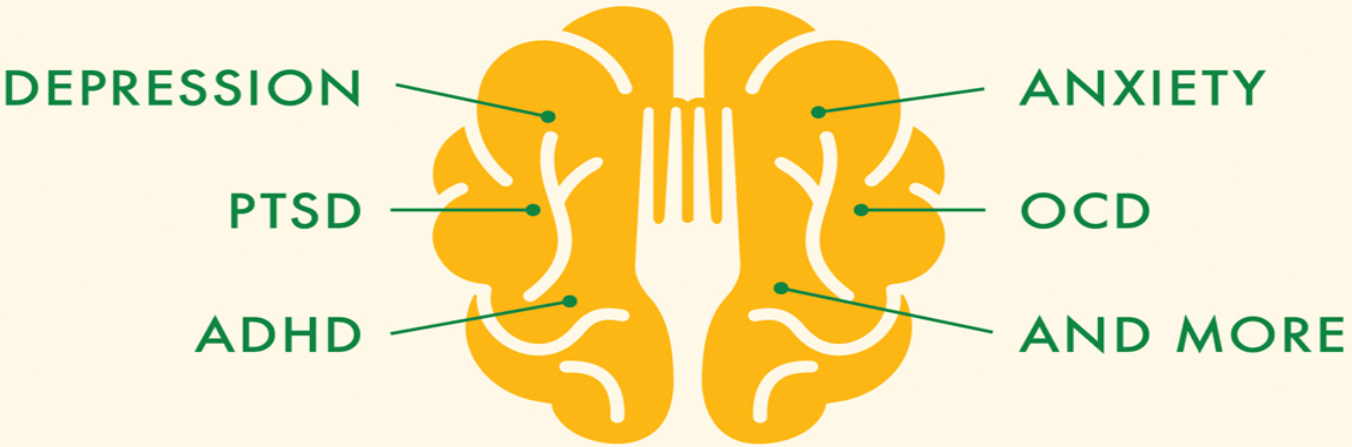
"When it comes to cooking and eating to improve mental health, nobody does it better than Dr. Naidoo." —**WILLIAM W. LI, MD,** author of *Eat to Beat Disease*

THIS IS YOUR BRAIN ON FOOD

AN INDISPENSABLE GUIDE TO THE SURPRISING FOODS THAT FIGHT



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An Indispensable Guide to the Surprising Foods That Fight Depression, Anxiety, PTSD, OCD, ADHD, and More

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Contents

This book is dedicated to my beloved late father and Pinetown Granny,

to my mom (who gave me the most important piece of advice in my life),

and to my husband, without whom this book would never have materialized.

Explore book giveaways, sneak peeks, deals, and more.

Tap here to learn more.

LITTLE,
BROWN
SPARK

Introduction

Nutrition and psychiatry may not seem like the most natural fit. When you picture Dr. Freud with his pipe and his leather couch, he's probably not scribbling a recipe for baked salmon on his prescription pad. Indeed, in my experience psychiatrists send their patients home with prescription drugs or referrals to other types of therapy, but no guidance on how food can help them with the challenges that brought them to the analyst's couch. And though many conscientious modern eaters think constantly about the food we're eating—how it will affect our hearts, the environment, and most of all our waistlines—we don't think about its influence on our brains.

While this relationship between nutrition and mental health may not feel intuitive at first glance, it's key to understanding twin epidemics in modern health care. Though medical knowledge and technology are better than they have ever been, both mental health disorders and bad health outcomes caused by poor dietary choices are disturbingly common. One in five American adults will have a diagnosable mental health condition in any given year, and 46 percent of Americans will meet the criteria for a diagnosable mental health condition sometime in their life. Thirty-seven percent of Americans are considered obese, with an additional 32.5 percent considered overweight, making a total of roughly 70 percent of the population above an optimal weight. An estimated 23.1 million Americans have a diabetes diagnosis, with another 7.2 million estimated to be undiagnosed. That's a total of 30.3 million people, almost 10 percent of the population.

Much like the intricate relationship between the gut and brain that forms the basis of this book, diet and mental health are inextricably linked, and the connection between them goes both ways: a dearth of good dietary choices

leads to an increase in mental health issues, and mental health issues in turn lead to poor eating habits. Until we solve nutritional problems, no amount of medication and psychotherapy is going to be able to stem the tide of mental issues in our society.

While fixing the broken relationship between diet and mental health is certainly important on a societal level, it can also make a crucial difference on an individual level—and not just for those who suffer from diagnosed mental conditions. Whether or not you have ever visited a mental health professional for depression or anxiety, every one of us has felt sad and nervous. We all have experienced obsession and trauma, large or small. We all want to keep our attention and memories sharp. We all need to sleep and have a satisfying sex life.

In this book, I want to show you ways in which you can use diet to achieve well-being in every aspect of your mental health.

When people learn that I am a psychiatrist, a nutritionist, and a trained chef, they often assume that I have been cooking since I was young and that my medical interests came later. But I actually learned to cook relatively late in life. I grew up in a large South Asian family surrounded by grandmothers, aunts, a mother, and a mother-in-law who were all exceptional cooks. I didn’t need to cook! My mom, a double-boarded physician and excellent cook and baker, did get me interested in baking, and it was through the exact measuring of ingredients that the roots of my love for science took hold. Otherwise, I was happy to let others handle things in the kitchen.

When I moved to Boston to train in psychiatry at Harvard, I felt ripped from the love and warmth of my extended family and the delicious food that signified home. I knew I had to learn how to cook in order to carve out a home in this new place. My husband, being the brilliant person he is, already knew how to cook, but I banished him from the kitchen (at least so he likes to joke—in reality he was an invaluable guide and brutally honest taste tester) and began to try out a few recipes that I’d been taught.

For inspiration, I channeled memories of Pinetown Granny, as we called my maternal grandma. While my mom attended medical school during the day, I hung out with her and watched her cook. At three years old I’d peer into the kitchen, not allowed to step anywhere near the hot stove and oven,

and observe her closely. We'd start the day by picking fresh vegetables from the garden, then prepped fresh vegetables for lunch, set the table, told stories, and took an afternoon nap.

Since cable was an unaffordable luxury as we were getting on our feet in Boston, I also watched public television and met the magnificent Julia Child, dropping omelets and teaching me about French cuisine. She inspired great confidence in my cooking and kept me company during many lonely hours when my husband was completing his fellowship. Slowly and steadily, cooking became a part of me and a space in which I could decompress once I began residency.

Even after I began to work as a practicing psychiatrist, my passion for cooking stayed strong, and my husband suggested I spend some time at the Culinary Institute of America. I loved taking classes at the CIA but couldn't sustain the commute while actively working as a doctor in Boston. So I enrolled in an amazing local school, Cambridge School of Culinary Arts, and pledged to keep myself committed to both psychiatry and cooking.

I quickly learned that unlike the sexy medical dramas on TV, which are a far cry from the real-life medical world, professional-level cooking as it is depicted onscreen is really how it is—a lot of screaming and yelling from the head chef, although they're not usually as foul-mouthed as Gordon Ramsay. Though it is stressful, nothing beats the gratifying feeling when your meringue comes together perfectly, or when you appreciate the depth and flavor of a perfectly executed consommé, or when your pâte is the texture of buttercream before it sets.

All the while, I was still actively practicing at the hospital. Thinking back, I am not sure how I managed it. There were many times when I took my books to dinner to study for my written culinary exams. There were also long hours catching up with work, emails, prescriptions, and telephone calls after school. Somehow I got through. I see now that my passion for both worlds drove me, for I truly love psychiatry as much as I do cooking.

During this phase I also became more fascinated with the nutritional value of food. I began speaking actively to my patients about how much cream and sugar went into their 20-ounce Dunkin' Donuts coffee when they complained about weight gain they attributed to their antidepressants. To augment my knowledge of nutrition and confidence in bringing dietary advice to my clinical work, after I graduated culinary school, I also

completed a program in nutritional science.

Armed with my knowledge of psychiatry, nutrition, and the culinary arts, I continued to integrate my clinical work with nutritional and lifestyle techniques, and I honed my own holistic and integrated approach to psychiatry. That method has become the blueprint for my work, culminating in the founding of the Nutritional and Lifestyle Psychiatry program at Massachusetts General Hospital, the first clinic of its kind in the United States.

Even after so much training and experience in my fields, my education in nutritional psychiatry wasn't complete until I witnessed its power firsthand. A few years ago, I was in a luxurious hotel room in Beverly Hills, glancing at sun speckles dancing on the wall, remembering how good it felt to read a book and slide comfortably into an afternoon nap. My husband and I were enjoying a long-awaited and much-deserved long weekend to celebrate his birthday—an event that had gradually evolved into an annual opportunity to get away from our lives to relax and reset.

As I settled myself in to nap, I moved the book, brushing against an odd spot on my chest that I would not normally have reason to touch. I felt a bump. At first, I thought I was just tired, but as I examined myself I shot up in bed, stunned. It was definitely a lump. Cancer. I wanted to doubt the accuracy of my clinical skills, but I could not.

Back in Boston, I was diagnosed within seven days. That week was a whirlwind of tests and appointments that flew by at lightning speed. I felt blessed for having access to some of the best medical care in the world. Despite immense support from colleagues and friends, for the first time in my life I was facing something I had not anticipated. No one wakes up thinking it might be the day they get cancer. I felt completely helpless. I kept thinking about what I might have done wrong, but my strong Hindu roots helped me reframe my situation. As my grandmother and mother had taught me growing up: "This is part of the karma you must face; approach it and handle it with grace, have faith in God, and it will all be okay." While my family and I were all devastated and in tears, those words rang true.

Still, I struggled to work through my emotions; my professional training as a psychiatrist didn't make it any easier to master the roil of feelings that

swirled through my brain. For the first time in my life as a doctor I could not control the outcome of this disease. It was out of my hands. I could do nothing but stretch out my forearm for blood tests and know that soon I would be doing the same for the massive IV bolus treatments of chemotherapy. I went from feeling desperate and panicked to feeling like my emotions were suspended. There was no laughter or tears, no fear or joy. There was only a bone-chilling numbness.

As I got up the morning of my first treatment, I decided I should have a calming cup of turmeric tea. I kept replaying how life had instantly taken a 180-degree turn. I was nervous and afraid and trying to be brave. I knew intimately all the traumatic side effects I might face, even if my treatment was ultimately successful. Yet something about turning the switch on the electric tea kettle metaphorically set off that light bulb in my head: “I know how to cook, I know about my body, and I can help myself through how I eat.”

That may seem like an elementary conclusion for a nutritional psychiatrist to reach, but it’s quite different to be the patient rather than the clinician, especially since I had always been lucky enough to be healthy. But I resolved that I was going to take care of my mind and body through eating healthy food, no matter what the cancer threw at me.

What transpired over the next sixteen months was an intense cycle of chemotherapy, surgery, and radiation. Every chemotherapy appointment, the oncology fellow who worked with me would ask what I had brought to eat that day. I would pull out my lunch bag with a nutrient-dense smoothie made from probiotic-rich yogurt, berries, almond milk, kefir, and dark chocolate. Because of how I ate, I was never nauseous. My weight fluctuated as the side effects of different medications made my appetite increase and decrease, but I ate foods I loved even when medication changed their flavor.

Through all of this oncologic assault on my body, I felt surprisingly healthy, and I found ways to keep my energy up even as the constant round of treatments should have left me totally drained. It was admittedly a greater challenge to stay on top of my mental health, but once again, the food I ate was crucial to keeping an even keel and positive emotional outlook. I cut back on coffee and gave up wine; I ate fresh fruit that I washed, cleaned, and prepared at home. I made soothing high-protein, high-

fiber Indian lentil soups (dal) loaded with folate-rich spinach (here). I made a healing and delicious hot chocolate from scratch once a week as a treat on Thursday nights, giving me something to look forward to after treatments. I was careful to make smart food choices that were not loaded with unhealthy calories. Fatigue prevented me from working out, so I chose to take brisk walks regularly; this also uplifted my mood, as exercise does raise endorphins. I ate to lower my anxiety around weekly Thursday chemo treatments and help lift my mood when the dark, wintry days of Boston closed in on me during chemotherapy.

It gave me strength to see how my mental health was bolstered by incorporating the same recommendations I was making to my patients. I truly needed to "walk the walk," as they say. I had to test myself to see if these strategies could quell my anxiety, soothe me to sleep, and lift my mood. I was not sure I would be a success story, but I felt I owed it to my patients and myself to give my own treatment plan a real fighting chance.

Cancer also made me embrace mindfulness and think more deeply about my own lifestyle. I grew up around regular meditation practice kept up by my parents and extended family; Ayurvedic principles were incorporated daily, and ballet, dance, and exercise were also routine. Yet cancer made me realize that after studying and working so intensely for many years, I'd allowed some of those healthy habits to slip. My mom reminded me to start meditating regularly; my husband and my best friend reminded me about my early years as a ballet dancer, which helped me to return to adult ballet classes and barre-style gym classes. The stress of my busy years had taken a toll on me on a cellular level, and so I now know on the deepest level how important lifestyle techniques are to helping us thrive and flourish. It is not one dimension or one thing; we are each a whole person, and holistic practice is key. While nutritional psychiatry is central to healing, the lifestyle aspects are vital too.

Until writing this, I hadn't spoken widely about my struggle with cancer. I have now completed treatment, my hair is back (thank goodness!), and I walk through each day hoping to reach remission while remembering that what I eat truly impacts how I feel.

All this experience—my background, my schooling, my clinical experience, my time in kitchens, my illness—has inspired me to write this book. I hope that in its pages I can not only introduce you to the exciting

field of nutritional psychiatry, but also give you advice on how to eat to maximize the awesome power of your brain.

CHAPTER ONE

The Gut-Brain Romance

There aren't many things that keep me up at night. I like my sleep. But on occasion, I find myself tossing and turning because I think that in psychiatry, and in medicine as a whole, we have completely missed the forest for the trees.

Granted, we've come a long way from the cold showers and shackles of the seventeenth and eighteenth centuries. In those early barbaric years, "madness" was considered a sinful state, and the mentally ill were housed in prisons. As civilization progressed, mentally ill patients were moved to hospitals.[1] The problem is, as we became more and more focused on the troublesome thoughts and emotions of mental illnesses, we stopped noticing that the rest of the body was also involved.

This wasn't always the case. In 2018, historian Ian Miller pointed out that eighteenth- and nineteenth-century doctors were clued in to the fact that the body's systems are connected.[2] That's why they talked about the "nervous sympathy" among our different organs.

However, in the late nineteenth century, doctors changed this perspective. As medicine became more specialized, we lost track of the big picture, only looking at single organs to determine what was wrong and what needed fixing.

Of course, doctors did recognize that cancers might spread from one organ to the next, and that autoimmune conditions like systemic lupus erythematosus could affect multiple organs in the body. But they neglected to see that organs that were seemingly quite separate in the body might still profoundly influence one another. Metaphorically speaking, illness could

come from a mile away!

Compounding the problem was that, rather than working collaboratively, physicians, anatomists, physiologists, surgeons, and psychologists competed with one another. As one British doctor wrote in 1956, “There is such a clamour of contestants for cure that the patient who really wants to know is deafened rather than enlightened.”[3]

This attitude prevails in medicine even today. That’s why so many people are oblivious to the fact that when mental health is affected, the root of the problem is not solely in the brain. Instead, it’s a signal that one or more of the body’s connections with the brain has gone awry.

We know that these connections are quite real. Depression can affect the heart. Pathologies of the adrenal gland can throw you into a panic. Infections darting through your bloodstream can make you seem like you have lost your mind. Maladies of the body frequently manifest as turbulence of the mind.

But while medical illness can cause psychiatric symptoms, we now know that the story goes even deeper. Subtle changes in distant parts of the body can change the brain too. The most profound of these distant relationships is between the brain and the gut. Centuries ago, Hippocrates, the father of modern medicine, recognized this connection, warning us that “bad digestion is the root of all evil” and that “death sits in the bowels.” Now we are figuring out how right he was. Though we are still on the forefront of discovery, in recent years the gut-brain connection has provided one of the richest, most fertile research areas in medical science and the fascinating nexus of the field of nutritional psychiatry.

ONCE UPON A TIME…

Watching a developing embryo differentiate is like looking through a kaleidoscope.

Once upon a time, a sperm made its way to an egg. They were not ships passing in the night. They connected. And when the union was successful, you were conceived. Warmly ensconced in your mother’s uterus, you, as this fertilized egg (called a zygote), started to change.

At first, the zygote’s smooth outer surface developed ripples like a

mulberry. As time went on, the magical egg, under the spell of biological instructions, started to change its configuration until your baby body took shape. Eventually, after nine long months, you were armed with a heart, gut, lungs, brain, limbs, and other nifty things, ready to announce yourself to life.

But before all that, before you emerged ready to take on the world, before your gut and brain became distinct entities, they were one. They came from the same fertilized egg that gave rise to all the organs in your body.

In fact, the central nervous system, made up of the brain and spinal cord, is formed by special cells known as neural crest cells. These cells migrate extensively throughout the developing embryo, forming the enteric nervous system in the gut. The enteric nervous system contains between 100 million and 500 million neurons, the largest collection of nerve cells in the body. That's why some people call the gut "the second brain." And it's why the gut and brain influence each other so profoundly. Separate though they may appear to be, their origins are the same.

LONG-DISTANCE RELATIONSHIP

I once had a patient who was confused as to why I talked about her gut while treating her mind. To her, it seemed irrelevant. "After all," she said, "it's not like they are actually next to each other."

While your gut and brain are housed in different parts of your body, they maintain more than just a historical connection. They remain physically connected too.

The vagus nerve, also known as the "wanderer nerve," originates in the brain stem and travels all the way to the gut, connecting the gut to the central nervous system. When it reaches the gut, it untangles itself to form little threads that wrap the entire gut in an unruly covering that looks like an intricately knitted sweater. Because the vagus nerve penetrates the gut wall, it plays an essential role in the digestion of food, but its key function is to ensure that nerve signals can travel back and forth between the gut and the brain, carrying vital information between them. Signals between the gut and brain travel in both directions, making the brain and gut lifelong partners.

That is the basis of the gut-brain romance.

CHEMICAL ATTRACTION

So how does your body actually transmit messages between the gut and the brain via the vagus nerve? It's easy enough to imagine the gut and the brain "talking" to each other over some kind of biological cell phone, but that doesn't quite do justice to the elegance and complexity of your body's communication system.

The basis of all body communications is chemical. When you take a pill for a headache, you usually swallow it, right? It enters your mouth, then makes its way to your gut, where it is broken down. The chemicals from the pill travel from your gut to your brain through your bloodstream. And in your brain, they can decrease the inflammation and loosen your tense blood vessels too. When the chemicals you swallow successfully exert their effects on the brain, you feel relief from that pain.

In the same way as the chemicals in that pill, chemicals produced by the gut can also reach your brain. And chemicals produced by your brain can reach your gut. It's a two-way street.

In the brain, these chemicals originate from the primary parts of your nervous system (with an assist from your endocrine system): the central nervous system, which comprises the brain and spinal cord; the autonomic nervous system (ANS), which comprises the sympathetic and parasympathetic systems; and the hypothalamic-pituitary-adrenal axis (HPA-axis), which comprises the hypothalamus, pituitary gland, and adrenal gland.

The central nervous system produces chemicals such as dopamine, serotonin, and acetylcholine that are critical for regulating mood and processing thought and emotion. Serotonin, a key chemical deficient in the brains of depressed and anxious people, plays a major role in regulating the gut-brain axis. Serotonin is one of the most buzzed-about brain chemicals because of its role in mood and emotion, but did you know that more than 90 percent of serotonin receptors are found in the gut? In fact, some researchers believe that the brain-serotonin deficit is heavily influenced by the gut, an idea we'll dig deeper into later on.

The autonomic nervous system (ANS) is in charge of a broad range of essential functions, most of which are involuntary: your heart keeps beating, and you keep breathing and digesting food because of your ANS. When your pupils dilate to take in more light in a dark room, that's the ANS. Perhaps most crucially for our purposes, when your body is under duress, your ANS controls your fight-or-flight response, an instinctual reaction to threat that sends a cascade of hormonal and physiological responses through your body in dangerous or life-threatening situations. As we'll see later on, the gut has a profound effect on fight or flight, particularly through the regulation of the hormones adrenaline and noradrenaline (also known as epinephrine and norepinephrine).

The HPA-axis is another crucial part of the body's stress machine. It produces hormones that stimulate release of cortisol, the "stress hormone." Cortisol amps the body up to handle stress, providing a flood of extra energy to deal with difficult situations. Once the threat passes, the cortisol level returns to normal. The gut also plays an important role in cortisol release and is instrumental in making sure the body responds to stress effectively.

In a healthy body, all these brain chemicals ensure that the gut and brain work smoothly together. Of course, as in all delicate systems, things can go wrong. When chemical over- or underproduction disrupts this connection, the gut-brain balance is thrown into disarray. Levels of important chemicals go out of whack. Moods are upset. Concentration is disrupted. Immunity drops. The gut's protective barrier is compromised, and metabolites and chemicals that should be kept out of the brain reach the brain and wreak havoc.

Over and over again throughout this book, we are going to see how this chemical chaos gives rise to psychiatric symptoms, from depression and anxiety to loss of libido to devastating conditions like schizophrenia and bipolar disorder.

In order to correct those chemical imbalances and restore order to brain and body, you might assume that we would need a barrage of sophisticated, carefully engineered pharmaceuticals. And to a degree, you'd be right! Most drugs used to treat mental conditions do seek to alter these chemicals to return the brain to a healthy state—for example, you may have heard of selective serotonin reuptake inhibitors (most commonly referred to as

SSRIs), which boost serotonin in order to fight depression. Modern mental health medications can be a godsend to patients who struggle with a variety of disorders, and I don't want to downplay their importance as a therapy in many circumstances.

But what sometimes gets lost in discussions about mental health is a simple truth: the food you eat can have just as profound an effect on your brain as the drugs you take. How can something as basic and natural as eating be as potent as a drug that cost millions of dollars to develop and test? The first part of the answer lies in bacteria.

WHY SMALL THINGS MATTER

Behind the scenes of the gut-brain romance is a huge collection of microorganisms that reside in the gut.[4] We call this panoply of different bacterial species the microbiome. The gut microbiome—in both humans and other animals—is another type of romance, with both parties relying on each other for survival. Our guts provide the bacteria with a place to live and thrive, and in return they perform crucial tasks for us that our bodies can't perform on their own.

The microbiome is made up of many different types of bacteria, with a much greater diversity of species in the gut than anywhere else in the body. Each individual gut can contain up to a thousand different species of bacteria, though most of them belong to two groups—*Firmicutes* and *Bacteroides*—which make up about 75 percent of the entire microbiome.

While we won't spend too much time discussing individual species in this book, suffice it to say that when it comes to bacteria, there are good guys and bad guys. The microorganisms that inhabit the gut are normally good guys, but it's inevitable that some bad ones get mixed in. This isn't necessarily a concern, as your body generally makes sure that the good and bad bacteria stay at the right balance. But if diet, stress, or other mental or physical problems cause changes in gut bacteria, that can cause a ripple effect that leads to many negative health effects.

The idea that the microbiome plays such an essential role in bodily function is relatively new in medicine (think about how often you've heard of bacteria as "germs that will make you sick" rather than as a helpful team

of microorganisms that performs a vital service), particularly when it comes to bacteria's influence on the brain. But over the years, the science has been building that gut bacteria can affect mental function.

About thirty years ago, in one of the most compelling studies that first made us aware that changes in gut bacteria could influence mental function, researchers reported on a series of patients with a kind of delirium (called hepatic encephalopathy) due to liver failure. In hepatic encephalopathy, bacterial "bad guys" produce toxins, and the study showed that these patients stopped being delirious when antibiotics were administered by mouth. That was a clear sign that changing gut bacteria could also change mental function.

In the years since, we've accumulated a huge amount of knowledge about how the gut microbiome affects mental health, and we'll unpack that knowledge throughout this book. For instance, did you know that functional bowel disorders like irritable bowel syndrome and inflammatory bowel disease also come with mood changes due to bacterial populations being altered?[5] Or that some clinicians feel that adding a probiotic as part of a psychiatric medication treatment plan can also help to lower anxiety and depression? Or that if you transfer the gut bacteria of schizophrenic humans into the guts of lab mice, those mice also start to show symptoms of schizophrenia?

The primary reason gut bacteria have such a profound effect on mental health is that they are responsible for making many of the brain chemicals we discussed in the last section. If normal gut bacteria are not present, production of neurotransmitters such as dopamine, serotonin, glutamate, and gamma-aminobutyric acid (GABA)—all critically important for the regulation of mood, memory, and attention—is impacted. As we'll see, many psychiatric disorders are rooted in deficits and imbalances of these chemicals, and many psychiatric drugs are tasked with manipulating their levels. Therefore, if your gut bacteria are intimately involved with producing these vital chemicals, it stands to reason that when your gut bacteria are altered, you risk doing damage to this complex web of body and brain function. That's a lot of responsibility for a group of microscopic organisms!

Different collections of bacteria affect brain chemistry differently. For instance, changes in proportions and function of *Escherichia, Bacillus,*

Lactococcus, *Lactobacillus*, and *Streptococcus* can result in changes in dopamine levels and may predispose one to Parkinson's disease and Alzheimer's disease.[6] Other combinations of abnormal gut bacteria may result in abnormally high concentrations of acetylcholine, histamine, endotoxin, and cytokines, which can damage brain tissue.

In addition to regulating neurotransmitter levels, there are various other ways in which microbiota influence the gut-brain connection. They are involved in the production of other important compounds like brain-derived neurotrophic factor, which supports the survival of existing neurons and promotes new neuron growth and connections. They influence the integrity of the gut wall and the gut's barrier function, which protect the brain and the rest of the body from substances that need to be confined to the gut. Bacteria can also have an effect on inflammation in the brain and body, particularly influencing oxidation, a harmful process that results in cellular damage.

A TWO-WAY STREET

As I mentioned earlier, the gut-brain connection works both ways. So if gut bacteria can influence the brain, it is also true that the brain can change gut bacteria.

All it takes is two hours' worth of psychological stress to completely change the bacteria in your gut.[7] In other words, a tense family Christmas dinner or unusually bad traffic can be enough to upset the balance of your microbiome. The theory is that the ANS and HPA-axis send signaling molecules to gut bacteria when you are stressed, changing bacterial behavior and composition. The results can be damaging. For example, one kind of bacterium changed by stress is *Lactobacillus.* Normally, it breaks down sugars into lactic acid, prevents harmful bacteria from lining the intestine, and protects your body against fungal infections. But when you are stressed, *Lactobacillus* fails on all these fronts due to how stress disrupts its functioning, leaving you exposed to harm.

The brain can also affect the physical movements of the gut (for example, how the gut contracts), and it controls the secretion of acid, bicarbonate, and mucus, all of which provide the gut's protective lining. In

some instances, the brain affects how the gut handles fluid. When your brain is not functioning well—for example, when you have depression or anxiety—all these normal and protective effects on the gut are compromised. As a result, food is not properly absorbed, which in turn has a negative effect on the rest of the body since it's not getting the nutrients it needs.

WHEN THINGS GO SOUTH

So to recap, your brain needs the proper balance of gut bacteria to make the chemicals it needs to stay stable and healthy. The gut needs your brain to be stable and healthy so that it can maintain the proper balance of gut bacteria. If that cyclical relationship is disrupted, it means trouble for both the gut and the brain. An unhealthy gut microbiome leads to an unhealthy brain, and vice versa.

A quick illustration of these issues is provided by a survey Mireia Valles-Colomer and her colleagues conducted in April 2019 of more than a thousand people, in which they correlated microbiome features with well-being and depression.[8] They found that butyrate-producing bacteria were consistently associated with higher quality-of-life indicators. Many bacteria were also depleted in people with depression, even after correcting for the confounding effects of antidepressants. They also found that when the dopamine metabolite 3,4-dihydroxyphenylacetic acid, which helps gut bacterial growth, is high, mental health is improved. GABA production is disturbed in people with depression too.

That's just the tip of the iceberg. In each chapter of this book, we will go into specific gut-brain disturbances that map out the relationships between the microbiome and individual disorders. In the pages to come, we will see how depression, anxiety, post-traumatic stress disorder, attention deficit hyperactivity disorder, dementia, obsessive compulsive disorder, insomnia, decreased libido, schizophrenia, and bipolar disorder might all be associated with an altered microbiome. For each condition, I will walk you through where we stand with research today and give you an idea where there may be room for further study.

FOOD FOR THOUGHT

In addition to exploring how disruptions in gut bacteria can cause these kinds of mental issues, we're also going to keep our eyes peeled and our appetites sharp for foods that can help encourage a healthy gut and a healthy brain.

Food influences your brain directly and indirectly.[9] When food is broken down by the microbiota into fermented and digested materials, its components directly influence the same kinds of neurotransmitters we've been discussing, such as serotonin, dopamine, and GABA, which travel to the brain and change the way you think and feel. When food is broken down, its constituent parts can also pass through the gut wall into the bloodstream, and certain metabolites can act on the brain that way as well.

As we've already touched on, food's most profound effect on the brain is through its impact on your gut bacteria. Some foods promote the growth of helpful bacteria, while others inhibit this growth. Because of that effect, food is some of the most potent mental health medicine available, with dietary interventions sometimes achieving similar results to specifically engineered pharmaceuticals, at a fraction of the price and with few if any side effects.

On the other hand, food can also made you sad—certain food groups and eating patterns can have a negative effect on your gut microbiome and your mental health.

Throughout the book, we will examine foods that both help and hurt mental health. You will learn how to use healthy, whole foods to ensure that your brain is working at peak efficiency. In chapter 11, I will provide you with sample menus and recipes that will boost your mood, sharpen your thinking, and energize your whole life.

THE CHALLENGE IN PSYCHIATRY

The idea of using food as medicine for mental health is central to nutritional psychiatry, and in my opinion, it's crucial to finding meaningful, lasting solutions to mental health problems.

As I said at the beginning of the chapter, we've come a long way since the seriously mentally ill were confined to asylums or hospitals without

much understanding of their suffering. But mental health is still in a crisis. More than 40 million Americans are dealing with a mental health concern —more than the populations of New York and Florida combined.[10] Mental disorders are among the most common and costly causes of disability.[11] Depression and anxiety are on the rise. Suicide is a staple on lists of top causes of death, no matter what age-group. We're in a mental health mess, no matter how many people are in denial about it.

It has been challenging to find treatments that help people manage their moods, cognition, and stress levels. Historically, we turned to evidence-based medications and talk therapies that worked for specific conditions. For example, for someone who was depressed, we might have tried a selective serotonin reuptake inhibitor like Prozac. For someone who was panicky, we might have used cognitive behavioral therapy. Those kinds of treatments are still in wide use and can be effective. But for some people, the positive effects last only a short period of time, and they do not completely eliminate symptoms. Sometimes patients develop side effects from the medications and stop taking them. Other times they are afraid of becoming "dependent" on a medication and ask to be taken off it. Some patients who come to see me do not meet the criteria for a disorder such as depression or anxiety. They struggle with symptoms but not enough to warrant a medication intervention.

My own view of where we went wrong is this: psychiatric diagnoses have no statistical validity, and the conditions have no biomarkers of specific diseases.[12] "Diagnoses" are simply lists of symptoms. We assume that when a person presents with psychological symptoms, the problem rests solely in the brain. Given what we have reviewed so far, it is clear that other organs such as the gut play a role in how we think and feel. We need to examine the whole person and their lifestyle in order to better treat them.

The problem is bigger than psychiatry, extending to medicine as a whole. Despite the huge number of health issues that relate to diet, it may sound far-fetched, but many patients don't hear food advice from their doctors, let alone their psychiatrists. Medical schools and residency programs do not teach students how to talk to patients about dietary choices. Nutrition education for doctors is limited.

Thankfully, we are inching toward a moment in health care when medicine is no longer strictly about prescriptions and a single line of

therapy. Thanks to the wealth of medical knowledge accessible to the general public, patients are more empowered and informed than ever. It feels as though all my colleagues are experiencing a similar movement in their specialties, with patients eager to explore a diverse range of ways to feel better. One of my success stories of nutritional treatment was a referral from an infectious disease colleague. Another time, an orthopedic colleague reached out to me to ask more about the data on turmeric as an anti-inflammatory, as his patient with severe knee pain wanted to delay surgery until he'd tried this nutritional intervention.

In psychiatry, we are finally beginning to talk about the power of food as medicine for mental health. The body of research on the microbiome and how food impacts mental health is growing. In 2015, Jerome Sarris and his colleagues established that "nutritional medicine" was becoming mainstream in psychiatry.[13]

The goal of nutritional psychiatry is to arm mental health professionals with the information they need so that they can offer patients powerful and practical advice about what to eat. With this book, my goal is to offer you, the reader, the same kind of information. That doesn't overshadow the importance of working with your doctor, since medication and the appropriate therapy remain a part of the journey to improved mental health. A better diet can help, but it's only one aspect of treatment. You cannot eat your way out of feeling depressed or anxious (and in fact, as we'll see, trying to do so can make things worse). Food is not going to relieve serious forms of depression or thoughts of suicide or homicide, and it is important to seek treatment in an emergency room or contact your doctor if you are experiencing thoughts about harming yourself or someone else.

As I found in my battle with cancer, it is also extremely important to look after your mental health with strategies of mindfulness, meditation, exercise, and proper sleep. The literature on these topics is vast, with methods both ancient and modern (and sometimes a combination of the two!). I won't go into detail about those topics in this book, but I encourage you to explore them on your own.

That being said, in addition to taking guidance from your doctor and encouraging mental wellness in other ways, you should support your treatment by paying attention to how and what you eat. The relationship linking food, mood, and anxiety is garnering more and more attention. In

the chapters that follow, I will guide you through the exciting science of food and its connection to a variety of common mental health challenges.

HOW TO USE THIS BOOK

To better guide you through the science behind how food affects mental health, I'm going to explore ten different mental conditions over the course of this book. Of course, no one reader will need every chapter—you see a lot as a clinical psychiatrist, but thankfully, even I haven't seen a patient who is suffering from every condition we will discuss. It's important to me that readers be able to skip around to the chapters that apply to them most, so I've arranged each chapter to be as self-contained as possible. If you're reading straight through, you'll likely start to notice trends in the advice as we see how various foods and eating patterns affect different conditions in similar ways. Since all the conditions we will talk about are rooted in the gut-brain connection, there is naturally overlap in the foods that worsen and improve them, so be aware that you will see the same recommendations come up multiple times. In each chapter, I will present the studies that support eating or avoiding foods for the given condition.

As you read the book, I encourage you to do so with an open mind. Nutritional psychiatry is just one part of a complex puzzle, and the amount of evidence differs for different foods. Most of the evidence showing that microbiome changes affect the brain comes from animal studies. But several human studies have now also demonstrated the key connection between microbiota and mental health, and I'll include as many human studies as possible in our discussions.

It's also important to note that in many of the studies we cover in the book, researchers supplied the nutrients they studied through dietary supplements. Supplements can help fill in nutritional gaps, but I believe you should always try to get your nutrients from your daily diet first. If you do want to incorporate supplements into your routine, always consult your doctor to ensure you're getting the dosages correct and there are no interactions with medications you are taking. For example, many people don't realize that the innocent grapefruit and related food products like grapefruit juice interact with many medications due to a chemical

compound that blocks certain liver enzymes.

Conventionally, good evidence in medicine means that there have been at least two double-blind clinical trials showing that a treatment has efficacy over a placebo control. A double-blind, placebo-controlled study means that the clinical trial participants may receive the real medication or an inactive substance that looks exactly like the medication (called a placebo). Neither the participant nor the researcher will know which medication (real or placebo) they are receiving. That's the only way to make certain that the real drug is effective.

The problem with double-blind trials is that they give you data on a group of individuals, not the individuals themselves. The group's characteristics may not reflect each unique brain. The only way to truly know what works for you is to experiment on your own. While you should never experiment with medication or even dietary supplements without consulting a doctor, as long as you are sticking to healthy, whole foods, I encourage you to try eating different things to see what diet makes you feel best. This book is intended to be a rigorous but realistic guide on how to choose foods based on your current mental health challenges. In each chapter, I will provide guidelines on each food's or diet's efficacy and safety and give you an idea of the current research and data that support my suggestions.

Of course, this information will likely change as time goes on, as medical knowledge shifts with the release of new studies and research. It doesn't make things easier that nutritional epidemiology has a tendency toward problematic data interpretation. For example, as I write this book, a recent series published in the *Annals of Internal Medicine* is dominating headlines with the claim that there are no health benefits for reducing red meat consumption. I cannot realistically support the conclusions reached by these articles, and I will just reiterate that in making the carefully balanced guidelines presented in this book, I have steered clear of sensationalized nutrient research and outcomes.

Finally, I want to emphasize that psychiatry is a complicated and individualized field. I am by no means suggesting that every patient who suffers from the conditions we are about to explore will find total relief solely through diet. It's important to work with a mental health professional to develop the right mix of psychotherapy and antidepressant medication

when necessary. But no matter what, the food you eat will be an important part of the puzzle.

THE WAY TO A PERSON'S BRAIN

There's a proverb that states that the way to a man's heart is through his stomach. We might have stumbled upon a great truth with slight modification: for both men and women, the food that enters our stomachs can warm our hearts and change our brains.

May this book help bring you greater clarity, calmness, energy, and happiness. Let the exploration begin!

CHAPTER TWO

Depression: Probiotics, Omega-3s, and the Mediterranean Eating Pattern

Let's face it, Doc, there's nothing a great meal can't fix, right?" Ted said to me during his first visit to my office. Ted was thirty-nine, a highly successful entrepreneur who found himself feeling depressed—unhappy with his weight and stressed out by his job and countless responsibilities at home—and using food to help him cope and feel happier. While he was able to function in his day-to-day life, his mood was low, and food seemed to ease the pain he felt. Every night, after working long hours, he'd eat dinner, promptly followed by a bowl of ice cream. Then he'd sit down, watch the news, and mindlessly munch on chocolate or whatever else he could raid from his kids' snack cupboard. All the while enjoying a glass of wine, or two, or three.

When he discussed his symptoms during his annual physical, his primary care doctor suggested he start taking Prozac. While he was open to the idea of an antidepressant, he first wanted to explore other options such as nutritional strategies to help him feel better. That was when he reached out to me for an appointment.

I think Ted was surprised to hear me commiserate with him about how tempting it can be to chase away bad feelings by eating unhealthy food. Even though I'm a doctor, I'm also a human being who knows the allure of "eating your feelings." But I also understand that even if it makes you feel better in the moment, staving off bad moods with junk food means you'll eventually pay the price both physically and mentally. The physical toll of

Ted's depression-induced eating was clear—he had gained 30 pounds, despite trying to eat healthily at his main meals—but the mental toll was even more profound. While Ted thought that his eating habits were combatting his depression, they were actually deepening it.

Ted was right about one thing: food can be powerful medicine. If you make the right dietary choices, a great meal *can* "fix" almost anything, including how you feel about yourself and your life. In this chapter we are going to dive into all the ways that food can harm and heal your moods and learn how to eat in order to live your happiest life.

DEPRESSION AND YOUR GUT

When stress is skyrocketing and your mood is plunging, it's only natural to turn to comfort food. How many of you, like Ted, have found yourselves in a funk, sinking into a couch in front of the TV, with a chocolate bar, tub of ice cream, or bag of potato chips in hand? It's not surprising that in 2018, a cross-sectional research study of depressed college students found that 30.3 percent ate fried foods, 49 percent drank sweetened drinks, and 51.8 percent ate sugary food two to seven times per week.[1] Women were found to be even more susceptible to eating unhealthy food when depressed.

Of course, not everyone who is depressed binges on junk food, because depression can have a variety of effects on appetite.[2] For some, depression dulls their appetite. For others, it makes them ravenous. Many depressed people will skip meals and make poor food choices, which makes sense given that depression is associated with waning levels of mood-regulating neurotransmitters such as serotonin. This can make self-care, like fixing healthy meals, a real challenge. All you can think is, *I want to feel better,* and convenient junk foods like candy bars and potato chips in the moment seem to do the trick.

But here's the thing: they really don't. As you'll come to learn later in this chapter, high sugar intake can contribute to and worsen depression, as well as increase the odds that depression will recur in your life. Luckily, there are foods that can boost and improve mood. How? In part, thanks to the fascinating and complex relationship between the gut and the brain. When discussing depression and the gut with my patients, I often use the

phrase “blue bowel,” a lighthearted name for the very serious relationship between depression and your gut.

As we discussed in chapter 1, food changes the types of bacteria present in your gut microbiome. Your gut bacteria may become less diverse as a result of your diet, which may cause the bad bacteria to outgrow the good bacteria, triggering a cascade of negative health effects. Food can also influence the chemical messages these bacteria send from your gut up to your brain along the vagus nerve—signals that can make you feel either depressed and drained or uplifted and energized.

Animal research first led scientists to theorize that people who are depressed have different populations of gut bacteria than those who are not depressed. For instance, in mice, when the brain’s main center for smell is surgically removed, the mice exhibit depression-like behavior. These changes were accompanied by alterations in gut bacteria. In other words, inducing depression in mice changes their gut activity and bacteria.

Studies in humans appear to confirm this hypothesis. In 2019, psychiatrist Stephanie Cheung and her colleagues summarized findings from six studies[3] that looked at gut health in patients with depression. They reported that patients with major depressive disorder had at least fifty types of bacterial species in their gut microbiome that were different from those of control subjects without major depressive disorder. Recent research suggests that bacterial species associated with higher quality-of-life indicators are depleted in depressed subjects, while bacteria that cause inflammation are often found in higher numbers in people suffering from depression. This tells us that inflammation and depression are closely linked.

Fighting Depression with Probiotics and Prebiotics

If you’re suffering from gut-induced depression, how do you reset your gut microbiome to steer you back to a healthy mental state? The key is to increase probiotics and prebiotics in your diet. Probiotics are live bacteria that convey health benefits when eaten. Probiotic-rich foods contain beneficial bacteria that help your body and brain. An animal study in 2017 from the University of Virginia School of Medicine indicated that *Lactobacillus,* a single gut bacterium commonly found in live cultures in

yogurt, can reverse depression in rats. This bacterium is often an ingredient in human probiotic supplement formulations. More recently, similar findings have been established in humans as well.

Prebiotics are essentially food for helpful bacteria, certain types of fiber that we cannot digest but the good bacteria in our guts can. For probiotics to be effective, it is helpful for them to have prebiotic foods available in the gut to digest. Probiotics break down prebiotics to form short-chain fatty acids that help reduce gut inflammation, block the growth of cancerous cells, and help the growth of healthy cells.

In 2010, Michael Messaoudi and his colleagues studied fifty-five healthy men and women who were randomly assigned to receive either a daily probiotic formula or a placebo for thirty days.[4] Before and after treatment, the research subjects filled out questionnaires about their mood. They also provided urine samples so that their levels of cortisol, the body's main stress hormone, could be checked.

Compared to the placebo group, those in the probiotic group reported less depression, and urinary levels of cortisol were lower, indicating that their brains were less depressed *and* less stressed.

Why was this the case? Certain species of gut bacteria have the ability to boost levels of brain chemicals such as gamma-aminobutyric acid, which may speed relief from depression and other mental health conditions.[5]

Probiotics are available in supplements, but it's preferable to increase your levels of friendly bacteria through dietary sources. Yogurt with active cultures is one of the best sources of probiotics; just avoid fruited yogurts high in added sugars. Other probiotic-rich foods include tempeh, miso, and natto (fermented soybean products); sauerkraut; kefir (soured yogurt); kimchi (Korean pickle); kombucha (a fermented tea drink); buttermilk; and select cheeses such as cheddar, mozzarella, and Gouda. Examples of prebiotic-rich foods include beans and other legumes, oats, bananas, berries, garlic, onions, dandelion greens, asparagus, Jerusalem artichokes, and leeks.

For an example of the power of probiotics, consider my patient Rosa. Rosa read about my work in nutritional psychiatry in a feature on probiotics in the *Wall Street Journal* and asked her pulmonologist to refer her to me. She had severe asthma and had been in and out of inpatient units suffering from serious bacterial, viral, and fungal chest infections. Her doctors could

not get ahead of the infections. She was treated with multiple antibiotics and other medications that she believed had disrupted her microbiome.

While Rosa was by no means terminally ill, she arrived in a frail, emotionally depleted state, feeling as though life was not worth living. She had lost her appetite, had lost weight, and had struggled with eating hospital food when she was in treatment. Given that her microbiome was likely quite disrupted by the medications she had been taking for several lung infections, I spoke to her about using both probiotic- and prebiotic-rich foods in her daily diet and bulking up on fresh fruit and vegetables.

She switched her breakfast chocolate croissant out for a plain Greek yogurt topped with berries, cinnamon, and a drop of honey. She followed my recipe for making a creamy salad dressing using kefir and added this to a healthy green salad with beans, dandelion greens, and radish for lunch. She added onions and garlic to all her vegetable side dishes and leeks to her soups. She began drinking kombucha and used my recipe for miso-glazed sweet potatoes (here) as a side to her baked salmon dinner (here). In fact, she liked the taste of miso paste so much that she began to use it on her daily vegetable side dish (her favorite was grilled asparagus), thereby incorporating another probiotic food source.

Although it took time to heal her microbiome, she began to feel brighter, less fatigued, and less "foggy" two to three weeks after we adjusted her diet. I am delighted to report she is now thriving, is eating healthier, has not been readmitted to the hospital for infections this year, and, most important, is no longer depressed and is feeling like herself again.

FOODS THAT DULL YOUR MOOD

There are many other ways that the food you eat can affect your mood. As evidenced by a 2019 study by Heather M. Francis and her colleagues, there is strong evidence that poor diet is connected to depression.[6] Whether you want to say goodbye to depression symptoms you're currently experiencing or prevent the blues from creeping up on you, be sure to leave the following foods on the grocery store shelf.

Sugar

While scientific literature backs the long-held notion that feeling down in the dumps can lead you to overindulge in sugary treats, it also suggests the opposite to be true: the more sugar you eat, the more likely you are to be depressed. In 2002, Arthur Westover and Lauren Marangell found a profound correlation between people who ate sugar and those with depression.[7] Statistically speaking, a perfect correlation is 1. Researchers almost never hit this mark, because there are always exceptions. But in their study, these researchers reported the correlation between eating sugar and having depression at 0.95—that's pretty close to 1. And this was true across six countries!

In 2019, a meta-analysis of ten previously published observational studies including 37,131 people with depression concluded that consuming sugar-sweetened beverages put people at a higher risk for depression. If they drank just over a 12-ounce can of soda a day (about 45 grams of sugar) they increased their risk by 5 percent. But if they drank two and a half cans of soda a day (about 98 grams of sugar), their risk jumped to 25 percent.[8] In other words, more sugar consumed also meant a greater risk of depression. Pay attention to the sugar content of what you drink.

Why might sugar cause depression? The brain relies on glucose, a type of sugar, from the food we eat in order to survive and to function. Over a twenty-four-hour period, the brain needs only 62 grams of glucose to do its job, an incredible display of energy efficiency considering the brain has at least 100 billion cells. You can easily meet this need through healthy, whole foods. Consuming unhealthy processed foods like baked goods and soda, which are loaded with refined and added sugars, often in the form of high-fructose corn syrup, floods the brain with too much glucose. This "sugar flood" can lead to inflammation in the brain and may ultimately result in depression.

Research also shows that higher blood-glucose levels are linked to lower levels of brain-derived neurotrophic factor (BDNF) in rats. BDNF is a protein found in the brain, gut, and other tissues that is critical to helping the brain grow and develop, as well as helping the brain adapt to stress.[9] So you won't be surprised to hear that studies have found low levels of BDNF in women with depression.[10] BDNF may also improve the effect of antidepressant drugs, another indicator that it plays an important role in preventing depression.[11]

High-Glycemic-Load Carbohydrates

Even if high-carbohydrate foods—for example, bread, pasta, and anything else made from refined flour—don't taste sweet, your body still processes them in much the same way it does sugar. That means they can also raise your risk for depression. Don't panic, I'm not going to suggest eliminating carbs from your diet completely! But the quality of the carbs you eat matters.

In 2018, researchers sought to evaluate which particular carbohydrates, if any, had an association with depression.[12] They administered a questionnaire called the carbohydrate-quality index to 15,546 participants. "Better-quality" carbohydrates were defined as whole grains, foods high in fiber, and those ranked low on the glycemic index (GI). The GI is a measure of how quickly foods convert to glucose when broken down during digestion; the faster a food turns into glucose in the body, the higher its GI ranking.

Of the participants in this study, 769 people were found to be depressed. The researchers discovered that people who had the highest score on the carbohydrate-quality index, meaning they were eating better-quality carbs, were also 30 percent less likely to develop depression than those who were eating high-GI carbs. In other words, a high-GI diet appears to be a risk factor for depression.[13] High-GI carbs include potatoes, white bread, and white rice. Honey, orange juice, and whole-meal breads are medium-GI foods. Low-GI foods include green vegetables, most fruits, raw carrots, kidney beans, chickpeas, and lentils.

In order to minimize your chance for depression, you'll want to structure your diet to avoid high-GI foods while leaning more heavily on medium- and especially low-GI foods, with an emphasis on good sources of whole grains and fiber such as brown rice, quinoa, steel-cut oatmeal, chia seeds, and blueberries. However, a word of caution: you don't want to overindulge in medium- or low-GI foods either. A large quantity of any carbs, no matter what their GI, places what is called a high glycemic load on your body. Very simply, the glycemic load of a certain food is a number that estimates how much the food will raise your blood-glucose level after you eat it. Studies show that a high glycemic load can increase your chances of depression as well.

The take-home message? While you don't need to cut out carbs completely to improve or avoid depression symptoms, it's essential to make sure you're choosing the right carbs and eating them in reasonable quantities. To help out, I've included a chart in Appendix A of common foods with low-, medium-, and high-glycemic loads.

Artificial Sweeteners, Especially Aspartame

Saccharin (Sweet'N Low), aspartame (NutraSweet), sucralose (Splenda), and stevia (Truvia) are just a few of the most popular artificial sweeteners in use by food manufacturers today. Other lesser-known compounds are erythritol, lactitol, maltitol, sorbitol, and xylitol. These sugar replacements are increasingly common in foods that purport to be "healthy" by helping you cut down on calories.

That's alarming, because science implicates many artificial sweeteners in depression: one study showed that people who consume artificial sweeteners, mostly via diet drinks, are more depressed than those who don't consume such beverages.[14] Even worse, several studies have demonstrated that artificial sweeteners can be toxic to the brain, altering brain concentrations of mood-regulating neurotransmitters.[15]

Aspartame, the primary sweetener in many popular diet drinks, including Diet Coke, has been proven to be particularly damaging. In 2017, a review of the studies on aspartame found that it increases substances in the brain that inhibit the synthesis and release of the "happy" neurotransmitters dopamine, noradrenaline, and serotonin.[16]

In addition, aspartame causes oxidation, which increases harmful free radicals in the brain. We'll talk about the damaging effects of oxidation many times throughout the book. Oxidation is a chemical process that releases certain particles known as reactive oxygen species, including free radicals, which are unstable molecules prone to causing havoc in cells.[17] At low to moderate concentrations, reactive oxygen species are important to your brain cells because they help to maintain internal chemical balance. However, at higher concentrations, an imbalance between antioxidants (which fight free radicals) and the free radicals themselves triggers a condition called oxidative stress, which can cause cell loss or even brain damage and can render the brain more prone to depression.

Not all sweeteners are guaranteed to be harmful. However, there is mounting evidence that other sweeteners beyond aspartame, such as sucralose, could also be causing or worsening depression. A 2018 study showed that sucralose significantly alters gut bacteria in mice, increasing a type of bacteria that other studies show is increased in people who are depressed.[18] Sucralose also increases myeloperoxidase activity. Myeloperoxidase is a marker of inflammation, and one study found that twins with a history of depression had levels of myeloperoxidase 32 percent higher than those without depression.[19]

If you suffer from depression, I recommend avoiding all artificial sweeteners. Since you're also avoiding sugar, it may take time to wean yourself off of a sweet tooth, but the benefits will be well worth the effort.

Fried Foods

Tempura, empanadas, samosas, fish and chips, chicken-fried steak. Is your mouth watering? I get it. I often spend time on Cape Cod, where, every summer, the delectable aroma of fried pickles and French fries fills my nostrils and proves simply irresistible. I couldn't imagine never eating fried food again, even though I know all the associated health risks. Flavor matters to my quality of life! Still, when it comes to depression, it pays to reduce the amount of fried foods you eat.

A study in Japan looked at 715 Japanese factory workers and measured their levels of depression and resilience. It also documented their level of fried-food consumption. Sure enough, the research team found that people who consumed more fried foods were more likely to develop depression in their lifetime.[20]

Much like the findings associated with sugar consumption, this finding might seem counterintuitive. I mean, when was the last time eating French fries depressed you? Never, right? At least not while you're eating them. I'm betting a few hours after the last time you indulged in a fried-food feast you felt bad—like you had too much and overdid it. While we usually think these bad feelings are simply due to the guilt of overeating, they might be feeding into more serious feelings of depression over time.

If you're eating fried foods daily, switch to weekly. If it's a weekly habit, try enjoying them just once a month. If you don't eat fried foods, you're

already on your way to happier times!

Bad Fats

Fried foods are likely such mood killers because they're usually fried in unhealthy fats. In recent years, the conversation around fat in the diet has changed from all fats being unhealthy to a clearer distinction between "bad fats" (for instance, margarine, shortening, and hydrogenated oils) known to cause cardiovascular disease and other woes, and "good fats" (for instance, avocados, almonds, and olive oil) that can help prevent disease and benefit well-being.

In 2011, Almudena Sánchez-Villegas and her colleagues reported on earlier research in which they had set out to determine if there was an association between fats and depression.[21] They enrolled 12,059 Spanish university graduates who were free of depression at the start of the study and had each answer a 136-item food-frequency questionnaire to estimate their consumption of specific culinary fats (olive oil, seed oils, butter, and margarine) in order to determine their intake of different categories of fats —saturated fatty acids, polyunsaturated fatty acids (PUFAs), trans-unsaturated fatty acids (trans fats), and monounsaturated fatty acids (MUFAs). During follow-up visits, participants were asked to note any new onset of depression.

After about six years, 657 new cases of depression were identified. The researchers found that the more trans fats in a participant's diet, the more likely they were to become depressed. On the other hand, the more MUFAs and PUFAs a participant consumed, the less depressed they were. In terms of individual culinary fats, the researchers concluded that olive oil—which consists largely of MUFA—significantly lowered depression risk.

To prevent or lower your chances of depression, shun all trans fats. Although the Food and Drug Administration banned trans fats in 2018, food manufacturers are permitted a transition period to comply with this regulation, so trans fats can still be found in certain foods including microwave popcorn, frozen pizza, refrigerated biscuit dough, fast food, vegetable shortening, and some margarines.

MUFAS should make up the majority of the fats in your diet. In addition to olive oil, MUFAs are found in nuts (almonds, walnuts) and nut butters

(almond and cashew butter) as well as avocados.

While PUFAs are better than trans fats, not all sources of PUFAs are the best choices for depression. For example, corn, sunflower, and safflower oil in moderation in your diet may be okay, but in excess they can cause an imbalance in omega-3 and omega-6 fatty acids, which may impact emotional regulation and lead to depression (more on this shortly).[22]

Added Nitrates

Used as a preservative and to enhance color in deli slices and cured meats like bacon, salami, and sausage, nitrates may be connected with depression.[23] One recent study even suggests that nitrates can alter gut bacteria in such a way as to tip the scales toward bipolar disorder.[24] If you simply can't live without salami and sausages, seek out those containing buckwheat flour, which is used as a filler. Buckwheat flour contains important antioxidants that will counter some of the negative health effects of these meats.[25]

GOOD FOOD FOR GOOD MOODS

Now that you know the common dietary culprits for depression—the foods that can cause all those unpleasant symptoms, from guilt to sleep and appetite problems, difficulty concentrating, low energy, and a loss of interest in many things in life—it's time to look at the flip side. Here's what to eat in order to prevent the blues or kick them to the curb once and for all.

Foods Rich in Omega-3 Fatty Acids

We already discussed good fats for depression earlier in the chapter, but I want to give special attention to the importance of omega-3 fatty acids. Omega-3s are crucial to mental health, and we will discuss their benefits over the course of the book.

Omega-3s are important for normal body metabolism—they are a vital part of cell membranes and provide the starting point for making the hormones that regulate blood clotting, contraction and relaxation of artery walls, and inflammation. But since we cannot produce them on our own, we

must get our omega-3s from our diet. This is why we call them *essential* fats.

The three main omega-3 fatty acids are alpha-linolenic acid, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). All three are important to the body, performing a number of tasks, especially in cell membranes. EPA and DHA are the two omega-3s that play the most critical role in mood disorders, so it's particularly important to ensure that you get enough of them.

While there is some argument about the importance of omega-3s in the fight against depression, most studies suggest they are instrumental, including a 2016 meta-analysis of thirteen randomized controlled trials of 1,233 patients with major depressive disorder. It found a beneficial overall effect of omega-3s in patients with major depressive disorder, especially in participants taking higher amounts of EPA and in those taking antidepressants.[26]

Omega-3s promote brain health by lowering inflammatory markers and protecting neurons from excessive inflammation. The key is to maintain a healthy balance between omega-3s and omega-6s, which are found in different foods. In a typical Western diet, omega-6s are quite common, while omega-3s are much rarer, leading to an omega-6 to omega-3 ratio of somewhere around 15 to 1. The ideal ratio is more like 4 to 1.[27] That means most Americans need to cut down on omega-6s while eating more omega-3s.

Indeed, studies have shown that people who consume foods high in omega-6 fatty acids have more than four times the risk of depression compared to those who consume foods high in omega-3s. This means that eating foods high in omega-6s like full-fat cheese, high-fat cuts of red meat, corn oil, and palm oil may increase your chances of depression. On the contrary, eating foods high in omega-3s like fatty fish, walnuts, vegetable oils, and dark, leafy vegetables may protect you against depression.

The very best source of omega-3s, especially EPA and DHA, is fish. In particular, cold-water fatty fish, such as salmon, mackerel, tuna, herring, and sardines, contain high amounts of omega-3s. Fish with a lower fat content, such as bass, tilapia, cod, and shellfish, aren't quite as rich in omega-3s but still have significant amounts. Farmed fish usually have higher levels of EPA and DHA than wild-caught fish, but it depends on the

food they are fed. That's because fish themselves do not actually make the omega-3s. Instead, they are found in microalgae. When the fish consume phytoplankton, which consumes microalgae, they accumulate omega-3s in their tissues.

Omega-3s can also be found in other foods, though nothing is as good a source as fatty fish. Grass-fed beef contains more omega-3s than commercial beef. Alpha-linolenic acid is available from plant sources like edamame, walnuts, and chia seeds, and there are an increasing number of omega-3-fortified foods on the market, especially eggs, milk, and yogurt.

You can also improve your ratio of omega-6 to omega-3 by using certain oils in your cooking. For instance, rather than using plain vegetable oil, which is extremely heavy in omega-6, use canola oil. While canola oil is far from a perfect source of omega-3s, its ratio of omega-6 to omega-3 is roughly 2 to 1, making it a natural choice for a healthier alternative to similar oils.

Foods Rich in Helpful Vitamins

Many vitamins play key roles in preventing and easing depression. The most important are folate (B_9) and B_{12}. Their functions in the body are inextricably linked: a deficiency in vitamin B_{12} results in a folate deficiency, which can ultimately contribute to a loss of brain cells, chiefly those located in the hippocampus. Termed "hippocampal atrophy," this loss of brain cells is associated with depression. The hippocampus is a critical brain structure that plays an important role in learning and memory, so depressed patients may lose their ability to learn new ways to cope with their stress.

In patients with folate deficiency, depression is the most common symptom.[28] In fact, studies have demonstrated that the higher one's folate level, the lower one's level of depression.[29] In addition to its role in the hippocampus, folate may also affect serotonin synthesis, and in depression, serotonin is often low.[30]

Hence, both vitamin B_{12} and folate should be optimized to prevent or treat depression. Enjoy ample amounts of legumes, citrus fruits, bananas, avocados, leafy green and cruciferous vegetables, asparagus, nuts and

seeds, and fish and shellfish.

Vitamins B_1 (thiamine) and B_6 (pyridoxine) are also key for preventing and easing depression, as they help the brain produce and synthesize the neurotransmitters involved in mood regulation. These vitamins are abundant in the foods mentioned in the previous paragraph, as well as in soybeans and whole grains.

Vitamin A facilitates proper brain function such as the growth and adaptation of neurons.[31] As with vitamin B_{12}, a deficiency of vitamin A may result in shrinkage of certain brain areas, disturbing how the brain responds to stress.[32] In 2016 a study found that vitamin A can significantly improve fatigue and depression in multiple sclerosis patients.[33] However, too much retinoic acid (a metabolite of vitamin A) has also been associated with depression and suicide.[34] The amount of vitamin A you would have to consume to suffer these ill effects is far beyond what you will eat in a healthy, varied diet, so feel free to eat vitamin A–rich foods such as sweet potatoes, carrots, spinach, and black-eyed peas.

Vitamin C is important for proper brain functioning, as it's responsible for the regulation of neurotransmitter synthesis.[35] Several observational studies have suggested a relationship between low levels of vitamin C and depression.[36] Get your vitamin C from citrus fruits, cantaloupe, strawberries, and cruciferous vegetables including broccoli, cauliflower, and Brussels sprouts.

We will talk about vitamins many times throughout the book, so if you need a refresher on what vitamins perform which brain functions, and what foods contain those vitamins, you can refer to Appendix B.

Foods Rich in Iron and Other Helpful Minerals

In the brain, iron helps make up the covering that protects neurons and helps control the synthesis of chemicals and chemical pathways involved in mood.[37] In fact, a large concentration of iron is found in the basal ganglia, a collection of brain cells that have been implicated in depression.[38] In clinical studies, low iron levels and depression have been linked.[39] Good food sources of iron include shellfish, lean red meats and organ meats (in moderation), legumes, pumpkin seeds, broccoli, and dark chocolate (though any sweet should be eaten in moderation).

Magnesium is also important for proper brain function. The first report of magnesium treatment for agitated depression was published in 1921, and it showed success in a whopping 220 out of 250 cases.[40] Since then, countless studies have suggested that depression is related to magnesium deficiency. Several case studies, in which patients were treated with 125–300 mg of magnesium, have demonstrated rapid recovery from major depression, often in less than a week. How can you get enough magnesium in your diet? Eat more avocados, nuts and seeds, legumes, whole grains, and some omega-3-rich fish (such as salmon and mackerel).

When it comes to potassium, the picture is not as clear, but some studies have shown that higher potassium intake can improve mood.[41] Sweet potatoes, bananas, mushrooms, oranges, peas, and cucumbers are all high in potassium.

Most evidence strongly supports a positive association between zinc deficiency and the risk of depression, with zinc supplements reducing depressive symptoms.[42] A meta-analysis of seventeen studies found that blood zinc concentrations were lower in depressed subjects than in control subjects.[43] Zinc probably helps because it reduces brain inflammation.[44] Find high concentrations of zinc in seafood (especially cooked oysters), lean beef, and poultry, with lower amounts found in beans, nuts, and whole grains.

Finally, several studies have also suggested that a diet high in selenium significantly improves mood scores.[45] Brazil nuts are packed with this nutrient.

Again, if you need a quick reference for what foods contain these minerals, see Appendix B.

Seasonings, Spices, and Herbs

What should you use to season that piece of nutrient-rich grilled fish or veggie sauté? The following spices and seasonings can help combat depression. Use them with the antidepressant foods shared previously for double the mood-boosting effect.

In general, one important benefit of spices is their antioxidant properties —in other words, they help the brain fight off harmful free radicals and therefore prevent oxidative stress, which can damage tissues. There is a

measure of spices' antioxidant capacities called ORAC (oxygen radical absorbance capacity). I've included an ORAC chart in Appendix C showing which spices have the most antioxidant benefits. Make sure to prioritize those in your cooking as much as possible.

Saffron: In 2013, a meta-analysis of five previously published randomized controlled trials looked at the effects of saffron supplementation on symptoms of depression among participants with major depressive disorder.[46] In all these trials, researchers found that saffron supplementation significantly reduced depression symptoms compared to the placebo controls. A study in 2017 demonstrated that 15 mg of saffron was as effective as 20 mg of Prozac in decreasing depressive symptoms! Apparently saffron's secret power was known to Christopher Catton, a nineteenth-century English herbalist who once said, "Saffron has power to quicken the spirits, and the virtue thereof pierces by and by to the heart, provoking laughter and merriment."[47] While its precise mechanism of action is not known, in animals saffron increases levels of the good-mood neurotransmitters glutamate and dopamine.[48]

Per pound, saffron is more expensive than gold, and its flavor can overpower others, so you'll want to use a sprinkle and not a handful! After blooming a few threads (see San Franciscan Seafood Stew, here), add it to vegetable and rice dishes, such as saffron risotto or biryani. You can also find a supplement or extract, though as always with supplements, consult your doctor before taking it.

Turmeric: A meta-analysis in 2017 evaluated six clinical trials that tested the active ingredient in turmeric, called curcumin, for depression.[49] They concluded that curcumin was significantly more effective than placebo in reducing depressive symptoms. How is it capable of such profound effects? Simply put, it adjusts brain chemistry and protects brain cells against toxic damage that leads to depression.

The effective dose is 500–1,000 mg a day. While you will read that 1 teaspoon of turmeric contains about 200 mg of curcumin, that's not exactly accurate. Because turmeric contains approximately 2 percent curcumin by weight, 1 tablespoon (or 3 teaspoons) which weighs 6.8 grams, really contains about 0.136 grams of curcumin, or 136 mg. For any dish, more than 1 teaspoon of turmeric may be overwhelming, so making a few dishes with a teaspoon or two of turmeric a day is a potential solution: add a touch

of turmeric to your soups and stews, or even add it to your smoothie. Make a hot tea with it or add a pinch to your salad dressing. Note that piperine, a constituent found in black pepper, increases the absorption and bioavailability of curcumin by 2,000 percent.[50] So when you use turmeric, always add some freshly ground pepper too.

Oregano: Carvacrol, an active ingredient in oregano, was found to have antidepressant activity in mice.[51] Other researchers have also connected carvacrol with neuroprotective and antidepressant effects in animals, although to date, there are no such studies in humans. That said, I believe it's likely to help protect brain tissue. Commonly used in many cuisines, it's a staple ingredient in my favorite Greek dressing, used to marinate olives and feta cheese, and delicious on oven-roasted vegetables.

I'll discuss lavender, passionflower, and chamomile in detail while discussing anxiety in chapter 3, but know that these herbs can all be helpful for depression too.[52] They're easiest enjoyed as teas.

I know that it may feel a bit overwhelming imagining yourself standing in a busy grocery aisle trying to remember exactly which foods are highest in which nutrients.

An even easier way to keep straight what you should and should not eat when fighting depression is to follow a broad diet that naturally steers you toward food that is healthy for your brain and away from food that can hinder your mood. Luckily, such a diet already exists!

THE MEDITERRANEAN EATING PATTERN

While the Mediterranean diet wasn't formulated expressly with mental health in mind, it incorporates all the depression-busting foods just mentioned, and in healthy ratios to help you achieve the nutrient balance needed for optimal brain functioning and mood regulation. And, of course, it's healthy for your body in many other ways.

As first described in 1957 by physiologists Ancel Keys and Francisco Grande Covián, and then refined by scientific studies that evaluated the impact of this way of eating on health outcomes, some daily foods in the original Mediterranean diet should include:

- 3–9 servings of vegetables
- ½–2 servings of fruit
- 1–13 servings of cereals (bread and other grains, preferably whole grains)
- Up to 8 servings of olive oil[53]

While those serving sizes look like broad ranges (particularly for cereals—13 servings of carbs per day is not advisable in modern nutrition), the amounts translate to roughly 2,200 calories a day, broken down as 37 percent total fat (of which 18 percent is monounsaturated and 9 percent is saturated) and 33 grams of fiber.

Rather than adhering to the strict proportions of the traditional Mediterranean diet, I prefer to have my patients follow the Mediterranean eating pattern (MEP), which confers the same protective effects on depression risk.[54] I sometimes describe this way of eating as a "Mediterranean lifestyle," because my patients often feel the word *diet* can sound negative. Diet is associated with restriction, while, truly, this dietary approach is all about the delicious foods you can *add* to your life to enhance your meals and feel better in the process. Plus, when you don't feel you're giving up food, you can avoid what inevitably occurs on restrictive diets: the pendulum swinging back, where you end up overeating the shunned foods anyway. The MEP is a plant-based diet that's abundant in locally grown seasonal fruits and vegetables and other foods that are minimally processed (e.g., beans, nuts, whole grains). Sweets are limited, and only high-quality fats are acceptable, with olive oil being the primary source of fat. The MEP includes low to moderate dairy intake, and protein is mainly seafood, with red meat and eggs consumed in smaller quantities and with low frequency. Wine is consumed in low to moderate amounts with meals, and herbs and spices are used instead of salt to add flavor to foods. In fact, there is plenty of flexibility with flavors. I always try to adapt the Mediterranean lifestyle to a patient's culture and tastes, so, for example, I might suggest South Asian recipes for chickpeas or adding Mexican oregano and fajita spices to hummus, depending on what the patient loves to eat.

It’s worth noting that there is some controversy about whether the actual diet of the Mediterranean region can be adapted to other parts of the world, as the food preparation and sources of food differ.[55] But I believe it can, since the composition of the diet is much more important than preparation or flavors. After all, the antidepressant mechanism of the Mediterranean diet is in large part due to its emphasis on consumption of fruits and vegetables—produce contains high levels of antioxidants that reduce oxidative stress and may, in turn, reduce neuron damage—and olive oil, which is rich in antioxidants and other brain-healthy compounds.[56] Nutrient-dense fruits and veggies and high-quality olive oils are now more readily available in supermarkets and online. And of course, fish, nuts, and whole grains can be found at many grocery stores or farmers’ markets as well.

The MEP in Action

For an example of the power of the MEP, consider my client Josephine, a fifty-one-year-old married woman dealing with weight issues and poor diabetes control—and depression as a result. When she arrived at our first meeting, she appeared exhausted even though it was only nine a.m.! Her eyes were sad and tired. She told me that she felt frazzled, like she was always making poor food choices. Despite her best efforts, she hadn’t lost any weight, and she couldn’t get her blood sugar under control. When I asked about her biggest stressor, she responded pointedly: trying to eat right. Her perceived lack of control over her diet saddened her to the point that she was considering taking an antidepressant.

I asked her to write out a food log for a few days, through which I discovered dietary red flags: she typically ate breakfast (Cheerios and low-fat milk), but she still felt “blue” and hungry when she arrived at work. She’d have a slice of toast with peanut butter later and remain on the edge of hunger most of the day, never feeling satiated or energized. Most important, she went to work unprepared, without any lunch or snacks, and instead relied on vending machines and options from her work cafeteria.

Over the course of several sessions, we discussed the Mediterranean eating pattern. I taught her how to build a healthy salad for lunch, jam-packed with nutrient-rich greens and fresh chopped veggies (broccoli, green

beans, and red peppers), and topped with oven-baked salmon, chickpeas, almonds, or an avocado for healthy proteins and fats. In addition, she added chia seeds for fiber and more protein and made a simple homemade vinaigrette (fresh lemon juice, olive oil, salt, and pepper). I recall her look of delight as she said, “I didn’t understand how filling that would be. Now I feel energized and full after my lunch, and I’m not running for peanut butter and crackers in the afternoon.”

For breakfast, she started making overnight whole-grain oats with almond milk, cinnamon, and berries; she would portion out five breakfasts in mason jars, seal them, and leave them in her fridge. Every morning she would grab her oatmeal and eat it on the train. It saved her time, she felt healthier for making better food choices, and she felt her mood slowly lifting from those prior morning blues and low energy.

By her third visit, she had lost 5 pounds, the blood test number that her diabetologist tracked had lowered for the first time in years, and she was enjoying her meals and not feeling deprived. She noticed that by eating tasty but healthy options throughout the day, she did not crave chocolate or ice cream at night. In fact, she ate a small piece of extra-dark chocolate with a few strawberries at night and felt good. Overall she described feeling revitalized. Her husband and colleagues noticed a difference. She even had enough energy to start exercising again and to use mindfulness in ways she had learned in a meditation course. She could do all these things because her blue and somber mood had lifted, and she told me she felt as though the weight of her depression had been lifted off her shoulders.

What the Studies Say

A wealth of research confirms the Mediterranean eating pattern’s ability to protect against diabetes, prevent heart disease, and confer longevity. And the literature backs up my clinical findings that it can help stave off depression and soothe depressive symptoms as well.

Perhaps one of the best-known studies is the SMILES (Supporting the Modification of Lifestyle in Lowered Emotional States) study. Dr. Felice Jacka, a colleague of mine and the director of the Food and Mood Centre at Deakin University in Australia, led a team that conducted a twelve-week trial to explore whether deliberate dietary intervention is effective as an

add-on treatment in moderate to severe depression. The diet they used? You guessed it: a Mediterranean eating pattern, which they termed the Mod*i*MedDiet. Specifically, their approach focused on "increasing diet quality by supporting the consumption of the following 12 key food groups" with these recommended servings:

Whole grains: 5–8 per day

Vegetables: 6 per day

Fruit: 3 per day

Legumes: 3–4 per week

Low-fat and unsweetened dairy foods: 2–3 per day

Raw and unsalted nuts: 1 per day

Fish: at least 2 per week

Lean red meats: 3–4 per week

Chicken: 2–3 per week

Eggs: up to 6 per week

Olive oil: 3 tablespoons per day

"Extras" foods: Wine (red preferred): up to 2 glasses per day, with meals

No more than 3 per week: sweets, refined cereals, fried food, fast food, processed meats, and sugary drinks

At the end of twelve weeks, the researchers found that close to a third of the people in the dietary intervention group exhibited an improvement in their symptoms of depression, whereas only 8 percent of the people in the control group improved. The diet worked!

More recently, in 2019, a related study followed up on 15,980 adults who did not have depression at the start of the study or in the first two years of the study.[57] Researchers measured participants' food consumption at baseline and then documented, over a period of time, whether they followed

the Mediterranean diet or another diet for comparison. Roughly ten years after the study began, 666 people had developed depression. Those who most closely followed the Mediterranean diet were significantly less likely to become depressed.

Note that most studies of this diet are observational, meaning researchers can only draw inferences. A trial by Almudena Sánchez-Villegas and her colleagues showed more definitively that the Mediterranean diet benefits depression.[58]

Other Dietary Strategies to Beat the Blues

Studies show that other "traditional" eating patterns are also effective dietary strategies for preventing depression, for example, the Norwegian diet, also known as the Nordic diet.[59] Like the MEP, the Nordic diet prioritizes plant foods over meats and animal products, foods from the sea and lakes, and foods from the wild countryside. The biggest difference between this diet and the Mediterranean diet is that it emphasizes canola oil rather than olive oil. In 2013, a review of twenty-five previously published studies examined how diet impacts depression. Researchers found that both the Norwegian and Mediterranean diets were associated with less depression, though the evidence was limited.[60]

Limited evidence also exists for the traditional Japanese diet and reduced risk of depression. This diet includes foods similar to those in both the Norwegian and Mediterranean diets, with the addition of pickled and fermented items, which, as we mentioned earlier, are rich probiotic foods.

A GREAT MEAL CAN FIX EVERYTHING

After our appointment, my patient Ted committed himself to following a personalized meal plan based on the MEP. For lunch at work, he bought a healthy salad with extra leafy greens topped with oven-baked salmon or roasted turkey breast. He replaced his afternoon vending-machine snack with snacks like almond butter on freshly sliced apples, walnuts with dark chocolate chips, hummus with celery and grape tomatoes, or a clementine with some grapes. He felt better, as he went to work with his own lunch bag and knew he would not be stressed about feeling hungry and making poor

choices. He even learned to make these same healthy choices when traveling, steering clear of pizza and hot dogs at airports.

When he got home at night, he enjoyed his dinner of oven-baked salmon with kale pesto (here) and a nutrient-dense flavorful green salad, and because he had made filling food choices during the day, he no longer craved ice cream and cookies following dinner. Even though he was not sure he was losing weight, he noticed his pants fit more comfortably. His coworkers told him he appeared trimmer and asked him if he had joined the gym.

More important, he gradually felt the positive effects on his mood. He described feeling brighter and more energized, and he successfully managed to treat his mood symptoms without taking Prozac. Three years later, he is living at his goal weight and no longer feels depressed.

Ted is the perfect example of how you can put the principles of nutritional psychiatry to work, creating nutrition and lifestyle plans that offer a natural approach to staving off and easing depression.

Of course, depression is only one facet of mental health. It often comes hand in hand with its partner, anxiety. In the next chapter, we'll explore ways in which anxiety can also be overcome with a diet of healthy, delicious food.

DEPRESSION CHEAT SHEET

The Mediterranean eating pattern is a great guideline to give you a complete diet that will fight depression and keep your brain healthy.

Foods to Embrace:

- Probiotics: Yogurt with active cultures, tempeh, miso, natto, sauerkraut, kefir, kimchi, kombucha, buttermilk, and certain cheeses.
- Prebiotics: Beans, oats, bananas, berries, garlic, onions, dandelion greens, asparagus, Jerusalem artichokes, and leeks.
- Low-GI carbohydrates: Brown rice, quinoa, steel-cut oatmeal, and chia seeds.

- Medium-GI foods, in moderation: Honey, orange juice, and whole-grain bread.
- Healthy fats: Monounsaturated fats like olive oil, nuts, nut butters, and avocados.
- Omega-3 fatty acids: Fish, especially fatty fish like salmon, mackerel, tuna, herring, and sardines.
- Vitamins B_9, B_{12}, B_1, B_6, A, and C.
- Minerals and micronutrients: Iron, magnesium, potassium, zinc, and selenium.
- Spices: Saffron and turmeric.
- Herbs: Oregano, lavender, passionflower, and chamomile.

Foods to Avoid:

- Sugar: Baked goods, candy, soda, or anything sweetened with sugar or high-fructose corn syrup.
- High-GI carbs: White bread, white rice, potatoes, pasta, and anything else made from refined flour.
- Artificial sweeteners: Aspartame is particularly harmful, but also saccharin, sucralose, and stevia in moderation and with caution.
- Fried foods: French fries, fried chicken, fried seafood, or anything else deep-fried in oil.
- Bad fats: Trans fats such as margarine, shortening, and hydrogenated oils are to be avoided totally; omega-6 fats such as vegetable, corn, sunflower, and safflower oil should only be consumed in moderation.
- Nitrates: An additive used in bacon, salami, sausage, and other cured meats.

CHAPTER THREE

Anxiety: Fermented Foods, Dietary Fiber, and the Tryptophan Myth

It was a beautiful day in Boston, one of those perfect crisp fall days that make me a little euphoric. The leaves were a reddish golden hue, and apples and pumpkins decorated the city. As the sunlight streamed in through the window, Marisol, a thirty-nine-year-old mother of two sons named Josue and Fernando, walked into my office. Despite the beautiful weather, she burst into tears shortly after sitting down. Her anxiety had become overwhelming.

"I just can't take this anymore," she said. "Every day I get up with a knot in my stomach. Will Josue be hit by a bus on the way to school? Will Fernando be held back another year? Will there be a school shooting? I mean, it never stops. Even when they are at home, I am literally chewing my nails off. And to top it all, my belly aches and I'm constipated. It doesn't help that Thanksgiving is around the corner. I've got to get my act together because twenty people are coming over for dinner."

She went on to tell me that she couldn't sleep at night with her heart pounding in her chest. I knew immediately that Marisol was describing symptoms of generalized anxiety disorder, a condition that causes normal, everyday worries to feel overwhelming.

Marisol's story is not uncommon. Anxiety can take many different forms: generalized anxiety disorder, panic disorder, agoraphobia, social anxiety disorder, or a host of specific phobias. Though these conditions have different triggers and develop in different ways, they all lock the brain

into unhealthy patterns that can lead to panic attacks, paralyzing fear, and an inability to lead a happy and satisfied life.

Anxiety disorders are the most common type of psychiatric disorder in the United States, with up to a third of the population suffering from one during their lifetime.[1] Even that might be an underestimation, since anxiety often goes undiagnosed and untreated. There is a tendency to accept anxiety as an inevitable part of living in a stressful modern world, and to a degree, it's true that it's impossible to totally escape worry. But that doesn't mean you have to let anxiety impinge on your living your best, most fulfilled life.

While there are several approaches to treating anxiety, only 50–60 percent of people respond to medication and psychotherapy, and only a quarter of patients have complete resolution of their symptoms. A crucial part of battling anxiety is making sure your diet is full of foods that are calming and free of foods that put you on edge.

Marisol had already completed several trials of medications that treat anxiety, without much success. We still had a few more medications to try, but that was not going to be enough. We needed to address her diet as well.

THE ANXIOUS GUT

Even if you don't suffer from an anxiety disorder, you probably intuitively understand that there is a connection between anxious feelings and your gut. Think about how your stomach feels when you are nervous. Maybe you've found yourself running to the bathroom before a big test in school. Maybe you've felt nauseated or had dry heaves when you're on edge about a presentation at work. The connection is even built into our language, as we talk about "butterflies in your stomach" for mild nervousness or "a pit in your stomach" for feelings of dread. Those figures of speech aren't mere coincidence. Whether we realize it or not, they're inspired by the complex bidirectional relationship between the gut and the brain.

In 2018, Gilliard Lach and his colleagues shed light on the physiological connection between anxiety disorders and bowel issues.[2] Their work centered around gut peptides, short chains of amino acids that are used by your body as signaling molecules, carrying information between the gut and the brain. In the gut, specialized cells called enteroendocrine cells produce

more than twenty signaling molecules, including peptides.[3] The specific types of signaling molecules that are created are determined by your gut bacteria. By manipulating the gut bacteria of mice, and then monitoring the corresponding change in various kinds of peptides present in the guts and brains of the mice, Lach and his team were able to track how changes in the gut microbiome influenced symptoms of anxiety, proving that there is a profound connection between the two. Though the researchers weren't able to make any conclusions about how this knowledge could be applied to microbiome-based therapeutic strategies to combat anxiety in humans, that's certainly a possibility down the road.

One part of the brain that is especially affected by changes in the gut microbiome is the amygdala, a structure found deep in the brain that is a key part of the circuit that goes awry when you are anxious.[4] In fact, the connection between the microbiome and amygdala development is so strong that some researchers think we should be targeting the microbiome to stabilize amygdala activation and reduce anxiety.

Research has shown that germ-free mice (meaning they lack all microorganisms and therefore have no gut microbiome) have larger amygdalae than mice with normal microbiomes.[5] The amygdala is also hyperactive, working overtime in an unhealthy way.[6] When it comes to amygdalae, bigger and more active is most definitely not better; in humans, a hyperactive amygdala makes it difficult to control your emotions, as if your brain has an alarm that is constantly going off.[7] If the lack of gut bacteria can so profoundly influence the amygdala's form and function, that's a strong sign that the microbiome plays an important role in brain health.

In 2004, Nobuyuki Sudo and his colleagues found that germ-free mice also have an exaggerated hypothalamic-pituitary-adrenal axis (HPA-axis) response to stress.[8] Incredibly, the introduction of just one specific bacterial species into the mice's microbiome reversed this. It amazes me that changing just one bacterial species—one among a multitude in the gut—can improve how an organism responds to stress!

If you're doubtful that the brains of mice have much overlap with your stressful human life, rest assured that recent human studies have found similar results. In 2018, a study compared the microbiota in people with generalized anxiety disorder to those of healthy controls.[9] They found that

the patients with generalized anxiety disorder had very different bacteria, which were both sparser and less diverse than those in their healthy counterparts. Specifically, bacteria that produce short-chain fatty acids—like the peptides we just discussed, which are a sign of a healthy gut—were scarce, and there was an overgrowth of "bad" bacteria. That's another clear example of how gut health affects brain health.

An interesting aspect of that study was that simply treating the anxiety disorder through nondietary methods did not cause a corresponding change in the patients' gut bacteria. In other words, while the gut has immense influence on the brain's behavior, the opposite may not be true—treating mental symptoms with antianxiety medication or psychotherapy doesn't mean that the imbalances in your gut will automatically fall in line. In order to address the root of the problem, you have to target the actual bacteria too.

Finally, irregularities in your microbiome can weaken your gut wall, which usually serves as a barrier preventing bacterial metabolites and molecules from entering the bloodstream.[10] Since a weakened gut wall allows bacteria to leak through the gut lining and into the blood circulation (and even into the brain), this is called leaky gut syndrome. While there are certainly compounds that need to travel into and out of our gut, in general we want to keep the bacteria of our microbiome confined there. When bacteria are allowed to escape, they can cause damage all over the body, including in the brain. For instance, we have evidence that a component of the bacterial cell wall called lipopolysaccharide causes anxiety-like behaviors in mice.[11]

Bowel Disorders

Given this constant interaction between your gut and your brain, it's no surprise that there is a strong correlation between anxiety and bowel disorders. Up to 60 percent of patients with anxiety have irritable bowel syndrome (IBS).[12] IBS is a chronic disorder that causes abdominal pain and changes in bowel habits, without any obvious physical cause. Marisol's constipation, for example, was a sign of IBS, but the condition can also manifest as gas, bloating, diarrhea, or all of the above. To make matters worse, the more severe the anxiety, the more severe the IBS.[13] That means when you have a stressor like hosting Thanksgiving dinner, your symptoms

are likely to flare up.

IBS patients have brain changes too.[14] Studies have shown that in IBS sufferers, regions of the brain that usually help us attend to our daily tasks, feel emotions, and manage pain do not function as well as they do in most individuals. These brain abnormalities are similar to what we see in patients who have an anxiety disorder, like panic disorder or generalized anxiety disorder. This correlation implies that IBS and these anxiety disorders affect the gut and the brain in similar ways.

Anxiety also occurs more commonly in people with inflammatory bowel disease (IBD), which includes bowel disorders where there is underlying structural damage to the gut, such as ulcerative colitis and Crohn's disease. Up to 40 percent of people suffering from these disorders also have troublesome anxiety.

FOODS THAT INCREASE ANXIETY

Now that we have an understanding of the relationship between the gut and the brain that causes jittery bowel, let's take a look at some ways you can improve your diet to alleviate symptoms of anxiety. First, we're going to focus on foods to keep out of your diet.

The Western Diet

Though it may sound like it's describing whatever cowboys cook over their campfires, the Western diet actually refers to the standard American diet. Though plenty of Americans are as health-conscious as anyone else in the world, the Western diet is what you'd typically find in a fast-food meal—the major components are bad fats (saturated fats, trans fats, and unhealthy PUFAs like the vegetable oil commonly used for deep-frying) and high-GI carbs, which means lots of fried food, sweetened drinks (especially those sweetened with high-fructose corn syrup), and lots of red meat. While there's no question that this diet is bad for your physical health, we'll see its negative influence on mental health throughout this book. Anxiety is no exception.

Many animal studies indicate that high-fat and high-carbohydrate diets promote anxiety. For instance, in 2016, neuroscientist Sophie Dutheil and

her colleagues demonstrated that rats on a high-fat diet were more prone to diabetes and anxiety.[15] In 2017, a research group confirmed that diets rich in saturated fats and fructose increase anxiety-like behaviors in rats.[16] And in mice, a lower-calorie diet has been shown to decrease anxiety while improving brain blood flow.[17]

There have been similar findings in humans, with several studies demonstrating that high-carb diets lead to obesity and anxiety.[18] While the exact brain chemistry associating high-fat and high-carb diets with anxiety is quite complex, it's likely that unhealthy diets cause brain serotonin to be reduced in some brain regions, thereby increasing the possibility of anxiety.[19] I don't want to oversimplify, as other genetic and chemical factors certainly play a role in anxiety.[20] Still, it's clear that serotonin levels do play an important role. Perhaps the most valuable takeaway here is that high-fat and high-carb diets can change your brain chemistry, potentially leading to anxiety.

Another reason it's a good idea to avoid the Western diet is that it's a prime culprit in weight gain and eventually obesity. Obesity is associated with being more anxious, with one study finding that obese people have a 25 percent increased chance of suffering from mood and anxiety disorders.[21] The chronic stress of anxiety can also increase visceral fat (fat that is stored in the abdominal cavity and around our organs), type 2 diabetes, and other metabolic complications.[22]

Obesity also leads to bacterial changes in your gut that lead to increased anxiety. In animal studies, obesity itself is not necessarily linked to anxiety—for example, obese mice were not found to be particularly anxious. However, when you give normal-weight mice microbiota from people on a high-fat diet, they become anxious even though they are not obese.[23] That's a strong indicator that the bacterial changes in your gut that come with obesity are responsible for the increased anxiety. Once again, we see how important our daily diet is in terms of taking care of our gut microbiome and hence the gut-brain balance.

While it's certainly a good idea to cut down on fats and carbohydrates to lose weight if you're suffering from anxiety, it's also important that you don't go too far in the other direction. I've had patients come to see me who are eating very little—800 calories or fewer a day—and report spikes in anxiety. Those who have panic disorder or generalized anxiety disorder can

also precipitate severe anxiety when they allow their blood sugar to plunge because they forget to eat.

As for how to structure your diet in order to maintain a healthy weight, I encourage you to follow the same principles we discussed with the Mediterranean eating pattern in chapter 2. When I talk about high-fat and high-carb diets, I don't mean that you have to cut out *all* fats or *all* carbs. As we've already covered, it's important to make sure that you are getting plenty of high-quality monounsaturated fatty acids and polyunsaturated fatty acids (especially omega-3s, which we will examine again shortly); low-GI carbohydrates are fine too. Most important is to use portion control to keep your calorie intake reasonable, and to strictly limit the amount of bad fats (such as trans fats and saturated fats), and high-GI carbs (such as refined flour and sugar).

For an example of how the Western diet can cause anxiety, consider my client Helen. Helen was pregnant, and though she had always been a calm person, during her pregnancy, she started to suffer from panic attacks. All of a sudden, her heart would start racing and she would get short of breath, break out into a sweat, and become so dizzy she'd have to sit down. Understandably, these panic attacks terrified her, even once she'd calmed herself down.

When I inquired about Helen's diet, I learned that prior to her pregnancy she ate cereals for breakfast, salad for lunch, and some kind of fish, chicken, or meat along with a side of vegetables for dinner. On occasion, she would indulge in a burger, pasta, or dessert. Overall, it sounded like an average, relatively healthy diet. But during her pregnancy, she became obsessed with gochujang, a Korean savory-sweet sauce, and kalbi, a kind of grilled fatty beef short ribs.

Now, if you've ever tasted gochujang, you'll understand how one could become obsessed with it. It's like a supercharged Korean ketchup—spicy, sweet, and savory. There's pretty much nothing that you couldn't slather it on. But sadly, that doesn't mean it's good for you. While there are a variety of recipes, the one Helen ate included rice powder, wheat flour, corn syrup, and a heap of sugar, all ingredients that should be avoided in large quantities. When you consider that she often ate this with kalbi, which consists of 71 percent fat, her diet quality was severely compromised.

Helen's poor diet choices were the root cause of her panic attacks, but

they were also putting the mental health of her baby at risk. Animal studies teach us that when a mother's diet is high in fat, it can change the child's physiology as well. For instance, in 2012, Daria Peleg-Raibstein and her colleagues reported that rats demonstrated increased anxiety when their mothers were on high-fat diets.[24] In humans, epidemiological studies have shown a link between obesity in the mother and anxiety and other mental woes in the children. The mechanism is thought to be due to inflammation caused by the mother being overweight during pregnancy, which then affects the developing brain of the fetus.

For Helen, who was rapidly gaining weight in excess of what was normal for her pregnancy, major dietary changes were needed. Once we weaned her off gochujang and kalbi and back to a diet focused on vegetables and healthy fats, her panic attacks abated, and her baby was born healthy.

Caffeine

Caffeine can feel like a lifeline in a busy world, but it's important to realize that excess caffeine in your diet can precipitate or worsen anxiety. Caffeine overstimulates regions of the brain that process threat. In 2011 an experimental psychology research study gave fourteen healthy male volunteers either 250 mg of caffeine or placebo capsules.[25] They then examined brain blood flow in different regions as subjects looked at threatening or neutral faces. They found that caffeine activated the midbrain periaqueductal gray matter, a brain region that is typically activated when a predator is closing in on you.[26] To make things worse, caffeine also shuts down a brain region that typically helps you regulate your anxiety.

If you are feeling anxious, you don't need to quit caffeine entirely, but consider cutting down. Just make sure you wean yourself slowly—some of my patients who have suddenly stopped drinking coffee end up in my office with significant panic attacks and anxiety brought on by caffeine withdrawal.

How much caffeine can you drink before it becomes problematic? Most studies show that less than 100 mg of caffeine has little or no effect on anxiety.[27] For between 100 mg and 400 mg/day, the results are mixed; nine studies showed no effect on anxiety, whereas twelve studies have shown

significant increases in anxiety. Above 400 mg/day, the majority of studies show a significant increase in anxiety.

Do your best to stay well under that 400 mg/day mark. To put this in context, one Starbucks venti (20 ounces) puts you over the daily limit (475 mg) by itself, so you'll need to stick to smaller sizes. On the other hand, one Nespresso capsule makes 1 ounce of coffee that packs only 50–80 mg of caffeine, so that is a good choice if you like to drink coffee throughout the day without overdosing on caffeine.[28] If you want to cut down on caffeine but still crave the taste of coffee, you can always switch to decaf, though even decaf coffee does contain small amounts of caffeine.

Alcohol

I often encounter people in my practice who live stressful lives. The "work hard, play hard" mind-set often leads to heavy drinking on the weekends as a way to relieve stress. While drinking might make them relax in the moment, they pay for their fun the next morning, when they wake up guilty, jittery, and jumping out of their skin, all symptoms of mild to moderate alcohol withdrawal. Plus, people who are anxious sleep more poorly if they drink alcohol regularly.[29] Add the fact that alcohol—and binge drinking—is one of the leading preventable causes of death in the United States, and it's fair to say that the "relaxation" alcohol provides comes with a significant price.[30]

For sufferers of social anxiety disorder, the cycle can be even more vicious. Those who get anxious in social situations tend to self-medicate with "liquid courage." They may feel like booze helps them socialize, but it can lead to deeper problems—social anxiety more than quadruples the risk of developing an alcohol use disorder.[31]

In general, men who consume more than 14 drinks per week or more than 4 drinks in a single day at least once a month are considered to be heavy drinkers, as are women who drink more than 7 drinks per week or 3 drinks per day.[32] But different people (and their brains) respond differently to alcohol abuse. When I work with anxious patients who drink, I always ask them to consider the contexts in which they might be using alcohol in an unhealthy way—for instance, using drinking as a means of coping with something they are trying to avoid—and to consider moderating the amount

they drink. Of course, for patients who show signs of alcoholism, it's important to recognize the heightened anxiety that can come from withdrawing from alcohol. Developing a plan to safely manage the symptoms of alcohol withdrawal is essential and should be done with the help of a psychiatrist or doctor.

Gluten

Rex, age forty-five, was an electrician with a jolly outlook on life. But in the weeks before he first came to see me, he had begun to have panic attacks, especially when he was out in public. Out of the blue, he would get heart palpitations and shortness of breath, and he'd feel like he was going to faint. After I ruled out medical causes of anxiety—like an excess of thyroid hormone and a primary heart condition—I started him on antianxiety medications. Unfortunately, the medication only mildly improved his symptoms.

On one occasion, Rex came to see me directly after the Fourth of July, and I asked him how he had enjoyed the day. He told me that even though he was surrounded by family and friends, he still had flare-ups of his anxiety. When I asked him what he had eaten, he listed sausages, baked beans, and hot dogs with ketchup. His drink of choice was vodka. Upon hearing this, I realized that every one of those foods has gluten in it. I referred him to a gastroenterologist, and within a few weeks, he was diagnosed with celiac disease. He was surprised at the diagnosis since he hadn't had any of the more common bowel symptoms. But celiac disease can be "silent," causing damage with no obvious signs. Once he stopped eating gluten-containing foods, he started feeling better, and within five months, his anxiety had disappeared.

While going gluten-free was absolutely the right choice for Rex, the overall science on anxiety in celiac patients is a little conflicted. In 2011 Donald Smith led a meta-analysis that examined whether people with celiac disease have a higher rate of anxiety than those without it.[33] Researchers found that anxiety is neither more common nor more severe in adults with celiac disease than in healthy adults. However, another study demonstrated that after being on a gluten-free diet for one year, patients with celiac disease were less anxious.[34] And yet another study demonstrated that being

on a gluten-free diet is less helpful in reducing anxiety for women with celiac disease than it is for men.[35]

Not everyone with gluten sensitivity has celiac disease, and even among celiac sufferers, the effect on the brain is complex.[36] However, if you're suffering from anxiety, I do recommend getting tested for celiac disease, or even testing yourself by going on a gluten-free diet temporarily to see if it reduces your symptoms. For my patients who have gone gluten-free on a trial basis, the difference in anxiety was obvious quite early, which led them to get more testing.

Artificial Sweeteners

As we saw in chapter 2, when you use artificial sweeteners that have no nutritional value, they can increase "bad" gut bacteria and therefore negatively affect mood and anxiety. Sweeteners like aspartame have been more directly linked with anxiety in research studies and should be avoided, or at the very least used in moderation.[37]

FOODS THAT RELIEVE ANXIETY

Just as there are foods that amplify anxiety, there are also foods that help tamp it down, so make sure to add these to your diet.

Dietary Fiber

In 2018, Andrew Taylor and Hannah Holscher found that diets rich in dietary fiber may reduce the risk of depression, anxiety, and stress.[38] Dietary fiber is a broad category of food ingredients that are nondigestible by our natural gut enzymes. However, though our guts themselves can't break down fiber, different types of gut bacteria can. When dietary fiber can be broken down by bacteria, we call this being "fermentable." Fermentable dietary fiber promotes the growth of "good" gut bacteria. For example, when dietary fiber is broken down into certain smaller sugar molecules, the "good" bacteria *Bifidobacterium* and *Lactobacillus* increase, which has a positive effect on mood by activating brain pathways and nerve signaling that can alleviate anxiety.[39]

Fiber can also assist with anxiety by keeping your weight down through a number of mechanisms. Since fiber-rich foods take longer to chew, you tend to eat them more slowly, which means your body has more time to recognize it's full. Fiber can also fill up your stomach without contributing a lot of calories, which helps you feel more satiated with less food. It also takes a longer time to pass through the stomach and small intestine, which makes you feel full for longer.[40]

Dietary fiber also decreases inflammation throughout the body, including the brain. There is considerable evidence that brain (and body) inflammation is elevated in patients with anxiety.[41] In 2016 Vasiliki Michopoulos and her colleagues found that people with anxiety disorders have elevated levels of certain markers that denote inflammation.[42] Inflammation in the brain has been shown to affect areas that are linked to anxiety (for example, the amygdala), and dietary fiber can help by calming down the brain's and body's inflammatory responses.[43]

You'll find rich dietary fiber in the "five Bs": beans, brown rice, berries, bran, and baked potato with the skin on. If you have bran and fruit for breakfast and brown rice and beans for lunch, then you'll have this covered. The "B" you'll want to eat sparingly is the baked potato—potatoes are high in carbs, and we tend to dress them with high-fat condiments. As we covered earlier, neither a high-carb nor a high-fat diet is good for anxiety.

Other high-fiber foods include pears, apples, bananas, broccoli, Brussels sprouts, carrots, artichokes, almonds, walnuts, amaranth, oats, buckwheat, and pearl barley.

Omega-3s

We talked about the power of omega-3s to combat depression in chapter 2, and they're important in the fight against anxiety as well.

In 2011, Janice Kiecolt-Glaser and her colleagues tested the effects of omega-3s on sixty-nine medical students, measuring their anxiety levels during lower-stress periods and again just before an exam.[44] They found that subjects who were given high levels of omega-3s had 20 percent less anxiety than a control group. What's more, the high-omega-3 group had 14 percent less inflammation in their bodies (as measured by an inflammation marker called interleukin-6).

In 2018, a study found that, specifically, the more omega-3 fatty acid eicosapentaenoic acid people consumed, the less anxiety they had. The study also found that a higher ratio of omega-6s to omega-3s led to increased levels of anxiety. Also in 2018, researchers conducted a meta-analysis of nineteen clinical trials, including 2,240 participants from eleven countries, which showed that omega-3s were associated with a reduction in anxiety symptoms.[45]

In general, the reduction in anxiety caused by omega-3s is thought to occur via anti-inflammatory and neurochemical mechanisms that affect the brain.[46] One potential mechanism for the beneficial effects of omega-3s may occur via the brain's dopamine pathway. When the brain is inflamed, IL-1, an inflammatory marker, can increase dopamine levels in the nucleus accumbens, a collection of brain cells implicated in human anxiety. Studies have shown that omega-3s can suppress this effect in both animals and humans.[47]

I first saw the dramatic effects of omega-3s in a patient named Amber, a twenty-three-year-old woman who suffered from social anxiety, avoiding staff meetings, presentations, and social events. Medications were only partially helpful. For her, simply adding more fish and seafoods rich in omega-3s and switching from vegetable to canola oil to lessen the omega-6 load and balance out the ratio (as we discussed in chapter 2) made all the difference in the world. Within three months of making these changes, her anxiety symptoms improved significantly.

Aged, Fermented, and Cultured Foods

Fermented foods, like plain yogurt with active cultures and kimchi, are a great source of live bacteria that can enhance healthy gut function and decrease anxiety.[48] In the brain, fermented foods may confer several advantages. Fermented foods have improved human cognitive function in several studies.[49] A recent review of forty-five studies indicated that fermented foods might protect the brain in animals, improving memory and slowing cognitive decline.[50] While the mechanism is not yet clear, three potential effects are highly likely: chemical by-products of intestinal bacteria and bioactive peptides may protect the nervous system; the changing gut bacteria might suppress the stress response through the HPA-

axis; and neurotransmitters and “brain tissue builders” such as brain-derived neurotrophic factor, gamma-aminobutyric acid, and serotonin may be increased.

In 2015, Matthew Hilimire and his colleagues questioned 710 people about their fermented-food consumption, social anxiety, and neurotic traits.[51] You’ve probably heard the term “neurotic” used in a number of different ways colloquially, but in medical literature, studies show that neurotic people typically are angrier, more anxious, self-conscious, irritable, emotionally unstable, and depressed than the average person.[52] Neuroticism is regarded as a fundamental trait that people often inherit from their parents. Hilimire’s study found that eating fermented food frequently correlated with having fewer symptoms of social anxiety in neurotic patients. Taken together with previous studies, the results suggest that fermented foods that contain probiotics may have a protective effect against social anxiety symptoms for those at higher genetic risk.

Probiotic-rich yogurt can be a powerful part of your diet, but it’s important to note that yogurt that undergoes heat treatment does not have the same benefits. One such example is yogurt-covered raisins—these aren’t going to help your anxiety, as the heat-treated yogurt has no beneficial bacteria left. Also, you should ensure that the yogurt you consume does not have added sugar. Cereal bars that say “made with real yogurt” may contain only small amounts of yogurt powder and will not help your anxiety.

Going back to Helen, my gochujang- and kalbi-addicted patient, one thing I did tell her was to continue eating kimchi—a delicious kind of fermented Korean cabbage. Kimchi is prepared by fermenting baechu cabbage with lactic acid bacteria. Like kefir and sauerkraut, kimchi is one of those fermented foods associated with less social anxiety.

Other sources of fermented foods include kombucha, miso, tempeh, and apple-cider vinegar. You can also ferment vegetables like carrots, cauliflower, green beans, radishes, and broccoli. You can find recipes for okra pickles and miso-glazed sweet potatoes in chapter 11.

Tryptophan

Even if you think you couldn’t name an amino acid to save your life, I’m

going to bet you've heard of tryptophan (TRP). Every year as we're digging into Thanksgiving dinner, someone is bound to bring up the idea that the TRP in the turkey is going to lull everyone into a post-meal nap.

To medical researchers, however, tryptophan is more than just a well-worn holiday talking point. Since TRP is a precursor of serotonin, scientists have theorized that a high-tryptophan diet could help raise the low serotonin levels in anxious brains. In animal studies, TRP reaches brain regions that can increase or decrease anxiety.[53] In humans, taking a supplement of purified TRP will increase brain serotonin.[54]

In 2014, Glenda Lindseth and her colleagues conducted a study to test how a high-TRP diet over four days could change the anxiety levels in study participants.[55] Twenty-five healthy individuals were given two diets, with a two-week period in between. The first contained 5 mg/kg of tryptophan (the current US recommended daily allowance) for four days. The second diet contained double that dose for four days. Sure enough, the study found that participants consuming higher levels of tryptophan had significantly less depression, irritability, and anxiety.

Before you dedicate yourself to eating a Thanksgiving meal every day of the year to cure your anxiety, there's a wrinkle: although purified TRP increases brain serotonin, foods containing TRP do not.[56] This is because tryptophan is actually the least abundant amino acid in protein, and it's carried into the brain by a transport system that prioritizes other amino acids. So, after the ingestion of a meal containing protein, tryptophan gets crowded out, keeping it from crossing over into the brain.

If this is the case, how do we explain the findings in the Lindseth study? There is a body of evidence that suggests that eating carbohydrates along with protein can increase the tryptophan available to the brain.[57] When you eat carbohydrates (like the mashed potatoes at Thanksgiving), the body produces insulin. This insulin diverts other amino acids to your muscles but leaves tryptophan untouched. As a result, tryptophan can cruise through into the brain.

Though that sounds logical, some experts question this rationale. So if you're trying to increase tryptophan, you should probably take it in supplement form. One study showed that, after just fifteen days, purified TRP made participants (particularly men) more agreeable and helped them feel better.[58]

While the tryptophan benefits of Thanksgiving dinner may be up for debate, there are other sources of tryptophan that may surprise you. For instance, try chickpeas. Some people refer to chickpeas as the ancestors of Prozac. To ensure tryptophan absorption, chickpeas can be made into hummus and combined with whole wheat pita bread, which provides the carbs. For breakfast or a snack, you could also try my recipe for avocado hummus (here) on healthy whole-grain toast.

Vitamin D

Studies have demonstrated that adults with depression and anxiety have lower blood levels of vitamin D. In 2019, Siavash Fazelian and his colleagues tested fifty-one women with diabetes and vitamin D deficiency to see whether taking a vitamin D pill every two weeks would change their anxiety levels.[59] After sixteen weeks, compared to people who took placebo, people who took the vitamin D were significantly less anxious. In another study, when vitamin D was administered as part of a micronutrient intervention to more than eight thousand people who were depressed and anxious, keeping vitamin D levels high was protective against anxiety.

Vitamin D is increasingly recognized as a necessary substance called a neurosteroid, which crosses the blood-brain barrier and enters brain cells.[60] While it's in the brain, it decreases inflammation and toxic destruction of cells and controls the release of nerve growth factor, which is essential for the survival of hippocampal and cortical neurons. The hippocampus plays a crucial role in providing feedback to the HPA-axis when there is stress, and it is also intricately connected to the amygdala.[61] The cortex, too, is involved in how we respond to anxiety and stress. Given that abnormalities in all these brain regions may lead to anxiety, vitamin D has an important role in protecting their tissues.

About 80 percent of our vitamin D comes from exposing our skin to direct sunlight; it's important to remember that sunlight streaming through our windows does not have the same effect, since glass absorbs all ultraviolet B radiation. With indoor lifestyles being so prevalent today, our skin is often left in the dark. As a result, vitamin D deficiency is occurring in epidemic proportions worldwide.[62]

Aside from sun exposure, fortified milk and other products such as egg

yolk, salmon, sun-dried mushrooms, and cod liver oil are all rich sources of vitamin D. That means that if you have a strict vegan diet, or suffer from milk allergies, you may be more predisposed to vitamin D deficiency, and you need to be extra-conscientious about getting enough of it in your diet or through sun exposure.

Other Vitamins

Vitamin D isn't the only important vitamin for brain health. In fact, cells would not be able to live or breathe without a broad range of vitamins. These vitamins are an intrinsic part of many chemical reactions necessary for sustaining an energetic life and a good mood. They are essential for the formation and synthesis of neurotransmitters and the metabolism of brain lipids, and they protect the brain from toxins, boost immunity, and regulate many chemicals that make us more or less anxious.[63]

Adam, a thirty-five-year-old patient of mine, was struggling with severe anxiety and binge eating. While he maintained a normal diet during the week, on the weekends, when he would come home intoxicated, he would aggressively binge eat popcorn, cookies, and ice cream. Over time, he developed chronic fatigue, insomnia, nightmares, depression, worsening anxiety, and recurrent headaches accompanied by frequent nausea, vomiting, diarrhea, and abdominal pain. After a full medical workup, we could not find the cause of his symptoms, but his anxious nature together with the binge eating and history of alcohol abuse made me wonder if he might be deficient in thiamine, another name for vitamin B_1. I suggested that he take thiamine more regularly, along with additional therapy. Within six months, despite the occasional alcohol binge, his symptoms improved drastically.

Up to 250 mg of thiamine has been shown to be effective for anxiety.[64] In animal studies, thiamine appears to reduce stress-like responses because it protects the hippocampus.[65]

Other B vitamins have specific antianxiety properties too. In older women and women suffering from premenstrual stress, vitamin B_6 may provide significant relief.[66] And many other studies have demonstrated that vitamin B complex can reduce anxiety, possibly by reducing oxidative stress in the brain.[67]

The positive effects of vitamins on anxiety extend beyond the vitamin B group as well. In 2012, researchers measured the levels of the antioxidant vitamins A, C, and E in the blood of patients with generalized anxiety disorder.[68] They found that levels of all three were low, and after six weeks of supplementation, anxiety symptoms improved. In other studies, multivitamins have been shown to reduce stress and anxiety after twenty-eight days, and in one study, to reduce stress in three hundred people after thirty days of supplementation.[69] A 2013 meta-analysis confirmed the stress-relieving effects of multivitamins.[70]

Given what we know, adding a multivitamin to your daily routine will likely help fight anxiety.

Magnesium

In humans, magnesium deficiency is associated with high anxiety levels. When people are anxious while taking a test, they excrete more magnesium than usual in their urine. And when magnesium levels are low, this can worsen anxiety.[71]

In 2017, Neil Bernard Boyle and his colleagues reviewed the effects of magnesium supplementation on anxiety.[72] They found that magnesium supplementation can help especially if you are vulnerable to anxiety, likely because of the way that magnesium can ease stress responses, changing levels of harmful stress chemicals in the brain.[73]

Dietary intake of magnesium is poor in Western populations. For example, 68 percent of Americans and 72 percent of middle-aged French adults consume inadequate amounts of magnesium in their diets. Foods rich in magnesium include almonds, spinach, cashews, and peanuts. Cooked black beans, edamame, peanut butter, and avocado also have relatively high amounts of magnesium.

Most studies show a difference in levels of anxiety after an intake of magnesium over six to twelve weeks.[74] As an added bonus, magnesium helps muscle cells relax after contracting. When magnesium levels are low, your muscles may contract too much and cause your body to experience muscle cramps, spasms, or tightness.

Nutritional and Herbal Supplements

Certain nutritional and herbal supplements can help you manage anxiety. In 2010, Shaheen Lakhan and Karen F. Vieira explained that there is strong evidence that herbal supplements containing extracts of herbs such as passionflower or kava and combinations of amino acids like L-lysine or L-arginine reduce anxiety.[75] Passionflower increases the neurotransmitter gamma-aminobutyric acid, which in turn decreases anxiety. One of the advantages of passionflower over traditional anxiety medications is that it causes less sedation—a frequent side effect of pharmaceutical treatments. Passionflower has been shown to specifically reduce anxiety after surgery too.

Forty-five drops of passionflower liquid extract taken daily or a specific tablet formulation of 90 mg/day has been shown to be effective. However, those of you on blood thinner medications (Coumadin or Plavix) or on the type of antidepressants called monoamine oxidase inhibitors (commonly referred to as MAOIs, for example, Nardil or Parnate) should avoid passionflower.

Other foods and nutrients that decrease anxiety include selenium (found in Brazil nuts), potassium-rich foods (e.g., pumpkin seeds), flavonoids (e.g., dark chocolate), and theanine (e.g., green tea).[76] Foods that contain high amounts of lysine such as lean beef and lamb, tempeh, seitan, lentils, black beans, and quinoa can also be helpful. On the other hand, avoid wheat bran since it contains phytic acid, which blocks zinc absorption and causes anxiety.

When it comes to spices that reduce anxiety, the standout is turmeric. The active ingredient in turmeric, curcumin, decreases anxiety and changes the corresponding brain chemistry, protecting the hippocampus. Curcumin's positive effect on anxiety has been confirmed by animal studies and three trials in humans.[77]

Chamomile is an herb that comes from the daisy-like flowers of the Asteraceae plant family. It has been consumed for centuries as a natural remedy for several health conditions, and it has been shown in several studies to help lower anxiety.[78] Though it can be taken in capsule form, I recommend getting chamomile the traditional way, in tea. One to 3 cups a day is generally safe unless you are taking blood thinner medications or are about to have surgery. Pregnant women should consult their doctors before consuming chamomile tea.

Oral lavender oil preparation has also been shown in several studies to lower anxiety.[79] Lavender oil is available as a supplement, but you can also drink lavender tea or even use lavender in aromatherapy. For supplements I suggest consulting with your doctor first.

Lastly, hydration is not something to be ignored when you're anxious. Although we need more evidence to convincingly follow this recommendation, I have had patients who experience worsening of anxiety or even full-blown panic attacks when they are dehydrated and do not realize it. So it's worth staying hydrated for general good health as well as to keep anxiety in check.

CALMING AN ANXIOUS GUT

My patient Marisol worked diligently with me to reshape her diet, focusing on eating foods that could help target her anxiety, while excluding those that worsened it. As an added bonus, the recipes that we developed together were full of nutritious foods, so they were good for her whole family. By lowering her anxiety and improving her sleep, she had the energy to be able to plan her days and weeks with both food and family activities. She loved her children fiercely, and being free of her pervasive worries about them opened up space that allowed her to genuinely enjoy their company rather than being consumed by anxiety. After six months she was eating better, sleeping better, and living a calmer life, no longer waking up with a knot in her stomach.

Even if your anxiety doesn't approach the level of Marisol's, I am confident that following the guidelines we've established in this chapter will help you calm your mind and free yourself from the anxieties of daily life.

ANXIETY CHEAT SHEET

Foods to Embrace:

- High-fiber foods: Beans, brown rice, berries, bran, pears, apples, bananas, broccoli, Brussels sprouts, carrots, artichokes, almonds, walnuts, amaranth, oats, buckwheat, and pearl barley.

- Aged, fermented, and cultured foods: Yogurt, kombucha, miso, tempeh, apple-cider vinegar, and pickled vegetables.
- Tryptophan: Turkey, other meats, and chickpeas, especially when combined with carbohydrates.
- Vitamins D, B_1, B_6, A, C, and E.
- Minerals: Magnesium, potassium, and selenium.
- Spices: Turmeric.
- Herbs: Lavender, passionflower, and chamomile.

Foods to Avoid:

- The components of the Western diet: Foods high in bad fats (red meat, fried foods) and high-GI carbs (white bread, white rice, potatoes, pasta, and anything else made from refined flour).
- Caffeine: Keep caffeine consumption under 400 mg/day.
- Alcohol: For men, stay under 14 drinks per week and no more than 2 drinks in any single day; for women, stay under 7 drinks per week and no more than 1 drink in any single day. By cutting back slowly, you will help lower anxiety.
- Gluten: If you have celiac disease or non-celiac gluten sensitivity, avoid all wheat products, such as bread, pizza, pasta, and many alcoholic drinks.
- Artificial sweeteners: Aspartame is particularly harmful, but also saccharin. Use sucralose and stevia in moderation and with caution.

CHAPTER FOUR

PTSD: Glutamates, Blueberries, and "Old Friends" Bacteria

My patient Letitia worked as a lawyer, protecting the rights of young women who had been domestically abused. Even on the best days, her job was stressful, both from the high-pressure environment of the legal profession and from the emotional weight of helping clients at such a difficult, vulnerable time. But one terrifying day, a gunshot nearly put an end to her journey. She was visiting a client at her house but never made it inside; the client's husband opened the door and was enraged at the sight of her. He pulled out a gun and shot her in the leg.

Thankfully, she was able to make a full physical recovery from the wound, but she still carried the emotional scars from that horrible day. Her work suffered because she could no longer bring herself to visit her clients at their homes. Even when she entered her own office, she lived in fear that a client's partner was lurking, waiting to attack her. Rationally, she knew that this was unlikely, but she was at the mercy of her fear. Despite an initial response to medication, and weekly psychotherapy sessions, Letitia still had residual symptoms, and the memory of that day continued to intrude on her life.

Letitia's story is typical for people who suffer from post-traumatic stress disorder (PTSD). While there is no surefire way to cure PTSD quickly, there are many ways in which a good diet can help improve its symptoms, especially when combined with psychotherapy and medication. Of course, there are also ways in which a bad diet can exacerbate PTSD and make

recovery even harder. In this chapter, we'll explore how trauma affects the body and brain and how PTSD sufferers can eat to manage their symptoms and keep themselves firmly on the path to recovery.

TRAUMA AND YOUR GUT

Most of us suffer some kind of trauma in our lives. The death of a loved one, a natural disaster, a sexual assault, or a difficult breakup may all take their toll on our lives. Whether the damage stems from a single event or unfolds over time, traumatized individuals are at risk for PTSD.[1] Thankfully, most people who experience a traumatic event do not go on to develop PTSD.[2] But those who do often have to wrestle with this condition for a long time; although symptoms may subside eventually, in many cases that can take well over a decade.[3] Furthermore, PTSD symptoms do not always materialize immediately. Sometimes, they are suddenly triggered even years after the traumatic event.

PTSD can cause a variety of symptoms, as we saw with Letitia. Some people might experience recurrent memories of the event, for example, or disturbed dreams. Some may even disassociate entirely, flashing back to a time of trauma in a way that feels like reality. They may have an exaggerated startle response, which means they overreact to startling noises with great shock and fear. These symptoms have been shown to be connected with excessive amygdala activation and a lack of activity in the frontal cortex and hippocampus—all parts of the brain that play a crucial role in fear response, trauma processing, and memory. Essentially, the fear and memory circuits of your brain talk to each other in harmful ways, trapping the brain in a cycle of reexperiencing traumatic events.[4]

Traumatic situations naturally trigger the brain's fight-or-flight system via the hypothalamic-pituitary-adrenal axis (HPA-axis), as your instincts help your body determine how best to deal with the stress. Since PTSD causes traumatic moments to resurface again and again, that creates constant disruption in the HPA-axis. As we've learned, the HPA-axis is one of the pathways through which the gut and brain are connected, which means the gut isn't spared from trauma.[5] In fact, of all the psychiatric syndromes we will discuss in this book, PTSD has one of the strongest

brain-body relationships, with repeated cycles of trauma adding to the wear and tear on delicate tissues.[6] Physical problems stemming from PTSD range from stomach ulcers to gall bladder diseases and bowel disruption. For example, in 2018, a meta-analysis of eight studies found that people with PTSD have more irritable bowel syndrome than those without it.[7] While these physical symptoms were once dismissed as imagined due to emotions gone awry, research shows a real connection here, which has been very validating for my patients.

Just as we've seen with other psychiatric conditions, a major factor in reversing trauma's effects has to do with making sure that gut bacteria are flourishing and healthy. When you feed a traumatized mouse one of two specific types of normal gut bacteria, *Lactobacillus rhamnosus* or *Bifidobacterium longum*, the mouse becomes calmer.[8] This modification of gut bacteria also changes its brain chemistry. In particular, brain-derived neurotrophic factor and N-methyl-D-aspartate receptor expression improves, allowing these receptors, which govern brain growth and adaptability, to start functioning normally again.

Think of your gut bacteria like a cushion against the harmful effects of trauma. If they are flourishing healthily, they can help your body react appropriately. Without them, stress that is transmitted to the rest of your body is uncontrolled.

PTSD and "Old Friends" Bacteria

In 2018, Sian Hemmings and her colleagues found that the types of gut bacteria in people exposed to trauma were similar whether they developed PTSD or not.[9] However, one subtle difference was that people with PTSD had fewer Actinobacteria, Lentisphaerae, and Verrucomicrobia, three bacteria that have long been considered "old friends" of ours.

The "old friends" hypothesis posits that in past societies, humans lived in a way that promoted certain beneficial bacteria that protected us from inflammatory diseases like allergies and asthma.[10] As our society has urbanized, those friendly bacteria have dwindled significantly due to our loss of interaction with soil, animals, and outdoor environments, leading to a growing epidemic of a wide variety of inflammatory diseases (this basic idea is known as the "hygiene hypothesis").[11] Perhaps the most troubling

subset of those diseases is mental health disorders, ranging from developmental disorders such as autism and schizophrenia to stress-related disorders like anxiety and PTSD.

In the absence of “old friends” bacteria, inflammation can get out of control, compromising our brains and leaving us more vulnerable to PTSD. Furthermore, PTSD itself may cause greater brain inflammation, which only deepens the cycle of destruction.[12] For instance, even six months after a motor-vehicle accident, children and adolescents who developed PTSD had elevated levels of interleukin-6 and cortisol, both of which are indicators of the body’s excessive inflammatory response. In other words, when you feel emotional pain, your brain has to rally. But too much rallying causes inflammation, which can hurt your brain even more.

Even though they’re not as plentiful as they once were, the three “old friends” bacteria are an important part of controlling your brain’s rallying processes. In their absence, your brain has to deal with recovering from emotional pain on its own, and it all becomes too much.

In addition to limiting inflammation in the brain, these “old friends” bacteria act as gatekeepers in the gut wall.[13] But when stress knocks them out, the gut-brain barrier is no longer as effective, and a host of chemical changes result (as we saw with “leaky gut” in chapter 3). Depression, anxiety, and PTSD are three possible consequences, depending on an individual’s vulnerability.

Much of that vulnerability is determined by what you do and do not eat. In the rest of the chapter, we will explore foods that worsen PTSD and your reaction to trauma, and those that help fortify your gut and brain against their effects.

FOODS THAT DEEPEN TRAUMA

For an example of how not to eat if you have PTSD, let’s go back to my patient Letitia. The first time she came to see me, I had a strong hunch that she wasn’t eating well for her condition. When I took a dietary history, I noticed that she was a newly diagnosed diabetic. Much like many other working mothers with busy lives, she had little time to cook for herself. She often ate out, and her top choice was Chick-fil-A. At least three times a

week, dinner was a quick Chick-fil-A Deluxe Sandwich, a large order of fries, and a 20-ounce diet soda.

Although the Chick-fil-A Deluxe Sandwich is 500 calories, 41 percent of that is fat, and 34 percent is carbohydrate. Only a quarter is protein. The large fries add another 460 calories, of which more than 90 percent are fat and carbs. Add that up, and you're talking about roughly 1,000 calories in one meal—about double what is recommended, especially if you're diabetic.

Letitia knew that her dinner choices were not the healthiest, but she had trouble weaning herself off a routine that was convenient and felt satisfying in the moment. Whether she was conscious of it or not, I suspected that her PTSD was also contributing to her poor diet. When you don't have trauma to deal with, you have enough brain capacity to take the time to make healthy choices. But a brain that is under fire from fear and painful memories has an entirely different agenda. All it wants is a little break. Fast foods and soda can act as a form of self-soothing, providing comfort in an almost automatic reaction that is difficult to stop.

Since there was no way Letitia was going to cut out Chick-fil-A entirely, I recommended that she switch to the Grilled Chicken Sandwich, which has 300 calories, only 17 percent of which are fat. I also suggested that she consume fewer than five fries, just for the taste, and then wean herself off entirely. Although the 20-ounce diet soda sounded harmless, it had more than 100 mg of caffeine in it. As we learned in chapter 3, caffeine can worsen anxiety, so I suggested that she either downsize to the 12-ounce or try sparkling water instead. Again, I had her wean herself off the soda slowly so that she did not precipitate caffeine withdrawal, which might make her anxiety worse.

Letitia followed this plan, fully embracing the idea that she needed to change her dietary habits. She began to buy rotisserie chicken seasoned only with salt and pepper, which she adapted into various meals for her family. For example, she might serve half a rotisserie chicken with a side of steamed broccoli or sliced chicken breast atop a healthy and tasty green salad with almonds, adding segments of clementine, which her children loved. If she had any chicken left over she took it for lunch in a lettuce wrap. Using a store-bought but healthily prepared chicken was a transition to eventually cooking more at home, eliminating unhealthy fats and eating

good carbs such as those in raw or steamed veggies.

Just months later, Letitia noticed a significant reduction in anxiety symptoms. After several months she felt calmer, no longer waking up at night with sweats and fear. As a result, she felt rested in the morning. Between her new diet and a steady flow of talk therapy with her regular therapist, over about six months she was able to get back to her important work at full efficiency, no longer paralyzed by the trauma she experienced.

High-Fat Diets

You'll probably recognize Letitia's Chick-fil-A habit as having two major aspects of the Western diet we discussed in chapter 3—high fat and high-glycemic-index (high-GI) carbohydrates. The Western diet is particularly destructive to PTSD patients, so let's first consider the effects of the abundance of fat (as always, when I talk about high-fat diets, I mean diets high in unhealthy fats like saturated fat, trans fats, and fats used in fried food, rather than healthy fats such as omega-3s or those found in olive oil).

When animals consume a typical Western high-fat diet, it makes them more susceptible to PTSD. In 2016, Priya Kalyan-Masih and her colleagues demonstrated this by first modeling "trauma" in mice by exposing them to the odor of cats.[14] They fed one group of mice a Western high-fat diet while the control group was fed a lower-fat diet. One week later, the mice that consumed the high-fat diet were much more anxious than the control group. And the hippocampus was significantly smaller in the high-fat group. Since research has shown that the hippocampus is already shrunken in brains suffering from PTSD, this study shows that high-fat diets further complicate symptoms.[15] In its shrunken state, the hippocampus is less effective at managing stress hormones and the brain's response to fear. Similar associations between high-fat diets and PTSD have been demonstrated in other animal studies.[16]

In human studies, it is clear that PTSD affects metabolism in a way that promotes overeating and obesity.[17] For instance, a whopping 84 percent of US male Vietnam War veterans are overweight or obese, a much higher rate than in the general population.[18] I have seen this firsthand in my work with veterans and their families. In 2017, I had the privilege of consulting with a hospital program that works directly with veterans. I developed a culinary

program for them that included live cooking classes based on easy and healthy recipes to encourage home cooking. (Some of the recipes I wrote, tested, and taught for those classes, like Baked Salmon with Walnut Kale Pesto, Chocolate-Dipped Strawberries, and Oven-Roasted Miso-Glazed Sweet Potatoes, are shared in chapter 11.)

John Violanti is a researcher who specializes in police stress (and was a New York State trooper for twenty-three years himself). In 2006, he and his colleagues did a study looking at the incidence of metabolic syndrome in police officers.[19] Metabolic syndrome is a cluster of conditions that occur together, increasing your risk of heart disease, stroke, and type 2 diabetes. These conditions include increased blood pressure, high blood sugar, excess body fat around the waist, abnormal cholesterol or triglyceride levels, and obesity. The results of the study showed that officers with severe PTSD had almost three times the rate of metabolic syndrome as those with milder forms of PTSD. In a similar study in 2007, Victor Vieweg and his colleagues found that male military veterans with PTSD had a higher body mass index (BMI) than those without PTSD, often reaching the obesity range.[20]

In 2016, Erika Wolf and her colleagues examined this PTSD–metabolic syndrome connection to determine how it affected the brain.[21] Wolf's team evaluated the brain structure of 346 US military veterans who had been deployed to Iraq or Afghanistan. Specifically, they examined whether the thickness of the brain's outer layer, the cortex, correlated with PTSD symptoms and/or metabolic syndrome. When they examined the data, they found that people with metabolic syndrome had thinner cortices and that PTSD conferred an additional risk for this.

So if you have PTSD, you are at risk for metabolic syndrome and premature brain aging. A high-fat diet might ease your symptoms in the short term, but it will only worsen your health problems. In my work with war veterans, I have felt a sense of surrender from these patients, as if the trauma of war had weakened their will to live. Not only were they tortured by their flashbacks and anxiety, but some let their bodies go as well. Others were struggling with the side effects of psychiatric medications—such as weight gain. On the one hand, I didn't like recommending that they cut down on the foods that comforted them. Why take away the one source of comfort they had? On the other hand, eating a high-fat diet amounts to self-

sabotage, damaging your brain in multiple ways.

The best way for PTSD sufferers to improve their diet is to think about comfort foods as a taste addiction that they simply have to beat in order to feel less anxious and preserve their brains. When I work with PTSD patients, I tell them to think of the fat in their diets as brain sludge, gumming up all the delicate folds and crevices of their precious gray matter. This image is usually vivid enough to help them cut down on fats.

Sugar and High-GI Carbs

Sugar and high-GI carbs are also destructive to the traumatized brain. In 2010, Bettina Nowotny and her colleagues examined the effect of acute psychological stress on glucose metabolism in fifteen overweight Bosnian war refugees with PTSD.[22] They found that acute stress increased cortisol and blood glucose after a meal. This was consistent with another study that demonstrated that women with PTSD had twice the risk of type 2 diabetes compared to women without PTSD.[23] And twin studies have confirmed that PTSD could be a marker of vulnerability to type 2 diabetes.[24] In fact, the association between PTSD and obesity is so common, researchers are beginning to think that PTSD is a metabolic disorder like diabetes. That's likely why it's not uncommon to see patients like Letitia who have both diabetes and PTSD.

Given this propensity for diabetes in PTSD patients, it stands to reason that drinking soda and other high-sugar beverages is problematic. Unfortunately, in 2011, Jacqueline Hirth and her colleagues found that among a sample of 3,181 women, those with PTSD were more likely to consume more than 1 serving of soda per day.[25]

High blood sugar affects the ability of the hippocampus to react to stress.[26] As a result, when people are dealing with trauma, eating sugary foods may compromise the brain's ability to deal with that stress. But as we learned in chapter 2, sweet foods aren't the only ones that can spike blood sugar. High-GI carbohydrates, like potatoes, white bread, and white rice, can have a similar effect. Foods with a low glycemic index (low GI) can help prevent sudden spikes in blood sugar. It's important to know which foods increase blood glucose more than others. For example, a banana increases blood glucose more than an apple, which has the same amount of

carbohydrates. And a boiled sweet potato increases blood glucose more than a boiled carrot.

But while knowing the glycemic index of individual foods is a good first step, food is combined in meals and, when combined, can affect glucose levels differently. For instance, in 2019, Jiyoung Kim and her colleagues found that although rice is a high-GI food, when it is eaten as part of a mixed meal with egg, sesame oil, and bean sprouts, the different components of the meal result in the rice having a lower GI index than it would in an unmixed meal with the same amount of carbohydrate. This is especially important for cultures that rely on carbohydrates like rice as a staple.

I saw this concept in action in Kushal, a patient of mine who was a Sri Lankan doctor suffering from PTSD. In 2004, a deadly tsunami swept through the southern coast of Sri Lanka as a result of the Indian Ocean earthquake, killing close to thirty thousand people. After that disaster, Kushal moved to Boston and came to see me for a number of symptoms. The slightest rumble of any kind would send him spiraling into a panic. He insisted on staying as far away from the ocean as he could, which disrupted his life with his family.

As a doctor, Kushal was familiar with PTSD, but he had had limited success with medications and psychotherapy. When he came to see me, I took a full dietary history, and I could see how distraught he was from trying to follow a Mediterranean-style diet. I asked him why he was staying away from traditional Sri Lankan food, and he said he was trying to avoid rice because of the connection between PTSD and diabetes. Sri Lankan food can be intense and spicy, and he couldn't enjoy it without rice. I admired how committed he was to changing his diet, but it clearly wasn't working for him.

When I talked to him about how mixed meals can alter the GI of individual foods, he started to cheer up. I explained that you can reduce the GI of foods like rice by adding foods rich in dietary fiber, or by adding vinegar or bean or dairy products.[27] In fact, one study found that you can reduce the GI of white rice by 20–40 percent in this way.[28]

Relieved, he went home and prepared his favorite Sri Lankan rice dish. He also began to use brown rice. On some days he made my recipe for cauliflower rice (here), which added more vegetables to his diet. You can't

imagine his delight when he next visited me. He had gone back to eating his traditional food a few times a week, and he was astounded by how it relieved his anxiety and PTSD over time. In addition after three years of follow-up appointments, he had no sign of diabetes or other metabolic syndrome, and his weight has remained stable.

While it's hard to know the GI for every meal combination, I hope you see why it's not sufficient to simply tally up the GI of individual foods. Of course, even in a mixed meal, you still have to watch your carbohydrate intake and make healthy choices. But Kushal's story is an important reminder that food genuinely is an important source of comfort, especially in people who have suffered from trauma. As long as you make an effort to understand how it affects your body and brain, consider your individual sensitivities, and eat unhealthy foods only in moderation, finding ways to integrate your favorite foods into your diet will ultimately have a positive effect.

Glutamates

Glutamate has been used to enhance the flavor of food for more than twelve hundred years.[29] It imparts a unique taste known as umami. Though umami is not as instantly recognizable as sweetness, sourness, bitterness, or saltiness, it is the fifth basic taste that our tongues have the capacity to perceive. Though glutamates naturally occur in many foods, the most common way to impart an umami flavor in a dish is to cook with the additive monosodium glutamate (MSG).

There has been considerable controversy over the years about whether MSG is toxic or not. However, that matter is considered close to settled in modern nutrition circles: extensive scientific studies have demonstrated that MSG is safe at ordinary levels, and some studies show that it may even promote digestion and metabolism of food in the gut.[30] Ten grams of MSG for an average adult does not increase glutamate levels. As a result, many experts believe that the MSG dangers are all hype.[31]

However, in sensitive individuals, MSG may cause problems including brain toxicity. PTSD patients are particularly likely to be vulnerable to excess glutamates, leading to increased brain inflammation and the destruction of brain cells.[32] Glutamate is an excitatory neurotransmitter,

which means that it generates an electrical impulse in nerve cells. If you have too many of these impulses, the connection between nerve cells can be disrupted. This disruption is especially prominent in the hippocampus and medial prefrontal cortex, regions that help modulate the stress response.

In 2019, Elizabeth Brandley and her colleagues reported on how a low-glutamate diet may impact PTSD.[33] They studied Gulf War veterans with PTSD and gave half of them a low-glutamate diet while the other half ate normally. Preliminary analyses indicated that the low-glutamate diet was effective in reducing anxiety and symptoms of PTSD.

Foods that contain MSG and other glutamates include fish sauce, oyster sauce, tomato sauce, miso, Parmesan cheese, savory snacks, chips, ready-to-eat meals, mushrooms, and spinach. Glutamic acid, a precursor of glutamate that has similar effects, is also found in seaweed, cheeses, soy sauce, fermented beans, tomatoes, and high-protein foods like meats and seafood. (Be aware that many high-glutamate foods also contain the amino acid tyramine, which can interfere with MAOI antidepressants. See chapter 9 for more details.)

You shouldn't assume that all these foods will definitely worsen symptoms, but sufferers of PTSD would be wise to eliminate some of them to see if there is any improvement. Even if you're not suffering from the effects of trauma, while it's not necessary to cut out glutamates entirely, follow the Goldilocks principle: not too much, not too little, but just enough.

SOOTHING FOODS

Thankfully, dietary treatments for trauma aren't all about food that should be left out of your diet. Let's consider foods that might help traumatized brains get back to normal function.

Blueberries

In 2016, Philip Ebenezer and his colleagues examined the anti-inflammatory effects of blueberries in rats with inflammation and free-radical damage in the prefrontal cortex and hippocampus due to PTSD.[34] One group of rats was given a blueberry-enriched diet, while the control

group ate a regular, blueberry-free diet. The study found that a blueberry-enriched diet increased serotonin levels in the brain and reduced free radicals and inflammation.

A closer look at the findings in a series of studies done by the same group revealed that the anti-inflammatory effects of blueberries may be even more dramatic than we think, with important implications for human mental health. The PTSD-induced rats in the study showed very low expression of the gene *SKA2*. That same gene also has low expression in humans who commit suicide. While we can't question rats about suicidal feelings, it seems likely that the similarity isn't coincidental. Remarkably, when the investigators had the rats eat a blueberry-rich diet each day, *SKA2* levels increased in the blood and brain compared to the rats on a normal diet.

In other words, blueberries may impact the downregulation of genes. We need more studies in humans to be sure, but it can't hurt to add more blueberries to your diet. They are delicious and healthy in many ways. I'd suggest adding ½ cup to 1 cup per day. Frozen blueberries are just as good as fresh as long as they don't have added sugars, juice, or preservatives.

Omega-3 Fatty Acids

We've already seen a few ways in which omega-3s can be good for mental health, and PTSD is no exception. Multiple studies have shown the efficacy of omega-3s in fighting PTSD: in 2019, Laiali Alquraan and her colleagues found that omega-3s protected the brains, particularly the hippocampus, of rats with PTSD.[35] In a randomized controlled trial of fish oil in rescue workers after the Great East Japan Earthquake, omega-3s also decreased PTSD symptoms.[36] In 2013, Yutaka Matsuoka and his colleagues examined three hundred people who had suffered from PTSD after a motor vehicle accident to see if blood levels of omega-3s correlated with PTSD symptoms.[37] Once again it was found that the higher the levels of omega-3s, the lower the levels of PTSD.

I saw the power of omega-3s to fight PTSD in my patient Leslie. When I first met Leslie, I didn't know she was suffering from PTSD, only that her anxiety was at an all-time high. She worked as a sous-chef in a busy hotel kitchen. If you've ever worked in a kitchen like this, you know how noisy

they can be. Pots and pans sizzle, and there is a cacophony of communication among staff. Dishes are plonked on the tables, and glasses come crashing down. Working in that environment was becoming untenable for Leslie; the noise was unbearable, and sudden noises made her jump out of her skin.

As we talked, I realized that there was more going on than just job stress. She broke into tears as she recounted being sexually abused by her father between the ages of eight and thirteen. Although she was able to escape him when she went to college, she had never confronted him or told anyone except her therapist about her trauma. She began to soothe her anxiety by eating more and making poor food choices, which led to weight gain. Several times a week, she had flashbacks and nightmares, making it difficult to sleep at night. This, in turn, made it almost impossible to go to work the next day. While medications and therapy had been helpful, she was still struggling.

Leslie's story was heartbreaking, but sadly childhood sexual abuse is more common than most people realize.[38] Worldwide, 8–31 percent of girls and 3–17 percent of boys are sexually abused, and victims often end up suffering from PTSD.

When I took a dietary history from Leslie, she described herself as a "meat and potatoes gal." She rarely ate fish because she had a strong aversion to its smell. This posed a real challenge because I knew that she needed omega-3s, and as we've already learned, fish are the richest source of them.

I recommended plant oils such as flaxseed, canola, and soybean oils. I told her that a key type of omega-3 called alpha-linolenic acid could be obtained from plants like edamame, walnuts, chia seeds, and radish seeds, though you won't find other omega-3s such as eicosapentaenoic acid or docosahexaenoic acid in these sources. I encouraged her to switch to grass-fed beef, which has higher levels of omega-3s (though no beef is a great source of them). I also pointed her toward foods that are fortified with omega-3s, like egg, milks, and yogurt.

When looking to bolster your omega-3s, general rules of thumb to remember are:

- Eat fish, especially farmed, fatty fish from reliable sources.
- If you eat beef, use grass-fed beef.
- If you're vegetarian, use organic canola oil and seek out foods fortified with omega-3s.

Vitamin E

In chapter 2, I introduced you to the damage that free radicals can inflict on your brain, causing oxidative stress. Free radicals may arise from normal physiological processes, stress, or inflammation, but they may also arise when you are exposed to X-rays, ozone, cigarette smoke, air pollutants, or industrial chemicals. Just think about that for a second. Every time you expose yourself to stress, it can damage the cells in your body the same way that powerful environmental pollutants can. Chronic PTSD means your brain is constantly stressed and therefore flooded with free radicals.[39]

Vitamin E is part of the body's defense system against free radicals. In 2019, Camila Pasquini de Souza and her colleagues found that vitamin E turned down the anxiety levels in mice with PTSD significantly, likely by mopping up free radicals.[40] We've also seen encouraging results in human trials. Many studies of patients who have brain trauma show that vitamin E can help to prevent further brain damage.[41] That feels like a strong reason to recommend vitamin E to those struggling with PTSD.

Just 1 tablespoon of wheat germ oil a day will give you your total vitamin E requirement. Other sources of vitamin E include sunflower seeds, dry-roasted almonds, hazelnuts, peanut butter, spinach, broccoli, and raw tomatoes.

Spices and Natural Supplements

Ginkgo biloba is a natural product that comes from a tree of the same name. One of its important effects is preventing cell damage by free radicals.[42] Because of that, it can protect the brain in much the same way as vitamin E.

A study by Jamal Shams and his colleagues reported on findings from a twelve-week trial that compared ginkgo biloba to placebo in people who met the criteria for PTSD after experiencing a magnitude 6.3 earthquake in

Bam City, Iran.[43] They found that 200 mg of ginkgo biloba was more effective than placebo for reducing anxiety, depression, and symptoms of PTSD. Since there is no way to get the active chemical of ginkgo biloba in regular food, you'll have to take it as a supplement, with your doctor's approval. It's available at pharmacies and health food stores.

It may also be helpful to incorporate our old friend turmeric into your diet to get the benefits of its active ingredient, curcumin. When rats consume curcumin, they form fewer fear-based memories and activate fewer of those memories.[44] While no curcumin studies have been done in humans with PTSD yet, given all the benefits we've already explored, it's worth a try.

Don't forget a pinch of black pepper in dishes with turmeric, since as discussed earlier pepper activates it.

OVERCOMING TRAUMA ONE MEAL AT A TIME

It is always fulfilling to help patients in my clinic improve their diets to strengthen their mental health, but that's particularly true with patients like Letitia, Kushal, and Leslie, who have overcome such devastating personal trauma. It is truly an inspiration to see their resilience in the face of hardship, and it's an honor to play a role in their journey to heal their brains and souls. I hope that this chapter helps you understand the crucial role that food plays in that journey, and that you can apply these same principles to recovering from traumas you may have suffered.

The human brain is remarkable in its ability to recover from painful experiences, but don't forget to give it the tools it needs to build itself back up—a healthy diet and a helping hand from the trusty gut.

PTSD CHEAT SHEET

Foods to Embrace:

- Blueberries: ½–1 cup per day.
- Omega-3 fatty acids: Fish, especially fatty fish like salmon, mackerel, tuna, herring, and sardines.

- Vitamin E.
- Spices: Turmeric.
- Supplements: Ginkgo biloba.

Foods to Avoid:

- The components of the Western diet: Foods high in bad fats (red meat, fried foods) and high-GI carbs (white bread, white rice, potatoes, pasta, and anything else made from refined flour).
- Sugar: Baked goods, candy, soda, or anything sweetened with sugar or high-fructose corn syrup.
- MSG, other glutamates, and glutamic acid: Fish sauce, oyster sauce, tomato sauce, miso, Parmesan cheese, savory snacks, chips, ready-to-eat meals, mushrooms, spinach, seaweed, cheeses, soy sauce, fermented beans, tomatoes, and high-protein foods like meats and seafood. You have seen in earlier chapters that some of these foods also have positive impacts. It is all about working out a personalized nutrition plan.

CHAPTER FIVE

ADHD: Gluten, Milk Caseins, and Polyphenols

Sanjay was a thirty-year-old computer programmer who was referred to me because of debilitating worry and panic attacks. He was constantly getting into trouble at work. He had missed several deadlines, and when he was asked about his performance, he was too terrified to say that he was struggling mentally. As a result, he often skipped work entirely, but of course his absenteeism just made the situation worse. His team leaders chalked his issues up to laziness and questioned his ability to perform his duties. He was at risk of losing his job.

Medications helped his anxiety somewhat, but he still found himself procrastinating whenever he had a task to complete. As I talked to him about his problems with work and life, I began to suspect that Sanjay was suffering from attention deficit hyperactivity disorder (ADHD). In fact, as we delved into his history, it seemed likely that he had been suffering from symptoms of the condition since high school, but his teachers and peers had written off his struggles as stubbornness, insubordination, or, worse, lack of intelligence.

Starting him on a stimulant medication (Ritalin) and making several changes to his diet eventually saved his job and maybe even his life. He stopped drinking alcohol impulsively, he felt less depressed and anxious, and the world started to feel manageable again. He began eating whole foods instead of junk food, processed fast foods, and soda. He could focus on tasks at work and became a valuable member of the team. Most of all, he

was relieved that people no longer thought of him as “dumb.”

Stories like Sanjay’s are not uncommon. We live in an age where our attention is constantly under attack. Notifications dinging on our phones, the endless chatter of social media, and the barrage of information at work and in our personal lives make it difficult to stay focused. Having email on your phone also means that your work world has access to you 24/7. All of this can make for a frustrating day, even for people with perfectly healthy brains. When you have to deal with these daily distractions while suffering from ADHD, you can feel overwhelmed and isolated.

The core features of ADHD include difficulty paying attention, hyperactivity, and impulsivity, but patients present in a variety of ways.[1] For some, learning is a particular challenge, whereas for others, unstable mood, anxiety, and oppositional behavior are the primary symptoms.[2] ADHD is an increasingly common condition—one in twenty-five people have the diagnosis. Usually it begins in childhood (though it can begin later too), but it often persists for years—65 percent of people with childhood-onset ADHD have symptoms that last into adulthood.[3] As we have seen with Sanjay, ADHD can compromise your ability to function at work, at home, and in your social life.[4]

Although ADHD may be addressed through medication or psychotherapy, it is often highly resistant to treatment.[5] For this reason, dietary interventions can be helpful alongside other treatments. In this chapter, we will examine ADHD, take a look at the gut-brain interactions, and consider foods that may help or hurt.

One thing that distinguishes ADHD from the other conditions we are studying is that it is quite often diagnosed in children. While I see plenty of adult ADHD patients like Sanjay, ADHD can certainly take hold early on and cause many challenges for children who suffer from it. The same is true for two closely related conditions: sensory processing disorder and autism spectrum disorder. Part of the reason I’m able to share this book with you is my clinical experience with adult patients. Though some of the studies cited in this chapter were performed on children, since I am not a child psychiatrist, I won’t delve into childhood ADHD or these other conditions specifically in this book. Still, the benefits of eating a whole, healthy diet apply to both children and adults.

ADHD AND YOUR GUT

When you have ADHD, the connections between different brain regions are disrupted, specifically between the prefrontal cortex, the "thinking" brain, and the striatum, the part of the brain that deals with reward behaviors. Additionally, your brain chemistry is affected, particularly your levels of dopamine, the brain's "reward" chemical, and noradrenaline, a fight-or-flight hormone.[6]

Although medications used to improve ADHD symptoms generally increase the levels of dopamine and noradrenaline, we are learning that treating ADHD isn't as simple as boosting the levels of these chemicals, as other brain chemicals such as gamma-aminobutyric acid and serotonin are also involved. While a full explanation of how brain chemistry impacts ADHD is beyond the scope of this book, it's clear that attention is regulated by a delicate balance of factors.

So, if ADHD is caused by chemical imbalances in your brain, what role does your gut play? Larger molecules such as dopamine and noradrenaline cannot cross the blood-brain barrier, which means that they are confined solely to your brain. But they are made of precursor molecules—building blocks—that can. And where are these precursor molecules made? You guessed it: the gut.

Gut bacteria play an important role in ADHD, synthesizing many of these chemical precursors.[7] Different bacterial species in the gut produce different chemicals, which means that if gut bacteria change, the brain's chemical stability can be upset.[8] And as we've seen with other conditions, a reduction in the diversity of gut bacteria can be particularly problematic.[9]

In 2017, Esther Aarts and her colleagues examined the differences in the microbiome between patients with ADHD and healthy individuals.[10] Compared to controls, people with ADHD had more bacteria that made phenylalanine, a building block necessary for dopamine and noradrenaline synthesis.

The investigators then looked at how the brains of each group responded to reward. Decreased anticipation of brain reward is a hallmark of ADHD—in other words, studies show that people with ADHD aren't motivated as strongly by incentives to behave in a certain way.[11] Sure enough, the researchers found that the ADHD subjects showed less brain activation in

response to being rewarded. Furthermore, the less their brains responded to the reward, the more phenylalanine-producing bacteria were present in their guts. The researchers concluded that ADHD subjects had to make more bacteria that produce phenylalanine to compensate for how their brains responded.

That's a highly simplified view of how chemical and bacterial mechanisms interact, but it gives you an idea of the important scientific research being done with respect to ADHD. In fact, even in this major study, the investigators recognized that the only sure conclusion they could draw was simply that gut "disturbances" correlate with brain "disturbances."

In addition to the serious neurological symptoms, ADHD can come with physical symptoms as well. In 2018, another research study found an increase in two gastrointestinal symptoms—constipation and flatulence—in children with ADHD when compared to control subjects.[12] Yet again, this study correlated the gastrointestinal dysfunction in ADHD with changes in the microbiome.

Fighting ADHD takes a combination of proper medications and a proper diet. Let's talk about some foods that harm and hinder patients who are striving to restore their focus.

FOODS THAT WORSEN ADHD

I recently evaluated a twenty-year-old college senior, Suzy. Suzy was a bright and hardworking student. However, even though she was conscientious and generally cheery, her grades began to fall during her senior year, and she started to feel depressed. She also constantly had an upset stomach, which she had just accepted as a way of life. She'd had an ADHD diagnosis since she was younger, but while Ritalin had helped her focus on her work in the past, the effect seemed to be dwindling as she built up a tolerance.

Suzy assumed that the cause of her troubles was that her dorm had become too distracting, but she also admitted that there had been no significant changes in her living environment since her more successful semesters. I noted that her diet seemed to have shifted toward more comfort

food. She told me that her standard breakfast was instant oatmeal with milk. Lunch frequently included bread and pasta. She snacked on cubes of cheese throughout the day, and she had pizza for dinner at least three times a week.

It doesn't take a nutritionist to see that she was eating a lot of dairy and gluten, and it's no coincidence that both of these dietary components can exacerbate the symptoms of ADHD.

Gluten

Just as we saw in chapter 3 on anxiety, there is also a well-established link between ADHD and gluten intolerance or celiac disease. In 2006, Helmut Niederhofer and Klaus Pittschieler assessed a sample of people across a broad age range to test the association between ADHD and celiac disease.[13] The participants' ADHD symptoms were measured before they started a gluten-free diet and six months after. The study found that people who had celiac disease were more likely to have ADHD, and a gluten-free diet improved their symptoms after the initial six-month period.

Suzy's celiac test came back negative, but you don't have to have celiac disease to be sensitive to gluten. This condition is called non-celiac gluten sensitivity.[14] While the association between non-celiac gluten sensitivity and ADHD is by no means conclusive, various studies point to a connection between the two. In some instances, as we saw in chapter 3 with my "silent celiac" patient Rex, gluten sensitivity may cause neurologic and psychiatric symptoms without any corresponding digestive symptoms.[15] People typically associate gluten sensitivity with digestive issues, so in the absence of upset stomach or bowel symptoms, gluten isn't on the radar as a factor that can worsen ADHD.

The exact reason that gluten sensitivity and brain dysfunction are connected is not fully understood. In 2005, Päivi A. Pynnönen and her colleagues assessed adolescents with celiac disease and behavioral problems.[16] They found that adolescent celiac disease patients had significantly lower tryptophan concentrations in their blood.

Three months after patients started a gluten-free diet, the researchers found a significant decrease in patients' psychiatric symptoms compared to their baseline condition, coinciding with significantly decreased celiac disease activity and prolactin levels and with a significant increase in L-

tyrosine, L-tryptophan, and other amino acids known to be precursors of brain chemicals such as serotonin. The authors concluded that it was possible that behavioral problems, such as those that occur with ADHD, may in part be due to certain important precursor amino acids not being available until people stopped eating gluten. In certain individuals, gluten-free diets can help the body increase levels of the precursors to make serotonin, which is one neurotransmitter involved in ADHD.

I encouraged Suzy to go on a gluten-free diet, and she quickly saw benefits. Most of the gluten Suzy was eating came from bread, pizza, and pasta, but it can also be found in a huge range of processed foods and alcohol. Thanks to an increase in awareness of gluten-free diets, there is a wealth of options for eating gluten-free, and it wasn't difficult for Suzy to cut out gluten without cutting out her favorite foods. After kicking her gluten habit, Suzy was able to get her senior year back on track and graduate as expected.

Dairy

Suzy's diet was also high in dairy. Eating a lot of dairy means you eat a lot of casein, which may worsen ADHD.[17] Casein is the main protein found in dairy products such as milk, cheese, yogurt, and ice cream, but it can be a factor even in foods that are thought of as dairy substitutes, like nondairy creamer and margarine.

Not all casein is the same. The main form is called beta-casein, of which there are two major types, A1 and A2. Most regular milk contains both types, but research suggests that A1 proteins may be harmful to the gut in ways that A2 proteins are not.

In 2016, a team led by Sun Jianqin studied forty-five participants who consumed milk containing both A1 and A2 milk proteins, and then milk containing only A2 protein.[18] The researchers found that when subjects drank milk containing A1 protein, they had more gastrointestinal inflammation, their thinking was slower, and they made more errors on an information-processing test. It was as if the A1 protein muddied their thinking, something that ADHD patients can ill afford. The study even suggested that lactose intolerance may be caused by sensitivity to A1 caseins rather than lactose itself.

Although more research is under way about whether A1 milk causes any adverse effects except occasional digestive problems, it's clear that sufferers of ADHD should be cautious about the kind of casein they consume.[19]

Luckily there is milk available that only has A2 proteins. Milk from breeds of cows that originated in Northern Europe is generally high in A1 protein. These breeds include Holstein, Friesian, Ayrshire, and British shorthorn. Milk that is high in A2 protein is mainly found in breeds that originated in the Channel Islands and southern France. These include Guernsey, Jersey, Charolais, and Limousin cows.[20] Of course, it's not often practical to choose what kind of cows your milk comes from! However, there are now A2-only milks available in many grocery stores and online.

While it's great to have A2 protein milk available, since much of the dairy we consume is in the form of cheese, yogurt, butter, and prepared foods, cutting out A1 caseins still requires significant dietary changes. It's worth noting that sheep's and goats' milk is generally A2 milk, which makes cheese and yogurt choices a bit easier. You can also try nut milks and milk nut yogurts as a way to avoid casein.

Sugar

You've probably heard that sugar makes people (especially children) "hyper." That's created a common perception that sugar causes or triggers ADHD. It's true that sugar can have an effect on ADHD through several pathways. For instance, because it can increase adrenaline, a hormone that increases heartbeat and blood sugar levels, sugar may cause more hyperactivity.[21] And because it reduces dopamine sensitivity in the brain, sugar can amplify impulsive reward-seeking behavior that is common in ADHD.[22] Still, while many parents and teachers swear by limiting kids' sugar intake to improve their behavior, recent research indicates that the idea that sugar causes ADHD is a misperception.

In 2019, Bianca Del-Ponte and her colleagues investigated whether high sugar intake was associated with ADHD in a study of children between the ages of six and eleven years old.[23] Through interviews and diet monitoring, the researchers were able to calculate the actual sucrose consumption of all the children in the study. Trained interviewers collected data on whether children met the criteria for ADHD or not.

Although they found that high sucrose consumption was more common in six-year-old boys with ADHD compared to those without ADHD, this effect was not seen in children of other ages in either gender. Changing sucrose consumption between six and eleven years of age also did not affect the incidence of ADHD in boys or girls. Overall, the researchers concluded that sugar consumption does not lead to ADHD. If there is any correlation, children with ADHD may simply consume more sugar.

Although there are other studies that have demonstrated that sugar consumption (especially sugar-sweetened beverages)[24] is associated with ADHD, a large majority of recent studies back up the idea that sugar does not cause ADHD.

Still, while the evidence of sugar's role in hyperactivity may not be as damning as popular perception would indicate, sugar is never good for mental or physical health, so I always recommend that ADHD patients of all ages limit how much they eat.

Food Colorings, Additives, and the Few Foods Diet

The earliest research on the effect of food on ADHD can be traced back forty years, when pediatric allergist Benjamin Feingold hypothesized that both artificial food additives (colorings and flavors) and foods rich in salicylates might make children more inattentive and restless.

Salicylates are chemicals found naturally in some fruits, vegetables, coffee, tea, nuts, spices, and honey. They are synthesized for use in medications like aspirin, Pepto-Bismol, and other products.

In 1976 Feingold formulated a diet that eliminated food additives and salicylates, which would come to be known as the Feingold diet.[25] Some people refer to it as the Kaiser Permanente diet. It was popular in its early days, though the effects were poorly understood. The studies by Dr. Feingold were followed by other studies investigating the effects of eliminating artificial food coloring and eventually led to a diet eliminating many foods and additives, called the few foods diet. This diet is essentially an elimination diet, a category of diets pioneered in 1926 by food allergy specialist Albert Rowe and still in use today.[26] In this approach, you remove one potentially offending food at a time and carefully record any changes in symptoms, before adding foods back in one at a time.

In 1983, a meta-analysis found that the effect of the Feingold diet on ADHD was actually quite weak, casting doubt on the efficacy of elimination diets in improving ADHD in general.[27] However, in 2004, another meta-analysis of only the higher-quality studies demonstrated that eliminating food colorings seemed to make a difference in parents' observations of children with ADHD, but not in teachers' or other caretakers' observations.[28]

Just as in our discussion of sugar, this gives us another example of how parents' conceptions of triggers for ADHD don't always agree with studies. While it is possible that parents may make erroneous associations and have strong biases, I don't believe that we can just throw out parents' findings.

A 2012 meta-analysis by Joel Nigg and his colleagues and a 2017 meta-analysis by Lidy Pelsser demonstrated that a restriction diet that eliminated food-coloring additives benefited some children with ADHD, determining that between 10 and 30 percent of people with ADHD would likely respond.[29]

While none of these elimination diets are ironclad ways to eradicate ADHD, they are still worth considering if symptoms don't respond to less drastic dietary measures.

FOODS FOR FOCUS

Preliminary research indicates that certain foods may improve the symptoms of ADHD. Before diving into specific nutrients, it's worth noting that research has shown that overall diet intervention has been effective at staving off ADHD—in other words, it's important to eat healthily over a broad spectrum of food.[30] For example, several studies have shown that ADHD responds well to the Mediterranean eating pattern, which we discussed in chapter 2. In 2017, Alejandra Ríos-Hernández and her colleagues studied 120 children and adolescents and found that those who did not stick to the Mediterranean diet were more likely to have ADHD.[31] Other studies have confirmed that low adherence to the Mediterranean diet is associated with ADHD.[32]

Beyond the Mediterranean diet, there are several specific foods and nutrients that can help fight ADHD.

Breakfast

Breakfast is an important meal for all of my patients, so that they are adequately fueled to jump-start their brains (and bodies) every morning. But for ADHD patients, stimulants can take a toll on appetite, so being hungry in the morning may not be a given.[33] My patients often find that creating a routine around breakfast can be helpful.

In 2017, David O. Kennedy and his colleagues explored what morning nutrients could be helpful for ADHD sufferers.[34] They compared the cognition of ninety-five people after they ate a noncommercial nutrient-enriched breakfast bar made for this study (containing alpha-linolenic acid, L-tyrosine, L-theanine, vitamins, minerals, and 21.5 mg of caffeine) versus a control bar for fifty-six days. Then they examined how cognitive function differed before eating the bars and at 40 and 160 minutes after eating the bars. They found that in all tests, people who ate the nutrient-enriched bars were more alert and attentive, and they could process information more rapidly.

It's unclear which specific nutrients in the test bars helped, and of course, you won't be able to find breakfast bars that are exactly the same as those used in the study, since they were specially formulated. And since commercially available breakfast bars tend to be packed with sugar and refined carbs, a better way to start the day when you can't eat whole foods is to make a smoothie. The Chocolate Protein Smoothie here is designed to give you nutrients similar to those in the bars used in the study to give your morning the right boost to fight ADHD.

Caffeine

One notable factor in the breakfast bar study discussed in the previous section was the caffeine. In animals, caffeine has been shown to have beneficial effects on attention and memory, and a 2011 study demonstrated that tea might be an effective treatment for adult ADHD.[35] Presumably, the caffeine in tea increases people's motivation, alertness, vigilance, efficiency, concentration, and cognitive performance. On the other hand, caffeine may cause overexcitability too, so it's important not to overdo it.[36]

As we discussed in the anxiety chapter (chapter 3), the amount of

caffeine that you consume matters. Again, our guideline is no more than 400 mg of caffeine per day for adults. I do not recommend giving children caffeine, even if it could be beneficial—it's just too hard to determine a safe dose for their smaller bodies.

Polyphenols

In 2018, Annelies Verlaet and her colleagues found that natural antioxidants like dietary polyphenols could be useful in combating ADHD, helping to alleviate oxidative stress on the brain.[37]

Studies have shown that people with ADHD are at a greater risk of oxidative stress in brain tissue.[38] This can lead to damaged brain cells and altered neurotransmitter levels (like dopamine) and electrical-signal transmission, which can make ADHD worse. Since ADHD sufferers appear to lack some of the natural ability to fight off oxidative stress, it is particularly important for them to get as many antioxidants as possible through food in order to alleviate their symptoms and prevent brain cell damage.

One crucial type of antioxidant is polyphenols. Polyphenols are chemical weight lifters for the body's immune response. They act as low-dose toxins that train the body to mount an immune response in a process called hormesis. Polyphenols can also exert other biological effects that are helpful to the brain; for example, they influence the survival and regeneration of neurons.

The richest sources of polyphenols are berries, cherries, eggplant, onions, kale, coffee, and green tea.

Dietary Micronutrients

Some animal and human studies have indicated that when there is a deficiency of zinc, hyperactivity may occur.[39] Indeed, zinc deficiencies are associated with ADHD in children, in part because its absence reduces the activity of reward pathways that rely on dopamine.[40]

Other studies have shown that children with ADHD have lower levels of iron and magnesium than controls, both of which are involved in dopamine synthesis.[41]

In 2017, Jin Young Kim and her colleagues studied 318 healthy children to see if their diets impacted their cognition. They used the Symbol Digit Modalities Test (SDMT), a test of speed of information processing, to see which dietary elements were beneficial.[42] They found that the consumption of vitamin C, potassium, vitamin B_1, and nuts all increased performance on the SDMT. In addition, the more mushrooms people ate, the better they were able to reason, while noodles and fast food decreased SDMT scores.

A FOCUS ON FOOD

It's clear that being able to focus is incredibly important to success, whether you're a kindergartner developing the skills to read and reason and socialize, a college student like Suzy studying for exams and writing papers, or an adult like Sanjay who is struggling to succeed at a fast-paced, high-pressure job. While ADHD drugs like Ritalin and Adderall can be godsends for those who really need them, they don't come without risks. They can be habit-forming and easily abused.[43]

If you struggle with mild ADHD symptoms, I encourage you to alter your diet in the ways we've talked about to see if your mind becomes clearer through strengthening the natural pathways between your brain and your gut. And even if medication is right for you, know that these dietary principles will work alongside your other treatments to clear and calm your mind.

ADHD CHEAT SHEET

As with depression, the Mediterranean eating pattern is a great overall diet to follow for improving ADHD symptoms.

Foods to Embrace:

- Breakfast: It's important for ADHD sufferers to get the day started right, so try starting with a smoothie like the one here.
- Caffeine: While caffeine can be beneficial to ADHD, keep consumption under 400 mg/day.

- Polyphenols: Berries, cherries, eggplant, onions, kale, coffee, and green tea.
- Vitamins C and B_1.
- Minerals: Zinc, iron, potassium, and magnesium.

Foods to Avoid:

- Gluten: If you have celiac disease or non-celiac gluten sensitivity, avoid all wheat products, such as bread, pizza, pasta, and many alcoholic drinks.
- Dairy, specifically A1 milk caseins: Drink and cook with products made from A2 milk, nut milk, or goat's or sheep's milk.
- Sugar: While sugar is unfairly vilified as a cause of ADHD, it's still best to limit intake; avoid baked goods, candy, soda, or anything sweetened with sugar or high-fructose corn syrup.
- Food colorings and additives: Colorings and additives can be eliminated by following diets such as the Feingold diet or the few foods diet if ADHD symptoms don't respond to less radical diet changes.

CHAPTER SIX

Dementia and Brain Fog: Microgreens, Rosemary, and the MIND Diet

More than twenty years ago, I met Brian, a wildly brilliant sixty-year-old professor who came to see me about his anxiety. It was both exciting and a little daunting for a young psychiatrist to treat a mind that had been deemed a possible Nobel laureate in medicine, but we developed a good rapport over the course of our weekly meetings, and I came to look forward to each appointment.

It was in March, as he was struggling with anxiety about preparing his taxes, when I first noticed that he seemed to be fading away. The effect was subtle; it wasn't as if he just came in one day without the ability to remember. But slowly, week after week, I saw an ever-so-slightly vacant look on his face, a tremor so subtle that I couldn't tell if it came from having too much coffee, and slips of the tongue so minor that I would have ignored them had I not noticed the other signs. At first, I wrote the symptoms off as stress, but eventually, this triad of vacancy, tremor, and oddities in speech raised my suspicion that something was amiss.

I referred him for a thorough neurological examination, which included detailed tests of his memory and attention. The results showed that he was in the early stages of Parkinson's disease. Parkinson's is known for causing physical tremors, but it is often accompanied by dementia as well, and given the decline I'd seen in him, I feared the worst. The news was devastating for him, for me, and for the world.

Parkinson’s has no cure, which meant we had only symptomatic treatments in our arsenal. I desperately searched the nutritional literature for possible diet and lifestyle alterations we might try. At that time, the field of nutritional psychiatry was in its infancy—in fact, the term “nutritional psychiatry” didn’t even exist yet—and there was not much to turn to. We were stuck.

Brian succumbed to complications of Parkinson’s disease some ten years later, and, sadly, for eight of those ten years, his memory was almost totally gone. After the initial slow fade, he lost both his long-term memory and the ability to form new short-term memories.

Had I known then what I know now, I would have been much more aggressive with nutritional recommendations. We don’t have a nutritional cure for dementia today, but there are now many studies that indicate different ways in which food may play a significant role in preventing or slowing cognitive decline. In this chapter, I will explain how our food choices can help us preserve our memories, and how they can clear our minds from the brain fog that sometimes disrupts the clarity of our daily lives.

Dementia comes in many forms. For example, vascular dementias occur due to blockages in blood vessels that stop blood from feeding brain tissue. Frontotemporal dementias are a general group of regional brain abnormalities that cause memory loss. Others, like Alzheimer’s disease, are less well understood. Even though we see distinct abnormalities in Alzheimer’s brains—most notably buildups of protein among nerve cells called amyloid plaques that disrupt nerve-cell function—we still do not fully understand the mechanics of the disease or the best ways to treat it.

While these conditions all stem from different parts of the brain and different causes, food can have a profound effect on all of them. As with all the other conditions we’ve discussed so far, understanding why starts with understanding the gut-brain connection.

YOUR GUT AND MEMORY

As we saw with anxiety, it’s not difficult to feel the connection between your gut and your memory. If you see an old partner who cheated on you,

you might instantly become nauseous. If you drive down a street where you ate a delicious meal, you may start to salivate and your stomach might grumble. Given that your gut "remembers," it should come as no surprise that it works hand in hand with your brain's memory systems. The key to that connection lies in the chemicals that make your brain and body function, many of which are regulated by your gut.

For example, the stress hormone cortisol can disrupt your ability to recall long-term memories, and as we've covered before, your gut bacteria affect blood cortisol levels by regulating the hypothalamic-pituitary-adrenal axis.[1] That means that the wrong balance of gut bacteria can lead to a spike in cortisol, which in turn can put a damper on your ability to recall memories.

Memory is also affected by levels of other neurochemicals, such as noradrenaline, serotonin, and dopamine.[2] For instance, we now know that noradrenaline enhances memory, especially when emotions are running high.[3] And studies have identified a close association between a serotonin-dopamine imbalance and changes in brain tissue that lead to learning and memory impairment. Once again, all these neurochemicals are dependent upon gut bacteria to produce the necessary precursors to keep them at healthy levels.

The vagus nerve can enhance memory when stimulated because it connects to brain structures like the amygdala and hippocampus, which are central to memory formation.[4] Since gut bacteria can change vagus nerve activation, that's another way in which they affect your memory.[5]

The most telling sign that there is a strong connection between the gut and memory is that the composition of gut bacteria changes in patients afflicted with several memory-related diseases. For instance, in Parkinson's disease patients like Brian, there is a significant decrease—77.6 percent—of the specific gut bacterium Prevotellaceae compared to controls.[6] And the microbiomes of Alzheimer's patients have decreased Firmicutes, increased Bacteroidetes, and decreased *Bifidobacterium.*

Sometimes the relationship can run the other way, with changes in gut bacteria altering the course of these diseases. Rosacea is known primarily as a skin condition in which people blush or flush more easily, but rosacea patients also have a slightly increased risk of developing dementia, particularly Alzheimer's disease.[7] Changing gut bacteria can make a huge

difference for rosacea patients. In 2009, Andrea Parodi and colleagues demonstrated that when you eradicate small-intestine bacterial overgrowth common in rosacea, the skin condition goes away.[8] This microbiome-based treatment can last up to nine months, and with the rosacea in remission, the risk of dementia is likely reduced.

Researchers also believe that gut bacteria trigger metabolic processes and brain inflammation that impact memory,[9] and they may also compromise blood flow in the brain. In addition, changes in gut bacteria may increase amyloid deposits, thereby contributing to Alzheimer's disease.[10] Modification of the gut microbiome by diet or by using probiotics may offer new preventive and possible therapeutic options for Alzheimer's.

All this evidence points to the idea that we may be able to reduce the possibility of dementia by avoiding foods that compromise our gut bacteria and eating foods that enhance them.

FOODS THAT WEAKEN MEMORY

In order to understand which foods are helpful or detrimental to memory, it's important to note that there are many different memory systems in the brain. For example, procedural memory systems help us to learn tasks such as playing the piano, typing, or playing golf. Relational memory includes remembering facts and events such as a new acquaintance's name or facts about the world. Working memory is short-term memory that we need to remember phone numbers or directions for how to get somewhere we've never been.

With all that in mind, let's look at how different foods and diets can harm or help these different kinds of memory.

The Western Diet

Once more we see the destructive effects of the Western diet.[11] High-fat and high-glycemic-index (high-GI) foods can alter brain pathways necessary for learning and memory, with neurons in the hippocampus and prefrontal cortex especially affected.[12]

The hippocampus is the part of the brain most involved in forming relational memories. Fascinatingly, hippocampal size actually changes

when you practice remembering. For example, the hippocampus is bigger in London taxi drivers, who have to memorize extensive and complicated routes through the streets of London.[13] However, when diets high in fats and sugar damage the hippocampus, it tends to shrink, which impedes memory. Furthermore, the hippocampus is responsible for regulating how much food we eat. Damage to this region makes portion control more difficult, which in turn can lead to overeating, creating a cycle that can be hard to break.[14]

High-fat and high-GI diets can affect the hippocampus in a variety of ways. First, the Western diet can hamper the expression of critical growth factors like brain-derived neurotrophic factor and other hormones that promote healthy function in the hippocampus.[15]

Second, poor diets can affect insulin signaling and insulin sensitivity in the body's tissues. It's unclear exactly what insulin's role is in the hippocampus, but studies have indicated that it likely impacts memory. One recent study showed that high saturated fat intake in male rats interfered with insulin signaling in the hippocampus, which led to interference with hippocampal function and corresponding relational memory abilities.[16]

Third, a diet high in saturated fat and refined sugar in male rats showed increased oxidative stress, which damages brain cells and reduces the efficacy of cell-to-cell communication in the hippocampus.[17]

Looking beyond the hippocampus and relational memory, a study from 2019 showed that obesity caused by a poor diet can lead to changes in cognitive control and the function of the prefrontal cortex and its impact on working memory as well.[18]

In addition to these direct effects on the brain, the Western diet compromises the blood-brain barrier, which is tasked with keeping toxic substances out of the brain.[19]

Dietary components such as saturated fat may also exacerbate inflammation in the brain, which has been linked to cognitive decline in aging and risk of developing Alzheimer's disease.[20] Inflammation disrupts many of the chemical pathways instrumental in memory formation, such as those that rely on dopamine and glutamate.[21] The nerves themselves become sluggish and information travels far more slowly.

There is also some indication that high-fat diets have different effects at different ages. Chloé Boitard and her colleagues demonstrated that while

juvenile exposure to a high-fat diet decreases memory and brain growth in mice, the same effects were not observed in adult mice.[22] Human studies, however, indicate that high fat consumption is detrimental to memory in adults as well.[23] It's worth noting that the developing brain in children and adolescents is particularly sensitive, which means we should be extra-vigilant about the foods they are eating.

Thankfully, it appears that the damage done by a high-fat diet can be undone. In 2016, Boitard and her team found that in adolescent rats, these brain changes are reversible by switching from the high-fat, high-sugar diet to a more standard and well-balanced diet. And in 2019, Paul Loprinzi and his colleagues found that in seventeen studies, sustained exercise in rodents reduced high-fat-diet memory impairment.[24] So, cutting back on bad fat, bad carbs, and sugar; eating a healthy, whole-foods diet; and exercising regularly are likely to help reverse the damage and enhance your brain's ability to remember.

Gluten

Several types of dementia are associated with celiac disease and non-celiac gluten sensitivity.[25] When patients have celiac disease, they often report sudden, intermittent memory difficulties as well as problems recalling words.[26] Some patients may develop a more severe form of dementia, with symptoms such as confusion and an inability to calculate simple math.

Though some studies show that avoiding gluten will heal the gut lining and restore memory, there is also evidence that once dementia sets in, the damage is done even if you avoid gluten thereafter.[27] So, if you are planning to cut out gluten, do it sooner rather than later. You can also remove it from your diet and see how you feel and if your thinking is clearer and sharper. In my work, the clinical feedback I get from my patients is an important factor that helps guide their personalized nutritional strategies.

PROTECTING MEMORY THROUGH DIET

The idea that certain foods can enhance your memory goes back centuries. Think of Ophelia in *Hamlet* saying, "There's rosemary, that's for

remembrance.” Let’s explore how modern science has shown that eating—and, in fact, eating a little less—can aid in memory and fight dementia.

Calorie Restriction

In a certain sense, all foods can contribute to memory loss. That’s not because of any specific nutrients, but because eating more calories overall seems to have a negative effect on memory. In 2009, Veronica Witte and her colleagues demonstrated that restricting calories by 35 percent improved memory in healthy elderly patients after three months.[28] While the exact mechanisms underlying the memory benefits of calorie restriction are unknown, in this study, memory improvements correlated with decreases in insulin and the inflammatory marker C-reactive protein. In other studies, low insulin and high inflammation have been correlated with better cognition.

The benefits of calorie restriction may extend to people who have Alzheimer’s disease. In mouse models, eating fewer calories resulted in less brain amyloid, and other studies have shown that individual brain cells are protected too.[29]

It’s not just the elderly who can benefit. In 2019, Emilie Leclerc and her colleagues conducted a clinical trial in which they compared working memory in healthy middle-aged adults who restricted their calorie intake by 25 percent over two years with others who ate whatever they wanted.[30] After twelve months and up to two years later, there was a significant improvement in working memory in calorie-restricted individuals compared to people in the other group. At the end of the study, the improvement in memory was shown to correlate most strongly with lower protein intake compared to other macronutrients. In other words, eating too much protein was correlated with memory loss.

If you plan to cut down significantly on your calories, it is important that you work with your doctor to explore healthy ways to do so. A few studies have demonstrated that dieting to lose weight can actually worsen memory, possibly because dieters obsessively focus on their food and weight, which takes up brain space necessary for memory.[31] But if you work with your doctor to formulate a responsible plan to reduce your total calorie intake by about 25 percent, your memory may improve.

Soy

Soy products are often mentioned as being good for memory and cognition, but the reality isn't quite that simple. First of all, it's important to define what soy products we're talking about. There is a huge range of soy products, and they each have different effects on the brain. Although all "soy" products come from soybeans, soy sauce, tofu, fermented tofu, miso, tempeh, and soy isolates are all different foods with different tastes and different nutritional profiles.

Isoflavones are a type of phytoestrogen, a plant-derived compound that mimics the activity of the human hormone estrogen (more on estrogen in chapter 10).[32] Soybeans and soy products are the richest source of isoflavones in the human diet, but they are also found in beans, chickpeas, split peas, peanuts, walnuts, and sunflower seeds. A 2015 meta-analysis of ten placebo-controlled randomized clinical trials involving 1,024 participants found that soy isoflavones favorably affected cognitive function and visual memory in postmenopausal women.[33]

Not all studies of isoflavones have been in agreement about their benefits. One theory for conflicting results is that people metabolize soy differently.[34] In regard to isoflavone metabolism, only about 25 percent of non-Asians and 50 percent of Asians host the intestinal bacteria that can metabolize isoflavones at all, meaning that any positive or negative effects are lost on much of the population.[35]

Fresh soybeans, generally known as edamame when eaten whole, contain thiamine and may help cognition in people with Alzheimer's disease. Soybeans have other micronutrients that can improve memory, for instance, phosphatidylserine, a lipid that is abundant in the brain. When soy-derived phosphatidylserine is consumed it improves cognitive function relative to placebo.

While the effects of various soy products are population- and individual-specific, there is enough evidence to recommend eating them in moderation. Certainly, fresh edamame is a healthy snack and offers you brain-boosting thiamine. Of course, you should consult with your doctor if you have any concerns.

Alcohol

In 2018, Karina Fischer and her colleagues examined a broad range of single foods, exploring whether there are universally applicable patterns of foods that are protective against Alzheimer's disease and memory decline.[36] They looked at the effect on memory of red wine, white wine, coffee, green tea, olive oil, fresh fish, fruits and vegetables, red meat, and sausages. They found that only red wine had an impact—at least in men. For women, drinking red or white wine increased their risk of memory decline.

However, in 2019, Jürgen Rehm and his colleagues reviewed twenty-eight studies on the connection between alcohol use and dementia performed between 2000 and 2017.[37] Overall, Rehm found that light to moderate alcohol use in middle to late adulthood was associated with a decreased risk of cognitive impairment and dementia. However, heavy alcohol use increased the risk of all types of cognitive impairment and dementia.

Archana Singh-Manoux and his colleagues followed 9,087 people over twenty-three years to see how alcohol related to the incidence of dementia. In 2018 in the *British Medical Journal*,[38] they reported that people who had abstained from alcohol completely or who consumed more than 14 drinks per week had a higher risk of dementia compared to those who drank alcohol in moderation.

Though international recommendations for alcohol use vary widely, according to the Centers for Disease Control, light alcohol use refers to fewer than 3 drinks per week. Moderate alcohol use refers to more than 3 but fewer than 14 drinks per week for men and fewer than 7 drinks per week for women. Heavy alcohol use refers to more than 14 drinks per week for men and more than 7 drinks per week for women. However, given the findings of the studies mentioned here, for maximum memory protection I recommend staying between light drinking and moderate drinking guidelines. For my patients, that means roughly 3 drinks per week for women and 5 drinks per week for men.

Of course, alcohol can have many negative health effects as well, so drinking according to either the CDC's recommendations or the guidelines I suggest only makes sense after talking to your primary care physician about other risk factors.

Coffee

In 2017, Boukje van Gelder and her colleagues reported on 676 elderly men they had studied over ten years to see if coffee protected them from cognitive decline.[39] They found that men who drank coffee had less cognitive decline than those who didn't. The greatest effect was seen in those who drank 3 cups of coffee a day, with those who drank more or less seeing less dramatic effects.

In 2009, Marjo Eskelinen and her colleagues reported on a group of people they had followed over twenty-one years to see if coffee helped cognition.[40] They found that coffee drinkers at midlife had a lower risk of dementia and Alzheimer's disease later in life compared with those who drank no coffee or up to 2 cups per day. The lowest risk of dementia was found in people who drank 3–5 cups of coffee per day.

There are a number of ways in which coffee might protect the brain.[41] Caffeine, which increases serotonin and acetylcholine, may stimulate the brain and help stabilize the blood-brain barrier. The polyphenols in coffee may prevent tissue damage by free radicals as well as brain blood vessel blockage. Trigonelline, a substance found in high concentration in coffee beans, may also activate antioxidants, thereby protecting brain blood vessels.

However, not every substance in coffee is helpful. Unfiltered coffee contains natural oils called diterpenes, which increase LDL cholesterol levels, potentially resulting in thickening and hardening of the walls of the arteries in the brain (though they do have some helpful anti-inflammatory properties).[42] Acrylamide, a chemical formed when coffee beans are roasted, can inhibit neurotransmission, destroy dopamine neurons, and increase oxidative stress. The amount of acrylamide in coffee can vary; dark-roasted, fresh coffee beans generally have the lowest amount.

The wide range of chemicals in coffee is probably why current researchers do not believe that the protective effect of coffee against dementia is conclusive enough to make a formal recommendation.[43] However, know that there are more good effects than bad of moderate coffee consumption (about 2–4 cups per day) and that it could have benefits later in life. Remember to keep your overall caffeine consumption under 400 mg/day.

Olive Oil

Many animal and laboratory studies have found that extra-virgin olive oil (EVOO) protects cognition. Olive oil is a source of at least thirty phenolic compounds, such as oleuropein, oleocanthal, hydroxytyrosol, and tyrosol, all of which act as strong antioxidants and brain protectors.

EVOO also enhances the extraction of polyphenols and carotenoids from vegetables. In 2019, José Fernando Rinaldi de Alvarenga and his colleagues examined the effects of EVOO using the *sofrito* technique.[44] The technique's name may sound exotic, but pretty much every culture has its version of it—while ingredients vary among cultures, it's simply sautéeing vegetables (often onion and garlic, and sometimes bell peppers, tomatoes, or chilies) in EVOO. *Sofrito* is used as a starter for many different dishes because of the savory depth of flavor it adds. The researchers found that when you use this technique with EVOO, brain-protective polyphenols such as naringenin, ferulic acid, and quercetin migrate from the other ingredients into the EVOO.

While not every study agrees on olive oil's cognitive benefits, given that it is a great source of healthy fats, I recommend using it, especially in a *sofrito* preparation as part of the MIND diet, which we will discuss at the end of the chapter.

Spices

Marina, age sixty, visited my office during a struggle with memory loss. After doing a battery of neuropsychological and brain-imaging tests, we found that her memory and brain were objectively healthy. However, on detailed psychological inquiry, I learned she was suffering from long-standing depression, which she had previously attributed to merely feeling "blah" as she aged.

People who suffer from depression can appear to be suffering from dementia, a condition we call pseudodementia.[45] Unlike "real" dementia, when you treat the depression, the memory problems go away. While Marina did recover, the shock of feeling like she was losing her memory prompted her to ask about preventive factors for dementia. Naturally, I was happy to talk to her about nutrition.

Marina already followed a diet similar to the Mediterranean diet, and she had no interest in following the MIND diet we will discuss shortly. My suggestion was to use spices that have been shown to improve memory function.

Turmeric, pepper, cinnamon, saffron, rosemary, ginger, and many other spices have been shown to enhance memory. While most of these need more research to definitively establish their benefits, many controlled studies and plentiful anecdotal evidence indicate that they are worth trying. After all, they have little downside, and they can amp up the flavors in your cooking without adding calories. For Marina, introducing new spices into her diet was a welcome change, and after just six months she reported that she felt sharper and that her mind felt refreshed. Try the following spices to improve your memory.

Turmeric: Once again, turmeric and its active ingredient, curcumin, are front and center. Curcumin has antioxidant, anti-inflammatory, and neurotrophic activities. In fact, one recent review of thirty-two animal and laboratory studies showed that it can reverse some brain damage caused by Alzheimer's.[46] A 2019 review of curcumin studies also showed improvement in attention, overall cognition, and memory.[47]

The effective dose of curcumin is not clear, partly because when you consume curcumin, very little of it is absorbed into the blood. However, as we've seen, black pepper may help curcumin absorption (and in fact, black pepper may improve cognition on its own; see the following text).[48] Curcumin is also made more available to your body through cooking. This all adds up to interesting recipes for dishes like Spicy Shrimp—sautéed with turmeric and black pepper—which you can find here.

Turmeric is also used in Indian curries, which may confer some of their own protective effects. A 2006 study on the relationship between curry consumption and cognitive function in the elderly found that elderly participants who "often" (once a month or more) or even "occasionally" (once or more in six months) consumed curry had superior cognitive function compared to those who "rarely" (less than once in six months) consumed curry.[49] Scientists have also reported the incidence of Alzheimer's disease for people aged seventy to seventy-nine to be four times lower in India than in the United States.[50]

It's very difficult to eat too much curcumin, so feel free to use up to 4

teaspoons daily. In addition to cooking with turmeric, you can add a teaspoon or two to a soup or a smoothie. Golden Milk made with turmeric (here) is also a delicious and soothing treat.

Black pepper and cinnamon: When winter arrives and you have to be outside in the cold for a long time, studies show that low temperatures can impair your cognition. But black pepper and cinnamon are two spices that can reverse this decline in thinking ability.[51]

Besides suppressing inflammatory pathways, these spices may act as antioxidants; increase the availability of acetylcholine, which improves memory; and help clear amyloid deposits, which as we've seen is an important factor in Alzheimer's disease.

Saffron: In 2010 Shahin Akhondzadeh and his colleagues tested whether saffron could impact cognition.[52] They administered either 15 mg capsules of saffron or a placebo twice daily to people with mild to moderate Alzheimer's disease. After sixteen weeks, saffron produced a significantly better outcome on cognitive function than placebo.

Rosemary: One of my favorite things to do is to pluck fresh rosemary and then run my index finger and thumb down the woody stem so that the leaves drop off. The aroma is intoxicating. It's a boost to the senses, and I feel sharper and calmer all at once.

It turns out that this is not just about my personal love for the scent. One study indicated that the aroma of rosemary changes brain waves so that people become less anxious, more alert, and better able to compute math problems.[53]

In 2012, Mark Moss and Lorraine Oliver examined the effect of rosemary on cognitive function.[54] They asked twenty people to sit in cubicles that were infused with the scent of a rosemary essential oil and gave them a number of tests of thinking ability, including arithmetic and pattern recognition. Higher levels of the scent correlated with better attention and executive function (the ability to retain information, be flexible with it, and organize it). In an earlier study, Moss had found that rosemary improved working memory too.[55]

Rosemary, like coffee, contains diterpenes. While we already discussed some downsides to diterpenes, they are anti-inflammatory and can protect cells from oxidative death. Rosemary can also boost acetylcholine, which is instrumental in memory.

While we need more studies to have full confirmation, at this point you can assume that rosemary will help boost memory, attention, and well-being. Try using rosemary with roasted vegetables, oven-baked potatoes, or a roast chicken dinner, or even add it to spice up some nuts. (Add a little olive oil to help the rosemary stick to these foods.)

Ginger: Ginger has also been shown to enhance working memory in middle-aged healthy women.[56] In animals, it has increased the levels of adrenaline, noradrenaline, dopamine, and serotonin contents in the cerebral cortex and hippocampus, so it is possible that it works through these brain chemicals to enhance memory in key parts of the brain.

In rats with Alzheimer's-type disease, gingerroot has also been shown to improve memory. This effect is currently being investigated in humans.[57]

Sage: Due to its rich array of pharmacological constituents, sage can influence cognition. Sage decreases inflammation in the brain, reduces amyloid deposits, decreases oxidative cell damage, increases acetylcholine, and helps neuronal growth.[58]

Studies have demonstrated that sage can enhance memory, attention, word recall, and speed of memory in healthy adults.[59] Sage can also make people feel more alert, content, and calm and can improve cognition.[60]

The benefits of sage can be attained by cooking with fresh or dried sage, or by essential oils using aromatherapy.

THE MIND DIET

If all this information about what foods to embrace or avoid to improve memory feels overwhelming, you'll be happy to know that researchers have pinpointed a diet that combines all these principles to offer maximum cognitive protection. The MIND diet (MIND stands for **M**editerranean-DASH **I**ntervention for **N**eurodegenerative **D**elay)[61] has been shown to be effective at reversing and protecting against cognitive decline and Alzheimer's disease.

As the name hints, the MIND diet is a combination of two diets, the Mediterranean diet and the DASH diet. We're already familiar with the Mediterranean diet from our discussion in chapter 2, but the important features here are that it is low in saturated fats and high in healthy oils, with

red meat eaten infrequently.

DASH stands for **D**ietary **A**pproaches to **S**top **H**ypertension. It typically includes 5 daily servings of vegetables, 5 servings of fruit, about 7 servings of carbohydrates, 2 servings of low-fat dairy products, 2 or fewer servings of lean meat products, and nuts and seeds two to three times per week.[62]

Earlier studies of these individual diets had demonstrated that each may protect patients from cognitive decline on their own. However, in 2015, Martha Clare Morris and her colleagues developed the MIND diet as a powerful combination of the two for long-term brain health.[63] Based on previous research, they put together a list of diet components that were either positive or negative for cognition. They named ten brain-healthy food groups: green leafy vegetables, other vegetables (like peppers, carrots, and broccoli), nuts, berries, beans, whole grains, seafood, poultry, olive oil, and wine. They also named five unhealthy food groups: red meats, butter and margarine, cheese, pastries and sweets, and fried or fast food.

Each of these components was assigned a MIND diet score, which allowed researchers to quantify how well participants were following the diet. For example, a participant would get 0 points for eating fewer than 2 servings of leafy greens per week, .5 point for eating between 2 and 6 servings per week, and 1 point for eating more than 6 servings per week. For the unhealthy foods, the scoring scale was reversed: a participant eating 7 or more meals of red meat per week would get 0 points, while 4–6 meals of red meat per week would yield .5 point, and fewer than 4 meals of red meat per week would get the full point.

Study participants were tested for five different dimensions of "cognitive impairment": episodic memory (long-term recall of personal facts), working memory (short-term recall of information that is still being acted upon), semantic memory (memory of facts and knowledge about the world), visuospatial ability (the ability to see and understand the size and space of our surroundings), and perceptual speed (how fast things are seen).

Morris's team tracked participants' MIND scores and cognitive scores over a number of years (the average participant was tracked for 4.7 years) and then correlated the cognitive scores with the MIND diet scores over time. The results were clear: the higher the MIND diet scores, the slower the rate of cognitive decline. Participants who were in the highest third of the MIND score category were seven and a half years younger in cognitive

age than those in the lowest third. These associations held up for the total cognitive score as well as each of the five cognitive domains, though the associations were strongest for episodic memory, semantic memory, and perceptual speed. The MIND diet was also associated with a reduced incidence of Alzheimer's disease.

Since Morris's initial study, there have been a bevy of studies that support her findings and show how the MIND diet affects individual diseases. In 2019, Diane Hosking and her colleagues in Australia also found that the MIND diet was more likely to prevent progression to Alzheimer's disease over twelve years.[64] And in 2018, Puja Agarwal and her colleagues found that the MIND diet was associated with a reduced incidence and delayed progression of Parkinsonism in old age.[65]

In short, experts now believe that the MIND diet offers the best evidence for protection of memory, so it's well worth integrating as many aspects of it as possible into your daily eating habits. You don't necessarily need to work yourself up to a full MIND diet score every week as long as you focus on the ten "good" foods.

MIND Diet "Good" Foods and Their Optimal MIND Score Serving Sizes[66]

Green leafy vegetables (kale, collards, greens, spinach, lettuce/tossed salad): 6 or more servings per week

Other vegetables (green/red peppers, squash, carrots, broccoli, celery, potatoes, peas or lima beans, tomatoes, tomato sauce, string beans, beets, corn, zucchini/summer squash/eggplant): 1 or more servings per day

Berries (strawberries, blueberries, raspberries, blackberries): 2 or more servings per week

Nuts: 5 or more servings per week

Olive oil: Use olive oil as your primary oil

Whole grains: 3 or more servings per day

Fish (not fried, particularly high-omega-3 fish such as salmon): 1 or more meals per week

Beans (beans, lentils, soybeans): More than 3 meals per week

Poultry (chicken or turkey): 2 or more meals per week

Wine: 1 glass per day (it's important to note that 1 glass of wine per day resulted in a higher MIND score than any more or less)

I want to highlight the importance of green leafy vegetables, which contain folate, vitamin E, carotenoids, and flavonoids, nutrients that protect against dementia and cognitive decline. When I tell my patients that leafy greens make a difference, they often turn up their noses at the idea. But "leafy greens" do not just include half-dead lettuce. When you go to the supermarket or farmers' market, experiment with different types of leafy greens.

For instance, microgreens are vegetable greens that are harvested very young, soon after they've sprouted. They are a delicious alternative to standard leafy greens, and they are extremely nutrient dense, containing up to forty times the nutrients of their mature counterparts. They are packed with vitamins C, E, and K. Microgreens can be grown from many vegetables, even ones for which you don't necessarily think of eating the leaves. For example, popular microgreens include arugula, chives, cilantro, red cabbage, kale, and basil, but also broccoli, radish, and sunflower. Another great thing about microgreens is that you can grow them in your own home. All you need is an inch of potting soil in a shallow tray, microgreen seeds (which you can buy at your local nursery or online), and clean water in a spray bottle to mist the seeds. Seven to fourteen days after they've germinated, they will be ready to harvest and eat. You can use them in a salad, on avocado toast, or over tacos as a garnish.

BRAIN FOG

While dementia is the most serious, life-altering form of memory loss, it's not the only condition that can cause gaps in your cognition. "Brain fog" occurs when you cannot think clearly, when you cannot concentrate or multitask, or when you lose short-term and long-term memory. Sometimes brain fog is associated with more serious dementia; for example, people

with early Alzheimer's disease often have brain fog. It also commonly occurs in autism-spectrum disorders, chronic fatigue syndrome, and fibromyalgia. However, in my experience, brain fog can happen to anyone, even without an underlying condition.

While we do not know for certain what causes brain fog, researchers believe that it is due to excessive brain inflammation. Much like other conditions we've seen, brain fog is most efficiently alleviated by the kind of basic, whole-foods-oriented diet we've talked about throughout the book. I recommend following a diet similar to the Mediterranean eating pattern or the MIND diet we just discussed.

Beyond those basics of diet, here are some tips on how to eat in order to fight that inflammation and restore sharp thinking and decision-making.

Luteolin: In 2015, Theoharis Theoharides and his colleagues showed that luteolin, a type of flavonoid, has numerous neuroprotective properties that decrease brain fog.[67] As an antioxidant and anti-inflammatory agent, this substance prevents toxic destruction of nerve cells in the brain.

Foods that contain luteolin include juniper berries, fresh peppermint, sage, thyme, hot and sweet peppers, radicchio, celery seeds, parsley, and artichokes. Oregano is also one of the best sources of luteolin, but you should buy dried Mexican oregano. While fresh oregano contains roughly 1 mg/100 g of luteolin, dried Mexican oregano contains 1,028 mg/100 g.

Probiotics are not always helpful: Since probiotics are all the rage—and we've discussed them as beneficial to promoting good gut bacteria several times in this book—you might understandably think they are always good for you, with no exceptions. However, in 2018, Satish Rao and his colleagues found that regular use of probiotics was associated with slower digestion, which led to brain fog.[68] If you're taking a probiotic and finding your thoughts sluggish, consider switching supplements (since every gut is unique and the effects of different supplements vary from person to person) or, better yet, getting your probiotics from dietary sources like yogurt with active cultures.

Gluten: In 2018, Lucy Harper and her colleague Justine Bold showed that gluten can cause brain fog.[69] After consuming gluten, some people find themselves thinking less clearly and wanting to sleep all day. If you are suffering from brain fog, cut out gluten to see if you improve. It may turn out that you have celiac disease or non-celiac gluten sensitivity.

Phosphatidylserine (PS): PS is required for healthy nerve cell membranes and coverings, and its protective effects can prevent brain fog. In 2010, Akito Kato-Kataoka explained that six months of soybean-derived PS improved memory function in elderly Japanese adults.[70]

PS is available in supplement form, but it's also present in soybeans. PS isn't very common otherwise, but you can try including white beans, eggs, and dairy products in your diet.

Citicoline: While it may be tough to figure out on your own what the cause of your brain fog may be, studies show that if your brain fog is due to acetylcholine and dopamine depletion, you can consider eating citicoline in foods such as beef liver and egg yolks.[71]

MEMORIES AND YOUR GUT

Memories are a cornerstone of human identity. They are an intrinsic part of the way we learn, document our histories, and benchmark our progress as we course through this life. Without our memories, we would be unable to do our jobs successfully, brush our teeth, drive home, or recognize people whom we have known throughout our lives. That's why we cherish our memories, and it is why we mourn the loss of them when dementia or brain fog sets in.

I wish that I had known what I know now when I treated Brian all those years ago, so that we could have put him on a robust eating plan full of foods that could have extended his memory for at least a few more years. No matter how old you are, it's never too late or too early to start eating in a way that gives you the best possible chance of staving off dementia as you age and making sure that you feel fresh, sharp, and capable every day.

MEMORY CHEAT SHEET

The MIND diet is the most comprehensive eating plan for ensuring a healthy memory. Eat green leafy vegetables, colorful vegetables, berries, nuts, olive oil, whole grains, fish, beans, poultry; drink red wine.

Foods and Strategies to Embrace:

- Calorie restriction: Work with your doctor to make a plan to reduce your total calorie intake by about 25 percent.
- Alcohol: Don’t abstain totally or drink too much; 3–5 drinks per week is ideal for women, and 5–7 drinks is ideal for men.
- Coffee: Coffee is beneficial, but keep total caffeine consumption under 400 mg/day.
- Olive oil: Olive oil is protective, especially when used in a *sofrito* preparation.
- Herbs and spices: Turmeric, black pepper, cinnamon, saffron, rosemary, ginger, sage.
- For brain fog: Luteolin-rich foods (juniper berries, fresh peppermint, sage, thyme, hot and sweet peppers, radicchio, celery seeds, parsley, artichokes, and dried Mexican oregano); phosphatidylserine (PS)-containing foods (white beans, eggs, and dairy); citicoline-rich foods (beef liver, egg yolks).

Foods to Avoid:

- The components of the Western diet: Foods high in bad fats (red meat, fried foods) and high-GI carbs (white bread, white rice, potatoes, pasta, and anything else made from refined flour).
- Gluten: If you have celiac disease or non-celiac gluten sensitivity, avoid all wheat products, such as bread, pizza, pasta, and many alcoholic drinks.

CHAPTER SEVEN

Obsessive-Compulsive Disorder: NAC, Glycine, and the Dangers of Orthorexia Nervosa

We all know that nagging feeling when we leave our homes and wonder if we left the stove on or if we actually locked the door. But imagine what it feels like when you cannot escape those thoughts. No worry ever leaves your mind, and no matter how hard you try, nothing is ever complete. That's what it's like to have obsessive-compulsive disorder (OCD), and it is absolute torture.

When Adam entered my office, he appeared to be a confident young man. But once he let his guard down, all the compulsions and repetitive checking behaviors came pouring out. His rituals, including checking the handbrake on his car, rescrewing the cap onto his toothpaste, and making sure the trash can lid in his kitchen was shut, consumed hours of his day. Sometimes he was late for work because he was afraid to start his car.

We worked on small ways to improve his symptoms. He followed my advice and used a ride-share service to work, which encouraged him to leave home without finishing his rituals, as he didn't want to make the driver wait. We found a trash bin online that had an automatic lid that shut every time you used it. This calmed him down to a degree, but when he drove to our appointments, he still went back to his car and would stay there for hours, obsessing over whether he ought to release the handbrake or not. What if he did and the car rolled backward? What if he hit the gas harder than he should and hit someone by mistake? The thoughts would spin

around in his mind relentlessly like a hamster on a wheel.

For many years, OCD was considered an anxiety disorder.[1] Only recently has it been put in a class of its own, along with other disorders on what is called the OCD spectrum. In my opinion, the differences between OCD and anxiety are debatable, because many patients with OCD also suffer from terrible anxiety—technically speaking, up to 30 percent of people with OCD also experience generalized anxiety disorder during their lifetime.[2]

OCD is closely related to several other mental health disorders. Tic disorders such as Tourette's syndrome are also considered to be on the OCD spectrum, as are body dysmorphic disorders, trichotillomania (hair pulling), excoriation disorder (skin picking), pathological gambling, kleptomania, sexual compulsivity, and other conditions. People with OCD also share personality traits with people with eating disorders such as anorexia nervosa or binge-eating disorders, and there is often overlap in patients.

When I was treating Adam, about fifteen years ago, the only available treatments were a few medications and cognitive behavioral therapy. Now there are controlled trials and many case histories that can help guide nutritional interventions as well. In this chapter I will explain the nutritional interventions for OCD and related conditions and how those who are trapped by these symptoms can find relief.

THE OCD GUT

As we've seen with related conditions like anxiety, the gut-brain connection is a factor in OCD. Changing gut bacteria can change the course of the disease, and gut bacteria change when OCD symptoms emerge.

For example, Pranish Kantak and his colleagues at the University of North Dakota induced OCD-like behaviors in mice and then tested whether probiotics altered their symptoms. In the first experiment, mice were pretreated with either a probiotic or saline for two or four weeks. After OCD-like behaviors were induced, the researchers observed that they were significantly less extreme in the probiotic-treated mice than in the controls, which received only saline.[3]

In the second experiment, an additional group of mice was included in

the analysis. These mice had been pretreated with fluoxetine, commonly known as Prozac, for four weeks. Selective serotonin reuptake inhibitor (SSRI) antidepressants are used as first-line treatment for OCD. Sure enough, the drug worked to lessen OCD symptoms, but the probiotic group had results very similar to those of the fluoxetine group. In other words, probiotics fought OCD just as well as the primary pharmaceutical treatment.

To demonstrate the gut-brain connection working in the opposite way, in 2018 Tony Jung and his colleagues at McMaster University administered a drug to induce OCD-like symptoms in rats and then monitored the rats' gut bacteria.[4] Their investigation determined that the rats' gut bacteria did indeed change as OCD set in. The researchers concluded that the change in gut bacteria was precipitated by the time taken and energy used in compulsive behaviors (for instance, think about how much time and energy my patient Adam was expending).

The results of those animal studies have been substantiated by human studies. For example, in a general survey about the psychological effects of probiotics in healthy humans, it was demonstrated that participants who used probiotics for thirty days reported that obsessive-compulsive symptoms were reduced.

In 2015 psychologist Jasmine Turna and her colleagues explained that OCD symptoms may be a result of the bidirectional relationship between the gut and brain.[5] Altered gut bacteria impact the hypothalamic-pituitary-adrenal axis (HPA-axis), starting a cascade of hormonal and immune responses that result in OCD.

There is considerable evidence that the HPA-axis is not working as it should in OCD. For instance, take the behavior of the stress hormone cortisol in OCD patients. In healthy individuals, cortisol levels have a low baseline. When these individuals experience stress, cortisol levels spike as the body releases the hormone to respond to crisis. In OCD patients, however, the baseline cortisol level is elevated, but when there is a crisis, there is no corresponding cortisol spike.[6] In fact, cortisol levels often go *down* when OCD patients are put under stress, the exact opposite of what we expect. It's as if the HPA-axis is overwhelmed due to the constant stress of OCD, and the brain cannot fight external stressors the way it would in a healthy person.

As for what causes the changes in gut bacteria that might precipitate OCD, in 2014, cognitive psychologist Jon Rees explained that stress and antibiotics can both alter the gut microbiome.[7] A wide variety of stresses might trigger changes in the gut microbiome and therefore OCD, and studies indicate that they do not need to be major, life-changing events.[8] Health-related worry, school stress, or loss of a loved one can all trigger OCD even when they are not traumatic. Even pregnancy can alter gut microbiota and lead to OCD-type symptoms.

In children, a variant of OCD called PANDAS—which stands for pediatric autoimmune neuropsychiatric disorders associated with streptococcus—has long been thought to be associated with streptococcal infections and immune dysfunction. However, now experts wonder if it's not the strep itself that leads to PANDAS, but rather the antibiotic used to treat the strep. The antibiotics that fight strep can disrupt the gut microbiome, triggering OCD symptoms.

All in all, these findings indicate that OCD symptoms arise when gut bacteria change, and vice versa. As we know by now, the way to ensure that you have healthy gut bacteria is to make sure you're getting the proper nutrients in your diet and avoiding foods that might upset the balance of your microbiome.

FOODS THAT CAN WORSEN COMPULSION

Since OCD is so intertwined with anxiety, I always recommend that patients stick to the basic tenets of eating for anxiety. Beyond avoiding foods that we discussed in chapter 3, here are a few dietary factors to steer away from when suffering from OCD.

Glutamate

As we saw in chapter 4 when discussing PTSD, glutamate is a substance that is common in many natural foods and used as an additive in prepared dishes to add umami flavor. Dietary glutamates are generally regarded as healthy in normal amounts for most individuals, but sufferers of OCD should be very careful about their glutamate intake. That's because glutamate plays an important role in your brain as a neurotransmitter that is

deeply intertwined with OCD symptoms.

In 2018, Kathleen Holton and Elizabeth Cotter presented a case of a fifty-year-old man who had suffered from daily OCD symptoms for thirty-nine years, with no improvement from any pharmacological treatment.[9] In addition to OCD, the man also had fibromyalgia (a chronic pain condition) and irritable bowel syndrome, which ended up being the source of a breakthrough discovery about how diet affects OCD.

This man was enrolled in a randomized double-blind placebo-controlled clinical trial to test the effects of a low-glutamate diet on fibromyalgia and irritable bowel syndrome. After one month on the diet, not only were his fibromyalgia and irritable bowel syndrome symptoms reduced, but he also had significant improvement in his OCD. Holton and Cotter concluded that glutamate must be involved in the chemical abnormalities underlying OCD.

In 2017, Přemysl Vlček and his colleagues presented extensive evidence showing a key role of glutamate pathway abnormalities within the brain circuits involved in OCD.[10] Glutamate is the major excitatory neurotransmitter in the central nervous system; that means that its role is encouraging neurons to spring into action.[11] Though the exact role glutamate abnormalities play remains unclear, OCD is at least partially caused by a malfunction of the system that tells your cells to act, and excess dietary glutamate can worsen the damage.

Excess glutamate is not the only piece of the puzzle, however. In 2019, Yan Li and his colleagues explained that OCD was most likely caused by increases in both excitatory glutamate and one of its counterparts, the inhibitory neurotransmitter gamma-aminobutyric acid (GABA).[12] As you might expect, inhibitory neurotransmitters do the opposite of excitatory ones, discouraging neurons from action.

The effect of having surpluses of both glutamate and GABA is that the brain is getting stop and go signals at the same time. OCD brains are in constant chaos due to the mixed messages being sent to their neurons. No wonder they get stuck! The full story behind GABA-glutamate abnormalities is much more complex than this simplified explanation, but the key point is that OCD patients can see relief by cutting down on glutamates in their diet.

There are two types of dietary glutamate. Bound glutamate is usually eaten as part of a protein, and thus it can be digested and absorbed well.

Free glutamate is not bound to other amino acids, which means that it can cause spikes of glutamate in the blood. You want to avoid these spikes.

Free forms of glutamate are found in cured meat, Roquefort and Parmesan cheese, fish sauce, soy sauce, ripe tomatoes, broccoli, grape juice, caviar, salami, miso, and bone broths. As we discussed in chapter 4, glutamate is also found in monosodium glutamate (MSG), an ingredient in many kinds of packaged, processed, and prepared foods. For instance, it is used in Chick-fil-A nuggets, as well as in stocks, instant meals, and soy and yeast extracts. Patients suffering from OCD or OCD-like symptoms should try to cut down on these foods as much as possible to see if an improvement is made. (I have already guided you to be aware that many high-glutamate foods also contain the amino acid tyramine, which can interfere with MAOI antidepressants. See chapter 9 for more details.)

Gluten

In 2018, gastroenterologist Luis Rodrigo and his colleagues conducted a study to see if reducing gluten intake could reduce OCD symptoms in children with both OCD and Tourette's syndrome.[13] Indeed, after one year on a gluten-free diet, patients found that their obsessions interfered less with their lives and that they experienced less distress.

The precise reasons for this improvement in OCD symptoms after removal of gluten are not known. In prior chapters I have explained how the celiac brain is prone to autoimmune brain cell destruction as well as glutamate-GABA imbalances.[14] This likely contributes to OCD symptoms.

While there isn't airtight evidence that a gluten-free diet can help people with OCD, this study and other case reports suggest that it's worth going on a gluten-free diet to see if symptoms improve.

FOODS AND SUPPLEMENTS TO FIGHT COMPULSION

Vicky was a fifty-year-old chief human resources officer for a Fortune 500 company. At work, she was meticulous about being on time and on task. But at home, she was frustrated and struggling with the fact that her last child was about to leave for college.

She was cheerful and upbeat when we chatted about most topics, but she

became anxious when speaking about her marriage. She eventually admitted that she was unsure whether to stay married or not. On the one hand, she had no major issues or fights with her husband. On the other hand, she felt that he was too set in his ways. She was ready to travel the world, and he did not want to make changes in his life.

In order to try to cope with her anxiety and desire to do something, she read *The Life-Changing Magic of Tidying Up* by Marie Kondo. At first she loved it; Kondo's philosophy of decluttering gave her an outlet for her stress. Before long, she had not only cleared out her closets and basement but also started to arrange all her shoes and clothing by color.

Her husband found her constant tidying annoying, and when she moved on to his clothes, he lost it. Even her children locked their doors when they came home for fear that she would come in and start rearranging things in their rooms. Gradually, her tidying habits started infringing on other parts of her life. She would be late for work because she was tidying, and when she got to the office it was all she could think about.

I recognized that she was developing OCD. Although OCD usually starts earlier in life, it can begin later too, with a small proportion of cases beginning in people over fifty.[15] Vicky was resolute that she did not want to try medication, but through our therapy sessions together, she started to see how her obsessional behaviors were replacing her anxiety about wanting to leave her marriage.

Given her reluctance to take medication, I decided to try some dietary interventions with her. In particular, I wanted to try two different treatments that have been shown to reduce OCD symptoms without accompanying SSRIs—N-acetylcysteine (NAC) and myoinositol (MI).

Through a combination of diet, supplements, and therapy, after three months, Vicky was able to think more clearly. She had fewer obsessive thoughts and they were less intrusive, allowing her to function better. Her compulsive tidying was reduced considerably, and though it was a difficult decision, after a year, she decided that a trial separation from her husband was in order. Eighteen months after that, they got an amicable divorce.

I have continued to see Vicky, and whenever she goes off her diet, she starts to obsess again—sometimes about whether she did the right thing with her marriage, and sometimes she goes back to cleaning. However, when she restarts her nutritional interventions, these symptoms go away.

Let’s explore NAC and MI, along with other dietary interventions that have been shown to help patients struggling with OCD.

N-Acetylcysteine

N-acetylcysteine is a dietary supplement used to treat a number of non–mental health illnesses, but it has also been shown to be a helpful treatment for OCD. NAC inhibits the release of glutamate between nerve cells in many brain regions, including the cortex, amygdala, hippocampus, and striatum, all of which are affected in OCD.[16] In addition, NAC reduces oxidative stress and inflammation in the brains of people with OCD.[17]

A 2017 study demonstrated that NAC amplified the effects of the antidepressant citalopram in improving resistance to compulsions and enhancing control of them in children and adolescents with OCD.[18] Another case report of a fifty-eight-year-old woman who controlled her OCD with the antidepressant fluvoxamine found that a supplementary course of NAC resulted in a significant improvement in OCD, with improvements beginning just one week into NAC treatment.[19]

NAC has also been shown to be effective in treating trichotillomania, an OCD-spectrum disorder in which individuals repetitively pull out their own hair. In 2009, Jon Grant conducted a double-blind randomized placebo-controlled trial to assess the efficacy of 1200–1400 mg/day of NAC in participants with trichotillomania over a twelve-week period.[20] Patients in the NAC treatment group were found to have a significantly greater reduction in hair-pulling symptoms compared to placebo.

There are case histories showing that NAC is helpful for compulsive nail-biting and skin-picking behavior too. More controlled studies are needed, but overall, the results of trials so far favor the use of NAC over placebo.[21] NAC is also considered safe, with no major side effects.

NAC isn’t found in any natural foods, so it must be taken as a supplement. However, once in the body, it converts to the amino acid cysteine. Though all the research on NAC’s effects on OCD is based on supplements, patients in my clinic have also achieved promising results by eating foods rich in cysteine. Meat, grains, and eggs all contain cysteine, as do ricotta cheese, cottage cheese, yogurt, broccoli, red pepper, and onion.

Myoinositol

Myoinositol is a variant of glucose that is made naturally in the body but can also be consumed through foods. There's a ton of MI in the brain, particularly in brain cell membranes, where it helps control which substances enter and exit the cells.[22] MI is a precursor of phosphoinositide, a type of lipid that facilitates cellular responses in many neurochemical pathways, including the serotonin and dopamine pathways implicated in OCD.[23]

Some researchers believe that MI has a mechanism of action on the brain similar to that of SSRIs.[24] Sure enough, a number of studies and trials have demonstrated that MI is helpful in OCD too. For example, in 1996, psychiatrist Mendel Fux and his colleagues studied thirteen patients with OCD, noting that 18 g/day of MI for six weeks resulted in a significant reduction in OCD symptoms compared to placebo.[25]

Despite the efficacy of MI on its own, it has not proven to be helpful as an add-on to standard treatments for OCD, such as SSRIs. Also, mild gastrointestinal side effects such as diarrhea, flatulence, and nausea have been noted. Still, those downsides are minor compared to the benefits it can provide.[26]

MI is plentiful in fruits, beans, grains, and nuts. Fresh vegetables contain much more MI than frozen or canned versions. For breakfast, grapefruit and bran flakes are rich sources of MI, and coffee has a trace. Just remember to check with your doctor before adding grapefruit to your diet, because of possible drug interactions. For lunch and dinner, steer toward navy beans or green beans. Brussels sprouts and lima beans are also high in MI, and carrots and corn have lower levels. Peanut butter (with no added sugar) is rich in MI, as is whole wheat bread. In general, whole-grain breads are higher in MI than refined breads. Cantaloupe and citrus fruits have an extraordinarily high amount of MI, so snack on them whenever you can.

Glycine

Glycine is another amino acid that impacts glutamate function in the brain, and studies indicate that it may be helpful in OCD due to its interaction with a type of glutamate receptor found in the brain known as an N-methyl-

D-aspartate (NMDA) receptor.[27] While glycine is also an inhibitory neurotransmitter, it does not butt heads with glutamate the same way GABA does, and it helps calm the conflict in OCD patients' brains.

In 2009, William Greenberg and his colleagues administered 60 mg/day of glycine or placebo to patients with OCD, then monitored their symptoms at four, eight, and twelve weeks after starting the trial.[28] In the test subjects who received glycine, there was a strong trend toward reduction of OCD symptoms.

Again in 2009, William Louis Cleveland and his colleagues reported on another case that highlights the importance of glycine.[29] The patient in the case study was diagnosed with OCD and body dysmorphic disorder at age seventeen, and his symptoms were severe enough that he had to stop school. At age nineteen, he was housebound and had no social contact except with his parents. Several lines of treatment—SSRI antidepressants, antipsychotic drugs, and intravenous therapy—proved fruitless.

At age twenty-two, his symptoms worsened after he received antibiotic treatment for *H. pylori,* a bacteria that causes stomach ulcers. His clinicians concluded that his NMDA receptors were not working properly. The doctors started him on glycine, to stimulate NMDA. Over five years, treatment with glycine led to a robust reduction of his OCD and body dysmorphic disorder symptoms, with partial relapses occurring whenever the treatment was stopped. Thanks to his new glycine treatment, the patient was able to resume school and social life.

Although this is just a single trial, the results are quite dramatic, and along with the results of the controlled trial, it is solid evidence that glycine can be highly effective in treating OCD.

You don't have to rely on supplements to get glycine. It's present in meat, fish, dairy products, and legumes. Turkey is a richer source of glycine than beef, which is in turn a richer source than pork or chicken. The best sources of glycine are collagen and gelatin. Since bone broth contains both glycine and glutamate, it may feel contradictory to eat it. I have my clinical patients test out adding or excluding bone broth to see how their OCD symptoms respond. If bone broth has a negative effect on an individual patient, we simply stay with plant-based options like spinach, kale, cauliflower, cabbage, pumpkin, and fruits like bananas and kiwi, all of which also contain glycine.

Milk Thistle

Milk thistle (*Silybum marianum*), a member of the same family of flowers that includes sunflowers and daisies, has been used as a medicinal plant for centuries. According to ancient folklore, its signature violet flowers and white-veined leaves came from the Virgin Mary's milk.

The component of milk thistle that helps people with OCD is the flavonoid silymarin, which is a natural antioxidant. One of the main actions of silymarin is to inhibit monoamine oxidase (MAO), an enzyme that (among other functions) removes serotonin from the brain.[30] Inhibiting MAO increases serotonin, and as a result, OCD symptoms ease. (We've mentioned MAOI antidepressant medications already, which work in roughly the same way.)

When Mehdi Sayyah and his colleagues compared the effects of milk thistle extract (600 mg/day) with fluoxetine (30 mg/day) in patients with OCD, they found that the two treatments were similarly effective, and the side effects were similar as well.[31] While more studies are needed to convincingly recommend milk thistle as a treatment for OCD, since the potential for negative side effects is low, it's worth a try.

Supplements are the only way to incorporate milk thistle into your routine. As always, consult with your doctor before starting to take them.

Vitamin B_{12}

Vitamin B_{12} (cobalamin) is essential for the production of many brain chemicals, including serotonin. One study demonstrated that 20 percent of patients with OCD have low vitamin B_{12}, and this finding has been corroborated by other studies.[32] Though it's unclear whether low vitamin B_{12} is a cause or consequence of OCD, we know that it plays a role.

In 2012, Vivek Sharma and Devdutta Biswas reported on a case of a middle-aged man presenting with OCD who had low levels of B_{12} and a family history of vitamin B_{12} deficiency.[33] His OCD symptoms resolved when his levels were raised by taking methylcobalamin, a form of B_{12}. That's a good sign that it's worth trying to replace vitamin B_{12} in OCD patients.

Vitamin B_{12} is mostly found in meat, fish, and chicken, so most omnivores don't have too much trouble getting enough. If you're a vegetarian, B_{12} can also be found in dairy products. If you're a vegan, you can look for vitamin-fortified cereals and other foods. But there are also out-of-the-box options like the fermented soybean product tempeh, which has high levels of vitamin B_{12}. Another rich vegetarian source of B_{12} is nori, a type of edible seaweed.

I once had a thirty-five-year-old vegetarian patient named Ashwariya. She had come to see me because of a collection of behaviors that were interfering with her life. For instance, she found herself trimming the fringe on her bedspreads, staying up all night to ensure that they were absolutely "perfect." She was obsessed with flaws in her skin, even when there were none. When she came to my office, she would sit down and then rearrange herself in the chair, sometimes making an embarrassed admission that she felt she was getting too fat to be able to comfortably seat herself, even though I could see she was of normal weight and that the chair was more than large enough for her to sit however she wanted.

After taking a detailed history, I recognized that she had OCD and body dysmorphic disorder. After doing some basic labs, I saw that her vitamin B_{12} was low, so I suggested that we try to improve this. Three months later, her distressing behaviors were still present and her B_{12} levels were still low despite taking supplements. When I asked her what form of B_{12} she was taking, she told me *Chlorella* tablets, which allegedly have significant amounts of vitamin B_{12}. However, she did not know that you have to check the nutrition label to see which version of *Chlorella* you are getting. Commercial preparations contain varying amounts of vitamin B_{12}, and hers did not contain much at all.[34]

She switched to *Spirulina*, a supplement made from blue-green algae. However, studies have shown that many dietary supplements like *Spirulina* contain pseudovitamin B_{12}—variants of B_{12} that are inactive in humans.[35]

Once more, her symptoms did not improve, so eventually, she started eating the dried seaweed product nori, which is rich in B_{12}, in vegetarian sushi. While nori does contain glutamates, Ashwariya didn't suffer ill effects from it. (If she had, I would have suggested wakame, a brown

seaweed often enjoyed in miso soup, which has high B_{12} levels with a negligible amount of glutamate.) Within three months, her symptoms started to improve. While replacing vitamin B_{12} is not an ironclad way to treat OCD symptoms in every instance, in some cases it can be a lifesaver.

Turmeric

In 2010, Drs. Jithendra Chimakurthy and T. E. Gopala Krishna Murthy explored the value of curcumin in OCD.[36] As we've seen in previous discussions, curcumin has long been known to impact serotonin, dopamine, and noradrenaline metabolism, so the researchers felt it was likely to have an impact on the underlying neurochemical changes in OCD.

To study this, the team induced OCD-like behavior in rats before treating them with either curcumin or paroxetine (an SSRI). Rats treated with 5 mg/kg and 10 mg/kg of curcumin increased their blood dopamine levels, but only the 10 mg/kg preparation of curcumin increased serotonin levels. Paroxetine-treated animals showed an increase in serotonin but no changes in dopamine. Both curcumin and paroxetine decreased compulsive behaviors.

While human studies of turmeric's effects on OCD are still being researched, turmeric is generally so good for mental health that I recommend it as part of your regular diet.

SPECIAL CONSIDERATIONS

Orthorexia Nervosa

One big challenge of working with patients with OCD is being careful not to worsen their symptoms by giving them new fodder for their obsessions. With minds that are constantly churning through different stresses and compulsions, you never want to be piling on to the problem. In particular, you have to ensure that you don't precipitate orthorexia nervosa.

In 1997, physician Steven Bratman and his colleague David Knight coined the term orthorexia nervosa to describe individuals with an obsession for proper nutrition. This condition results from diets that are too restrictive, an obsessional focus on food preparation, and ritualized patterns

of eating. In other words, people suffering from orthorexia nervosa are "health food junkies" to the extreme.

I admit that it may seem ironic for someone who is writing a whole book about eating well to caution against the pitfalls of being *too* focused on nutrition. But while it is a virtue to be conscious of what you're eating and do your best to ensure you're consuming food that is both nutritious and sustainable, there's no doubt this can cross over into obsession and feed other OCD tendencies.

I had a patient named Josue who traveled from far away for a consult with me after hearing of my work and my clinic. He expected to be given blood tests almost as soon as he entered the door, practically demanding an intricate medical solution to his problems. Yet on my initial interview, it was clear that his major issue was overly strict food choices, which left him nutritionally deficient. I began to address this by gently suggesting we talk about some healthy building-block recipes, but he scoffed and said my recommendations seemed "very pedestrian."

While I would love to tell you that I've gotten through to every single patient I've ever had, I don't think Josue followed my advice. He was not willing to accept the fact that the key to his mental health might be loosening his grip on a strictly regimented diet and focusing on eating a wide variety of healthy foods. Unfortunately, he never returned and I suspect his orthorexia prevented him from reaching his goals of a healthier weight and improved mood.

Of course there is a gray area here, and it's worth acknowledging that discussions surrounding foods change with time. I remember being at a restaurant in New York some years ago, not sure whether to be shocked or amused that several colleagues were asking the befuddled waiter questions about the cows' diet and whether pesticides were used on the vegetables. Nowadays, a preference for grass-fed beef and organic foods is commonplace, but back then, these preferences hadn't yet reached the mainstream.

I never want to discourage my patients from making healthy choices, but when their restrictive diets start to intrude upon their lives I begin to worry. Orthorexic individuals are often preoccupied with weight control, so I see that as a warning sign.[37]

In order to avoid symptoms of orthorexia nervosa, follow these rules of

thumb when making changes in your diet:

- Start with changing one food at a time.
- If you fail to maintain that change, try another.
- Start with the least restrictive change so that your mood does not plummet.
- Plan ahead so your choices are automatic and you don't feel like you have to obsess over every meal.
- Measure your weight weekly rather than daily.
- Try limiting your social media exposure while changing your diet. In particular, studies have shown that Instagram use worsens orthorexia.[38]

These rules can be helpful for those with OCD tendencies and are good tips even for healthy individuals who are making diet changes.

Muscle Dysmorphia

Muscle dysmorphia is a variant of OCD in which people are obsessed with their musculature and often compulsively exercise.[39] This can result in radical diets and the use of dietary supplements in order to find the perfect muscle mass and to reduce body fat mass.

Jason, for instance, was a thirty-year-old who came to see me because he felt directionless and wanted to jump-start his motivation. Within a short period of time, I realized that his relationship with his father was at the core of his conflicts. On the one hand, he worked for his father and loved the ease of that. On the other hand, his father was hard on him, and as he grew older, this left him feeling frustrated, as if he would never rise to the level of his father's success.

Unable to talk to his father about any of this, he worked out his frustration in the gym. Despite having less than 9 percent body fat and obvious muscular definition, he told me that he had to get leaner and

stronger because he had decided to enter a bodybuilding competition. I told him I thought he was in good enough shape, and he looked at me like I was clueless.

In the following weeks, he kicked his workout up a few notches, radically changed his diet, and came in looking so lean that it was mildly disturbing. Even at 5 percent body fat, he could not stop. He increased his protein intake far beyond even the high levels recommended for resistance and endurance athletes.[40] He also added a number of supplements—branched chain amino acids, glutamine, and the growth-hormone-stimulating amino acids (lysine, ornithine, and arginine). Worst of all, he started anabolic steroids.

It wasn't hard for me to see that Jason had pushed himself too far, but I had difficulty making him understand. At my urging, we ran a battery of tests and discovered that he was on the verge of renal failure. Luckily, it was early enough that the test acted as a wake-up call. I recommended going back to square one, a healthy diet of fresh fruit, vegetables, lean protein (chicken breast, turkey, and salmon were his favorites), and sources of healthy fats like olive oil and avocados. With time and patience he gradually came to see the difference and feel better both emotionally and physically. While I continued to work with him on the nutritional aspects of his condition, he also started to see a therapist who was able to talk to him about his childhood and growing up around his powerful and successful father. Eventually he connected his extreme diet and exercise choices with his complicated feelings toward his father. Over a year, he began to show significant improvement in recovering a healthy lifestyle.

To address muscle dysmorphia, avoid radical dietary changes and always consult a doctor or nutritionist when changing protein consumption or taking a supplement. In particular, avoid supplements that you read about online and from unvetted sources. Give careful consideration to what you are adding to your diet. Finally, always be wary of underlying psychological causes that are driving an unhealthy approach to otherwise healthy pursuits.

FIGHTING OBSESSION THROUGH DIET

Through the stories of my patients, I hope I've impressed upon you that

OCD can be a subtle condition that presents in a host of different ways. While there are certainly patients like Adam, who have classic compulsions and radical checking behaviors, that's not the only form OCD can take. Sometimes, as we saw with Vicky, OCD can arise out of an interest that initially appears to be healthy, or it can be an accumulation of small habits and concerns about your body as it was with Ashwariya. Or maybe, as in Jason's case, it can even be the result of too much focus on a healthy lifestyle.

With such a varied, insidious disease, it is paramount that you see a doctor if you feel you are suffering from OCD-like symptoms. While treatments need to be individualized for each patient, it is always a good idea to implement some of the nutritional strategies we've discussed in this chapter.

OCD CHEAT SHEET

Since OCD is so closely related to anxiety, the dietary recommendations in chapter 3 also apply here.

Foods and Supplements to Embrace:

- N-acetylcysteine: While NAC itself must be taken as a supplement, cysteine-rich foods can also be effective. Try meat, grains, eggs, ricotta cheese, cottage cheese, yogurt, broccoli, red pepper, and onion.
- Myoinositol: Fresh vegetables, especially navy or green beans, Brussels sprouts, and lima beans; peanut butter; whole wheat bread; cantaloupe; and citrus fruits.
- Glycine: Meat, fish, dairy products, legumes, spinach, kale, cauliflower, cabbage, pumpkin, bananas, kiwi.
- Milk thistle (*Silybum marianum*): Available as a supplement.
- Vitamin B_{12}.
- Spices: Turmeric with a pinch of black pepper.

Foods to Avoid:

- MSG, other glutamates, and glutamic acid: Fish sauce, oyster sauce, tomato sauce, miso, Parmesan cheese, savory snacks, chips, ready-to-eat meals, mushrooms, spinach, seaweed, cheeses, soy sauce, fermented beans, tomatoes, and high-protein foods like meats and seafood.
- Gluten: If you have celiac disease or non-celiac gluten sensitivity, avoid all wheat products, such as bread, pizza, pasta, and many alcoholic drinks.

CHAPTER EIGHT

Insomnia and Fatigue: Capsaicin, Chamomile, and Anti-Inflammatory Diets

Dumisani was a forty-year-old cop who came to me for help with depression—at least that's what she thought she needed help with. She and her husband had adopted a newborn baby from Kenya, and since her husband's job required him to work during the day, she took the night shifts on the force, regularly working until past dawn.

When it was time for her to get to sleep at the end of a long shift, she couldn't. The exhaustion that felt overwhelming when she was at work was nowhere to be found when she closed her drapes and got into bed. The stress of her shift kept her wound up. Her baby was overjoyed to see her and wanted to play. She just couldn't convince her body that it was time to sleep. As a result, she only managed to snooze a little here and there while her baby napped during the day. Of course, when she went back to work the next night she felt even worse, dragging herself through shifts buoyed by a constant stream of coffee before repeating the cycle again.

This pattern eventually got to her. Depression set in, and despite eating healthily, she gained 15 pounds. I could immediately tell that an antidepressant was not going to be the solution to her problems. We decided that prior to trying medications, she should try a few lifestyle changes. We talked about how working the late shift was disrupting her gut bacteria, the importance of regular sleep patterns, and ways she could change her diet to better manage her energy.

She changed her schedule so that she didn't have to work the graveyard shift every night. Her husband also made changes to his schedule and was able to take the baby to work on certain days. She was diligent about following the eating plan we had developed, which helped her feel energized and sleepy at the right times.

It may seem like a lot of juggling, but the sum of these changes was that Dumisani and her husband were able to attend to their family much more successfully. She was still working some nights, so her sleep schedule wasn't totally ideal, but even with this imperfect solution, within three months she had a dramatic change in her mood.

Close to a third of the world's population has trouble sleeping.[1] Whether you have trouble going to sleep or trouble staying asleep, it can affect every organ system in your body.[2] Your brain, heart, lungs, kidneys, and general metabolism may all be off-kilter.

When all the soothing music and sedatives in the world will not help you sleep, what can you do? And when you're awake, how can you live your life with optimum energy? That's what we will discuss in this chapter, highlighting foods that help and hurt when insomnia and fatigue disrupt your life.

SLEEP AND YOUR GUT

Maintaining the delicate balance of bacteria in your gut is crucial for healthy sleep. The gut-brain connections we see with sleep should feel familiar by now: by interacting with the immune system, your hormones, and the vagus nerve directly, gut bacteria communicate with your brain to determine sleep patterns.[3] And once again, the interaction goes both ways, with the brain able to have an effect on gut bacteria as well.

You've probably heard about the circadian rhythm, a twenty-four-hour internal body clock that regulates when we sleep and when we're awake. When this sleep/wake cycle is disrupted, it leads to metabolic damage. In 2014, Sarah Davies, a research associate at Imperial College London, demonstrated that when twelve young, healthy men were sleep deprived, levels of twenty-seven metabolites—including some of our favorites, like serotonin and tryptophan—changed.[4] When you sleep normally, these

metabolites rise and fall in specific rhythms throughout the day. However, when you do not get enough sleep, this rhythm is disturbed and chemical peaks and troughs become erratic. This has led to another emerging field of medicine called chrononutrition, in which researchers study how your body's internal clock affects your digestion and metabolism.[5]

What does this have to do with your gut? Well, it's not just humans who have a natural sleep cycle; all living things do, including the bacteria in your microbiome. Intestinal bacteria fall into a pattern of "sleeping" and "waking" as their physiological processes fluctuate throughout the day.[6] In fact, the circadian rhythms of your gut bacteria can affect the human circadian rhythm by changing the genes that help you go to sleep or stay awake.[7]

Gut bacterial internal clocks and human internal clocks are usually synchronized.[8] However, when your body's internal clock is thrown off—for instance, when you have too many late nights or you are traveling across time zones and suffering from jet lag—the composition and behavior of your gut bacteria can change.[9] The resulting misalignment of circadian rhythms can affect how you metabolize food, ultimately contributing to obesity.

There are many animal studies that demonstrate this close connection between gut bacteria and sleep patterns. For example, one study showed that breaking up sleep patterns changes gut bacteria in mice.[10] As a result, the colon linings of the mice were damaged, "leaking" out substances that increased inflammation in their bodies, causing altered insulin sensitivity and increased eating. Researchers found that when they transplanted feces from these sleep-deprived mice into germ-free mice, the germ-free mice started experiencing the same problems with inflammation and metabolism.[11] Probiotics reversed these changes.

In humans, we see the dangers of sleep disruption most clearly with shift workers like Dumisani, who work during normal sleeping hours. You may think that shift work is uncommon, but two in five workers in the United States are shift workers who don't work nine-to-five jobs (coincidentally, that's approximately the same rate as the obesity rate in the United States).[12] Overnight workers rarely get enough sleep, and as a result, their gut bacterial equilibrium is thrown off. Even when shift workers have diets identical to those of non-shift workers, they are not able to metabolize food

normally, resulting in a tendency to be more overweight or obese.[13]

Eating for Sleep

The best recipe for sleep often lines up with a healthy diet. For example, in 2014, Ryoko Katagiri and her colleagues reported that women who ate more noodles and sweets and less vegetables and fish had worse sleep than those with healthier diets.[14] Poor sleep quality was also more common in people who consumed energy drinks and sugar-sweetened beverages, and those who skipped breakfast and ate irregularly.

Despite this negative effect of sugar, it has been shown that a high-glycemic-index carbohydrate meal will get you to sleep faster, though it will ultimately lead to sleep that is less satisfying.[15] Another study showed that high-sugar diets, as well as high-saturated-fat and low-fiber diets, will give you lighter, less restorative sleep.[16] In particular, high-fat and high-carbohydrate diets decrease slow-wave sleep, which is restorative, and REM sleep, which helps to consolidate memory.[17]

Other sleep studies can be harder to parse. A Japanese study found that low protein intake (less than 16 percent of energy from protein) was associated with poorer sleep quality and difficulty going to sleep, whereas higher protein intake (more than 19 percent) was associated with difficulty maintaining sleep. Rather than encouraging you to try to thread the needle to hit the perfect 16–19 percent energy from protein, it’s safe to say that eating a moderate amount of protein is ideal. As the mantra throughout this book has been, eat even the good foods in moderation, and be conscious of the balance of how and what you eat.

Broadly speaking, I recommend you follow a healthy, whole-foods diet like the Mediterranean eating pattern, and make sure to include or exclude certain foods based on how they affect your sleep. One credible finding is that if your diet has a smaller variety of foods in it, you will likely have worse sleep, so try to mix in as many foods as possible.[18] Whether it helps sleep or not, that’s good advice in general; it makes eating novel and fun and diversifies your opportunity to get a wide array of nutrients.

FOODS THAT DISRUPT SLEEP

Certain foods will disrupt your sleep and make it far more difficult for you to feel refreshed. Let's consider foods you should limit when you're focused on getting a good night's sleep.

Caffeine

It's not rocket science to know that caffeine will keep you up at night—after all, feeling awake and alert is why we drink it in the first place. Drinking caffeine is a double-edged sword. On the one hand, it does make you more alert. On the other, if it prevents you from sleeping well, you will be less alert the following day. Researchers refer to this as the "sleep sandwich" effect, where sleep is sandwiched between two days of caffeine consumption, getting slowly squeezed down to fewer hours. Unfortunately, the number of people who fall prey to this effect is increasing. Close to 33 percent of Americans sleep fewer than six hours per night.[19]

Caffeine acts on adenosine receptors in the brain, which are associated with sleep, arousal, and cognition.[20] Many studies have shown that caffeine can disrupt sleep considerably. In 2013, Christopher Drake and his colleagues gave 400 mg of caffeine (roughly 4 cups of brewed coffee) to three groups of people either just as they were going to sleep or three or six hours prior.[21] All caffeine groups experienced a disruption in their sleep compared to placebo.

However, as we've seen previously, there are net benefits of caffeine, so simply eliminating it isn't necessarily the best strategy. Extensive research indicates that having 3–4 cups of coffee daily may help you to live longer, and it may protect you from heart disease, cancer, and neurologic, metabolic, and liver conditions too.[22] So the optimal solution is to use caffeine wisely and learn to recognize when it is working against you.

I suggest following these guidelines: drink 3–4 small to medium cups of coffee or caffeinated tea a day, but stop all caffeine consumption by three p.m. to be safe. If you're extra-sensitive to caffeine, avoid decaffeinated beverages late in the day too—Starbucks' decaffeinated coffee may actually have up to 13.9 mg of caffeine per 16-ounce serving.

Alcohol

Aidan was an eighteen-year-old college student who came to see me because he was depressed. His grades were dropping, and whenever a test approached, his anxiety shot through the roof. When I took a history, he told me he drank heavily on weekends when he knew he could sleep in the next day but stayed sober on weeknights when he had to get up early the following morning. This pattern of alcohol use isn't unusual among college students or other social drinkers, and it sounds logical; feeling tired after drinking should be mitigated by getting extra sleep on the weekends, right? Well, it's not quite that simple.

I recommended a sleep study on one of Aidan's sober days, and even though he was not drinking, his sleep was very poor. In particular, his REM sleep was disrupted, which was probably hurting his ability to remember information during exams and contributing to his pre-test anxiety.

Since he was reluctant to take medication, I recommended that he try giving up drinking for a month. Though this was difficult for him, he managed it, and the results were remarkable. His anxiety dropped and his grades improved significantly. He did go back to drinking alcohol after his month off but he did so far less frequently, and he now understood the damage that it could do to his sleep.

Alcohol is a sedative, so in theory it will put you to sleep faster.[23] However, soon after you go to sleep, it disrupts the normal sleep cycle. If we looked at Aidan's brainwaves on a night when he'd had a few too many, in the first half of the night we'd see an increase in slow-wave sleep.[24] Slow-wave sleep is very deep, and under a normal sleep schedule it takes some time for your body to get there. Though alcohol gets you into deep sleep much faster, in the second half of the night, your sleep is of poor quality, leaving you feeling drained in the morning.[25]

Alcohol also suppresses REM sleep, which in turn leads to issues with mental performance—as we saw with Aidan's slipping grades. A lack of REM sleep can make it more difficult to cope with threatening situations too.[26] When you drink alcohol, it changes your gut bacteria in a way that increases inflammation in the gut and the brain and reduces the protective calming effects from the vagus nerve.[27] Also during both intoxication and withdrawal, the amygdala becomes activated, worsening anxiety.

People who abuse alcohol have sleep disturbances that occur even when they aren't drinking. That's why, like Aidan, weekend binge drinkers often

report not feeling rested during the week when they're not drinking.

So if you're tempted to use alcohol as a sleep aid—even something as seemingly innocent as a glass or two of wine before bed to "wind down"—be cognizant that drinking may end up hurting more than it helps. Even if you don't think of yourself as a heavy drinker, if you're having trouble sleeping, try abstaining totally for a month or so and seeing if your sleep improves.

FOODS THAT HELP YOU SLEEP

Melanie was a thirty-six-year-old food blogger. She spent her days testing recipes, making videos, posting pictures on social media, and responding to online queries. From the time she started her morning exercise routine to the time she slipped under the covers, there wasn't a wasted minute. When she eventually turned her light off, however, she couldn't get to sleep. Sometimes it took her two to three hours before she could fall asleep, and she often struggled to stay asleep all night. Since she went to bed at eleven p.m. and woke up at six a.m. daily, she would regularly struggle through her days on four hours of sleep.

When she came to see me, she was really frustrated. She had tried turning the television off early, putting away her phone well before bed, avoiding caffeine, and counting sheep, but none of these things had worked. So we started talking about her diet.

First, we identified foods that were especially lacking. She had very little oily fish in her diet, so I suggested she add in salmon, fresh tuna, and sardines. I also suggested that she add blueberries to her morning cereal and make a calming chamomile and tart cherry juice drink before bedtime.

With these changes, Melanie was able to fall asleep much more easily, and she stayed asleep all night long. Let's take a closer look at the foods that can help you sleep better.

Omega-3s

You can add improved sleep to the long list of benefits of omega-3 polyunsaturated fatty acids. A number of studies in animals demonstrate that omega-3s decrease inflammation and normalize sleep and that they

protect the brain from memory impairment in sleep-deprived mice.[28]

There are also an increasing number of studies that demonstrate the beneficial effects of omega-3s on human sleep. For instance, in 2018 Leila Jahangard and her colleagues conducted a study on fifty depressed patients.[29] Compared to those on a placebo, the participants who received omega-3s improved their depression, anxiety, and emotional control, and over time they improved their sleep as well.

Omega-3s exert a direct or indirect effect on a host of factors that are necessary for good sleep.[30] For example, some fatty acids are precursors of prostaglandins, sleep-promoting substances in the brain. Other fatty acids contribute to the development of melatonin, necessary for sleep.[31] Omega-3s increase sleep efficiency and REM sleep too.[32]

Melatonin

Melatonin is a hormone produced naturally in the brain that regulates the body's circadian rhythms. Several research studies have shown that melatonin can help people fall asleep and can be very useful for jet lag, when our internal time clocks get disrupted. Melatonin can also help those suffering from seasonal depression by regulating their sleep cycles.

Melatonin is available as a supplement, but it also occurs naturally in certain foods. Food sources include eggs, fish, milk, rice and other grains (barley and rolled oats), fruits (grapes, pomegranates), nuts (especially pistachios and walnuts), seeds (sunflower seeds, mustard seeds, and flaxseeds), and a variety of vegetables (asparagus, tomatoes, broccoli, and cucumber).

Tryptophan

As we discussed in chapter 3, the popular myth that the tryptophan in Thanksgiving turkey makes you sleepy isn't always true, since it's difficult for dietary tryptophan to reach the brain. But there's no doubt that when tryptophan does make it into your brain, it puts you right to sleep.[33] Tryptophan increases blood and brain serotonin and melatonin, both of which help you get to sleep more easily.[34]

Tryptophan can be used in sleep therapy; it is usually dosed as an

“interval therapy,” in which people take the drug for a few weeks, hold off for a few weeks, and then restart. Again, I want to emphasize that supplements like tryptophan should only be taken under the supervision of a doctor. In fact, although in the United States tryptophan is regulated as a dietary supplement, in Canada, it is regulated as a medication.

If you would rather not take a supplement and would like to get as much tryptophan as possible from food, remember our corollary to the Thanksgiving myth: while much dietary tryptophan isn’t absorbed into the brain, it can help to combine good sources of tryptophan with carbohydrates, like turkey and mashed potatoes. That same nutritional sensibility applies to cereal with milk (make sure to choose a healthy, low-sugar, whole-grain cereal), peanut butter on whole-grain toast, or cheese and whole wheat crackers. All these snack combinations can help you go to sleep.

Tryptophan is also found in pumpkin and squash seeds, roasted soybeans, cooked lamb shoulder, and cooked tuna. Not all of these make for perfect bedtime snacks, but it can’t hurt to increase some of these foods in your diet, along with carbs, at dinner if you’re struggling to sleep.

L-Ornithine

As we’ve discussed before, there are nine essential amino acids that cannot be made by the body and therefore must come from food sources. Like tryptophan, L-ornithine is an essential amino acid that has the potential to improve sleep quality when you’re fatigued.[35] It is produced in the body from foods containing L-arginine.

The simplest way to get L-arginine is to eat complete protein sources, which means they contain all nine essential amino acids, which the body cannot produce on its own. These include meat, poultry, fish, eggs, soybeans, and quinoa.

Chamomile

We discussed chamomile in chapter 3 when talking about herbs that could help lessen the effects of anxiety, but its most enduring use is as a sleep aid. I’m sure you have heard about chamomile tea helping you sleep, and with

good reason: chamomile is one of the most ancient herbs in existence, and science has backed up its positive effects.

In 2017, Mohsen Adib-Hajbaghery and his colleague conducted a sleep study in people more than sixty years of age who received either 200 mg of chamomile extract capsules or a placebo daily for twenty-eight consecutive days.[36] The study found that consuming the chamomile improved sleep quality significantly. And in 2019, a meta-analysis of all studies on chamomile tea and sleep demonstrated that it was very effective for improving sleep quality.[37]

The sedative effect of chamomile is attributed mainly to one of its constituents, a flavonoid called apigenin, which binds to the same receptors in the brain as Valium and Xanax.[38]

The most common way to get chamomile is to simply drink chamomile tea (though technically speaking, it's an "infusion" since there is no actual tea in the drink). Different kinds of teas have different amounts of chamomile, but it can be difficult to tell how much chamomile is in a given cup. Still, I would recommend 1–3 cups (8 ounces per cup) per day. I suggest to my patients that they have their last cup in the early evening so that it mellows them down in preparation for bed but leaves enough time for them to use the bathroom if needed.

Before you start drinking chamomile tea, clear it with your doctor, since chamomile can interact with sedatives, blood thinners, and painkillers. Also, if you are allergic to ragweed, daisies, marigolds, or chrysanthemums, you should avoid drinking chamomile, as you may be allergic to it as well.

Other Micronutrients

In addition to chamomile, there are many other naturally occurring compounds that can improve sleep, including gamma-aminobutyric acid (GABA), calcium, potassium, melatonin, pyridoxine, and hexadecenoic acid. You can get supplements of many of these dietary additives, but there are foods that contain these and other helpful substances too.

Barley grass powder is rich in antioxidants, electrolytes such as potassium, and GABA, all of which protect the brain and help you go to sleep.[39]

Maca is a plant relative of radish that smells like butterscotch. Found in

places like Peru and China, it contains calcium, potassium, and fatty acids that also help with sleep.[40]

The *Panax ginseng* flower and leaf stimulate GABA receptors in the brain that promote sleep.[41] *Panax ginseng* is known as Asian, Chinese, or red ginseng, not to be confused with its American counterpart (which can have the opposite effect, as we will discuss shortly).

Lingzhi is an oriental fungus, which also stimulates GABA receptors and promotes sleep.[42]

Lettuce contains a substance known as lactucin, which is thought to contribute to its sedative properties.[43]

Cherries are a rich source of polyphenols and vitamin C.[44] As a result, they decrease inflammation and promote sleep. Tart cherry juice is a preparation that has been shown to reduce insomnia.[45] In 2018, Jack Losso and his colleagues administered either cherry juice or placebo to eleven subjects for two weeks and found that cherry juice increased sleep time and sleep efficiency.[46] While this is a small study, it provided the first human evidence for cherry juice as a sleep aid. Cherry juice is thought to increase tryptophan availability and reduce inflammation.

FOODS THAT FIGHT FATIGUE

If you're not sleeping well, it's only logical that the most noticeable consequence is going to be fatigue. You're not going to be able to tackle life's highs and lows with energy. But lack of sleep is far from the only reason that you might feel fatigued; there are lots of reasons why your body and brain may not be operating at peak efficiency.

If you are persistently fatigued, it is important to see a doctor, as fatigue can be rooted in many serious medical conditions such as heart and thyroid disease. When these have been ruled out, nutrition is a good place to start thinking about how to raise your energy levels.

Anti-inflammatory Foods

One reason for fatigue is chronic low-grade inflammation, which can be caused by several factors, including obesity, depression, and chronic pain.

When inflammation is present in the body, less energy is available to the

brain. That's because low-grade inflammation flips off a metabolic switch in the chemical pathway that produces energy. The result is not only lower energy but an increase in toxic free radicals that damage brain tissue and reduce insulin sensitivity.

Because of this cycle, foods that increase inflammation can decrease your energy availability. To reduce inflammation, it is important to eat an anti-inflammatory diet.[47] We've covered plenty of anti-inflammatory foods thus far in the book, but the central tenets of an anti-inflammatory diet are as follows:

- Your brain is made up of 60 percent fat. In order to perform at its best, it requires a constant supply of omega-3 fatty acids—at least 2–3 g combined of eicosapentaenoic acid and docosahexaenoic acid per day.
- Reducing omega-6 fatty acids is key to maintaining the correct balance of omega-3s to omega-6s. Eating an excess of omega-6s can trigger the body to produce chemicals that spike inflammation. These fatty acids are found in oils such as corn, safflower, sunflower, grapeseed, soy, peanut, and vegetable. That means you should cut down on mayonnaise, many salad dressings, and most processed and fast foods.
- A diet rich in colorful, nonstarchy vegetables adds polyphenols, which fight inflammation through a number of processes. Other sources of polyphenols include: cloves, star anise, cocoa powder (natural, non-alkalized), Mexican oregano, dark chocolate, chestnuts, and flaxseed meal.[48] Black and green tea, blackberries, muscadine grape seeds, apple-cider vinegar, cinnamon, and superfruits such as the maqui berry may also help to decrease inflammation.[49]
- When you are on an anti-inflammatory diet, you must stabilize insulin by eating whole, plant-based foods rich in healthy fat (avocados, dark chocolate, olives, chia seeds, coconut, almonds, pecans, and walnuts) and natural chemicals.[50] Eat vegetables such as cauliflower, green beans, and broccoli.

If you follow these tenets, your body will be less inflamed and you will

feel more energized and rejuvenated.[51]

Magnesium and Zinc

More than two decades ago, researchers realized that patients with chronic fatigue syndrome had low magnesium levels in their red blood cells. When their magnesium was replaced, they felt more energized.[52]

Magnesium decreases inflammation and relaxes the nervous system. For example, when you exercise, lactate accumulates in your blood, which leads to tired and achy limbs. However, magnesium can prevent this lactate accumulation, which in turn helps relieve fatigue.[53]

Food sources of magnesium include dry roasted almonds, boiled spinach, dry roasted cashews, soy milk, cooked black beans, and edamame.

Low zinc levels are also a hallmark of chronic fatigue syndrome, and increasing zinc can improve and prevent fatigue.[54] Zinc deficiency is very common, with about half of the world's population prone to zinc deficiencies due to dietary patterns. To get more zinc, incorporate lamb, pumpkin seeds, hemp seeds, grass-fed beef, and chickpeas into your diet.

Vitamins

Vitamins play an essential role in protecting the brain and energizing you. While you can certainly take a multivitamin to help bolster your levels of many vitamins, I encourage you to get as much as you can through natural sources. That means a balance of meat, fish, eggs, fruits, and vegetables. When I see patients with vitamin deficiencies, I usually see a glaring gap in their diets. Either they eat no meat or they eat few fruits and vegetables. If you feel this might be the case for you, examine your weekly diet to see where the gaps are. Then reflect on how you might increase the diversity of nutrients. For instance, over the years I have encountered many patients whose energy levels quickly improved after adding citrus fruits back into their diets.

Here are how specific vitamins work to provide you with the energy you need (for common food sources of these vitamins, see Appendix B):

Thiamine: Decreased thiamine levels (vitamin B_1) can result in altered mitochondrial activity. Since the mitochondria are the energy factory of

your body's cells, that means reduced energy production. Neurons have high energy requirements, which means they are especially vulnerable to a thiamine deficit.

B_6: Vitamin B_6, also called pyridoxine, is low in patients with chronic fatigue syndrome.[55] In the brains of animals, vitamin B_6 deficiency correlates with less glucose being utilized to produce energy.[56] A lack of vitamin B_6 also leads to a disruption of the connections among brain cells, decreasing efficient processing of information. Fatigue is a natural consequence.

Vitamin B_6 deficiency is more common in pregnant or lactating women, and it may also result from chronic alcoholism.

Folate: Vitamin B_9 is also known as folate. Like deficiency in other B vitamins, folate deficiency is associated with chronic fatigue syndrome.[57] Folate is also involved in cell development throughout the body. Without it, development is slowed down, and you are likely to feel fatigued from increased energy demands.[58]

The fatigue from folate deficiency may occur due to anemia. For instance, a forty-four-year-old man presented to a primary care internal medicine clinic with a one-month history of shortness of breath, fatigue, and numbness and tingling in his fingers.[59] After extensive investigations, his physicians found that he had a type of anemia called macrocytic anemia, which is commonly caused by folate deficiency. Anemia prevents you from having sufficient oxygen in your tissues, which leads to fatigue.

While there are other causes of fatigue besides anemia, I have seen many patients who simply have a lack of folate-rich foods in their diet.

B_{12}: Vitamin B_{12} (also known as cobalamin) deficiency has been associated with fatigue in certain instances, such as after a stroke.[60] We covered dietary sources of B_{12} in chapter 7, but in certain cases, for example, if patients suffer from gastritis, anemia, or Crohn's disease, those sources may not be sufficient. Although there is some controversy as to whether oral vitamin B_{12} is sufficient to increase levels, many studies have shown that it is.[61] However, some people may need an injection to bring levels up. Your doctor will be able to help you monitor your B_{12} levels and determine your needs.

Vitamin C: Vitamin C is a crucial antioxidant in the brain,[62] and fatigue is a common symptom if you are low in vitamin C.

Vitamin D: When you do not have high enough levels of vitamin D, brain injury and inflammation ensue.[63] Vitamin D helps nerve growth and assists in the production of brain tissue. You can make your own vitamin D, but you need to expose your skin to the sun, and not through windows. Of course, excessive sun exposure poses its own risks, including skin cancer. Low SPF sunscreen appears not to affect vitamin D production, but higher SPF sunscreens may hamper it.[64] My dermatological colleagues would have some choice words for me if I told you not to wear sunscreen, so that's why nutritional sources are so important.

Vitamin E: Vitamin E (also known as alpha-tocopherol) can become deficient when there is malabsorption of fat, so deficiency is common in people who have digestive disorders or those who cannot absorb fat properly due to conditions such as cystic fibrosis or celiac disease.[65] It, too, is important for the developing nervous system, ensuring that the body's energy needs are met.

Capsaicin

Capsaicin is the compound in chili peppers that makes them spicy. In addition to adding a delicious burn to food, it has been shown to reduce fatigue in mice.[66] In humans, consuming 2.5 mg of capsaicin per meal (7.68 mg/day) has been shown to restore the energy balance in the body.[67]

Capsaicin affects energy because it impacts glucose metabolism in the body.[68] When capsaicin enters the gut, it triggers a vagal response to the brain, thereby regulating appetite by helping hormones from the brain's appetite regulation center more effectively detect when enough is enough.[69] There is increasing evidence attesting to its anti-obesity potential, which probably also helps fatigue.

The amount of capsaicin varies widely among different types of peppers, and it's proportional to how spicy the chili tastes. For example, the relatively mild jalapeño has only 0.165–0.33 mg of capsaicin. A serrano chili contains 0.396–1.518 mg of capsaicin. Spicier chilies like Thai bird's eye chilies and habaneros can be an efficient way to get capsaicin (if you can handle them!).

Rather than trying to add up capsaicin levels, I recommend that you try to incorporate more spicy food into your diet. Use extra cayenne pepper in your cooking, and if you order in Thai, Indian, or other spicy foods, order them one level spicier than you normally would.

Bear in mind that it's not just generic "spiciness" that matters, but the capsaicin itself. In other words, spicy foods that derive their burn from non-capsaicin compounds, like mustard, horseradish, black pepper, and ginger, do not affect energy balance in the same way.[70]

Other Spices

Black cumin: In one study in rats, *Nigella sativa* seed, commonly known as black cumin, helped fatigue after exhaustive swimming. It is known to be neuroprotective due to its antioxidant properties.[71] It also increases acetylcholine in the brain, which helps your muscles contract.

Though this is a very promising spice, we need more data, especially from human studies, before we can be sure it has a marked positive effect. Still, it can't hurt to integrate it into your food. You may see it sold as nigella seeds, onion seeds, or kalonji (the Hindi name). It can be used in Indian naan bread, Bengali potato stir-fry, and preserved lemons.

Turmeric: Our old friend curcumin, the active ingredient in turmeric, has been found to increase muscle glycogen content in mice.[72] Glycogen is an important energy source. In humans, it may help in the management of exercise-induced inflammation and muscle soreness, thus enhancing recovery and performance in active people. Just 100 mg of curcumin can improve fatigue.

American Ginseng

Ginseng is often marketed as a supplement that increases energy levels and alleviates fatigue. There are some indications that this could be the case, since ginseng affects brain activity, specifically by increasing brain levels of dopamine, noradrenaline, and serotonin. It may also increase energy produced in the brain.

There are no food sources of ginseng, but it is sometimes added to drinks and foods, and it is available as a supplement.

FOOD IS ENERGY

I hope this chapter has proved to you that food is energy in more than one way. Of course, the calories you get through food provide the fuel that makes your biological systems go, but food can also be a key component in helping your body rest, allowing you to thrive with a clear mind and healthy attitude.

If you have trouble sleeping (or are fatigued while you're awake), I encourage you to try out the dietary strategies we've discussed. But it's also important to practice good overall sleep habits—sometimes called sleep hygiene. Make sure you're allowing yourself enough time for sleep, and keep a steady sleep routine. Ensure that your sleep environment is dark and peaceful, and avoid checking your phone, working on your computer, or watching TV at bedtime, since these can stimulate your brain and keep you awake. Avoid taking long naps during the day, which can disrupt nighttime sleep.

I know it can feel hard to prioritize sleep with all the demands of work, child care, and entertainment. But I promise you that getting a good night's sleep is fundamental to good overall health.

INSOMNIA AND FATIGUE CHEAT SHEET

Foods to Embrace:

- Omega-3 fatty acids: Fish, especially fatty fish like salmon, mackerel, tuna, herring, and sardines.
- Melatonin: Eggs, fish, milk, rice, barley and rolled oats, grapes, pomegranates, walnuts, sunflower seeds, mustard seeds, flaxseeds, asparagus, broccoli, and cucumber.
- Tryptophan: Turkey, other meats, and chickpeas, especially when combined with carbohydrates.
- L-ornithine: Meat, poultry, fish, eggs, soybeans, and quinoa.
- Chamomile tea.

- Foods containing helpful micronutrients: Lettuce, tart cherry juice, barley grass powder, maca, *Panax ginseng*, lingzhi, asparagus powder.

For Fatigue:

- Anti-inflammatory foods: Omega-3s, colorful vegetables for polyphenols.
- Minerals: Magnesium and zinc.
- Vitamins B_1, B_6, B_9, B_{12}, C, D, and E.
- Capsaicin-rich foods: Chili peppers including cayenne, serranos, and jalapeños.
- Spices: Black cumin and turmeric.

Foods to Avoid:

- Caffeine: You don’t have to completely eliminate caffeine, but stick to the guideline of no more than 400 mg/day, and don’t drink caffeine after three p.m.
- Alcohol: Though alcohol can put you to sleep, it also disrupts sleep.

CHAPTER NINE

Bipolar Disorder and Schizophrenia: L-Theanine, Healthy Fats, and the Ketogenic Diet

When it comes to serious psychiatric disorders, none are more recognizable than bipolar disorder (BD) and schizophrenia (SCZ). The two conditions have become so pervasive in the culture that they've been transformed into slangy adjectives in the modern lexicon. If something is "bipolar," it changes swiftly and violently—maybe the weather on a day that swings from chilly to warm or vice versa. If something is "schizophrenic," it has a split personality—perhaps an unpredictable boss who one moment is glowing with pride and the next fuming with anger.

Both of these popular usages are misrepresentations to a degree. While patients suffering from bipolar disorder do experience dramatic changes in mood, the up and down phases don't swing on a moment-to-moment basis, with manic episodes that generally last at least a week and depressive phases often lasting two weeks or more.

Despite the longtime association, SCZ does not have anything to do with "split personality," which is more likely a symptom of dissociative identity disorder. In medical literature, SCZ's symptoms are split into positive and negative. Positive symptoms include psychotic behavior not seen in the healthy population, like delusions and hallucinations. Negative symptoms are those that affect normal behaviors, like garbled speech or simply looking withdrawn and depressed.

Bipolar disorder and schizophrenia have parallels, and in fact some

psychiatrists don’t draw a clear distinction between the two conditions. Diagnosis in psychiatry can be controversial, and the criteria listed in the *Diagnostic and Statistical Manual of Mental Disorders* are not robustly based on research—relying instead on lists of symptoms. The categories aren’t always satisfying to clinicians.[1] So while technically BD is classified as a mood disorder and SCZ is classified as a psychotic disorder, BD sometimes presents with psychotic symptoms such as hallucinations, which makes it difficult to tell them apart. On the other hand, someone with schizophrenia may also have a mood component, seeming irritable or angry, which may be interpreted as bipolar disorder.

In fact, some researchers don’t believe that SCZ exists, while others see BD and SCZ as existing on a spectrum from mood swings to mood swings with psychosis to mostly psychosis.[2] In deference to the traditional idea that they are separate conditions, I will address them one by one in this chapter, but as you’ll see, they benefit from many of the same dietary inclusions and exclusions.

BIPOLAR DISORDER

Nancy was a longtime patient of mine; I diagnosed her with bipolar disorder when she was twenty-one years old. She had been stable on 1200 mg of lithium and clonazepam for about a decade. Then she started a new job, and all hell broke loose.

She became stressed and stayed up at night with her mind racing. At work, she could not concentrate because her mind flitted from one subject to the next. She found herself putting together elaborate to-do lists that were an attempt to manage her time but ended up becoming a jumbled mountain of tasks that felt insurmountable. When she got home, instead of relaxing, she kept the lists going.

With an increase in distractibility, racing thoughts, and too much goal-directed activity, I recognized that she was hypomanic—hypomania is a less severe form of mania, but troublesome nonetheless. She had been stable on her medication for so long that I was hesitant to start changing it. So, before I made any adjustments, I checked on her dietary history. To my surprise, I

found a number of things off-kilter. As she was stressed and always in a rush, she had switched from her regular protein shake for breakfast to bagels and muffins. She was drinking more coffee than usual so that she could concentrate at work. And at night, she was having a few glasses of wine, hoping they would help her go to sleep.

You're probably sensing familiar patterns in her eating habits that were harming her already delicate state of mind. To understand fully, let's consider the connection between the gut and brain in bipolar disorder.

THE BIPOLAR GUT

One of the key symptoms of BD is mood lability, a fancy way of saying that moods are prone to dramatic changes. For a week or so, people with bipolar disorder may be so hyperalert that they stay up all night, talk really fast, and struggle to focus on any one thing—they experience mania. After about a week they may plunge into depression, become withdrawn and worried, and have no interest in day-to-day activities.

The seriousness of BD goes beyond dramatic mood swings. People who have BD die prematurely from a variety of secondary medical causes. For instance, obesity occurs in 40 percent of adolescent youth with BD—twice the rate of the general population—which is exacerbated by the fact that many BD medications have weight gain as a side effect. BD patients also have more cardiovascular disease, diabetes, and autoimmune disease than the general population. That's why some researchers think of bipolar disorder not solely as a mental condition, but as a multisystem inflammatory disease.[3]

As we already know, the ongoing, low-grade inflammation in your body is often related to disruptions to your gut. When this widespread inflammation throughout the body occurs, the marker C-reactive protein increases. When BD patients are in either depressed or manic states, we also see an increase in C-reactive protein, an indicator that gut inflammation may also be associated with mood swings.

The links between BD and gut inflammation will likely sound familiar. For instance, patients with irritable bowel syndrome have more than twice the rate of BD compared to the general population.[4] There is also a rare

condition called antibiomania, which is mania caused by antibiotics.[5] Indeed, the rising number of manic cases is thought to be in part due to an increase in prescriptions of new antibiotics that upset the balance of the gut microbiome.

We also see symptoms of leaky gut associated with BD. In BD patients, we can see gut chemicals in the blood by tracking a part of the gut-bacteria cell membrane called lipopolysaccharide. In healthy individuals lipopolysaccharide stays confined to the gut, but in BD patients, it leaks out, stimulating inflammation and promoting proinflammatory cytokines, which lead to greater depression and mood symptoms.[6]

The hypothalamic-pituitary-adrenal pathway is also affected in BD. When you are stressed, as is often the case in BD, a hormone called corticotrophin releasing factor is stimulated, presumably so that cortisol can be released from the adrenal gland to help the body cope with the stress. However, too much corticotrophin releasing factor can make the gut more "leaky" and sensitive.[7]

BD patients often have different types of gut bacteria, similar to the differences found in inflammatory bowel disease.[8] This leads to reduced levels of several familiar neurotransmitters produced by gut microbiota, including gamma-aminobutyric acid (GABA), noradrenaline, serotonin, dopamine, and acetylcholine. As we've seen so many times before, proper levels of these neurotransmitters are necessary for brain health.[9]

Given this evidence of the strong connection between BD and the gut microbiome, we know enough to start implementing dietary solutions. Let's talk foods that can impair and foods that can improve the bipolar brain.

FOODS AND EATING PATTERNS THAT WORSEN BIPOLAR DISORDER

Fluctuations between manic episodes and deep depression make it extra tricky to treat bipolar disorder with nutritional interventions. What may be good for mania may not be good for depression and vice versa, so it's important to tailor dietary treatments around the emotional seesaw. The foods that have an effect on bipolar depression mirror those that we discussed in chapter 2 on depression, so refresh your memory if you need

to. Here, I will focus on studies that specifically address mania and bipolar disorder.

It's worth noting that several of the foods covered here may interact negatively with lithium.[10] Lithium has been used as the primary treatment for BD for decades, and it is so widely prescribed that it makes sense to consider the impact of different foods on its efficacy as well.

The Western Diet

Once again, we see the damaging effect of the Western diet.[11] Eating bad fats, refined carbohydrates, sugar, and meat with very few vegetables is destructive to the bipolar brain. In particular, as we saw with depression, BD patients consume more carbohydrate and high-energy foods.[12] Some researchers believe that eating sugar and comfort food is a form of self-medication for BD patients, but there is no doubt that an unhealthy diet ends up being physiological self-sabotage.

Switching to a diet like the Mediterranean eating pattern is helpful for BD.[13] However, it is difficult for BD patients to stick to healthier foods. Giving up a high-fat, high-sugar diet may be particularly challenging for sufferers of BD, because close to 10 percent of bipolar patients have binge-eating disorder, a condition that leads to out-of-control eating.[14] In 2017, Matias Melo showed that people with bipolar disorder also have night-eating syndrome, meaning they eat less during the day and binge at night, sometimes even waking up from a deep sleep to do so. That isn't a recipe for making healthy choices.[15]

With enough work and support it's possible for BD patients to change their eating habits. One study demonstrated that patients with BD could reduce their body mass index, and another demonstrated that having support from a nurse and lifestyle coach made a difference. Given the difficulty of implementing nutritional interventions with BD, it is important to have social support while doing so.[16]

While the Mediterranean eating pattern is a good alternative to the Western diet, there's another diet that has shown even more promise for treating BD. Preliminary data and case histories indicate that the ketogenic diet—which is high fat and low carbohydrate—has mood-stabilizing effects.[17] In 2019, Iain Campbell and Harry Campbell investigated how a

ketogenic diet affected mood stabilization among individuals with bipolar disorder.[18] They analyzed text comments of 274 people in online forums about the mood effects of three types of diets: ketogenic, omega-3-enriched, and vegetarian. People reported stable moods far more often on the ketogenic diet than on any other diet.

There are many reasons for the keto diet's positive effects on BD, including its effects on glutamate/GABA transmission, in reducing oxidative stress, and in lowering overall inflammation.[19] Perhaps most important, the keto diet makes the mitochondria, your cells' energy makers, work better. Mitochondrial dysfunction has been associated with bipolar disorder.[20]

The ketogenic diet is high fat, moderate protein, and very low carbohydrates. I won't go into detail on how to implement a keto diet; it's currently in vogue for weight loss, so there is a wealth of information about how to make the switch. I recommend checking out *Keto Diet* by Dr. Josh Axe for a full rundown.

Beware that the keto diet has both short- and long-term side effects. After starting the keto diet, you may experience nausea, vomiting, headache, fatigue, dizziness, insomnia, difficulty in exercise tolerance, and constipation. This group of symptoms is sometimes referred to as keto flu and may last a few days to a few weeks. Ensuring adequate fluid and electrolyte intake can help counter some of these symptoms. Long-term adverse effects include fatty liver, low protein in the blood, kidney stones, and vitamin and mineral deficiencies. If you want to try the keto diet, it is important to consult your doctor.

Caffeine

Randy, a twenty-year-old literature major, was considering transitioning his gender (he preferred to use male pronouns when I treated him). This was a challenging time for him, and his stress was a factor in precipitating a manic episode during which he stayed up all night for most of three weeks, jumped over a highway median, and had delusions that he was Jesus come to save the world. He was eventually hospitalized, and I saw him six months after hospitalization.

By the time I started treating him, he was stable enough on medications

to begin to process his gender dysphoria. But two months into treatment, he started to rev up again, acting overenergized and developing a tremor in his hands—something that concerned me because hand tremors can be caused by toxicity from high lithium levels. Part of me wondered if we should slow down the deep processing of an issue that had tortured him his entire life, but as we talked one day, he confessed that he had been drinking energy drinks. It wasn't just 1 or 2 a day. He had been consuming about 8–10 cans a day.

Energy drinks are not uncommon among college students.[21] Red Bull, Amp, Monster, Rockstar, Rip It, Full Throttle, and the ostentatiously named Cocaine are all designed to give them energy highs to fuel both studying and partying. Each energy drink contains about 80–141 mg of caffeine per 8-ounce serving (and one can usually contains much more than 1 serving). That level of caffeine consumption is too much for anyone, but for someone with BD, it's a risk for mania. Several case histories have demonstrated the connection between energy drinks and mania in BD patients.[22]

Fortunately, Randy did not have a toxic level of lithium; his tremors were due to his system being jazzed up on all that caffeine. I asked Randy if he was willing to taper off his caffeine consumption under my direct guidance—something that has to be done carefully because caffeine withdrawal can lead to a spike in lithium levels as well. He agreed and, slowly, over the next eight weeks, reduced his caffeine use from 8–10 energy drinks a day to 1 cup of coffee in the morning. His manic symptoms disappeared, and, even without the caffeine, he was able to focus better on his work because he stopped having the hand tremor, which had made it difficult to take notes and engage in his studies.

It's not hard to understand why caffeine might be bad for BD patients in manic states. In low doses, it elevates mood, most likely due to the interaction between dopamine and adenosine receptors in the brain, but in large doses it can lead to dangerous mood elevation.[23] Caffeine also disrupts sleep patterns, another factor that makes mania more likely.[24]

Unfortunately there have been no controlled trials on the negative effects of caffeine in BD patients. As in Randy's case, though, using common sense and doing a trial discontinuation may pay off in the long run. For most BD patients, our standard routine of no more than 400 mg/day of caffeine is fine. When cutting down, remember that patients must wean

themselves off caffeine gradually. Rapidly stopping can throw an already vulnerable brain into a tailspin and pose a danger for patients taking lithium.

Changes in Sodium Levels

Maurice was a forty-five-year-old Jamaican American man who came to see me about his BD. Within a few short weeks, we got his mania under control, and lithium seemed to be working wonders. His lithium blood level was at 1, which was a perfectly respectable number, since the ideal range is between 0.6 and 1.2.

Unbeknownst to me, after I'd been seeing him for about six months, Maurice was also diagnosed with hypertension. His primary care physician asked him to follow a low-salt diet. From the perspective of treating the hypertension, this made sense. However, a low-sodium diet may enhance lithium reabsorption in the kidneys, causing lithium blood levels to shoot up. This eventually worsens kidney function, which is especially problematic in a person who is prone to high blood pressure.

Maurice developed a tremor and diarrhea. I suspected lithium toxicity. Testing showed that his blood level was 1.5. Balancing lithium's effects in a hypertensive patient can be tricky, so we switched medications and tapered the lithium off slowly. His tremor went away, and he could reengage in his low-salt diet without negative consequences.

Maurice's case was not unusual; bipolar patients often have hypertension. In fact, there are some preliminary data that indicate that mania and hypertension have a lot of overlap.[25] There are even some case histories indicating that antihypertensive drugs such as verapamil and beta-blockers may help people with mania. Both disorders are associated with a greater incidence of stroke, thyroid disease, and diabetes.

Still, if you are taking lithium, it's important to keep sodium levels consistent. And if you're seeing multiple medical professionals about multiple conditions, make sure to keep everyone informed of each treatment you undergo.

Gluten

Recent studies have found elevated gluten-related antibodies in patients with bipolar disorder and have indicated that manic episodes may be associated with increased serum levels of antibodies against gliadin, a class of proteins present in wheat.[26] In other words, patients with BD are more likely to have celiac disease or non-celiac gluten sensitivity.

One study demonstrated that ASCA, a marker that is associated with both inflammatory bowel disease and celiac disease, was elevated in bipolar disorder.[27] Patients who were ASCA-positive were three to four times more likely to have bipolar disorder. In other words, there is evidence that the immune system in bipolar disorder is off-kilter, and when the bowel lining is compromised, foods including gluten and dairy caseins may instigate immune responses.

Since the case histories and basic science indicate that going gluten-free may be helpful, I often ask my patients to consider a week of gluten-free eating to observe if their mood stability improves.

Alcohol

In 2006, Benjamin Goldstein and his colleagues conducted a study in which they examined the relationship between alcohol use and BD in 148 patients.[28] None of the study participants were heavy drinkers; men consumed fewer than 4 drinks per week, and women consumed fewer than 1.5 drinks per week. Despite this low level of alcohol use, men with BD who drank closer to 4 drinks per week had more manic episodes and visited the emergency room more often over the course of their lives than those who drank less. Consuming spirits put them especially at risk. For women, the more alcohol they drank, the greater the likelihood of depression and hypomania.

Other studies have indicated that heavy alcohol consumption placed BD patients at risk for depression and that alcohol use put patients at greater risk of not adhering to their medication regimens.[29] Drinking too much alcohol may make for a slow recovery from bipolar depression, and it increases the chances of a manic episode.[30]

Together, these studies are strong evidence that patients suffering from BD should abstain from alcohol or, at the very least, severely restrict its use.

Grapefruit Juice, Tyramine, and Other Foods That May Interfere with Medication

As we've touched on earlier in the book, though grapefruit juice may seem like a tart, harmless way to start the day, it can inhibit the enzyme system that metabolizes certain drugs in the liver, thereby increasing the blood levels of medication.[31] This includes certain antidepressants, antianxiety medications, mood stabilizers, stimulants, and antipsychotics. All these types of drugs are commonly used in the treatment of BD.

For BD patients who are on MAOI antidepressants, it is important to avoid foods that contain the amino acid tyramine, which may inhibit the drug's function and cause a serious spike in blood pressure that requires emergency treatment.

Foods rich in tyramine include aged cheese, aged or cured meats, fava beans, Marmite (concentrated yeast extract), sauerkraut, soy sauce, and tap beer. A doctor can help you track many other relevant foods.

MOOD-STABILIZING FOODS AND SUPPLEMENTS

Omega-3s

We've seen many ways in which omega-3 fatty acids enhance mental health by protecting the brain, and there are some encouraging signs for bipolar disorder. In 2003, psychiatrists Simona Noaghiul and Joseph R. Hibbeln found that people who ate more seafood—a major source of omega-3s—had a lower prevalence of BD.[32] In 2011, David Mischoulon and colleagues conducted a meta-analysis of six clinical trials in which patients randomly received omega-3 supplementation or placebo.[33] They demonstrated a significant positive effect on depressive symptoms, though there was no improvement in manic symptoms. This should come as no surprise, given what we learned in chapter 2 about the power of omega-3s to fight depression. Even if they are only aimed at depressive symptoms, I recommend that BD patients eat a steady diet of omega-3s, given their broad-ranging benefits.

N-Acetylcysteine

In 2018, Jair Soares and his colleagues reported that when BD patients were given a combination of aspirin and the supplement N-acetylcysteine (NAC), their depressive symptoms resolved after sixteen weeks, an improvement over placebo.[34] This confirmed findings from earlier studies showing that NAC on its own was effective for bipolar depression. However, a more recent study could only partially confirm this effect, suggesting that NAC augmentation may not work for every patient.[35]

As we saw in our discussion of OCD in chapter 7, NAC is a derivative of the amino acid cysteine. It has antioxidant properties and protects brain tissue from damage by free radicals by decreasing inflammation. NAC is not found in food sources, but in the body, it converts into cysteine. Cysteine itself is found in onions, garlic, egg yolks, oats, Brussels sprouts, broccoli, red peppers, wheat germ, yeast, and dairy products like ricotta cheese, cottage cheese, and yogurt.

Folate and Folic Acid

In 2017, my Massachusetts General Hospital colleague Andrew Nierenberg and his co-investigators conducted a trial of L-methylfolate, a form of folate (vitamin B_9), in patients with bipolar depression.[36] The majority of patients had more than 50 percent improvement in depressive symptoms.

Another study demonstrated that in BD patients being treated with lithium, 200 mcg of folic acid protects them from relapsing.[37] However, a subsequent trial found that although folic acid supplementation may decrease the time to onset of symptoms, it doesn't prevent mood disorder any better than placebo.[38] That said, when folic acid is added to sodium valproate, a medication used to treat mania, it confers additional improvement.[39]

Some good food sources of folate include asparagus, leafy greens, bananas, legumes (cooked lentils and kidney beans), citrus fruit (oranges, lemons, limes, though remember to avoid grapefruit), beets, eggs, avocados, wheat germ, almonds, and flaxseeds.

Magnesium

In 1999, Angela Heiden and her colleagues administered intravenous

magnesium sulfate to patients with severe, therapy-resistant manic agitation for seven to twenty-three days.[40] During the infusion, the subjects needed much less of their standard BD medications to feel stable. More than half of the patients showed marked clinical improvement, with no prohibitive side effects.

Two years prior to this, an oral magnesium preparation was found to have results equivalent to lithium in at least 50 percent of patients.[41]

Both of these studies are consistent with others that demonstrate that unmedicated BD patients have low levels of magnesium. It's also worth noting that lithium increases magnesium levels in the blood, which is possibly part of why it's an effective treatment for BD.

Though the evidence for magnesium's efficacy in treating BD isn't airtight, it's worth considering dietary supplementation with nuts, spinach, black beans, edamame, peanut butter, and avocado.

Zinc

In 2016, Marcin Siwek and his colleagues found that people with BD have decreased zinc during the depressive phase of their illness.[42] Another study indicated that for women with BD, lower zinc concentrations correlated with more severe depression.[43] When they were manic, hypomanic, or in remission, zinc levels were normal.

This squares with our discussion of zinc as a way to fight depression in chapter 2. I highly recommend that BD patients make sure to eat enough zinc, especially during depressive phases. Dietary sources of zinc include seafood (especially cooked oysters), lean beef, poultry, and egg yolks, with lower amounts in beans, nuts, and whole grains.

SCHIZOPHRENIA

Alice, a twenty-eight-year-old patient of mine, suffered from schizophrenia. When I first started treating her, she told me she believed that the Hells Angels were after her. At a Bruce Springsteen concert, she was convinced that men in leather jackets and sunglasses were in the crowd taking

photographs of her. They also (allegedly) pursued her at Grateful Dead and Rolling Stones concerts. When I asked her why they might do this, she looked over both shoulders and said, “I’ve been sworn to secrecy. I’m sorry. I can’t tell you.”

It sounds outlandish, but at the time, her story was not that unusual. I had seen many patients, both male and female, who believed that they were in trouble with the Hells Angels, a particular version of a symptom called a paranoid delusion. When I started her on an antipsychotic called clozapine, she recovered. Although the symptoms never completely went away, they no longer held her back. She stopped hearing voices in her head, and she was able to function properly with less fear. Within a short period of time, she completed her GED and started working as an administrative assistant.

She stayed healthy for ten years. Then she started dating someone. Within a short period of time, I noticed the psychotic symptoms returning. I was shocked and wondered if her new relationship was troubling her. But when I took a dietary history, I noticed one big change. She and her boyfriend ate out a few times a week. She told me that they would often eat the bread at restaurants, whereas previously she ate very few wheat products. She was also drinking more, up to a few glasses of wine every night.

Hearing warning bells again? Before we dive into the specific ways Alice’s new eating patterns were harming her, let’s consider the gut-brain connection in schizophrenia.

THE GUT IN SCHIZOPHRENIA

Whether medicated or unmedicated, people with schizophrenia have less diversity of gut bacteria, and they even have some unique bacteria that aren’t found in healthy guts.

One study demonstrated that when human feces from SCZ patients are transplanted into mice, the mice showed signs of SCZ compared to controls.[44] The mice also displayed behaviors similar to behaviors of other mice who had SCZ-like symptoms induced in another way. This animal study is powerful evidence that changes in gut bacteria can change brain chemistry.

As we saw with BD, SCZ patients have more gut problems than the general population. They have more inflammation, food intolerances, and defects of the gut wall leading to leaky gut. One postmortem study of gastrointestinal inflammation associated with SCZ in eighty-two individuals found that 50 percent had gastritis, 88 percent had enteritis, and 92 percent had colitis, all signs of serious gut inflammation. And 20 percent of patients with irritable bowel syndrome have schizophrenia too.[45]

Due to the differences in gut function and gut bacteria, SCZ patients may have poor immunity. This means, for instance, that people with schizophrenia are more prone to bacterial infections, which leads to a greater rate of antibiotic prescriptions, potentially killing off normal gut bacteria.[46]

It's not just gut bacteria that are different in SCZ. There are also differences in the bacteria of the mouth and throat—something we don't see in the other conditions we've discussed.[47] If you think of the digestive system as one long, convoluted road from the mouth to the anus, you could say that the entire digestive highway is affected.

So, once again, diet matters in schizophrenia. Let's start with foods to avoid.

FOODS THAT WORSEN SCHIZOPHRENIA

The Western Diet

In 2015, Koji Tsuruga and his colleagues compared 237 patients diagnosed with either SCZ or schizoaffective disorder (similar to SCZ, but with additional symptoms of depression or BD) with healthy controls to see if their eating patterns put them at risk for their mental illnesses.[48] To explore whether diet correlated with illness, they divided groups into two dietary patterns. One group followed a vegetable dietary pattern and the other followed a cereal dietary pattern. People who followed the vegetable dietary pattern ate a lot of green leafy vegetables, seaweed, potatoes, and soybean products such as tofu and natto. By contrast, people who followed the cereal dietary pattern consumed a lot of rice, breads, and confectioneries.

When the researchers looked at the results, an interesting pattern emerged. The cereal dietary pattern was associated with schizophrenia, and

within this group, schizophrenia correlated to a higher ratio of unhealthy fats to total calories.

Another study shows that patients with schizophrenia tend to consume meals that contain substantially more unhealthy oils and fats. While there are many potential reasons for this, one leading idea is that SCZ patients have insufficient energy supply in the brain, and as a result fats are broken down at an increased rate.[49]

Any of this sound familiar? A combination of high levels of bad fats along with high-glycemic-index carbs and sugar is the calling card of our old friend the Western diet. Once again, we see how unhealthy it is for the brain. SCZ patients would be well served by switching to a diet heavy in vegetables and good fats, like the Mediterranean eating pattern that we have discussed.

Gluten

The idea that SCZ might be connected to gluten goes back to 1966, when physician and endocrinologist Francis Dohan reported a correlation between wheat consumption and SCZ during World War II.[50] Modern research has continued to explore the connection.

The presence of celiac disease in SCZ patients is almost double the rate of the general population. About one-third of patients with SCZ have antigliadin antibodies—about triple the rate of the general population—which can lead to both celiac disease and non-celiac gluten sensitivity.[51]

In 2018, Anastasia Levinta and her colleagues reviewed studies to determine whether being on a gluten-free diet was helpful to SCZ patients.[52] Six of nine studies demonstrated improved functioning and decreased symptom severity.

In 2019, Deanna Kelly and her colleagues conducted a study of sixteen patients with SCZ or schizoaffective disorder, all of whom had elevated antigliadin antibodies but did not have celiac disease.[53] Over five weeks, they received standardized gluten-free meals and a shake each day containing either 10 grams of gluten flour or 10 grams of rice flour.

Compared with participants who ate gluten, gluten-free participants demonstrated overall clinical improvement, better attention, fewer gastrointestinal side effects, and improvement in negative symptoms such

as social withdrawal and apathy. There were no improvements in positive symptoms such as hallucinations, and cognitive symptoms were not better, but the overall effects were impressive.

Clearly, all patients with SCZ should at least try a gluten-free diet. We've already discussed eliminating gluten in chapters 3 and 5, so I won't go into detail here, but obvious foods to avoid include regular bread products, pasta, pizza, and cereals. Gluten may also show up unexpectedly in foods such as soy sauce, canned soups, licorice, imitation crabmeat, meat broths, beer, and products made with malt vinegar, malt flavoring, and malt extract.

Sugar

Eating refined sugar is a risk factor for SCZ. It has been shown to lead to poor outcomes in SCZ patients over a two-year timeframe, and SCZ patients have a greater prevalence of diabetes than the general population.[54]

Of ten studies that assessed refined sugar, breakfast cereals, and sweetened drinks, all found that the more patients ate these somewhat toxic substances, the greater the likelihood of psychosis.[55] These studies were mostly observational, so they aren't definitive, but still, SCZ patients should be encouraged to cut down their sugar intake as much as possible.

Alcohol

Drinking alcohol complicates the clinical picture of SCZ. More than 6 percent of schizophrenic patients have a history of hazardous alcohol consumption. Alcohol use usually starts after the earliest symptoms of the disease, so it is not thought to be a cause of SCZ per se, but alcohol abuse may be a result of the negative symptoms patients experience.[56]

One study looked at how alcohol abuse affected SCZ patients who were being treated with regular injections of an antipsychotic medication called fluphenazine.[57] It found that people who drank more than 20 drinks per week had more relapses of SCZ symptoms than those who drank occasionally or not at all. They also had more frequent positive symptoms like hallucinations and delusions. Other studies have confirmed that alcohol use can increase suspiciousness, and SCZ patients typically report more

hallucinations and paranoia after drinking alcohol.[58]

Alcohol worsens symptoms of schizophrenia because it amplifies the negative effects of abnormalities that already exist in schizophrenic brains. For instance, people with SCZ have reduced white matter volume and changes in hippocampal anatomy that can be worsened by alcohol.[59] My advice to SCZ patients is to drink little to no alcohol. I find if I insist on complete abstinence they feel unfairly restricted, so I compromise by recommending no more than 1 drink per week, perhaps with Saturday dinner.

REALITY-RESETTING FOODS

Omega-3s

In 2009, Paul Amminger and his colleagues studied eighty-one people at "ultra-high risk" of a psychotic disorder.[60] These subjects were not being treated with antipsychotics. Over twelve weeks, participants were given a supplement of omega-3 polyunsaturated fatty acids or a placebo, followed by a phase of monitoring. By the end of the study, which lasted twelve months, two of forty-one individuals (4.9 percent) in the omega-3 group and eleven of forty (27.5 percent) in the placebo group developed a psychotic disorder. Omega-3 polyunsaturated fatty acids also significantly reduced positive and negative symptoms compared with placebo. This was a powerful demonstration of the protective effects of omega-3 in psychoses like SCZ.

This dramatic result hasn't been replicated in every study, but a recent review has agreed that omega-3s can be beneficial to those with schizophrenia.[61] I certainly encourage my schizophrenic patients to increase omega-3 consumption in their diets.

N-Acetylcysteine

SCZ patients have abnormal brain metabolism that leads to oxidative stress.[62] The release of free radicals damages brain tissue and sabotages the brain's normal defense systems, causing brain physiology to go awry. Antioxidants are particularly important for SCZ patients to help fight the

negative effects of oxidative stress.

Glutathione is an important antioxidant that is low in patients with SCZ. Giving a dose of straight glutathione isn't helpful, since it is poorly absorbed and does not reach the brain easily. However, N-acetylcysteine (NAC) has been shown to successfully raise plasma glutathione levels and thus protect the brain.[63]

In a case study of a twenty-four-year-old woman with chronic and worsening paranoid-type schizophrenia that did not respond to antipsychotic treatment, NAC supplementation spurred improvement in seven days.[64] Improvements were seen in schizophrenia-specific symptoms as well as in spontaneity, social skills, and family relations.

These findings were supported by another study in which forty-two SCZ patients with acute symptoms who were being treated with an antipsychotic received either NAC or a placebo for eight weeks.[65] The researchers saw significant improvements in negative symptoms in the NAC treatment group compared to controls, though there was not significant improvement in all symptoms or frequency of symptoms.

In another study, 140 SCZ patients randomly received either placebo or NAC supplementation in addition to antipsychotic medication over twenty-four weeks.[66] People who received NAC supplementation improved on all symptoms.

Taken together, these studies give reasonable evidence that NAC supplementation could help treat schizophrenia. As we've discussed, NAC itself is not available from dietary sources, but I encourage SCZ patients to eat foods containing the amino acid cysteine, which are described in the section on bipolar disorder earlier in this chapter.

Alpha-lipoic Acid

Alpha-lipoic acid is a common ingredient in multivitamin formulas and antiaging supplements.[67] It plays a key role in chemical reactions of the cell's energy source, the mitochondrion. Like NAC, it is an antioxidant and protects the brain from excessive inflammation.

A 2017 research study in SCZ patients found that alpha-lipoic acid may reduce overall symptoms of SCZ and improve cognition as well.[68] It was also helpful in counteracting weight gain and movement abnormalities

caused by antipsychotic medication.[69]

Alpha-lipoic acid is commonly found in vegetables (spinach, broccoli, tomato) and meats, especially organ meats like heart, kidney, and liver. While organ meats may not sound appealing, certain dishes like steak and kidney pie, liver and onions, and various types of pâté are delicious.

Vitamins

Vitamin C: In one study, forty patients with SCZ showed lower levels of a marker associated with SCZ after receiving a course of vitamin C.[70] SCZ symptoms also improved significantly in the experimental group compared to those receiving a placebo. Other studies have confirmed that vitamin C may be helpful in SCZ patients.[71]

B vitamins: B vitamins play an essential role in cellular metabolism. Low blood levels of B vitamins are a relatively consistent finding in patients with schizophrenia. Folate has been of particular interest, since folate deficiency may interfere with DNA synthesis and repair and overall cellular function in the brain.[72]

In one study of Dutch SCZ patients, investigators noted that there were lower levels of serum vitamin B_{12} in SCZ patients compared to healthy controls.[73] There were no differences in folate and vitamin B_6 levels between the groups, although an earlier trial found differences in folate levels that correlated with an increased risk of SCZ.[74]

A former Massachusetts General Hospital colleague, Donald Goff, and his research group also reported low folate levels in ninety-one SCZ outpatients.[75] They found that higher folate levels correlated with a decrease in negative symptom severity among nonsmoking patients.

Several studies have demonstrated that B vitamin supplementation may be effective in SCZ. In one study, seventeen SCZ patients with low folate levels[76] received daily methylfolate supplementation (15 mg/day) in addition to their pharmacologic treatment for six months. They showed improvements in their symptoms and social abilities, allowing them to reintegrate back into society.

In one of the largest randomized controlled trials examining vitamin supplementation, Massachusetts General Hospital psychiatrist Josh Roffman and his colleagues randomly assigned 140 patients with

schizophrenia on antipsychotic medication to a sixteen-week treatment of either a combination of folic acid (2 mg/day) and vitamin B_{12} (400 mcg/day) or placebo. The folate-plus-B_{12} group showed significant improvement in negative symptom severity, but treatment response was strongly influenced by each individual patient's genetics, which determined how well they absorbed folate.[77]

In 2017, Roffman and his colleagues found that folic acid supplementation does in fact improve symptoms in patients with SCZ.[78] While genetic variants played a role, improvement in negative symptoms occurred regardless of genes.

As discussed previously, vegetables and fortified whole-grain, low-sugar cereals are high in folate, and meat and dairy products are high in vitamin B_{12}. Green leafy vegetables, dark green vegetables such as broccoli and Brussels sprouts, beans, and other legumes all contain folate.

L-Theanine

L-theanine is a unique amino acid present almost exclusively in the tea plant, from which most varieties of tea are produced. It enhances alpha brain waves ("relaxation" waves), decreases excitatory chemicals in the brain, and boosts calming brain chemicals such as GABA.

One rigorous study found that L-theanine augmentation of antipsychotic therapy relieved several symptoms in SCZ and schizoaffective disorder patients. Another study found that L-theanine relieves positive symptoms and insomnia in SCZ patients.[79] While more studies are needed for these results to be conclusive, these provide good reason to drink tea.

Regular varieties such as green, black, and oolong tea contain theanine, but they also contain caffeine, so too much of these teas will rev you up. With SCZ patients, it's always best to look for a decaffeinated alternative. Herbal teas aren't made from traditional tea leaves, so they do not contain theanine. Fortunately decaf green, black, and oolong teas do.

Melatonin

Melatonin, the "sleep hormone," which we discussed in chapter 8, has been shown to be effective for insomnia in patients with SCZ. It may also

augment the effects of antipsychotics through its anti-inflammatory and antioxidant effects.[80]

Eggs and fish are good sources of melatonin, as are nuts. Asparagus, tomatoes, olives, grapes, barley, oats, walnuts, and flaxseeds are also good sources.

SERIOUS MENTAL ILLNESS REQUIRES SERIOUS MEDICINE

Pharmaceuticals like lithium and antipsychotics are powerful weapons in fighting BD and SCZ. But equally powerful are the changes to diet that can work alongside medications to help people suffering from these debilitating illnesses.

My bipolar patient Nancy switched back from the Western diet to a ketogenic diet, cutting out carbs. She slowly cut her coffee down to 1 cup in the morning. And we added the protein shake for breakfast, this time with additional peanut butter.

For lunch, she avoided gluten, eating a salad with plenty of onions for cysteine, and avocados, lettuce, spinach, and red kidney beans for folate. For dinner, she increased the oily fish in her diet. For instance, she really liked baked salmon, so she had this regularly with different seasonings. Her favorite was olive oil, black pepper, oregano, and thyme, and she topped this with an onion sauté. She stopped drinking wine on weekdays. In about six weeks, her symptoms resolved, and she returned to baseline.

My schizophrenic patient Alice cut out bread and alcohol. Within seven weeks, her symptoms resolved, and she was able to function again. Her fiancé, spooked at first by her social withdrawal and hallucinations, was relieved to see that she was back to her normal self. She was able to discuss her problems with him, and since he observed what a difference alcohol and bread made, he was totally on board to help her cut both out of her diet. Now, a few years later, she is about to get married.

Both Nancy and Alice are inspiring examples of how maintaining mental health isn’t always straightforward. It can require dedication to keep up with the latest recommendations. Both were stable on medication when something new in their life threw a wrench into their routines, sending them into a spiral of problems they thought they’d resolved. But with patience

and determination and the right support, they were able to change their diets to help fill in the gaps that their medication didn't cover.

BIPOLAR DISORDER CHEAT SHEET

The keto diet has been shown to be a good whole-diet approach for patients with bipolar disorder.

Foods to Embrace:

- Omega-3 fatty acids: Fish, especially fatty fish like salmon, mackerel, tuna, herring, and sardines.
- N-acetylcysteine: While NAC itself must be taken as a supplement, cysteine-rich foods can also be effective. Try meat, grains, eggs, ricotta cheese, cottage cheese, yogurt, broccoli, red pepper, and onion.
- Vitamin B_9 (folate).
- Minerals: Magnesium, zinc.

Foods to Avoid:

- The components of the Western diet: Foods high in bad fats (red meat, fried foods) and high-glycemic-index carbs (white bread, white rice, potatoes, pasta, and anything else made from refined flour).
- Caffeine: Keep caffeine consumption under 400 mg/day.
- Sodium: For patients treated with lithium, it's important to keep sodium levels constant.
- Gluten: If you have celiac disease or non-celiac gluten sensitivity, avoid all wheat products, such as bread, pizza, pasta, and many alcoholic drinks.
- Alcohol: BD patients should totally abstain from or heavily restrict alcohol use.

- Complications with medicine: Grapefruit juice and foods containing tyramine (aged cheese, aged or cured meats, fava beans, Marmite, sauerkraut, soy sauce, and tap beer) can interfere with some medications prescribed for BD.

SCHIZOPHRENIA CHEAT SHEET

Foods to Embrace:

- Omega-3 fatty acids: Fish, especially fatty fish like salmon, mackerel, tuna, herring, and sardines.
- N-acetylcysteine (NAC): While NAC itself must be taken as a supplement, cysteine-rich foods can also be effective. Try meat, grains, eggs, ricotta cheese, cottage cheese, yogurt, broccoli, red pepper, and onion.
- Alpha-lipoic acid: Spinach, broccoli, tomato, and meats, especially organ meats like heart, kidney, and liver.
- L-theanine: Green, black, and oolong tea.
- Melatonin: Eggs, fish, milk, rice, barley and rolled oats, grapes, pomegranates, walnuts, sunflower seeds, mustard seeds, flaxseeds, asparagus, broccoli, and cucumber.
- Vitamins B_9, B_{12}, and C.

Foods to Avoid:

- The components of the Western diet: Foods high in bad fats (red meat, fried foods) and high-glycemic-index carbs (white bread, white rice, potatoes, pasta, and anything else made from refined flour).
- Gluten: If you have celiac disease or non-celiac gluten sensitivity, avoid all wheat products, such as bread, pizza, pasta, and many alcoholic drinks.

- Sugar: Baked goods, candy, soda, or anything sweetened with sugar or high-fructose corn syrup.
- Alcohol: SCZ patients should try to abstain from or heavily restrict alcohol use.

CHAPTER TEN

Libido: Oxytocin, Fenugreek, and the Science of Aphrodisiacs

Living in the modern world, it's difficult to avoid products designed to enhance your libido. Every day we're inundated with pharmaceutical ads for erectile dysfunction drugs showing vibrant middle-aged couples on their way to romantic weekends. Racks of drugstore and gas station "supplements" making dubious (and possibly dangerous) claims of the sexual supremacy they will deliver. Magazines full of tips to get in the mood and please your partner. It's safe to say that the genuine, factual advice on the subject is watered down with snake oil and attention-grabbing sensationalism, but there's no doubt that people are seeking ways to enrich their sex lives and improve their libidos.

What is a libido anyway? While the word is generally equated with sexual desire, in psychological theory, it has broader implications. Sigmund Freud, founder of psychoanalysis, described it as "the motive force of the sexual instincts," a fundamental drive for humans to seek pleasure. The psychiatrist and psychoanalyst Carl Jung, however, believed that libido could be separated from sexual instincts and was more akin to a vital life force that the philosopher Henri Bergson called élan vital.[1] And the psychoanalyst Ronald Fairbairn described libido as "primarily object seeking," downplaying the pleasure-centric Freud viewpoint in favor of thinking of libido as a way of relating and connecting with other people.[2]

Though there is no universally agreed definition, in all these interpretations of libido, the common thread is that it is an essential human

drive.[3] In fact, libido has many similarities to another human drive: hunger.

Like hunger, libido is an instinctual state. They can both affect the way you behave, making you prioritize them above all else. There's not much thinking involved in either one, but we are programmed so that satiating hunger and satiating sexual desire are both rewarding, activating overlapping brain circuitry focused on pleasure.

Hunger and libido also involve similar chemicals, with dopamine playing a major role in both, and sex hormones like estrogen, testosterone, and progesterone influencing food intake and appetite.[4] The two even have an evolutionary similarity, since the ability to overeat and store the extra energy as glycogen and lipids conferred a reproductive advantage by allowing animals time to look for mates without worrying about constantly seeking food.[5]

Given all these connections, it's no surprise that food can influence your sex drive. In this chapter, we will look at how certain foods affect your libido, and how eating the right foods can help you optimize your sexual function.

Of course, it's important to remember that all psychological challenges come in a specific context. For some people, depression, stress, or anxiety may reduce libido. For others, the culprit could be the antidepressants used to treat those conditions—many psychiatric medications, from SSRI antidepressants to antipsychotics, decrease libido. As tempting as it is to believe you can fix sexual problems by eating certain foods, in my experience it's not that simple. So as you read through these tips, know that they are just one component of the solution. They are not quick fixes, but life and libido enhancers.

AROUSAL AND YOUR GUT

There are two main sex hormones—estrogen and testosterone. You probably know them as the "female" and "male" sex hormones, and indeed, estrogen is produced primarily by the ovaries and testosterone by the testes. Still, men and women have both estrogen and testosterone, and both are important to the sexual function of each gender. For example, while testosterone certainly plays a major role in male libido, estradiol (the main

form of estrogen) has been shown to have a profound influence on libido, erections, and sperm creation.[6] And though there is some disagreement about the role testosterone plays in the female libido, it's clear that the connection is there.[7] Beyond sexual function, estrogen and testosterone are involved in the health of your bones, brain, and blood vessels.

Gut bacteria are yet again intimately involved in modulating libido because of their role in producing these two sex hormones. In 2014, veterinarian Theofilos Poutahidis and colleagues investigated whether gut bacteria can influence sex hormones in mice.[8] They gave mice a probiotic containing the gut bacterium *Lactobacillus reuteri* (*L. reuteri*), which has anti-inflammatory properties. Mice consuming *L. reuteri* in their drinking water produced more sperm and had more testosterone-producing cells in their testes compared to controls that were not exposed to this bacterium. This was particularly evident in older mice; in fact, the treatment essentially made the mice more youthful, restoring the size of their testicles to resemble those of younger mice. The study concluded that since probiotic supplementation can boost sexual function in mice, there is a strong possibility the same could be true in humans.

It has also been shown that mice that are exposed to antibiotics when they are young suffer from a disrupted microbiome that leads to low testosterone and decreased sperm quality.[9]

As for estrogen, in postmenopausal women, it appears that gut microbiota play a key role in regulating levels of estrogen circulating in the blood.[10]

Beyond estrogen and testosterone, gut bacteria control other neurochemicals that change libidinal function. For instance, some strains of gut bacteria can produce gamma-aminobutyric acid (GABA). While GABA is essential for healthy brain function, when GABA receptors are overstimulated, erectile dysfunction (ED), loss of libido, or difficulty achieving an orgasm can result.[11]

When your gut is not functioning properly, it can be difficult to tap into your libido, even when your symptoms aren't expressly related to sexual function. For example, inflammatory bowel disease has been shown to track with depression, arthritis, and poor body image, all of which serve to lower libido.[12]

FOODS AND COMPOUNDS THAT REDUCE DESIRE

In a sense, eating poorly can be a kind of nutritional castration, no matter what your age or gender. Let's take a look at eating patterns and foods that hamper libido and then establish healthier alternatives.

The Western Diet

It should be no surprise that the Western diet is once again a threat to your well-being. High-fat diets have been found to impair testicular function and have been linked with impaired sperm production and function.[13] This is referred to as the GELDING theory, which stands for Gut Endotoxin Leading to a Decline in Gonadal function—a bit of a stretch as an acronym, but a nice play on the word "gelding," which refers to male castration. This theory purports that high-fat and high-calorie diets cause the same kind of "leaky gut" we've seen in other conditions. As a result, gut bacteria pass into the circulation, which allows endotoxins, powerful immune stimulants present in bacteria, to cause low-grade inflammation throughout the body. This impairs testicular function and reproductive performance, providing us with another example of how gut health is essential to sexual health.

In 2017, Justin La and his colleagues reviewed the scientific studies published between 1977 and 2017 on how diet affects men's sexual health.[14] They found that the Western diet was associated with lower semen quality and greater incidence of ED. Obese and overweight men who went on a low-fat, low-calorie diet were able to improve their erections and boost their testosterone.

Another study demonstrated that a high-protein, low-carbohydrate, low-fat diet improved sexual function, with improvement in both erectile function and sexual desire up to one year after the change in diet.[15]

An increase in prevalence of the Western diet correlates with the lower sperm counts in the general male population. Sperm counts have dropped precipitously, by 59 percent in North America, Europe, Australia, and New Zealand.[16] A new Harvard study presented at the 2019 meeting of the European Society of Human Reproduction and Embryology found that the sperm counts for men who typically ate meals of high-fat foods were 25.6 million lower than those of men who ate healthier diets.

I have had several patients of both sexes in my clinic who have switched away from a Western diet and improved their sexual performance. For instance, Joey was a thirty-eight-year-old programmer and football fanatic who lived on the north shore of Massachusetts. He came to see me for depression, which I learned was precipitated by difficulty he and his wife were having in trying to conceive a child.

They had visited an infertility specialist, and to Joey's massive disappointment, he was told that his sperm count was low and that he had poor sperm motility (his sperm were not moving in a healthy way). The doctors could not identify any medical cause for his issues, and he and his wife were devastated. Though they kept trying, they were far less hopeful than they had ever been.

Joey was so depressed that I had to start him on an antidepressant. The trouble is, many common antidepressants like fluoxetine (Prozac) can disturb sexual function. I opted for bupropion (Wellbutrin), which has fewer sexual side effects, but also told him that he had to change his diet. No more game-day hot dogs, nachos, pizza, wings, or any of the usual football food.

I also directed him to eat more nuts. In 2012, Wendie Robbins and her colleagues found that the addition of walnuts to a standard Western diet improves the quality, vitality, and physical form of sperm.[17] A 2018 study confirmed that 60 grams (just over ¼ cup) per day of a mixture of nuts added to a Western diet made a difference in sperm count and sperm quality.[18]

I asked him to try switching to a healthier diet built around daily servings of fruit, vegetables, avocado, olive oil, and healthy nuts and make a serious effort to avoid unhealthy fats and processed carbs. Joey was all in. His new diet was not exactly up his alley, but he was willing to do what it took to have a child. Six months after he started the diet, his wife became pregnant. Now, five years later, they have a beautiful son and daughter. Though Joey has allowed himself to ease back into his weekend football-food rituals, he is much more careful in limiting unhealthy foods.

Though sperm-count studies are obviously geared toward men, kicking the junk-food habit can have reproductive benefits for women as well. A recent study of more than five thousand women found that those who ate fast food more than four times a week (and fruit fewer than three times a month) took longer to get pregnant and had a greater chance of infertility.[19]

This is exactly what happened with my patient Inka. She came to see me because she and her husband had been trying unsuccessfully to conceive a child. Furthermore, she said she was tired of trying, unable to work up excitement and desire to have sex with her husband. When I took a dietary history, I learned that Inka had been working late after a promotion at her law firm. Though she enjoyed her work, she was putting in long hours at the office, which led to an excess of unhealthy take-out food. She admitted that she could not recall the last time she ate at home or even had a fresh piece of fruit. Even when she ate salads, they were covered in bacon and drenched in creamy, rich, unhealthy dressings.

She began by building in a Sunday afternoon of meal prep to help plan out the meals for that week. For breakfasts she added in nutritious, fiber-filled foods like overnight oats, chia pudding (here), and scrambled eggs in a mug with vegetables (here). She also began to take simple but healthy lunches to work (chopped salad with heaps of tasty mixed lettuces and chopped vegetables, and a side of rotisserie chicken or baked salmon). She stocked her office with fruit and nuts as healthy snacks. Though her meals were simple to put together, she quickly began to feel better about what she was eating. She also noticed that she was more relaxed at home and began to enjoy an intimate relationship with her husband again. Whereas their intimacy had become regimented to match her ovulation schedule, now she looked forward to their Friday and Saturday date nights.

About eighteen months after making these changes to her diet, she and her husband announced they were pregnant. After the birth of a healthy baby girl, she called me to let me know that her healthy eating habits had helped her energy levels during her pregnancy and as a new mother.

Soy Protein

In 2011, clinical neuroscientist Timo Siepmann and his colleagues reported on a case of a nineteen-year-old man who had suddenly lost his libido and developed ED.[20] Though the man did have type 1 diabetes, he was otherwise healthy. When Siepmann's team took a history, they found that he consumed large quantities of soy-based products in a vegan-style diet.

When they first saw him, his blood levels of testosterone were low, and his levels of a testosterone precursor called dehydroepiandrostendione were

high—an indicator that this precursor was not being properly made into testosterone. After one year of stopping the vegan diet, these parameters all normalized. As his testosterone came back up, his sexual symptoms disappeared, and he regained full sexual function one year later.

Though Siepmann's research was a single case study, it was an indicator that soy-protein consumption can disrupt normal sex hormone production and libido. Other studies are consistent with this finding, showing that higher intake of soy foods and soy isoflavones is associated with lower sperm concentration.[21]

As we learned in chapter 6, isoflavones are estrogen-like substances found in soy. They are polyphenols, which means that most of the time they are actually good for your brain because of their anti-inflammatory properties. But many researchers believe that the estrogen introduced by isoflavones can impact sex hormones so that men may develop breasts and lose their libido.[22] If you're curious whether the estrogen-boosting properties of soy can help female libido, results are inconclusive—one study did report that soy protein can increase libido in postmenopausal women, but with no greater effect than placebo.[23]

It's worth considering that China and India are the number one and number four, respectively, consumers of soy in the world. Given their population numbers, it would be surprising if soy really had a massive effect on libido and sex-hormone production. Still, if you are a man who consumes lots of soy protein (such as tofu, edamame, and soy-based imitation meat products) and suffers from low libido, it may be worth trying to cut back on the soy to see if your sex drive improves.

Alcohol

I spend lots of time on college campuses, which are often the nexus of discussions about the relationship between sex and alcohol. Pop culture has weighed in on the subject all the way back to Shakespeare, who famously said in *Macbeth* that alcohol "provokes the desire, but it takes away the performance."[24] It turns out the Bard was right.

One study demonstrated that when men are dependent on alcohol, it causes ED, unsatisfying orgasms, and premature ejaculation.[25] Another study showed that intoxicated men take longer than sober men to reach

orgasm, without any other sexual side effects.[26] In 2018, Deepak Prabhakaran and his colleagues questioned men with alcohol dependence on their sexual function.[27] They found that sexual dysfunction was reported in 37 percent of their subjects. Twenty-five percent of those reported ED, 20 percent reported "dysfunction in satisfying orgasm," and 15.5 percent reported premature ejaculation. A small percentage of people reported excessive libido. These results were enough to convince the researchers that alcohol plays a role in sexual dysfunction, but they also point out one of the difficulties with gathering this kind of data: since alcohol distorts how people recall their experiences, self-reporting can be inconsistent and unreliable.

Alcohol plays a complex role in women's libido, too. Research has shown that moderate alcohol use enhances desire and makes sexual activity more likely, but high doses of alcohol have the opposite effect.[28] Another study found that alcohol suppresses orgasm in young women, but only at higher dosages.[29] Furthermore, women who have been sexually victimized —for instance, those who have suffered childhood sexual abuse, rape, or attempted rape—are more likely than normal to drink heavily, putting them at risk for further sexual harm.[30]

It's clear that, whether you're a man or a woman, drinking heavily leads to poor sexual performance or—much worse—a greater risk of putting yourself in dangerous sexual situations. However, moderate drinking—no more than 14 drinks per week for men, and no more than 7 drinks per week for women—shouldn't take a toll on your sex life.

Sugar

Sex has long been associated with sweet foods like chocolate-covered strawberries and other candies, especially at Valentine's Day. However, science has shown that sugar isn't good for the sex lives of those who eat too much of it.

For instance, excessive consumption of sugar-sweetened beverages, especially by those with a high body mass index, is associated with lower testosterone levels.[31] Another study demonstrated that sugary beverages decrease sperm motility too.[32]

Higher-sugar diets also lead to higher leptin levels. Leptin is a hormone

made by the body's fat cells that helps you to regulate your energy balance. The higher your leptin levels, the lower your testosterone, especially if you are already overweight.[33] When you are overweight, your fat tissue makes so much leptin that it suppresses the hypothalamic-pituitary-adrenal axis, which in turn stops making testosterone, another possible link between consuming more sugar and lower testosterone.[34]

Just as I do for patients with other conditions, for those with libido issues, I recommend cutting down on sugar as much as possible, particularly sweet drinks and snacks sweetened with high-fructose corn syrup. For desserts, prioritize fresh fruits, medium-glycemic-index natural sweeteners like honey, or lower-sugar treats like dark chocolate. (In fact, as we will soon see, dark chocolate has other helpful properties also. Natural, non-alkalized chocolate is best, as it has higher antioxidant levels.)

Licorice

One particular type of sweet that has been shown to have a negative effect on libido is licorice. Licorice derives its flavor from the roots of the licorice plant and contains the active ingredient glycyrrhizic acid, which several studies have indicated is associated with lower testosterone levels.[35]

Aside from licorice candy, licorice can be found in teas and certain chewing gums. It's important to note that only black licorice contains the harmful chemicals (look for "licorice extract" on the label); red licorice is licorice in name only. But, as we just discussed, eating less candy of any sort is the right thing to do.

Perfluorooctanoic Acid

Perfluorooctanoic acid (PFOA) is a chemical with many applications, most notably in certain kinds of nonstick cookware and food packaging. Studies have suggested the potential of PFOA and similar chemicals to disrupt the endocrine system, increasing the risk of adverse health effects.

PFOA has been shown to turn the hormone receptors (e.g., androgen) off, leading to a reduction of testosterone.[36] The more PFOA you consume, the greater this effect. There is also evidence that PFOA may be associated with infertility, and animal studies have shown that it affects ovaries as

well.[37] Furthermore, PFOA can change gut bacteria, causing inflammation.[38]

Thankfully, there has been some response from manufacturers in the face of the growing body of evidence that such chemicals are harmful. A 2019 study showed that between 2005 and 2018, there was a downward trend in using PFOA.[39] However, some microwave popcorn bags and some plastic bags still contain PFOA, and it is also used to make Teflon and other stain- and stick-resistant materials. Jolly Time Popcorn, Snappy Popcorn, and Newman's Own Organics Popcorn are PFOA-free. Or make easy air-popped corn or old-fashioned stovetop popped corn. Use stainless-steel or cast-iron cookware, avoiding nonstick coatings, and switch to unbleached paper bags for snacks and sandwiches.

APHRODISIACS AND LIBIDO-ENHANCING FOODS

The idea that certain foods can increase sexual desire is as old as human civilization. The word "aphrodisiac" is derived from Aphrodite, the Greek goddess of love, but the Greeks weren't the only ancient culture to believe in the power of food to increase libido, potency, or sexual pleasure.[40] Almost every culture has used foods and substances derived from plants, animals, and minerals to enhance sexual desire. And though modern science hasn't fully investigated the claims of every single one of these foods, we know enough to understand that there are genuine connections between certain foods and libido.

Interestingly, some of the most well-known aphrodisiacs are the ones that have been most thoroughly debunked. Take, for example, the cautionary tale of the oyster. You've probably heard that slurping raw oysters can amp up sexual desire. The legendary Casanova swore by them as a way to sustain his sexual appetite. Though the idea that oysters are an aphrodisiac isn't new, the legend grew in the mid-2000s when news outlets reported on a study that attributed the oysters' effects to the presence of an amino acid called D-aspartic. The findings turned out to be all hype, the result of a misunderstanding at a scientific conference.[41]

The same is true for strawberries, another food commonly mentioned as having aphrodisiac properties. Though strawberries do contain

phytoestrogens, which could possibly help symptoms in postmenopausal women, there are no other indicators that they enhance sexual performance.

In this section, we'll look at other foods and supplements that are both well-known and more obscure, measuring up the evidence that they can enhance libido.

Oxytocin-Boosting Foods

Oxytocin is known as the "bonding hormone" because of its wide range of functions in sex, love, and child-rearing.[42] It is involved with libido in several ways, eliciting sexual arousal and contributing to the culmination of pleasure, as it's released during orgasm for both men and women. Giving both men and women extra oxytocin has been shown to heighten arousal while watching erotic films.[43]

The brain effects of oxytocin are complex. Many of them occur via the brain's "reward" pathway.[44] Oxytocin receptors are abundant in the mesolimbic system, which links the reward pathway with the brain's limbic system and plays a key role in the registration and expression of emotion.[45] The gut microbiome plays a role in the development and function of this pathway, so gut bacteria can affect the function of neurons that rely on oxytocin.[46]

While you can't get oxytocin directly from food, there are foods that can help you raise oxytocin levels. Chocolate is commonly known as an aphrodisiac, and sure enough, dark chocolate stimulates dopamine in the brain, which in turn increases oxytocin production.[47] However, specific research into chocolate's libido-enhancing properties is not a slam dunk. Although one study demonstrated that chocolate may enhance sexual function in women, when this effect was adjusted for age, it was not significant.[48]

Magnesium has been found to promote the biological activity of oxytocin.[49] While this connection is not robust or well replicated, eating a diet high in magnesium can't hurt. As we covered earlier, make sure to eat lots of green vegetables, nuts, seeds, and unprocessed grains, all of which are rich in magnesium.

Oxytocin is a peptide of nine amino acids. Two of these, isoleucine and leucine, are essential amino acids that must be obtained from the diet as

they cannot be produced in your body, so you'll definitely need to eat foods high in them to make sure your body can create oxytocin. You will find them in meat and meat products, grains, milk and dairy products, and, to a lesser degree, vegetables and eggs.

Coffee

In 2015, David Lopez and his colleagues analyzed data from 3,724 men to see if coffee prevented ED.[50] They found that caffeine intake did reduce the odds of ED, especially when subjects drank approximately 2–3 daily cups of coffee (170–375 mg of caffeine/day). Another study demonstrated that 100 mg of caffeine prior to intercourse improved sexual satisfaction.[51]

As we've discussed, it's important not to overdo coffee consumption, but it can be beneficial to your sex life provided you don't exceed 400 mg/day of caffeine.

Red Wine

We've already discussed how heavy drinking can hamper your libido, but moderate consumption of red wine can actually enhance it. In 2009, Nicola Mondaini and his colleagues investigated whether red wine intake affected sexual function in women.[52] They divided a sample of 798 women into three groups: teetotalers, moderate drinkers (1 or 2 glasses of red wine per day), and heavy drinkers (more than 2 glasses of red wine per day and/or other types of alcoholic drinks, including white wine).

They found that women who drank red wine moderately had significantly better overall sexual function, as well as higher sexual desire and lubrication than participants who drank a lot or none at all. No significant differences between the groups were observed concerning sexual arousal, satisfaction, pain, and orgasm.

Other studies have demonstrated that red wine can increase testosterone levels in men.[53] And others have demonstrated that the polyphenols found in red wine may decrease ED.[54]

Of course, while red wine can have benefits, I want to stress that you should always drink in moderation. I ask my patients to stick to 1 glass per day to ensure that their libido doesn't suffer ill effects from too much

alcohol.

Pistachios and Other Nuts

In 2011, Mustafa Aldemir and his colleagues studied seventeen married male participants.[55] They gave them 100 grams of pistachios a day for three weeks and tracked erectile function. They found an improvement in erections, as well as an increase in good cholesterol (HDL) and a decrease in bad cholesterol (LDL).

Another study in women in Iran found that a combination of pistachios and almonds in a traditional Persian dish (made with wild carrots and saffron) enhanced sexual desire, arousal, lubrication, orgasm, and satisfaction.[56]

Given that we've already seen the beneficial effects of walnuts when discussing my patient Joey, I recommend adding pistachios, walnuts, and almonds to your diet. You can overdo it with nuts, so stick to around ¼ cup per day.

Saffron

We have seen that saffron is an effective antidepressant, and it has positive effects on libido as well. Studies have shown that it may increase libido, enhance erectile function, and improve semen quality. A different review of the effects of saffron on sexual function also found that it improved ED.[57]

I recommend adding saffron to your diet, though remember that a little goes a long way—it's very expensive and its flavor can overpower others in dishes. See here for instructions on how to include it in your cooking.

Fenugreek

Fenugreek is a delicious but potent herb. When I mix the fresh or dried herb into a dough to make Indian bread, the aroma can take a week to wear off my hands! However, it might be worth the effort.

In one study, fenugreek was shown to increase testosterone in men.[58] Another double-blind placebo-controlled study confirmed that fenugreek boosts libido in men, with improvements in arousal and orgasm.[59]

A study in men found that taking 600 mg of fenugreek extract per day led to significant improvement in sexual desire and arousal.[60]

Fenugreek has a deep flavor that you might recognize from the butter chicken you can order at an Indian restaurant. The seeds can be crushed, boiled in hot water, and consumed as a flavorful tea with a drop of honey. Fenugreek extract is available as a supplement, but as always I recommend getting it from food instead. Fresh or dried fenugreek leaves can be used to make delicious Indian breads called *methi tepla*, which you can also buy in specialty stores.

Apples

In 2014, a urology research team enrolled 731 women in a study to see if eating an apple a day affected the sex lives of healthy, young, sexually active Italian women.[61] Around half of the women reported regular daily apple intake while the other half did not consume apples regularly. The study determined that women in the apple group had significantly better overall sexual function and lubrication scores than those who didn't eat apples.

Apples are easy to include in your diet, and in addition to improving your libido, they are rich in vitamin C and potassium and have antioxidant and anti-inflammatory properties.

Pomegranate Juice

In one study, pomegranate juice increased sperm quality in rats.[62] In other studies, in men and women, pomegranate juice enhanced testosterone levels by 24 percent.[63]

Rich in polyphenols, pomegranate juice is an effective antioxidant, so it's a great addition to your diet. I always suggest making your own juice from pomegranate seeds, as commercial juices have extremely high sugar content.

Chili Peppers

We saw how chili peppers and their capsaicin can energize you. There is

also a long history of belief in capsaicin as a libido enhancer.[64]

In 2015, Laurent Bègue and his colleagues studied 114 males between the ages of eighteen and forty-four years old to see if there was a correlation between eating spicy foods and testosterone levels.[65] The researchers found that the greater the quantity of hot sauce used, the higher the salivary testosterone of the subject. This study suggests a correlation between preference for spicy food and testosterone levels.

Remember, capsaicin only comes from chili peppers, not from other spicy foods like black pepper or horseradish. To add it to your diet, use red pepper flakes, powdered cayenne pepper, or fresh jalapeño or serrano peppers in your cooking.

Onions

There are promising signs that onions may have beneficial effects on testosterone; they may increase certain key hormones and reduce the formation of free radicals. Onions also increase nitric oxide production in cells found in the testicle, which dilates blood vessels and improves ED. Onions lower blood sugar too, which has a positive effect on the production of testosterone.

In 2019, Saleem Ali Banihani conducted a review of all studies on onions and their effects on testosterone.[66] His review confirmed these factors, but most of the studies were done in animals. Only one human study demonstrated that onions increase testosterone, and none have looked at libido in detail.[67] Still, there are certainly indications that onions are good for libido, and, as we've learned in earlier chapters, they are a great prebiotic too.

Avocados

The Aztecs named the avocado tree *ahuacatl*, meaning "testicle tree," because the fruit hung in pairs like male testicles. There may be more to this comparison than meets the eye.[68]

Avocados are one of the richest dietary sources of the element boron, which is vital for the production of sex hormones. Boron has been shown to increase levels of both testosterone and estradiol in postmenopausal

women. In healthy men, it appears that boron helps to make testosterone more available and useful to the body, which can be especially beneficial in older men.[69]

However, in boron-supplementation studies, it appears the effective dose of boron for a testosterone boost is 10 mg/day. One cup of avocado contains only about 1.67 mg of boron, so you'd need around 6 cups of avocado to get up to that level—in other words, too much. There have been studies that demonstrate that 3 mg/day of boron can boost testosterone levels; that's about 2 cups of avocado. Even for a healthy fat, that's a bit too much on a daily basis, but it's still worth eating avocado in smaller amounts.[70]

Ayurvedic Libido Enhancers

In addition to readily available foods, many traditional herbs and supplements have been thought to enhance libido. While different cultures have their own systems, I will focus on the Ayurvedic tradition.

Ayurveda, a health system that originated in India, uses plants in complex ways.[71] It is one of the most ancient health traditions, but it has many practitioners even today. Ayurveda has numerous approaches to sexual dysfunction. There are more than eighty-two herbs that have been discussed in scientific journals and, under the supervision of Ayurvedic practitioners, popularly used to improve various types of sexual dysfunction.[72]

If you're struggling with libido and aren't satisfied with treatments offered by Western medicine or dietary changes, it's worth learning more about Ayurveda. If you're interested in more information and resources to find a qualified Ayurvedic practitioner, check out the website of the National Ayurvedic Medical Association, which represents Ayurvedic practice in the United States.[73]

JACK'S PRO-LIBIDO DAY

To give you an idea of how I might approach helping a patient with libido issues, consider Jack, a thirty-five-year-old married gay man who felt he'd lost his sex drive. While it was difficult to integrate 5 cups of avocado with fenugreek into his day, I helped him develop a menu that would lead to him

getting his groove back.

Since he was stressed out during the week, he generally didn't want to have sex. Over the weekend, he and his husband wanted to be more intimate sexually, so that was a good place to start. I joked that we could maybe start with a meal plan for "Sexy Saturdays," and he liked the idea. We planned a menu for the day so they would be ready to cozy up in the evening.

For breakfast, the choice was avocado toast on healthy whole grain bread, along with coffee and a glass of fresh-squeezed pomegranate juice—cleaning and juicing fresh pomegranates is a fun and sensual activity itself.

Jack made a delicious salad for lunch with romaine lettuce and diced chicken breast. The chicken was made with a cayenne-based rub, which brought a dose of capsaicin to the table. The salad included apples and walnuts.

At dinnertime, he poured on the love with a dish of San Franciscan Seafood Stew (here) spiked with chili so that the broth was spicy and delicious. He also made a risotto with cauliflower rice. Dinner was paired with an expertly chosen red wine.

For dessert, he dumped the cake and ice cream and went for dark-chocolate-covered strawberries (here)—dark chocolate for the oxytocin boost, and even though strawberries aren't necessarily aphrodisiacs, there's nothing wrong with sticking to the classics.

While you don't need to plan out an elaborate day of libido-enhancing foods every time you want to have sex, I hope this shows that integrating brain-healthy foods into your diet can be fun and physiologically helpful all at the same time. Jack told me that after dinner, he and his husband were ready for the main event, and in the weeks and months afterward he found his libido hit a new groove with the right blend of good attitude and good food.

LIBIDO CHEAT SHEET

Foods to Embrace:

- Foods that boost oxytocin: Dark chocolate, magnesium, and essential amino acids (found in meat, grains, milk, dairy, and, to a lesser degree, vegetables and eggs).
- Coffee: Keep total caffeine consumption under 400 mg/day.
- Red wine: No more than 1 glass/day.
- Nuts: Pistachios, almonds, and walnuts.
- Apples.
- Pomegranate juice.
- Onions.
- Avocados.
- Herbs and spices: Saffron, fenugreek.

Foods and Compounds to Avoid:

- The components of the Western diet: Foods high in bad fats (red meat, fried foods) and high-glycemic-index carbs (white bread, white rice, potatoes, pasta, and anything else made from refined flour).
- Soy protein: For men suffering from low libido, it’s worth cutting down on tofu and soy proteins such as those found in vegetarian and vegan imitation-meat products.
- Alcohol: For men, stay under 14 drinks per week and have no more than 4 drinks in any single day. For women, stay under 7 drinks per week and have no more than 3 drinks in any single day.
- Sugar: Baked goods, candy, soda, or anything sweetened with sugar or high-fructose corn syrup.
- Licorice: Avoid candies and other products that contain licorice extract.

- PFOA: Beware of nonstick cookware and food packaging that contains PFOA. Use stainless-steel or cast-iron cookware, eat PFOA-free microwave popcorn, and use unbleached paper snack bags.

CHAPTER ELEVEN

Cooking and Eating for Your Brain

These days, most of my patients come to me expecting food advice. Either they've heard of my clinic and my practice in nutritional psychiatry somewhere out in the world, or they've been referred specifically to me by a colleague who knows the work I do. That wasn't always the case, though. Although I have always been fascinated by the intersection of food and mental health, as you know, nutritional psychiatry is a nascent field, and it wasn't all that long ago that patients who came to see me for problems with their minds were probably confused that I kept talking about their stomachs. When working with those patients, I quickly became aware of how little experience many people have with food prep. I'm not judging—after all, you'll recall that I barely cooked myself until I was an adult living out on my own, and I'm sure my culinary school instructors were similarly struck by me when I showed up barely knowing my mise en place from my miso soup.

In fact, I came to enjoy walking those patients through the baby steps of how to think about ingredients, orient themselves in a kitchen, and dip a toe into the not-so-choppy waters of feeding themselves. Though patients now tend to be at least a bit savvier—which may be a reflection of the population at large in our food-obsessed internet age—I still find that many of them benefit from basic instruction in not only what to eat but how to prepare it.

In this chapter, I want to give you similar basic information about how to grocery shop and set up your kitchen, along with recipes that are good jumping-off points for you to integrate into your routine during your

journey toward eating for a healthy brain.

STOCKING YOUR PANTRY WITH BRAIN FOODS

When it comes to grocery shopping, at least one old cliché is true: don't shop when you are hungry. That's never a recipe for being mindful about your choices and is more likely to find you buying unhealthy comfort food rather than whole, nutritious, satisfying foods.

As for what to buy, I'm sure you already have a fairly solid idea of that from the foods we've talked about in these pages. As a bit of a refresher, I've put my central recommendations into the acronym BRAIN FOODS:

B: Berries and beans

R: Rainbow colors of fruits and vegetables

A: Antioxidants

I: Include lean proteins and plant-based proteins

N: Nuts (almonds, walnuts, Brazil nuts, and cashews)

F: Fiber-rich foods, fish, and fermented foods

O: Oils

O: Omega-3-rich foods

D: Dairy (yogurt and kefir, certain cheeses)

S: Spices

Berries and Beans

- Blueberries, blackberries, raspberries, and strawberries all make great additions to your day and double as a dessert.

- Eat berries that are in season. When you buy fresh berries, make sure to eat them soon—good ripe ones won't last long, even in the fridge. At times of the year when fresh, ripe berries aren't available, frozen berries are fine to use as long as you make sure they do not have added sugar or other additives.
- Beans, legumes, and lentils are important staples for your brain.
- A healthy source of nutrients, vitamins, and fiber, beans, legumes, and lentils are easy to prepare and can be a main course or an appetizer, can be added to a salad, or can even be made into a dessert.

Rainbow Colors of Fruits and Vegetables

- I always encourage my patients to eat as many different colorful vegetables as possible. From red cabbage to radicchio to green and yellow bell peppers, expand your palate and maximize the range of nutrients that are beneficial to your brain. This is particularly true of micronutrients, like vitamins, polyphenols, phytonutrients, and flavonoids.
- The same applies to fruits! Berries, apples, and citrus all come in a wide variety of colors. Just be careful not to overdo it with sweet fruits like grapes and cherries.
- Even though I want you to chase color, don't forget the most important color: green. Though eating a broad range of colors is great, you have to make sure you're getting enough dark, leafy greens. My favorites are arugula, romaine, Bibb lettuce, endive, and bok choy. I also love to add microgreens when I can find them; they add a flavorful nutrient-dense punch to my meals.

Antioxidants

- We've covered many kinds of antioxidants throughout the book, including berries and the polyphenols in colorful vegetables we've just discussed.

- Dark chocolate is a great source of antioxidants, as long as you stick to the dark stuff and make sure that it doesn't include too much sugar. While cocoa and chocolate are delicious—and as a chef I was trained to use Dutch-process (alkalized) for flavor—as a nutritional psychiatrist I know that natural or non-alkalized is best for the highest antioxidant levels, and that's what I've specified in the recipes in this chapter.
- Many vitamins are crucial antioxidants. You can get vitamins from a broad range of dietary sources. This is one of the most important reasons to eat a diverse diet. But get a recommendation for a multivitamin supplement from your doctor; this is a great way to make sure you're not missing anything.

Include Lean Proteins and Plant-Based Proteins

- Well-sourced lean poultry, seafood, and occasional grass-fed beef are good choices to ensure you are getting plenty of protein and the essential amino acids that your brain needs to function.
- For plant-based sources of protein, organic tofu and tempeh can be enhanced with spices for flavor.

Nuts

- Nuts have healthy fats and oils that our brains need to function well, along with vitamins and minerals, for example, selenium in Brazil nuts.
- Eat ¼ cup a day (not more—it's easy to overdo it with nuts!) as a snack or added to your salad or vegetable side dish. Nuts can even be combined into a homemade granola or trail mix that contains much less sugar and salt than store-bought versions.

Fiber-Rich Foods, Fish, and Fermented Foods

- Beans, legumes, lentils, fruit, and vegetables are great sources of fiber. Fiber is important as a prebiotic, can help keep your weight down, and decreases inflammation in the entire body.
- As we discussed earlier, in chapter 2, fish such as salmon add healthy omega-3s to your nutrition plan.
- Fermented foods like kefir, miso, and kimchee are great for your brain and gut since they're a natural source of active-culture bacteria.

Oils

- While you want to avoid an excess of saturated fats and other unhealthy oils like the omega-6 oils used for frying, you want to ensure you're getting enough healthy fats from sources like olive oil, avocados, and oily fish.
- Even with healthy fats, be aware of portion size and try not to eat too much. All fats are calorie dense.

Omega-3-Rich Foods

- We've talked about omega-3s at length throughout the book, so you know well by now to ensure you're getting plenty of them. The most important source of omega-3s (especially docosahexaenoic acid and eicosapentaenoic acid) is oily fish, like salmon, mackerel, and tuna.
- Omega-3s (largely alpha-linolenic acid) can also be found in plant-based sources—chia seeds, Brussels sprouts, walnuts, and flaxseeds to name a few.

Dairy (Yogurt and Kefir, Certain Cheeses)

- Yogurts and kefir with probiotic cultures are great for your gut, providing you with helpful bacteria and protein.
- Grass-fed dairy products are better options for you and your brain.

- Remember that certain conditions, like ADHD, can be aggravated by dairy, so be aware of its negative effects.

Spices

- Spices are a no-calorie, guilt-free way to boost flavor in all your food while adding beneficial brain effects as well.
- In particular, spices like turmeric, black pepper, saffron, red pepper flakes, oregano, and rosemary should be part of your brain armor.

Beyond sticking to these foods, the rules thin out a bit, but there are still useful guidelines. The most important is that you never be afraid to push yourself. I have had many patients with fairly narrow diets, out of either comfort or convenience, who learned they had been missing broad swaths of nutrients and eating pleasures once I gave them a prescription to branch out. If you see new and interesting vegetables and fruits at the grocery store that you've never tried, don't be afraid to buy them. Commit yourself to making sure they don't turn moldy, forgotten in a crisper drawer, and search through recipes in cookbooks and on the internet to find a way to integrate them into your diet, even if just once. As long as you stick to the principles of healthy eating we've been discussing throughout the book, you really can't go wrong, and you may end up discovering a new favorite food!

SET UP YOUR KITCHEN LIKE A CHEF!

Just as your brain and gut need certain nutritional building blocks in order to operate at peak efficiency, your kitchen also needs certain equipment before you can cook a great meal. You don't need a whole lot of fancy equipment—no need for single-use tools like avocado cutters or mango pitters—but you do need some decent-quality basics. Here is a quick list of the tools you'll want to have before tackling the recipes that follow.

Large knife and small utility knife

The large knife should be a chef-style knife that you feel comfortable

using. The smaller knife is for smaller jobs in the kitchen. Once you find knives you're comfortable with, make sure to keep them sharp. A sharp knife is less likely to slip and cut you.

Knife sharpener

I prefer the countertop sharpeners, where you just guide the blade through a slot, rather than the large handheld sharpening steel used in professional kitchens.

Vegetable peeler

I use a vegetable peeler both to remove the skins from vegetables and to create easy ribbons for salads. Try this on an English cucumber, zucchini, or carrot—it adds a colorful, phytonutrient-packed element to any salad or vegetable side dish.

Chopping board

You'll need a chopping board, either wood or synthetic. The board can be used for all your prep. Start with vegetables on one side, then flip it for your meat prep. Be sure to keep it clean and sanitized.

Instant-read thermometer

In the recipes, I will refer many times to the internal temperature of cooked food, especially meat. Eyeballing the doneness of your meat can easily lead to it being undercooked and dangerous, or overcooked and dry. With the ease and accuracy of modern instant-read digital thermometers, there's no reason to guess!

Lemon or lime zester

An easy, inexpensive way to add the vibrant bold flavors of citrus rind from lemons, limes, oranges, and clementines to salads, side dishes, and even baking.

Measuring cups

These are used for measuring dry ingredients and are helpful to measure out portions for meal planning.

Measuring pitcher and measuring spoons

The measuring pitcher is for liquids and the measuring spoons are useful in both cooking and baking.

Medium and large stainless-steel or glass bowls

Having plenty of bowls in a range of sizes allows you to be flexible and efficient during food prep.

Mini mise set

This mini prep bowl set helps to organize and set up your ingredients—see more about the importance of mise en place in the next section.

Kitchen towels and paper towels

These are useful for drying dishes and for drying vegetables or fruit after washing. Moisture can breed bacteria, so keeping your workspace and equipment dry is key to a clean kitchen.

Sanitizer spray

I use cleaning and home-care products for my kitchen that get an A rating on the Environmental Working Group testing scale (https://www.ewg.org/guides/cleaners).

Mason jars

These are handy for mixing salad dressings, storing foods, and building salads for meals or snacks.

Half sheet pan/baking pan and glass casserole dish for oven-baked dishes

I love oven-baked meals because they are easy and delicious. A simple aluminum sheet pan is an inexpensive workhorse in the kitchen. No need for nonstick coatings. For recipes that need a higher-walled vessel, use a glass casserole dish.

Parchment paper

Parchment paper makes baking on a sheet pan very easy, as it provides a nonstick surface and allows for browning. It also makes cleanup much easier, since you can throw out the parchment paper and the sheet pan won't require scrubbing.

Stainless-steel pots and pans

If you have not invested in a set of pots and pans, I'd recommend looking at a good-quality stainless-steel set at your local kitchen store. If a whole set is too pricey, the most important components are a large stock pot, a medium-size saucepan, and a 10-to 12-inch sauté pan.

Cast-iron skillet

Cast iron is cheaper than stainless steel, and often its heat retention and superior browning make it the right choice whether on the stovetop or in the oven. I recommend a 10-to 12-inch skillet. A cast-iron skillet can last a lifetime as long as it's properly cleaned and seasoned. You can find instructions for proper cast-iron care online.

Dutch oven

A Dutch oven is a large cast-iron pot with a tight-fitting lid used for soups and stews. Dutch ovens are often enameled (like the classic Dutch ovens from French brand Le Creuset).

Food processor

Food processors take a lot of the labor out of mixing, chopping, and blending food. An 11-cup food processor is a good basic size for any kitchen. Mini food processors (sometimes called mini food choppers) are best for chopping small herbs or pulverizing foods like garlic or ginger.

Blender

Blenders are similar to food processors but are intended to blend liquids rather than solid foods. They are perfect for pureeing wet ingredients or making smoothies.

Immersion blender

An immersion blender is a handheld blender that allows you to blend food in the pot you're cooking in—much more convenient than pouring everything into the bowl of a traditional blender. They're great for smoothing out soups or giving lentils a more even consistency.

Ice-pop molds

Ice pops are a great way to make your own healthy frozen treats for dessert. I prefer stainless-steel molds, which are usually dishwasher safe, making cleanup easier.

Salad spinner

This is a very useful item if you eat lots of leafy greens (as you should!), because you can wash your greens properly without worrying about waiting for them to dry. It's helpful to prepare a large quantity of lettuce, spinach, or kale for a few days at a time, and store the extra in a tightly sealed container.

Mise en Place

Mise en place is a French culinary term that means “everything in its place.” When you are organized in the kitchen, it will make your tasks easy and quick. The basic idea is to get all your ingredients ready to go, measured out, and accessible before you start cooking. If you’ve ever watched cooking shows, you’ve probably seen the chefs with their ingredients already parceled out into small bowls, ready to be added to the dish. That’s not just for TV! I encourage you to use this same principle.

In addition to small prep bowls with ingredients and spices, it’s also useful to have two larger bowls for scraps—one for meat scraps, which you can freeze and use later for making stock, and one for vegetable scraps to compost.

Remember Food-Safety Principles!

While your kitchen won’t be receiving a letter grade judging its cleanliness, that doesn’t mean that food safety is any less important at home than in a restaurant. Make sure to follow these simple guidelines:

1. Wash your hands.
2. Wear an apron (or a chef’s coat!).
3. Secure your hair, and remove your rings and jewelry.
4. If you are wearing nail polish, make sure flecks of polish are not falling into your food.
5. Use a tasting spoon and wash between uses if needed.
6. Use your thermometer to check the temperature of your proteins.
7. Keep your prep area clean.
8. Change, flip, or wash your cutting board when working with proteins and vegetables.
9. Do not thaw proteins on your countertop overnight—always leave

them in the fridge.

10. Always store poultry on the bottom shelf of your fridge, making sure it does not drip onto other foods or surfaces in your fridge.

11. If family members or friends are in the kitchen with you, respect the kitchen space and be careful when opening the oven or carrying a hot dish. If you absolutely have to walk with a knife, always point it down. You will hear chefs on TV cooking competitions yell “behind” when walking behind another chef for this reason.

Respect All Ingredients

In addition to all the practical considerations, it’s important to be in the right mental space for cooking. Eating is a basic human drive and the food you prepare will nourish you and your loved ones.

- Avoid waste; use all parts of the fruit, vegetable, or protein that are food safe. If you can’t use all the food for the recipe you are currently making, save it for later, whether that means simply putting it in the fridge or making a stock from it that you can freeze and use in further recipes.
- Be respectful of your ingredient, whether it is a white truffle, a chicken breast, or a simple piece of lettuce.
- Be grateful and mindful of the moment when you handle your ingredients and combine them into a meal. Cooking and eating are a privilege.

Cleanup Practices

Finally, though I know it’s not the most thrilling aspect of cooking, it’s extremely important to keep a tidy workspace in the kitchen, not just for sanitary reasons, but so that you can be productive and stay motivated to cook. Clean up between steps of a recipe to ease the burden after dinner. And make sure that you do a good job of that post-meal cleanup—if you

wake up to a messy kitchen, you'll be much less likely to feel motivated to make yourself a healthy breakfast.

Menus

Now that we've covered the basics for selecting ingredients and setting up your kitchen, it's time to explore what a full brain-healthy menu might look like. For each condition we've covered in the book, I'm going to give you a sample menu that includes all three major meals and snacks in between.

While these menus are geared toward an individual condition, bear in mind that there is enough overlap between the different eating patterns we've examined that all recipes are worth considering for general brain health—as long as you eat in an overall healthy way, you don't need to prioritize any single ingredient at every single meal.

My hope is that through reading these sample menus and trying some of the recipes, you will feel more comfortable in the kitchen, making your own food and relying less on store-bought ready-made or processed foods. Just this in itself is almost guaranteed to lead to a healthier lifestyle; the National Health and Nutrition Examination Survey, the most important research study about home cooking, showed that consumers who eat home-cooked meals also eat fewer calories.

There are times when it's okay to cut corners, though: when a recipe calls for vegetables like artichokes or cauliflower, it's okay to use a healthy frozen version with no added salt or sauce. Since foods are flash-frozen in the United States, frozen fruits and vegetables are healthy alternatives to fresh. For frozen fruit, always check that there's no added syrup or sugar. Of course, if you have the time and kitchen skills, working with fresh vegetables can be even more delicious and rewarding, so don't hold back!

Similarly, while it's great to make your own stock as we discussed earlier, it's not strictly necessary. Store-bought stock will work just fine, but make sure you are using an organic, low-sodium version. That way you can add the salt needed according to your taste.

Without further ado, on to the recipes!

RECIPES

Menu to Help Depression

Breakfast: Mung Bean Tofu Scramble

Snack: 1 tablespoon extra-dark chocolate chips

Lunch: Hearty Vegetable Soup

Snack: Spiced Nut Mix

Dinner: Baked Salmon with Walnut Kale Pesto

Dessert: A fresh orange and a glass of red wine

Mung Bean Tofu Scramble

Servings: 4
Prep Time: 10 minutes
Cooking Time: 10 minutes

(vegetarian/vegan/gluten-free/dairy-free)

Sprouted mung beans are a great way to add vitamin B_{12} and folate to your diet. Garlic, onions, and asparagus are rich in prebiotics. The turmeric brings all the beneficial effects of curcumin and gives the tofu a vibrant yellow color to make it look like scrambled eggs. Citrus fruit adds vitamin C easily to your meal.

1 (14-ounce) block organic soft tofu

1 tablespoon canola oil

¼ medium onion, finely diced

½ clove garlic, finely chopped

2 stalks asparagus, cleaned, peeled, and cut into 1-inch pieces

1 teaspoon ground turmeric

1½ teaspoons kosher salt

¼ teaspoon black pepper

1 (12-ounce) bag mung bean sprouts

Juice of ½ lemon

Roughly chop the block of tofu and then pulse to a chunky size in a food processor. (Use the pulse mode so that you do not turn the tofu into a liquid.) Heat the canola oil in a cast-iron skillet over medium heat. Add the onion, garlic, asparagus, turmeric, salt, and pepper and sauté for 2–3 minutes. Add the tofu and sprouted mung beans and sauté for 3–5 minutes, until the tofu begins to look like scrambled eggs. Add a squeeze of fresh lemon before serving.

Hearty Vegetable Soup

Servings: 4

Prep Time: 15 minutes

Cooking Time: 30 minutes

(vegetarian/vegan/gluten-free/dairy-free)

This soup has peas for magnesium, broccoli for iron, and sweet potatoes for vitamin A. It is low in saturated fat and high in fiber and antioxidants.

2 tablespoons olive oil

1 leek, sliced

1 clove garlic, finely chopped

1 cup fresh or frozen peas

2 cups fresh or frozen broccoli florets

1 sweet potato, unpeeled, cut into ½-inch dice

1 tablespoon kosher salt, plus more if needed

1 teaspoon black pepper, plus more if needed

½ teaspoon dried thyme

½ teaspoon dried parsley

4–6 cups hot vegetable stock or filtered water

Fresh parsley, chopped (optional)

Heat the oil in a cast-iron Dutch oven on medium heat. Add the leek and garlic and sauté for 3–5 minutes, until the leek is soft and almost translucent.

Add the peas, broccoli florets, sweet potato, salt, pepper, thyme, and dried parsley and allow to cook, stirring the mixture once or twice, for 3–5 minutes. Once the vegetables appear partly cooked, add the vegetable stock. Partially cover, and allow the soup to simmer on medium for about 20 minutes.

Season to taste with additional salt and pepper if desired, and garnish with fresh parsley, if desired.

Spiced Nut Mix

Servings: 8

Prep Time: 10 minutes

Cooking Time: 10 minutes

(vegetarian/vegan/gluten-free/dairy-free)

This nut mix includes pumpkin seeds for iron, Brazil nuts for selenium, cayenne pepper, and turmeric.

1 teaspoon ground turmeric

¼ teaspoon black pepper

¼ teaspoon garlic powder

¼ teaspoon cayenne pepper

2 teaspoons kosher salt

1 tablespoon olive oil

1½ cups plain roasted pumpkin seeds

1 cup Brazil nuts

Preheat the oven to 300°F and line a half-sheet baking pan with parchment paper.

Mix the turmeric, black pepper, garlic powder, cayenne pepper, salt, and olive oil in a medium stainless-steel bowl. Toss in the pumpkin seeds and nuts. Spread the seeds and nuts in a single layer on the lined baking pan. Roast for about 10 minutes. Cool and serve. Store in an airtight glass jar at room temperature for up to 2 weeks.

Baked Salmon with Walnut Kale Pesto

Servings: 1 (8 servings of pesto)

Prep Time: 5 minutes

Cooking Time: 15 minutes

(gluten-free)

This is a great way to get omega-3s. It also provides folate from kale and the mood benefits of walnuts.

For the fish:

1 (4–6-ounce) salmon fillet, boneless and skinless

2 tablespoons olive oil

½ teaspoon kosher salt

¼ teaspoon black pepper

For the pesto:

¼ cup olive oil

¼ cup grated Parmesan cheese

1 clove garlic, peeled and microwaved for 30 seconds

2 cups baby kale, washed and chopped

¼ cup walnuts

1 teaspoon lemon juice

½ teaspoon salt

Prepare the fish:

Preheat the oven to 350°F and line a baking sheet with parchment paper. Brush the salmon with the oil and then season with salt and pepper. Place on the baking sheet and bake for 8–12 minutes, or until the salmon is cooked through. A thermometer should read an internal temperature of 145°F.

Prepare the pesto:

Blend the pesto ingredients in a blender or food processor on medium speed. Add cold water to loosen the mixture if needed. Taste for salt, as you may need to add more.

Serve the oven-baked salmon with 1–2 tablespoons of the pesto.

Chef Tips:

- Pesto will last up to a week in the fridge stored in a mason jar.
- Try pesto on a whole wheat pasta salad or a gluten-free buckwheat noodle salad with vegetables.
- Pesto can also be used on oven-baked chicken breast.

Menu to Aid Anxiety

Breakfast: Avocado Hummus

Snack: Green tea

Lunch: Mushroom and Spinach Frittata

Snack: Kimchee with celery sticks

Dinner: Turkey Gumbo with Brown Rice

Dessert: Watermelon and Blueberry Pops

Avocado Hummus

Servings: 6
Prep Time: 10 minutes

(vegetarian, vegan, gluten-free, dairy-free)

Chickpeas are a source of tryptophan, and avocados and olive oil are great sources of healthy fats, including omega-3s (avocados are rich in fiber and various vitamins too). You can eat this tasty spread on a low-GI toast like pumpernickel, or as a dip for fresh-cut vegetables.

½ large ripe avocado, skin and seed removed

2 cups cooked or canned chickpeas

⅓ cup tahini paste

¼ cup fresh lime juice

1 clove garlic

1 teaspoon kosher salt, plus more if needed

¼ teaspoon black pepper

½ teaspoon ground cumin

¼ teaspoon smoked paprika

½ cup fresh cilantro

3 tablespoons olive oil, plus more for drizzling

1 tablespoon sliced, toasted almonds

¼ cup chopped fresh flat-leaf parsley

Using a food processor, combine all the ingredients except the olive oil, almonds, and parsley for about 1 minute.

With the motor running on medium speed, drizzle in the olive oil and continue to process until the hummus is very light and creamy, about 1 more minute. Season with additional salt, if needed.

Transfer the hummus to a shallow bowl.

Top with toasted almonds and chopped parsley and drizzle with additional olive oil.

If you are not eating immediately, cover the hummus with plastic so that the avocado does not turn brown. The hummus can be stored in the fridge for up to 1 day.

Mushroom and Spinach Frittata

Servings: 6

Prep Time: 10 minutes

Cooking Time: 18 minutes

(gluten-free, dairy-free)

This easy-to-make frittata has mushrooms for a vitamin D boost and spinach for magnesium. You could save pieces for lunch for the next 2 days or save for up to 1 month in the freezer.

5 whole eggs

1 cup almond milk

½ teaspoon kosher salt

¼ teaspoon black pepper

1½ teaspoons dried parsley

1 tablespoon olive oil

1 cup spinach (fresh or frozen and thawed)

1 cup mushrooms, chopped

Preheat the oven to 300°F. Line a 9-inch round casserole dish with parchment paper.

In a medium bowl whisk the eggs with the milk, salt, pepper, and parsley and set aside.

Heat the oil in a medium cast-iron pan over medium heat.

If using frozen spinach, wrap in cheesecloth (or a clean dish towel or paper towel) and squeeze to remove the excess water.

Sauté the spinach and mushrooms in the oil until the mushrooms are lightly brown, about 3 minutes. Allow to cool.

Place the cooled mushroom-spinach mixture in the casserole dish. Pour the egg mixture over the vegetables, cover with foil, and bake until the eggs are just set, 15–18 minutes. Ovens vary, so make sure the eggs are set before removing the frittata from the oven. Cut into 6 even pieces and serve.

Turkey Gumbo with Brown Rice

Servings: 4

Prep Time: 20 minutes

Cooking Time: 25 minutes

(gluten-free, dairy-free)

Though we've learned about the difficulty of dietary tryptophan absorption, turkey is still a good source of tryptophan. Instead of a high-GI carb like

mashed potatoes, serve it over lower-GI brown rice to help as much tryptophan as possible reach the brain while not overdoing it with less nutritious calories.

1 tablespoon canola oil

¼ cup chopped leeks

¾ cup diced celery

1 carrot, grated

2 cloves garlic, grated

1 pound ground turkey

1½ teaspoons kosher salt

½ cup trimmed and chopped okra (1-inch pieces)

3 cups low-sodium chicken broth or water

1 teaspoon hot sauce

2 cups cooked brown rice

Heat the oil in a cast-iron Dutch oven over medium-high heat. Add the leeks, celery, carrot, and garlic, and sauté about 6 minutes, or until tender.

Add the turkey and salt and simmer for about 5 minutes, or until the turkey is lightly browned, stirring and chopping up the turkey while cooking. Add the okra. Stir in the broth. Bring to a boil, then reduce the heat and simmer uncovered for about 10 minutes. Add the hot sauce and serve over brown rice.

Watermelon and Blueberry Pops

Servings: 6 to 8 pops

Prep Time: 10 minutes

(vegetarian, gluten-free, dairy-free)

These simple homemade ice pops are soothing because of their cool, lightly sweet taste. Watermelons are rich in antioxidants and vitamins A, B_6, and C. These treats can be made with almond milk for a creamier texture or coconut milk for added flavor.

2 cups seeded, chopped watermelon

1 cup almond or coconut milk (optional)

½ teaspoon fresh lime juice

1 tablespoon lime zest

¼ teaspoon honey

½ cup fresh or frozen blueberries

Puree the watermelon with the milk, if using, in a blender. Stir in the lime juice, lime zest, and honey. Pour into stainless-steel ice-pop molds until each mold is two-thirds full, leaving room for the blueberries. Use 2–3 blueberries per mold.

Seal the molds and freeze for 3 hours or overnight.

Healing Trauma Menu

Breakfast: Chia Pudding Topped with Nuts and Berries

Snack: Sardine Snack

Lunch: Spice-Roasted Chicken Breast; Steamed Broccoli with Lemon

Snack: Celery sticks with almond butter

Dinner: Pepper-Crusted Filet Mignon with Baby Spinach Chimichurri

Dessert: Blueberries with lemon zest, a squeeze of fresh lemon, and chopped hazelnuts

Chia Pudding Topped with Nuts and Berries

Servings: 2

Prep Time: 10 minutes

(vegetarian, gluten-free, dairy-free)

Chia pudding is a great way to start the day and doesn't require any early-morning prep. Since it has to set in the fridge overnight, you can prepare it the night before and then eat on the go.

½ cup organic canned light coconut milk

½ teaspoon honey

½ teaspoon vanilla extract

¼ teaspoon ground cinnamon

2 tablespoons chia seeds

Raspberries, blueberries, walnuts, or other fruit or nut toppings

Pour the coconut milk into a mason jar and stir in the honey, vanilla, and cinnamon. Sprinkle the chia seeds on top.

Screw the lid of the mason jar on and shake well so that the seeds mix with the milk.

Chill overnight in the fridge.

Serve topped with nuts and berries.

Sardine Snack

Servings: 2

Prep Time: 10 minutes

(gluten-free, dairy-free)

Sardines are a great source of nutrients, especially omega-3s. Always buy sardines packed in olive oil and eat no more than half a can for a snack (the rest can be put into a mason jar and eaten the next day).

1 (4-ounce) can sardines packed in olive oil

½ tomato, diced

¼ teaspoon kosher salt

½ teaspoon black pepper

Juice of ½ lemon

1 large romaine lettuce leaf, cut in half

Drain some of the oil from the sardines. In a small bowl, mix the sardines with the tomato, salt, pepper, and lemon juice. Serve in a piece of romaine lettuce, letting the leaf act as an edible serving cup.

Spice-Roasted Chicken Breast

Servings: 2

Prep Time: 5 minutes

Cooking Time: 40 minutes

(gluten-free, dairy-free)

While chicken breast is a healthy lean protein, it can lack flavor, so the addition of spices here benefits both the brain and the flavor. Leftovers can be used to top a healthy green salad.

1 teaspoon cayenne pepper

1 teaspoon ground turmeric

¼ teaspoon ground black pepper

½ teaspoon ground coriander

½ teaspoon ground cumin

1 teaspoon kosher salt

½ teaspoon garlic powder

¼ cup olive oil

2 (6-ounce) boneless, skinless chicken breasts

Combine the spices in a small bowl and add them and the olive oil to a large bowl. Allow the spices to blend into the oil for a few minutes. Apply this marinade to the chicken breasts. You can marinate the chicken for as little as 30 minutes or overnight in the fridge.

When ready to cook, preheat the oven to 400°F and position a rack in the middle of the oven. Line a sheet pan with parchment paper.

Place the chicken breasts on the sheet pan and bake for about 30 minutes, or until the internal temperature at the thickest part of the breast reads 165–170°F.

Rest the roasted chicken for 10 minutes before serving.

Steamed Broccoli with Lemon

Servings: 2

Prep Time: 2 minutes

Cooking Time: 5–8 minutes

(vegetarian, vegan, gluten-free, dairy-free)

Whether using fresh or frozen broccoli florets, this is an extremely easy, no-fuss way to make a great vegetable side. You can use the same recipe for green beans, cauliflower florets, sugar snap peas, carrots, asparagus, and green peas.

2 cups fresh or frozen broccoli florets

1 lemon

½–1 teaspoon kosher salt

Place the broccoli in a glass baking dish, adding a few tablespoons of water. Steam uncovered in the microwave for up to 4 minutes. The broccoli should be cooked through with no cold or frozen bits. Drain any excess water.

Grate lemon zest over the broccoli and add a squeeze of fresh lemon juice. Season with salt before serving.

Pepper-Crusted Filet Mignon with Baby Spinach Chimichurri

Servings: 1 (6 servings of sauce)

Prep Time: 20 minutes

Cooking Time: 40 minutes

(gluten-free, dairy-free)

Since you shouldn't eat too much beef, a filet is a great way to get the maximum deliciousness in a small cut. Searing first and then finishing in the oven allows you to get a browned exterior with a smooth, evenly colored interior. Serve this steak with a simple salad of leafy greens for a dinner worthy of a special celebration.

For the steak:

1 (6-ounce, 2-inch-thick) filet mignon steak

1 teaspoon kosher salt

1 teaspoon black pepper

1 tablespoon canola oil

For the sauce:

1 cup fresh flat-leaf parsley

1 cup tightly packed fresh baby spinach

½ cup fresh oregano

2 cloves garlic

Zest of 1 lime

1 tablespoon fresh lime juice

1 tablespoon white wine vinegar

½ cup olive oil

¾ teaspoon kosher salt, plus more as needed

¼ teaspoon black pepper, plus more as needed

Prepare the steak:

Allow the steak to come to room temperature, covered, for 30 minutes. Add the salt and pepper to all sides. Preheat the oven to 425°F.

Heat the oil in a medium cast-iron skillet over medium heat. Place the steak in the hot pan, searing for about 2 minutes per side.

Put the pan in the oven. For medium-rare, roast for about 7 minutes, until the internal temperature reaches 135°F. For medium, roast for about 10 minutes, until the internal temperature reaches 145°F.

Prepare the sauce:

Add the parsley, spinach, oregano, garlic, lime zest, lime juice, and vinegar to a blender. Blend on low to medium until you have chunky consistency. Drizzle in the olive oil and blend on medium speed. Season with salt and pepper, adding more if desired.

Once the steak has reached the desired temperature, remove from the oven and rest for 10–15 minutes. Top with 2 tablespoons of the sauce and serve.

Chef Tips:

- The chimichurri sauce will last for at least a week in the fridge if stored in a sealed glass jar.
- Use the chimichurri sauce over grilled chicken or a pork chop.
- The sauce can also be added to oven-roasted vegetables.

Focus Menu

Breakfast: Chocolate Protein Smoothie

Snack: Small piece of extra-dark chocolate

Lunch: Creamy Artichoke and Leek Soup

Snack: ¼ cup blueberries with 1 tablespoon cashew nut butter

Dinner: Oven-Roasted Chicken Drumsticks; Mushroom Salad

Chocolate Protein Smoothie

Servings: 1
Prep Time: 10 minutes

(vegetarian, gluten-free)

In chapter 5, we talked about a study that tested a specially formulated breakfast bar that aimed to improve the symptoms of ADHD. Here, I've adapted that formula into a delicious smoothie, providing many of the same benefits.

1 cup unsweetened almond milk

1 tablespoon walnuts

1 scoop vanilla whey protein

1 tablespoon ground flaxseeds

1 teaspoon organic ground instant coffee powder

1 teaspoon natural (non-alkalized) cocoa powder

1 tablespoon coconut flakes

½ teaspoon honey

¼ ripe avocado

Place the ingredients in a blender with ¼ cup of ice cubes, and blend. Add more water or ice if the smoothie is too thick for your liking. Sip and enjoy!

Creamy Artichoke and Leek Soup

Servings: 4

Prep Time: 10 minutes

Cooking Time: 20 minutes

(vegetarian, vegan, gluten-free, dairy-free)

This gluten-free, dairy-free soup is naturally rich in healthy fiber and prebiotics from the leeks. The addition of a nut milk makes it creamy, but much healthier than using heavy cream.

1 tablespoon olive oil

½ cup chopped leeks

1½ teaspoons kosher salt, plus more if needed

½ teaspoon black pepper, plus more if needed

1 tablespoon sweet paprika

1 teaspoon garlic powder

½ teaspoon fresh thyme

½ teaspoon fresh chopped parsley

1½ cups frozen artichoke hearts

2 cups low-sodium vegetable stock

2 cups almond or cashew milk

Juice of ½ lemon

1 tablespoon chopped fresh flat-leaf parsley

1 tablespoon toasted pumpkin seeds

Heat the oil in a large stainless-steel pot over medium heat, and sauté the leeks with the salt, pepper, paprika, garlic powder, thyme, and fresh chopped parsley for about 5 minutes, or until the leeks are soft. Add the artichoke hearts and allow them to soften for another 3 minutes.

Add the stock and cover, bringing to a boil over medium heat. Add the almond milk and reduce the heat. Simmer, uncovered, until the artichokes are tender, about 10 minutes.

Allow the soup to cool for a few minutes. Using an immersion blender, puree the soup to a smooth texture (you can also leave it chunky if you prefer).

Season to taste with additional salt and pepper, if needed. Stir in the lemon juice and serve hot, garnished with flat-leaf parsley and toasted pumpkin seeds.

Oven-Roasted Chicken Drumsticks

Servings: 1

Prep Time: 10 minutes

Cooking Time: 40 minutes

(gluten-free, dairy-free)

This is a time-saving sheet-pan meal that can easily be scaled up for more people—just add drumsticks and balance the spice blend accordingly.

1 tablespoon olive oil

1 tablespoon sweet paprika

½ teaspoon ground turmeric

¼ teaspoon black pepper

½ teaspoon kosher salt

2 skinless chicken drumsticks

Preheat the oven to 400°F. Line a sheet pan with parchment paper.

In a medium bowl, mix together the olive oil, paprika, turmeric, pepper, and salt. Coat the chicken with the marinade. With clean hands, massage the marinade into the drumsticks.

Transfer the chicken to the sheet pan and bake for 30 minutes, or until the internal temperature reaches 165°F. The chicken should not have any pink color when you cut into it. If it does, return it to oven for at least another 10 minutes and recheck the temperature. Allow the chicken to rest for 10 minutes on the sheet pan before serving.

Mushroom Salad

Servings: 4

Prep Time: 15 minutes

Cooking Time: 5 minutes

(vegetarian, gluten-free, dairy-free)

In recipes that include soy sauce you can omit the salt if you desire. Mushrooms sometimes need more seasoning, so if they need a pinch of salt later, you can sprinkle some on at the end.

1 tablespoon sesame seeds (optional)

1 tablespoon plus 1½ teaspoons rice wine vinegar

1½ teaspoons almond butter

¼ teaspoon ground ginger

Pinch of crushed red pepper

¼ teaspoon garlic powder

¼ teaspoon honey

¾ teaspoon gluten-free soy sauce

¾ teaspoon sesame oil

2 cups white button mushrooms, cut into bite-size pieces

Toast the sesame seeds, if using, in a medium sauté pan over low heat until lightly browned. Set the toasted seeds aside in glass bowl to cool.

Using the same pan, whisk together the vinegar, almond butter, ginger, red pepper, garlic powder, honey, and soy sauce over medium-high heat. Stir until warmed through. Stir in the sesame oil. Pour the warm dressing over the cut mushrooms in a medium bowl and stir to combine. Sprinkle on the toasted sesame seeds. Allow to cool and serve.

Memory-Boosting Menu

Breakfast: Cup of coffee; 1 cup gluten-free oatmeal with cinnamon and ½ cup chopped fresh strawberries

Snack: 1 chopped hard-boiled egg seasoned with salt and black pepper and served with 5 medium-size whole-grain crackers

Lunch: Cauliflower and Chickpea Stir-Fry served with microgreens

Snack: Steamed edamame with flaked sea salt

Dinner: Southern French–Style Scallops; Turmeric-Infused Cauliflower Rice

Dessert: Cinnamon–Black Pepper Hot Chocolate

Cauliflower and Chickpea Stir-Fry

Servings: 8
Prep Time: 10 minutes
Cooking Time: 10 minutes

(vegetarian, vegan, gluten-free, dairy-free)

This simple stir-fry follows the principles of the MIND diet.

2 tablespoons olive oil
1 teaspoon cayenne pepper
1 teaspoon ground coriander
1 teaspoon ground turmeric
¼ teaspoon black pepper
4 cups frozen cauliflower florets
2 cups cooked chickpeas
1½ teaspoons kosher salt, plus more if needed
1 tablespoon fresh lemon juice
1 tablespoon chopped fresh cilantro (optional)
½ cup microgreens (e.g., pea shoots or radish sprouts)

Heat the oil in a medium cast-iron pan over medium heat. Add the cayenne pepper, coriander, turmeric, and black pepper to the hot oil and let them infuse for a few seconds. Add the cauliflower and chickpeas and stir to combine with the spices. Sauté for about 1 minute and cover to cook for 3 more minutes. If the vegetables are sticking to the pan, add ¼ cup water. Season with salt, adding more

if desired. Add lemon juice and a garnish of chopped cilantro, if desired. Sprinkle microgreens on top and serve hot.

Chef Tips:

- This dish can also be served cold as a salad.
- Organic canned chickpeas, rinsed and drained, can be used.

Southern French–Style Scallops

Servings: 6

Prep Time: 10 minutes

Cooking Time: 15 minutes

(gluten-free, dairy-free)

Scallops are delicious and easy to cook. They are a great way to impress friends with your chef skills. This gluten-free recipe highlights the memory-boosting benefits of rosemary and omega-3s.

1 pound bay scallops (or sea scallops, halved horizontally)

1½ teaspoons kosher salt, plus more if desired

1 teaspoon black pepper, plus more if desired

2 tablespoons organic gluten-free flour

2 tablespoons olive oil

2 medium shallots, finely diced

1 clove garlic, finely chopped

1½ teaspoons fresh rosemary (or ¾ teaspoon dried)

2 tablespoons chopped fresh flat-leaf parsley

⅓ cup white wine

1 lemon

Sprinkle the scallops with salt and pepper and then toss them in the flour, shaking off the excess. Heat the olive oil in a large stainless-steel sauté pan on high heat. Add the scallops in a single layer. Lower the heat to medium and allow the scallops to brown lightly on one side. They will release from the pan when ready; turn them over and let them brown lightly on the other side. The scallops should cook for about 4 minutes in total. Remove the scallops and set aside in a medium bowl.

Add the shallots, garlic, rosemary, and 1 tablespoon of the parsley to the pan and sauté for a few minutes. Return the scallops to the pan and add the wine and cook for 1 minute. Zest the lemon over the scallops and sprinkle on the remaining 1 tablespoon parsley. Season with additional salt and black pepper. Serve hot with a squeeze of lemon juice.

Turmeric-Infused Cauliflower Rice

Servings: 4

Prep Time: 10 minutes

Cooking Time: 5–8 minutes

(vegetarian, vegan, gluten-free, dairy-free)

Cauliflower rice is a great way to enjoy the texture of rice without the high glycemic load by providing a serving of vegetables as well as the fiber and nutrients from cauliflower.

1 tablespoon olive oil

2 cups frozen plain cauliflower rice (see Chef Tips for details on ricing fresh cauliflower)

1 tablespoon kosher salt

1 teaspoon ground turmeric

½ teaspoon black pepper

1 teaspoon garlic powder

Zest of 1 lemon

Heat the oil in a medium cast-iron pan over medium heat. Add the rest of the ingredients except the lemon zest to the pan and stir to combine. Cook for 5–8 minutes, until the cauliflower is slightly browned.

Sprinkle on the lemon zest and serve.

Chef Tips:

If you'd like to use fresh cauliflower, remove the outside leaves from a head of cauliflower. Wash the head and pat dry. Break the florets off the cauliflower and, working in small batches, place them in a large food processor with the steel blade attachment. Pulse until the cauliflower is in small rice-size pieces. If there are large chunks of cauliflower remaining, these can be removed and used for another recipe.

Cinnamon–Black Pepper Hot Chocolate

Servings: 2

Prep Time: 5 minutes

Cooking Time: 10 minutes

(vegetarian, vegan, dairy-free)

This delicious and rich chocolate treat doesn't need to be too sweet. The complexity of dark chocolate (use natural, non-alkalized) really shines through, and the black pepper gives it a bit of a contrasting bite. Cinnamon and black pepper also help boost your memory.

¼ cup dark chocolate chips (65 percent cacao or darker)

2 cups coconut, almond, oat, or cashew milk

1 teaspoon vanilla extract

½ teaspoon ground cinnamon

Pinch of black pepper

Place the chocolate chips in a medium heatproof bowl. Warm the milk, vanilla, cinnamon, and pepper in a saucepan over medium heat. When bubbles form around the edges of the milk, remove from the heat and pour it over the chocolate chips.

Allow the warmed milk to begin to melt the chocolate. Wait 2 minutes, then use a whisk to gently mix the milk and chocolate together. If the mixture is too thick, add a little more warmed milk.

Beating OCD Menu

Breakfast: Homemade Cereal

Snack: Cottage cheese with blueberries

Lunch: Lentil Soup with Spinach (Dal)

Snack: 1 small to medium kiwi

Dinner: Paprika-Roasted Turkey Breast with Red Onions and Cherry Tomatoes

Dessert: Banana “Ice Cream”

Homemade Cereal

Servings: 2

Prep Time: 10 minutes

(vegetarian, vegan, gluten-free, dairy-free)

Even “healthy” store-bought cereals may be high in sugar. It’s easy to make a delicious cereal out of whole grains and other brain-healthy ingredients.

½ cup rolled oats

¼ cup bran flakes

¼ cup unsweetened coconut flakes

1 tablespoon chopped walnuts

½ teaspoon flaxseeds

Pinch of cinnamon

Pinch of ground nutmeg

Combine all the ingredients in a medium bowl. Store in an airtight mason jar for up to 2 weeks.

You can serve the cereal in a variety of ways—with almond milk or another milk of your choice, with 1 tablespoon of organic dark chocolate chips for a twist, topped with fresh berries, or all of the above! If you need a little sweetness, add a touch of honey.

Lentil Soup with Spinach (Dal)

Servings: 8

Prep Time: 30 minutes (plus overnight soaking)

Cooking Time: 20 minutes

(vegetarian, vegan, gluten-free, dairy-free)

Dal is one of my favorite comfort foods, but even if you didn’t grow up eating it, I’m sure you’ll find it filling and soothing. The turmeric is an added bonus. Asafetida powder is used in Indian cooking as a digestive, helping to lower the effects of gas and bloating from foods like beans and

lentils. While it has a pungent aroma, it is very flavorful once added to a dish.

2 cups yellow split pea lentils

2 tablespoons canola oil

1 teaspoon black mustard seeds (optional)

1 teaspoon cumin seeds

2 cloves garlic, peeled and sliced in half lengthwise

1 dried whole red chili (optional)

1 medium onion, finely chopped

1 medium tomato, finely chopped

1 teaspoon ground turmeric

¼ teaspoon black pepper

2 cups spinach leaves

1 tablespoon kosher salt

½ lemon

1 teaspoon asafetida powder (optional)

Chopped fresh cilantro for garnish

Rinse and soak the lentils in a covered glass bowl in the fridge overnight. Make sure the water covers the lentils by about a half inch. Rinse out the lentils the next day, transfer to a large saucepan, and add 4 cups water. Boil the lentils for about 30 minutes, until soft. The texture should be smooth, like a paste. Alternatively, you can cook the lentils in a pressure cooker—follow the directions supplied by your pressure cooker's manufacturer.

Heat the oil in a medium stainless-steel pot over medium heat. Add the black mustard seeds, if using, and cook until they pop. Add the cumin seeds, garlic, dried red chili, if using, and chopped onion. Cook for 3–5 minutes, or until the onion is translucent. Add the

tomato, turmeric, and black pepper, and stir to combine. Add the spinach and allow to wilt for just 1 minute.

Add the lentils, lower the heat, and allow to cook for about 20 minutes. Add 2 cups water, as the mixture will be thick and you want to prevent the lentils from sticking.

Season with the salt, a squeeze of fresh lemon, and the asafetida powder, if using. Serve hot, garnished with chopped cilantro.

Paprika-Roasted Turkey Breast with Red Onions and Cherry Tomatoes

Servings: 4

Prep Time: 10 minutes

Cooking Time: 20 minutes

(gluten-free, dairy-free)

For a plant-based option, this recipe works with 1 block of firm tofu cut into slices or cubes. A chicken breast is another option. Turkey is a rich source of B vitamins, and vitamin B_{12} may have a positive impact on OCD.

2 tablespoons olive oil

2 tablespoons paprika

1 teaspoon ground turmeric

1½ teaspoons kosher salt

¼ teaspoon black pepper

4 (4-ounce) pieces boneless, skinless turkey breast

2 cups cherry tomatoes, pierced

½ red onion, thickly sliced

Preheat the oven to 400°F and line a sheet pan with parchment

paper.

In a medium bowl combine the olive oil, paprika, turmeric, salt, and pepper. Put the turkey breasts, tomatoes, and onion in the bowl and stir till well combined and the turkey is coated.

Transfer the turkey, tomatoes, and onions to the sheet pan and bake for 15 minutes, or until the turkey reaches an internal temperature of 165°F. If you'd like to brown the turkey, broil for 3 minutes, or until browned. You may wish to remove the tomatoes and onions before broiling, as they may burn.

Banana "Ice Cream"

Servings: 6

Prep Time: 12 hours

(vegetarian, gluten-free, dairy-free)

This is another way to get your fix for a frozen, slightly sweet treat without going overboard on dairy and sugar.

8 extremely ripe bananas, peeled and diced

1 tablespoon honey

½ cup unsweetened almond, cashew, oat, or coconut milk, as needed to achieve desired consistency

Place the banana pieces on a sheet pan and freeze overnight.

Place the frozen banana pieces in a blender or food processor with the honey. Blend while slowly adding milk to thin the mixture. Watch carefully, as you may need more or less than the ½ cup of milk. You are looking for the texture of soft-serve ice cream. Once this texture is achieved, transfer to a bowl and place in the freezer for at least 3 hours or overnight.

Before serving, add mix-ins, if desired, like chopped nuts, dark chocolate chips, or peanut butter. Top with fresh berries.

Chef Tips:

- For chocolate ice cream, add 2 tablespoons of natural (non-alkalized) cocoa powder at the end before you chill the “ice cream.” As you blend the mixture, make sure there are no lumps. You may have to first pass the cocoa powder through a sieve or strainer, so it blends evenly into the mixture.

Menu for Ideal Sleep Patterns and Lower Fatigue

Breakfast: On-the-Go Scrambled Eggs in a Mug

Snack: Banana and almond butter over cottage cheese

Lunch: Spicy Shrimp; mixed green salad

Snack: Pickled Okra

Dinner: Oven-Roasted Turkey Breast; Oven-Roasted Miso-Glazed Sweet Potatoes

Dessert: Golden Milk

On-the-Go Scrambled Eggs in a Mug

Servings: 1
Prep Time: 2 minutes
Cooking Time: 3–5 minutes

(gluten-free, dairy-free)

It’s important to have a nutritious and energy-filled start to the day when you’re fighting fatigue. This twist on classic scrambled eggs is a great way to enjoy an omega-3-rich meal without having to take the time to sit down and eat. For an extra dose of vitamins, you can add spinach or kale to the

eggs, which will wilt easily into the mix.

Organic olive oil spray

2 large omega-3-fortified eggs

1 tablespoon nondairy milk of choice

¼ teaspoon kosher salt

Pinch of black pepper

¼ cup chopped spinach or kale

Spray a coffee mug with the olive oil spray. Crack the eggs into the mug and use a fork to beat them together with the milk, salt, and pepper. Heat in the microwave for 30 seconds to 1 minute. Stir the egg mixture with a fork. Return to the microwave and cook until the eggs appear scrambled, about another minute. Use the fork to fluff up the eggs. Stir in the spinach or kale and allow to wilt.

Spicy Shrimp

Servings: 1

Prep Time: 20 minutes

Cooking Time: 5 minutes

(gluten-free, dairy-free)

These shrimp are a great way to get a dose of seafood and capsaicin in your diet. You can add a bit more cayenne pepper if you prefer your food spicier.

8 medium shrimp, peeled and deveined, tails left on

½ teaspoon ground cumin

½ teaspoon cayenne pepper

½ teaspoon ground turmeric

¼ teaspoon black pepper

¼ teaspoon garlic powder

1 teaspoon kosher salt

2 tablespoons olive oil

In a medium bowl, toss the shrimp with the cumin, cayenne pepper, turmeric, black pepper, garlic powder, and salt.

Heat the oil in a cast-iron skillet over medium heat. Add the shrimp and stir-fry until they are cooked through and pink on the outside, about 3 minutes.

Pickled Okra

Serving Size: 8

Prep Time: 15 minutes

Cooking Time: 10 minutes

(vegetarian, vegan, gluten-free, dairy-free)

Like most pickled vegetables, this okra must be made ahead of time, but once it's made, it keeps very well in the fridge for at least a month if stored in a glass mason jar with a tight-fitting lid. This is another great way to get nigella seeds, capsaicin, and other spices into your diet.

2 cups fresh okra

Juice of ½ lemon

¾ teaspoon sugar

2 cups white vinegar

2 cups filtered water

2 tablespoons kosher salt

2 tablespoons nigella seeds

1 tablespoon coriander seeds

1 tablespoon chili pepper flakes

1 teaspoon celery seeds

1 teaspoon black pepper

3 large cloves garlic, peeled and sliced

4 thick slices lemon

Place the okra in an extra-large mason jar.

In a medium stainless-steel pot, heat the lemon juice, sugar, vinegar, water, and salt over medium heat. When the liquid is warmed through, add the remaining spices, garlic, and lemon. Allow to simmer over low heat for 3 minutes. Remove from the heat and cool slightly before pouring over the okra. Cover tightly and chill in the fridge for at least 3 hours or overnight.

Oven-Roasted Turkey Breast

Servings: 4

Prep Time: 10 minutes

Cooking Time: 20 minutes

(gluten-free, dairy-free)

As we mentioned for the Paprika-Roasted Turkey Breast (here), if you prefer a plant-based option, this recipe works with 1 block of firm tofu cut into slices or cubes. A chicken breast is another option. Turkey is a rich source of B vitamins, including vitamin B_{12}.

2 tablespoons olive oil

1 teaspoon garlic powder

1½ teaspoons dried oregano

1 teaspoon fresh thyme leaves, chopped fine

1½ teaspoons kosher salt

¼ teaspoon black pepper

4 (4-ounce) pieces boneless, skinless turkey breast

1 tablespoon lemon zest

Preheat the oven to 400°F and line a sheet pan with parchment paper.

In a medium bowl combine the olive oil, garlic powder, oregano, thyme, salt, and pepper. Put the turkey breasts in the bowl and stir till well combined and the turkey is coated.

Transfer the turkey to the sheet pan and bake for 15 minutes, or until the turkey reaches an internal temperature of 165°F. If you'd like to brown the turkey, broil for 3 minutes or until browned. Sprinkle with lemon zest and serve.

Oven-Roasted Miso-Glazed Sweet Potatoes

Servings: 8

Prep Time: 20 minutes

Cooking Time: 25 minutes

(vegetarian, vegan, gluten-free, dairy-free)

This is one of my favorite recipes to share and teach. Fermented miso paste gives both a great probiotic benefit and wonderful depth of flavor to the richness of the sweet potatoes. Once you taste the umami from the miso paste, you may enjoy using it to brighten other roasted vegetable dishes too.

½ cup white miso paste

¼ cup olive oil

¼ tablespoon kosher salt

¼ teaspoon black pepper

4 medium sweet potatoes, unpeeled, sliced into discs

Preheat the oven to 425°F and line a sheet pan with parchment paper.

Mix the miso paste, olive oil, salt, and pepper in a large bowl. Toss in the sweet potatoes and combine. Place the sweet potatoes on a sheet pan, making sure they are arranged in a single layer. Roast in the oven for 20–25 minutes, until the potatoes are tender (a sharp knife should cut through easily).

Golden Milk

Servings: 1

Prep Time: 5 minutes

Cooking Time: 5 minutes

(vegetarian, gluten-free, dairy-free)

This turmeric drink is a treat after dinner. It is especially warming and soothing to help you to sleep.

1 cup almond milk

1 teaspoon ground turmeric

¼ teaspoon black pepper

½ teaspoon honey

¼ teaspoon grated nutmeg

Heat all the ingredients except the nutmeg in a medium saucepan over medium heat for about 5 minutes. Pour into a mug, sprinkle with nutmeg, and serve.

Menu for Bipolar Disorder and Schizophrenia

Breakfast: Peanut Butter Matcha Smoothie

Snack: Steamed Edamame with Flakes of Sea Salt

Lunch: Oven-Roasted Rosemary Chicken Breast; Romaine Lettuce Salad with Mustard Vinaigrette; green tea

Snack: Macerated Strawberries with Black Pepper

Dinner: Salmon Patties with Ginger and Scallion Sauce

Dessert: Clementines and oranges served with shavings of dark chocolate

Peanut Butter Matcha Smoothie

Servings: 1

Prep Time: 10 minutes

(dairy-free)

Matcha powder is powdered green tea that is easy to add to smoothies or other foods and drinks—there's no need to steep as you would traditional tea leaves.

½ cup almond milk or other nondairy milk

1 scoop organic protein powder

1 pitted date

1 teaspoon matcha powder

1 tablespoon peanut butter

½ banana

Combine all the ingredients in a blender with ½ cup ice cubes; blend until smooth and frothy. Serve immediately.

Steamed Edamame with Flakes of Sea Salt

Servings: 2

Prep Time: 5 minutes

Cooking Time: 2 minutes

(vegetarian, vegan, gluten-free, dairy-free)

I prefer edamame in the shell for this snack, as it takes more time to eat and one tends to feel more satiated. Shelled edamame are delicious to add to salads or soups or even steamed as a vegetable side dish.

1 cup frozen edamame in the shell

¼ teaspoon flaked sea salt

Place the edamame in a glass bowl. Heat in the microwave on medium heat for about 2 minutes. If still frozen or hard, heat for another minute. Sprinkle with salt and eat hot.

Oven-Roasted Rosemary Chicken Breast

Servings: 4

Prep Time: 10 minutes

Cooking Time: 20 minutes

(gluten-free, dairy-free)

This recipe uses chicken breasts, but you could use a whole chicken as well, with the seasoning mixture rubbed on the skin. Cooking time will increase,

but roast until the deepest part of the thigh registers 165°F.

2 tablespoons olive oil

1 teaspoon garlic powder

2 tablespoons chopped fresh rosemary leaves

1½ teaspoons kosher salt

¼ teaspoon black pepper

4 (4-ounce) pieces boneless, skinless chicken breast

Preheat the oven to 400°F and line a sheet pan with parchment paper.

In a medium bowl combine the olive oil, garlic powder, rosemary, salt, and pepper. Put the chicken breasts in the bowl and stir till well combined and the chicken is coated.

Transfer the chicken to the sheet pan and bake for 15 minutes, or until the chicken reaches an internal temperature of 165°F. If you slice the chicken breast and there is any pink color, return to the oven for another 5 minutes and check the color again.

Romaine Lettuce Salad with Mustard Vinaigrette

Servings: 4

Prep Time: 10 minutes

(vegetarian, vegan, gluten-free, dairy-free)

Romaine lettuce is delicious, crunchy, and nutritious. You're much better off making your own dressing rather than buying one, as store-bought dressings tend to be high in sugar, sodium, and preservatives. The classic dressing is a vinaigrette. A vinaigrette is an emulsion, meaning an acid comes together with a fat. One part acid to three parts fat is a good guideline.

For the salad:

1 head romaine lettuce

For the dressing:

2 tablespoons red wine vinegar

½ teaspoon kosher salt

¼ teaspoon black pepper

1 teaspoon whole-grain or Dijon mustard

6 tablespoons olive oil

Prepare the salad:

Prepare a head of romaine lettuce by chopping off the end and separating the leaves. Rinse under cool water, then place in a salad spinner to drain off excess water. If you don't have a salad spinner, simply pat dry the leaves with clean paper towels. Once the lettuce is dry, tear or chop the leaves into bite-size pieces.

Prepare the vinaigrette:

Combine all the ingredients in a mason jar. Cover the jar and shake until the dressing is emulsified.

Place the lettuce in a serving bowl and add the vinaigrette. Toss to combine.

Chef Tips:

- You can prepare a whole head of lettuce and use it over 2–3 days for salad as long as the dressing is not added (which would make the lettuce soggy). Store extra romaine lettuce in an airtight container in the fridge for up to 4 days.
- Store your vinaigrette in the mason jar you mixed it in. If you make a larger batch of dressing, it will keep for up to 2 weeks in the fridge. Shake before use to mix up the dressing again.
- You can use a variety of vinegars and add chopped shallots,

garlic, or fresh herbs for different flavors.

Macerated Strawberries with Black Pepper

Servings: 2
Prep Time: 10 minutes

(vegetarian, gluten-free, dairy-free)

I first discovered this unusual combination in culinary school. The benefits of black pepper and the strawberries with their antioxidants, vitamin C, and folate make these a perfect snack.

Juice of ½ lemon

½ teaspoon honey

1 cup sliced fresh strawberries

Pinch of black pepper

In a small bowl, combine the lemon juice and honey. Stir. Add the strawberries and toss to combine. Sprinkle with the black pepper. Allow the strawberries to macerate for 10 minutes before serving.

Salmon Patties with Ginger and Scallion Sauce

Servings: 2
Prep Time: 10 minutes
Cooking Time: 10 minutes

(gluten-free, dairy-free)

Once again, salmon is a great source of omega-3s, and patties are a great

way to eat them. The ginger-scallion sauce has a wonderful flavor while also providing a nutritious boost. Salmon patties are an easy way to eat a protein-rich meal with no additional carbohydrates.

For the sauce:

1 teaspoon olive oil

½ cup thinly sliced scallions

2 teaspoons grated fresh gingerroot

1 clove garlic, grated

1 tablespoon gluten-free soy sauce

For the patties:

2 tablespoons olive oil

2 fresh salmon patties

1 teaspoon kosher salt

½ teaspoon black pepper

2 large romaine lettuce leaves

Prepare the sauce:

Heat the olive oil in a small saucepan over medium heat. Add the scallions and allow them to sizzle for 1 minute. Add the ginger, garlic, and soy sauce and simmer for 5–10 minutes. If the sauce appears too thick, add up to ¼ cup water.

Prepare the salmon patties:

In a stainless-steel frying pan, heat the olive oil. Season the salmon patties with salt and pepper.

Pan-fry the patties in the oil for 3–5 minutes on each side, until the center is cooked and the internal temperature reaches 145°F.

Serve each salmon patty in a romaine lettuce leaf and drizzle with the ginger-scallion sauce.

Libido-Lifting Menu

Breakfast: Lox, sliced red onions, capers, and lemon juice on whole-grain toast

Snack: Fresh pomegranate juice

Lunch: Oven-Baked Cajun Chicken

Snack: Sliced avocado with ¼ cup unsalted pistachios

Dinner: San Franciscan Seafood Stew

Dessert: Chocolate-Dipped Strawberries

Oven-Baked Cajun Chicken

Servings: 2
Prep Time: 10 minutes
Cooking Time: 25 minutes

(gluten-free, dairy-free)

Cajun spice is a great and easy way to get the libido-boosting benefits of capsaicin and garlic. These spices delight the senses.

2 tablespoons olive oil

2 tablespoons salt-free Cajun seasoning

2 (4–6-ounce) boneless, skinless chicken breasts

1 tablespoon kosher salt

½ teaspoon cracked black pepper

Preheat the oven to 425°F and line a sheet pan with parchment paper.

Combine the olive oil and Cajun seasoning in a small bowl. Season the chicken with salt and pepper, then brush the chicken with the Cajun marinade.

Place the chicken on the sheet pan and bake until it is golden brown and cooked through, 20–25 minutes, or until the thickest part of the chicken reaches an internal temperature of 165°F.

San Franciscan Seafood Stew

Servings: 8

Prep Time: 15 minutes

Cooking Time: 20 minutes

(gluten-free, dairy-free)

Roasted or oven-baked salmon can become repetitive. This stew uses both salmon and shellfish, which are rich and healthy brain foods.

¼ teaspoon saffron threads

2 tablespoons olive oil

1 medium fennel bulb, thinly sliced

1 medium onion, chopped

½ teaspoon Italian seasoning

2 tablespoons kosher salt

2 cloves garlic, grated

¾ teaspoon cayenne powder or crushed red pepper flakes

2 tablespoons tomato paste

1½ cups chopped tomatoes

1 cup dry white wine

4 cups low-sodium seafood stock

8 mussels, scrubbed and debearded

2 (4-ounce) pieces boneless, skinless salmon, cut into 2-inch chunks

1 lemon

Place the saffron threads in ¼ cup boiling water, set aside for about 5 minutes, and allow to bloom. Heat the oil in a large cast-iron soup pot over medium heat. Add the fennel, onion, Italian seasoning, and salt and sauté until the onion is translucent, about 10 minutes. Add the garlic and cayenne pepper and cook for 3 minutes. Add the tomato paste and stir gently, followed by the chopped tomatoes, wine, and seafood stock. Add the mussels, cover, and cook for 3 minutes. Add the salmon pieces, cover, reduce the heat to low, and simmer until the seafood is cooked through, about 3 minutes. The salmon should no longer be pink, and the mussels should have opened up. Discard any mussels that do not open, as they are considered unsafe to eat.

Add the saffron with its liquid. Allow the fish stew to simmer for at least 10 minutes for the flavors to meld. Make sure the seafood is cooked; cooking times on your stove may vary.

Squeeze fresh lemon juice over the stew and serve in individual soup bowls.

Chef Tips:

- Your seafood market or seafood counter can help you prepare the salmon pieces and mussels if you are not sure how to work with them.
- Italian seasoning is a salt-free spice blend found in most supermarkets.
- Saffron is a costly spice and should be used sparingly.

Chocolate-Dipped Strawberries

Servings: 15

Prep Time: 5 minutes

Cooking Time: 20 minutes

(vegetarian, vegan)

Use natural, non-alkalized extra-dark chocolate chips for better antioxidant levels.

1 cup extra-dark chocolate chips

2 tablespoons coconut oil

1 pint fresh whole strawberries with stems

Line a sheet pan with parchment paper and chill in the freezer for up to ½ hour. Using a double boiler, melt the chocolate chips with the coconut oil (see Chef Tips) and remove from the heat.

Quickly dip the strawberries in the melted chocolate and allow to dry on the cold sheet pan.

Allow to set in the fridge for 5–10 minutes.

Chef Tips:

To melt chocolate in a double boiler (bain-marie method), fill a stainless-steel saucepan one-third full of water. Put the chocolate in a heatproof glass bowl and place over the saucepan so that its base does not touch the water. Heat the water over medium heat. Once the chocolate starts to melt, remove from the heat using an oven mitt, then gently stir until fully melted.

You can also melt the chocolate in the microwave on medium heat in 30-second bursts until melted. The time depends on the power of your microwave.

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LITTLE,
BROWN
SPARK

About the Author

Uma Naidoo, MD, is a board-certified psychiatrist (Harvard Medical School), professional chef (Cambridge School of Culinary Arts), and nutrition specialist (Cornell University). She is currently the director of nutritional and lifestyle psychiatry at Massachusetts General Hospital (MGH), where she consults on nutritional interventions for the psychiatrically and medically ill; is director of nutritional psychiatry at the Massachusetts General Hospital Academy; and has a private practice in Newton, Massachusetts. She also teaches at the Cambridge School of Culinary Arts. Dr. Naidoo speaks frequently at conferences at Harvard, for Goop audiences, at the New York City Jewish Community Center, and at Ivy Boston. She blogs for *Harvard Health* and *Psychology Today* and has just completed a unique video cooking series for the MGH Academy that teaches nutritional psychiatry using culinary techniques in the kitchen. She

has been asked by the American Psychiatric Association to author the first text in the area of nutritional psychiatry. Baking is one of her true passions, in addition to savory cooking.

Appendix A: Glycemic Load of Carbohydrates

Low Glycemic Load (10 or under): “BOB CATS”

Bran Cereal
Oranges
Beans, kidney and black, and lentils
Carrots, cashews, and peanuts
Apples
Tortilla, wheat
Skim milk

Medium Glycemic Load (11–19): “$B^2R^2OW^2$”

Barley, pearl type (1 cup cooked) *or*
Bulgur (¾ cup cooked)
Rice (¾ cup cooked brown) *or*
Rice cakes (3) Oatmeal (1 cup cooked) Whole grain: pasta (1¼ cups cooked) *or* 1 slice bread

High Glycemic Load (20+):

French fries and baked potato
Soda and other sugar-sweetened drinks
Candy and candy bars

Refined breakfast cereals
Couscous
White basmati rice and pasta (white flour)

Appendix B: Common Sources of Vitamins and Select Minerals

Vitamin: Vitamin A

Mental Condition: Mood
Anxiety

Dietary Sources: Liver:
- Beef
- Cod-liver oil
- Lamb

Fish:
- Bluefin tuna
- Mackerel
- Salmon
- Trout

Cheeses:
- Blue
- Camembert
- Cheddar
- Feta
- Goat
- Roquefort

Caviar
Hard-boiled egg

Vitamin: Vitamin B_1 (thiamine)

Mental Condition: Mood
Anxiety

Focus
Sleep

Dietary Sources: Acorn squash
Asparagus
Barley
Beef
Black beans
Cauliflower
Eggs
Kale
Lentils
Nuts
Oatmeal
Oranges
Pork
Salmon
Sunflower seeds
Tuna
Whole grains

Vitamin: Vitamin B_6 (pyridoxine)

Mental Condition: Mood
Anxiety
Memory
Sleep

Dietary Sources: Eggs
Fish
Milk
Peanuts
Pork
Poultry: chicken and turkey
Whole-grain cereals:
oatmeal and wheat germ

Vitamin: Vitamin B_9 (folate)

Mental Condition: Mood
Memory
Sleep
Bipolar
Depression
Schizophrenia

Dietary Sources: Asparagus
Beans
Beets
Cauliflower
Citrus
Leafy green vegetables
Lettuce
Whole grains

Vitamin: Vitamin B_{12} (cobalamin)

Mental Condition: Mood
OCD
Sleep
Schizophrenia

Dietary Sources: Beef
Clams
Fortified cereal
Milk, yogurt, Swiss cheese
Nutritional yeast
Organ meats
Salmon
Sardines
Trout
Tuna

Vitamin: Vitamin C

Mental Condition: Mood
Anxiety
Focus
Memory
Sleep
Schizophrenia

Dietary Sources: Black currants
Broccoli
Brussels sprouts
Chili peppers
Guavas
Kale
Kiwifruit
Lemons
Lychee fruit
Oranges
Papaya
Parsley
Persimmons
Strawberries
Sweet yellow peppers
Thyme

Vitamin: Vitamin D

Mental Condition: Anxiety
Sleep

Dietary Sources: Canned light tuna
Cod-liver oil
Egg yolks
Herring
Mushrooms
Oysters
Salmon
Sardines

Shrimp

Vitamin: Vitamin E (alpha-tocopherol)

Mental Condition: Anxiety
Healing
Memory
Sleep
Schizophrenia (in moderation)

Dietary Sources: Almonds
Avocado
Beet greens
Butternut squash
Peanuts
Spinach
Sunflower seeds
Swiss chard
Trout

Vitamin: Vitamin K

Mental Condition: Memory

Dietary Sources: Avocado
Beef liver
Broccoli
Brussels sprouts
Chicken
Cooked collard greens
Cooked green beans
Cooked green peas
Cooked kale
Cooked mustard greens
Hard cheeses
Kiwifruit
Natto
Pork chops

Prunes
Raw spinach
Raw Swiss chard
Soft cheeses

Vitamin: Iron

Mental Condition: Mood
ADHD

Dietary Sources: Broccoli
Dark chocolate
Lean red meats
Legumes
Pumpkin seeds
Shellfish

Vitamin: Magnesium

Mental Condition: Mood
Anxiety
ADHD
Fatigue
Bipolar disorder

Dietary Sources: Avocados
Fish such as salmon and mackerel
Legumes
Nuts
Whole grains

Vitamin: Potassium

Mental Condition: Mood
Anxiety
ADHD

Dietary Sources: Bananas
Cucumbers
Mushrooms

Oranges
Peas
Sweet potatoes

Vitamin: Selenium

Mental Condition: Mood
Anxiety

Dietary Sources: Brazil nuts

Vitamin: Zinc

Mental Condition: Mood
ADHD
Fatigue
Bipolar disorder

Dietary Sources: Beans
Nuts
Poultry
Seafood
Whole grains

Appendix C: Antioxidants and ORAC

Certain spices offer distinct cognitive advantages due to their antioxidant potential, as summarized in this table.

ORAC stands for oxygen radical absorbance capacity. It is used to measure the antioxidant capacity of foods or dietary supplements. Although ORAC applies to single food constituents, the actual ORAC value of different constituents may be synergistic. Hence the reported ORAC value may be lower than the actual value.

The next time you choose a recipe, make a note of the ORAC so that you can start to think about this as you cook.

Spice: Dried oregano

Measure: 1 tsp

ORAC: 3,602

Spice: Ground turmeric

Measure: 1 tsp

ORAC: 3,504

Spice: Cumin seed

Measure: 1 tsp

ORAC: 1,613

Spice: Curry powder

Measure: 1 tsp

ORAC: 970

Spice: Chili powder

Measure: 1 tsp

ORAC: 615

Spice: Black pepper

Measure: 1 tsp

ORAC: 580

Spice: Thyme

Measure: 1 tsp

ORAC: 407

Spice: Paprika

Measure: 1 tsp

ORAC: 376

Notes

Chapter 1. The Gut-Brain Romance

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Chapter 8. Insomnia and Fatigue

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Chapter 9. Bipolar Disorder and Schizophrenia

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Chapter 10. Libido

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