FOOD *for Your* BRAIN

A GUIDE TO EATING SMART, STAYING MENTALLY SHARP AND THE BEST DIET TO INCREASE THE HEALTH AND POWER OF YOUR BRAIN

AISHA SUMMERS

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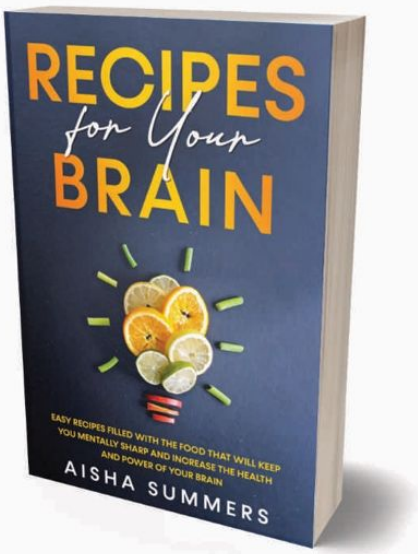

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INTRODUCTION

Few men come to realize that their entire life has been lived inside their mind.

Kapil Gupta

Many years ago, when I was a little girl, my grandfather developed dementia. He was sick for a long time, and his illness really affected my family.

I know that's a strange place to start a book. But based on what this book is about, I'm sure that you can understand why this is my starting point.

Even though I was quite young when he was first diagnosed, I could see that he was changing. We called him Dadu, he was my dad's father, and he lived just round the corner from our house, so I saw him all the time. I didn't know exactly what was happening to him. Looking back, I can remember episodes before my parents told me he was sick that seem like tell-tale signs to me now.

But when you're young, it's easy just to accept the world the way it is. You don't think it can be any different. For a long time, I just thought that's what grandfathers were like, I didn't see my other grandfather much who lived in India, and this was long before FaceTime. I thought that at some point the same thing must happen to all old people. Gradually they start to lose more and more of themselves.

As I grew up, and as he got worse, I realised that what was happening to him was not the normal pattern. As you get older, your brain does start to function less well, you slow down and become more forgetful, but what was happening to my Dadu was something else.

And I wished, more than anything else in the world, that there was something I could have done to help him, to have lessened his suffering, and have made life easier for my grandmother who cared for him for many years. I didn't realise it back then, but there was.

I had no idea how everything is connected together.

You might not think about it much, but our entire reality exists within our mind. Our feelings, emotions and senses, our experiences and memories, even our friends, our families. It's all information that is absorbed, processed and relayed to us by our brain. Our brain is fundamental to our experience of reality.

But we barely appreciate it for that! As much as we talk about physical health, about exercise and about movement, we have a real habit of ignoring our mental health, our brain and the functioning of our mind. We're obsessed with the exterior, how we look from the outside. We concentrate so much on the things that we can see, to the extent that we forget about the things we can't. The two have some deep and powerful connections, but by focusing solely on how we look, we don't take care of how we feel.

Your brain is entirely responsible for how you feel. And it might be at its limit.

In fact, it's very possible that right now, as you're reading this, your brain is at the very best it'll ever be. It could be at the peak of its possible performance and from now on, it'll just steadily decline: your memory will become less clear, your cognitive powers will become weaker, and you'll lose your sharpness. You'll feel less good.

Because this is the reality for everyone at some point in their lives. Brains get older and weaker. Sometimes they seriously and critically dysfunction.

But what if there was something you could do to prevent it? To slow down or even put a stop to this apparently inevitable process of mental decay? Wouldn't you kick yourself if you didn't start doing it right now, before it was too late?

This book is for you if...

1. **You want to finally achieve clarity on how to look after your brain and the health of your mind**

There's a lot of conflicting information out there about what's good for you and what's not. Should you eat low fat? Or low carbs? Or take pills? Nutritional science is confusing, brain chemistry is complex, and there are seemingly hundreds of marketers, influencers and gurus trying to sell you *"the one secret product"* that you didn't even know you were missing, but that you can't live without. I wrote this book to cut through the noise

and give you complete clarity on how the food you eat interacts with and changes your brain.

2. **You want actionable steps that you can use immediately**

I don't want this book to be 'interesting' without being useful, to be all theory and no practice. If you want to read something purely for entertainment, then pick up some fiction. If you want to be able to pass an exam about the science involved, then read a textbook. But if you want to understand how the food that you're eating may be damaging your brain, and the steps you can take to do something about it right now, then read this book.

3. **You want to keep your mind sharp, and your brain healthy and functioning at its best for as long as possible**

I shared the story about my grandfather for a reason. I know how great the impact of brain decline can be, both on the person experiencing it, and the people around them. Dementia is at the far end of the scale, but it is by no means the only way a brain can decline. Many people start to suffer from slower thinking, less mental flexibility, increased fatigue and grogginess. And this can start when you're young! I wrote this book to counter those things, to keep your mind sharp, and to maximise your quality of life for as long as you live.

To accomplish those things, here's what we're going to cover:

Chapter 1: The brain crisis, in which we'll look at the true scale of dementia worldwide, as well as why your brain is amazing, what happens to it as you age, and the troubling interactions we're seeing with today's diets.

Chapter 2: Your heart & brain, a love affair, where we'll discover the relationship between your heart health and brain health, as well as looking at diet tips to support them.

Chapter 3: Is butter all bad? In which we'll explore the different types of fat, the truth about saturated fats, and the links between fats and your brain.

Chapter 4: Grains on the brain, in which we'll explore the impact of carbohydrates, grains and gluten on your brain and neurological health, finding out whether or not there's anything you need to be worried about, and what kind of action you might want to take.

Chapter 5: Gut to brain and back again, where we'll examine the surprising science of how keeping your gut healthy can keep your brain healthy too. We'll cover some specific tips and dietary advice.

Chapter 6: The bad guys. No story would be complete without a villain, and the story of your brain has plenty! In this section you'll find out which foods to cut out completely, and why.

Chapter 7: Superfoods for a super brain. If the story of your brain has bad guys, then it also needs some heroes. In this chapter I'll provide you with a breakdown of the foods which are particularly good for your brain health.

Chapter 8: To supplement or not to supplement, that is the question. We'll dive into the complex, and sometimes *deliberately* misleading world of supplements to arrive at a brief overview of some of the best supplements for your brain.

Chapter 9: The best food is less food, a chapter where we turn everything on its head and look at the science behind calorie consumption, calorie restriction and fasting, providing practical recommendations for brain health.

Chapter 10: Food is the answer, but not the only one. Our final chapter, in which we'll look at why food has the biggest impact on brain health, but also at some of the other things that you need to do to keep your brain healthy and sharp.

Who am I to offer advice?

Maybe it's best to start with who I'm not.

- I'm not a guru looking for followers.
- I'm not a scientist, but I am a researcher. So, I haven't conducted the trials and experiments myself, but spend my time interpreting the results.
- And I'm not some fancy, 1000-word-a-minute marketer, trying to sell you something you don't need.

My name is Aisha Summers, and I was born in England to Indian parents. My parents were born in Kolkata at a time when it was still called Calcutta but moved to Britain before they started a family. I grew up in a lively household, where food was at the

centre of our celebrations. And we always took the opportunity to celebrate!

We didn't just eat food from my parents' homeland though. When we were young, my siblings and I always wanted English food, which we pestered my mother to make. I grew up eating a range of foods and cuisines, so I saw first-hand what was good and what was bad about each.

Now, I know I'm not unique – so many people have relatives, friends, partners who suffer from dementia. But seeing my grandfather, and the effect his illness had on my family, sparked a lifelong interest in brains.

For a long time, I've been drawn to learn as much as I could about the causes of dementia and about how and why brains develop such serious problems. It was a search that inevitably led me to nutrition. And today, I now understand that the foods that my grandfather loved, that we all loved, were some of the worst things for the health of his brain. Sometimes I'm struck with the bittersweet irony that the food we'd make him when he was getting worse, his favourite things, to try and make him feel more settled and happier, were quite possibly some of the worst things for him to eat.

So now I'm on a mission. A mission of education. I want to help people understand which foods are good for your brain and which aren't. The foods to eat and the foods to avoid. I want to help people understand that the choices that we can make on a daily basis affect the health of our brain. And I want you to realise that you can take your health into your own hands.

Because 1 in 3 cases of dementia are preventable, and we don’t have to just accept that our brains are automatically going to get so much worse as we age.

There’s never a better time to do something about it than NOW!

WHAT THIS BOOK IS AND WHAT IT IS NOT

First things first, this book isn't going to be some extreme or controversial diet which will tell you to cut out certain food groups entirely, or to seek out rare and expensive supplements and treatments. In fact, I'm going to go as far as to say that anyone who does say those things is either dangerously misinformed, or deliberately misleading people in order to make money. To me, this is one of the most despicable things that you can do to someone who has put you in a position of trust.

So, what is this book?

It's a guide to a holistic understanding of what food is good for the long-term health of your brain and what food isn't, along with well-evidenced reasons why. A lot of research has gone into it. It is a streamlined, condensed version of my many years of study, that takes solid, scientific evidence and makes it accessible and actionable for you. It's a way for you to take the power into your own hands: the power to become the champion of your own health.

Talking of research – everything that I talk about in this book comes from studies and research that has been carried out to help us understand how nutrition affects the human body. I've put all the footnotes at the back of the book, so that you can look into it further if you are interested – otherwise there's no need to go and click the link every time you see a numbered footnote.

A QUICK PROMISE

One last thing before we start, though, and that's a promise. Not a promise from me to you, but a promise that I'm going to ask you to make.

I want you to promise to ***put what you read into action.***

Because I can offer the best information in the world, and you can come away with a complete understanding of nutrition and brain health. But if you never actually take any of the actions I recommend, then it won't make any difference.

You could know the names of every single micronutrient your body needs, the recommended daily allowances and the best possible sources of them, but if you sit at home and eat nothing except deep fried pizza (spoiler alert, that's in the 'bad guys' section) then it's going to be all for nothing.

It's not really a promise to me. It's a promise to yourself. To your future self, and to the future health of the people you love.

You're reading this book for a reason, either to improve your own health or someone else's. Ideally it will be both. You can directly affect the people around you, you can help your parents, your friends, your children. I want you to commit to those goals. I want you to remember why you started reading and remember this initial motivation even when life gets busy and distracting.

Because if you can, the information in this book and the actions you take from it are going to be completely life changing.

Do we have a deal?

Fantastic! Let’s get started…

CHAPTER 1: THE BRAIN CRISIS

The World Economic Forum recently called dementia a "*Trillion-dollar global economic problem.*"

For regular people like you and me who have no idea what a trillion dollars looks like, it's…

$1,000,000,000,000

Or, to try and understand it another way, you can change the scale. Think of one penny representing a million dollars. That means if you had a thousand pennies – which is $10 – that would represent a billion dollars. A thousand times that is a trillion, which would be $10,000 according to this scale. So, if you're thinking about the impact of something costing a trillion dollars, whether or not you add another billion dollars to the bill would be the equivalent of adding another $10 to something that costs $10,000. It's a crazy amount of money.

Or, if the cost of dementia was a country, it would rank 16th largest in the world's economy!

In this chapter we're going to look at WHY dementia is such a huge problem, we're going to briefly explore the complexity of your brain, what happens to it as you age, and how the Western pattern diet might be playing into this.

WHY IS DEMENTIA SUCH A HUGE PROBLEM?

It’s not just a case of increasing numbers of patients, which is the first issue, there are a lot of reasons:

People are living longer

Advances in medical care mean that the average life expectancy in many countries is rising. In principle, this sounds like it can only be a good thing – we get more time with our friends, families and loved ones. The problem, however, is that living longer is not always the same as living for longer in good health. The risk of various health issues, including dementia, increases significantly with age.

Commentators started to call the phenomenon the “silver tsunami” at around the time that the baby boomers – the generation born just after the Second World War – reached their 60s. There was a growing wave of older people worldwide as global birth rates declined, and medical care and living conditions improved – and this trend is only increasing.

Today, estimates suggest that dementia affects almost 50 million people worldwide, with a new case of dementia occurring somewhere in the world every 3 seconds. Moreover, the number of people living with dementia in high income countries is also expected to double by 2050.

Many countries are not set up to deal with dementia patients

As anyone who has cared for or known someone with dementia will tell you, caring for them can often become a full-time job. Unfortunately, with many healthcare systems already under significant strain, there are often not appropriate set-ups in place to deal with dementia patients within hospital and clinical settings.

This is an even greater concern when you consider that more than half of people with dementia worldwide (58%) live in Low to Middle Income Countries (LMICs) with these numbers expected to increase fivefold by 2050.

Diagnosis is often made far too late

Early intervention is key for the management of dementia and mentally degenerative diseases. It allows for risk reduction strategies to be put in place, including social, community and care services, all of which greatly enhance the quality of life for those dealing with the disease, both the patients and their carers. Moreover, early diagnosis would go a long way to reducing the huge time and labour costs of avoidable emergency interventions, ambulance trips and emergency room visits.

Unfortunately, data suggests that early diagnosis is incredibly rare. In high income countries it is less than 50%, whilst in LMICs it is less than 10%.

Dementia impacts women more than men

World Health Organisation research from 2019 shows that Alzheimer’s and other dementias are the second biggest cause

of death for both men and women. However, whilst men's figures in the US are 57.9 deaths per 100,000 population, the figures for women are double that at 116 deaths per 100,000 population. Similar trends are also seen across the UK and Western Europe.

Worse still, research also suggests that as well as being the most directly affected by the disease, women are also the most indirectly affected, as they take on the majority of care support roles both within the family, and through professional care services.

Put simply, dementia is a growing worldwide health crisis experienced by more and more people every year. Medical set-ups around the world are not effectively diagnosing the condition early enough, nor are they currently able to provide consistently appropriate levels of care and support. This, more often than not, leaves the burden of care on female family members.

WHAT IS DEMENTIA?

Okay, so now that we know some of the underlying reasons for why dementia is such a huge global problem, perhaps we should take a few moments to fully understand what dementia is.

Although it's frequently used as a term for the disease itself, dementia is actually an umbrella term that covers a wide range of over 200 subtypes of progressive conditions that affect the brain. The 4 most common subtypes are:

- Alzheimer's disease
- Vascular dementia
- Frontotemporal dementia
- Lewy body dementia

We'll explore how the brain works in more depth later, but for now, a straight-forward understanding is that your brain works through a combination of nerve cells (or 'neurons') communicating with each other by sending electrical message signals. Dementia, or rather the conditions that it describes, act by damaging these nerve cells, making it far more difficult for your brain to send the electrical messages that it needs to send, and disrupting proper communication and relaying of information.

This results in symptoms such as:

Memory problems

People whose brains are being impacted by dementia often struggle with memory, finding it difficult to remember places and names. They also frequently find themselves misplacing things or forgetting why they went to a place to begin with.

Cognition difficulty

Those with dementia often struggle to think clearly and concentrate, finding it much harder to solve previously simple life and household problems. Some people also find that their ability to reason, use logic and make decisions is reduced.

Mood and behaviour

The brain issues caused by dementia also means that sufferers may experience changes in mood, behaviour or personality. This is complicated by possible mood changes associated with anxiety and depression over having the disease. These symptoms can also be some of the most damaging to surrounding family members and carers, who now see their loved one acting very unpredictably.

Communication

When your brain doesn’t process information as quickly or accurately as it used to, it can have significant impacts on your ability to communicate. For example, dementia sufferers often find themselves struggling to find the right words or end up repeating themselves a lot. It’s not unusual to see previously outgoing people become much quieter and introverted. Information processing issues also apply to reading, writing and

creative activities, and so those with dementia often struggle with these activities as the illness progresses.

BRAIN SCIENCE - WHEN DOES MENTAL PROCESSING PEAK?

The brain is an incredibly complex part of the body. In order to understand when and how it might start to degenerate, let's look at its normal pattern of functioning. An important part of research in neuroscience has been to determine how, and when, brains reach 'peak' mental performance.

Part of the issue in determining this is that there are so many different factors present that it can be hard to decide upon an objective measure of mental performance. Moreover, many tests of intelligence and mental function can be biased by factors such as language and culture.

Luckily, researchers are finding innovative ways to start answering some of these questions for us. One group of researchers took the approach of looking at chess.[1]

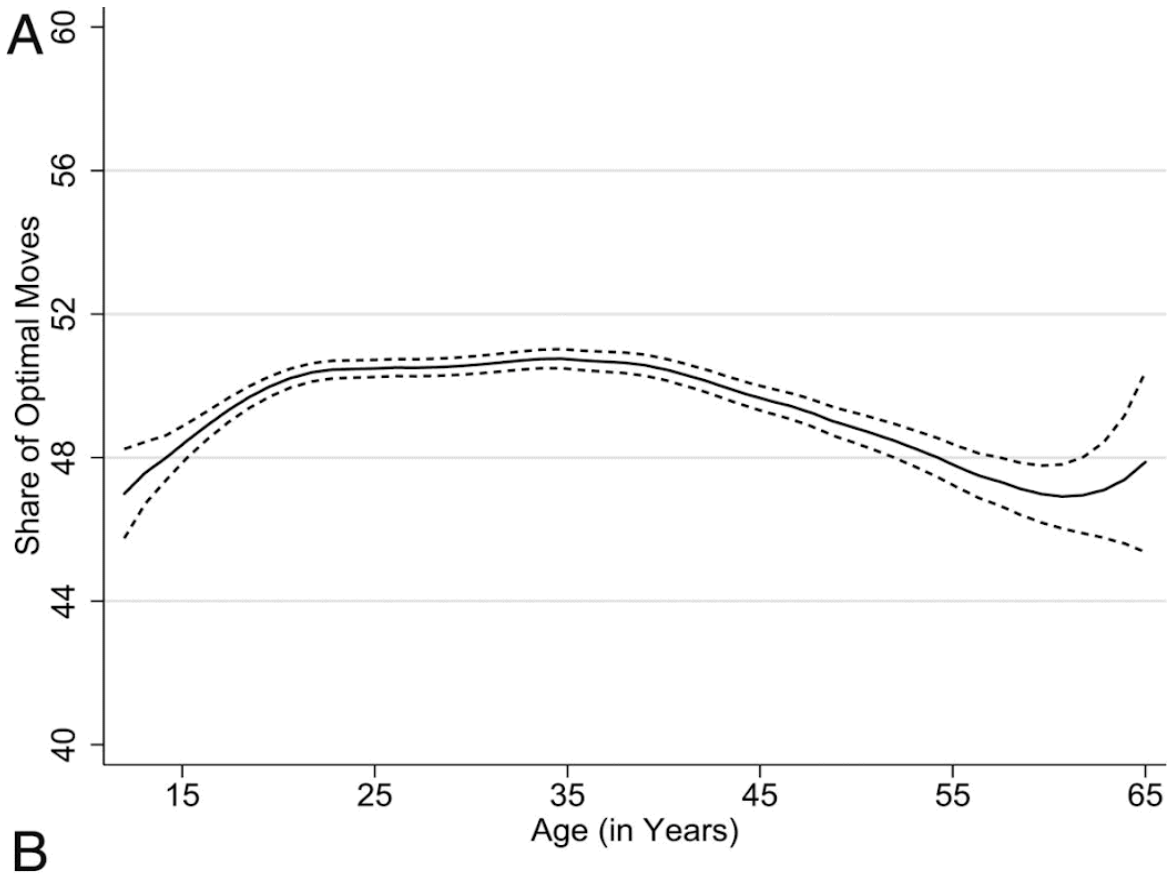
They examined historical files and records of every professional match played by every world chess champion going all the way back to 1890. That's 130 years of chess, or a total of 24,000 matches. They then gathered the data and closely looked at how chess champions moved their pieces, comparing their moves against what current 'Game Theory Optimal' chess computers would do if they were presented with the same position.

It's an amazing idea and really required some lateral thinking to correlate the historical data with brain function. Chess is an objective game. Each specific situation – each layout of the board

– has a list of potential following moves. Each move can be ranked. Some are better and some are worse. Moreover, as there is no language component to chess, it serves as a great way to compare results from people across a wide variety of backgrounds. And there are very few other places where you are going to find over 130 years of well-recorded, ultra-specific data.

What did they find?

The researchers found that there was a clear ‘hump’ shape in their results…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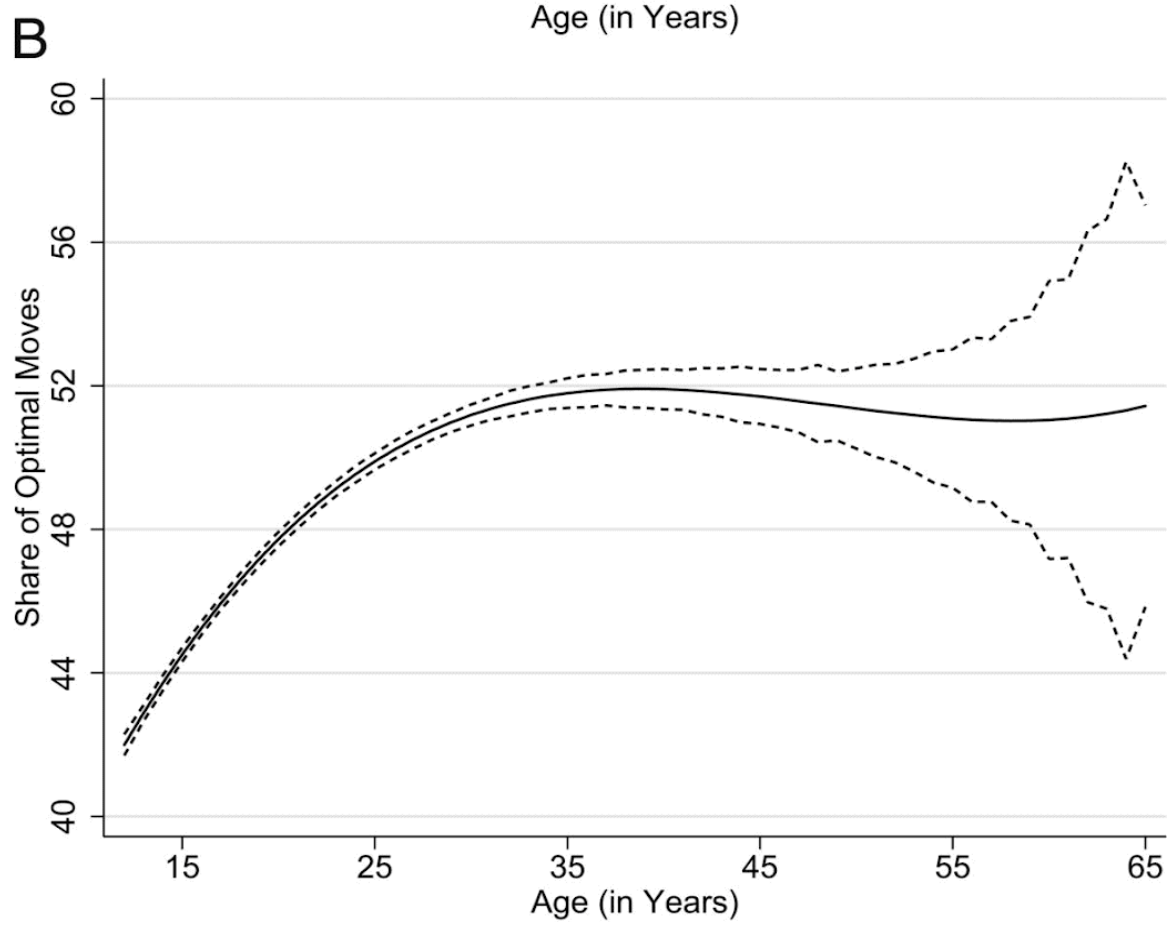
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Age (in Years)

These are two graphs based on the 2 different ways that the huge amounts of data were processed and analysed. We can see similar patterns are evident in both.

Chess skill was found to improve quickly throughout childhood and adolescence, with smaller improvements throughout the 20s and peaking at around age 35. This peak lasts for about 10 years until the age of 45, at which point chess skill starts to decline.

If we agree with the suggestion that chess is a good proxy measure for mental performance, which many neuroscientists do, this means that our brains are at their best between 35 and 45 years old, a result that matches similar suggestions from other researchers.

Fluid versus crystallised intelligence

The study also notes that there is a difference between fluid intelligence and crystallised intelligence, concepts introduced in the 1960s by a psychologist called Raymond Cattell.[2]

Fluid intelligence is the ability to perform tasks related to information processing, speed of processing and visualisation. This tends to be best in children and adolescents, hence the incredible rate of mental development across almost all tasks.

An obvious example of this is the world of competitive video games, where the best players worldwide tend to mostly be under the age of 23. Video games require players to process

large amounts of information incredibly quickly and react accordingly, so it makes sense that younger players have a competitive advantage.

On the other side of the coin we have crystallised intelligence, which is the performance of tasks based on experience and knowledge. This type of intelligence has been shown to increase until at least fifty years of age and goes a long way to offset the reductions in fluid intelligence experienced beyond age 20.

A real-world correlation of this idea can be seen in team sports such as football or basketball. Players in their thirties still provide extensive value to the team, despite being physically outmatched by their younger counterparts. The older players have amassed more experience, and so their positioning, game awareness and strategic play helps them to compensate.

WHAT HAPPENS TO YOUR BRAIN AS YOU AGE?

So, we've touched on the idea of fluid versus crystallised intelligence, which offers a great conceptualisation for the changes in performance we see across numerous activities as people age.

Now I want to explore what's actually happening from a neurological perspective to your brain as you age in a little more depth.

First things first, your brain is amazingly complex!

The average human brain has approximately 100 billion neurons. That's about as many stars that are contained within our galaxy, the Milky Way. It would take thousands of years to count them all.

The neurons are all interwoven. Each one can connect to up to 15,000 others through a specialised junction called a synapse. Most synapses in the brain are chemical synapses which mean they use neurotransmitters to make the connection between the neurons – some of these neurotransmitters are very well known now, like dopamine and serotonin. There are trillions of synapses which means the complexity of all the possible interconnections is currently way beyond our computational power. We cannot yet model and understand it.

If you had a hard time thinking about how large a trillion dollars was, the number of connections in the brain goes way beyond that. The brain has approximately 10^{15} connections – a trillion

connections is equally insignificant to 10^{15} – a thousand times less.

Neurons are excitable cells, which means that when they are stimulated in the right way, they can transmit an electrical signal. Your brain is always buzzing. When you're awake, the brain generates enough electricity to power a dim lightbulb. And it all only weighs around 3lb (1.3kg).

James Watson, who played a crucial role in developing our understanding of DNA called it, "the most complex thing we have yet discovered in our universe."

The amazing thing about the brain is its capabilities: what makes the human brain a truly remarkable evolutionary feat is its ability to adapt and change. In fact, throughout your lifetime your brain will undergo more changes than any other part of your body, almost constantly adapting, altering neural connections, rerouting pathways and patterns of nerve cells.

Research has even shown that during the first few years of your life, your brain forms more than 1 million new neural connections every single second.[3] In the time it's taken you to read this sentence, a baby's brain could have built 5-10 million new neural connections. Your brain tripled in size in the first year of your life, and with the changes is size came exponential changes in complexity.

Further research has shown that our frontal lobes, the part responsible for 'executive functions', like planning, working memory and impulse control, are actually the last to fully mature.[4] It would appear, very much in line with what our chess

researchers found, that these areas might not fully develop until you reach something close to 35 years of age.

It’s important to keep this incredible level of complexity in mind when we talk about the brain, because it helps us to understand why scientists, doctors and researchers don’t have all the answers.

Like all scientific research, they can only come up with hypotheses based on their current understanding which they test to try and further their understanding. Nothing can really be considered set in stone, because new information is always coming to light.

WHAT DOES 'NORMAL' (NON-DEMENTIA) AGING LOOK LIKE?

Humans just aren't built to last forever. As we enter old age, we see a gradual reduction in function across a wide variety of bodily systems, not just the brain. For example, take the circulatory system. Heart muscle cells naturally degenerate as you get older, and the valves, which prevent the blood from flowing back into the chamber it's just been pumped out of, thicken and get stiffer. Blood vessels gradually change and the whole cardiovascular system starts working less well.

Within the brain, these reductions in function are thought to occur because of 4 main changes:[5]

Reduced brain mass: We see the frontal lobe and hippocampus begin to shrink significantly sometime between the ages of 60 and 70. These are areas associated with higher cognitive function and encoding new memories. In general, however, the whole brain starts to shrink when you're in your 30s or 40s – which matches the data about brain function from the chess research.

Reduced cortical density: The cerebral cortex, the outer-ridged surface of your brain becomes thinner due to a declining number of synaptic connections, which may lead to slower cognitive processing. The cerebral cortex is the largest part of the human brain and one of the things that makes it different from the brains of every other animal. It plays an important part

in attention, perception, awareness, thought, memory, language, and consciousness.

Shrinking ‘white matter’: Inside your brain, myelinated nerve fibres are bundled up into tracts, and this is known as ‘white matter.’ The job of this white matter is to assist in carrying nerve signals between brain cells. When we talk about a ‘myelinated’ nerve, a simplified explanation is that it’s a nerve that has been insulated, and thus conducts electrical signals more quickly. Researchers think that as we age, myelin shrinks, reducing this insulation effect and creating slower information transfer.

Reduced neurotransmitter activity: Researchers are beginning to conclude that as we age, our brains also simply start to generate fewer chemical messengers (dopamine, acetylcholine, serotonin, and norepinephrine) and that this reduced neurotransmitter activity may play a role in declining cognition, memory and even an increased likelihood of depression.

So, in short, areas of your brain shrink, send fewer messages, and the messages they do send travel more slowly. The combination of these neurological changes results in changes to memory and mental processing as you age, such as:

Difficulty learning new information or skills: For an obvious example, learning to play the piano at 60 is so much harder than learning to play the piano at 16, or it might be much harder to learn new board games, especially ones that are very conceptual.

Struggling to “multitask”: Having a slower brain function can make multitasking much harder. Although multitasking is often

thought to be the ability to do lots of different things simultaneously, the reality is that it's actually the ability to switch quickly between tasks. Research shows, however, that multitasking is not all it's cracked up to be: errors go up considerably, and it takes much longer to do anything.

Difficulty recalling names and numbers: From age 20 and onwards strategic memory, which helps with remembering names and numbers, begins to slowly decline. So, if you could easily remember a room full of people's names at 20, you will have a much harder time doing the same at 70. Similarly, if you're someone who can hear or read a telephone number once and remember it in your 30s, you might not be able to do the same in your 60s.

Not remembering lesser used information and appointments: With reduced processing power, your brain may start to put certain non-essential information into 'storage.' Think of it like a computer, which starts to crash when it has too many tabs open at once, so it starts to close some of the lesser used tabs. They're still saved to bookmarks, so you can get them later, but this will likely require some form of cue or reminder to jog your memory.

Clever compensation: your brain isn't stupid

It's easy to get carried away by the downside. Your brain deteriorates, you slow down. No one can stop it entirely, so what's the point in trying! But before we get too carried away, we also need to consider that your brain is also incredibly smart.

As we mentioned earlier, crystallised or ‘experiential’ intelligence is one of the ways in which your brain compensates for reduced function. Think about the above four reductions. Experience provides simple solutions.

You might have **difficulty learning new information or skills,** but you’ve already learnt most of the skills that you’ll need – they’ve got you through life so far. You’ve also had 60+ years to develop the patience required to accept learning at a slower rate.

You might struggle to multi-task – or task switch – but in your 60s and 70s you might well have less tasks to switch between. You may no longer be running a business, raising young children, juggling a career or trying to do a million and one other things at the same time. You’ve hopefully learnt the value of focusing on one thing at a time, giving it your care and attention.

You might have difficulty **recalling names and numbers,** but that’s why you have a phone and address book that you’ve learnt to keep up to date (does *anyone* remember phone numbers anymore?). Plus, in your 60s and 70s you don’t need to remember hundreds of names. You tend to have a smaller, but closer circle of family and friends, rather than working in large teams.

And yes, perhaps you **struggle with remembering less-used information and appointments,** but you’ve learned to keep a diary or calendar, and you check it each day, or write out a to-do list as part of your morning routine.

Researchers have also found from brain mapping studies that *“aging brains may find an alternate route to complete the neural computations necessary for functioning”* and that they can *“augment processing in local regions by recruiting distant communities of neurons in response to neural decline.”*[6]

Put simply, your brain isn’t going down without a fight, and will find different ways of doing what it needs to do. It’ll try to keep you operating at your best.

THE BRAIN CRISIS AND THE WESTERN PATTERN DIET

However, it's likely your brain is under attack. Even though it isn't going down without a fight and even though it's able to compensate for the natural weakening effects of aging, it's being bombarded from another quarter.

It's very likely that your brain is under attack and being damaged by the food that you eat.

It's not entirely your fault though. Of course, you make the choices about what you eat, but the choices are limited by what you see to in the shops, by the advertisements you're exposed to, and even the news stories that the media broadcasts to you. The deck is stacked against you.

We haven't always eaten the way we do now.

There have been two major changes to diet in human history. The first occurred more than 10,000 years ago and is sometimes called the Neolithic Revolution or the First Agricultural Revolution. It marked a transition from a lifestyle of hunting and gathering, to one of settlement and agriculture. Cereal crops were farmed, animals domesticated, and the balance of macronutrients in our diet changed significantly. Protein went down and carbohydrates went up.

The second change was much more recent – the Industrial Revolution – and it's still continuing today. The industrialisation

of food production has radically altered modern dietary patterns worldwide. It introduced more processed cereals, refined sugars and refined vegetable oils. It changed animal farming and meat production so much that the products you can buy in the shops no longer resemble the things that your great-grandparents or even grandparents could buy at the turn of the last century. Nowadays the standard American diet is heavy on processed meat, refined carbohydrates and pre-packaged food, and light on vegetables, fish and whole grains.

Even if you live in Southern Italy, South America or, like my family, come from South Asia, you're constantly exposed to the Western pattern diet. You can find fast food restaurants on every high street, Coca-Cola is currently available in every country worldwide (except for Cuba and North Korea), and the convenience of pre-packaged high-calorie and low-nutrient snack food means that you have to lead a very sheltered life to avoid its influence. Lifestyles are constantly projected at you in aspirational terms. You can press a button on your phone and food will appear at your door.

I want to help you understand the relationship between the Western pattern diet and the worsening global brain crisis, and the simplest way to do that is with an analogy.

YOUR BRAIN: THE HIGH-PERFORMANCE RACE CAR

By now, you have a good understanding of just how complex your brain is. It is constantly taking in numerous types of sensory information, visuals, sounds, smells, tastes, analyzing them and processing them into something that you can understand. It is also managing your emotions, your movements, your temperature, your ability to speak and communicate. On top of this it produces your thoughts, regulates your breathing and your heartbeat. It performs at an incredibly high level, but it's also very sensitive to damage.

You could think of it like a high-performance race car, specifically a formula-1 car. F1 cars are the fastest cars on the planet, capable of incredible performance, but they're also the hardest to handle and maintain.

- If you don't get the complicated clutch precisely right, they stall.
- If you drive them too slowly, they don't have enough aerodynamic downforce to drive properly, and the brakes don't heat up enough to be able to slow down when you need to.
- And if you put anything other than the exact right mixture of fuel in, the car's onboard mapped computers fail.

And your brain works in very much the same way. You have to balance a lot of things correctly to ensure optimal function. If you 'fuel' your body with inappropriate food, you can't expect

your brain to perform at anything even close to its maximum potential. Worse still, you set yourself up for future breakdowns, system failures and massive dysfunction. Unfortunately, modern western diets are increasingly full of inappropriate fuels.

Refined sugars and brain issues

One of the major culprits, and a great example, is following a diet that is too high in refined sugars. This will damage your body's regulation of insulin (increasing your likelihood of diabetes) as well as increasing inflammation and oxidative stress across your body. We'll go into what this all means in the next chapter.

Moreover, studies have found a strong correlation between a diet high in refined sugars and impaired brain function, including higher rates of major depression. Sugar is bad for your mental health! In one study, the researchers gathered data from 6 countries, and looked at the total number of major depression cases versus sugar consumption data for the past decade and found a significant strong correlation. [7] Similarly, a 2020 study looked at data from the past 12 years, covering thousands of people, and concluded that diets high in refined carbohydrates increased the risk of dementia.[8]

Food, your gut and mood

This is a whole chapter in itself – Chapter 4 – but for now, just one little fact. Serotonin, a key neurotransmitter in the mediation of your mood, is mainly made in your gastrointestinal tract – up to 95% of it! Which means the foods you eat, and the bacteria in your gut, can have a HUGE impact on your mood.

This is a problem, because western diets are increasingly becoming less healthy for our guts and digestion. The combination of refined carbs, processed foods, and foods with very low fibre content means that your gut no longer creates the conditions for a thriving microbiome and this, as we shall see, affects everything else.

Author's note

Don't be disheartened! It's a lot to take in, and can seem overwhelming, especially if you're beginning to suspect your diet might be filled with less-than-ideal food for your brain. However, a little change goes a long way – as far as your diet is concerned – and I've seen first-hand the positive impact that making these changes can have.

Having spent so long researching nutrition and the brain, I gained a reputation among my friends and family for having (sometimes too vocal!) opinions about their choice of diet. As well as reading the scientific literature, I also tested out what I was reading by adopting and trying out many different diets and strategies myself. Of course, some were definitely fads, but some I've stuck with as the evidence is too strong to ignore. When my family would cook big meat-heavy and butter-filled biryanis, I'd also bring some salads made with wholefoods to the extended family gatherings. When I knew that someone would be bringing a tray of donuts round for a Sunday morning brunch, I'd make sure that we had fresh fruit as an alternative at the table.

It’s difficult when you’re eating habits are very different from the people you spend most time with, and although my choices often generated a fair amount of eye-rolling from those around me – and not just from the older generation – a lot of people would still ask my advice.

We’ll cover the specifics of the kinds of recommendation I’d make throughout the chapters of this book, but what I want you to understand now, is that it doesn’t take a lot to make a big change. The changes I suggested were simple little things to put into action for a couple of weeks. Even after just a short time of trying a new way of eating, the people who’d asked my advice would report back with excitement about how they felt mentally clearer or had more energy. They’d be excited enough to try and share what they found had worked with their friends and family. And that’s an amazing feeling: when you see first-hand the positive power of the ripple effect.

Key takeaways from this chapter

- Dementia is a global crisis and continues to grow at an alarming rate.
- It results in complex memory, cognition, mood and communication problems
- Brain processing peaks at 35-45 years of age.
- Normal aging includes reductions in brain size, neural communication frequency and neural communication speed.
- However, these changes are significantly offset by experiential, ‘crystallized’ intelligence.
- Lastly, the global brain crisis is strongly associated with poor nutrition habits, especially in the typical modern

western diet.

But that’s enough setting the scene.

Now that we understand the problem it’s time to start exploring ways to tackle it head on.

In the next chapter, we’re going to do just that.

HOW AT RISK ARE YOU?

We all know that our genetic make-up determines so much about us – you inherit characteristics from your parents, and if you have them, you can see traces of yourself in your children. However, the effect of genetic expression on us as individuals is determined in large part by our environmental context – where we live, who we spend time with, the stresses that we face, and the food that we eat. Of all these factors, food is the one that can be most easily influenced.

If you want to get straight down to it, to work out right now how at risk your brain may be, here's a quick assessment you can go through. The questions are split into two sections, one which covers more general health factors, and ones which are concerned with your diet.

They are all a simple 'yes' or 'no.'

General health:

Do you have high blood pressure?
Do you have high blood cholesterol?
Do you find it challenging to walk up four flights of stairs?
Do you have diabetes?
Are you overweight?
Do you smoke?
Do you sleep badly at night?
Do you spend almost all your time alone?

Specific eating habits:

Do you regularly eat fast food?
Do you regularly drink soda (diet or regular)?
Do you regularly alcohol?
Do you avoid eating vegetables?
Do you eat a very low-fat diet?
Do you eat white bread, rice or pasta on a regular basis?
Do you eat tuna fish more than once a week?
Do you tend to eat exactly the same thing every day?
Do you avoid eating fish?

Answering “yes” to any one of those questions constitutes a risk factor. The more yeses, the higher the risk. The questions in the first section are much broader. Some will be addressed by changes in your diet, and you should seek advice from your healthcare provider if you have or suspect you might have any of the conditions listed.

The second section is what we’re going to look into in the rest of this book. Don’t panic if you answered yes to any or all of the questions there. Once we delve into the science behind keeping your brain in its best health, you’ll come to understand why the questions are so important, and how to act to change your answers.

CHAPTER 2: YOUR HEART & BRAIN, A LOVE AFFAIR

One day we will learn that the heart can never be totally right if the head is totally wrong. Only through the bringing together of head and heart - intelligence and goodness - shall man rise to a fulfillment of his true nature.

Martin Luther King, Jr.

It seems that the saying, *“go with your head or go with your heart,”* might not be all that accurate - at least not from a health perspective!

Current research is showing stronger and stronger links between heart health and brain health, and we’re seeing that people who eat specifically heart-healthy foods also tend to have some of the healthiest and sharpest minds.

In this section we’re going to discuss the link between your heart and brain, the types of foods that improve heart health, and the broad range of benefits you can see from following heart healthy diets.

WHAT IS THE CONNECTION BETWEEN HEART HEALTH AND BRAIN HEALTH?

It's been well established that a poor diet can lead to cardiovascular disease.[9] Arteries get clogged, your heart has to work harder which puts it under more strain, and your blood pressure increases. All of this increases your risk of heart attacks, angina and strokes, and means that your blood vessels can become blocked or diseased.

But how does this link to brain health?

Your brain needs a lot of oxygen. If the supply isn't constant, if it goes for more than a few minutes without oxygen, brain cells start to die. Every minute, up to a litre of blood flows through your brain, exchanging gases and nutrients in the roughly 400 miles of capillaries.

Blood supply is key. If you have a stroke, blood supply to part of the brain is cut off and the area can become damaged or die, resulting in long-term brain damage. This is the most direct and potentially traumatic link between your cardiovascular system and the health of your brain.

Vascular dementia is sometimes caused by a single stroke, although not always. It can be caused by narrowing of the blood vessels in the brain, or lots of mini-strokes ('transient ischaemic attacks' or TIAs) which temporarily reduce the blood flow to the brain, both of which are linked to cardiovascular health.

Studies of Alzheimer's patients have also found that their brains often have considerably reduced blood flow, as well as significant vascular damage. Specifically, scientists are suggesting that blood flow to the brain is essential for clearing tubular proteins, and that without a good blood flow brains can end up full of 'neurofibrillary tangles.' These are tangled tube-shaped tau proteins that collect inside neurons, which are commonly found in the brains of Alzheimer's patients.

Not only do heart issues and brain issues have the same risk factors, but the presence of these risk factors in younger people cause problems for their brain when they're older.

- **Obesity** – is associated with the brain shrinking at a rate that is faster than normal. We've seen that it starts to reduce in mass from middle age, and this can particularly affect the area associated with memory if you are obese.
- **High blood pressure** – is obviously a risk factor for stroke, especially haemorrhagic stroke, where weakened blood vessels rupture and bleed into the brain, but even without that occurring, hypertension increases the risk of developing dementia in later life.
- **High cholesterol** – isn't a risk factor for vascular dementia, but it is for developing Alzheimer's disease when you're older if your cholesterol is high when you're middle-aged.
- **Diabetes** – both types of diabetes can cause changes in blood vessels which affect blood flow to the brain and can mean that cognitive skills can suffer in middle age, as well as increasing the risk for Alzheimer's and vascular dementia.

It’s easy to think of dementia and cognitive impairment as a problem to think about when you’re older, that it’s something that doesn’t affect you when you’re young. And it may be that you don’t feel the effects of it when you’re 18, but that’s when you start laying the groundwork for the future of your brain. It is when you don’t feel like you could have a problem that you start creating one.

What happens to your future brain has been going on for some time.

A large study published in 2021,[10] examined data from 15,001 people aged 18–95, so it covered a broad range of ages and considering the breadth of the data gathered, was a relatively big cohort. In scientific studies, evidence is always more convincing with larger sample sizes – if the populations are too small, the margin of error can increase so much that the results are no longer statistically useful.

The study looked at cardiovascular health, body mass index, fasting glucose and total cholesterol, as well as testing global cognition and processing speed. They used some comprehensive testing: Modified Mini-Mental State Examination (3MS) which verbally evaluates, attention, memory and language and the Digit Symbol Substitution Test (DSST) which is done with paper-and-pencil and measures motor speed and visuoperceptual functions. The research also adjusted for demographics, education, and cohort.

The findings of the study were serious, *“cardiovascular risk factors across the life course, **especially in early adulthood**, were associated with greater late-life cognitive decline.”* (My emphasis).

This is incredibly important to think about and it affects everyone. During young adulthood, your brain is still developing, and as we've seen from the research based on chess ability, that brain processing power is still increasing until up to about the age of 45 in some people. So, even during the time that you feel your cognitive powers are improving, or even when you feel that your brain is at its best, if your heart is not healthy, your brain won't be either.

The link between the heart and the brain is continuous and all important: not just if you want to avoid debilitating conditions like dementia. Continuously maintaining and improving the health of the cardiovascular system, which mediates the blood supply to the brain, is the recipe for quicker thinking, improved memory and greater cognitive performance.

WHY ‘BLUE ZONES’ MIGHT HOLD THE KEY TO HEART AND BRAIN HEALTH

Our knowledge and understanding of these risk factors are based on the studies of populations that have them and then start developing brain problems as they age. We can also do the opposite: look at those who have the least problems as they age. Think of it a bit like reverse engineering. If you want to pursue any goal, look to the people that have already successfully achieved it.

- If you want to be a great painter, you should try to understand how great painters see the world and interpret it through their painting techniques.
- If you want to be a great sprinter, then you should look at how great sprinters train, eat and recover.
- And if you want to live a long, healthy life, then you should look at how the people living the healthiest, longest lives are living.

That’s where ‘Blue Zones’ come in.

‘Blue zones’ is a non-scientific term that has been given to the areas of the world where inhabitants have the lowest rate of health issues, and the longest lives. The term itself comes from Dan Buettner, who wrote a book about some of these areas.[11] In his work, he focuses on several zones:

- Icaria, a Greek island in the Aegean Sea
- Ogliastra, a province in eastern Sardinia, Italy

- Okinawa, the fifth largest island of Japan
- The Nicoya Peninsula on Costa Rica's Pacific coast
- The Seventh-day Adventists in Loma Linda, California (USA). This isn't so much a place, but a group of people located in the same geographical area. It's difficult to find 'blue zones' as distinct areas in the USA.

The findings in Buettner's book, that people in these areas live longer with improved health and quality of life, has been strongly backed up by independent studies of each area.[12] The inhabitants really do enjoy more years of good health than the rest of the world[13] – there are unusually high rates of nonagenarians and centenarians (90 and 100-year-olds) in the blue zones.[14]

What do these 'Blue Zones' have in common?

What's interesting is that although these blue zones are all in different locations around the world, populated by people from different cultures, there are 5 key similarities that they share:

1. Majority Plant-Based diet
2. Calorie restriction and the 80% Rule
3. Exercise and movement are part of daily life
4. Good quality sleep
5. Sense of community

We're going to talk about points 3, 4 and 5 in more detail in chapter 10, where we'll look at diet within the broader perspective of healthy living. The points I want to focus on now are the first two, which are most relevant to the food you eat, and its impact on your brain:

1. Plant-based diet

In Icaria, Greece, people eat a Mediterranean diet rich in vegetables and olive oil. In Okinawa, Japan, people eat a lot of vegetables, fish and soy-based foods. In the Nicoya Peninsula, Costa Rica, people eat a lot of vegetables and beans.

Research is increasingly clear that diets which are composed mainly of vegetables are strongly associated with improved health outcomes and reduced likelihood of all-cause mortality.[15] In other words, having more of your diet come from vegetables makes you less likely to die of almost every natural cause imaginable.

Moreover, in studies comparing hundreds of thousands of individuals, people who eat mainly plant-based protein sources tend to have better health outcomes than people who eat mainly meat-based protein sources.[16] A study examining data from over half a million people found that, "*red and processed meat intakes were associated with modest increases in total mortality, cancer mortality, and cardiovascular disease mortality.*"[17]

Alongside a high intake of vegetables and low intake of meat, inhabitants of each of these 'blue zone' areas also tend to have a higher intake of nuts and seeds,[18] legumes (lentils, beans)[19] and whole grain carbohydrates,[20] all of which have been shown to be strongly associated with a broad range of improved health outcomes.

So, in the simplest terms, eating plants is good for you. No surprises there! This doesn't necessarily mean that a fully

vegetarian or vegan diet is always the healthiest option.

2. Calorie restriction and the 80% rule

In Okinawa, one of our blue zones, they have a rule called *hara hachi bu* which roughly translated to English means, “eat until you are eight parts (out of ten) full” or “belly 80-percent full.”

The idea that you shouldn’t eat too quickly or overfill yourself is now backed up by research. The hormones responsible for letting us know we’re full don’t kick in until 20 minutes after you start eating,[21] so by slowing down and not eating to complete fullness, Okinawans found a way to eat appropriate amounts of calories.

This lines up with research of generations of Okinawans, which found that long term calorie restriction (fewer daily calories), may have been a contributing factor to their longevity.[22]

It’s also worth noting that plant-based diets full of whole grains and vegetables are very filling, but often contain far fewer total calories than the equivalent sized portion of meat and animal products.

The biggest impact in keeping calorie consumption down, is that it reduces the likelihood of obesity, diabetes and cardiovascular issues in these populations. We’ve seen that these are all high-risk factors for brain problems, especially when you have them earlier in life.

Calorie restriction also has other unexpected benefits for your brain, which we’ll look into in Chapter 9.

PUTTING IT INTO ACTION: THE MIND DIET

Broad suggestions about how to live and stay healthy longer are all very well, but it doesn't give you much to go on. This is where the MIND diet comes in. It was developed by a nutritional epidemiologist called Martha Clare Morris in a way to make it easy for most people to actually follow. An epidemiologist is someone who works in public health and looks at the causes of diseases and how to stop them spreading through populations. In this case the diseases the diet addresses are those of neurodegeneration.

Although it's a great idea, the name is catchy, and the advice is straightforward enough for almost anyone to follow, the name is a bit of an awkward acronym! MIND stands for:

Mediterranean-DASH
Intervention for
Neurodegenerative
Delay

As you can see from the name, the MIND diet is the combination of parts of the Mediterranean diet[23] and the DASH Diet[24] (Dietary Approaches to Stop Hypertension – another mouthful!) both of which have been proven to be effective in improving cognition.

However, neither diet on their own were developed to slow down neurodegeneration, which is why researchers combined them to make the MIND diet. The MIND diet therefore builds on 5 of the major principles of those diet types.

1. Lots of vegetables and fruits
2. Plenty of whole grains
3. Some nuts, seeds and healthy fat sources
4. Some lean protein
5. Limited sugar and sodium (salt)

However, what the MIND diet does differently is to draw on brain specific research to come up with its lists of 10 foods to eat and 5 foods to avoid, along with recommendations for how often you should eat them. Research has shown that adherence to these lists reduces the risk of Alzheimer's disease[25] and slows cognitive decline.[26]

Being clear with the lists of foods takes all of the guesswork out of what to eat, so that you immediately know precisely whether your diet is having the optimum benefit for your brain. The diet is not overly restrictive, which means it doesn't entirely prevent you from eating the things that you enjoy, and it prioritises certain foods for their neurological benefits.

THE MIND DIET RECOMMENDATIONS

What to eat:

Green, leafy vegetables: such as spinach, kale, cooked greens and salads. The MIND diet recommends 6+ servings per week.

All other vegetables: Aim to another, different vegetable in addition to the green leafy vegetables at least once a day.

Berries: Strawberries, raspberries or blueberries are to be eaten 2+ times per week.

Nuts: Any nuts, ideally a mixture, walnuts, almonds, peanuts are all good examples, 5+ servings per week.

Olive oil: To be used as your main cooking oil.

Whole grains: Such as oatmeal, quinoa, brown rice, whole wheat pasta, whole wheat bread. 3+ servings per day.

Fish: Fatty fish such as salmon, sardines, trout, tuna and mackerel are high in omega-3 fatty acids, which are great for brain health. Aim to eat at least once per week.

Beans: Black beans, kidney beans, pinto beans, lentils and soybeans are all good examples. Aim to eat them as part of 4 meals each week.

Poultry: Lean cuts of chicken or turkey can be eaten 2+ times per week. Avoid fatty cuts, and fried chicken.

Wine: Either red or white wine may benefit the brain, with much of the research looking at the red wine compound resveratrol, which may help protect against Alzheimer's disease. Aim for no more than one glass daily.

What to avoid or minimise:

Butter and margarine: Aim to reduce consumption to a maximum of 14g (1 tablespoon) per day. Olive oil is recommended instead.

Cheese: For many people, this is the hardest part of the diet. Whilst cheese might be tasty, try to limit consumption to less than once per week. Once per fortnight would be a good example. Make it a really special treat.

Red meat: Such as beef, pork, lamb and products made from these. Limit consumption to three servings per week.

Fried food: The MIND diet really emphasises avoiding fried food, especially the kind from fast-food restaurants which may be full of trans fats. Aim to completely remove from your diet or eat less than once per week.

Pastries and sweets: Such as cookies, brownies, snack cakes, ice cream, donuts and candy. Basically, if it's super sweet and processed, try to limit consumption to less than four times per week.

SOME SIMPLIFIED SCIENCE (THAT YOU'VE PROBABLY HEARD ABOUT)

Everything that you read in the popular press about nutrition will tell you that you need more antioxidants in your life. It's a buzzword that's used to sell everything from green tea to diet plans to supplements.

They're also a very important part of your biology that, for all your familiarity with the term, you might not fully understand. Here's a quick explanation. Free radicals are being produced in your body on a constant basis. They are chemicals which can damage cells and the genetic material contained within them. They are formed from exposure to harmful things like cigarette smoke, pollution or industrial chemicals – which in principle could be avoided. But they're also formed from essential metabolic processes, like turning food and oxygen into energy – which can't.

Free radicals are a normal part of your biochemistry, but high levels in the body can cause oxidative stress and inflammation. In the long term, this has been linked to chronic diseases such as cardiovascular disease, diabetes and cancer. Research strongly backs this up – one large study with a population of almost 70,000 participants points towards the potential for anti-inflammatory diets to reduce all-cause mortality from cardiovascular disease and cancer.[27]

The body's best defence against free radicals is antioxidants. Although we produce some in our bodies ourselves, we also get

them from the plants and animals that produce them too, when we eat them. You'll be familiar with vitamins C and E, but there are hundreds of different substances which work as antioxidants, each with a specific function in a complicated network of chemical processes.

Free radicals aren't all bad though – there's some evidence that they are important for the brain's ability to adapt, and they're used in the immune system to fight infection – so it's critically the balance of free radicals to antioxidants which is important for long-term health. However, due to the Western pattern diet, high alcohol intake, increasing levels of air pollution and exposure to toxins, many people have lower than necessary levels of antioxidants in their body for optimal health.

The MIND diet is high in foods containing good sources of antioxidants, like vegetables, and tries to limit foods which might cause an increase in the production for free radicals, like refined sugars and processed meats.

THE BENEFITS OF THE MIND DIET

The MIND Diet has numerous benefits:

First and foremost, as you would have guessed, the major benefit is that the diet is neuroprotective, helping to keep your brain healthy and sharp for longer.

It also reduces all-cause mortality. Studies of 800+ people have shown that closer adherence to the MIND diet reduces your risk of dying from almost all natural causes by around 37% when compared to traditional western diets.[28]

Improved weight management. Following a diet that places a large emphasis on vegetables, fruit, lean protein and whole grains should make weight management easier, as these food types increase satiety (fullness) whilst containing fewer calories. It also limits sugar intake which has a huge impact on weight gain.

The MIND diet very likely helps to reduce oxidative stress and inflammation,[29] given that the diet is so high in antioxidant-rich foods. This also reduces the risk of cardiovascular disease, and other chronic diseases linked to inflammatory states in the body as we've seen above.

There's also a strong likelihood that the MIND diet helps to prevent and manage type 2 diabetes.[30]

So, by following the MIND diet you'll have better brain health, a healthier body weight, a lower risk of diabetes, lower

inflammation and an overall reduced risk of dying from pretty much every natural cause of death.

TAKE REALISTIC STEPS

It's a pretty convincing list of benefits, and no one could claim that they wouldn't want to receive them. However, as with all lifestyle changes, there's a big gap between the theory and the practice. It can be very hard to cut out foods that you're particularly attached to, or to add foods that you don't particularly like.

In the next couple of chapters, we'll look at whether all the foods to avoid are as bad as the diet suggests, and whether some that are recommended should be so strongly championed. But in the meantime, don't think of trying to make a global change if your current habits are very far away from what the MIND diet recommends. Usually, if the change you make is too big and too quick, you'll soon revert back to your old habits because the new regime is too hard to maintain.

Start by making a list of what you actually eat in a week. Keep a food diary, recording it day by day, so that you don't have to try and remember days later. Work out how far you are from the weekly recommendations of all the different categories and think of one or two changes you can make. For instance, if you have pasta more than once a week, you could try having whole wheat pasta on one occasion and having a leafy green salad with it on another. Or you could add fruit – specifically berries – to your breakfast. Or replace some of the meat with extra beans in a chili. Or find a replacement recipe for fried chicken that you cook in the oven.

There are so many little changes that you can make that over time will add up. The biggest obstacle to change is often the idea that it will be too big to make. You get overwhelmed by the prospect of the effort ahead. So, start small! Break it down into manageable pieces that you can work on immediately.

Author's Note

There's a lot of information in this chapter that I wish my parents, and especially my grandparents had known when they were growing up. My grandfather, who suffered from dementia, was a Muslim. He grew up on a traditional South Asian diet, which he continued to eat when he came to live in the UK. It wasn't much like the Western pattern diet, but it was nothing at all like the MIND diet either. It contained lots of red meat and saturated fat, lots of sugars, and very few whole grains. Although there was a good quantity of vegetables, dal (made from lentils) and some fish, when we were cooking for a special occasion – which seemed to be a lot of the time – we'd cook mutton, buttery rice and deep-fried snacks like samosa and pakora.

What made it worse, was that my grandfather loved, and I mean absolutely LOVED, sweet things from a young age. He had an incredibly sweet tooth, which my grandmother and their children all indulged, especially when his condition deteriorated.

His particular favourites were jalebi and gulab jamun. We'd hear stories of his childhood in India, and the special place they had in his heart. I still remember how my grandmother used to make the jalebi when I was younger, which she would start the night before we were going to eat them, to allow the batter to sit. She

said that's what gave them their special flavour. They were delicious spirals of bright orange deep-fried wheat flour, soaked in sugar syrup. The combination between the crunch and the juiciness made you only want more! We had gulab jamun less often, as an extra special treat when we went shopping with my grandparents: little balls made from semolina and milk, deep fried and also swimming in sugar syrup. It's one of the sweetest things that you can imagine eating!

Key takeaways from this chapter

- Your heart health is linked to your brain health, predominantly because of blood flow.
- Diets that are heart healthy are therefore usually brain healthy.
- This has an effect from a young age: if your heart is unhealthy when you're younger, you'll have a higher risk for problems with your brain when you're older.
- We can examine 'blue zones' (very healthy areas of the world) to look for key health indicators, which include plant-based diets and calorie restriction.
- The MIND diet combines this information into a list of weekly food recommendations and is backed up by a good amount of research.
- The MIND diet has numerous benefits, including brain health, lower all-cause mortality, improved weight control, reduced risk of diabetes and lowered oxidative stress and inflammation.

We've covered a lot of ground in this chapter, and you might think that we've covered it all. If you were to stop here and start to put even a little of what you've read into practice, you'd be

giving yourself an incredible boost to the long-term health of your brain.

But this is not the end of the story! Because although the MIND diet is excellent, it isn't perfect, and when you look more closely at some of the research, there's really so much more that we also need to consider.

Which is exactly what we'll be doing in the next two chapters, where we'll look at the role of two controversial food groups in the body: fats and grains.

CHAPTER 3: IS BUTTER ALL BAD?

The reason fat people are happy is that their nerves are well protected.

Luciano Pavarotti

It turns out that Pavarotti, the famous and quite large opera singer, was entirely wrong about this. Being fat does not necessarily make you happy – in fact some research has shown the opposite: increased weight can increase your sensitivity to some kinds of pain,[31] which will probably make you unhappy. However, he might have – possibly inadvertently – hit on the connection between fat, nerve cells and the brain.

HOW MUCH FAT IS TOO MUCH?

Fat has had a bad rap for decades. Even now it is often the portrayed as an agent of ill health – too much is bad for your heart, too much will make you fat. The latter is definitely true from one perspective: fat is high in calories, per gram more than double that of carbohydrates or protein. If you persistently eat more calories than you burn it results in a calorie surplus. If that continues for too long, the extra energy gets stored in the body, either as fat or muscle, depending on what you're doing with your time. If you're sitting on the couch or at a desk all day, you know it's unlikely to turn into muscle! This is a bit of an oversimplification of course – eating too much sugar will likely be an even faster way to storing excess energy in the body as fat, but fat gets in calories quickly.

So, fat might make you fat, and obesity in middle age is a risk factor for neurodegeneration in later life, as well as a risk factor for type 2 diabetes and the cognitive impairments that the condition can cause. It's definitely a problem if the consumption of too much fat leads to obesity.

Cholesterol can also be a problem. Atherosclerosis, a chronic inflammatory condition, starts when cholesterol begins to be deposited in the artery walls and form plaques which can eventually cause their narrowing or even a blocking of the blood supply.

But is fat itself specifically bad for your cardiovascular system, and by extension, bad for your brain?

In other words, if you made sure that your calorie intake didn't exceed your daily energy expenditure, but you filled your calories with more fat – even saturated fat – than the guidelines suggest, would this harm your heart and cause the kind of vascular damage that we've seen eating a heart-healthy diet prevents?

That question is more complicated.

In this chapter we're going to try and unpack that question, exploring the different types of fats, the pros and cons of fats in our diet, and how to strike the right balance for brain health.

WHAT ARE THE GUIDELINES?

How much you should eat in a day depends a lot on what you do during that day, or the days around it. Your energy intake should not exceed your energy expenditure if you want to maintain your current weight. The general guide is 2,000 calories a day for a woman, and 2,500 for a man – although this would need to be adjusted higher or lower, depending on activity levels, age and whether your aim is to lose weight, gain it, or stay the same.

To understand people's attitude to fat, you need to look at the past. Early research into eating habits by Ancel Keys in the 1950s and '60s, uncovered a link between saturated fat, cholesterol and cardiovascular disease in his famous Seven Countries Study.[32] Much of the findings and the methodology are still contentious, but the link was made and dietary advice in the US was established, setting the trend worldwide.

In the 1980s, the power of the popular health media continued to promote the benefits of a low-fat diet.[33] The food industry complied by producing vast quantities of low-fat and non-fat products, which coincided with the boom in convenience food.

This meant that for decades, the US governments recommendations restricted fat intake. It allowed no more than 35% of daily calories to come from fats, with saturated fat further limited – only 10% of daily calories. For the average 2,000-calories-a-day diet, that's a maximum of about 77g of fat. If you wanted to eat it all at once, that's roughly 7 eggs, 5 avocados or 10 tablespoons of peanut butter. Although if you ate

seven eggs, you'd be over your limit for saturated fat, whereas you'd be just under with avocados or peanut butter.

Maybe it's unlikely that you'll eat five avocados in one go, unless you really like guacamole, but it gives you a sense of the quantities. If you ate only carrots, you could eat 38½ kilos before you'd reach the limit for daily fat intake, which is about five and half thousand carrots.

It's not a lot of fat (although it is a lot of carrots!), and guidelines in the US have since changed slightly. Saturated fat is still limited to 10%, but the focus now is on healthy eating patterns, rather than macronutrient percentages. However, fat still has a bad reputation: the legacy of research in the mid-twentieth century into the role that some kinds of fat plays in cardiovascular disease, meant that to many it is considered the driving force behind it's increase. The dietary guidelines from the World Health Organisation haven't changed in 2021 – they're still at 30% for all fats.

Nowdays, in many people's minds, cutting down on fat containing food is still considered healthy.

IF YOU DON'T EAT FATS, WHAT ELSE WILL YOU EAT?

Fat is one of the three macronutrients:

- Fats
- Carbohydrates
- Proteins

These three macronutrients make up all food sources. For example, lean cuts of chicken are basically all protein, with maybe a gram or two of fat, whilst bread is pretty much all carbs, with a couple of grams of protein and fat.

So, this means that unless you want to be quite hungry most of the time, if you drastically reduce the amount of one macronutrient group, you have to make up for it with another.

What would that mean if you started following a low-fat diet like so many did during the 1980s?

People following those diets cut right back on fats, with some foods going as close to zero grams as possible. The problem is, fats make food taste good, so the manufacturers needed to put something in to replace the fats. What did they use? Sugars! That means that all these supposedly 'healthy' low-fat foods might be packed to the brim with sugars. The number of calories might have been slightly reduced – remember fat is twice as calorific per gram as carbohydrates – but eating too much sugar contributes to issues like insulin resistance and diabetes.

This didn’t just happen on extreme low-fat diets though, it was everywhere. For instance, in the past, because of the restriction on fats in the US government’s dietary guidelines, meals in American schools banned whole milk, but allowed no-fat milk that had been sweetened with sugar.[34]

Food manufacturers have perfected hitting the “bliss point” – getting the exact proportions of fat, sugar and salt to make their products appeal most to consumers. For something to go down well with mass market taste buds, you need either fat or sugar. So, if you take out the fat and you still want to sell it, you’ve got to add sugar.

FATS AND YOUR BRAIN

Fats play a variety of roles in your body, including energy storage, insulation and protection for our vital organs. They also act as messengers, helping proteins do their jobs, as well as playing a role in chemical reactions that help control growth, immune function, reproduction and various aspects of your metabolism. They are vitally important for your health.

For your brain, metabolic issues are bad news (we'll talk more about this in chapter 4) so we can say right from the start that fats are essential for brain function in at least one very important way.

But even before taking that into account, your brain is made up of around 70% fats, and omega-3 fatty acids form essential building blocks.

Fats also play *"structural and functional roles in neurons"* and have a *"neuroprotective effect."* They have *"significant impacts on both cognition and mood"*[35] – this probably isn't what Pavarotti was thinking of when he said that nerves are well protected if you're fat, but on a physiological level, this is the connection. In the first chapter, we talked about how "white matter" in the brain naturally shrinks as you age. It's called white matter because it consists of nerves wrapped in myelin, which acts as an insulator and helps electrical transmission. Myelin is composed largely of fats.

So, we can say with certainty that a very low-fat diet is not optimal for brain health.

THE DIFFERENT TYPES OF FATS

However, not all fats are the same, and there is of course a big difference between the fats that you consume and the ones that are required in your body. Fats can be subdivided into three distinct types based on their chemical structure, specifically how many carbon to hydrogen bonds they have.

Saturated Fats: These fats have lots of hydrogen bonds, which makes them last longer, and makes them solid at room temperature. Foods which are high in saturated fats include things like milk, cheese, coconut oil, palm oil, cacao butter, as well as baked goods made with butter, and butter itself.

Mono-unsaturated Fats: These are sort of an in-between fat, they have a good number of hydrogen bonds, just not as many as saturated fats. Food examples include olive oil, canola oil, various nuts and nut oils.

Polyunsaturated fats: These are fats with far fewer hydrogen bonds, making them liquid at room temperature. Foods full of polyunsaturated fats include vegetable oils, sunflower oil, soybean oil, sesame oil, and fish.

ARE SATURATED FATS BAD FOR YOU?

Saturated fats have typically been portrayed as the villain in the media, but some research, specifically meta-analyses that review dozens of other studies, shows that there is no direct association between saturated fats and cardiovascular disease[36] or between saturated fats and all-cause mortality.[37] And if they don't have a negative impact on our heart health, then it's hard to find the link with a negative impact on our brain.

Anecdotally, this is also evidenced by the fact societies like the Inuits derive more than 50% of their total calories from fats, with higher levels of saturated fat than current recommendations, and yet have good overall health. However, there is also some evidence that these populations have specifically adapted to this diet over generations, they have a way higher than average intake of polyunsaturated fats and as a population, and they're also not entirely free of cardiovascular disease.

Likewise, our ancestral diets would likely have contained animal fats, which are mainly saturated, and not a lot of mono-unsaturated. There would only have been polyunsaturated fats available if you lived near water. Before the industrialisation of food processing, getting oils out of nuts or seeds would have been much harder than getting lard or butter out of an animal. Again, you could also argue that life expectancy was too low to register the ill effects of higher levels of saturated fats in the diet, or that most people wouldn't have had much fat overall in their diet. But all of this is theoretical, because we don't have any data.

People in the paleo and keto communities have used the argument of ancestral diet to justify their extreme food choices, as we'll see in the next chapter. All in all, opinion is heated on all sides.

The reality is that it's complicated.

Perhaps one of the most significant issues isn't necessarily with saturated fats, but more with their common usage in various junk foods, processed foods and highly refined foods that have all been strongly linked to health issues, including neurodegeneration (we'll talk more about this in our 'bad guys' chapter). So saturated fats might be a bit of a victim by association.

Similarly, a key term to look out for in this regard is 'trans fats,' which are fats that have been artificially saturated or 'hydrogenated' to make them last longer. These have been shown to be incredibly bad for you. These are typically used in lots of junk foods and processed foods.

With all that said, there is some evidence that saturated fats *might* raise cholesterol levels in the blood, and potentially negatively impact cognitive flexibility in children.[38] And although there seems to be no benefit to preventing cardiovascular disease from the reduction of dietary saturated fat,[39] there is some evidence that replacing saturated fats with polyunsaturated fats reduces coronary heart disease during clinical trials.[40] The research results are inconsistent, which suggests more needs to be done.

Like I said, it’s complicated! So perhaps it’s easiest to stick with the guidelines which currently suggest that saturated fats are fine to consume, just in limited quantities.

NOT ALL SATURATED FATS ARE CREATED EQUAL

Saturated fats can come from different sources. While the most common are from animals – dairy products or animal fat – coconut oil, an increasingly popular cooking oil, contains 80-90% saturated fat. Likewise cocoa butter, the edible fat that is extracted from the cocoa bean and used to make chocolate contains 60% saturated fat.

For instance, with chocolate, the saturated fats are in the form of stearic and palmitic acids. Whilst palmitic acid is the most common fatty acid found in animals – excess carbohydrates in the body are converted into palmitic acid, so your body itself contains a fair amount of palmitic acid – stearic acid doesn't raise cholesterol levels.[41] So, some of the saturated fats in chocolate act like other saturated animal fats, and some don't.

Coconut oil, on the other hand, has become big business and many of its touted health benefits don't necessarily stand up to the eye of scientific research. As usual, it's difficult to filter out the hype of industry marketing from the science.

One thing is clear though, the composition of fatty acids in coconut oil is slightly different from other dietary fats. Olive oil, fish, nuts, avocados and many other foods contain long-chain triglycerides (LCTs) – these are fatty acids with 14 or more carbon atoms. Coconut oil contains some too, but it also contains medium-chain triglycerides (MCTs) which have a positive effect on the cholesterol in your blood stream. However, the effect is probably not large enough to counteract the massive amount of LCTs that coconut oil also contains.

The case gets even more confusing when you look at populations of Pacific islanders whose diets contain a lot of coconut – more than 60% of dietary calories – who have low rates of heart disease.

And that's really the takeaway from this: it gets confusing and contradictory quickly, and any attempt to make a hard and fast rule about a food group, or even part of a food group, quickly finds itself on shaky ground.

Just look at cholesterol…

DOES EATING CHOLESTEROL RAISE YOUR CHOLESTEROL?

The short answer is no. But also yes, and that if it does, maybe it's not too important.

Nowhere does the possibility for confusion reign more supreme than with cholesterol. Cholesterol, like fat, is an important substance in your body, vital for cell health, hormone production and essential for many metabolic processes. Your liver also produces as much of it as you need, so you don't need to get it from your diet.

Too much in the blood stream is a problem. We've known since the 1960s that atherosclerosis, which is a chronic inflammatory condition that starts with cholesterol being deposited in the walls of arteries, is unsurprisingly connected to the levels of cholesterol in the blood. Since then, we've determined it's actually higher levels of small low-density lipoprotein (LDL) particles, a structure that carries cholesterol in the blood, that are associated with an increased risk of heart disease.[42] These cholesterol carrying lipoproteins come in two varieties, and high-density lipoprotein (HDL) has a positive effect on cardiovascular health.

Although the general assumption has always been that eating cholesterol-rich foods will increase cholesterol levels in the body and therefore cause heart disease, research has made it clear that this is really not what happens.[43] Some people's cholesterol levels do go up, they're often called "hyperresponders," but

confusingly it doesn't seem to increase the risk of heart disease in these individuals.[44]

A lot of research has been done with eggs – a food high in dietary cholesterol – the consumption of which have been repeatedly shown not to be associated with an increased risk of heart disease. Eggs, as we shall see, are a superfood for your brain.

In fact, a lot of high-cholesterol foods are incredibly nutritious, like grass-fed beef, full-fat dairy and liver. These foods also do contain high levels of saturated fat which, as we have seen may – *or may not* – contribute to an increased risk of heart disease.

Clear so far?

PRACTICAL RECOMMENDATIONS

In the last chapter we talked about the MIND diet and looked at the specific recommendations it gives for a healthy brain.

The diet is quite restrictive in terms of the source of fats. Even though there aren't any limits on how much olive oil you can use for cooking, and you are encouraged to regularly eat nuts, which are high in mono- and polyunsaturated fats, and also to consume some oily fish, there are strict restrictions on saturated fats.

Butter and cheese are basically off the table. This might make the MIND diet hard to follow for some. Then, having read this chapter on fat, you might think, "*It doesn't really matter whether I eat more saturated fat than the MIND diet recommends*." And you may be right – for you.

The best research that we have looks at lots of different clinical trials and evaluates their methodology. It weights their results against how well the trial was carried out and gives us an answer to a question we're asking with a degree of statistical confidence. It doesn't look at individuals. It can't answer the question: "*If I eat a cheeseburger every day, will it affect my cognitive capacity later in life*?"

The best advice comes down to general lifestyle, rather than specific foods. When you look at the diets of the healthy hundred-year-olds in the Blue Zones, it's possible that some of the participants of the study had more butter or more red meat than others, but it's the overall pattern that matters.

That means if your dietary pattern starts to include more cheese and beef, does that mean it will also start to include more cheesecake and ice cream? Will the pattern start to develop into a habit?

Not necessarily. But often, because of the context we live in, the convenience and availability of the food, the expectations of our peer groups, and the media bombardment which normalises the pattern of eating, it will.

It's clear that your eating patterns from a young age have a strong effect on your brain's future capacity. They can also affect its current state, and we'll see in chapter 5 how great that effect can be.

Look at what you eat over a longer period. If you keep a food diary, you can see easily see a month's worth of eating. Look at the general pattern and notice if it's changing. Try to make sure that most of your fats come from healthy sources, ideally mainly unsaturated, with some saturated every now again if they're foods that you really like and avoid highly processed foods that contain artificially hydrogenated trans fats.

And don't be afraid of fat!

A FULL-FAT CHILDHOOD

Growing up, I remember all too clearly the low-fat fad that sprung into full swing when I was a kid in the 1980s.

Although I was born in the United Kingdom, I was bought up on a diet that came from India. While my friends at school would have sugary low-fat yoghurts in their packed lunch, my mother would give me leftover homemade rice pudding, made with the creamiest milk. They'd get processed cheese sandwiches, while I'd get chapati and channa – homemade flat bread and chickpeas.

I remember going round to one friend's house and being amazed that they had the microwavable healthy meals in their fridge that I'd seen advertised on television with the catchy jingle. We never had any of that – we had homemade food, mostly curries and dals, with mutton, beef and fish, cooked in vegetable oil, but also sometimes with butter or ghee. Sometimes we managed to convince my mum to cook an English roast as a special treat!

When we had mutton or beef in our curries, it was always a treat to get a fatty bit, or a bit that was still on the bone that contained some marrow. We didn't have lots of meat with our meals, but they would definitely leave us feeling full and satisfied. It meant we had fewer snacks in between meals, and I didn't crave the sugary treats that I know my friends pestered their parents for. We had a cupboard full of biscuits and chocolate bars, but my siblings and I weren't obsessed with it.

When you look at the effect of eating a macronutrient like fat, you've got to think of the whole effect. How will it affect the rest of your diet? Too much saturated fat is clearly a problem – too much of anything is a problem. In the right context a little bit can be beneficial.

Key takeaways from the chapter

- Fats are one of three macronutrients, and when you choose to eat less fat, you often compensate by eating more of the other macronutrient sources.
- There are 3 different types of fats, saturated, mono-unsaturated and polyunsaturated.
- Fats are essential for optimal brain function.
- Studies show that saturated fats might very well not be that bad for your heart and brain health, and it might be that they have been given a bad reputation through unfair association with junk food, processed food and trans fats.
- Studies are also often conflicting and don't always have the answers.
- Practical recommendations include following the MIND diet, but allowing more personal flexibility towards fat intake, especially if you tend to eat fewer carbs, and aiming to create a healthy overall pattern of eating.

This chapter has included a lot of information, and although it might not seem it, it hasn't been intended to be deliberately confusing!

Part of the problem is that scientific understanding changes over time, so what might have been relevant in one era, no longer makes sense in the present. How research is used and

interpreted is all important, and as we shall see in the next chapter, misinformation can play a big part in moulding our ideas about what is and isn’t healthy.

CHAPTER 4: GRAINS ON THE BRAIN

There is something massively wrong with your diet. Remove [insert food here] *and all your problems will be solved.*

Every Clueless Online Diet 'Expert'

I wanted to write this book so that I could provide the best possible diet and nutrition advice for brain health, which involves breaking down scientific research to create concise, actionable points, so that you can understand the effects of the food that you're eating.

However, as we've seen with the case of fat, it's very easy for ideas to spread and become part of collective understanding, when there isn't necessarily very strong evidence to back the ideas up.

The same thing has been happening with grains – a topic of hot debate.

They're a food type that is included as part of both the Mediterranean diet and the MIND diet – 3 times a day for the MIND diet – and yet some people claim they could have very negative consequences for your brain. In fact, the claims have become so widespread, that some people will associate the label "gluten-free" with greater general health benefits, just like others have with "fat-free" in the past.

What's the reason? How can two diets, which have been strongly shown to have brain health benefits, also include a food that potentially goes against this goal?

In this chapter we're going to find an answer to exactly this question, looking at the science of grains in relation to brain health, the role of gluten, the links between glucose, insulin, diabetes and brain health, and where low-carb and keto approaches might fit into the picture.

WHAT ARE GRAINS?

Okay, let’s start with the absolute basics. Cereal grains are small, hard and edible dry seeds that grow on grass-like plants called cereals. In most countries around the world grains form part of the staple diet and provide more food energy than any other food group. The most widely-eaten grains are corn, wheat and rice – in that order. By far the most corn is produced worldwide at 1.12 billion tons yearly, 45% more than wheat.

Other grains like barley, sorghum, oats, millet and rye are also produced in huge quantities – at the other end of the scale, an enormous crop of 14 million tons of rye is grown a year. Today we also see many staples from the store cupboard made from grains, including foods that we’re all familiar with like pasta, tortillas, bread, breakfast cereals, muesli and oatmeal, and products that we don’t see but might consume, like high fructose corn syrup. A huge amount of the grain we produce goes to feed the animals that we eat.

THE CLAIMS AGAINST GRAINS

Many different groups of people have taken a stand against grains and follow extreme diets which cut them out entirely. This approach has grown in popularity, latching onto the booming growth of keto and paleo diets.

The paleo diet – sometimes called the caveman diet – takes as its premise that humans evolved eating a diet that didn't include the products of modern agriculture. It's based on an idealised version of what might have been eaten more than 10,000 years ago before the first agricultural revolution. The reality of what was actually eaten by cavemen is certainly very far from the steak and steamed spinach that is championed by the paleo diet, but it is a diet that is distinctly anti-grain. Grains were only produced in large quantities once the hunter-gatherer pattern changed to settled agriculture and, the argument goes, human biochemistry hasn't been able to adapt to the change.

The loudest voice in the anti-grain argument claims that eating grains, gluten in particular, contributes to a wide range of serious issues, including:

- Impacted mental health
- Dementia
- Diabetes
- Multiple sclerosis
- ADHD
- Autism
- And of course, since it's the 2020s, coronavirus

As well as the more generalised ancestral argument, “humans didn’t evolve to eat grains,” there are specific reasons why grains are proposed to be detrimental: they supposedly promote inflammation, impair digestion, and contain lectins and phytates. Many, including anti-grain diet promoters, have started labelling lectins and phytates as ‘antinutrients.’

Antinutrients are compounds usually found in plants that interfere with digestion in some way that prevents the absorption of essential nutrients. They aren’t only present in plants, they’re present at some level in all foods – for instance egg whites contain avidin which binds to biotin, an important B vitamin, and prevents its absorption.

In some cases, antinutrients can be very dangerous. As an example, kidney beans, for instance, which you might have in a chilli, contain the lectin phytohaemagglutinin which causes red blood cells to clump together. Even if you ate as few as five raw kidney bean you could experience some severe symptoms like vomiting and diarrhoea. Luckily, cooking destroys the lectin which means kidney beans, if properly cooked, are fine to eat.

WHO IS MAKING THE CLAIMS?

One of the main voices against grains doesn't come from a research institute, team of scientists or nutrition advisory body. Instead, it comes from an award-winning celebrity doctor named David Perlmutter, who published a bestselling book with the title, *Grain Brain: The Surprising Truth About Wheat, Carbs and Sugar - Your Brain's Silent Killers.* He gained widespread popularity through appearing on the US TV show 'Dr Oz,' as well as launching his own website and personal brand.[45]

For me, anytime someone tries to create fear in their audience and then sell them the solution, alarm bells always start ringing. And the solutions that Dr Perlmutter is selling aren't cheap. If you look at his website, you'll find supplement stacks for $90-160, and an $8,500 detoxification retreat.

The alarm bells start ringing more loudly when the claims against grains include more complicated or novel conditions like autism and coronavirus.

Initial concerns

Even with the alarm bells ringing, you always have to ask: are these claims justifiable?

First of all, it's hard to find evidence that grains cause inflammation. Most studies point in the opposite direction. Regular consumption of whole grains appears to be 'anti-inflammatory' as shown by a recent review of 9 major health studies.[46]

Second, whilst lectins and phytates *can* have negative health impacts, studies have shown that this only occurs when specific foods are poorly cooked and prepared, eaten to massive excess, and the person has a poor and imbalanced diet to begin with.[47] So, saying that grains are unhealthy because of lectin and phytates is like saying carrots are unhealthy if all you eat is carrots every single day in the absence of most other foods! The author of the study concludes that: *"Despite numerous speculative assumptions that wheat germ lectins cause intestinal damage and disease, there is at present neither evidence that this is the case nor reason to recommend the healthy population to abstain from whole grain food products."*

Third, and the cause of most concern, is the assertation that grains can somehow cause autism or are linked to coronavirus.

Autism is a complex disorder caused by specific genetic mutations, a topic that has been debated for a long time, without resolution. In fact, it is most well-known for controversy in its causes than anything else. Moreover, there is no direct evidence linking the condition to grains or gluten.

COVID-19 is a complex, mutating virus, a topic being tackled by the world's most competent virologists. Although David Perlmutter is a doctor, the level of specialism required to make these kinds of assertion is way outside his personal field of knowledge. Moreover, there is once again no evidence linked to grains or gluten.

So you have to ask yourself: why are these conditions in particular being linked to grains?

The cynic in me wonders whether it's to increase exposure to his work.

Coronavirus has been at the forefront of the news cycle for many months and any connection you can create between ill health caused by grains and the virus would be newsworthy, regardless of whether it could be substantiated.

Autism is a known hot-button topic for specific groups, specifically those with an affiliation for 'alternative science' and a tendency towards anti-vaccination stances. They're also the type of group who might buy into the ideas he's selling: that the establishment doesn't want you to know that grains are actually silently killing your brain.

This is just speculation, but my concerns are also echoed by the opinions of experts in the field.

Expert opinions on 'Grain Brain'

PhD level researchers at the University of Baylor Medical Centre published a paper in 2014 which concludes, *"according to Grain Brain, much chronic disease originates in the widespread ingestion of carbohydrates, and these foodstuffs, rather than cholesterol or saturated fats, are the premier contributor to an unhealthy individual. Numerous recent studies, however, have provided high-level evidence to the contrary."*[48]

Epidemiologist David Katz, who is the founding director of the Yale-Griffin Prevention Research Center, also said that *"Perlmutter is way ahead of any justifiable conclusion"* – that there

just isn’t the evidence connecting grains to all the conditions that he does.

Microbiome expert Jonathan Eisen also criticized Perlmutter’s work and opinions, saying that *“To think we can magically heal diseases by changing to a gluten-free diet and taking some probiotics is idiotic… It resembles more the presentation of a snake-oil salesman than that of a person interested in actually figuring out how to help people.”*[49]

THE ACTUAL SCIENCE OF GRAINS AND YOUR BRAIN

Okay, I know that might have seemed like a long tangent, but maybe you can tell, I feel pretty strongly about it.

Here's the thing.

Having seen with my own eyes the damage that mental degeneration can do, I believe that people have the right to have access to the best quality information on how to prevent, manage and treat it. And as much as I'm trying to get the right information out there, I'm also trying to make sure that you can spot the wrong information when you see it.

Moving on though, now that we've established that some of the more extreme claims against grains and gluten for your brain are potentially highly unreliable, we need to dial back into what the best, most current research says about grains, and give you some simple, actionable steps to follow.

The best place to start is with the big difference between refined and whole grains.

WHOLE VERSUS REFINED GRAINS, WHAT'S THE DIFFERENCE?

Up until this point, we've talked about grains as one big, unified collection of foods, but that's not the case. Grains can be divided into two types, refined grains and whole grains, and that's a key distinction.

A whole grain consists of three main parts: bran, germ and endosperm.

Bran: Is the hard outer layer of the grain, and contains fibre, minerals and antioxidants.

Germ: Is the core of the grain, and is the most nutrient-rich, containing carbs, fats and proteins as well as antioxidants, vitamins, minerals and numerous phytonutrients.

Endosperm: Is the biggest part of the grain, containing mostly starchy carbs and protein.

A refined grain on the other hand only has one of these parts, the endosperm. The process of refining – of turning whole wheat into white flour for instance – removes the bran and the germ.

The idea behind doing this is that it helps to create a finer texture, as well as to extend shelf life and make the products easier to transport and store.

The obvious drawback of this approach is that it removes a lot of the nutritional value of the grains, making them a far less healthy option.

WHOLE GRAINS - WHAT DOES THE SCIENCE SAY?

Research conclusively shows that eating whole grains offers a wide range of positive health outcomes, including improved cardiovascular health,[50] reduced risk of coronary artery disease,[51] improved brain health,[52] reduced risk of diabetes[53] and obesity[54] and reduced risk of all-cause mortality.[55] Many of the studies which show this are 'meta-analyses' - the best possible type of summary or overview research, that reviews all other research on the topic.

One study, also a meta-analysis, found that the effect of whole grains on cardiovascular health was dose dependent. In other words, the greater the intake of whole grains, the greater the reduction in risk of cardiovascular disease.[56]

Examples of whole grain foods include:

- Whole oats (e.g., steel cut oats)
- Whole wheat pasta
- Whole wheat noodles
- Couscous
- Quinoa
- Brown rice
- Whole grain breads
- Corn (Unprocessed)
- Whole grain and some bran type breakfast cereals
- Popcorn

REFINED GRAINS - WHAT DOES THE SCIENCE SAY?

Having had most of the nutritional value taken out of them, refined grains lose out on all the health benefits offered by whole grains.

The change in their nutritional profile turns them from being less healthy than whole grains, to be being very unhealthy.

They also have a higher Glycaemic Index (GI) which means that they get broken down and digested more quickly, leading to faster rises in blood sugar. Eating too much of these foods over time can be a contributory risk factor for insulin resistance and diabetes[57] – there's more on this below.

Refined grains are also less filling per calorie, meaning you'll be hungrier more often[58] which in combination with blood sugar spikes can lead to overeating, weight gain and an increased risk of obesity.[59]

And since we know that obesity, diabetes and heart health have a complex and linked relationship with brain health, this also means that refined grains are a bad choice for your brain.[60] [61]

Examples of refined grain foods include:

- Processed, sugary breakfast cereals
- White bread and bagels
- Most pasta

- Most noodles
- White rice
- Most cakes and pastries
- Corn chips

THE LINKS BETWEEN GLUCOSE, INSULIN, DIABETES AND BRAIN HEALTH

We've previously discussed how diabetes is associated with negative brain health, that suffering from diabetes can mean that your cognitive skills can be impacted in middle age, and that you increase your later life risk for dementia and Alzheimer's disease. Let's take a quick moment to explore the basics of how glucose, insulin and diabetes have this negative impact.

What are glucose, insulin, insulin resistance and diabetes?

Glucose is a simple sugar which is an important energy source in living organisms and is a component of many carbohydrates.

Insulin is a crucial hormone secreted by your pancreas. Its primary responsibility is to regulate nutrient flow in your bloodstream, specifically controlling blood sugar levels.

In practice, what this means is that when you eat something that contains carbohydrates (of any type) the amount of sugar in your bloodstream increases. Your pancreas then responds by releasing insulin, which travels through your bloodstream and lets cells know that they need to start picking this sugar up, which in turn returns blood sugar back to normal levels. This is a very normal process.

However, your pancreas can only release so much insulin, and insulin can only help to reduce blood sugar at a certain rate. So, when we eat loads of high GI (Glycaemic Index) foods that

rapidly increase blood sugar, this can put a lot of strain on your insulin system and the cells involved. When this strain is repeated over and over again, due to a poor diet, it can sometimes lead to cells not responding to insulin correctly anymore. This is a condition known as insulin resistance.

A good analogy for this is that your body is your house, and your insulin system is the fire department. Every time you eat a lot of high GI carbs, you're lighting a little fire in your house, and then calling the fire station, who rush out and sort the problem. You do this once, it's not a problem. You do it 2 or 3 times a month, not ideal but not the end of the world. You do it every single day and eventually the fire department is just going to stop coming out to your house – they're exhausted and no longer able to deal with fires of any sort, big or small.

Over time, insulin resistance can lead to a rise in blood sugar levels to the point at which you're classed as having type II diabetes, a very serious disease that has grown by more than 400% in the last 40 years.

HOW DOES THIS LINK TO MY BRAIN HEALTH?

Okay, this is the basic background, *but what does glucose, insulin and diabetes have to do with brain health?*

Well, it turns out that insulin resistance and diabetes negatively impact your brain in 3 immediate ways:

1. Your cells don't get the fuel they need, and so your brain can't operate as intended.

2. High blood sugar can create fatty deposits in your blood vessels, which reduces blood flow to the brain, and impacts it in ways very similar to those we discussed in the heart and brain chapter.[62]

3. Excess insulin can mess with the chemical balance in your brain.

And that's just the start. Over time, high blood sugar levels also increase your risk of heart attack and stroke, which as we've discussed, can severely impact blood flow and blood supply to your brain, causing permanent damage to brain function.[63]

Furthermore, high blood sugar increases the clumping of protein pieces called beta amyloid, which essentially get 'stuck' in between your nerve cells in your brain, blocking signals. This blocked nerve communication is a characteristic of Alzheimer's disease. Some people have proposed that Alzheimer's disease should be called type 3 diabetes.

Last but not least, diabetes can lead to structural changes in your brain, such as causing your hippocampus to shrink. The hippocampus is the area responsible for memory.[64]

PREVENTING THE DAMAGE

There are things you can do of course. A big aim of this book is to give you simple, actionable steps you can take to improve your health. With that in mind, here are 5 best practice pieces of advice to prevent insulin resistance and diabetes.

1) Eat fewer high GI fast digesting foods. Focus instead on eating low GI, slow-digesting foods in their place.

In this chapter we're concentrating on grains, and it's worth bearing in mind that grains usually have a high GI. Whole grains generally have a lower GI, and contain more fibre, so are better for your digestion, but sometimes the difference is not as big as you might expect.

For instance, white bread has a GI of 75 (above 70 is considered a high GI), but whole wheat bread doesn't fare much better – it has a GI of 74. White rice has a GI of 73, and brown rice of 68. Cornflakes have a GI of 81 and instant porridge oats of 79.

This might be some of the most important information in this book!

Remember that foods that are often presented as healthy often aren't necessarily that healthy. You don't need to go extreme conclusions and remove grains entirely but remember that they can have a big effect on blood sugar levels, even when they are whole grains.

2) Eat plenty of vegetables and some fruit. This has been associated with reduced risk of diabetes.

3) Reduce your body weight. The nutrition information in this book will go a long way to helping you manage your weight, but weight loss is as much about the way you think and feel as it is about the foods you eat. For help with these aspects, it can be a great idea to talk to your doctor for referral to a specialist dietician, and to look for the support of community weight loss groups.

4) Exercise more often. Exercise uses carbohydrates (glucose/sugars) as fuel, which means that the sugars you do eat are more likely to be used efficiently for their intended purpose.

5) Avoid alcohol and smoking. Both of which are associated with an increased risk of diabetes.

Where low-carb and keto approaches might fit into the picture

We touched on this before with the paleo diet, but if you've not heard about them before, low-carb approaches are just what their name suggests, diets that keep carbohydrate intake deliberately low.

For low-carb approaches, carbs are usually limited to between 50-130g per day.

For keto approaches, carbs are usually limited to 20-50g per day, so it's quite a bit stricter than the average 'low-carb' approach.

Right from the start, this offers two benefits for most people:

Reducing carbs means less refined carbs, so less biscuits, cakes, sweets and snacks that are known to be unhealthy.

Reducing carbs tends to also lead to a reduction in daily calories, which helps with weight loss.

ALTERNATIVE BRAIN FUEL

Your brain runs on glucose. As it lacks its own fuel storage, it needs a continuous supply of glucose. You might be wondering, therefore, how a low-carb approach is even possible.

It's possible because your brain and body are clever, and they adapt the way they work through processes called ketogenesis and gluconeogenesis.

Ketogenesis. Since your brain can no longer rely solely on glucose as an energy source, and cannot use fat like it would in muscles, it starts to use ketones, which are produced by your liver when glucose and insulin levels are low. These ketones can provide your brain with about 75% of its energy needs.[65]

For the other 25% of its required energy, your brain will rely on **Gluconeogenesis,** which is where your liver makes new glucose from amino acids and glycerol and use this to supply your brain with the glucose that it needs.

Your brain is, unsurprisingly, pretty smart – and so is your body.

Brain health benefits of a low carb or keto diet

Part of the allure of the argument in a book like *Grain Brain*, is that drastically reducing the amount of carbohydrates in your diet and switching your body's energy supply from dietary glucose does seem to have some promising benefits for your brain.

1. Managing epilepsy

Although most people don't know it, the ketogenic diet was developed back in the 1920s by Dr Russell Wilder, as a way to treat drug-resistant epilepsy. His research still holds up, and numerous further studies have shown that following a classic ketogenic diet created improvement in over half of study participants.[66]

2. Reducing the likelihood of Alzheimer's disease

Although there is far less research on this, the research that does exist shows an emerging and promising trend for low carb and keto diets as a possible route towards reducing the likelihood of Alzheimer's disease.

This is likely due to low carb and keto diets helping patients to manage glucose levels, which helps prevent insulin sensitivity and diabetes. As we discussed above, both are high risk factors for Alzheimer's and other brain issues.

Moreover, studies have shown that supplements which elevate ketone levels in the brain are positively associated with improved mental cognition in those with Alzheimer's.[67]

It's also interesting to note that research has found that Alzheimer's shares some similarities with epilepsy and since we know the low-carb approaches help with the treatment of epilepsy, it makes logical sense that they would also help in some way with Alzheimer's.[68] Again, here more research is needed.

3. Reduced likelihood of migraine

Studies have also found that low carb and keto type diets help to reduce the likelihood of migraine. Since migraines are believed to be caused by cerebral energy deficiency or oxidative stress levels that exceed antioxidant capacity, the researchers concluded that: *"Ketone bodies are an alternative fuel source for the brain, and are thus likely able to circumvent some of the abnormalities in glucose metabolism and transport found in migraines."* [69]

4. Enhanced memory

Research found that in older adults with a mild level of cognitive impairment, moving to a low carb or keto style diet improved memory and cognition.[70]

Who are low carb and keto diet best suited for?

Low carb and keto diets are well suited for most people, in particular, anyone who suffers from some of the conditions we've discussed:

- Epilepsy
- Alzheimer's
- Migraine
- Diabetes or insulin resistance*

It may also be useful for people looking to lose weight, as reducing carb consumption also limits junk food intake, and tends to limit calorie intake as well.

*For people with diabetes or insulin resistance, it should go without saying that you must discuss any dietary changes with your doctor first, especially if you're already taking certain prescription drugs to help combat your diabetes or insulin resistance. In essence, taking the same dose of insulin or insulin-stimulating medication as you did prior to adopting a low-carb diet might result in low blood sugar, something that can potentially become dangerous.

Who isn't the diet suited for?

Most competitive athletes

Although some die-hard keto diet fans might argue otherwise, it's hard to defend a keto or low carb approach if your goal is to maximise sporting performance. For high level competitive athletes who train hard for multiple hours per day, multiple times per week, carbohydrates are essential for energy, as well as recovery and repair.

Luckily, since these people are exercising so often, their bodies are also FAR more likely to use the glucose from carbohydrates effectively, significantly offsetting any potential health or insulin issues.

People with certain health issues - especially liver related

The ketogenic diet is not a good idea for people with:

- Pancreatitis
- Liver failure
- Disorders of fat metabolism

- Primary carnitine deficiency
- Carnitine palmitoyltransferase deficiency
- Carnitine translocase deficiency
- Porphyrias
- Pyruvate kinase deficiency.

Remember that ketogenesis and gluconeogenesis rely on the liver to produce ketones and glucose by breaking down fatty acids. If you have liver issues, or a problem breaking down fatty acids, your body won't be able to provide the energy you need to survive in the absence of carbohydrates.

Again – this is why all major dietary changes should be discussed with your doctor first.

THE ROLE OF GLUTEN

It's estimated that approximately 3 million Americans have Celiac disease. It is essentially an allergic reaction to gluten that results in your immune system attacking your own tissues after eating gluten, damaging your gut and reducing your ability to take in nutrients. If someone with celiac disease eats gluten, they suffer from significant bloating, cramping, diarrhoea, indigestion, constipation or any combination of the above. Not to mention issues like fatigue and possibly even malnutrition due to their reduced ability to take in nutrients. All in all, a very good reason to avoid gluten.

However, research is increasingly showing that you don't have to have full blown celiac disease to experience negative impacts from gluten. It's estimated that 18 million Americans have Non-Celiac Gluten Sensitivity, or NCGS.[71] That's not an insignificant number – about 5% of the population, or 1 in 20 people. The symptoms are wide-ranging and may include:

- Bloating, gas or abdominal pain
- Diarrhea or constipation
- Nausea
- Headache
- Brain fog
- Joint pain
- Neuropathy
- Fatigue
- Abdominal Pain
- Skin Problems
- Depression & anxiety

- Anemia

Albeit to a less intense and frequent degree than those symptoms experienced by people with celiac disease.

Unfortunately, there's no test for NCGS – it doesn't have any autoimmune markers like you'd see in celiac disease – so it is not easily diagnosed. Furthermore, some doctors aren't completely convinced of its existence and won't suggest it if you go to see them with a list of symptoms.

To make the picture even more confusing, irritable bowel syndrome (IBS) has a lot of the same symptoms of NCGS. It's similarly hard to diagnose and affects about 1 in 10 people. Gluten has shown to be a trigger for symptoms in some people, but not everyone improves when they exclude it from their diet. [72]

But what does this have to do with brain health?

Well, this is where things get interesting, and we're going to talk about this in much more detail in the next chapter, but it appears that NCGS and IBS negatively impact your brain by altering activity along the 'gut–brain axis', which is "*the bidirectional communication system between the enteric nervous system in the gut and the central nervous system in the brain and spinal cord.*" [73]

This gut–brain axis essentially links your gut function to your brain, including the emotional and cognitive centres. What this means is that things that impact your gut health, i.e., the foods you eat, can also impact brain function and mental states. In the case of both celiac disease, non-celiac gluten sensitivity and

irritable bowel syndrome, since your gut is massively disrupted and uncomfortable, there's good reason to believe this will cause additional disruption in your brain.

Relatedly, researchers are increasingly proposing that food intolerances such as gluten intolerance can contribute to long-term negative mental health impacts such as depression, anxiety, bipolar disorder[74] and even neurodegenerative diseases.[75]

All of which raises the question…

SHOULD YOU GO GLUTEN FREE?

The answer predominantly depends on your personal, individual response to gluten.

If you have celiac disease, or if you suspect you have non-celiac gluten sensitivity, then it makes 100% sense to go gluten free. You have very little to lose, and loads to gain in terms of brain health, gut health, and an overall improved quality of life.

If you're not sure whether gluten is affecting your health, you can test it.

This isn't a lab test of any sort, but by following a systematic protocol, you can work out whether gluten is affecting you or not. This science at its best – observation and analysis that you can do yourself. It does require some discipline to stick with the diet, and this is where people often fail in their approach because of the time it takes. These are the basic steps:

1. If you suspect that you are sensitive to gluten, make a list of your symptoms. This can include anything from the list above.
2. Test yourself by eating a diet which includes gluten for 6 weeks. Rate your symptoms on a numerical scale for severity on a regular basis.
3. Follow this by eating a strict gluten free diet for the next 6 weeks. Make sure you check the labels of things you eat, which might contain gluten without you realising it. Rate your symptoms the same way as before.

4. Calculate the average of your symptoms over each of the 6 weeks of both tests.
5. If more than one of your symptoms has reduced by greater than 30% for at least 3 out of the 6 weeks, then you can say you've had a positive response to a gluten-free diet.

A NOTE FROM PERSONAL EXPERIENCE

You might find it ironic that I'm not a big fan of grains in my own diet. After condemning the likes of Dr Perlmutter for spreading questionable information and instilling fear in impressionable minds over the effects of grains, it might seem contradictory to hear that I don't eat them much myself. But it's true! I do eat some, and I think that whole grains have some very important health benefits, but I limit them in my diet.

Rice was always a big part of my life growing up, but we never ate whole grain rice. Even now, I find it very hard to convince my family to cook whole grain rice. When they do, if I'm at a family gathering, they act as if they've made it especially for me, even though I don't really eat that much of it. It's hard to get the message across that I want them to cook it for their own benefit, and to keep cooking it even when I'm not there!

I've experimented throughout my life with different diets, and I truly believe there's not a one-size-fits-all approach to nutrition. Maybe it was having too much rice when I was young that has put me off it now! If I eat a diet high in grains and starchy carbohydrates, I find it negatively affects my energy levels. Maybe this has started to happen because of the placebo effect as I'm not sensitive to gluten, nor do I have any known food intolerances. However, it is important to find foods that you respond to well, so that you create a positive feedback loop for any dietary changes you do make.

I find eating ancient grains, like amaranth, farro, freekeh, bulgur and quinoa work best for me. Perhaps that's because I know

they've got a particularly good nutrition profile, and they're less likely to be from genetically modified sources. Like I said, maybe it's the placebo effect in action, or a case of successful marketing from modern lifestyle brands, because all whole grains have been shown to be beneficial for your brain and should be part of your diet.

Key takeaways from this chapter

- Some of the claims made against grains are factually incorrect. Make sure you're inquisitive, and pay attention to how the food you eat makes you feel.
- Whole grains are good for brain health and physical health, whereas refined grains should be limited or avoided where possible.
- Whole grains may not always be that much healthier for blood sugar levels when compared to refined grains.
- Diabetes and insulin resistance are associated with poor brain health, so diet, exercise and weight management steps should be put in place.
- Low carb and keto approaches may be useful for people with diabetes, epilepsy, Alzheimer's and migraines, but should be avoided by people with specific health conditions.
- Gluten intolerance can negatively impact brain health through the gut-brain axis, so people who are gluten intolerant or sensitive should avoid foods that contain it.

Now, speaking of gluten intolerance and the gut brain axis, I think we should dive much deeper into this.

Because think about it, *if gluten can upset your gut and that can*

negatively impact your brain, what if we could do something to make your gut feel good? Would that have a positive impact on your brain instead?

GRAIN-FREE BREAD

Even if you're not suffering from any of the symptoms of non-celiac gluten sensitivity, it's easy to feel that you're having too much bread. If you're like me, and a diet high in grains doesn't always agree with you, this amazing recipe from Natasha Corrett is great to have ready when you need it.

Overdosing on carbs isn't good for anyone (except for professional athletes who need the instant fuel), so I've included my all-time favourite grain-free bread alternative:

Kale bread

This is the powerhouse of brain boosting breads. It contains dark leafy greens in the form of kale, quinoa and brain healthy nuts and seeds, like almonds and pumpkin seeds. You won't get big sandwich slices, but this bread is perfect for piling with nut butter, smashed avocado, eggs, or any of your favourite toppings.

Ingredients

- 4 tbsp melted coconut oil – olive oil works too.
- 1 ½ cups water (350ml)
- 1 tbsp brown rice syrup
- 1 ½ cups kale, finely chopped (100g) with 1 tsp of oil to cook
- 1/3 cup sunflower seeds (45g)
- ½ cup linseeds (85g)
- 1 ¼ cups almonds, toasted and roughly chopped (125g)
- 1 ½ cups quinoa flakes (100g)

- 1 tbsp coconut flour
- ¼ cup chia seeds (25g)
- 3 tbsp psyllium husk powder
- ½ tsp salt
- A little more than ½ cup pumpkin seeds (70g)

Method

1. Place the oil in a container with the water and brown rice syrup – mix it well, so that the brown rice syrup dissolves.
2. Sauté the kale over a medium heat using 1 tsp of the oil. Cook until wilted – 2-3 minutes.
3. Once the kale has softened, transfer it to a large mixing bowl.
4. Add the rest of the ingredients and mix well.
5. Pour the water, oil and syrup mixture into the bowl – give it one quick stir to emulsify the oil before you pour it in.
6. Mix everything up to form a thick dough.
7. Grease a 1kg loaf tin with the oil – or alternatively line the tin with greaseproof paper.
8. Put the dough into the tin and pack it down, then leave it to sit for 1-2 hours.
9. Bake at 170°C for 50 minutes.
10. Take it out of the tin and put it back in the oven. Bake it for a further 15-20 minutes until the surface has browned like bread.
11. Use a wire rack to allow it to cool before slicing.

CHAPTER 5: THE NOT-SO-SECRET MISSING LINK: GUT TO BRAIN AND BACK AGAIN

Trust your gut. You know yourself, so don't let somebody else tell you who you are.

Tatiana Maslany

Why do you think it is that we use the term 'gut feeling' for something that just feels true on a deep, personal level?

When we say, "*I feel it in my gut*," we're talking about something that overrules rational, conscious thought. We're suggesting that our body is comprehending something that our logical, information-driven mind hasn't quite processed yet.

If you feel compelled to follow a certain career path, passion, or hobby, even when it doesn't make sense upfront, you'd call it a gut feeling.

If you find yourself in a situation that just feels 'off,' it's a gut feeling telling you to get out of there and remove yourself from possible harm.

So what's it all about? Why is our gut so central to our being when as a civilisation we pride ourselves on the power of our minds, on the pre-eminence of the brain?

In this chapter we'll explore how your gut and brain are connected, the impact your gut can have on both your mental health and the health of your brain, and the practical ways that you can improve your gut bacteria and see whole body health benefits.

HOW THE GUT AND BRAIN ARE CONNECTED

Maybe you've seen advertisements for probiotics or gut health boosting supplements and think of it as the next fad in the endless wave of diets and nutritional advice that food manufacturers or celebrity health gurus use to sell you things.

Given what we've covered so far about fats and grains, you'd be justified in feeling this way. Misinformation is everywhere, fear is used to sell ideas, and buzzwords and fluff are often used to fill in the gaps of what is actually possible.

The gut, however, lives up to all the hype!

You contain more cells in your body which aren't 'you' than ones which are. Human cells are outnumbered by a third. Your gut hosts trillions of microbes that make up the human microbiome. Your brain weighs a little more than a kilogram, which is about the same as the weight of microbes in your gut. That includes up to 1,000 species of different bacteria – although it's not only bacteria. The human microbiome is composed of communities of bacteria, viruses and fungi that have a greater complexity than the human genome itself. In fact, the Human Microbiome Project, found that your microbiome has 3.3 million unique protein-encoding genes as compared with the entire human genome, which has around 23,000 genes.

What's more, they also found that your human microbiome is an essential organ, having extensive functions such as helping to "*develop immunity, defend against pathogens and produce short-chain fatty acids important in host energy metabolism, plus the*

synthesis of vitamins and fat storage as well as an influence on human behaviour."[76]

In short, your gut is vital to your health, and to your brain!

Your gut and brain are connected through the 'gut-brain axis,' which we briefly touched on in the previous chapter and can be thought of as an overarching term that encompasses four main forms of connection.

1. Vagus nerve

The gut is highly innervated, containing 500 million neurons, connected to the brain through the nervous system. The first major part of this connection is the vagus nerve, the longest of the cranial nerves and the largest nerve that connects your brain and gut.[77] It sends signals in both directions, and as part of the parasympathetic nervous system, it's concerned with maintaining homeostasis in the body.

Studies have also shown that gut bacteria can influence areas mediated by the vagus nerve, effectively "hijacking" vagus nerve signalling and altering behaviour, in as far as it is related to what the vagus nerve controls. The action of the vagus nerve works to counteract the fight or flight response in the body.[78]

So important is this connection that people with conditions such as irritable bowel syndrome (IBS) or Crohn's Disease have been shown to have reduced vagal tone, which suggests a reduced function of the vagus nerve itself.[79]

2. Neurotransmitters

Another important part of this connection is the role of neurotransmitters, chemicals produced in your brain that control things like feelings and emotions. A good example of a neurotransmitter is serotonin, which influences the feeling of happiness, and is often the neurotransmitter found to be most lacking in patients with depression.[80] Interestingly, as we touched on briefly in the first chapter, these neurotransmitters are also produced to some extent, in your gut, including serotonin. Another of the neurotransmitters produced in your gut is called gamma-aminobutyric acid (GABA), and it helps to control feelings such as fear and anxiety. Studies on mice have even shown that supplementing with a simple probiotic food or drink to soothe the gut can increase the production of GABA and lead to significant reductions in stress and anxiety.[81]

3. **Your gut makes other essential chemicals that affect your brain**

A third part of this connection is that your gut also makes various other chemicals that can affect your brain, the most prominent of which are short-chain fatty acids (SCFA) such as butyrate, propionate and acetate, which are made by digesting fibre.[82] These fatty acids help to reduce hunger, as well as reducing the feeling of reward when eating high energy (high calorie) foods. So, if you're trying to lose weight, or maintain a healthy body weight, having a healthy gut can make the process much easier.

These fatty acids also play a role in forming the blood brain barrier, which *"prevents solutes in the circulating blood from non-selectively crossing into the extracellular fluid of the central nervous*

system where neurons reside." Or to put it in plainer English, the blood brain barrier prevents toxins getting into your brain and causing damage and infections.

4. Gut microbes affect inflammation

As we discussed in Chapter 2, inflammation causes a lot of problems, both for your heart and your brain. The immune system also plays a major role in inflammation in the body – inflammation is one the immune system's response to a harmful stimulus. This is fine if it is within controllable limits but can become damaging if it goes on for too long.

Your gut plays a major role in the immune system – it controls what passes from the digestive tract into the rest of the body, and what is removed from the body entirely. How well it does this job is mediated by the balance of populations of gut microbes,[83] which are constantly changing, based in part by what you eat.

A healthy gut also limits the production of Lipopolysaccharide (LPS) which is an inflammatory toxin made by certain bacteria. If too much LPS passes from your gut to your blood, it can increase bodily inflammation. This has been associated with severe brain conditions like dementia, depression and schizophrenia.[84]

In combination, these four pathways mean that your gut and your brain are closely linked, so if you want to look after the health of your brain, you also need to look after the health of your gut.

How does that explain gut feelings?

One way of thinking of it is that because of the complex connection between the gut and brain, we can end up feeling unconscious mental processing in our gut, which we then label ‘gut feelings.’

And by unconscious mental processing, I’m referring to the fact that your brain is constantly taking in and processing information without your active awareness. Because your brain and your gut have a two-way connection you can then end up experiencing this as sensation in your stomach – either as something as extreme as pain or nausea, or more likely just a slight feeling of ‘butterflies’. This is your gut feeling, and it’s something that you actively notice, almost like an alarm for something you can’t quite remember.

Studies on intuition have also found these links.[85] Researchers had participants look at a screen of moving red dots and decide as quickly as possible whether they were moving to the right or to the left. The participants didn’t know they were viewing the dots through a ‘mirror stereoscope,’ which allowed the researchers to manipulate what they were seeing. A mirror stereoscope allows people to consciously see some images whilst being exposed to but not consciously seeing others. So what images were they being exposed to but not consciously seeing?

- A baby
- A puppy
- A snake
- And a gun

And what the researchers found was that when the participants were exposed to the snake or the gun (even though they weren't consciously aware of it) their decisions about the red dots became faster and more accurate. The participants also experienced physiological responses such as increased heart rate and subjective feelings of 'butterflies.'

Essentially, it's a hard-wired human survival mechanism. However, when you're experiencing poor gut health, this mechanism becomes less functional, and instead of being able to rely on instinctive gut feeling, you might experience varying levels of anxiety instead, anxiety that leads to even poorer decision making in an attempt to alleviate it.

GUT IMPACTS ON MENTAL HEALTH AND BRAIN HEALTH

We know that the impacts of gut health on mental health and brain health are numerous and significant, and that the complex interconnection between the two areas can mean quite serious problems can develop.

The bottom line is that poor gut health can lead to:

- Increased risk of dementia, depression and schizophrenia through over production of LPS.

- Increased hunger and food cravings due to improper fatty acid production.

- Increased stress and anxiety through impaired GABA production.

On top of that, you have to consider the secondary impacts of these issues, for example:

- Increased hunger and food cravings will very likely lead to more eating, which can easily lead to weight gain and the possibility of obesity, a risk factor for various health issues and brain issues, as well as a risk factor for diabetes, which poses additional brain risks.

- Increased stress and anxiety often lead to poor sleep, which has long been established as causing significant negative

impacts on brain function, including fatigue, memory issues and concentration issues.[86] Moreover, stress and anxiety increase the chances of people using unhealthy coping mechanisms such as alcohol or smoking, which go on to create more health and brain issues.

Your body is a complex organism, and issues in one area can often end up spilling over and cascading into other areas.

And then lastly, we also have to consider the practical, day to day impacts of poor gut health on mental health.

- Constipation and diarrhoea are uncomfortable, embarrassing, and can quite obviously get in the way of you enjoying day to day activities.

- Digestive discomfort and stomach aches hurt. They're miserable to deal with and they absolutely ruin your productivity at work, as well as taking time away that could be used to enjoy other daily activities.

- Bloating can make you feel self-conscious. It can prevent you from participating in activities that might boost your mental health.

HOW TO IMPROVE YOUR GUT BACTERIA

Okay, so now that you know how the gut and brain are linked, the potential negative impacts that poor gut health can have, you now need to know what steps you can take to improve your gut health, prevent these issues, and get your brain as healthy as possible.

Here are 5 action steps for you:

1. **Eat plenty of high fibre, nutritious foods, some great examples include:**

- Whole grains (whole wheat cereal/bread, quinoa, couscous etc)
- Broccoli
- Green peas
- Raspberries
- Chickpeas
- Lentils
- Almonds
- Pistachios

Studies found that diets high in fruits and vegetables prevent the growth of various disease-causing bacteria,[87] whilst simultaneously increasing *bifidobacteria*, a good form of bacteria that has been shown to improve gut health and reduce inflammation.[88]

Some foods which fall in this category are also considered to be 'prebiotics' – foods which feed the friendly bacteria in your gut:[89]

- Apples
- Bananas
- Artichokes
- Leeks
- Beans (kidney, black, pinto or white)
- Steel cut oats

2. Eat Fermented Foods

Fermented foods include things like:

- Kimchi & sauerkraut – which are great side dishes to main meals.
- Yogurt & kefir – which make great desserts or snacks.
- Kombucha – which makes a great drink.
- Tempeh – which makes a great replacement for meat. It's also high in protein.

The process of fermenting typically involves the sugars within the food being broken down to form alcohols or organic acids, and fermented foods have long been associated with *lactobacilli*, another type of good bacteria with various gut-health benefits.

Studies have shown that people who regularly eat yogurt have more of these healthy bacteria in their intestines.[90] Interestingly, the study also found that these same people tended to have lower *enterobacteriaceae* levels, and since this is a bacteria associated with inflammation and several chronic diseases, it's a strong reason to give fermented foods a try.

The same is true of people who eat kimchi. Studies have shown that they experience improved gut flora and microbiota.[91] Have a look at the end of the chapter for a way of making your own supply of fermented food!

3. Take a probiotic supplement

Probiotic supplements are cheap, simple and effective ways of helping to improve your gut health. They are living microorganisms, typically 'good bacteria' that can help to improve the bacteria composition of your gut.[92]

Now, studies have shown that if your gut is already healthy, probiotics don't make all that much of a difference, but if you're unhealthy they can have a noticeable positive effect on your gut health.[93] So, if you're recovering from surgery, an illness, disease or stomach upset, that would be the best time to take a probiotic supplement.

4. Eat more omega 3s

Studies have shown that consuming more omega-3 healthy fats can improve gut microbiome diversity and favourably alter gut composition.[94] Sources of omega-3 include:

- Salmon
- Mackerel
- Tuna
- Herring
- Oysters
- Flax seeds
- Chia seeds

You can also get omega-3 supplements in tablet form, including vegan friendly supplements made from algae.

5. Avoid things that harm your gut

If you're putting in a lot of effort to eat food which is good for your gut, it would be a shame to undo it all by eating, drinking and doing things that harm your gut. Things to avoid include:

Excess alcohol

An occasional glass of wine or bottle of beer isn't the end of the world but drinking too much has serious negative impacts on gut health. To be honest though, the fact that too much alcohol makes you vomit, gives you an upset stomach and causes hangovers should be your first clue that it isn't the best thing to put in your body!

Smoking

Again, everyone knows that smoking is bad for you. From a gut health perspective, it is currently listed as one of, if not the biggest, risk factor for bowel disease and digestive tract issues. [95]

Fried foods

Fried foods are harder for the body to digest – greasy food stays longer in the stomach. If you want a guaranteed ticket to stomach upset, bloating and diarrhoea, spend a day eating nothing but fried foods! Fried foods might also impair the gut

microbiome. These are something you'll want to remove from your diet as much as possible.

Too much sugar

More and more research is uncovering the multitude ill effects of eating too much sugar. A diet that is high in refined sugars can have a very detrimental effect on the gut microbiota. It seems that it creates an imbalance in key populations of bacteria which influence inflammation, gut barrier function and immunity.

Antibiotics

This isn't to say that you shouldn't take antibiotics if you need them – exactly the opposite. There are many conditions for which taking antibiotics will be a life-saving intervention. However, antibiotics don't discriminate. They kill the bad bacteria that they're targeted for, but a lot of the good gut bacteria gets taken out as collateral damage. So, after a course of antibiotics, it's really important to work on getting your microbiome back to full health.

WHAT'S THE ALTERNATIVE?

If all this healthy dieting and eating sounds like too much hard work, then perhaps consider the alternative solution to a healthy gut.

Faecal transplants.

It's exactly what it sounds like. A doctor transplants faecal matter (yes – that's poop!) from a healthy donor into your body through a colonoscope, a small, flexible tube that inserts through the rectum.

It's proving itself to be an effective way of managing and treating irritable bowel syndrome and inflammatory bowel disease, and an experimental way of repopulating your gut with healthy bacteria.

Key takeaways from this chapter

- Your gut and brain are connected via the gut-brain axis.
- This includes the vagus nerve, neurotransmitters, gut made chemicals and the impact that gut microbes have on inflammation.
- 'Gut feelings' and intuition are due to these links.
- Poor gut health has numerous negative mental and brain health impacts.
- To improve gut bacteria, focus on eating high fibre, nutritious foods such as vegetables and whole grains, along with fermented foods, omega-3's and potentially probiotic supplements in certain conditions.

- Avoiding smoking, as well as limiting intake of alcohol, sugar and fried foods will all help to improve your gut health.

And speaking of things to avoid, surely there's more things on our list than just smoking, drinking, sugar and fried foods? Are there even some foods that we think are healthy but actually have negative impacts?

This is exactly what we'll be looking at in our next chapter, 'the bad guys'!

BOOST YOUR GUT HEALTH

Once of the easiest fermented foods to make is sauerkraut. Eating a little bit of fermented food on a regular basis is a really good way to increase and maintain the populations of beneficial bacteria in the gut. A good way of incorporating it into your diet is to keep a jar in the fridge and have a spoonful with it with your lunch or dinner (depending on what you're eating of course!).

It's made by a process called lacto-fermentation. The surfaces of the cabbage leaves (and really any fruit and vegetables) have friendly bacteria living on them. When the leaves are submerged in brine, *lactobacillus* ferment the natural sugars in the cabbage. This produces lactic acid, which gives the sauerkraut its distinctive taste, and lowers the pH of the sauerkraut, which will eventually stop the *lactobacillus* from continuing the fermentation process unless you stop it yourself by putting it in the fridge.

It's not difficult to make, and it's way cheaper than buying the shop bought variety. Once you get the hang of it, you'll always want to have a jar on hand, so you can add to a salad, or put some in a bowl or on a sandwich.

HOW TO MAKE SAUERKRAUT

Ingredients

- You only need really two ingredients to make sauerkraut – cabbage and salt – although you can add lots of different things for flavour. Use firm white or pale green cabbage and some good quality salt.

- How much you need of each depends on how much you want to make, and how salty you want it to taste. Use about 2 tsp salt per pound (≈450g) of cabbage for a slightly saltier version, 1 ½ tsp per pound for a less salty version.

- So, if you're using a medium sized white cabbage (about 2lb or 900g), then use about 4 tsp of salt.

- You can add caraway seeds or peppercorns for flavour. For the same sized cabbage use between 1 tsp and 1 tbsp of caraway seeds depending on how much you like the taste.

Method

1. Start by cleaning everything you're going to use. Wash a large tub or mixing bowl, a knife and chopping board – or a food processor. Rinse with boiling water and wash your hands thoroughly. It's a good idea to get rid of all the bacteria you don't want before you start the making the ones you do!

2. Remove the old outer leaves from the cabbage and discard them, chop the cabbage into quarters and finely shred it. You can use a food processor to speed things up.

3. Put the cabbage and the salt in a bowl or tub and combine thoroughly – layer it all as you put it in, to make sure that it's evenly distributed. Start massaging the salt into the cabbage using your hands. Gradually the cabbage will reduce in volume and produce brine. At this point you can add the caraway seeds and/or peppercorns.

4. Cover the cabbage with cling film and press out all the air bubbles, then weigh it down with something heavy that covers as much of the surface area of the cabbage as possible. It should produce more brine, so that the cabbage is covered. If it doesn't, you can always add more liquid (dissolve 1tsp of salt in a cup of water).

5. Now leave it to ferment! Cover it and keep it in a dark cool place. Fermentation will be faster with smaller batches and if the temperature is relatively warmer. Too warm, and the sauerkraut can become too mushy, so aim for cool room temperature. You can start tasting it after 3 days, and if it tastes good, take it out and put it into the fridge. You can leave it longer to ferment – 10 days to 2 weeks or more.

6. Check the cabbage while it is fermenting. If it's bubbling or there's white foam or scum on the surface, this is a good sign of the fermentation process going as it should. If it looks mouldy, remove the mould and make sure that the brine is fully covering the cabbage. Skim off the scum when you see it, or before you put it in jars in the fridge. Release

gas that builds up while fermentation is progressing – and change the clingfilm and rinse whatever weights you're using with boiling water.

7. When you like the taste of the sauerkraut, you can put in into smaller containers – sterilized jars work well – and it will keep for quite a long time in the fridge.

CHAPTER 6: THE BAD GUYS

Every story needs its hero. And its villain. And its monster.

Amie Kaufman - Jay Kristoff, *Obsidio*

It's rare to find a good story or film that doesn't have a bad guy, an antagonist. Someone to dislike. Someone who stands in the way of the hero's journey.

Some of the most memorable films of all time all have them:

- *Star Wars* has Darth Vader
- *Batman* has the Joker
- *The Wizard of Oz* has the Wicked Witch
- *It's a wonderful Life* has Mr Potter

The magic of the bad guy is that they give the hero something to overcome. An obstacle and a challenge to rise above in order to succeed.

And it might sound like a cliché, but your journey towards optimal brain health is no different. Certain foods are your bad guys, they're going to stand in the way of your goals and your progress. And sometimes, in your weaker moments, they might even try to lure you over to the dark side.

You might find it useful to think of these foods in this way, as 'bad guys,' so that your interaction with them becomes completely clear. That way you don't think of them in shades of

grey – that they're ok in some circumstances – but rather that you should avoid them at all costs. There's really nothing good about them.

In this section we're going to be looking at 6 of the worst foods for your brain, exploring why they're so bad, and what you might want to eat instead.

The 6 'bad guy' foods you need to avoid

TRANS FATS

Why they're bad

It should come as no surprise that trans fats make this list, because they're also known to be terrible for your heart, and we already know that your heart and brain are really closely linked.

Trans fats are also known as 'hydrogenated fats,' which means that from a chemical structure standpoint, they have had hydrogen ions deliberately, artificially added in order to make them last longer.

Research strongly suggests that trans fats are associated with heart disease, [96] diabetes[97] and systemic inflammation,[98] as well as brain issues such as Alzheimer's,[99] poor memory[100] and cognitive decline.[101]

Typical sources

- Processed foods
- Margarine
- Some branded frostings
- Some microwavable popcorn
- Ready-made cakes
- Pre-packaged cookies

If you are going to buy any of these foods, look for ones labelled as trans-fat-free. Or better yet, avoid buying them altogether!

Alternatives

You don’t really need to eat any of these food types (I know it’s hard to hear but it is possible to live without cookies and cakes!)

With that said, if you do want an occasional treat, try baking some yourself using a reliable, health-focused recipe. Have a look at the section at this end of the chapter for just one idea of an alternative to the bad guys!

REFINED CARBOHYDRATES

Why they're bad

We covered this extensively in Chapter 3, 'Grains on the brain,' when we examined the difference between whole grains (mostly healthy) and refined grains (not healthy).

Refined carbs are highly processed grains and sugars that have been processed to extend their shelf life at the cost of nutritional value. These foods typically have high Glycaemic Indexes meaning that they are fast digesting, delivering a lot of sugar straight to your bloodstream very quickly. In the long term, this can lead to insulin resistance and diabetes, both of which are associated with brain issues.

Moreover, studies have shown that they cause inflammation of the hippocampus, which leads to memory issues.[102]

Typical Sources

- Cakes
- Biscuits
- Pastries
- Crisps / Chips
- Candy
- Sugary breakfast cereal
- White bread
- White pasta

Alternatives

The obvious alternative is to aim to replace refined carbs with whole grains wherever possible. So instead of white bread, eat whole wheat bread, and instead of white pasta, eat whole wheat pasta. You can also look for whole grain breakfast cereals.

If you do want the occasional snack or treat, try to make your own cakes, biscuits or pastries using whole grain ingredients, for example wholemeal flour or oat flour.

SUGARY DRINKS

Why they're bad

In general, aim to eat your calories, rather than drink them. Sugary drinks can easily lead to overeating and excess calorie consumption, which can increase weight gain and over time poses as a huge risk factor for both diabetes and brain issues.[103]

Sugary drinks such as sodas are especially bad in countries like the USA, where the primary ingredient is often high fructose corn syrup. This has been strongly associated with obesity, diabetes, high blood pressure, high blood fats and arterial dysfunction, all of which significantly increase the long-term risk of developing dementia.[104]

Typical Sources

- Sodas
- Sports Drinks
- Energy Drinks
- Some fruit juice*

*Fruit juice is on this list because it's high in sugar, and sometimes has extra ingredients added to it. So, it is best avoided if you're aiming to reduce blood sugar. However, if your blood sugar levels are fine, then an occasional glass of *pure* fruit juice, such as orange juice, shouldn't be a major issue.

Alternatives

If you’re looking to quench your thirst and improve your mental and physical performance, there’s nothing better than plain old water. It’s what our bodies are designed to drink. It’s what they’re 80% made of, and it’s what they need to survive.

Other acceptable options include unsweetened iced tea, vegetable juice, and unsweetened dairy products. These should be in addition to water though, and not drunk in place of it.

ARTIFICIAL SWEETENERS

Why they're bad

Unfortunately, sweetening your food or drinks with artificial sweetener isn't the solution.

Although considered to be a safe sweetener overall when consumed in moderation, (no more than 18–23 mg per pound of body weight per day) the sweetener aspartame has been linked to an increase in your brain's vulnerability to oxidative stress, as well as potentially causing negative effects on emotions and learning when consumed in excess.[105]

Studies have also found that people who consume artificially sweetened drinks have an increased risk of stroke and dementia.[106]

Alternatives

Your simplest option is just to reduce intake of artificially sweetened foods and drinks altogether. Even if you stick to the current safe guidelines, you can still consume a lot of artificial sweetener. A typical sweetener sachet contains about 36mg, and a can of soda about 200mg, which means for an average adult female, you could drink up to 15 cans of diet soda a day and still be within 'safe' guidelines, which is a huge amount.

Or, if you want to maximise your health potential, choose alternatives without artificial sweeteners. Water is always going to be the healthiest drink possible. Choose treat foods that are

home-made and derive their sweetness from fresh fruits or specific vegetables – you can do a lot with apple sauce and sweet potato!

ALCOHOL

Why it's bad

This shouldn't come as too much of a surprise. Even without diving into the science we know that excess alcohol consumption makes us dizzy, nauseous, confused, gives us patchy memory and changes our patterns of behaviour. So, we already have a pretty good idea of the impacts that alcohol can have on our brains.

And of course, when we look at the science these suspicions are simply confirmed. Chronic alcohol consumption has been shown to lead to reductions in brain volume, metabolic changes, and disruption of neurotransmitters (your brain's chemical communicators).[107]

Over long periods of time, excessive consumption can cause vitamin B1 deficiency, and studies have shown the alcoholics have increased risks of a brain disorder called Wernicke's encephalopathy. This can develop into Korsakoff's syndrome, in which the person is shown to have severe damage to the brain, including things like eyesight disturbances, memory loss, confusion and constant balance problems and unsteadiness.[108]

Typical sources

- Beer
- Cider
- Wine
- Spirits (vodka, gin, rum, whiskey etc.)

Alternatives

If you currently drink quite a lot, your first step is to reduce the amount to within current ‘safe’ guidelines (no more than 14 units per week, which is about 8 bottles of beer, or 9 small glasses of wine). Then, if you’re looking to maximise your brain health, you can look to reduce this even further until alcohol is completely removed from your diet.

Older research has often come out slightly in favour of very low levels of alcohol consumption being beneficial, or even that wine is preferable to other forms of alcohol in relation to risk of blood clots and stroke. However, more and more research now suggests that any amount of alcohol consumption can be harmful to your brain.

There are now many non-alcoholic versions of so many different drinks, that it should be possible to find something that can replace your favourite beverage on a night out, or even a night in. And there’s always the best, but least popular alternative – water!

FISH HIGH IN MERCURY

Mercury is a heavy metal, and historically it was used in thermometers, batteries, fluorescent lights and as a cure for syphilis. Luckily the cure for syphilis has long since been changed to one that actually works, and its use in products is increasingly being phased out.

Unfortunately, due to environmental damage and pollution, mercury has found its way into our oceans. That means that fish can become vulnerable to mercury ingestion. This is especially problematic for long-lived, predatory fish, which can carry amounts over 1 million times the concentration of the water around them.

The problem for us is that we then eat those fish, along with the mercury, which acts as a neurological poison. It can damage your central nervous system, including your neurotransmitters, as well as the stimulation of additional neurotoxins (a sort of domino effect) which ultimately can result in damage to the brain.[109]

Typical sources

Luckily, most fish are not big sources of mercury, so it's only specific fish that we need to be aware of:

- Shark
- Swordfish
- Tuna
- Orange roughy

- King mackerel

Alternatives

Since the above types of fish are the main culprits, the easiest solution is just to choose other fish to eat as part of your diet. There are loads of good options that will provide the same protein and omega-3 benefits.

If you do want to eat some of these fish, that’s generally okay, just limit the amounts to within the safe guidelines that your body can process. Typically, this is around 1 serving per week. However, pregnant women and children should avoid these higher mercury fish altogether. All in all, since we’re trying to optimize our brain health, maybe it’s not worth taking the risk when there are so many other good options to choose from.

NORMALISATION OF FOODS

I think the big problem with some of the big six ‘bad guy’ foods, is that a lot of them are so commonplace and normal in today’s diets that we don’t even question them. Growing up I certainly had plenty of sugary drinks, and millions of kids around the world grow up drinking Coke, Pepsi and similar sodas. Remember, you have to go to Cuba or North Korea if you want to find somewhere that doesn’t sell Coca-Cola: you can find it in the smallest villages in the middle of India, in the rainforest of the Amazon delta, deep in the Australian outback and even in Antarctica. The genius of the soda companies is that they sell you something that by now everyone knows is terrible for your health. This magically gives them another product line: apparently ‘healthy’ diet sodas.

I come from a community where not drinking alcohol is the norm, so when I went to university, I felt the pressure of social drinking. It’s taken as given that young people – at least in the UK – will drink alcohol, and it can leave you feeling ostracised if you don’t. These things being so normal in our lives means that we often don’t even think to question them, and when we do it’s not uncommon to face a bit of pushback from friends or family.

It’s ok to question the choices around you. Just because everyone’s having a syrup-flavoured Frappuccino with extra whipped cream on top, it doesn’t mean you have to as well. Just because the rest of the children in your kid’s class are given cartons of sugary juice doesn’t mean that you have to do the same.

Avoiding the items on this list of the very worse things is vital for the long-term health of your brain, so stick with it, even if it means sometimes being the odd one out.

Key takeaways from this chapter

- Certain foods should be limited or avoided altogether for brain health.
- These foods include trans fats, refined carbs, sugary drinks, artificial sweeteners, alcohol and fish high in mercury

Now we know the big 6 that we shouldn't eat for brain health, what about the other side of the coin. Is there a list of foods that we absolutely should be eating?

That's exactly what we'll be covering in Chapter 7 - Brain Superfoods.

DEFENCE AGAINST THE BAD GUYS

Sometimes the pull of the bad guys is really strong – usually when we're most tired or have had a difficult day. Here's just one idea for something that you can keep in your freezer as a treat when you need it, knowing that it doesn't contain anything on the list – but they still taste amazing!

They contain dates, which are full of good gut-friendly fibre, but if you're diabetic or on a diet which is really trying to cut down on sources of dietary sugars, they might not be the best choice. You can also replace the peanuts and peanut butter with almonds and almond butter. If you're using almonds, cut the dates into halves, rather than thirds.

Vegan snickers bites

Ingredients

8-10 Medjool dates
peanut butter
peanuts
½ cup dark chocolate chips
1 tsp coconut oil

Method

- Pit the dates if they still have their stones in them.
- Slice the dates length wise, without cutting all the way through.

- Chop each date width wise into thirds. Add peanut butter to the inside of each third and one peanut. Press together.
- Set aside on a parchment lined plate. Repeat for each date.
- Once all are filled, freeze for about 30 min.
- Add chocolate and oil to a small bowl and melt in microwave on 30 second intervals.
- Remove dates from freezer. Place date in the melted chocolate and coat. Place date back on the parchment paper.
- Repeat for every date. Once all covered in chocolate, freeze for another 10 minutes.
- Remove from freezer and enjoy

CHAPTER 7: SUPERFOODS FOR A SUPER BRAIN

Let food be thy medicine, and medicine be thy food

Hippocrates

I've often wondered whether Hippocrates, the ancient Greek physician who is usually referred to as the "Father of Medicine," really said this. I don't think it's very likely that he did. He did talk about διαιτήμασί (pronounced as "deaytimasy") which means *"dietetic measures."* In his book, "De Alimento," there's another statement about food, which roughly translates as: "In food excellent medicine can be found, in food bad medicine can be found; good and bad are relative."

So even thousands of years ago people realised that food could serve both good and bad functions, that it can help to improve your health, or to make it worse.

In this chapter we're going to be looking at the positive side of the coin, specifically we're going to be highlighting 9 superfoods and why they're so awesome for the health of your brain.

9 superfoods for your brain

BLUEBERRIES

Blueberries are a sweet, delicious fruit that makes a great addition to fruit salads, yogurts and desserts, as well as being tasty snack on their own. They're also low in calories, making them easy to fit into most diets. In fact, an entire cup-full is only 84 calories.

Nutrition-wise they contain 4 grams of fibre, which goes some way to the 30g recommended daily intake, 24% of the RDI for Vitamin C, 36% of the RDI for Vitamin K, and 25% of the RDI for Manganese. Pretty impressive for such a low-calorie fruit. They're also a rich source of antioxidant phytonutrients. As we discussed in Chapter 2, this can help reduce the risk of cancer and cardiovascular disease. They also have positive impacts on cholesterol and blood pressure and the prevention of oxidative stress and inflammation in the body. In fact, most colourful fruit and vegetables are high in antioxidants, which is why you should try to eat a rainbow of colours on your plate.

What I'm most interested in, though, is that studies have shown promising and specific brain health benefits. In fact, one study of 16,000 older people, conducted over a period of six years, found that blueberries (and strawberries as well) were linked to delays in mental aging by up to 2.5 years.[110] That's a pretty amazing effect for a little berry!

BROCCOLI

It may not be the trendiest food in the line-up, but good old-fashioned broccoli makes this list as it's been shown to have some fantastically positive impacts on your body.

First, it's high in fibre, improving gut health (which we already know has a knock-on effect to brain health), plus it's also high in various vitamins and in antioxidants.

Beyond that, and crucially for us, broccoli is also known for its 'anti-amnesiac' properties, meaning that it can improve memory and reduce forgetfulness.[111]

Furthermore, remember when we talked about fluid vs crystallised intelligence back in chapter 1? Well broccoli contains lutein, a pigment which has been shown to help preserve crystallised intelligence by protecting the neurons in the brain.[112] Lutein is a carotenoid, a pigment that is found in all sorts of leafy green vegetables, which is one of the reasons that the MIND diet strongly recommends eating them.

AVOCADOS

Next up we have avocados, the ultimate in trendy hipster foods that has taken the fresh food market by storm this past decade. They have a range of health benefits.

For our brains, studies have shown that avocados might be able to help protect against nerve damage, specifically in the prefrontal cortex, which is responsible for things like planning and critical thinking. In an animal study,[113] a combination of avocado and soybean fats prevented oxidation and protected against nerve damage. Plus, avocados may help to prevent brain issues brought on by high blood pressure and strokes.[114]

It’s worth remembering, though, that avocados are also high in calories, so you’ll want to keep the amount you eat limited if you’re trying to lose weight.

EGGS

As well as being a great breakfast, eggs are also great for your brain, containing a variety of nutrients linked to brain health, such as vitamins B6 and B12, folate, and choline. Studies have shown that choline is associated with better cognition and mental function,[115] whilst low folate levels are commonly found in dementia patients.[116] Eggs also contain lutein, the same carotenoid found in broccoli but in a lipid form, which means it is more bioavailable than from vegetable sources, and easier for the body to absorb. They are also relatively high in the amino acid tryptophan, which is a precursor for the neurotransmitter serotonin – consuming tryptophan can have an anti-depressive effect.

When you can find them, go for organic free-range eggs, or better yet find a local farm or chicken owner who sells their eggs. Not only are free-range eggs ethically better (no caged hens) but they also have a better nutrient profile because of what the hens eat.

WILD SALMON

Salmon is an incredibly nutritious food.

Salmon falls into the category of fatty fish, making it a rich source of omega-3 fatty acids, which have a wide range of health benefits.

For your brain, which is made up of around 60% fats, these benefits are profound. The omega 3s are used to build nerve cells, and regular consumption has been shown to slow age-related decline, as well as to help prevent Alzheimer's disease.[117] In general, the omega-3 fatty acids that are found in salmon, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), have well-documented cardiovascular benefits. Not only do they help decrease inflammation,[118] but they also help reduce the dangerous plaques that can build up in arteries.[119]

Many people's diets are low in omega-3s, and they are an essential fatty acid – we can't synthesise them ourselves inside our bodies. We tend to consume many more omega-6 fatty acids. Ideally, we want to try and maintain a ratio of 1:1 or 4:1 of omega-6 fatty acids to omega-3 fatty acids, but due to diet imbalances most people end up at closer to a ratio of 16:1. According to research, this increased ratio has been linked to "*promoting the pathogenesis of many diseases, including cardiovascular disease, cancer, and inflammatory and autoimmune diseases.*"[120] So by eating more omega-3s we're bringing this ratio back into ranges closer to what our bodies are designed for.

Salmon is high in B vitamins (a single serving contains 100% of the RDI of vitamin B12), which all work together to keep your brain and nervous system functioning well. Wild salmon is also a good source of potassium which helps manage blood pressure and can reduce your risk of stroke.

The distinctive red colouring in salmon is from astaxanthin, a carotenoid that has powerful antioxidant properties. Research has shown that not only does it help reduce inflammation and decrease oxidative stress, lowering the risk of cardiovascular disease,[121] but in combination with omega-3s, it seems to have neuroprotective properties.[122]

All in all, salmon is a powerhouse!

TURMERIC

I grew up with this spice, which we called *holud*, and it is a staple used in Indian cooking that gives food an intense orange-yellow colour. It's been used as a medicinal herb for thousands of years, and recently science is beginning to understand why it's so powerful. Now popular culture is also catching on, and you can often get turmeric lattes, or 'golden milk' in trendy coffee shops!

A lot of its magic comes from curcumin, its most active ingredient, which can cross the blood brain barrier and create benefits for the brain cells. It's also known to be a strong antioxidant, and to have anti-inflammatory properties. Studies have shown that it can have protective effects against Alzheimer's disease, helping to clear amyloid plaques in the brain,[123] as well as boosting brain-derived neurotrophic factor (BDNF), which helps brain cells grow.[124] A lot of brain disorders – from depression to Alzheimer's – have been linked to low levels of BDNF.

Several studies have shown that curcumin can improve your cardiovascular system and protect against cardiac diseases – so as well as directly affecting the brain, it also protects it by keeping the heart healthy, and maintaining a healthy blood flow.

Although I use turmeric a lot throughout the week, the curcumin content in the spice is not that high – it's only about 3% by weight. A lot of the research shows the greatest benefits when the dosage of curcumin is quite high, much higher than the amount of turmeric you'd need to put into your dish for it to still be edible. Too much turmeric tastes bitter as I discovered when I

began to learn more about the amazing effects of curcumin. I started to put way too much in everything! For this reason, even if you do use it in your cooking, you might want to consider a curcumin supplement as well, unless you *really* love the taste!

DARK CHOCOLATE

Everyone needs an excuse to eat chocolate for health reasons, and here it is! Research conclusively shows that eating dark chocolate (within reason) does have some significant health benefits. Just remember that it still contains quite a few calories, so keep your intake limited if you're restricting your calories.

The healthy part of dark chocolate comes from its high cacao content (70%+) which means it contains loads of flavonoids and antioxidants. The flavonoids in dark chocolate have been shown to help reduce cognitive decline and mental degeneration as well as to improve mood,[125] with the results backed up by plenty of other studies and research.

As well as improving brain function, chocolate may also reduce your risk of heart disease, even though as we have seen it has a relatively high content of saturated fat. It seems to prevent the risk of calcified plaque in the arteries, at the same time as improving the good cholesterol-carrying lipoproteins in the blood. Furthermore, it can reduce insulin resistance, a condition which left untreated can lead to type 2 diabetes. It's no wonder that part of cacao's scientific name – *Theobroma cacao* – means "food of the gods."

Remember though, these benefits only apply to dark chocolate. Milk and white chocolate don't contain enough flavonoids, and usually contain way too much sugar.

ALMONDS

In general, all nuts are good for you, but almonds are particularly beneficial, which is why they made the list.

First, since they're a nut, and nuts of any kind are associated with improved cognitive function, they're off to a good start.[126] Maybe part of the reason for almonds in particular is because they increase acetylcholine levels in the brain.[127] Acetylcholine is a neurotransmitter which is important throughout the nervous system, and the research shows that an increase in levels corresponded to an enhancement of memory function.

Almonds, along with walnuts and hazelnuts, are great sources of healthy fats, antioxidants and vitamin E which offer additional neuroprotective properties.[128]

The heart-health benefits of almonds are notable too: almonds seem to reduce the levels of LDL cholesterol in the blood and contain potassium which helps regulate blood pressure. A trial on almond consumption in people with type 2 diabetes found that eating the nuts improved glycaemic control – in other words they helped regulate blood sugar levels – as well as improving obesity markers and lowering the risk of cardiovascular disease. The trial was small though, with only 20 participants, but the results are still encouraging.[129]

Finally, almonds are also good for your gut! The nut and their skins act as a prebiotic, increasing the levels of friendly gut bacteria, while suppressing populations of pathogenic ones.

PUMPKIN SEEDS

Last but certainly not least we have pumpkin seeds, which aren't just good for your brain, they're also good for your bladder, and your prostate (if you have one) and can be protective against certain cancers.

Brain-wise, they're a strong antioxidant, as well as being a great source of minerals such as zinc, magnesium, copper and iron, each of which is linked to brain function. For example, zinc deficiency is associated with Alzheimer's and Parkinson's disease, [130] whilst low copper levels are associated with poor nervous system control and a greater risk of neurodegenerative disorders.[131]

Magnesium is essential for the proper functioning of the nervous system, and low levels can cause a whole host of neurological and mental health problems, including anxiety and depression. Most adults have a surprising low intake of magnesium in their diets. Pumpkin seeds are one of the best natural sources: a 1 ounce (28g) serving contains 37% of your RDI.

Studies in animals have shown some potential heart benefits, and also that they can help reduce blood sugar levels. Both of which have a positive knock-on effect for your brain, reducing the risk of cardiovascular disease and the effects of diabetes.

Lastly, just like with nuts, avocados and chocolate, remember that seeds are high in calories, so you'll need to limit your intake if you're trying to lose weight.

THE NEXT CHALLENGE

Now that you've got your list of 9 superfoods for a super brain, the challenge is to come up with ways that you can incorporate these foods into your weekly eating that are likely to stick.

There are of course many other superfoods that will benefit your brain – for instance, if you're not a fan of broccoli, choose some other leafy greens that appeal to you and put that on your list. You could choose walnuts instead of almonds, or strawberries instead of blueberries.

If you make a definite list of foods that you know will boost your brain health, a list of foods you actually like, it becomes much easier to get into the habit of eating them. It takes some of the guesswork out of the equation. It doesn't mean that the only foods you eat come from the list, but it gives you a solid foundation for your eating routine that you know will benefit you in the long run.

For instance, if you have cereal or porridge for breakfast every day, you could sprinkle some pumpkin seeds on top.

You could decide that you were going to have a weekly Mexican night, with burrito bowls topped with guacamole made from avocados.

Instead of buying a sweet pastry or chocolate bar as a snack to have with your coffee, you could take some almonds and a square of dark chocolate out with you.

The possibilities are obviously limitless, and you have to choose the things that appeal to you, so that you'll actually stick with them. There's no point in resolving to have boiled eggs and broccoli for lunch every day, if you don't really like boiled eggs or broccoli!

Key takeaways from this chapter

- Certain foods are really good for your brain health, we can call them brain 'superfoods.'
- These foods include blueberries, broccoli, avocados, eggs, salmon, turmeric, dark chocolate, almonds and pumpkin seeds.
- Finding ways to make these part of your weekly eating is essential to seeing the brain health benefits.

I also briefly mentioned curcumin supplements as being something you might want to try out.

But what about other supplements – are there any other that could be good for brain health? This is the subject of the next chapter.

CHAPTER 8: TO SUPPLEMENT OR NOT TO SUPPLEMENT

A clever person solves a problem, a wise person avoids it.

Albert Einstein

Supplements are big business. They're a billion-dollar industry that appears to be at the cutting edge of technological innovation. The idea of a nutritional supplement might make you think, "Isn't science amazing?"

And it does seem amazing what we can do. We can look at how part of the human body works, how compounds in the food we eat are processed in the body. We can work out the specific effects of chemicals on cells and tissues and determine if they'll have good health outcomes. Then we can isolate and reproduce the chemicals in a lab and put them in a pill, powder or liquid format so that someone can get some of the same effects of eating the food without actually eating it.

At least that's what it seems like. In reality it's not so straight forward. Mostly scientists come up with hypotheses that they test – they work backwards. They have a potential answer for a question, and then they test to see whether they're right or not.

A lot of the time, the conclusions are not as clear cut as the advertisement proclaims.

We’re going to look at the range of supplements available for improving brain health and function, assessing the effectiveness and safety of each, and then come to a conclusion about whether it’s worthwhile spending the money to buy them.

Before we begin though…

A QUICK NOTE ON PRIORITIES

Supplements, just as their name would imply, are meant to supplement an already good diet and lifestyle. If you've jumped straight to this chapter looking for the easiest (or arguably laziest) possible solution to a complex problem, then you need to get your priorities in order.

To use an analogy, supplements are like the icing on the cake, but good nutrition, diet and exercise are the main ingredients that make the cake itself. Without the cake, you've got nothing to actually put the icing on. Icing on its own is no good – it can easily make you feel sick if you eat too much!

And a quick disclaimer

Also, I need to remind you that this isn't medical advice, and that I'm not telling you which supplements to take. I'm just providing a breakdown of the available options and evidence, but the decision of what to do is totally yours. Before taking any supplement, please consult your doctor.

Supplements available for improving brain function

FISH OILS

Let's start with a really simple supplement that we've already touched on in previous chapters. Fish oil supplements are taken as a source of omega-3 fatty acids, and typically contain two types of omega-3s, DHA and EPA, both of which are great for your health.

The effectiveness of omega-3s to improve brain function is well documented, this is why salmon is on the superfoods list in Chapter 6. Omega-3 supplements containing DHA have been shown to improve thinking skills, memory and reaction times in healthy people,[132] as well as helping people experiencing a mild decline in brain function.[133]

Fish oils are also a completely safe supplement. They are a cheap and effective way of improving your brain health. If you're already eating oily fish like salmon, mackerel or tuna twice per week, you might not need a fish oil supplement, but if you're not eating those foods that often, then a supplement could be a good idea.

Moreover, if you're a vegetarian or vegan, you can get omega-3 supplements made from algae, which also have positive impacts on brain health.

CREATINE

Creatine is most commonly used as a fitness supplement to enhance exercise performance. It does this by providing readily available phosphates that top up ADP molecules to make ATP molecules, your body's primary energy source for very high intensity exercise.

Interestingly, though, creatine also has a wide range of brain health benefits.

Studies have shown that creatine can improve thinking skills and memory, especially in people who do not regularly eat meat.[134] A recent review has found creatine to be a promising supplement for brain health and cognitive processing, especially in populations dealing with trauma or conditions such as Alzheimer's disease.[135]

Creatine has also been found to be an incredibly safe supplement. Due to its popularity in the fitness world, it has been studied thousands of times over many decades, making it one of the most rigorously tested and widely used supplements around.

PHOSPHATIDYLSERINE

I'm always more suspicious of a supplement that's got a name that sounds like it was cooked up in chemistry lab, but phosphatidylserine naturally occurs in the body and is a component of the cell membrane. It's a type of fat compound called a phospholipid, and you'll get it in your diet from meat or fish. The supplement version is usually made from soy or cabbage.

Studies have found that taking the supplement three times per day (in 100mg doses) can help to reduce age related declines in brain function, including in Alzheimer's patients[136] as well as improving mental performance in elderly people with subjective memory complaints.[137]

In recommended doses, phosphatidylserine has been found to be safe, however it can cause side effects such as insomnia and stomach upset, at doses over 300 mg per day, so this should be the upper limit for supplementation.

It may also have interactions with certain drugs prescribed for Alzheimer's, so it's essential that any supplementation plans are discussed with your doctor first. It has a decent body of research supporting its use, and is safe in doses under 300mg per day, so could make a good choice of supplement for brain health for many people – however, more research needs to be done

ACETYL-L-CARNITINE

Another supplement with a complex sounding name, acetyl-L-carnitine is an amino acid produced naturally in your body and helps with various forms of energy production. Studies have shown that acetyl-L-carnitine may be a useful supplement for slowing the decline in brain function due to age,[138] as well as potentially improving brain function in people living with mild dementia or Alzheimer's disease.[139]

However, there is little to no research showing that the supplement has brain health benefits for those who are healthy.

In terms of safety, it has been found to be safe for most people, although a small number of people report side effects such as stomach upset, nausea, vomiting, dry mouth, headache, and restlessness, as well as a "fishy" odour of the urine, breath, and sweat.

Based on the research, it seems like it is only useful for people already experiencing some level of cognitive decline, so these are the only people who should consider taking it. Moreover, since some people can have side-effects, dosages should be started conservatively, with attention being given to individual responses.

BACOPA MONNIERI

Bacopa monnieri is a herb that has been used in traditional healing practices and Ayurveda for many years. It is thought to have beneficial brain health effects.

Studies have been incredibly positive regarding this traditional herb, with modern science coming out very much in favour of its effectiveness. In fact, studies have shown that supplementing with the herb improves cognition and memory in people with healthy brains as well as people dealing with brain decline.[140]

Safety wise studies suggest that it is safe to use for about 12 weeks. This doesn't mean it is unsafe afterwards, that's just the length of most studies, so that's what we can say with more certainty. Some people also experience side effects such as increased bowel movements, stomach cramps, nausea, dry mouth, and fatigue, so start conservatively and see how you respond.

RESVERATROL

Resveratrol is an antioxidant, and it's found naturally in the skin of various red and purple fruits such as grapes, blueberries, raspberries, as well as in red wine, which is derived from grapes.

Studies have suggested that it could prevent the deterioration of the hippocampus, and so have a positive, preserving effect on memory,[141] potentially slowing down age-related brain function decline.

Resveratrol is also safe when eaten naturally through foods, and when supplemented at 1500 mg daily for up to 3 months (again the length of most studies). Higher doses tend to lead to some stomach upset, so it's best not to go too far beyond 1500mg per day.

It might have some interactions with drugs that slow blood clotting, so as with all supplements, make sure to consult your doctor before usage. Overall though, there haven't been enough human studies done on this supplement to know how effective it really is.

SUPPLEMENTS SUMMARISED: ARE THEY WORTH TAKING OR NOT?

GCBH concerns

Concerns have been raised by the Global Council on Brain Health (GCBH) which was established in 2015 by AARP (formerly called the American Association of Retired People) in the US, with support from Age UK. Specifically, their concern was that the supplement market is very poorly regulated, so it can be hard to guarantee the accuracy of various supplement claims, or to guarantee the specific ingredients within individual supplements.

And they do have a point. There are undoubtedly some very unscrupulous companies who market supplements with ludicrous claims. There are also companies who bulk up products with filler ingredients rather than what you paid for.

However, I don't think that we can completely discount the usefulness of supplements simply because some companies are disreputable. It's the same in every industry – there are bad actors that need to be avoided. As we've discussed above, there are various supplements with good quality scientific research supporting their effectiveness and safety, and we shouldn't just discount this research.

A better approach

So, a better approach would be to turn back to what I said right at the start of this chapter about priorities.

Feel free to use certain supplements (with proven effectiveness and safety) so long as your diet and exercise is already the best it could possibly be. Don't use supplements to try and make a bad diet better.

That means that you should be following the MIND diet principles we discussed in chapter 2, following the gut health advice I provided in chapter 4, avoiding the all the foods from chapter 5, and regularly eating the 'super-brain' superfoods from chapter 6. That also means you should be following the broader lifestyle and exercise advice that we're going to discuss in the final chapter of the book.

Remember, relying on supplements without all of these things in place first is like eating the icing without any cake.

It might seem like a good idea to start with but could easily leave you feeling worse down the line. And it won't necessarily solve the problem. That's the aim of all this: to keep your brain at its healthiest and functioning at its highest for as long as possible.

FEAR OF MISSING OUT

Part of the power of supplements is that they tap into our insecurities. They exploit the feeling that you might be missing something without realising it.

I eat a well-balanced diet but, like everyone who lives in the modern world, sometimes feel tired or stressed. There have definitely been times in the past where I've felt that the way I'm feeling might be because I'm low in a key vitamin or mineral. I don't meticulously make a record of everything that I eat, so I don't know the exact nutrient content of my diet. As a result, I've tried various over the counter herbal supplements and chemical compounds. I have a drawer filled with half-used pill bottles from the health food store.

This is the gap that the producers of supplements try to leverage. Uncertainty and FOMO and the guarantee that you're not going to feel 100% for 100% of the time. What if there was a secret herb, or ancient remedy that you've never heard of that could radically change the way you feel? *Take this pill and feel good!*

This isn't to say that supplementation isn't necessary – sometimes it certainly is, and for serious concerns you must always speak to your healthcare provider. However, it can't be overstated that one of the most powerful ways of feeling good is by putting food in your body that will make it feel good in the long term.

Key takeaways from this chapter

- Some supplements can have positive impacts on brain health.
- These include creatine, fish oil, resveratrol, acetyl-L-carnitine, phosphatidylserine and bacopa monnieri.
- Supplements should only be considered after you have the fundamentals of good brain health nutrition sorted.
- Any supplementation should be discussed with your doctor first.

Actually, I know I just said that one of the most powerful ways of feeling good is by putting food in your body that will make it feel good, but I want to add a caveat. Putting the right amount of food in makes a difference, as we shall see in the next chapter.

CHAPTER 9: THE BEST FOOD IS LESS FOOD

This evidence is overwhelming at this point. You eat more plants, you eat less other stuff, you live longer.

Mark Bittman

For thousands of years, the only food problems faced by the world were undereating, lack of food and malnourishment. These problems are still very real for many parts of the world, but a new, challenging problem has now emerged as well…

Overeating.

In the past 70 years, the mechanisation, industrialisation and wide scale mass production of food, especially processed food, has completely changed the way that people across the world eat. With these changes we've seen enormous increases in obesity, diabetes and weight-related diseases, all of which have negative impacts on brain health.

In this chapter we're going to be looking at the merits of general calorie restriction for brain health, as well as whether or not fasting might provide a potential method for improving the health of your brain.

GENERAL CALORIE RESTRICTION AND YOUR BRAIN

In chapter 2 we talked about the 'blue zones,' areas of the world where the inhabitants maintained excellent physical and mental health into very old age. An overarching feature of those zones was that their diets consisted of foods that kept them feeling fuller for longer, whilst containing fewer calories than most other foods.

It was first noted way back in the 1930s that general calorie restriction and lower calorie diets increased the lifespan of rats, [142] and various research throughout the 20th century has observed similar findings in yeast, rotifers (microscopic aquatic animals), spiders, worms, fish and mice, as well as in non-human primates. The studies found that in particular, calorie restriction delayed the onset of kidney disease, certain kinds of tumour growth, autoimmune disease, and diabetes. Significantly, it also delayed age-associated neuronal loss in most mouse models of neurodegenerative disorders such as Parkinson's or Alzheimer's disease.[143]

The specific physiological pathways that activate these benefits are complex, too complex to cover in detail within the context of this book and we'll briefly look at how fasting affects the body using similar mechanisms later in the chapter. But overall, the research is incredibly positive:

"Calorie restriction is, to date, the most successful intervention to delay ageing progression or the development of age-related chronic

diseases."[144]

ALL ABOUT FASTING

One of the biggest questions that I get asked by people when talking about health and nutrition, is whether or not fasting is a good idea. The answer is actually a little complicated, so let's break it down into a few bitesize sections.

What is fasting?

Fasting is a deliberate period of eating no food, usually for a specific set time or number of hours. Whilst it has become an incredibly hot topic in today's diet culture, the reality is that fasting has been around for thousands of years and has been part of almost every major religion at some point. Muslims fast during Ramadan, during a month of prayer and reflection. It is one of the Pillars of the religion of Islam, and it is also practised by many Christian denominations.

Popular fasting techniques

There are various forms and variations of fasting that people use, each with different timings, pros and cons. Here are the four most popular:

Time-restricted feeding: In which meals are consumed within a limited number of hours (such as 6-8 hours) each day, with nothing consumed during the other hours. Within this broad window of time-restricted feeding, there are various arrangements that can be used. For example:

- 16:8, in which you limit eating to an eight-hour window each day, typically between noon and 8 p.m. A lot of people who skip breakfast regularly (maybe just having a coffee) even do this without releasing.

- The ‘Warrior Diet’, in which you fast or eat significantly less than you normally would over a 20-hour window, then eat one much larger meal during a four-hour evening window.

- OMAD (One Meal a Day), in which you fast for 23 hours and then eat your daily calories during a one-hour window, typically between 4-7pm.

Alternate day fasting: In which eating is unrestricted every other day, and either zero or minimal calories are consumed on the days in between.

5:2: In which eating is unrestricted for 5 straight days each week, followed by 2 days of restricted caloric intake. Usually, these two days are highly restricted.

Periodic fasting: In which calories are restricted for multiple consecutive days, such as 5 days in a row once a month, and unrestricted for all other days.

HOW FASTING AFFECTS THE BRAIN

In humans, we're still waiting on more good quality research before we can say with certainty that fasting has positive impacts on the brain. To quote a recent research review:

"Four of the plausible mediational mechanisms by which intermittent fasting could provide benefits include lowering of insulin resistance and improving metabolic regulation, increasing autophagy, reducing neuroinflammation, and increasing the brain-derived neurotrophic factor...[but] current understanding is limited, and long-term effects should be investigated."[145]

What this means is that fasting could very well have the same, or similar impacts on our brains as calorie restriction. This makes a lot of sense, because fasting is a form of calorie restriction.

- Reducing neuroinflammation is important, as inflammation within the brain has been linked to numerous brain issues.

- Improving metabolic regulation means that your body can better process sugars/glucose, reducing insulin resistance and the likelihood of diabetes, which we already know have huge negative impacts on brain health.

- Increasing autophagy means that old, damaged cells are being more frequently replaced with newer, healthier ones. Since brain degeneration is specifically related to cell decay and degeneration, encouraging the production of replacement brain cells could have huge positive effects on

brain health.

- And lastly, increasing brain-derived neurotrophic factor (BDNF) is great for your brain, since decreased levels of BDNF are associated with neurodegenerative diseases which involve neuronal loss, such as Parkinson's disease, Alzheimer's disease, multiple sclerosis and Huntington's disease.

Before we get too far ahead of ourselves though, we also have to remember that current understanding is limited, and that far more human studies are needed to confirm these findings in humans.

With all that said, the results from animal models are incredibly promising, with a recent review highlighting that *"fasting improves cognition, stalls age-related cognitive decline, usually slows neurodegeneration, reduces brain damage and enhances functional recovery after stroke, and mitigates the pathological and clinical features of epilepsy and multiple sclerosis in animal models."*[146]

In short, fasting could very well be a powerful tool for the promotion of brain health and the fight against neurodegeneration, but we just don't have enough information yet to say anything conclusive.

Who shouldn't use fasting?

Whilst fasting may be a promising tool for brain health, there are still various groups of people for whom fasting is a poor choice.

Children and teens under age 18

Children and teens are still developing their relationship with food and imposing fasting type approaches on them may increase the likelihood of disordered eating habits and problematic relationships with food. Instead, children and teens should be encouraged to eat a healthy, well-balanced diet full of vegetables and fruit.

Women who are pregnant or breastfeeding

Research is still very mixed and inconclusive about the long-term safety of fasting during pregnancy, so it's probably best avoided. Moreover, pregnant women may find that they have enough to contend with due to the thousands of changes happening in their bodies daily, including massively fluctuating hunger levels, without introducing more confusion into the mix.

People with diabetes or blood sugar problems

Diabetes and blood sugar problems are best managed and controlled through consistent, regular eating patterns, for example, regular low carb meals every 3-4 hours. Fasting doesn't allow for this. Moreover, if you treat your diabetes with insulin, fasting might make your blood sugar levels drop too low. Similarly, eating large portions when you break your fast might make your blood sugar levels shoot too high. All in all, fasting and diabetes aren't a great mix.

Those with a history of eating disorders

If you have a history of eating disorders or poor relationships with food, then the last thing you should be doing is messing

around with only eating at specific times of the day. Research shows that people dealing with anorexia, or those who have previously dealt with it, severely struggle to differentiate fasting from starvation. If you fall into this category, do not fast. Discuss all nutrition approaches with your doctor, dietician and relevant support staff.

APPLYING GENERAL CALORIE RESTRICTION AND FASTING IN REAL LIFE

Now that we've talked about the potential benefits and the mechanisms, we need to tackle the hard part – finding ways to put that information into practice.

The two simple rules to apply general calorie restriction

1. ***Eat a diet that consists mainly of vegetables and lean protein sources, with some fruit, some whole grains and a small amount of healthy fats.***

2. ***Drink mainly water***

It sounds incredibly simple but following these two rules will significantly reduce your total calorie consumption. These foods are very filling yet contain fewer calories than most other foods and drinks.

An extra step to apply general calorie restriction

3. ***Eat calories relevant to your physical activity levels and exercise amounts.***

On days when you're moving around a lot (whether through recreation or work) you can eat slightly more. Similarly, you can also eat a bit more on days in which you do significant exercise.

On the other hand, on days in which you're sitting around not doing very much, and not exercising, aim to consume far fewer calories.

Applying fasting, the two golden rules

1. **Start slowly and conservatively**

If you want to try a fasting approach (and you're not part of the 'do not try' list above) then the best piece of advice I can give you is to start slowly and build up over time. There are no trophies for speed when it comes to putting fasting into practice, and by jumping in too hard too fast, you increase your chances of it not going well, of getting really hungry, grumpy and miserable, and of giving up on the whole endeavour. Instead, build up over time. For instance:

Let's say that you want to try a 5:2 fasting approach. You could start with a 6:1 approach, so you only fast one day per week. Then, if you feel good after a few weeks, transition to a 5:2.

Or, say you want to try an OMAD (One Meal a Day) approach. You could start with something more like 16:8, so you fast for 16 hours a day and eat during an 8 hour window. Try it for a few weeks, and then if that's okay, move on to something like the 'warrior diet', in which you eat for only 4 hours per day. Then, if that's okay, you finally progress onto OMAD.

In other words, progressively increase the time spent fasting, so that you don't try and do too much too quickly.

2. **Choose the type of fasting/caloric restriction that works for you - and don’t feel tied to it.**

Different types of eating approaches will work better for different people. For example:

If you’re someone who isn’t really that hungry in the morning, then a 16:8 approach where you only eat after midday is probably a great choice that fits into your natural pattern.

On the other hand, if you’re someone that feels irritable and low energy until you’ve had breakfast (I definitely fall into this category!), then not eating until midday might be the worst thing to do. You might be better off with a 5:2 approach, where you can still eat something on the 2 days of calorie restriction.

Your best bet is to choose an approach that you think will be best suited to your own likes, dislikes and lifestyle. Then you can try it out and see if it works. If it does, that’s great. If not, don’t get too caught up in it, just move onto another approach.

And if, at the end of the day, you decide that fasting isn’t for you right now, no problem at all. It’s not essential for your physical or brain health, it’s just one of many potential avenues for you to explore.

GROWING UP WITH FASTING

Growing up as part of a Muslim family, fasting has always been a part of my life. In Islam, Ramadan serves as a time for reflection, prayer and self-awareness, and I've always felt that there was something inherently beneficial about the practice of fasting.

Our family always observed Ramadan, and the adults would fast – and sometimes the children too, although usually not for the entire month. During the month of Ramadan, fasting starts at dawn and ends at sunset, so depending on the time of year that it falls, the length of the fast varies. It was always hardest in the summer, when the daylight hours are so long.

When the sun set, we'd break the fast with *iftar*, and the whole family would get together. Traditionally, you eat dates first, which I always loved – and although they're high in sugars, they contain some gut-healthy insoluble fibre. In our family, we'd always follow this with a long list of less-than-ideal food. We'd have samosas and pakora – deep fried and delicious, but not a great start to an even heavier meal, usually quite late at night. And eating that late made it hard to go to sleep straight away.

In the summer, we'd need to wake ourselves up in the middle of the night to eat the first meal of the day before the sun rose. All in all, with the disrupted sleep, the celebratory food and the daily exhaustion, I wonder how far the beneficial effects of fasting were offset by everything else involved.

It's still a practice that is very important to me, and now I try to make sure that my nutrition is the very best in can be during the

time. My food choices now are definitely not that traditional! Of course, there are many reasons to fast which have nothing to do with physical health. However, it's very easy to fall into the trap of riding on the promise of great intentions that turn out very different when actually put into effect. You must make sure that if you do try fasting, you eat well the rest of the time.

Key takeaways from this chapter

- General or total calorie restriction (i.e., eating fewer calories each day) is strongly associated with improved physical and brain health markers.
- Fasting also appears promising based on extensive animal studies, but more human studies are still needed to confirm these findings.
- To practically apply total calorie restriction, focus on eating low calorie, high satiety foods and drinking mainly water, as well as adjusting the number of calories you eat based on how active you are each day.
- To practically apply fasting, start conservatively, build up over time, and aim to find a style of fasting that works for you as an individual.
- Do not use fasting if you are pregnant, diabetic or have a history of eating disorders.

We've now covered every possible aspect of diet and nutrition, including not eating!

I want to finish off by taking a step back so that we can see the bigger picture and start to get a sense of how everything works together.

So that’s exactly what we’ll be doing in Chapter 10.

CHAPTER 10: FOOD IS THE ANSWER (BUT NOT THE ONLY ONE)

In order to properly understand the big picture, everyone should fear becoming mentally clouded and obsessed with one small section of truth.

Xun Kuang

At this point in the book, we've covered a huge amount of diet and nutrition information, and I hope you've got a rounded picture of how the food you eat affects your brain. I truly believe that knowledge is food for your brain, and by learning more about what you eat, you're helping your brain in more ways than one!

But I don't want you to get so caught up in the details that you lose sight of the bigger picture.

In this section we're going to take a step back and look at some of the other methods that you can use to improve the health of your brain. We'll explore how effective they might be in comparison to nutrition, and we'll wrap up with how to make these things work together in a way that will complement your approach to diet and nutrition.

There are, of course, many other things which can improve your brain health. These are the main ones:

EXERCISE

Hopefully you're not too surprised to find this one on the list! Exercise is well known to have positive effects on your heart, which we already know is strongly linked to your brain health. Plus, we all know that warm, happy mood-boosting feeling we get after exercise due to the endorphin release, so we know that exercise and your brain are linked.

Studies also show that exercise is one of the most potent ways to augment brain-derived neurotrophic factor (BDNF) which plays a big role in cognitive function and memory.[147] Reviews of literature have also found that exercise helps to prevent cognitive decline with aging.[148]

So, if you're wanting to improve your brain health, make exercise part of your regular weekly schedule.

COMMUNITY AND SOCIAL INTERACTION

Have you ever wondered why one of the worst punishments inflicted on prisoners is to be put into isolation?

It's because human contact and companionship is essential for good mental health and going without it is strongly associated with problems such as depression and anxiety.[149]

The film *Cast Away* from 2000 with Tom Hanks depicts this in stark terms. Lost alone on an island in the Pacific Ocean, he paints a face on a volleyball in his own blood, calls it Wilson and talks to it for years because he has no one else to interact with.

On the other end of the spectrum, consider the 'blue zones' we discussed earlier, the areas where people live much healthier for much longer. It should come as no surprise that each of these areas are renowned for stronger, close-knit communities that support one another.

Therefore, if you want to improve your brain health, taking the time to involve yourself in your local community and to socialise can make a big difference. So much so, in fact, that researchers have said that these things are "*central to human brain function.*"[150]

MEDITATION AND MINDFULNESS

In Okinawa (another blue zone) they even have a term, *ikigai*, which translates along the lines of, “life worth and purpose.” It is used to describe the pursuit of activities that bring enjoyment, require mastery, and add value to those around you. In Nicoya they use the term *plan de vida*. You can think of *ikagi* and *plan de vida* as meaning something along the lines of, “why I wake up in the morning.”

Living a life of purpose also encompasses a large element of present moment awareness:

“…embracing the joy of little things, being in the here and now, reflecting on past happy memories, and having a frame of mind that one can build a happy and active life.”

It’s this present moment awareness that defines mindfulness, and these mindfulness-based approaches to life have been strongly associated with longer lives, lower stress, improved immune system and improved brain health.[151]

The same research that has shown that exercise has a positive effect on brain-derived neurotrophic factor, also shows that meditation and mindfulness augments BDNF, which has been associated with cognitive function and working memory.

So, if you want to look after your brain, living mindfully, as well as occasionally taking the time to meditate, can make a big difference.

GET GOOD SLEEP

Ask any new parent what they need most of all, and this one is all too obvious.

Sleep is an essential part of brain health, it's used by your body to consolidate memory and learning, locking in things you've experienced each day. Moreover, research has shown that if you don't get enough sleep, the grey-matter volume in your frontal lobe might even begin to decrease. Since your frontal lobe is the region that supports and controls your working memory as well as executive function, this can pose a real issue.

Acute sleep deprivation has negative impacts on your mood, energy levels and concentration, whilst chronic sleep deprivation has those same negative effects magnified. Your brain starts to struggle to operate, decision making becomes impaired, your ability to regulate hot and cold starts to deteriorate, and your ability to solve even basic problems starts to disappear.[152]

So, if you want to keep your brain healthy and functioning well, aim to get at least 7 hours sleep per night. Ideally you should also follow a stable sleep routine, going to bed and waking up at around the same time. It can also be a great idea to follow a bedtime routine that helps you to relax. Typically, this means removing phone screens and games, and making sure not to work, check emails or do anything stressful in the hour before bedtime. This should improve the quality of your sleep significantly.

PLAY MORE GAMES

It's easy to look at children playing outdoor games, board games or even video games and just think, *"they're only doing those things because they're young and their brains are quick."*

And there is some truth to that. We know very well (from Chapter 1) that younger people have far more fluid intelligence.

But what if we flipped the way we looked at the situation? Perhaps instead of children playing games because their brains were quick, it's that children's brains are quick BECAUSE they play so many games!

Think about it, if you're challenging yourself every single day to learn something new, a new skill, a new activity, a new game, you're constantly exposing your brain to more challenges and problems that it has to solve. This is going to create the best conditions for your brain to thrive. Whose brain is going to look the healthiest, and who is going to be the most mentally flexible: someone that has spent the last ten years solving a huge variety of novel problems, or someone that has spent the last ten years sitting around watching reruns of old TV shows?

Exactly!

And neuroscience research is starting to come to very similar conclusions,[153] showing that 'brain games' and video games are effective ways to help prevent brain decline with age.

If you think about the bigger picture for a moment, games are also fantastic ways of accomplishing other brain-positive things as well. Games are often social, which allows for community and social interaction. And games are often a great way to relax and reduce stress, fully absorbing the people playing them in a way that mirrors a lot of the beneficial effects of mindfulness. And if they make you move around, even better!

Which approach has the greatest impact?

Scientifically speaking, I can make a strong case that your diet and nutrition has the greatest impact of all possible interventions for brain health. That's why I've written this book on the topic after all! Between the interaction between your heart and your brain, and between your gut and your brain, due to the effects of the total amount of food you eat, the type of food and its quality, because of the interaction of blood sugar levels and diabetes, there's just so much evidence that what you eat and drink plays a HUGE role in your brain's health.

And it's also the area that people usually need to work on the most.

Personally, though, I think that looking for which brain intervention is 'best' is completely the wrong approach to take.

In reality, all of these interventions, exercise, mindfulness, community interaction and diet all work together to form the big picture.

Let's put it this way, when firefighters turn up to a burning building, do they sit around and decide whether they should get

in there and save the people or focus on spraying water on the fire? No, of course not, they do both of those things simultaneously.

And the same goes for your brain health.

It may not seem like it’s as big an emergency as a burning building, but you need to be as diligent as a firefighter and use every tool available to help your brain.

PUTTING IT ALL TOGETHER

Although it might seem like quite a lot to do, really there's a lot of overlap. You don't carve up your time into these distinct categories. You end up doing a combination of things:

- You might invite your friends round to cook a (brain-healthy) meal together.
- You might go to a group exercise class or join a softball team with some of your work colleagues.
- And if you go to a group yoga class, you're combining exercise with mindfulness and putting it within the context of all important social interaction.

In fact, mindfulness isn't really anything special or mystical. You can integrate mindful practice into daily activities by paying attention to what you're doing with simple things, like walking or gardening, or even doing the cleaning! Mindful eating is a great way to start to really observe what you're consuming, the pace you're eating it, and how you feel about the whole experience.

BALANCE

We live in a culture that favours work and champions extreme displays of productivity. All the messages you're exposed to tell you that you've got to keep moving and keep getting things done or you'll fall behind. And while work can be extremely satisfying and cater to many important parts of our mental life, it is important to take time off.

Now that more and more work is happening remotely, away from offices, it also means that many people are even missing out from the community aspect that a workplace can provide.

So, give yourself a break.

Holidays can combine it all: they give you a chance to focus on eating the right kind of food because you have more time to think about what you're going to eat and to prepare it. You can spend time with friends and family, playing games together and getting exercise together. And most importantly you can sleep! Resting isn't something that is side-lined in favour of productivity – on holiday rest is quite often the aim.

Key takeaways from this chapter

- Food and drink are very likely the most powerful and impactful things you can pay attention to in order to improve your brain health.
- However, other factors such as exercise, community/socialising and mindfulness all play a role too.

- For best brain results, think about the various ways that you can combine these factors throughout your week.

CONCLUSION

Your brain is amazing. It's allowing you to look at this book, not just interpreting the sensory input of shapes, colours, textures and smells, but also making sure that your hands and arms are holding it up. It's then converting the small black marks on the page into a vast network of association and meaning that will be processed and incorporated into the network, enlarging it. This will go on to influence how your brain interprets the world, how it evaluates the choices you've made in the past and determines the ones you are going to make in the future.

Usually, it's hard to remember that this process – reading in this case – that becomes so ingrained and unconsciously easy, is mediated by the incalculably complex interactions of cells in our heads. We can all too easily separate our minds from the physical reality of the stuff that produces it.

But the cells in the brain are influenced by the same things that cells in the rest of our body are influenced by. The same building blocks are used everywhere. Brain cells are mainly fat, they run on carbohydrates and a large part of their communication uses proteins – this might be a different distribution from a heart cell or a liver cell or a muscle, but it's the same basic components.

Fat, protein and carbohydrates. These are the same building blocks contained in all the food you eat. What goes into your body directly affects all the cells it contains.

Through the course of this book, I hope you've come to a greater understanding of how great this effect can be.

Maybe all of this has reaffirmed what you already know. Maybe your diet is at its very best – which is great! But maybe much of it has been a revelation, a new understanding of how the choices you make with something as fundamental as the food that you eat have the potential to seriously damage the health of your brain. You might have got to this point and realised that you need to change.

I want you to know that you can make the changes that you need to. You really can. Some of them will probably be easier than others but changing your approach to food is entirely possible. The only caveat is that you can only do it if you really want to.

So, if you really want to, and you don't know where to start, you need to find the right motivation.

For me the motivation has always been easy. I remember my Dadu and some of the moments we had together and wish we could have had more like that. I remember my grandparents together, and how they were before my Dadu got really ill. I remember my early childhood memories with them, and maybe they are nostalgic, gold-tinted moments that have been transformed by time, but they motivate me. They have motivated me not only to learn more and share what I've learned, but also to put it into practice for myself. I teach my family and the people that mean a lot to me about nutrition, and partly I do that by putting the knowledge into action for myself.

I want to make sure that I'm still there for my children and for their children when they have them. I want to make sure that I

get to spend as much time with them as possible, time that has meaning for both of us.

You might not have the same motivation. Maybe you've had no first-hand experience of the effect of neurodegeneration. As we saw in the first chapter though, that is becoming increasingly statistically unlikely. Dementia rates are soaring worldwide, people are living longer, and healthcare is becoming cripplingly expensive or devastatingly ineffective.

And maybe it seems like it's all a long way away, that you've got your whole life to live, but the choices you make when you're young have been shown not only to have a direct effect on the brain in later life, but even when you're still quite young. The crucial connection between your heart and your brain means that keeping your heart and cardiovascular system healthy will increase the likelihood of keeping your brain healthy for longer.

Sadly, poor cardiovascular health is no longer just the domain of the middle-aged and above. Heart attacks are on the rise in young people. Type 2 diabetes is huge contributary factor, bringing a long list of brain problems of its own, and has become an epidemic. The current dietary pattern of much of the Western world has started a long-term war against our mental health, and the functioning of our brains. And it's a dietary pattern that is backed up by advertising and messaging that is powerful and effective, and entrenched in our current global economy. When you see the pizza commercial on television it's hard to resist! You might not order one there and then, but the seed is sown for that night you're late back from work, too tired to cook and frazzled from a long day of effort and exertion.

Once you have the motivation you need to make a change, you need the capabilities. Hopefully this book has provided you with some of that.

In the second chapter, we looked at the MIND diet, an extension of the Mediterranean diet, both of which seem to have the best overall results for improving and maintaining brain health. This can provide the basic framework for a diet to follow, but as with all the diets, it's never a one size fits all situation.

As we discussed in the third and fourth chapters, with the case of fat and carbohydrates – in the form of grains – the science can be both confusing and contradictory. The MIND diet limits some kinds of fat quite significantly and endorses grains in a big way. We know that low fat is not a good solution, and that even 'bad' fats might not be all bad all of the time. Quality of life and levels of risk need to be taken into consideration, and the MIND is erring as far as it can on the side of caution. That might be the right route for you too. Likewise, a grain-reduced, in particular gluten-free diet might be the right approach for you too. It's so important not to get swept up into the hype of nutritional advertising, and while whole grains are certainly not a problem for most, you might suffer from gluten sensitivity which means cutting them out would be the right path, or you might find eating them means you eat too many of them.

What ties it all together is the gut, your second brain, the subject of the fifth chapter. It unconsciously thinks for you, produces vital neurotransmitters and how it feels on a day-to-day basis directly affects your mood and mental health. The complexity of this relatively new field means that it's likely that some of our

most strongly held beliefs about nutrition may be modified or overturned in the years to come.

Listen to your gut, take care of it, and remember it is as unique and special to you as every other part of your body.

The capabilities that this book has given you is to make the right choices for you. And if you only followed one piece of advice, cutting out all the 'bad guys,' the foods listed in Chapter six would likely change the outcome of your life dramatically. You can add as many of the superfoods from chapter seven as you like, but if your diet is high in trans fats and refined sugar, all the broccoli in the world won't make a difference. And it's also the easiest part of the message to pass on – make sure your loved ones understand that there are some foods best avoided entirely.

Unfortunately, there aren't any shortcuts for creating a healthy brain from the things you put into your body, as we saw in Chapter eight. Some supplements seem to be worthwhile, but they'll only work if they're adding on to other things you're already putting into your body. You need to do the work of putting in more of the right things in the first place, and less of the wrong things. However, there is a shortcut in the opposite direction. In Chapter nine we discussed the promising research into calorie restriction and fasting as a means for improving brain function. Maybe it is less of a shortcut, but more a way to speed up the process of getting back on track, if you feel that you're currently far off course.

In the last chapter we looked at the bigger picture, and that's how I want you look at all of this. Everything is interconnected.

The people you spend time with need to support your choices, just as you support theirs. Part of the reason the Blue Zones provide such a strong example of a healthy model of life is because of the interconnectedness of the lives in each zone. Community, passion and play all provide the context in which a healthy diet will have the optimum benefit for your brain.

The final component to change is opportunity. You can have the motivation, and the capabilities, but without the opportunity, neither will create the change on their own. Opportunity can be the easiest or the hardest part of it all.

The most powerful solution is to try to make the best choice the easy choice. That can be as simple as making sure you have a good supply of your favourite superfoods in the house so that you always have something you can rely on to eat. Prep your meals in advance, so that you don't have to decide between ordering delivery and cooking from scratch. Make sure that you have an alternative to the bad guys in your cupboard for those times that feel drawn to the lure of donuts.

And give yourself some time.

All meaningful change, especially within diet and nutrition, takes time and consistency. You have to consistently eat the good brain foods whilst minimising your intake of the bad brain foods. You have to consistently find ways to work more vegetables into your diet, to drink more water, to eat more whole grains and to eat the foods that improve your heart and gut.

You don't have to do it all at once, and you certainly don't have to be perfect. But you *do* have to make a genuine, continued effort.

And when you do, the results can be absolutely life changing. And I'm not saying life changing in some exaggerated, over the top kind of way like, "this new shampoo will change your life!" I'm saying life changing and meaning that it will be something that will completely change the course of your next 10, 20, 30, 40 or 50 years on this planet.

I'm talking about the difference between walking, jogging and doing yoga when you're older versus being barely able to stand.

I'm talking about being able to communicate clearly, quickly and still being "sharp as a tack" when you're 80, instead of being stuck inside your own head, unable to truly engage with the outside world.

And even long before that, I'm talking about thinking faster, making smarter decisions, solving problems more intelligently and having better emotional control right now.

I'm talking about more opportunities, a better career, stronger relationships, more energy, less stress and a more stable mood.

I genuinely can't emphasize enough just how incredibly impactful the information in this book will be to your quality of life. You just need to put that information into action and start moving forward one step at a time towards your best ever brain. Good Luck!

Yours

Aisha Summers

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