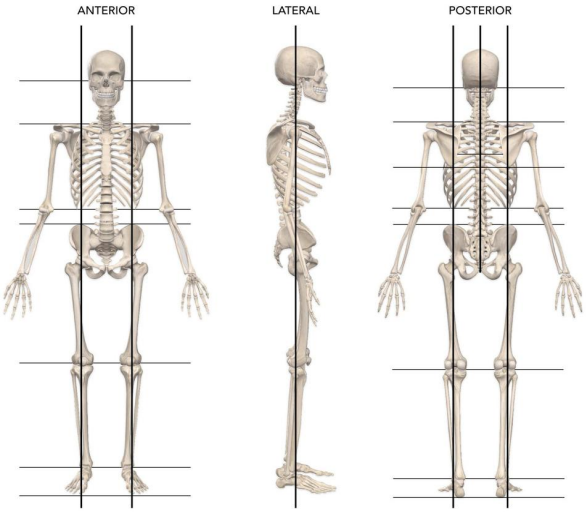
There are several shoe choices on the market that serve a function of respecting the original pattern of the foot. These are often called 'barefoot shoes.' Instead of being narrow and tight, they are shaped to fit a decompressed foot, so the foot doesn't change its form by adapting to a new environment.

Apart from that: stay barefooted as often as possible. Especially when exercising. This is when the great process of signals from the nervous system and sensory system occurs in the delivering of information to the feet as a part of the proprioceptive pathway, that signals back and forth throughout the body how to respond by movement.

If you, like myself, and the vast majority of other people have had a long-life habit of covering up your feet with shoes ignorant to the potential risks from excessive use and poor shoe choices, then your feet might have changed their shape to such a degree that merely being barefoot isn't just the optimal solution. In these cases, where the foot has altered its shape and balance points severely enough, the biomechanical pattern of the rest of the body may be compromised too much.

In such cases, there should be an intense focus on decompressing the foot and the toes to let it return to a neutral point, meanwhile doing as much physical activity barefooted as possible, only wearing shoes when absolutely necessary, and being conscious about the choice of shoes.

<table>
<tr><th colspan="2">FOOT CORRECTION</th></tr>
<tr><td colspan="2">RELEASE:
• Plantar fascia
• Achilles tendon (softly)
• Lower calves
• Fibularis longus
• Tibialis anterior</td></tr>
<tr><td>ENGAGE
(HOLLOW ARCHES/INVERSION)</td><td>ENGAGE
(FALLEN ARCHES/EVERSION)</td></tr>
<tr><td>• Ankle mobility in dorsiflexion</td><td>• Ankle mobility in dorsiflexion</td></tr>
<tr><td>• Fibularis longus</td><td>• Tibialis anterior</td></tr>
<tr><td>• Adductors</td><td>• IT band</td></tr>
</table>



A. IDEAL LINES OF GRAVITY **B.** IDEAL LINE OF GRAVITY **C.** IDEAL LINES OF GRAVITY

When all comes to all, we should strive to have a skeletal system somehow balanced, and somehow similar to the one illustrated above**.** And as you know by now, the skeletal system is reflected by the superficial layers, which includes muscles, tissues, and fascia.

A skeletal system in balance is a body in balance, and a mind in balance. It determines how well each joint is moving, which we covered piece by piece in previous section.

When assessing the posture from an anterior perspective (A), we primarily consider the horizontal lines, and whether any body part falls out of a straight horizontal line. From above, this can be the head tilting, which is usually caused by imbalances of the neck tissues. A shoulder falling out of the horizontal line can be caused by several factors, but is usually caused by imbalances in the neck, chest, scapula, or even the abdominals or the rib cage (causing every part of the structure above to drop down).

The rib cage should likewise follow the horizontal line to ensure no parts of the cavity is collapsed or compressed. If so, one should focus on the diaphragm or abdominal tissues. If the pelvis falls out of the horizontal line, it means that it tilts laterally, which may force the leg on the lifted side to elevate and appear longer than the other. This misalignment is what becomes visible by the horizontal line near the kneecaps.

Lines around the ankles show potential imbalances in the ankles and arches.

Secondly, the vertical lines of gravity must move through the scapulae, pelvis, kneecaps, and heels, so that a straight vertical line can be drawn from the heels following all parts of the legs in a hip width stance.

Moving to a lateral perspective (B) we primarily assess the posture from a vertical line of gravity. Ideally, the posture should fit in a complete line including the lateral malleolus, middle of knee, between the ASIS and PSIS, middle of rib cage, shoulder joint and ear. Although in modern society it is typical to see a posture more compressed and less vertical, where knees, pelvis, and especially shoulder and ear fall out of this ideal alignment.

The ideal lines of gravity from a posterior perspective (C) resembles the cue points from (A) pretty good, although with a few extra key points. I've added a new vertical line at the exact midpoint of the structure beginning at the coccyx moving through the spine and ending at the skull. This line is to ensure that the spinal cord fits into a vertical axis. If not, degrees of scoliosis may be present. Another line has further been added between the medial borders of the scapulae running across the spine. This line is used to assess the distance from each scapula to the spine, which should be equally long. The other line just below is used to assess, whether the bottom border of the scapulae is located around the same area or if one tends to be elevated or depressed, which in the end has a lot of connectivity to the shoulder.

Six Pillars of Efficient Biomechanics

I. Myofascial Release (MFR)

- Apply self-massage to soften muscles, tissues, and fascia for trauma relief (physical and mental).
- Traumas appear as knots, causing imbalances and skewness in movement.
- Trauma and tightness cause postural issues.
- Intervals of 2-10 minutes of MFR per spot are required.
- Attention and focus must be on the pain. Distractions inhibit the process.
- Breathe deeply, but slowly. Extend your exhalations and use your nostrils. This affects the nervous system, which affects the muscles and tissues.
- Required for an isolated and focused period of at least two to three weeks, and for most people even longer.
- When pain dissolves, so does the trauma.

II. Applied Breathing

- Utilize the rib cage, and thereby diaphragm, for breathing as often as possible.
- When relaxing, abdominal breathing is allowed.
- During exercise, abdominal breathing may inhibit the ability to fire up the deep abdominals and control the pelvis, why the lowest portion of the abdominals, will have to be engaged and retracted.
- Use only the nostrils for respiration to that the degree which is possible. Continue improving.
- Breathing manipulates the nervous system. If you want to feel alertness, breathe rapidly. If you want to feel calm and in cognitive control, breathe slowly.

III. Correction

- Muscles need engagement through isometric (static) exercising to learn to 'fire' correctly, especially those that are weak or 'locked long.'
- All movement should be performed barefoot, unless there is a danger connected to it. This will open the metatarsals and decompress the foot over time (and induce *grounding* if performed outside).
- Muscles that are tight, have now already been released. Muscles that are disengaged should now become engaged.

- Prioritize postural compound muscles such as: transversus abdominis (TVA), gluteus maximus, erector spinae, etc.
- This will be the main focus for the following period.
- Continue with MFR as long as there are spots that are painful.

IV. Integration

- Engage muscles of an entire sling in an integrated manner (Functional Lines, Spiral Line, SBL, etc.).
- This will reconnect the different parts of the body and teach them to properly communicate effectively communicate to create the best outcome of movement.
- This is achieved through either neutral standing (corrective standing) exercises or dynamic movements.
- This will be the main focus for the following period while still applying MFR and doing corrective exercises if needed.

V. Load

- Continue performing exercises that respect the myofascial meridians and principles of tensegrity.
- Include complex movements in the three-dimensional plane, which replicate everyday movement patterns such as walking, running, throwing etc.
- Begin adding on more load as the body gradually adapts to this increasing level.
- Proprioceptive strength is my term for functional strength. It is the muscles' ability to locate their position in space in cooperation with the vestibular system, and communicate most efficiently, even with limited access to the senses. Stimulate these mechanisms as often as possible.

VI. Elasticity

- Work on this component along with load exercising. Elasticity is often the most complex as it requires optimum biomechanics to perform rapid and dynamic movements properly.
- Muscles should be taught how to fire up isometrically, while the fascia (and especially Achilles' tendon) utilize their elastic properties.
- Continue with multi-plane exercises that replicate 'regular' human movement.
- Ideally at this point, you'd only revolve around 'Load' and 'Elasticity'. Maybe MFR as a tool would still be necessary at occasions.

Proprioception

The nervous system is an extraordinarily complex communication pathway that includes the brain and spinal cord and connects to your organs and the rest of the body by communicating and cooperating in a continuous loop. It governs all the biological systems of the body, and when detecting environmental changes that impact the body, it works in tandem with the endocrine system to respond to these events.

In the nervous system, there are neurons, which essentially are nerve cells that communicate with other cells through synapses, being are the gaps between neurons that communicate and pass on chemicals. It is one large electrical system that governs all information transfer throughout our bodies. The autonomic nervous system is the response pathway that controls unconscious bodily functions and governs our transition between alertness and focus. One of the branches of the autonomic nervous system is the sympathetic nervous system (SNS), which is associated with alertness, also known as the "fight or flight" system. The other branch is called the parasympathetic nervous system (PSNS), and is associated with calmness, the "rest and digest" system.

The autonomic nervous system is the metaphoric representation of the polarity existing in all areas of reality. Ancient civilizations passed on knowledge through art, instead of solely by writing books as we do today. One piece of art that kept repeating itself through history was the figure of a pinecone placed on top of a pillar. On both sides of the structure two serpents were rotating upwards toward the pillar. See figure 6.9 for reference. Even today it's a commonly used symbol within the medicinal and pharmaceutical world. Why is this symbol so important? And how has it passed on through thousands of years to become a symbol of contemporary medicine?

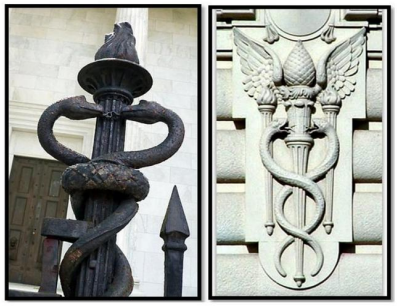


Fig. 6.9 Two different representations of the iconic ancient figure, which may hold a deeper message than what we believe it to be.

Maybe the serpents represented more than merely snakes climbing up a pillar. Maybe they were another representation of the numerous metaphorical cases of polarity expressed in all parts of nature, the same way that traditional Chinese medicine uses Yin and Yang as representation of the never-ending, and ever-evolving, good and bad in all things.

In more detail, maybe the serpents were meant to represent the two branches of the nervous system responsible for fight/flight versus rest/digest that guide our biological responses. The two polarities that are opponents to each other and fight to dominate, however cannot work without the other. Which, incidentally, happens to emerge from or travel through the spinal cord. The spinal cord, which in this case, would represent the pillar. And when referring to the human body, on top of the pillar being the spine, the cranium and brain are located. A brain which could naturally represent the pinecone on the figure, that has two hemispheres, vastly different from one another, and which determine how we perceive the world around us. Another part of nature, and of us as an organism, that is divided into two polarities vastly different from one another, but parts that must integrate and cooperate to function optimally.

The main functions of the nervous system can be divided into five main sections:

1. Sensation: being our experiences filtered by sensory receptors, or neurons that filter and generate feelings in body parts, such as when we detect heat, sound, etc.

2. Perception: our ability to make sense of what we are sensing, which is controlled by our attention.

3. Feelings/emotions: being the release of neuromodulators such as dopamine, serotonin, noradrenaline, etc.

4. Thoughts: the activity from the analytical mind perceiving what has happened (past), what is happening (present), or what we imagine will happen (future).

5. Action/behavior: which is the conversion of all the above into action.

Brain neurons are plastic, meaning that they in essence are adaptable. This concept is known as neuroplasticity; a term that refers to the brain's ability to change and adapt as a result of experience.

It’s actually a recent discovery that the brain has the capacity to reorganize pathways, create new connections and new neurons, even after childhood. Children’s brains though, are the most malleable, which is the reason why they learn new skills so fast, such as learning multiple languages.

This capability is what makes us able to learn new things, enhance our cognitive abilities, recover from a trauma, and strengthen lost/declined functions throughout most of our lives.

Continuous cognitive stimuli throughout life will aid our process of neuroplasticity. This includes when we learn new languages, play different sports, travel, and explore, play different instruments, engage in creative activities and so forth. Neurons are really changing their connections from being new and

challenging to becoming reflexive.

Neuroplasticity occurs during rest and recovery. This is when the brain processes what it's been learning, and synapses are strengthened during sleep and rest. Even through short periods of rest, such as a 20-minute nap, where the analytical mind shuts off, neuroplasticity is accelerated.

The nervous system is the information pathway throughout the body. It receives and sends messages. These messages are sensory information. The nervous system communicates with the senses that register sensory information. This sensory information is sent to the brain, which can respond with appropriate corrective actions to the nervous system, or the muscular system.

One of these sensory systems is the vestibular system, the system responsible for your balance and spatial orientation. The vestibular system is also part of the auditory system as it is located in the inner ear, forming a labyrinth.

Multi-plane movement is challenging the vestibular system and the nervous system. This means movement with rotations and tilts. This is comprised into two components in the system, which are the semicircular channels, indicating rotational movement, and the otoliths, which indicate linear accelerations. The vestibular system then sends signals to the neural structures in control of eye movement to synchronize their information. This is for instance how motion sickness occurs. When the information that the vestibular system receives does not correlate with the information that the eye neurons receive, such as being the passenger in a car with bumps and sharp turns, while starring at a phone with stationary images, this mismatch of information is what creates the sensation of motion sickness.

The same pathway of information is sent to the muscular system that responds by contraction. This is what's known as postural control, hence an optimal communication pathway with the vestibular system is paramount in all species in order to maintain its desired position in space. The brain utilizes information from the vestibular system in the head and through the body to comprehend its dynamics and kinematics through continuous position and motion. This is what is called proprioception, which in essence is body intelligence and interconnectedness.

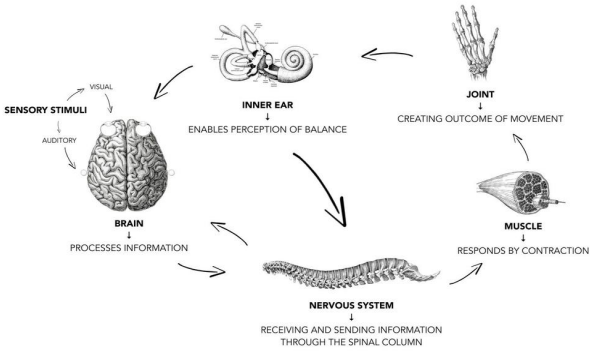


Fig. 6.10 A visual representation of the proprioceptive pathway.

In figure 6.10 you see the proprioceptive pathway. As information enters the visual system and is registered by the eye neurons before entering the brain or coming in form of sound through the auditory system, or another sensation that the brain must respond to, it then processes this information before sending demands through the nervous system. The nervous system then carries out this information to the body, such as the particular muscle that responds by contraction. This muscle's contraction forces a movement in the joint, which can be a kick to the ball or an impulsive action when you grab for something you're about to drop.

All of these motions are further supported by the vestibular system, which enables the perception of balance. Try to cut off one part of the sensory system, and you will feel the proprioceptive system at a much deeper level. Try standing on one leg balancing. After a while, close your eyes and feel the challenge at a much higher level, demanding more signals to the muscles and receptors in your foot and calf muscles. This is the reason why exercising with limited access to the sensory system will enable an improved balance and sense of bodily location whenever access is then given back to the senses that were cut off.

With an estimated 100,000,000 nerve endings in the interstitium, the fascia may be the richest and most influential sensory organ of proprioception, which is yet another reason to treat your fascia respectfully. This sense of self in space comes across a variety of sources, from the inner ear explained as the vestibular system, to the visual system, the temporomandibular joint, the hip joint, and the skin sensors, for example from the bottom of the feet and other places of nerve endings throughout the fascial tissues of the body. You are not born with this essential mechanism.

You gradually learn it through your first years on Earth. After a bunch of mistakes and falls, you become better and better at matching the information from the inner ear to the outside world. But before you think

you're an expert at proprioception, remember that it only takes a step into a room with a floor that is a few centimeters lower that you thought, and you'll understand how easily your proprioceptive system can be fooled and the shock it creates when miscalculating the information with movement in the outer world.

The athlete's proprioceptive abilities are playing a major role in the causation of injuries in sports. In most sports, even in team sports that involve several opponents, non-contact injuries are most common. Even in American Football the numbers reported are up to 70% of injuries occurring not being from contact.

So, even though we have increasingly growing athletes in size, speed and muscles, injuries keep occurring at high intensities. Especially in the world of soccer. This despite an enormous billion-dollar business that is now larger than it has ever been.

Muscle size and strength will be of no value whatsoever if the athlete's proprioceptive abilities are weak. This would be similar to pulling out the brain of a human. Meat and blood with no intellectual interaction. Muscles need to know how and when to fire, which muscles to fire, and which composition of muscles to fire in collaboration to create the best outcome of movement relative to what the brain has just received of information from the sensory system, and how the vestibular system can react to this process by enabling balance and sending this new information back to the brain through the nervous system.

When intelligence isn't taught to the muscles, they become dull. They know how to contract and relax because they've been taught that by repetitive isolated movements, but they don't know how to work most efficiently in symbiotic relationship with the brain to signal the most coherent messages to its joints.

The impaired information pathway can thrive superbly in a world where only size and aesthetics matter, but pure functionality and kinesthetic wealth will never exist here. I'm convinced, that this is one of the major reasons why non-contact sporting injuries are still at the extreme rates we experience them.

I have visited a large number of soccer clubs around the world, including teams from the Danish Super League, the Bundesliga, La Liga, the Swiss Super League, Mexico's Liga MX and others. I have consulted with the players, the coaches and physios, and the pattern of team management and physical preparation is more or less the same across the clubs. The larger an economy, the more physical trainers, and therapists. But the type of physical preparation does not differentiate much.

Despite enormous budgets across clubs and countries, the resources are rarely spent on physical preparation and treatment. It's not uncommon that twenty players are on contract each earning hundreds of thousands, if not millions, of dollars per year, while the club is just having employed one or two physical trainers. These trainers are largely responsible for the preparation and development of each player. You don't have to be a mathematical genius to figure out that this is suboptimal, when having in mind how much could be done just by adjusting the resources a tiny bit to prioritize the department of physical development.

Nonetheless, this is the old fashion way things are done in the world of soccer in the 21st century. When I have spoken in front of the clubs' staffs, the questions, and topics are always the same:

'What additional approaches can we do to prevent injuries?'

'How do we teach interconnectivity and functionality into the muscular system?'

In essence, what can we do to let the body of the athlete function at a higher level and not having to be constant afraid of them becoming injured?

Recently, a comprehensive study was undertaken to examine the estimations of the financial and sporting costs from injuries in the English Premier League based on five seasons of data [83]. The researchers concluded that by approximately 136 days out due to injury, the team would in average lose one point in the league. By approximately 271 days out due to injury, the team would lose one place in the table. Economically, the team loses in average 45 million pounds per season due to players being injured and unavailable. Not only the financial, but also the sporting cost is massive, and really unnecessary.

When you go to the gym on a Saturday afternoon, in the crowded space of male adolescences pumping up their biceps for the evening events, girls thrusting the barbells to tone their butts, or even the 65-year-old woman making repetitive motions in the fitness machines, what you basically see is people teaching their muscles how to contract and relax. Muscles that grow in strength and size, become stimulated, but only to the degree that they are exercised in that particular situation. In these circumstances, the nervous system and vestibular system are almost completely inoperative. From a perspective of improving biomechanics or preventing injuries, these types of exercises will therefore be almost completely purposeless. Yet, this type of traditional fitness still dominates the world of physical preparation in soccer.

During games, the player moves in the multidimensional space with tilts, cuts and turns, repeated decision makings and continuous cognitive stimulation. Their nervous system engages, and senses and balance perception enable. This situation is when they will train their proprioceptive abilities. Unfortunately, this is one of the only circumstances in their preparation where it happens.

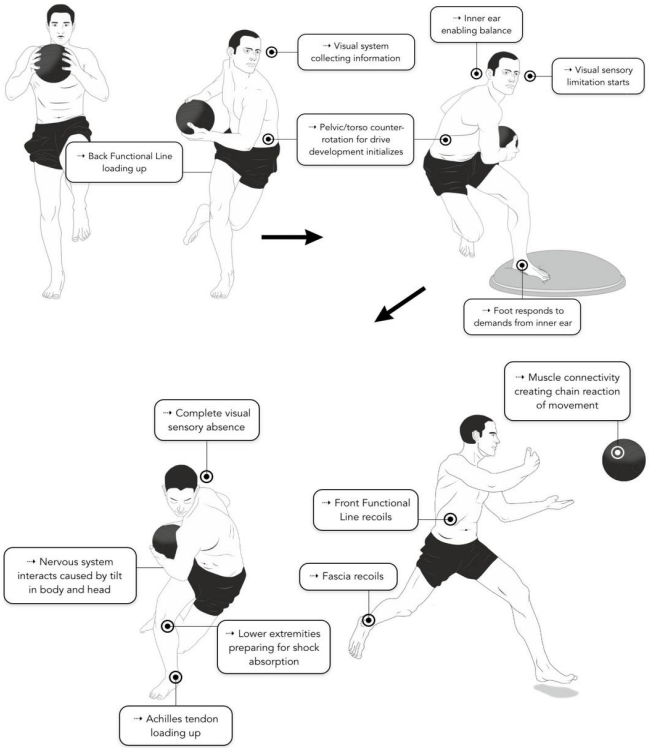
Bear in mind that fitness approaches in soccer varies from region, continent, league, and club, but the baseline is that the foundation of the physical preparation is still based on traditional fitness, that does no more than merely stimulating a muscle in isolation.

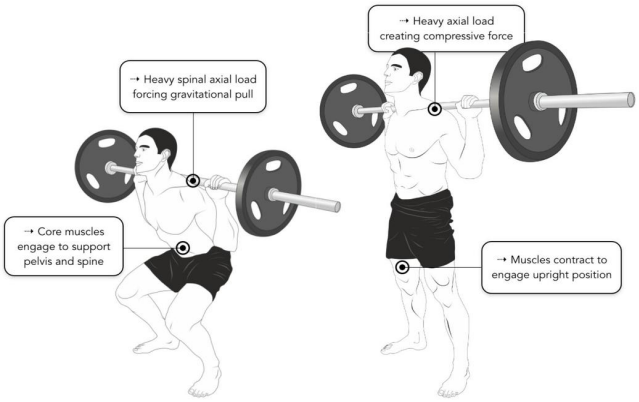
This is the answer and my perspective on solutions I tell the staffs of the clubs, and the exact same approaches I use in practical application on every single athlete, and patient in general, I work with.

Proprioception promotes joint centering, overall alignment, and smoothly coordination, well-timed execution of movement. When wanting to train your proprioceptive abilities, use exercises that challenge you. Choose unusual variations. Or even stimulate your proprioceptive receptors by myofascial releases. Exercising with your eyes closed, doubles the demands on the vestibular system due to its limited cooperation with the visual system. This method may be one of the most intense ways to improve your proprioception and ‘body consciousness.’

Start by standing on one leg with closed eyes. This will be challenging enough to most. Improve by challenging your balance more or begin moving or doing physically challenging (not physically heavy) exercises with your eyes closed. Apart from that, choose multi-plane movement that involves several muscles to function in interaction, and exercises that involves cognitive engagement.

On the following pages, two scenarios are presented. The initial example presents an exercise involving the proprioceptive pathway and demands from the senses and nervous system, while the second example shows the primary stimuli from a well-known traditional approach.


→ Visual system collecting information
→ Inner ear enabling balance
→ Visual sensory limitation starts
→ Pelvic/torso counter-rotation for drive development initializes
→ Back Functional Line loading up
→ Foot responds to demands from inner ear
→ Muscle connectivity creating chain reaction of movement
→ Complete visual sensory absence
→ Front Functional Line recoils
→ Nervous system interacts caused by tilt in body and head
→ Fascia recoils
→ Lower extremities preparing for shock absorption
→ Achilles tendon loading up


→ Heavy axial load creating compressive force
→ Heavy spinal axial load forcing gravitational pull
→ Core muscles engage to support pelvis and spine
→ Muscles contract to engage upright position

VI. HEAL & RECOVER

There exists an incredibly special pill. One of the few pharmaceuticals that comes without a single side effect. It perfectly recovers your brain and body, no matter how hard you've been working prior to taking the pill. It makes you live longer, look younger, and appear more intelligent. It improves your physical and mental performance, and helps you prevent and heal injuries. It enhances your memory and makes you more creative. It improves your metabolism and makes it easier for you to eat healthy. It boosts your immune system and protects you from cancer. Chances of depression and anxiety drop considerably from taking this pill. Oh, and it's free.

Would you be surprised to know that this pill is accessible to almost all 7,5 billion people on Earth but very few choose to take advantage of it?

That ‘pill’ is obviously sleep.

Start by asking yourself these questions:

- Do you get eight hours of undisrupted sleep on a regular basis?
- Are you able to sleep 8+ hours, wake up the same time every morning without an alarm clock feeling refreshed and not needing caffeine?

Both are indicators for how well you *really* sleep. And of course, ideally you would want to be able to answer ‘yes’ to both.

I proposed these questions to my follower audience while writing this chapter. Indeed, most of my audience are eager to learn, curious about health and fitness, currently physically active, and some even are world class athletes, which apparently should give them a higher probability of answering ‘yes’.

Out of 3000 people, 35% answered ‘yes’ to whether they were able to get more than eight hours of undisrupted sleep regularly. And as little as 21% answered yes to whether they were capable of waking could wake up refreshed without an alarm at the same time every morning after at least eight hours of sleep.

This, to me, was a clear indication, that that one of the most basic and profound traits of the human species, and in fact all species on Earth, was so disturbed that not even half of the asked audience were able to get a full night of quality sleep on a regular basis.

Why is that?

Are we not willing to, or do we not know how to? Maybe our society has evolved in a way that makes it nearly impossible to get the same quality of sleep that our ancestors naturally got?

These are some of the answers you will be enlightened with during this chapter.

Mastering The Biological Clock

Another essential job of the nervous system is to work in tandem with the endocrine system, which is the system made up of all the body’s different hormones that help regulate all biological processes in the body. These processes include the development of the brain and nervous system, growth and function of the reproductive system, metabolism, and of course sleep. Some of these hormones essential for optimal sleep are cortisol, serotonin, and melatonin, each playing their essential role in the puzzle of sleep.

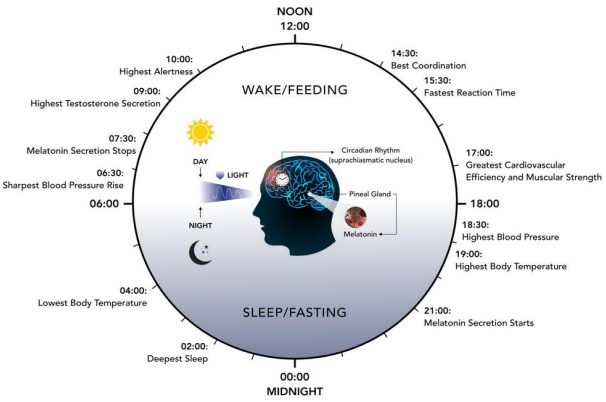
These are just few of many sleep regulators in our bodies. In fact, our bodies are governed by sleep and daytime regulators, which act as transmitters that govern all biological processes. If these regulators didn’t exist, your biology would be pure chaos with no structure in your sleep, eating or exercise patterns. Day and night would shift and turn upside down.

The name for this rhythmic control pattern that enables order and structure to provide us with the best abilities of survival is called the circadian rhythm. If you haven’t already heard about it by now, imprint it in your memory. It is one of the single most important biological functions of the human organism; one that

you can't run away from, but one you can screw up. And trust me, you don't want to do that.

The circadian rhythm is not unique for human beings. In fact, mother nature has embedded all living creatures with this natural cycle. A cycle that tells us and our internal system when we want to be awake and when we should go to bed. It controls our preferences for eating and drinking, it controls our moods and emotions, our core body temperature, metabolic rate, and the release of hormones. The mechanism regulates our sleep pattern to what works most efficiently for us if we choose to listen. We can work against it, or we can work with it. The key factors that regulate our sleep, and in particular our circadian rhythm, are light, temperature, nutrition, and exercise. This, in fact, is the reason why people with some degree of blindness not entirely loses their circadian rhythm. If the rhythm was only governed by light, it would be problematic for them, but the rhythm is determined by many other factors than merely light; factors act as backup triggers to them.

Our circadian rhythm regulates these responses, and we can also consciously choose to regulate them. Either to help push our sleep pattern in the right direction, or as many people tragically are doing, affect these regulators to mess up our circadian rhythm even more. We will discuss these regulators much more detail during this chapter and provide you with various tools in how to master your circadian rhythm, and in the end, sleep.



The circadian rhythm is in fact a physical structure in your body. Let's call it our biological clock. But the real name is *the suprachiasmatic nucleus*. It is located middle of the brain, in the hypothalamus, where is it samples the signals from, for example, the eyes, to calibrate the internal clock second by second, minute by minute, hour by hour. But this biological clock is not exactly the same for all people, as it may slightly vary from individual to individual.

You may have heard of A- and B-persons, and you may even have a clear determination of which of those you by definition are. That these types exist is actually true, while it is not just two types of people who adapted to each their different sleep pattern. Some people experience wakefulness early in the day and sleepiness early at night, like I do myself. Loving the dark early hours of the day with a silence as intense as the scenes of an apocalypse, as well as they despise the late-night events, going out after midnight and in any way engaging in social activity after sunset. Whereas other people experience wakefulness late in the day and sleepiness late at night. They simply do not function early in the morning, but they love to stay up until late night where they feel the most comfort. And there's extraordinarily little you can do to change that. Considering the hazards, it creates on the structure of society and work life, but in particular on our children up until the teenage years where learning and adaptation are in a stage of acceleration. Because not only does our biological clock calibrate differently by nature, it but it also differentiates with age. We experience this in teenagers, who stubbornly stay up late and are almost impossible to get out of bed in the morning. And this is not necessarily due to laziness. In fact, the reason is most likely another.

Teenagers' circadian rhythm is in fact installed to be a little later than 'normal.' It's a natural phase of life, and you have been there, or will be, yourself. And what generation are those that are most stressed out? That need to learn the most? That are faced with longer and longer school days?

It's the same generation that are forced to meet in school before dawn and are expected to be refreshed and able to learn. Put to this, that this is one of the stages of their lives where learning and development is at its apex. Depriving children and adolescences from their sleep in such stages of life will impair a significant part of their development.

The fact is that society is only constructed to fit one type of person and one type of circadian rhythm. Not only is it wreaking havoc on our children, but also on a lot of societal processes requiring productivity and creativity. Even worse, it may cause psychological distress, mental illness, disease, and disrupted stages of growth from continuously being deprived of sleep; both in children and in adults.

Knowing about the mechanics of circadian rhythm and the importance of sleep, there's a lot to be done in our contemporary system that would fit growth, creativity, health, and development way more than the current primitive solution does. Schools should create a more versatile environment in terms of meeting times. Meeting times at 8am compromise sleep for the majority of children and adolescences too much. Instead, part of the problem could be solved by postponing physical meeting times until 10am. Furthermore, school days should be shorter, or more physical activity involved in the long school days. Learning will be impaired without frequent breaks, fresh air, and movement.

A classic example is the hour after lunch break. How often haven't you caught yourself feeling heavy headed, lazy, and desiring to take a nap after lunch? When we eat a big meal, lunch break is often the first time of the day we do so, where metabolism really begins, and the digestive system starts operating. It then gets harder concentrating.

One of the reasons for this may lay in the response of carbohydrate ingestion in the body. Eating meals low in carbohydrates tend to be less fatiguing to the body and brain in terms of energy levels and productivity. Part of the reason may be that carbohydrates trigger the release of serotonin. Since serotonin has a calming effect on the body, you may feel heavy and lazy after eating a meal rich in rice and pasta. Part

of the solution to preventing this issue can be to isolate your carbohydrate intake to the late part of the day. The part of the day that often does not require productivity and focus. Instead, light meals during the day, primarily consisting of protein, fat, and vegetables, may induce more productivity and less heaviness in the body and brain at times where focus is needed.

But before emptying the refrigerator prior to going to bed, be aware that nutrition was one of the core components that affected your circadian rhythm. Eating too close to bedtime may therefore not be the best idea. When eating, your metabolic rate increases. Metabolism and body temperature go hand in hand, so as the metabolic rate increases, so does your core temperature. And temperature is also a significant factor of your circadian response.

In fact, when your body temperature starts dropping, approximately after 7pm, it signals sleepiness to your body. Postpone this process, and you will postpone sleepiness, or accelerate the process and you will accelerate the response of sleepiness. To visualize the circadian response in core body temperature during the day, take a look at figure 7.1.

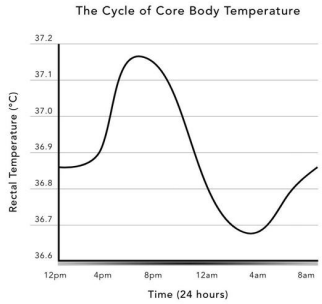


Fig. 7.1 The 24-hour cycle of core body temperature

One way to accelerate the process is, paradoxically, to go to a sauna or taking a hot shower. The increased external temperature forces the body to drop its own core temperature to dump off heat; a process that continues after leaving the hot exposure. One way to postpone this process is by eating a large meal, which turns on the digestive system, increases core body temperature and elevates the cardiac activity by increasing the heart rate. All are responses opposite of what's optimal to become drowsy and prepare for sleep. I therefore suggest that you stop eating circa three hours before bedtime.

Something happened in the 20th century that would change the biological rhythms of the human

being forever.

Airplanes were invented.

The simple solutions of moving through space by walking, running, driving, or sailing were no longer enough. We were now capable of travelling through time zones much faster than our 24-hour circadian rhythm could keep up with. This ability is causing big biological troubles to a system that doesn't not know how to adapt to this rapid change of time and season. A trouble known as jetlag. Travel to the west and you will experience a time zone that was present earlier at the day. Travel to the east and you will experience a time zone as it would be later at the day. Whatever biological processes your suprachiasmatic nucleus has spent the entire day preparing for, the time that it is calibrated to will have to adapt to the new zone you find yourself in.

To overcome the jetlag experienced from the 'time travel,' expect a period of one day per time zone travelled for your circadian rhythm to adapt. By now you are aware of some of the main regulators of sleep. For that same reason, you now know what the parameters to manipulate to speed up the process of adapting to the jetlag. Light and melatonin production may be the most significant of them.

Travel westward during the day and you will rewind the clock to be at the earlier hours of the day. You will be forced to stay awake for a longer period. Since sunlight, or light in general, is associated with wakefulness, which the eye neurons signal to the brain, exposing yourself to light will help you postpone the desire to sleep.

Travel eastward and you will experience a later time of the day where the night hours will be closer to you. Darkness will be the regulator that accelerates the process of melatonin secretion in your pineal gland, which signals sleepiness.

Supplementing melatonin may be beneficial in the process of overcoming jetlag, although it has its pros and cons. A few hours prior to the onset of endogenous melatonin production, which occurs at approximately 9pm, a dose of 3 mg melatonin can be ingested to manipulate the brain to believing it is bedtime. Supplementing melatonin should be done with caution, and medical advice should be sought first.

Apart from its pros, there are a few cons in melatonin supplementation. First, melatonin helps you fall asleep, but not stay asleep. It is normal that you will wake up during the night feeling refreshed and unable to sleep, since the concentration of melatonin declines and your circadian rhythm has not yet fully adapted. Research is also indicating that melatonin may suppress puberty in children and adolescences supplementing it, and it and may have a negative effect on sex hormones. It is therefore recommended that children avoid any type of sleep medicine, even melatonin [84].

An alternative to melatonin that is more sustainable and helps you stay asleep is to get enough magnesium. Magnesium comes in different forms, and not all are equally beneficial. Some may even cause harm. Magnesium L-Threonate, taurinate or glycinate are some of the types you can supplement to enhance your sleep and keep having optimal levels of magnesium in your body. As it may induce drowsiness, consume it approximately one hour prior to bedtime. This recommendation is general, and not just for the experience of jetlag.

When you feel sleepiness approaching, it is because you have been awake for more than 12 hours. Usually, your circadian rhythm is calibrated to signal sleepiness after 12-16 hours of being awake. This is the ideal time to go to sleep. Waking up and going to bed at the same time every day will create the most sufficient foundation for your circadian rhythm. A rhythm that doesn't need daily regulation and a sleep pattern that will be much easier to maintain. And like we initialized this chapter with, this is the baseline for what will make you able to wake up in the morning without an alarm clock, but at the same time always while still feeling refreshed and not needing your cup of coffee.

Upon waking up your cortisol levels naturally start rising. Cortisol is the stress hormone that controls the alarm system. Upon waking up, cortisol production is a natural part of this process. But waking up to the sound of a loud alarm clock during a part of your sleep where you are not yet fully recovered, will create a sudden shock that will induce an incline in your stress response, even before you are fully rested, and in a room that may be completely dark. It seems unlikely that this is the way Mother Nature indented us to sleep (and wake). If you choose to wake up by an alarm clock either way, choose a soothing sound, and turn the volume down to the lowest possible level, where you are still able to hear it. Preferably at a level, which does not wake you up immediately. Ideally, light should be approaching upon waking up. So that the room is not completely dark, and yet not completely bright. Unless following the rhythm of the sun, this will obviously be difficult always to ensure, unless having special indoor lightning systems, which are created to stimulate this process.

The closer upon waking up you can get sunlight in your eyes, the better. Due to the angle and light spectrum of the sun, watching the sunrise at the morning helps calibrating the circadian rhythm (just like watching the sunset will). This is a process that starts in the eye neurons, or what is called the melanopsin cells, which perceive the light and respond to the type and quality of the light when the sun is low. Small intervals of two to ten minutes may be enough to positively stimulate the circadian rhythm. The same goes for watching the sunset. An interval of two to ten minutes may be sufficient to let the eyes signal to the brain that you are approaching bedtime.

Not getting unfiltered light through the eyes impairs this process significantly. This does not mean that you should look directly at something bright. This will, on the contrary, damage your vision. But view the light through dark sunglasses, which could be sunrise, sunset, or just regular daylight, and it will take 100 to 1000 times longer to gain the same benefits as from perceiving the light unfiltered. View light through a window, such as driving a car or sitting in your office, and it will take 50 times longer to gain the same benefits. For the same reason I do not recommend you wearing sunglasses during the day unless there is a special reason to do so. Wearing sunglasses will block these receptors in the eyes that are signaling wakefulness to the brain.

However, there is a fundamental significance in blocking these receptors during the night hours. Our sleep is continually becoming worse and more impaired, which is caused by a change in society and various environmental factors. These include caffeine, alcohol, regularized temperatures, and light pollution from smartphones, televisions, LED light and streetlights among others. During the past 100 years, we have gradually moved into an electrical society living in a 24-hours cycle of light in an artificially constructed constant daytime.

Our eyes can perceive different wavelengths of light on the visible spectrum. Those include the shorter wavelengths which we perceive as cooler violets and blues, to the longer wavelengths we perceive as warmer yellows and reds. The sunlight includes a mix of all. When we stop perceiving the sun, such as when the sun sets and it is no longer present, this loss of daylight signals to our suprachiasmatic nucleus that nighttime is approaching, hence the melatonin production can begin in the pineal gland. Problems occur when this process never initiates. When the sun sets, streetlights are automatically set to light up. At that point, you have turned on the light at your home so you're able to see. The television may be on, while you work on your computer or scroll on your iPhone. If you didn't consciously know the sun had set, your brain would have no idea. The next time you experience darkness will probably be when you decide to sleep, and you close your eyes. Now, the process of melatonin production can begin. A process that normally would have taken place several hours earlier. A process which forces your sleep cycle to be postponed by several hours impairing the quality of your sleep.

There are several ways to help control the potential damage of this issue. One way is to wear blue light blocking glasses. Obviously only in the night hours, a couple of hours before bedtime. This action will help convert the cold, blue light into, warm yellow light. Another thing you can do is to set a timer on your phone and computer, which automatically shifts the tone of the light from cold to warm.

My own computer is installed to shift at 7pm and turn back at 7am. This can even be done on a television, although I'm not aware of any timer function as in cell phones. By changing the tone of the TV screen, you are able to find another picture, which is warmer and not bright in light. Also remember not to expose yourself to bright light in the evening, even though it's warm and yellow. Dim the light from whatever source you are watching, so it is more comfortable to the eyes.

The same can be done with the light in your home. Gradually dim it throughout the night after the sun has set, so it simulates the pattern of the sun. Maintaining a completely dark bedroom during the night is also critical for your sleep. And as previously described, room temperature is essential for a good night's sleep. Your core body temperature must drop circa 1 degree Celsius, or what corresponds to 2 to 3 degrees Fahrenheit to successfully initialize sleep. For this reason, you should keep your room cool. To put a number on it, you should keep your room at about 18-19°C, which is about 65°F. Obviously this may vary from individual to individual, but this temperature may be ideal for most people. This is also why it is always easier to fall sleep in a room that is too cool than too hot, since the cold environment will force your brain and body in the right direction in order of temperature regulation.

It is for the same reason that I do not recommend you exercise intensely during the late hours. High or even moderate intensity physical exercise will increase the body's core temperature, and it will remain increased after physical exertion. To avoid this, stop exercising a minimum of two to three hours prior to bedtime. Or at least keep it at a low intensity.

A complete recommendation of the perfect sleep environment will follow later in this chapter.

Imagine waking up by a bomb exploding across the street. Or maybe something as common as the sound of several fire trucks passing by your window. Seems pleasant, doesn't it? Or not?

What would biologically occur in a situation like this would be an acute activation of your fight/flight system

as a survival response is still innately kept deep within you. From your deepest and calmest time of the day in deep sleep to a sudden signal you must react, respond, fight, and flight.

Blood pressure spikes and a shock acceleration in heart rate caused by a burst of activity from your sympathetic nervous system occurs. Ironically, but sadly, this is what the majority of people in the westernized world choose to do voluntarily five days a week, and often at times of the morning where you should be fast asleep. The invention of the alarm clock is wreaking havoc on our systems in ways that could and should be avoided. Add to that the function of that— the snooze button. Not only do you suffer the shock response once every morning, but some people also even choose to repeat this damaging sequence. And I know it may sound impossible to some not to rely on an alarm, because people don't want to lose their jobs, but this is exactly what our circadian rhythm is for. If your biological clock was perfectly calibrating and you did a great job maintaining its function, you would wake up at the exact same time within a margin of 15 minutes every morning. This is how precise our circadian rhythms are. You may even have experienced it. Waking up to your alarm clock at the same time Monday to Friday, tired and most of all wanting to stay in bed. Finally, Saturday presents itself. It is weekend, you can stay up late and sleep late. But to your big disappointment, you wake up at the exact same time your alarm clock used to wake you up. And you even stayed up late, so now you're also short on sleep.

This is the circadian rhythm in action. Become friends with it or become its enemy. I know what I would choose. The best option is obviously to try and master your circadian rhythm as good as possible to permanently remove the alarm clock. This starts by going to sleep and waking up at the same time every day, preferably within a margin of 30 minutes. Keep this pattern, and sleepiness and wakefulness will be perfectly installed to your biological clock.

Should this pattern for some reason not be possible, or you might be a shift worker, then make sure the alarm you use follow these criteria: keep the volume low. As low as possible to a level where you are still able to wake up by it. It should preferably take you a few seconds to register it ringing. Choose a pleasant sound, and not a siren from World War II. Waking up to soothing sounds, like water, birds, or any other sound types similar to nature imitates best a natural way of waking up the same way our ancestors were used to.

As you know by now, our sleep is controlled by different hormones. Upon waking up, cortisol and serotonin are those in action. When the sun sets, melatonin dominates. This is all supported by an internal sleep barometer present in your body. The regulator is called adenosine.

Adenosine is a chemical which is building up in the brain. As you wake up, the concentration is low, but as minutes and hours go by, it keeps increasing in concentration. The more adenosine that accumulates the higher a desire to sleep. This is also what is called *sleep pressure*. As mentioned earlier, you will feel a natural pressure after roughly 12 to 16 hours of being awake. At this moment adenosine levels have reached so high a concentration combined with the beginning of melatonin secretion, you will feel a desire to sleep. It is important that you try to follow this desire and go to bed when the sensation approaches. In figure 7.2 you can see the natural process of melatonin secretion throughout a 24-hour cycle.

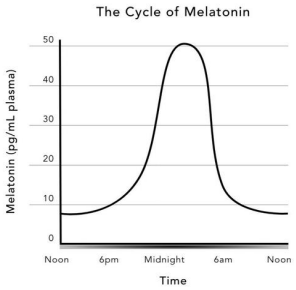


Fig. 7.2 The 24-hour cycle of melatonin secretion.

Caffeine is the antagonist to adenosine. This means it works oppositely of adenosine and is temporarily able to mute the sleep pressure felt from the adenosine. But it's not without consequences. When caffeine is consumed, it blocks the receptors from the accumulated adenosine. You will feel the energy and alertness from the caffeine, and the adenosine build-up will temporarily be muted. But even though you don't feel the adenosine building up, the process is still occurring. Once the caffeine starts leaving the system and you are no longer feeling the rush from it, you are hit with the sleepiness you felt before ingesting it plus all the extra adenosine that has accumulated in the meantime. This is what we call a caffeine crash. To prevent a caffeine crash I will advise you to postpone your intake of caffeine for 60-120 minutes upon waking up. But don't wait for too long. This will bring a wave of new troubles.

Caffeine has a half-life of five to seven hours. Half-life refers to the length of time it takes for the body to remove 50 percent of a drug's concentration. This means that if you had a cup of coffee at 4pm, half of that caffeine will still circulate in your brain tissue at 9pm. Or even 11pm. Referring to a more average time of caffeine consumption, let's say you had a cup of coffee at 10am. Averagely, at 4pm 50% of the caffeine would still be in your brain. But at 10pm, 25% of the caffeine might even be active. And this is for a single cup of coffee at 10am. Now multiply this number, and let's say you have been drinking three cups at 10am instead of one, and you will triple the amount of caffeine circulating in your body, both during the day, but also during the night.

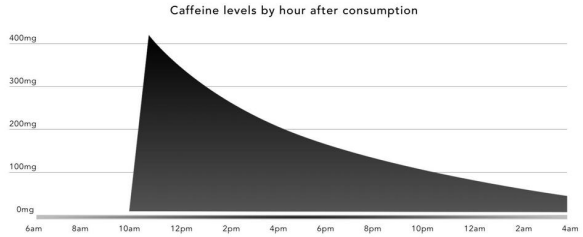


Fig 7.3 FDA's recommendations for the healthy limit of caffeine intake is within 400 mg/day for adults, which corresponds to approximately three cups of coffee. To some, this level is obtained, or even exceeded by 10am. Even if settled with one cup, one should notice that 50% of the caffeine is still active and circulating in the brain tissue after 5 to 7 hours, and even 10-14 hours later 25% of that same caffeine will still circulate. This means that a single cup of coffee consumed by 10am may result in 25% of the caffeine still being active at midnight.

To be sure the caffeine will not affect your sleep in terms of delaying the onset of melatonin, blocking the adenosine receptors, impairing the ability to fall asleep, stay asleep or reach stages of deep sleep, then you would have to drink your last cup roughly 10-14 hours before bedtime. At least, these are my recommendations.

People respond differently to caffeine, so there aren't any common guidelines for all. However, the vast majority of the people's sleep will be affected unless only consuming caffeine in the early hours of the day.

Taking naps throughout the day may be beneficial to some, as long as it does not compromise the full quality of the night sleep. Ideally, you would want to sleep through the night and feel refreshed in the morning. This habit should keep you going for the entire day. If you, for some reason, still need a nap, keep it short, and never longer than 90 minutes. Naps as short as 15 to 20 minutes may be beneficial for productivity and creativity. This is for the same reason big companies like Nike and Google have implemented it into their employees' working schedules [85].

And if we can settle with one-third of our life in bed, why not stop there? Think about it. If mother nature decided that humans need to spend roughly a third of their life in bed to maximize chances of survival, fitness, and longevity, it must serve an absolutely vital function. A sleep volume which is even larger in many mammals. Take the bat, which sleeps for up to 20 hours of the day, or the Python sleeping 18 hours of the day away. Even a human infant sleeps for the vast majority of the day, which adds up to about 16 hours. And the list goes on of mammals that are awake approximately the same amount of time that they are asleep. We are disabled from hunting, gathering, socializing, reproducing or in any way be productive, why sleep must serve an essential function to life. Otherwise, it would be the biggest mistake mother nature has ever made.

But from what we currently know from research, sleep is paramount for a long list of biological processes. Processes will be drastically impaired if choosing to cut down on sleep. Sleep has a vital impact on the brain function and recovery. It improves our ability to learn, it organizes and stores memories in way the waking brain has no chance of achieving, it helps up make logical decisions, recalibrate our emotional brain circuits helping us think rationally. And then it gives us dreams. Dreams, for instance, serve the function of processing past and present events in a virtual, creative space. It may even help us process and predict future events. Dreams are extremely mysterious, and with death, the most mysterious part of life, which we can only wonder and hypothesize about. This will be covered in much greater detail later in this chapter.

During sleep the body restocks the armory of the immune system aiding our processes of fighting infection and warding off sickness. It reforms the body's metabolic state by fine-tuning the balance of insulin and glucose, it regulates your appetite and helps control your body weight. This is due to our willingness to choose healthy foods during the waking hours over impulsivity and fast food when we have slept well instead of deprived ourselves of sleep. Sleep also flourishes the microbiome within your gut. A place that is central to health in the human body. Add to the list that a good night's sleep improves your cardiovascular health by lowering your blood pressure and keeping your heart in a healthy condition. In fact, mention anything in life you want to be good at. Deprive yourself from sleep and you will be impaired in that particular quality. Maximize your sleep potential and you will improve that same quality.

Our sleep is generally broken up into 90-minute cycles. These cycles we call the ultradian rhythm. Initially during the night NREM (non-rapid eye movement) sleep, or deep slow-wave sleep will dominate. But for every 90-minute cycle passing REM (rapid eye movement) sleep will occupy more time. The more sleep you get, the more REM sleep you will experience.

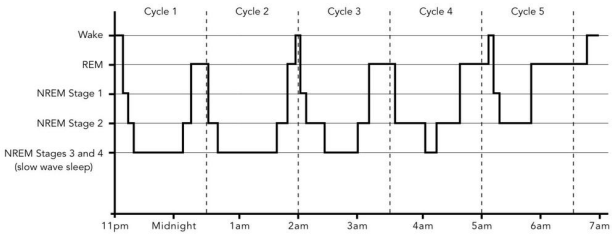


Figure 7.4 illustrates the ultradian rhythm in action during the night. Around midnight deep NREM sleep is dominating. When the morning approaches, REM sleep will dominate more.

As presented in figure 7.4 you can see how the sleep stages change during the night. Going to bed too late

may therefore cut off some of your NREM sleep, which is associated with physical recovery. Waking up too early may on the contrary cut off an important part of your REM sleep, associated with cognitive development. Choosing to go to bed two hours later than usual, or waking up two hours earlier than usual, so you get six hours of sleep instead of eight, will logically deprive you of 25 percent of your sleep. But it is actually worse than that. Not only are you deprived from 25 percent of your total sleep, but you are also deprived from a dominant part of what sleep stage was dominant in the period you cut off. Say you woke up two hours earlier than normal, and this would cut off 60 to 90 percent of all your REM sleep. You don't want to cut off any particular stage of your sleep. No component is more important than the other.

An experiment was once conducted to examine whether NREM sleep, or REM sleep was most essential to sleep. Tests have both been conducted on mammals, birds, and humans, who were forced to be awake an entire night. Letting them sleep normally the day after, the sleep was analyzed to discover what stage the brain would feast on when it was finally offered a chance to sleep again. The results of the research indicated two essential things about our sleep.

1. When offered the chance to sleep, the duration of the sleep was ten to twelve hours long. Dividing that the duration into two, which would correspond to the two nights, equates to an average sleep duration of five to six hours. Far less than what is optimal. We don't have any chances of "sleeping back" what we have previously lost. Optimal sleep must occur on a daily basis daily.

2. When offered a chance to sleep on the second night, NREM stages were far more dominant than REM sleep. Conclusion: the brain is far more eager to consume NREM stages of sleep when getting the chance to sleep again. But this is not entirely correct. Keep recording the data from the participants on the following nights and the picture is different. Now REM stages become the primary choice of sleep.

All sleep stages must therefore serve an equally vital function of our nights in bed. Mother nature, or whoever is in charge, didn't create anything by mistake.

Other experiments have since been conducted where infant rats have been blocked from their REM sleep. The results indicated the growth of the cerebral cortex of the rats stopped. And even when they were finally allowed to get their REM sleep back again, the cerebral growth started, but it did not accelerate and fully get back on track. Experiments where rats in life stages equivalent to human adolescences have further been conducted, where NREM sleep this time was blocked. These tests indicated the maturational refinement of brain connectivity stopped [86].

Deep NREM sleep is associated with improved motor learning, such as learning a new dance or a new football skill. Based on your experiences in real life, this stage offers a virtual space for your motor control to install new technical patterns. As the night progresses REM sleep occurs more. Eye movement initializes and you are completely laid out paralyzed. This mechanism is to prevent you from outliving your dreams, which may be fatal. Your experience is hallucinatory during this time. You are dreaming. An interesting fact is that when being in REM sleep, it is actually one of the only times in your life where the stress hormone norepinephrine, related to adrenaline, is completely absent. There is no chemical manifestation of fear and anxiety. The dream may not be pleasant, but you won't feel it in your body. This period of sleep allows us to review things that may have traumatized us, but with the absence of fear and the chemicals it brings. Therefore, nightmares probably only take place in slow-wave sleep.

Dreams: A Mysterious and Vital Gift

Going back in time, thousands of years, the Egyptians believed the state of dreaming was a message pathway from the Gods. This altered state of consciousness presented a chance for humans to communicate with the Gods. As with many other aspects of culture and history, the Greeks shared the exact same beliefs as the Egyptians when it came to dreaming.

The entire function of dreaming has yet to be uncovered, and it still stands as one of the biggest mysteries in our existence. Because of this, we can only theorize for what reason Mother Nature chose to let us enter such deep a state during sleep offers a parallel reality to our living reality.

Dreams get you into an altered state of consciousness where the rules are different from your living state of consciousness. Time is often abstract with no appearance of a continuous linear stretch like when awake. The dream state is offering a virtual space of creativity helps you create solutions to problems. But could it also be a playground of the subconscious mind? The part of the mind is suppressed, or hidden away, during the waking hours. Maybe the dreams state offers the subconscious part of your mind to unfold and help present solutions to unsolved past events of our lives. Think for a second, about how many times do you recall having dreamt of past relatives or past events. People and events that somehow still have a place in you, consciously or subconsciously. Watch carefully, and you may find the answers to your deepest problems that the subconscious mind lays out for your during your stages of REM-sleep.

Personally, I keep dreaming about of past relatives who I somehow never got to a conclusive ending with. People that slipped out of my life. Sometimes they are even represented as aspects that I may not like about myself, but in an exaggerated manner. To me, at least, this is a clear indication of a subconscious part of myself trying to communicate with the thinking brain in ways that are not possible during the waking part of the day, where we are highly engaged in beta brainwaves that constantly wants us to react, respond and analyze. These are parts of ourselves that are completely absent during sleep where our brains delve in delta brainwaves.

Could creativity unfold in dreams to such a degree your subconscious mind is developing ideas and connecting the puzzle of information that you collect during the day? It seems likely. Numerous world-changing ideas in fact came from dreams. Albert Einstein's Theory of Relativity is one of them. In his dream, Einstein talked to a farmer, who he was telling about an event where cows were being surrounded by an electric fence. The farmer replied that he also saw the event, but he saw something completely different. Einstein awakened with the realization that the same event could vary when seen from different perspectives, which gave rise to the theory of relativity.

Another concept came to life from dreams was something we all may know of, at least those who have gone to school. The Russian chemist Dmitri Mendeleev was exhausted after three days of trying to classify the 56 elements, and he decided to sleep on the problem. The dream that followed ended up becoming the periodic table. Dmitri Mendeleev reported from his dream: "I saw in a dream a table where all the elements fell into place as required. Awakening, I immediately wrote it down on a piece of paper," Mendeleev wrote in his diary, "Only in one place did a correction later seem necessary."

The Danish physicist Niels Bohr was once the deep asleep when he got a vision of the planets circulating

the sun, but with pieces of strings attached between them. He woke up from his dream, and suddenly he started envisioning the movement of electrons [87]. This vision became the model of the atom.

If you want to consolidate what you have already learned into long-term memory, create improved comprehension of a problem or finetune your skill learning, this is done through sleep, and more specifically through dreaming. An abstract reality where anything can happen without the same rules than define our living reality.

We can all agree on the possibility that dreams may indeed serve a function of analyzing past and present events. But how about future events? Is this even possible? Well, we have never experienced the future, which has never occurred and therefore does not exist. Dreaming about the future will therefore technically be impossible. Or will it? We now move into speculative ground. But how can we then explain why some people report having dreams so profound and realistic, which turn out to happen in the exact way they were experienced during the dream?

I experience this mystical phenomenon myself frequently, and I cannot help but wonder, since any plausible scientific explanations probably won't be discovered in the nearest future. I have also discussed this phenomenon with friends and colleagues who have reported experiencing similar occurrences.

I recall talking to my cousin earlier this year. My girlfriend and I were at that time trying to get pregnant and had been trying for quite a I while. This was our secret that no one knew about, not even our parents. I didn't talk a lot with my cousin a lot at that time, but either way she eagerly texted me that February night: "OMG. I just dreamt that you and Denise had a little baby girl." We laughed, and I told her that she would have to wait quite longer for this to come true. At that point, we still had not managed to become pregnant, and were more or less beginning to give up after a long and exhausting process. One month passed by, and the pregnancy test turned positive. And it wasn't just positive; the baby was created in that exact week my cousin had texted me. A few months later, it also turned out that my girlfriend was carrying a girl.

This example is just one of many, and maybe you have experienced the phenomenon to some degree as well. Contemporary science will probably not be able to explain such experiences, but other metaphysical explanations may enlighten us on the mystical reality of dreams.

One is that time is simply an illusion. An illusion we only perceive in our three-dimensional reality, so we experience life as a gradual linear experience. Although this may only be a state in which is able to be perceived in the three-dimensional space we occupy. Instead, when we move outside of realms that are not defined by the laws that define our 3D-reality, time is perceived differently. And when time is perceived differently, such as like a physical dimension, everything can happen at once. This means that as everything happens at once, everything has already happened, and at this point time travel will be possible. This is not possible, at least currently, in our 3D-reality. But maybe the rules are different in the altered state of consciousness that we call dreams.

Another explanation may be found in the multiverse theory. That we are living side by side with an infinite number of parallel universes, which are parallel realities to our own. Every time you make a new choice or make a decision which may alter your reality from the smallest degree to a noticeably big deal, you are tapping into a new reality. This happens thousands of times during the day for each living person,

which makes every possible outcome of one's life achievable. Our beliefs and choices shape our reality. Maybe more than we tend to believe. It is the same reason why prayers work if enough people are doing them, or if the individual trusts the prayer enough. What someone has labeled "law of attraction" can be explained by the same mechanisms.

The dream state may indeed act as a portal into the timeless reality that our conscious mind suppresses during our waking life. During sleep, we completely shut off our sense of time. We are in a zone where that rule does not exist. Time is often elongated, and the amount of information the brain is able to experience and process, does not match the amount of time being asleep.

No matter what, or which, purposes dreams represent in our existence, it is safe to say that they aren't just a random biproduct of life, which I fundamentally believe that nothing is. To gain advantage of their purposes, whatever they might be, one should indeed take them seriously and try to comprehend the messages that they are teaching us. This is for the same reason you should always spend the initial time upon waking up analyzing those dreams, while they are fresh in memory, which is also providing you with a tool that prevents you from engaging in stressful situations such as checking your email or social media.

Dimethyltryptamine, known as DMT, is a molecule which is said to be produced by the pineal gland. During sleep DMT creates a psychedelic experience, which may be what we experience during the dream state. DMT is a natural substance also found in more than 60 different plants. Supplement it and you will alter your state of consciousness to a reality that seems highly unsimilar to 'real' life, yet familiar to those taking it. It is a natural occurring tryptamine, which is in family with serotonin, melatonin, psilocybin, and LSD.

For many thousand years, humans have been using DMT as a drug. Back in 1990, two well preserved mummified human bodies were dug up near the Matanza River in Northwestern Argentina. When the bodies were dug up, it wasn't *just* two dead bodies that were found. With them was buried an engraved pipe, sculpted from a puma bone. After being tested in a laboratory and carbon dated, they found that the pipe had been used to smoke the substance *Anadenanthera colubrina var. cebil,* which is a South American plant containing DMT. The pipe was dated back to 2130BC [88].

Maybe these psychedelic experiences participated in the creation of religion. One can only wonder.

Taking DMT as a drug, the user is left with a psychedelic experience of extreme visual and auditory hallucinations, that are highly vivid in comparison to day-to-day reality. People taking it report the 'death' of their ego, which is the separation of self from other to become more attracted to unity and oneness. DMT also tends to push the subconscious core up to the surface, so the user is forced to stay face-to-face with their deepest issues. Much likely to what dreams do to us.

The natural pathway of DMT seems to be through the cerebrospinal fluid via the pineal gland. The cerebrospinal fluid travels inside its pathway in the spinal cord, from the sacrum throughout the entire spine and up to the brain where in circulates. As we have already discussed in chapter four, there are specific protocols to be made to accelerate this process of upward flow of CSF into the brain and pineal gland. A process that seems similar to what the Tibetans described as the Kundalini, where the flow of energy travels through the sacrum, the base of the spine, and up towards the top of the scull, the area of the pineal gland.

Might this process merely be DMT travelling through the CSF to engage the pineal gland? Maybe this was the process of the Kundalini that awakened. Or what the Indians called the opening of the chakras. Or what the Chinese called the Qi arriving.

Perhaps we are speaking different languages, but still trying to describe the same phenomenon.

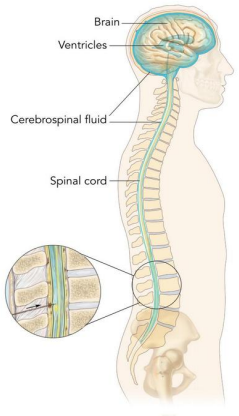
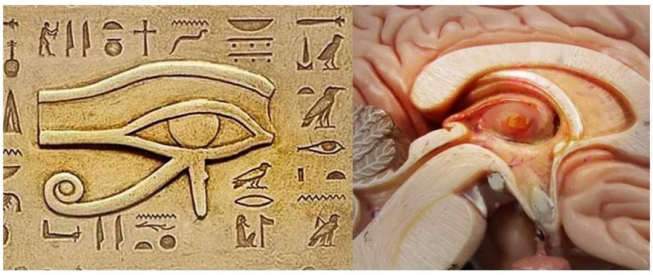


Figure 7.5 The pathway of cerebrospinal fluid (CSF) from the spinal cord and into the brain.

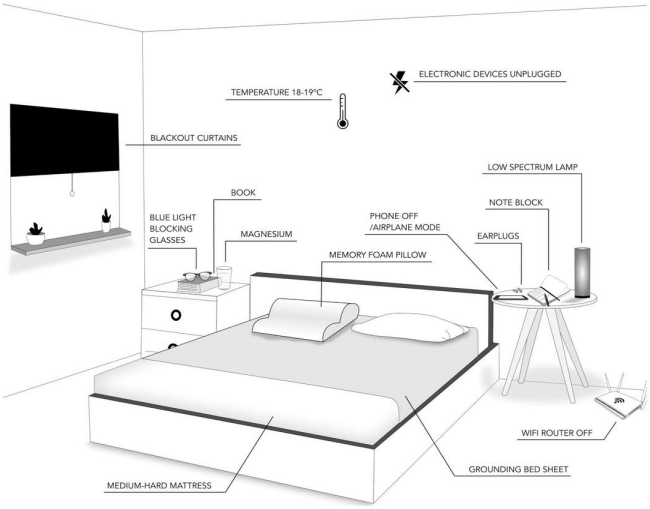
Even though contemporary science still fails to discover the complete function of the pineal gland, the tiny structure in the human body is difficult to overlook and seems to be involved in parts of our biological processes that are essential for our existence. Whether this is merely the production of melatonin that creates a good night's sleep, or something more profound as producing DMT or being responsible for consciousness, it is indeed the master organ, and was perceived by our ancestors as the 'seat of the soul.'

As discussed in earlier chapters, our ancestors used art and symbols as a way of communicating information to future generations instead of solely relying on vulnerable sources like books. The Eye of Horus was a sacred Egyptian symbol of healing, regeneration, wholeness, and protection. Maybe it served no other purpose that merely being art. Maybe there was a more profound message kept in the symbol.



And maybe this is nothing more than a coincidence. But it could be our ancestors' way of telling us about a structure in the human brain that serves a biological purpose, which we need to respect and research thoroughly. At least, this symbol is one of many created several thousand years ago that are close to identical to components of the human body. All created by civilizations that are said to have been remarkably less advanced than we are today.

The Master Bedroom



Dealing With Stress

Stress is not just feeling burned out from your job or having more homework than you can handle. Stress is a biological response which indicates a fundamental imbalance in the body and brain. At least if the stress experienced is long-term and not acutely. A response of an individual who has reached its physiological and mental capacity; a degree that varies from individual to individual.

Basically, these biological responses are determined by the dominating part of our autonomic nervous system. An imbalance in the system forces the sympathetic fight/flight response to keep being switched on, impairing any ability to reach a deep state of recovery. As a result, the resting heart rate will remain above normal, whilst the heart rate variability (HRV) will be low and irregular.

The HRV can tell you a lot about your current stress response and level of recovery, whether you should take it easy or whether you are good to go. HRV measures the regularity between each heartbeat. So, if your heart beats 60 times per minute, it does not always mean that the intervals between each beat is one second. Sometimes it may be 1.1, other times it may be 0.9. The less stability between each beat, the lower an HRV, which indicates that your system needs rest.

However, there are times where the HRV naturally will be low as well as there are times where it will naturally be high. This cycles up and down, depending on your body's need for rest. Just like there are advantages of engaging in your sympathetic nervous system at times, whereas the parasympathetic nervous system must take on over other times. Every time you work out, the sympathetic response engages and the HRV usually drops. This is a natural stress response that passes when the alert situation is over. When we sleep, meditate, or just relax, the parasympathetic response activates and the HRV increases. This cycle is natural and refers to the health and resilience providing benefits of acute stress. However, when it becomes chronic, we are in great danger.

HRV can easily be measured with a heart rate tracking device and one of many free apps on the market, and should be used as a tool in any person's life to measure the current state in which your body and mind is in. The last factor is found in your brain waves.

Stress, the sympathetic nervous system and low HRV are often associated with the individual being engaged in their Beta brainwaves. This type of brain waves is the most active brain wave state. Usually it is associated with alertness, concentration, and deep cognitive engagement. The active state is great to be in when you are in the classroom, at an important meeting or learning new skills, but this is what can be referred to as the monkey brain, the thinking and analyzing brain. Spend too much time in this state and you will become utterly mentally exhausted. Types of brain wave states include:

1. Delta waves

They participate in deep sleep and the transition into sleep. It's a state of brain waves that potentially are also great for very deep and profound meditations.

2. Theta waves

The state below Delta waves. They can assist in non-sleep rest and participates in deeper states of meditation as well. The mind is still awake, but the body is drifting off to sleep.

3. Alpha waves

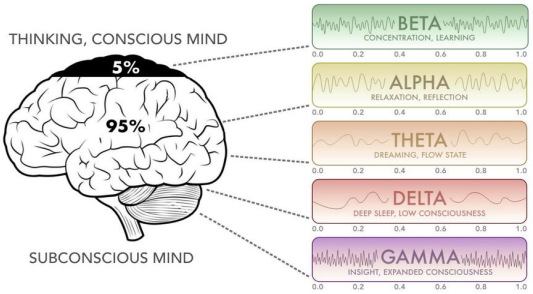
You are awake, but you are calm, relaxed, creative, and intuitive. This is because the analyzing brain has shut off, and the access to the subconscious mind is more available.

4. Beta waves

A state for focus and complex learning. This is present in most of our waking day, where we are aware of space and time and cognitively engaged.

5. Gamma waves

The highest frequencies that put you in a superconscious state. This state is good for learning and problem solving.



There are active tools you can use to manipulate your state of brain waves to best serve the purpose you want to serve, as well as lowering the state to assist rest and recovery from stress. You will learn about them in the end of this chapter.

As previously mentioned, acute stress is fine for you. It can actually be beneficial and resilience providing for your system. This is why we work out or jump in the ice bath to induce acute stress, which is highly beneficial for the immune system. When you are in a state of acute stress, your pupils dilate, heart rate increases, you sense a sharpening in your cognition and responds to a narrow and sharp focus in the moment. This was a similar occurrence our ancestors faced when approaching a predator on the savanna. As with most other species, an innate survival gene signals fear to their brain to turn on their fight/flight system, where energy becomes mobilized to prepare for the threat, so the body can respond properly to the threat. We become highly alert and are only able to be in a state of brainwaves that allow us for acute problem solving.

This is the stress response. Natural and undangerous. For short durations of time.

The problem is that more and more people are stuck in this response, where they go through these cycles for hours, days and even weeks and months. No matter how much, or how little you experience stress, it should never be experienced more than acutely. Long-term suffer can lead to heart disease because of the way adrenaline impacts blood vessels. Stress is the polarity to the state we want to be in to heal. It is a state where healing cannot occur.

Several protocols can be implemented in your day-to-day lives to either learn how to manage long-term stress or prevent it from occurring. Instead of medicating yourself with pharmaceuticals containing hazardous side effects, which may be even worse than the stressor itself, and as a side note never treats the underlying cause of the condition, natural procedures can be followed to aid your recovery and induce healing as the default program in your system.

According to the CDC, four percent of U.S. adults have used prescription sleep aids in the past month. The potential side effects of sleep [89] medication include constipation, diarrhea, drowsiness, dizziness, heartburn, mental inefficiency, memory loss and attention issues. Issues that may be even worse than the problem itself.

According to the CDC, statistics from 2018 further shows that 13.2 percent of U.S. adults have been using antidepressant medications in the past 30 days, which corresponds to more than 2.7 million people [90]. Potential side effects from antidepressant are just as troubling as sleep medication, which goes from dizziness to weight gain, tiredness, confusion and disorientation to diabetes, heart problems and even suicide. Continuous research is suggesting that it is even the placebo effect that is responsible for the majority of the perceived benefits from taking the drug, rather than the actual effect of the drug itself [91].

My advice is to implement the following routines into your daily life before turning to medication. Experiment with them, try different combinations out and create healthy habits that may get you to the bottom of your problem once and for all. Even if the issue is far from being troubling enough for you to consider medication, these protocols may benefit your healing and recovery to such a degree that you will prevent approaching serious conditions later in life.

1. Master your sleep. Sleep is the foundation for recovery. It's the reset button that ensures that all your biological processes optimize for the following day. Use what you have already learned about sleep and create a permanent healthy habit of sleeping well and undisturbed every single night, as good as is possible for you.

2. Meditate. Meditation shuts off time and space around you and lets you access your subconscious mind, where you can process your true being. It lowers the frequencies of your brain waves and puts a pause to external stimuli. Do not make it fancy. Meditation can be a walk in nature, or merely sitting with your eyes closed and observing your thoughts rather than digging into them.

3. Absence of perpetual pleasure. Realize what habits you expose yourself to daily, that subconsciously pushes you away from your troubles and true nature. This can be gaming, watching the TV,

smoking, or even eating. Removing those distractions from your life for a temporary period, such as fasting and removing all encoded programs from your daily life will expose you to the emotions you mask with your habits. This is the road to the core of your issues, and where healing starts: physically, mentally, and emotionally.

4. Manage your default breathing. Begin breathing through the nose and into the abdomen. Slow down the breathing rate and the breathing volume. Breathe lighter and breathe less. In contrast, mouth breathing and chest breathing induce a sympathetic response that makes you stuck in a stress response.

When you exhale, your diaphragm moves up, your heart gets smaller and more compact so blood will move more quickly. This sends a signal to the brain to slow down your heart rate. To slow down your heart rate, exhale therefore for longer durations than you inhale. This can be in a ratio of 3:1, where the inhalation duration is normal, but the exhalation is three times longer.

5. Polarity therapy. Everything in nature is dual. Everything has its opposite pole. In essence, this means that two opposite poles in essence are the same. Love, hate. Good, bad. Up, down. Depressed, ecstatic. Angry, joyful. So, whatever the emotion may be that is holding you back from expressing your desired actions in life, place your focus upon its opposite pole and you will, over time, kill out the undesirable by changing its polarity. If this is anxiety, then practice things that makes you feel courageous, and so forth.

6. Sound therapy. Sound frequencies alter your brain wave state. Down to the deepest level, sound vibrates and affects how we think and feel. It can be used to heal, but also to harm. Mozart was said to tune his instruments to 432 Hz. A frequency that worked in harmony with the human brain, and perhaps this was the reason why his work became so popular.

Today, the standard frequencies have shifted in a lot of modern music. Frequencies that are not in sync with brain wave states of healing and recovery. Oppositely, certain sound frequencies such as binaural beats, which are exceptionally low frequencies, or other sounds in frequencies of 432 Hz, 528 Hz or 963 Hz, can alter your brain wave state to work with you instead of against you. Even what is known as ‘white noise’ seems to be an effective approach for brain activity, memory, and learning (in adults) when used as background noise during the task. White noise is a soothing hum, similar to the sound of a fan or a hair dryer. If used for cognitive enhancement, make sure it is neither too loud nor too quiet, but at some undisturbed level in between.

Healing Protocol

· Duration: 1 – 1,5 hours



Step 1: Fast for 3+ hours to avoid an operating digestive system.



Step 2: Go to nature to exposure your body to negative ions and distance yourself from harmful EMF's and pollution.



Step 3: Be barefooted to induce Earth's grounding potential.



Step 4: Move (walk, run, exercise etc.) to heat up the body and get energy flowing.



Step 5: Practice cold exposure (15°C / 59°F or less) for as long as possible whilst being safe. Preferably at the same location: in nature, on the beach etc.



Step 6: Practice (advanced) Tummo Meditation while listening to harmonizing sound frequencies of e.g. 963 Hz.

Instructions:

1. Take 40-50 deep and rapid breaths through the mouth.
2. Do a breath hold on ¼ of the last exhalation.
3. When reacahing your limit, take a deep inhalation and hold it for 30 sec. while erecting the spine and squeezing the pelvic floor muscles maximally. Visualize the cerebrospinal fluid travelling from the base of the spine up towards the center of the brain.
4. Release and immidiately start over. Repeat three to five times.

- *No phone engagement or social interaction allowed during the practice.*

Summary

- Wake up without an alarm clock to prevent the acute spike in blood pressure and fight/flight response as the first thing upon waking up.
- Go to bed and wake up at the same time every day within a margin of ~30 minutes.
- No phone, email, etc., within 30 minutes upon waking up. Analyzing your dreams and visualizing day plans are great tools in this period.
- Immediately hydrate ~400mg water.
- Avoid caffeine or:
  - No caffeine within 60-120 minutes upon waking up to avoid ‘caffeine crash’.
  - No caffeine later than 10-14 hours, before bedtime.
- Watch the sunrise or gradually brighter light immediately upon waking up (artificial/blue light is ok when the sun is up.
- Get daylight exposure frequently in durations of more than 5 minutes on cloudless days or more than 20 minutes on cloudy days.
- No sunglass uses during daytime.
- No naps after 3PM, or no naps at all (depends on who you are, how your night sleep was, etc.). Do not nap for longer than 90 minutes, and preferably much shorter. Micro naps for 15 to 20 minutes may be the most beneficial.
- Watch the sunset, if possible, to induce wakefulness.
- No large meals before two to three hours prior to bedtime. This may cause indigestion interfering with your sleep. A key is not to feel full nor hungry.
- No artificial/blue light within two to three hours prior to bedtime (especially overhead lights).
- No moderate to high intense training within two hours prior to bedtime.
- Keep your bedroom cool at around 18°C (hot showers and saunas will accelerate the process of cooling core body temperature).
- Alcohol messes up your sleep, especially deep restorative sleep. Marihuana does the same.
- If having troubles sleeping, supplement either magnesium L-Threonate, taurinate or glycinate, or a combination. Do this roughly one hour prior to bedtime.
- Limit intake of fluid 2-3 hours before bedtime, but drink if you are thirsty. Hydrate instead throughout the day. This is to prevent toilet visits during the night.
- Be careful what noises pollute your ears during the night. If noises are disturbing your

sleep, try sleeping with ear plugs.

- Avoid going to sleep later than 11pm (this may be different for teens).
- Develop a healthy sleep routine with relaxing tools: keep your bedroom entirely free of EMFs if possible. Phone on airplane mode/switched off, no TV or TV unplugged. No engagement in stress, such as checking social media or e-mail at least one hour prior to sleep. Instead, read a book, write, practice breath work or other low-intense activities.

Conclusion

I often wonder why we think we know so much. The human species tends to hold on to the arrogant belief that we know it all as if we were in charge of everything. However, every time there is a breakthrough in science and our current understanding of the world turns upside down, we are for a moment forced to humbly acknowledge how small and insignificant we in fact are.

Imagine what would happen if you travelled just 100 years back in time and gave a random person your iPhone. The same thing that happens today when airplanes and speedboats are approaching isolated indigenous islands. The shock response from something appearing as exceptionally foreign to them as the technology approaching them induces an instinctive action of defense.

The enormous changes that have occurred for the past 100 years, occur now in roughly 1/10 of the time by an exponential speed that keeps increasing.

I am not religious. But when someone tells me God does not exist, or that there by definition can't be life after death, or that the human body is incapable of this or that, I refer to how little we in fact know. What is outside the universe? What was present before the Big Bang? Are we alone in space?

The fact that we can't answer some of these most mysterious questions in existence should at least indicate how little we know compared to how much we have still to learn.

By covering health from as many perspectives as possible, I'm trying to solve just a few percentages of the riddle when it comes to the human body well knowing that our way of approaching these solutions may not ultimately be the best way to do it, but the best possible way in terms of our current understanding of reality.

I passionately believe that once we acknowledge the human body from a more bioenergetic perspective,

where we choose to treat the emotional system more in an integrated manner, in contrast to the approach of treating the body chemically by drugs, we will reach new and more sustainable peaks in our understanding of health and enlightenment.

I believe that it is time for us to let go of the belief that was imprinted in our understanding of the world when Darwin proposed his theories of competitiveness, and instead begin considering nature as a cooperative system that would not thrive by competition alone. This is the first step to understanding that the same rules apply to human life. Because human life will never become more harmonic if we keep dividing everything and everyone by their choices, beliefs, and actions.

About the Author



MADS TÖMÖRKÈNYI is a Copenhagen-based biomechanics specialist and scientific researcher. He is the founder of the organization MT Performance. With more than 10 years of experience in the field, Mr. Tömörkènyi has been serving as an international speaker and coach for sporting leagues and clubs, including the UFC, the Premier League, the Bundesliga, La Liga, Mexican Liga MX and others, whilst coaching a great number of the highest performing athletes in the world. He has devoted his career to enhance awareness of health on a global scale. In 2020, he founded an online education platform, the Human Mechanics Online Course, that to this day has students from more than 140 countries across the world. Human Mechanics is his first book.

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