IMMUNITY RESET

A Personalized Plan to

Pandemic-Proof Your Body and Build Resilience

for a Long, Healthy Life

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It's time for people to take their power back when it comes to their immune health.

The current pandemic has ushered in a new era for all of us. It's been next to impossible to escape media coverage of the event, and the bulk of it has focused on what has left us feeling so disempowered: the millions of deaths worldwide, the lockdowns, the school-closings, the mask-wearing (or not-wearing), the economic hardship, the political fallout. But there is also good news that has come out of all that we've endured: the pandemic has acted as a kind of

catalyst, prompting vital new research, a new focus on and understanding of immune health, and signs of new health habits and behaviors being adopted on wide scale.

After more than a year of being at the mercy of government officials, disease experts, and the media telling us what we should and should not do, of waiting for the medical breakthroughs that were supposed to save us and then didn't quite live up to the hope, an important fact has gotten lost: We have more power over our own resilience in the face of this or any pathogen than we have been given credit for. And there has never been a better time to focus that fact—on how we can best support and optimize our own immune systems.

First of all, there's all the new research. It has come so quickly and voluminously over past year that there has been no time to collect it in one place, let alone interpret it into meaningful and, in this age of misinformation, *trustworthy* advice for people at home. For most, 2020 was a flurry of ever-evolving, often contradictory health headlines that left them feeling confused, anxious, and completely disempowered.

Even as medical professionals, there are things we simply did not know this time last year. For example, we did know that too much sugar isn't good for our waistlines, but it only recently became clear that there may be even more reason to kick that sugary soda habit—because it may also *suppress your immunity*. New research suggests that diets high in fructose may actually "damage" your immune system, making you more susceptible, not just to COVID-19, but to all pathogens. That doesn't mean you can never enjoy another sweet treat again, by the way. There are low-calorie options out there for baking or sweetening your morning coffee that have no fructose at all—like allulose, a relatively new, natural option that does not affect blood sugar or insulin levels, does not cause gas or bloating, tastes great, and actually has positive

health benefits. Wouldn't it be nice to know what those are and how to use them for the sake of your immunity?

There are also some new immune-supporting superfoods that have emerged. You may have heard about elderberry, but what about *Nigella sativa* (black cumin) or Himalayan Tartary buckwheat? These little-known but soon-to-be superstar immune enhancers can be worked into your diet or taken as supplements. There are immune-supportive powers of some foods you may already be eating but almost surely could make better use of—including foods rich in polyphenols like green tea, berries, celery, and oregano, and nitric oxide–boosting foods like beets and fermented foods. In fact a recent study found that diets high in polyphenols may have a protective effect against severe illness resulting from COVID-19, and a recent survey of fermented food consumption found that "for each gram/day increase in the average consumption of fermented vegetables, the mortality risk decreased by 35.4%." These are but two of the many studies over the past year showing that, when it comes to your risk of getting sick, your diet really does matter—a fact that our government and the media aren't talking about but really should have been since the beginning.

We are also seeing evidence that the pandemic is significantly changing people's habits. Suddenly many have taken charge of their health and well-being in record numbers. They are cooking at home more often with an emphasis on fresher, healthier fare when they can find it. They are seeking ways to reduce stress. Despite a climate of economic pain and uncertainty, people spent more last year on things like supplements and fresh, organic foods than they did before the pandemic began. COVID-19 kicked off a kind of DIY healthcare revolution, one that we believe has long been needed and unfortunately took a global pandemic to ignite.

Of course, that's only one side of the story. The pandemic has been an extreme event so it's unsurprising that it has elicited extreme reactions. While there were those who renewed their focus on personal health, others went in the opposite direction. There is evidence of widespread weight gain (42% of Americans), greater alcohol consumption, poorer quality sleep, and high rates of anxiety, depression, and stress—all things that have a negative impact on immunity. What's more, people put off regular checkups and health screenings, so they might not yet realize the damage that's been done. As the pandemic wears on, these trends are likely to catch up with people, who will then need to reclaim their health and wellbeing. In fact, that first trip back to the doctor for a checkup may serve as a stark wake-up call for so many.

And let's talk about the vaccine for a moment. It's become clear already that it won't crush COVID in the way that we had hoped. With each new variant that arises (and it's highly unlikely that Delta will be the last), questions arise alongside it about whether it will be more transmissible, deadly, and/or vaccine resistant. The hard truth is that this virus is unlikely to go away any time soon, and we will end up living with it in the same way we do flu viruses—where the focus is more on managing it, and the illnesses that result, than eradicating it. (Pharmaceutical companies are already looking at the possibility of combining a COVID vaccine with your annual flu shot.) What's more, research suggests that poor health behaviors can negatively affect the body's immune response to the vaccine itself, which will remain true as booster shots become common. Then there's the fact that widespread skepticism remains an obstacle to universal vaccination, *and* the fact that "long hauler" syndrome is an increasing concern, one that is currently the subject of a considerable amount of well-funded research. All of this means that a focus on immune health is going to become more important, not less, as time goes on.

Don't get me wrong: the vaccine is welcome news. At the same time, what I have listed here are just a few of the reasons why relying on vaccination alone was always risky strategy. And that's not just my opinion. More and more people are raising concerns about the fact that governmental approaches to fighting this pandemic have been so narrow—focused on masks, social distancing, and vaccine development while doing very little to promote the healthy habits, like good nutrition, that can make anyone more resilient—now and long into the future.

I want to propose a better strategy—one that extends beyond the vaccine and even beyond the current crisis. Because with this crisis has come opportunity. After decades of trying to persuade patients to focus on the everyday things that affect their immunity—like their eating habits, nutrient levels, and mental well-being—many of those same patients are now actively seeking that information. I project that more and more people will do the same as the pandemic continues to evolve and we find our way to a new version of normal.

And that can be a good thing, because a focus on immune health is long overdue in this country. By igniting this focus and spurring so much needed research, the pandemic has come with a kind of silver lining. It has also been keenly *revealing* in a whole host of ways.

Revelation #1: We need to stop trying to treat disease in a vacuum.

Something that has gained traction in scientific communities as a result of the COVID crisis is the concept of a *syndemic*, or synergistic epidemic, a term suggesting that no disease exists in isolation but rather is impacted by a whole range of factors. In the U.S., for example, the virus was helped along by the high percentage of Americans with underlying health conditions that made them more susceptible to disease. At the same time, the virus has revealed or made worse a wide range of societal ills, including (but hardly limited to) existing mental health problems that

have led to a global increase in suicides and underlying social inequities that have caused marginalized populations to shoulder a far greater share of the economic and health risks.

Why does all that matter? As researchers at Australia's University of New South Wales recently pointed out: Because we have viewed the cause of this crisis as an infectious disease, all of our interventions have focused on controlling the virus's spread. But that's not enough. How does that strategy help the underlying social inequities we've seen? How does it help the economic fallout that has been disproportionally felt? How does it help the widespread impact on mental health? As the authors of the article concluded: "No matter how effective a treatment or protective a vaccine, the pursuit of a purely biomedical solution to COVID-19 will fail."

That's a warning we must take seriously. It's also the same kind of warning I have been sounding for years. While we certainly can't offer panaceas, we can arm people to do what they can to fortify themselves. We need to talk to people about their diets and stress levels. About how well they hydrate and how to sleep better. (Did you know that just one additional hour of sleep improves your odds of staving off infection?) About their mental health, physical activity, and more, because it *all* matters. A synergistic epidemic is going to require a synergistic approach to healing.

Revelation #2: By making us feel vulnerable, the pandemic revealed that we were vulnerable already.

Researchers have suggested that the COVID-19 pandemic is actually just one half of a *twin pandemic*: COVID-19 superimposed on top of a pandemic of preventable chronic diseases that already existed in much of the world, particularly the United States.

We have all heard how people with certain underlying conditions are more susceptible to the virus and its most disastrous outcomes. What's less talked about is how many of those underlying conditions fall into the category of "lifestyle diseases," meaning they are not inevitable. They result from, or are exacerbated by, how we live our lives. In fact researchers at Tufts University recently looked at data on COVID patients and came to an alarming conclusion: as many as two-thirds of hospitalizations could have been prevented if we, as a culture, led healthier lives. No vaccine is going to cure us of that, of the chronic diseases that made so many of us so vulnerable in the first place.

What's more, I believe that people aren't going to be able to unlearn this lesson of the pandemic so easily. It appears there were a lot of people out there walking around with a false sense of security. Maybe they were a little overweight (70% of Americans), maybe they took their blood pressure or other medications as prescribed, but most never thought of themselves as being at real risk of severe illness or death. But now they know better. They have heard about it on the news for more than a year now. They have seen people like themselves succumb to the virus. They have felt their vulnerability, and that's going to be difficult to forget.

While it has become painfully clear that your underlying condition does matter, I would add that it matters *and* there's almost always something you can do about it. Consumers need to be armed with the advice they need to lessen their burden, improve lifestyle risk factors, and optimize their immunity so that if another pandemic rolls around (or, as most researchers would say, *when* another one rolls around) or if this one persists longer than we are hoping, then they won't have to feel so vulnerable.

Revelation #3: Most people have a poor understanding of how their immune systems work. That poor understanding is likely one of the reasons why misinformation has gotten so much traction during this period. For example, the popular media has long loved to talk about immunity as something to "boost" or "supercharge," even though a supercharged immune system can actually be a real problem, when it comes to COVID especially. It's now clear that an overactive immune system has negatively affected patients, by kicking off what's known as a "cytokine storm." This is when a person's immune response escalates to the point where it does more damage to the body than the virus itself.

We must change the way we think about and talk about immunity. It's something that needs to be empowered, fortified, supported, balanced—not supercharged or boosted. It's something that needs to be cultivated over the long-term, not just propped up with a medication or vaccine when trouble arises. The truth is that many of our immune systems were overtaxed already thanks to the ways in which we live, which is why we'll introduce readers to a new and better paradigm for the post-Covid age: *Goldilocks Immunity,* which is not too little, not too much, but just right *for everyone*. It's time that good health—especially good immune health—became accessible to all.

Pandemic-Proof Your Health

This virus certainly has been a teacher. It has gotten our attention and given us focus. So what can we do with all that we've learned and are still learning from it?

If you have ever consulted a financial advisor, you may have heard the term "recession-proof." A wise advisor will steer you to invest in a range of assets that are likely to withstand any

recession on the horizon. There are never any guarantees, of course, but there is always plenty you can do to mitigate risk while also maintaining a resilient financial portfolio.

Guess what. You can do the same for your health. You can "pandemic-proof" your body and mitigate risks to your health and wellbeing. While none of us can control which pathogens come our way, we can control how likely we are to withstand them when they inevitably arrive. And they will always arrive.

Too many people have been led to believe that their health is mostly out of their hands. They think it comes down to genetics. Or to scientists who come up with the new vaccines and medications they need. Or to costly and time-consuming diets, programs, or treatments that aren't practical for most of us. But that doesn't have to be the case. What people need most is the right guidance and the right guides to show them how to empower themselves. For example, when President Trump got COVID-19 and was flown to Walter Reed Medical Center, he was given more than just the cutting-edge drugs and experimental therapies that most of us would never have access to then. He was also given supplements: he took zinc, vitamin D, and even melatonin. This begs a question: If the President, who arguably received some of the best medical treatment in the world, was given accessible and affordable supplements like these—especially when there is evidence of widespread deficiencies or insufficiencies in vitamin D and Zinc; especially when there is evidence that some such deficiencies hit communities of color particularly hard—then why aren't we all taking such things?

And we can do more than just pandemic-proof our bodies. The strategies that will make us more resistant to COVID-19 or the next pathogen to come—are exactly the same ones that will help us in other ways. They can help us feel better and have more energy. They can help us maintain a healthy weight. They can help us live longer. They can help us gain more control over

many of the chronic lifestyle diseases that are a real drain on the vitality, productivity, pocketbooks, and resilience of so many of us.

The integrative approach to medicine addresses just the kind of widespread and complex health issues the pandemic has revealed and intensified. For example, the quickest, most logical path to health and wellness is using food as medicine, but what if you can't get your hands on nutritious, whole foods or don't even know how to eat anymore? There is so much misinformation out there about what to eat and why. And while it's true that food is the best medicine, when is it not enough? Who should take supplements and why? Even if you have a healthy diet, what other factors might be undermining your health? Stress levels, physical activity, mental wellbeing, environmental factors, and more can all have a significant impact on immune health—which is why an all-of-the-above, integrative approach is sorely needed.

Of course we would not have wished this pandemic on anyone, but in a lot of ways I have been waiting for this moment our entire careers. It has been a wake-up call—a moment when people are really paying attention, when they are primed to gain a new understanding about the importance of optimizing their immunity and the motivation to finally take the power into their own hands. It's well within our grasps to become more resilient to whatever the world throws at us—and to feel healthier, more energized, and more empowered in the process. And who wouldn't want all that?

The health and wellness industry was already sizable and growing in 2019, but COVID-19 has brought even more popular attention to the subject area. According to the Boston Consulting Group's COVID-19 Consumer Sentiment Snapshot, not only have pre-COVID

spending trends in this category continued steadily this year, but there has been *growing* interest in areas like "organic and fresh food" (24% increase), "preventative health" (23% increase), and "vitamins and supplements" (20% increase)—and this has been happening in the midst of a contracting economy where consumers have cutback in a number of other areas. Research also shows that there has been a renewed focus on lifestyle factors, like getting good-quality sleep, exercise, and general self-care—all topics that will be addressed in this book.

This doesn't really come as a surprise. A high percentage of Americans report feeling worried about the health of their families (67%) and themselves (49%). As a result there has never been greater media coverage of health topics, and visits to health information sites have surged during the pandemic. Everyday Americans have become conversant in once specialized subjects like herd immunity, transmission rates, comorbidities and drugs like hydroxychloroquine, ivermectin, remdesivir, and the new "Covid pill" Molnupiravir. Who would have thought this time last year that such things would become topics for dinnertime conversation?

I think it's important to note that these motivators aren't likely to disappear anytime soon. There may be a number of vaccines, but despite their benefits, it's clear that they aren't a panacea. Research is already showing that coronavirus immunity wanes and that after serious outbreaks, viruses tend to resurface. Plus, there will hundreds of thousands, if not millions of people dealing with the lingering effects of long-haulers syndrome—for which natural lifestyle approaches offer the only promise in the absence of pharmacological fixes.

Just as importantly, the underlying causes of our vulnerability existed long before the pandemic and will last long beyond it if we don't act. Because people are currently paying

attention and motivated (80% of U.S. adults say they will make a greater effort to practice self-care in the future), this is perhaps the best opportunity we will ever have to create real change—to help people feel better, live healthier, and become more resilient long into the future.

Resilience Self Test

Our journey to optimizing your immunity starts exactly where it should start—with you! After all, if you were to walk into one of our offices for a consultation, we would begin by asking you questions and gathering information so we could start to form a complete health picture that is unique to you. We are all different in so many ways that can affect our immune health—our lifestyles, environments, diets, habits, and yes, our genetics—so it's important to take that uniqueness into account. It's how we will personalize this journey to suit you and your specific needs going forward.

Because you aren't sitting in my office right now, I have designed the following self test to get you started. It will allow you assess your resilience based on a variety of acknowledged risk factors. By the end, you will have formed a picture of the overall state of your immune health.

Before getting started…

The first question I need to ask you is a practical one: Have you seen a doctor within the past year and had bloodwork performed?

If the answer is yes, you will need to find the results of your bloodwork in order to answer questions in the first category below. If not, then you can still do the test. Simply mark D/K (for "don't know") for each question that asks for a test result and proceed to the rest of the questionnaire. Keep in mind, however, that you will miss out on potential points each time you answer "don't know" so we strongly encourage you to get those blood tests!

Answer the questions as best you can, and then tally the results in Column A for both categories.

General Health: Metabolic Fitness[1]	Column A	Column B
1. Is your blood pressure frequently greater than 120/80?	No	Yes or D/K
2. Is your HDL cholesterol less than 40 (men) or less than 50 (women)?	No	Yes or D/K
3. Are your fasting triglycerides greater than 150?	No	Yes or D/K
4. Is your hemoglobin A1c[2] 5.7 or greater?	No	Yes or D/K
5. Is your fasting blood sugar greater than 100?	No	Yes or D/K
6. Are you currently taking blood pressure medication?	No	Yes
7. Are you currently taking cholesterol-lowering medication?	No	Yes
8. Are you currently taking medication for diabetes?	No	Yes
9. Is your waist circumference greater than 40 inches (men); 31 inches (women of Asian/Indian decent); 35 inches (all other women)?	No	Yes
Total from Column A		

(Note: If you answered yes to one or more of the above questions, you're not alone; a National Health and Nutrition Examination Survey concluded that a mere 12% of American adults met all these criteria!)

General Health: Frailty[3]	Column A	Column B
10. Do you have trouble arising unassisted from a seated position?	No	Yes
11. Have you experienced frequent falls?	No	Yes
12. Do you have trouble managing daily tasks (bathing, grooming, dressing, food preparation, etc.) without help?	No	Yes
	No	Yes

[1]Notes

https://www.liebertpub.com/doi/10.1089/met.2018.0105

[2] https://drhoffman.com/article/hemoglobin-a1c-what-is-it-and-why-does-it-matter/

[3] https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(20)30146-8/fulltext

13. Do you suffer from memory problems that interfere with your ability to manage your affairs and necessitate help from caregivers or family members? 14. Do you often feel sluggish or low-energy? **Total from Column A**	No	Yes

Overall Score

Add up your Column A totals from both categories. This gives you your overall resilience score.

A "perfect" score is 14, but if your score is 12 or above, you're well on your way to optimal resiliency.

A score of 10-11 is pretty good, too, but there's room for improvement.

A score of less than 10 reveals gaps in your resiliency portfolio; you have some work cut out for you to shore up your vulnerabilities.

If you score less than 5, you're at high risk for complications or death if you contract COVID-19. But, more importantly, even if you're not exposed to the virus, these same risk factors will put you in jeopardy of the degenerative medical conditions that prematurely claim the lives of millions of Americans every year. And many of them are modifiable with simple lifestyle changes.

If you haven't been to a doctor recently and therefore didn't have test results handy to help you answer the first few questions, then you likely have an easy way to boost your score. Get yourself to a doctor to right away! You missed out on 5 potential points by not having the information that basic bloodwork provides. What's more, you're lacking valuable insight into your own overall health and resiliency.

Building Block Scores

This overall score gives you a quick, general picture of the current state of your immune health. I have identified five key Building Blocks:

1) Nutrition
2) Supplementation
3) Physical Wellbeing
4) Mental Wellbeing
5) Environmental Factors or Detoxification

This self test will help you identify key areas I call your **Resilience Achilles Heel**. It's an area where you have the most room for improvement and where it would benefit you to focus more of your attention and efforts as you make your way through this book.

Building Block 1: Nutrition

Nutrition Self Test	Column A	Column B
1. Do you consume at least 2 six-ounce portions of fish per week?	Yes	No
2. Do you consume at least five servings of fresh or frozen vegetables and fruits daily?	Yes	No
3. Do you consume processed meats (hot dogs, luncheon meats, bacon) more than twice weekly?	No	Yes
4. Do you drink sugary soda or sweetened fruit beverages more than occasionally?	No	Yes
5. Do you frequent fast food eateries (more than twice/week)?	No	Yes
6. Are you a "yo-yo dieter"—having lost and regained more than 20 pounds in the last 5 years?	No	Yes
7. Do you frequently eat ultra-processed foods, e.g. chips, salty snacks, sugary desserts?	No	Yes
8. Are the majority of your meals via take-out or at restaurants?	No	Yes
9. Are you a late-night or middle-of-the-night snacker?	No	Yes
10. Do you frequently fry foods in canola, corn, soy, safflower, or sunflower oil?	No	Yes
11. Do you regularly use extra-virgin olive oil (more than 4 times per week)?	Yes	No
12. Do you pay attention to the expiration date on your cooking oils?	Yes	No
13. Do you frequently consume sugary breakfast cereals?	No	Yes
14. Do you have at least a 10-hour interval between your last meal or snack at night and your breakfast?	Yes	No
15. Do you frequently consume grilled or charred meat?	No	Yes

16. Do you frequently drink green tea or unsweetened coffee? **Total from Column A**	Yes	No

Your Nutrition Score

Add up your total for Column A. This will give you your Nutrition Resilience Score.

A "perfect" score is 16, but if you score 14 or above, you're well on your way to using nutrition to optimize your resiliency.

A score of 12-13 is pretty good, too, but there's room for improvement.

A score of less than 12 reveals gaps in your resiliency when it comes to nutrition; you have some work cut out for you to shore up your vulnerabilities and ensure that nutrition is not your immune system's Achilles Heel.

If you score less than 6, you're at high risk, not just for complications if you encounter a virus like COVID-19, but also for conditions like diabetes, hypertension, and heart disease that negatively impact your health and your quality of life.

Why Nutrition Matters

Imagine your body is a computer that is constantly running intricate software programs to perform critical functions, like immune defense. The code that makes your body's software work is largely determined by the nutrients you consume on a daily basis. Poor nutritional code makes for poorly performing software—or software that doesn't perform at all. In other words, as pioneers in the field of computing once put it: Garbage in, garbage out.

And that garbage—or poor nutrition—impacts immunity in several important ways. First, deficiencies of key vitamins, minerals, and other vital nutrients undermine immune responses.

It's no secret that malnourished populations more easily succumb to infectious diseases. They're also less likely to achieve immunity with vaccines. Good nutrition is an important factor in making vaccines more effective by allowing the immune system to be receptive to vaccines.[4][5]

But in the U.S. and in westernized countries that follow American dietary patterns, we have the paradoxical situation of over/under-nutrition. By that we mean that even though we have skyrocketing rates of obesity, a substantial percentage of the population is still deficient in key nutrients essential for mounting an optimal immune response.

Second, excess empty calories, especially from refined carbohydrates, are the prime drivers of an epidemic of *metabolic syndrome*, thought to be the principal pathway by which Americans succumb to premature, **avoidable** degenerative disease and death. The features of metabolic syndrome include any or all of the following:

- A waist to hip ratio of greater than 1.0 in males; greater than 0.85 in females (or a waist circumference greater than 40 inches in men, and 31 inches for women of Asian/South Asian ethnicity; 35 inches for all other women).
- High triglycerides (fasting greater than 150) and a total cholesterol to HDL cholesterol ratio greater than 5 to 1
- Hypertension
- Fatty liver
- Elevated or borderline blood sugar

Regarding that last one, during the pandemic it was noted that not only were diabetics more prone to bad outcomes with COVID-19, but so were patients with mere borderline blood

[4] https://www.telegraph.co.uk/global-health/science-and-disease/good-nutrition-can-make-vaccines-effective/
[5] https://pubmed.ncbi.nlm.nih.gov/19793845/

sugar (so-called "pre-diabetes"). In fact, a major determinant upon admission to the hospital of who would go on to require a respirator was blood sugar.[6][7]

Getting back to our computer analogy, in far too many cases people are "programming" their bodies through what they eat to be more susceptible to pathogens and degenerative diseases. These are obviously not the messages we want to send to our cells—and often we do it without meaning to. Conversely, the foods we choose can act as a kind of antivirus software for the body. Like with a computer system, no program is 100% virus proof, but the right one can do a lot to bolster your resilience and overall good health.

Here are some key ways that our diets can serve to either undermine or support our overall health and immunity, depending on the choices we make:

Weight Gain: Pounds matter, as we saw during the pandemic with increased mortality among overweight individuals.[8] However, research suggests that not *all* overweight individuals are at higher risk. It's not just about the extra pounds, but where you carry them. Visceral fat—the fat that surrounds your organs in the abdomen—is more likely to be a health risk than fat found in other areas of the body,[9][10] and yet the BMI index is still used by many professionals even though it's an imperfect measure that doesn't account for this distinction. Overall, however, weight is an important factor. To cite just one of many studies on the subject, it has been shown that obese individuals who lose enough weight in early to mid-adulthood to lower their BMI category from "obese" to simply "overweight" significantly shaved their risk of passing away at an early age—by 54%![11]

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[6] https://www.frontiersin.org/articles/10.3389/fendo.2020.574541/full

[7] https://www.healio.com/news/endocrinology/20201124/high-hba1c-increases-risks-for-acute-respiratory-distress-syndrome-covid19-mortality

[8] https://pubmed.ncbi.nlm.nih.gov/32712623/

[9] https://www.webmd.com/diet/what-is-visceral-fat#1

[10] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7685947/

[11] https://www.theladders.com/career-advice/losing-weight-during-this-life-period-is-linked-to-a-longer-lifespan

Food Quality: Overeating is a prime driver of weight gain, but it's too simplistic to subscribe to a strict calories-in, calories-out model. Research has made it clear that certain foods deliver a message to the endocrine system to store energy as fat, while others that are high in calories (think avocados!) don't make us pack on the pounds as readily. It's the *quality* of food, not just the *quantity* that matters most.

Comorbidities and Frailty: Comorbidities have serious ramifications for immune system resilience and diet is a prime driver of many of these degenerative diseases. They include the obvious ones like heart disease, fatty liver, high blood pressure, and diabetes, but many other conditions are, at least in part, diet-related. Diet is also a prime driver of frailty. Sarcopenia, which is the loss of muscle mass as we age, is the hallmark of frailty, and poor diet magnifies the problem. A lack of protein as the basic building block for muscles is often talked about, but fruits and veggies are also being recognized for their ability to put the brakes on the deterioration process.[12] Without question people with comorbidities and frailty die at a higher rate from anything that taxes their immune system, COVID-19 included.[13][14]

Inflammation: Inflammation is responsible for a wide range of harmful effects when left unchecked—sore joints, blocked arteries, blood clots, brain disorders, and the "cytokine storm" of COVID-19 to name a few. But diets can be pro-inflammatory or anti-inflammatory. Unfortunately, our typical Western diets—laden with refined carbohydrates, processed oils, corn-fed livestock, and chemicals, and bereft of fresh produce and oily fish—are highly pro-inflammatory. Prioritizing anti-inflammatory foods can staunch the internal fires that cause damage.

Toxins: They surround us, in the air we breathe, in the water we drink, in the products we put on our bodies, and in many of the substances we indulge in, like alcohol, tobacco, and recreational drugs. So, too, the medications we take to relieve our symptoms, but

[12] https://academic.oup.com/ajcn/article-abstract/112/6/1540/5918520?redirectedFrom=fulltext

[13] https://www.mdedge.com/dermatology/article/232586/coronavirus-updates/blood-glucose-admission-predicts-covid-19-severity

[14] https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(20)30146-8/fulltext

unfortunately take a toll on our detoxification capacities. But food, too, is a prime delivery route of environmental toxins into our bodies. These alter our metabolisms and suppress our immune systems. Clean eating is a prerequisite to resilience. (We'll devote an entire chapter to the subject of detoxification.)

Microbiome: There's a strong relationship between the bacterial composition of our GI tracts and immunity and metabolism, and there's even recent evidence of a relationship between an unbalanced microbiome and more severe outcomes from COVID-19.[15][16] Both good and bad species can be present in our microbiomes, and what we eat, to a large extent, determines the balance in our intestines. Refined carbohydrates cause bad bugs to proliferate; chemicalized food hinders the growth of beneficial bacteria. Fiber feeds helpful species, and fermented food introduces good bacteria.

Essential Micronutrients: Foods are delivery systems for an array of micronutrients, which are essential for protecting our DNA and cells. Antioxidants—including classic vitamins and minerals like beta carotene, vitamin C, zinc and selenium, as well as plant compounds too numerous to list—are vital, and while a daily multivitamin can provide some of our requirements, antioxidant protection cannot be gleaned from pills alone. We need the embedded antioxidants in food to essentially mop up the damaging free radicals that are naturally produced by our bodies every single day. And that's just one category; there are other micronutrients that are vital for optimal immune function as well, like vitamins B, D and K, copper, manganese, and other unique substances.

Nitric oxide: Nitric oxide is an important chemical that's released through processes in our body, and foods like beets and arugula support its production. The ability to sustain high levels of nitric oxide within the body has been linked to resistance to high blood pressure and heart disease. It also may be a key protectant against the adverse effects of respiratory viruses. Some have theorized that the respiratory collapse that characterizes life-threatening viral pneumonia results from exhaustion of the body's nitric oxide

[15] https://theconversation.com/a-healthy-microbiome-builds-a-strong-immune-system-that-could-help-defeat-covid-19-145668
[16] https://gut.bmj.com/content/early/2021/01/04/gutjnl-202

reserves. Clinical trials are underway to determine if nitric oxide support can help save severely ill Covid-19 patients.[17]

Why Nutrition Is So Often an Achilles Heel

Nutrition is an "Achilles Heel" for many, if not most, of us in western society. This point was brought home during the pandemic, when "co-morbidities" were found to be key determinants of whether or not people who contracted the virus ended up hospitalized—or dead. While it's true that genes can predispose us to some of the things that negatively impact immunity—like overweight, certain diseases, and frailty—our diets contribute considerably. And unlike our genes, our diets are subject to our control. We can prevent, lessen the impact, or even reverse many of the conditions that sabotage our immunity when we learn how to eat.

Unfortunately, many forces steer us away from an ideal diet. In fact, prominent nutrition authorities contend that the U.S. food system is literally killing us. It fosters over-consumption of unhealthy foods that are endowed by food manufacturers with characteristics that make them ultra-palatable and addictive. Their processed features are a radical departure from what our bodies evolved to benefit from before the advent of industrialized food production.

For example, the introduction of high-fructose corn syrup during the mid-20th Century —and its ubiquitous presence in sodas, fruit drinks, candies, and processed foods from salad dressings to baked goods—has coincided with the dramatic uptick in weight gain and diabetes in western countries like ours.[18] Furthermore, economic incentives steered by government subsidies keep the prices of commodities like wheat, corn, and soy artificially low. The result is a profusion of high-profit-margin products made with refined flour, high-fructose corn syrup, and

[17] https://www.medicalnewstoday.com/articles/covid-19-nitric-oxide-shows-promise-as-antiviral-treatment
[18] https://www.sciencedirect.com/science/article/pii/S1570677X19301364

ultra-processed vegetable oil, which are then preserved with dodgy chemicals. They are engineered for palatability and shelf-life with little regard for nutrition.

As a result, we live in what some experts have termed an "obesogenic environment"—meaning the environment we live in and the systems that provide our food actually *encourage* behaviors—like unhealthy eating and a sedentary lifestyle—that lead to obesity.

As a consequence, the Federal Nutrition Research Advisory Group, in a July 2020 paper, indicated that 46% of adults in the U.S. have an overall poor quality diet; among children, the percentage was 56%.[19] And of course, we all know that obesity rates are soaring.

So, what can we do about it all?

We know that telling you to "eat right" is one of those things that's easier said than done. There is so much information out there, and so much of it is confusing or even contradictory. How is someone supposed to figure out what to eat and what not to?

First understand that, despite what many marketers will tell you, there is no such thing as a one-size-fits-all diet plan. Genetics, tastes, lifestyle, activity level, ethnicity, religion, and more all play a role in what works—and what doesn't—for each individual. But there are some basics rules that everyone can subscribe to—so we start there with The 7 Rules for Immune-Supporting Nutrition that everyone can follow no matter what their genetic profile, what they like to eat, or what diet (keto, vegan, etc.) they subscribe to or are trying at the moment. They are as follows:

<u>7 Rules for an Immune-Supporting Nutrition</u>

1) Avoid Ultra-Processed Foods
2) Limit Carbs
3) Don't Skimp on Protein and Healthy Fats
4) Time Your Eating

[19] https://sites.tufts.edu/nutritionadvisory/files/2021/01/WP_Executive-Summary_Final.pdf

5) Feed Your Microbiome
6) Highlight Diversity and "Superfoods"
7) Prepare Most of Your Meals

In the coming sections, I'll talk through each of these rules and provide my recommendations, or prescriptions, for how to incorporate them on a daily basis to nourish your immune system.

Rule #1: Avoid Ultra-Processed Foods

You have likely heard this one before. It's well-known that we should avoid "junk food" and "fast food." Your mom probably told you as much. But we want to take a closer look at the subject here because until recently, there was a lack of scientific consensus on what exactly processed foods are, why they are so bad for us, and whether avoiding them really makes a difference. (Spoiler alert: it does, but you might be surprised by why and how much.)

It wasn't until 2010 that Brazilian researchers created a formal classification system for ultra-processed foods (UPFs). Called the NOVA classification, it formally rates food on the degree to which "sophisticated equipment and technology" is used to alter food from its fresh, natural state.

So what are UPFs? According to researchers: "Ingredients characteristic of UPFs include food substances of no or rare culinary use, including sugar, protein and oil derivatives (e.g., high-fructose corn syrup, maltodextrin, protein isolates, hydrogenated oil) and cosmetic additives (e.g., colors, flavors, flavor enhancers, emulsifiers, thickeners, and artificial sweeteners) designed to make the final product more palatable."[20] By this definition, a strikingly high percentage of foods found in your local supermarket contribute to your UPF burden.

[20] https://www.mdpi.com/2072-6643/12/7/1955/htm

After this rating system was established, studies began conclusively linking UPFs to the risk of disease and premature death. For example, researchers demonstrated that UPFs are highly correlated with the risk of obesity. For those in the highest quarter of UPF consumption, there was a 28% increase in the risk of metabolic syndrome compared those who ate minimal junk food. Their inflammatory markers were higher, too.

Furthermore, each 10% increase in UPFs in a person's diet has been associated with a 15% higher risk of type 2 diabetes, a 13% higher risk of heart disease, and an 11% higher risk of stroke. A study showed that the risk of breast cancer was 2.85 times higher in Brazilian women who consumed the highest levels of UPFs.

Premature death being the ultimate adverse outcome, how did consumers of UPFs fare? In a US study, those with the highest intake of UPFs had a 31% higher risk of all-cause mortality. In a Spanish survey, the risk was even higher at 44%.

How exactly do UPFs undermine health? Probably in a multitude of ways. One is simply because they deliver "empty calories"—a surplus energy wallop bereft of nutritional value. Another is because they lack healthy fiber, essential for optimal function of the microbiome (more on that later). Additionally, they may be Trojan horses for toxic chemicals (more on that later as well). Finally, they're precision-engineered by food scientists to be ultra-savory and addictive, and they're cheap, ubiquitous, and aggressively marketed, which means that for most people, it's actually easier and less expensive to eat unhealthy foods than it is to eat healthy ones.

Prescription

The fresher the better. While each person will have to take in account their lifestyle and the accessibility of fresh food in their area, following are some ideas to get you started:

1) As much as possible, aim to return to the old European way of making frequent trips to the store for ingredients to cook and consume within a day or two.
2) When fresh isn't possible, use frozen or packaged foods without UPFs. Get in the habit of reading labels to avoid unnecessary additives.
3) Please, try to get out of the habit of stocking up at Big Box stores! While they may be great for paper towels and toilet paper, no one needs an extra-large tub of anything cluttering up their garage. Super-sized portions may seem like a bargain, but they're subject to deterioration and rancidity. Besides, anything with a shelf-life that may span years is likely laced with preservatives.

Rule #2: Limit Carbs

Carbohydrates are one of three macronutrient food groups, alongside fats and proteins, and they are primarily an energy source, releasing glucose molecules that are used by the body as fuel. Despite the fact that carbs pack less than half the calories per gram as fats, they have come under the gun recently because of the way they influence insulin metabolism. Insulin is responsible for fat accumulation, and it's theorized that many people with metabolic syndrome arrived at that state because of excessive carb consumption, a characteristic of modern diets.

What has resulted is what we call "the carb conundrum," which has become one of the most controversial issues in nutrition: whether to go low-fat or low-carb. The dispute plays out in bitter arguments on Twitter and Facebook, especially since either of these diets, *when strictly applied*, results in weight loss and improved cardiovascular markers.

Even the government and top health authorities can't make up their minds. The newly updated Dietary Guidelines for Americans[21] doubled-down on its recommendation that Americans restrict their intake of sugar to less than 10% of calories. Thus prompting indignant reactions from nutrition groups who called for *even* more stringent bans and bitter accusations that the guideline authors were in the pockets of food conglomerates.

The rationale of many who still recommend plentiful carbs remains the outmoded notion that fat is the real culprit, and that the caloric and metabolic impact of carbs can be blunted when packaged in slow-release form. This is referred to as the glycemic index (GI) theory, which holds that the metabolic effect of carbohydrates is determined by their matrix. High-fiber carb sources are thought preferable to refined ones. A whole grain bran muffin trumps a white bagel; a baked potato is preferable to instant mashed potatoes; brown rice is better than white rice . . . and so on.

But it's our view—one that's shared by many of our nutrition science colleagues—that these generic rules apply only to healthy, young, very active people of normal weight, who are not genetically programmed for metabolic syndrome—which describes only a small minority of Americans. For many of our patients, attempts to simply "reduce sugar" or "eat more complex carbohydrates" don't solve their weight problems, reduce their blood pressure, optimize their lipid profiles, or prevent their blood sugar from skyrocketing.

In contrast, I've seen a truly low-carb diet work for countless patients, and it can be transformative. Study after study has also validated the effectiveness of low-carb diets—consisting of as little as 10%, or even less, of calories from carbohydrates—for reversing metabolic dysregulation. That's about 100-150 grams (or about 3.5-5.3 ounces) of carbs a day.

[21] https://www.dietaryguidelines.gov

A word about low-carb high-fat diets like Atkins or keto. If strictly adhered to, they're unmatched for promoting weight loss and reversing metabolic syndrome. But when you're consuming lots of calories as fat, the gains can easily be reversed if your discipline lapses and you introduce even a smidgeon of carbs. Then your metabolism reverts to the ordinary laws of thermodynamics and all those surplus energy sources are easily rerouted into your fat cells.

A Word About Sugar

Sugar is the name for a wide-ranging class of simple carbohydrates with a sweet taste. They may appear naturally in foods like fruits, vegetables, even dairy (lactose is a form of sugar), we more often think of them in their processed (and much more problematic) form, derived from sugarcane, beets, palm, agave, maple, or any number of sources.

The thing to know about these processed forms of sugar is that they have no nutritional value whatsoever. You may have noticed that they appeared in our discussion of UPFs that preceded this. The relationship between sugar and weight gain is well known, but like other UPFs, added sugars can also have negative impact on your immune system by triggering inflammation that it has to work to contain, thereby diverting resources that could be used for other things like combating infections, from the common cold to COVID-19.[22]

So how much added sugar can you have? As little as possible is really the best answer for your immune health. The UK's National Health Service recommends adults consume no more than 30 grams (about 7 teaspoons) a day. A typical chocolate bar would already exceed that amount, so choose wisely—and sparingly. That said, no one expects you to live an entirely treat-free life, and some added sugars are better than others. The Cooking Tips & Recipes section at

[22] https://lizearlewellbeing.com/healthy-living/health/sugar-immune-system/

the back of the book has you covered.

Prescription

We could all use some carb consciousness, but how conscious should we be? I have 3 "tiers" of low carb diets that I recommend to patients depending on their state of health and whether they're trying to lose or maintain weight.

1. Very low carb: <20gms/day (think diets like Atkins, Keto, or the Carnivore diet)
2. Moderately low carb: 20-100gm/day
3. Limited carbs: 100-150gms/day

Some considerations to help you choose what's right for you:

1. With very low carb (VLC) diets, men tend to do better than women. We've all heard the story where husband and wife go on the Atkins diet and the husband loses 50 pounds in 3 months while the wife loses 7 in the first week and then gets stuck there. This is also a difficult diet to sustain long term. We like to cycle in and out of ketogenic diets.
2. Moderately low carb is easier to follow but may take longer to get to an ideal weight if weight loss is your goal. If it is, starting with VLC and then transitioning to moderate amount may be your best bet.
3. The limited carbs diet is more of a maintenance plan for someone who is normal weight, exercising moderately to high intensity, and typically younger in age like (under 50 in men; 45 in women).

Rule #3: Don't Skimp on Protein and Healthy Fats

While I suggest that you limit your intake of the first macronutrient category of food—carbs—you can support your resolve by prioritizing the other two, which are protein and fats.

Protein

Proteins, which have the crucial task of becoming the building blocks of our cells and organs, are composed of necklaces of amino acids, strung together and coiled into complex structures. Our bodies can make certain amino acids, but others must come from our diet. A diet deficient in these important amino acids has long been known to undermine immune function, leaving a person more susceptible to infectious disease and even death.[23][24]

That alone should be reason to prioritize protein in your diet, but evidence suggests that it can also help you maintain a healthy body weight. Researchers have recently come up with what's called the Protein Leverage Hypothesis, which suggests that humans require a certain amount of protein in their diets and will continue to eat until those needs are met—even if it means overconsuming calories from fat and carbs to get there.[25] You can imagine, then, how starting your day with a carb-filled breakfast like a bagel or a muffin could be a problem for someone who is watching their weight. The same number of calories found in a protein-filled breakfast is more likely to leave person feeling full for a longer period of time.

There's also evidence that protein can stave off some of the negative effects of aging, like frailty and osteoporosis.[26][27] The minimum daily requirement of protein has long been set at 0.80

[23] https://pubmed.ncbi.nlm.nih.gov/17403271/
[24] https://pubmed.ncbi.nlm.nih.gov/2105184/
[25] https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0025929
[26] https://academic.oup.com/ageing/article/49/1/32/5618813
[27] https://doi.org/10.1093/ageing/afz142

grams per kilogram of body weight, but there's growing evidence that older people could benefit from even more to help compensate for the natural loss of muscle and bone as we age.[28]

Of course, there are all sorts of proteins to choose from. So what should you be eating? Following are three basic guidelines to follow:

1) Prioritize animal proteins (if you're not a strict vegan).

Foods vary in their amino acid content, and while vegetable sources of protein like beans contain some amino acids, other key ones are not present in sufficient quantities. These nutritional gaps limit the efficiency of vegetable protein for meeting the needs of protein synthesis and bodily repair. In fact, there's a hierarchy of protein efficiency called net protein utilization (NPU). Egg protein, for example, is a complete and balanced amino acid package designed to support the development of the chick embryo. When compared to that complete protein, the NPU of wheat is estimated at 41%.

I recommend animal protein when possible because, according to research presented at The Physiological Society's 2020 conference: "On a gram for gram basis, animal proteins are more effective than plant proteins in supporting the maintenance of skeletal muscle mass with advancing age."[29] Does this mean you can't be a vegan or vegetarian and still get the protein you need? No, but it does mean you will have to boost your total protein intake in order to compensate. (See the section on Veganism in the resource section for more.)

2) Choose high-quality options.

"Organic" and other such food labels can be the cause of much confusion and questions about whether they are worth the added expense. There are certainly problems with our labeling

[28] https://www.sciencedaily.com/releases/2017/05/170523095019.htm
[29] https://www.sciencedaily.com/releases/2020/07/200707113329.htm

systems, but generally speaking organic tends to be the better choice. This is just as true for protein sources as it is for produce. Organic meat has been found to be lower in saturated fat and higher in beneficial omega-3 fatty acids.[30] Similarly, milk from cows fed organic feed has shown higher concentrations of omega-3s and conjugated linoleic acid (CLA).[31]

A similar nutritional benefit is found with "grass-fed" options. Even red meat may not be as bad for us as we have been led to believe, if we choose quality options. Organic, grass-fed animal products deliver fewer toxins, and grass-fed red meat has more of those omega-3s and fewer pro-inflammatory omega-6 fatty acids. This is not an invitation to eat red meat for breakfast, lunch, and dinner of course, but moderate consumption of unprocessed, organic, grass-fed cuts—especially when part of a portfolio of other lean meat protein options and fish (see the Superfoods section for more on this)—does not appear to be a health liability. And its undeniable satiety effects can deter the consumption of less healthy, ultra-processed refined foods.

3) Don't overdo it.

There is some evidence that excessive protein may foster the growth of certain cancers by helping cells to grow and multiply. For people with impaired kidney function, it may be necessary to limit protein so as not to overburden the kidneys' filtration capacity. Safe to say, aim for adequacy, not excess, which can be defined as more than 2 grams per kilogram of body weight each day.[32]

Healthy Fats

We can't write about nutrition without mentioning fat, the last macronutrient category. The right

[30] https://www.ncbi.nlm.nih.gov/pubmed/26878675
[31] https://www.ncbi.nlm.nih.gov/pubmed/26878105
[32] https://newsnetwork.mayoclinic.org/discussion/are-you-getting-too-much-protein/

fats may support immunity, and consuming fat is not inimical to overall good health. In fact, avoiding it is no longer the golden rule. Instead, nutritionists recognize certain fatty acids as "essential." But let's start with which fats to avoid. The hard-and-fast rule is trans fats. Not much controversy there. Look at labels for the terms "hydrogenated" and "partially hydrogenated." Hydrogenation is used for food preservation so these fats tend to show up in packaged foods like margarine, vegetable shortening, potato chips, and crackers, as well as in fried fast foods.

Saturated fats are another story and a bit of a controversial one. Saturated fat often is solid at room temperature and liquifies in heat. It's mostly found in meats, but there are other sources as well, like coconuts. The research linking saturated fats to disease is, at best, contradictory. Food scientists recognize that the health effects of fats cannot be assessed in isolation, but depend on a person's overall diet. The physiological effects of different forms of saturated fats are modified by the composition of the foods in which they are delivered and how they are cooked. Observational studies of large populations that "prove" risks associated with high intakes of saturated fats are tainted by the likelihood that big consumers of meat, dairy, eggs, and tropical oils might be eschewing healthier foods like fruits, vegetables, and unprocessed and fiber-rich starches. They might also consume more sugar and junk food. This makes it look like saturated fats are the problem when it's really overall diet quality. There is even evidence that the oft-repeated advice to substitute full-fat dairy products with low-fat versions is misguided; dairy that's rich in saturated fat might actually confer protection against cardiovascular disease.[33]

Some of the healthiest types of saturated fats are **short chain fatty acids (SCFA)**, typically found in butter, ghee, and high fat dairy products. A particularly important SCFA called

[33] https://academic.oup.com/ajcn/article/108/3/476/5052139?guestAccessKey=c18b1acf-2778-42b9-8d72-878c0e86cdbf.

butyrate helps protect against colon cancer and lowers inflammation in the gut. Another healthful type of saturated fat is **medium chain fatty acids**, which are also known as **medium chain triglycerides (MCTs)**. Butter contains some MCTs, but coconut oil and palm kernel oil have higher concentrations. There's a reason why many health-conscious folks sing the praises of coconut oil: Research shows that MCTs boost metabolism, improve insulin sensitivity, and even help improve critical thinking and memory. Coconut oil also delivers ample amounts of lauric acid and monolaurin, with documented antiviral effects.

Last, there are **long chain fatty acids (LCFAs)** and **very long chain fatty acids (VLCFAs)**, both of which are found in most animal foods (though these acids are found in mono-unsaturated and polyunsaturated fat, too). While not the health foe they've long been claimed to be, they have fewer health benefits than SCFAs and MCTs. One main reason is their inability to cross the blood-brain barrier—meaning your brain can't use them as fuel.

LCFAs are abundant in the American diet, particularly in processed oils that have gone rancid from light exposure or from being overheated, and in lard from meat and dairy made from non-grass-fed animals. This is why I recommend choosing leaner cuts, and cooking it appropriately (i.e. no charring) and choosing more fish and poultry.

That said, I believe it's misguided to slavishly avoid saturated fats and it's the overall diet that plays a more important role in your overall health. Suffice to say for now that there are healthy fats that you should look to include in your diet.

Omega 3 fatty acids, for example, are a type of polyunsaturated fat that may play a role in your immunity. Recent research hypothesizes that higher omega 3 levels in our bloodstream decrease the risk of death from COVID-19.[34] Omega 3's also have been linked to improvements

[34] https://www.medrxiv.org/content/10.1101/2021.01.06.21249354v1.full?utm_source=Akreto&utm_medium=email&utm_campaign=Research%20Extracts&utm_content=Extracts%20-%20January%202021&tid=60184560d118845f315076ed

in blood pressure, cholesterol markers, memory, and depression, but it is their impact on reducing inflammation that is the most impressive. To get these benefits, we must find omega 3's in our diets because our bodies can't make them. The richest sources are fish like salmon and sardines, flaxseeds, chia seeds, walnuts, free-range eggs, and grass-fed meat. The emphasis here is on free range and grass fed because they have been shown to have higher contents of omega-3 fatty acids. Another type of polyunsaturated fat is omega 6 fatty acid, which we need to make hormones. These fats are abundant in our diets and some can be inflammatory, so it's important to balance with more omega 3 containing foods.

Finally we must give a nod to monounsaturated fats, which are loaded with omega 9 fatty acids and are found in seeds and plant oils. Olive oil and macadamia nut oil are particularly high in monounsatured fat, which has been shown to have great cardiovascular benefit. But really what's most important here is to strike the right balance of omega 3, 6 and 9 fatty acids.

Rule #4: Time Your Eating

Recent research has shown that a healthy diet isn't just about what you eat, but *when* you eat as well. Eating your calories earlier in the day has been shown to boost metabolism and therefore indirectly impacts immunity. Late eating, by contrast, has been associated with an increased risk of becoming overweight or obese, as well as developing cardiometabolic issues like heart disease and diabetes.[35] There is an old adage about eating "breakfast like a king, lunch like a prince, and dinner like a pauper," which turns out to be rather sound advice. Front-loading your calories is a useful strategy for overall good health that anyone can adopt.

[35] https://academic.oup.com/ajcn/article/113/1/154/5918527

This may mean a change in habits for some, but once you get used to eating breakfast "like a king" and avoiding late-night snacking, it's worth taking the strategy of timing your eating a bit further. Research regarding the health benefits achieved with fasting has increased significantly over the past five years. And this isn't an entirely new concept. Fasting has been used for centuries as a religious practice before it was shown to be beneficial for the whole body.

Of course, there are a number of different ways you can fast, some of which are better than others. Here are a few:

- Water fasting: Drinking only water during a set period of time. This is most commonly used in religious practice, but isn't generally recommended for its health benefits because it tends to be too stringent for most people.

- Juice fasting: Drinking fruit or vegetable juice with no chewing of anything. This means you don't eat or chew any fruit, vegetables, or food during a set period of time. We are sometimes reluctant to recommend this kind of fast for a variety of reasons. For example, imbibing sugar rich juices made from carrots, beets, or exotic fruits can elevate blood sugar and perpetuate a cycle of carb cravings, creating more issues.

- Intermittent fasting: Consuming nothing but water for a 24-hour period. This is done typically 2 days a week, and for best results those 2 days should be contiguous. But there are variations. For example, instead of just water some opt for 2 days of very low calories like the 5:2 diet popular in the UK with a limit of 500 calories during those 2 days.

- Time restricted eating: Allowing yourself to eat only in a certain time frame. An example would be to choose an 8-hour window—say, from noon to 8:00 pm—in which to fit all your meals. You might do this 3 days a week or make it a daily routine. Or select a less stringent fasting interval, starting with just twelve hours. (See prescription below.)

Caloric restriction is not officially a type of fasting but deserves mention. Like fasting, calorie restriction, which typically means consuming less than 1000 calories a day, has been associated with increased longevity and healthy aging. In fact, there is a ton of research on calorie restriction. The problem is that it's nearly impossible to do for most people. It can also lead to an unhealthy behavior of over-restricting foods and might fuel eating disordered behavior. It may

have other negative impacts, too, especially in people with insulin dependent diabetes, so please don't try it without consulting your doctor first!

In modern society, we don't often allow ourselves to feel hungry and it turns out our bodies need that sensation to set off a chain of metabolic reactions that enable us to burn fuel and fat more efficiently. According to a 2017 review, research has demonstrated that fasting works by reducing:[36]

- overall body fat
- resting heart rate and blood pressure, while increasing heart rate variability
- chronic inflammation
- stress-related damage to the brain and heart
- insulin and leptin, while increasing insulin and leptin sensitivity
- the risk of diabetes

In addition to the metabolic switching (burning fat vs. carbohydrates for fuel) that takes place, this form of eating also leads to systemic cellular responses that carry over into the feeding hours. During fasting, cells activate the autophagy defense pathways that remove and repair damaged molecules.[37] During the feeding hours, these responses continue to activate cell growth, plasticity, and regeneration. This is beneficial for a variety of reasons, not the least of which is that plasticity keeps our brains young. Literally meaning flexibility or capability of being molded, plasticity is what allows our nervous system to register and learn new ideas.

Among the options noted above, time restricted eating is what we most often recommend and research is proving it to be very advantageous. According to an article in *The New England Journal of Medicine*, it can increase stress resistance and longevity while decreasing incidences

[36] https://www.nejm.org/doi/pdf/10.1056/NEJMra1905136?articleTools=true
[37] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7351063/

of disease, including obesity and cancer.[38] Muslims who observe Ramadan, a month of fasting from sunup to sundown, may have a positive immune effect against Covid-19.[39]

In order to gain the most benefit, it's my recommendation to make time-restricted eating *a way of life*. This is not a short-term strategy, but it is absolutely doable and sustainable for most people. If you have any comorbidities, like diabetes or hypertension, you should be closely monitored with your physician, especially because of the likelihood that you may need to lower your medications when you lose weight.

Prescription

Start by front-loading your calories and work up from there. Once you get in the habit of avoiding late eating, try *fasting for at least 13 hours each day*. For example, stop eating at 8:00 pm and then start your first feed at 9:00 am the next day. Water, herbal tea, and black coffee are okay to have during the fast.

If you find this difficult, start with only 12 hours and try it for 28 days in a row to make it a habit. Once it is, add an extra hour a few days a week until you can shift your schedule permanently. With certain precautions, you can try even longer periods—up to 16 hours of fasting—for greater benefit.

Rule #5: Feed Your Microbiome

[38] https://www.nejm.org/doi/pdf/10.1056/NEJMra1905136?articleTools=true
[39] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7423203/

As I noted in the beginning of this chapter, a balanced microbiome contributes to a robust immune system and overall healthy function. In addition to the things I have already talked about—like reducing refined carbs and UPFs, which can have a negative impact on your gut bacteria—there are two main dietary components that support the microbiome: 1) fiber, which feeds healthy bacteria, and 2) fermented foods, which introduce good bacteria to your gut.

Fiber

You have probably heard already that fiber is good for you, and that it's sadly lacking in the typical Western Diet. Fiber is often referred to as "roughage", thought to provide bulk and thus make us feel full. An increase in fiber is often recommended as part of a weight loss program.

Fiber, however, does a lot more than just fill us up. Fiber has a spongelike effect that draws water into the intestine, which helps keep things moving through our digestive system and prevent constipation. This may be the reason why a high-fiber diet has been shown to reduce the risk of colon cancer.

It's interesting to note that attempts to replicate the effects of a diet high in natural fiber (from fruits, vegetables, nuts, legumes, and whole grains) through over-the-counter products like Metamucil® have produced ambiguous results when it comes to cancer prevention.[40][41] There is something about natural fiber that seems to confer resistance. It may have to do with the protective polyphenols that are inextricably linked to natural fibers, but get

[40] https://academic.oup.com/ajcn/article/112/3/603/5867027
[41] https://academic.oup.com/ajcn/article/112/3/603/5867027

lost in refining. It's now clear that certain polyphenols—like cacao and resveratrol—exert their beneficial effects in part by acting as prebiotics—food for beneficial bacteria in the intestine.

Fiber may also pull excess cholesterol out of the body, recycling it through the liver and gallbladder into the digestive tract where it is then bound up and excreted. And it slows down carbohydrate assimilation, time-releasing the glucose molecules within starchy or sugary foods like grains, beans, root vegetables and fruit. Therefore, increasing dietary fiber may confer protection against metabolic syndrome and diabetes. But for carb-sensitive individuals, the downside of all those excess carbs may outweigh the protective effects of the fiber-rich foods.

Additionally, certain fibers—like lignin from flax—may modify hormone levels, which could help put the brakes on breast and prostate cancer.

Fiber tends to get a bad rap when it comes to taste, but fiber friendly foods aren't all gritty or tough. Soft, soluble fiber that has a creamy consistency, like pectins from apples and beta glucans from oats, offer just as much benefit. And there is such a thing as too much fiber. We often see patients who have overdone it with the "virtuous" raw vegetables, beans, and whole grains, which overtaxes their intestines and causes GI distress.

Keto-Friendly Fiber[42]	
Artichoke, 1 large	10.4gm
Avocado ½	9 gm
Blueberries, 1 cup	4 gm
Chia seeds, 1 ounce	9-10gm
Flax seeds, 1 ounce	8 gm
Jicama, 1 cup	6 gm
Spaghetti squash, cooked 1 cup	2 gm

[42] Whittle, Naomi, *High Fiber Keto*

Shredded coconut, 1 cup	7 gm
Almonds, 1 ounce	4 gm
Zucchini, cooked 1 cup	3 gm
Walnuts, 1 ounce	2 gm
Sunflower seeds, ¼ cup	2 gm
Pumpkin, 1 cup	0.6gm

Fermented foods

Since time immemorial, humans, faced with the perishability of fresh foods before the advent of refrigeration and canning, have devised ways of preserving foods and enhancing their taste via fermentation. Milk was made into cheese, yogurt and kefir; cabbage into sauerkraut and spicy kimchi; cucumbers into pickles; soybeans into natto. A host of other vegetables and foodstuffs were rendered storable via pickling. Virtually every traditional culture has its favorites.

Because fermented foods retain traces of live bacteria, they're valuable sources of probiotics and their chemical byproducts, which maintain the diversity and integrity of our microbiomes. Fermented foods help reduce inflammation in the gut and mucosal immunity, which can help the body fight infections like COVID-19.[43] In fact a survey of fermented food consumption in various European nations found that "for each gram/day increase in the average national consumption of fermented vegetables, the mortality risk for COVID-19 decreased by 35.4%."[44] While correlation is not necessarily causation and other variables may be at work, this offers a tantalizing hypothesis about the power of fermented foods to support immunity.

A note of caution when searching for fermented foods to incorporate into your diet: you want options that have *not* been rendered sterile with preservatives like sodium benzoate and

[43] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7378002/

[44] https://www.researchgate.net/publication/342754388_Association_between_consumption_of_fermented_vegetables_and_COVID-19_mortality_at_a_country_level_in_Europe

calcium chloride. (Look for these common additives when you shop for pickles.) Real fermentable foods are "live" and are best kept under refrigeration. Better yet, learn how to make your own! (See the recipe section for some options to try.)

Prescription

Fiber should be part of your daily diet. However, if you're on a low carb diet, it can be really difficult to get enough. See the sidebar for a list of Keto-friendly fibers that can help.

Fermented foods—like kimchi, miso, kombucha, kefir, and sauerkraut—are eaten daily in some cultures, but aim for at least three times a week. And don't forget to look at the labels for additives. Some popular kombucha brands are loaded with added sugar, for example, but you will find plenty of options with minimal if you look for them.

Rule #6: Highlight Diversity and "Superfoods"

The best overall advice we can give you about nutrition is to aim for a diverse diet of real, whole foods. Because our bodies need a wide variety of nutrients for optimal health and because no single food or food group encompasses them all, eating a variety of vegetables, fruits, lean protein, and fats is the best way to get what you need. This is sometimes called "eating the rainbow," which means choosing an array of different colors and types of foods each day to optimize your nutrient profile.

Within the diversity spectrum, there are some "superfoods" that have been linked to benefits for the immune system and are worth paying particular attention to. Articles about superfoods abound these days, but the truth is that there's no consensus among nutrition

scientists about exactly what constitutes a superfood.[45] Typically what elevates a food into the superfood pantheon is some attribute that augments defense against, for example, cancer, diabetes, heart disease, cognitive decline, gastrointestinal issues, or pathogens. What complicates matters is that there's considerable overlap. A food that's helpful for detoxification—broccoli sprouts, for example—might earn bona fides against a whole spectrum of diseases. There's also the matter of "nutrient density"—the degree to which exceptional nutritional qualities are concentrated into a food, meaning you don't have to consume so much of it to acquire benefits. For example, apples are sometimes considered a superfood by virtue of their content of quercetin, a substance theorized to confer protection against viral infections. But, while among the most popular in the hierarchy of quercetin-containing foods, apples lag behind onions, tea, red wine, watercress, and red leaf lettuce. And pickled capers are nature's richest source of quercetin—but who can consume more than a sprinkle of salty capers at a sitting?

Additionally, individual foods each contain a concatenation of beneficial compounds: scores of distinct prebiotic fibers, polyphenols, antioxidants, vitamins, and minerals. But like a talented film star with a repertoire of skills among a flock of less versatile wannabes, a few foods stand out. What follows is an introduction to some of the standouts (with no intended slight to innumerable gifted understudies worthy of auditioning for the title of superfood). These are the stars of the immune-boosting show.

Polyphenol-Rich Foods

You've probably heard about polyphenols even though you may not know exactly what they are. They're touted as the magical ingredients in "Superfoods" that convey all kinds of health

[45] https://www.livescience.com/34693-superfoods.html

benefits. There are over 8,000 polyphenols, and they're only present in plant foods and spices. Berries, coffee, tea, and red wine are among the richest sources of beneficial polyphenols, but many other foods deliver them as well.

Why did plants evolve to produce polyphenols so beneficial to human health? No, it's not plant altruism toward humans. It's an exquisite example of *co-evolution*, in which substances designed to protect plants from stress—insect predators, extremes of temperature, or fungal invasion, for example—are harnessed by animals to confer a myriad of health benefits. In fact, polyphenols actually have a flavor signature that makes humans seek them out. Thus, more flavorful fruits, vegetables, and spices are richer in polyphenols. An example is resveratrol, a polyphenol found in **red wine**. It is believed that since a specific grape in Sardinia, Italy has the highest resveratrol content of all, that this is one of the reasons why the region is a Blue Zone—an area in the world where people live the longest. The resveratrol content in grapes is amped up in response to cold weather, which is likely why vineyards in typically balmy climates yield grapes considered inferior in taste to those subject to cold snaps. Resveratrol is thought to be heart-healthy and the basis of the "French Paradox" by which the French enjoy relative freedom from cardiovascular disease despite rich diets.

Polyphenols possess potent antioxidant activity, and they're also strongly anti-inflammatory. Back to quercitin, one of the most common polyphenols, found in apples, black tea, and onions, may act on viral proteases, enzymes that enable viruses like COVID-19 to invade and damage cells. Catechins like EGCG (epigallocatechin gallate), present in **green tea**, have well-researched antiviral and anti-inflammatory effects as well.[46]

[46] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7367004/

In addition to tea, **coffee and cocoa** are rich in polyphenols. This may explain the seemingly paradoxical longevity dividends obtained by coffee drinkers and consumers of dark chocolate, once shunned as unhealthy indulgences.

Others with exotic names like kaemferol (found in **spinach, cabbage and dill**), naringinin (**citrus fruit**), luteolin (**celery**), carvacrol (**oregano**), oleuropein (**olive oil**), proanthocyanidins (**berries and pomegranates**), and curcumin (**turmeric**) confer similar protection. (More on many of these in our section on supplements).

In addition to their direct effects, it's now recognized that polyphenols may exert their protective effects via the microbiome. Consuming them may nourish the bacteria in our intestines, favorably altering the composition of GI flora. Harmful species may be kept in check, and beneficial microbes encouraged, resulting in enhanced immunity and metabolism.

Since there's no single "magic bullet" that unequivocally vanquishes pathogens and promotes resilience, it's good practice to diversify your portfolio of polyphenols by consuming a wide array of fresh, flavorful, and colorful natural plant foods, spices, and beverages.

<u>Beets</u>

Beets are at the head of the class of a group of foods that are rich in dietary nitrates, natural chemicals that are precursors to nitric oxide (NO). Nitric oxide garnered a lot of attention in the 1990s as researchers explored its potential for promoting circulation. But a funny thing happened during a clinical trial for a new drug intended for patients with hypertension and heart failure. At the end of the study, participants were told they could stop their medication, but many asked where they could get additional supplies. Intrigued, researchers asked why. It turned out the

medication aided men's sexual performance. (It was later marketed as Viagra.) Because NO dilates blood vessels, it gave a hydraulic boost to more than just men's hearts.

How does this relate to immunity? We saw with COVID-19 that hypertension was one of the common comorbidities that put people at higher risk. And it turns out that foods rich in nitrates—including spinach, arugula, celery, garlic, pomegranates and apples, as well as beets—can deliver circulatory benefits.[47][48]

And they can do more than just combat hypertension. COVID-19 is believed to put inordinate stress on the body's NO reserves. Patients often succumb to strokes and heart attacks, in which endothelial function plays a critical role. NO is also crucial for pulmonary function, and may be seriously depleted when the lungs are inflamed or damaged. So much so that a clinical trial has been launched to see if a novel nitric-oxide based therapeutic drug could ameliorate symptoms in hospitalized patients with COVID-19.[49]

Berries

Berries make practically everyone's list of Superfoods. That's because they are rich in antioxidants, including vitamin C. But what makes them distinct is their content of beneficial polyphenols called proanthocyanidins whose purplish hue lends berries their distinctive color. In addition to anticancer and neuroprotective effects, berry polyphenols have been demonstrated to enhance immunity. Several studies highlight their role in staving off colds and flus.[50] Elderberry,

[47] https://pubmed.ncbi.nlm.nih.gov/22019438/
[48] https://pubmed.ncbi.nlm.nih.gov/29745362/
[49] https://www.biospace.com/article/releases/clinical-study-begins-for-the-first-oral-systemic-nitric-oxide-based-therapeutic-for-african-americans-with-covid-19/
[50] https://nutritionj.biomedcentral.com/articles/10.1186/1475-2891-12-161

in particular, has been used traditionally in tinctures and decoctions to relieve cold and flu symptoms. It's antimicrobial and antiviral properties have been well-documented.[51]

Cabbage Family

The brassica family of foods—including broccoli, cabbage, mustard, cauliflower, kale, Brussels sprouts, and kohlrabi—are richly endowed with compounds that have been the object of intense research. Chief among those compounds is sulforaphane, a detoxifier that accelerates the breakdown and elimination of harmful compounds and waste products. According to studies, it may play a role in supporting the immune response with applications for cancer, macular degeneration, and autism.[5253] A second compound, called diindole methane (DIM), was also found to be "a potent stimulator of immune function."[54]

An enzyme called myrosinase is responsible for the conversion of glucosinolates in cruciferous vegetables to bio-active sulforaphane. But studies have shown that cooking broccoli, even steaming it lightly for more than a minute, destroys much of the myrosinase activity, rendering it a far less potent source of sulforaphane. While intestinal bacteria have some ability to synthesize myrosinase, many individuals lack this ability, particularly if they have an imbalanced microbiome. So when it comes to consuming cruciferous vegetables, your best bet is to consume them raw, like fresh broccoli sprouts, or very lightly braised. You can also amp up the delivery of sulforaphane by consuming cabbage family vegetables with a tangy dressing made of freshly grated wasabi, daikon, or horseradish—all rich sources of myrosinase.

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[51] https://nutritionj.biomedcentral.com/articles/10.1186/1475-2891-12-161

[52] https://pubmed.ncbi.nlm.nih.gov/26820305/?dopt=Abstract

[53] https://www.sciencedaily.com/releases/2008/03/080306133919.htm

[54] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2387240/

Keep in mind, however, that excessive consumption of brassicas can suppress thyroid function. This is usually not a problem for people consuming ordinary portions, but the frequent consumption of fresh cabbage juice or a daily kale smoothie may present problems.

Cocoa Power

You might be happy to learn that cocoa can be a powerful tool for restoring metabolic wellness and immunity. This is likely due to the fact that the cacao bean, from which chocolate is derived, is rich in antioxidant *flavanols*, a category of polyphenols.

And the studies on this subject are many. Researchers tell us that regular intake of cocoa powder and/or dark chocolate can lower blood pressure, as well as improve the flexibility of arteries. In rats bred to model human obesity and diabetes, a cocoa-rich (10%) diet reduced blood sugar, increased insulin sensitivity, and actually helped insulin-secreting cells in the pancreas to regenerate. There's ample evidence that cocoa also promotes nitric oxide (NO) generation—remember that NO supports circulation by helping arteries to dilate, and it affects platelets by making them less sticky and less prone to blood clots. Cocoa consumption has even been shown to reduce cholesterol and triglycerides and modulate several risk factors associated with metabolic syndrome.[55]

Some of these claims may be over-ambitious, and candy should not be mistaken as health food! Still, there is ample reason to consider incorporating cocoa into your diet as long as it's the right kind of cocoa. Seek out sources that don't deliver a wallop of sugar, which can undercut the benefits. And choose dark over milk chocolate as the addition of milk interferes with the bioavailability of those valuable flavanols. We recommend going for at least 70% dark chocolate, preferably 85% or 90% if you can stand the bitterness.

[55] https://doi.org/10.3390/nu11040751

Another problem results from processing of raw cocoa with a method called "dutching." By treating natural cocoa with alkali, its bitter flavor is suppressed, but this process may reduce its flavanol content by up to 20-fold![56] Most commercial chocolate is heavily dutched, so seek out products that minimize processing. (See the Resource section for sources.)

Coconut

Coconut oil has been much-maligned because it delivers a wallop of saturated fat—supposedly the bad kind when it comes to heart disease. And consumption of coconut oil does in fact cause a rise in LDL cholesterol, the type implicated in cardiovascular risk,[57] which has led to its use being discouraged by heart authorities.

But LDL skeptics believe that a transient elevation in LDL merely reflects the body's adaptation to saturated fat intake and doesn't necessarily equate to heart risk. In fact, epidemiological studies of Pacific Islanders who obtained a high percentage of their calories from coconuts had a low incidence of heart disease—it was almost unheard of before the introduction of Western foods.

And coconut oil delivers more than just saturated fat. It's a rich source of medium chain triglycerides (MCTs), which are essential for GI health. And even more germane to immunity, it's a source of unique antiviral compounds, lauric acid and monolaurin, which are thought to dissolve the lipid envelope that encapsulates viral RNA and inhibit the binding of viral proteins to the cell membrane.[58]

[56] https://life-enhancement.com/pages/effect-of-treating-cocoa-with-alkali-the-dutching-process
[57] https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.119.043052
[58] https://www.mdpi.com/2072-6643/13/2/464

A group in the Philippines recently tested the hypothesis that administering virgin coconut oil to patients with COVID-19 could ameliorate symptoms. Indeed, the group receiving coconut oil had a faster recovery, and less severe disease, than a comparable control group.[59] While no miracle cure, the researchers concluded that dietary coconut oil might prove a useful and economical adjunct to conventional treatments for COVID-19 and other viral infections.

Fish

We have already talked about protein as something to prioritize in your diet, but fish deserves a special mention. Multiple studies have been undertaken recently to determine if fatty acids found in fish oils have a beneficial effect on COVID-19 infection.[60] Fish is also a good source of essential nutrients like selenium (especially yellowfin tuna, but also sardines, oysters, clams, halibut, shrimp, salmon, and crab) and zinc (particularly shellfish). Vitamin D—which the British government saw fit to provide to older and vulnerable residents during the pandemic in order to combat COVID-19 infection[61]--can be found in abundance in salmon, with just one 3.5-ounce serving providing two-thirds of your recommended daily values.

One drawback to a diet rich in fish is mercury contamination. Some fish are high in mercury, which can cause health issues, especially for pregnant women. The best advice is to simply more often choose low-mercury options—like salmon, freshwater trout, shrimp, and sole. Also, certain fish species, especially those sourced from polluted lakes or coastal waters, are high

[59] https://www.nutraingredients-asia.com/Article/2020/03/11/Coconut-and-COVID-19-Philippines-studying-antiviral-properties-of-coconut-oil-as-potential-treatment

[60] https://www.medrxiv.org/content/10.1101/2021.01.06.21249354v1.full?utm_source=Akreto&utm_medium=email&utm_campaign=Research%20Extracts&utm_content=Extracts%20-%20January%202021&tid=60184560d118845f315076ed

[61] https://www.dailymail.co.uk/news/article-8925321/Millions-elderly-vulnerable-free-Vitamin-D-government.html

in PCBs, and other dangerous chemical pollutants. (Consult the resource section for information about the mercury content of different fish and better fish choices).

Garlic

Garlic—and the allium family of vegetables as a whole, which includes leeks and onions—are consumed around the world and count as superfoods for several reasons. First, they are rich sources of sulfur compounds with anticancer and circulatory benefits.[62] Second, they can function as prebiotics, which help cultivate a healthy microbiome. Third and finally, they have antimicrobial effects that support immune function. In fact, garlic consumption may account for some of the health benefits seen with the highly touted Mediterranean Diet.

Mushrooms (the culinary kind, not the psychedelics!)

Mushrooms may be among the most super of superfoods. They are made up of a high percentage of water (93-95%), valuable minerals (iron, potassium, phosphorus, calcium, and copper), and vitamins B and D. They are relatively high in protein and low in calories. They contain all the essential amino acids required by adults and are one of the best plant-based sources of niacin in the world.[63] And they are also good sources of beta-glucans (particularly shiitake, maitake, reishi, shimeji, and oyster varieties) which have been shown to have immune-modulating properties. It is important to note that beta glucans are found in the cell wall of these mushrooms and must be extracted through heating—so this particular benefit is only evoked with cooked mushrooms but is maximally obtained through supplementation (more on that in the next

[62] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6694434/

[63] A Review on Different Benefits of Mushroom DOI: 10.9790/3008-120102107111 www.iosrjournals.org 109.

chapter).

Certain varieties, like Lentinula edodes (shiitake) and Grifola frondosa (maitake), even have a long history of medicinal use in parts of Asia. Medicinal mushroom research has indicated potential cardiovascular, anticancer, antiviral, antibacterial, antiparasitic, anti-inflammatory, hepatoprotective, and antidiabetic activities.[64][65]

Olive Oil

Olive oil has often been cited as the "secret sauce" that makes the Mediterranean diet so healthy. It's a vegetable oil, but unlike most of its kinsmen—sunflower, safflower, corn, soy, cottonseed—it's monounsaturated, not polyunsaturated, which is thought to be more beneficial.

But olive oil's health benefits aren't limited to that. Canola oil, derived from rapeseed, mirrors the fatty acid profile of olive oil, but can't stake the same claim to heart health. That's because canola is highly processed and bereft of the polyphenols that lend olive oil its distinct flavor and aroma. Olive oil is rich in an array of compounds that support circulation, enhance immunity, protect the brain, dampen inflammation, and even may fortify bones.[66]

Make sure to buy fresh olive oil in relatively small quantities and store in a dark container at a cool temperature (no need to refrigerate as it tends to solidify). Look for extra virgin olive oil, which signifies higher quality. The oil should be aromatic, with a distinct piquancy that you can feel on the back of your tongue, which is a signature of its beneficial compounds.

Olive tree leaves have been used in traditional medicine for millenia. It turns out they're even higher than olive oil in beneficial polyphenols, especially oleuropein, which has

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[64] Lentinan, 2009

[65] http://www.iosrjournals.org/iosr-jpbs/papers/Vol12-issue1/Version-2/Q120102107111.pdf

[66] https://olivewellnessinstitute.org/extra-virgin-olive-oil/bioactive-compounds/

antimicrobial properties.[67] Extracts of olive leaf have been shown to enhance the activity of crucial white blood cells involved in immune defense (a subject we'll cover in more detail in the chapter on supplementation).

Tea

Tea, especially green tea, contain a variety of compounds that support health. In fact, scientific literature abounds with references its protective effects against heart disease, cognitive decline, cancer, diabetes, and inflammation. Studies even suggest that it can help with weight loss.[68][69]

There's also a body of research proposing that tea specifically supports immunity and safeguards against viral infections. Tea flavones have been found to increase the number of regulatory T cells, specialized white blood cells that fight pathogens, and put the brakes on autoimmunity.[70] Important to note: tea is best consumed without milk or non-dairy creamer, because adding these additions may bind up and neutralize its valuable polyphenols!

Prescription

Eat the rainbow and consume a variety of nutrient-rich foods, prioritizing superfoods as much as possible!

Rule #7: Prepare Most of Your Meals

[67] https://www.eurekaselect.com/157221/article
[68] https://www.sciencedirect.com/science/article/abs/pii/S0261561419302304
[69] https://www.intechopen.com/online-first/role-of-tea-polyphenols-in-metabolic-syndrome
[70] https://www.sciencedaily.com/releases/2011/06/110602143214.htm

People who cook most of their meals at home are generally healthier than those who eat out, whether that means take out, fast food, or eating in restaurants. Not only do the foods they prepare themselves tend to be healthier—fewer carbs, less sugar, less salt, and less fat—they also typically consumer fewer calories overall.[71] Home cooking has also been linked to a reduced risk of cardiovascular disease[72], diabetes, and obesity.[73]

It makes sense. Making your own meals offers enhanced awareness and control over what you eat, the quality of ingredients, and how your food is prepared so you can make healthier choices. If you have food allergies or sensitivities, this can be especially important.

Home cooking doesn't have to be time-consuming either. There are plenty of delicious and nutritious meals that can be whipped up in under 30 minutes—less time than it would typically take to pick up dinner at a local restaurant. It's often far less expensive, too. You will find lots more on this topic throughout the book—including healthy cooking help in the Cooking Tips & Recipe section and a discussion on nontoxic cookware and food storage options in the Detoxification chapter—but for now, pay attention to how often you eat out and think about how you might be able to shift a few of those meals into the healthier home-cooking column.

Dr. H's Case Study

When Kevin, 40, first consulted me during the pandemic, he had significant comorbidities: he was over 300 pounds and a blood test revealed his hemoglobinA1c to be 10.5, well above the 6.5 threshold for diabetes. Kevin was a dentist, which meant frequent contact with patients, and he

[71] https://www.sciencedaily.com/releases/2014/11/141117084711.htm
[72] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7766427/
[73] https://www.health.harvard.edu/blog/home-cooking-good-for-your-health-2018081514449

was concerned about contracting COVID because, despite his relatively young age, he was clearly vulnerable to adverse outcomes if it happened.

I was concerned about Kevin because, even though his primary care doctor had prescribed him medication for his diabetes, his at-home fingersticks indicated his blood sugar continued to be wildly out of control. I frankly wasn't entirely confident that a simple diet change could forestall a catastrophe at this late juncture, but seeing that Kevin was seriously committed to a health makeover, we decided to try. I referred him to my nutritionist for help implementing a strict, low-carb, ketogenic diet. At the same time, I urged Kevin, who was sedentary, to undertake a program of light daily walking.

At first the results were discouraging. Kevin's felt de-energized, and inordinate cravings for carbs undermined his resolve. My nutritionist and I recognized this as a classic withdrawal from dependency on his previous carbohydrate-laden diet. It often takes patients a few weeks to undergo the metabolic switch from reliance on sugar and refined carbohydrates as energy sources to ketones derived from dietary fat and from the body's stored adipose tissue.

Around the six-week mark, something clicked. Kevin said his energy was better than it had been in years. So much so that he enrolled in a gym and began working out for up to an hour a day. My nutritionist and I then upped the ante and encouraged him to extend his overnight fast, first to 12 hours, then 14, and even 16 on weekends when he didn't have to go to work.

Kevin's progress accelerated. He had lost 25 pounds. His blood sugars rarely exceeded 200 and were mostly in the normal range. He began to enjoy his regimen of low-carb protein-rich meals without missing pizza, French fries, rice, muffins and croissants.

Kevin's appointment with the diabetes specialist, which had been delayed for two months due to the pandemic, finally rolled around. He gleefully reported that his hemoglobinA1c had

decreased to 6.5-–not perfect, but at the lower limits of the diabetic range. The endocrinologist, who I suspect ordinarily might have ramped up Kevin's meds, instead agreed that continuing his current efforts were likely to suffice to bring him into normal range.

Six months later, Kevin is thoroughly enjoying his metabolic reset. He has lost over 50 pounds and his hemoglobinA1c is well within normal. Moreover, Kevin now has the confidence that, should he be exposed to COVID-19, he will not be at inordinate risk of a severe outcome.

Building Block 2: Supplementation

Diet is the single biggest factor in optimizing immunity, but supplementation is a close second. This has long been an area of expertise for me, so I feel it's important to start off by making the case for supplements. Too often they get a bad rap as unregulated, unproven, and even harmful to the point where many people stay away from them. And yet, we consider them an essential part of any immune-building program. And the flurry of research coming out of the pandemic has only made the case for supplements even stronger.

For example, when President Trump got COVID-19 and was flown to Walter Reed Medical Center, where he arguably received some of the best medical treatment in the world, he was given more than just cutting-edge drugs and experimental therapies; he was also given supplements: he took zinc, vitamin D, and even melatonin. Melatonin is widely known for its sleep benefits, but emerging science is showing it has immune benefits as well. Vitamin D has also gotten a lot of attention from researchers recently because of evidence that it may prevent or improve outcomes not just in COVID, but in numerous infectious diseases. One promising study is ongoing.

Dr. Fauci takes supplements. The British government gave out free supplements to elderly and vulnerable populations in an effort to curb the virus' spread. I take immune-supportive supplements daily (and have since long before the pandemic began), as do most physicians. It's frustrating to me that in the face of all the scientific evidence of their benefits, questions remain about their efficacy, but even a cursory scan of popular media's coverage of the subject shows that skepticism persists.

Some of the negative reporting may stem from a place of understandable confusion. When the pandemic hit and our patients started inundating me with questions, the most common

topic was supplements—not surprising considering supplement sales went through the roof in 2020. But people simply don't know how to take them—which is also not surprising considering there are so many different ones out there, they are not all necessary (or even helpful), and they are not all created equal. Plus, you need to know how to take supplements properly and how much is too much. Zinc, for example, has antiviral properties, which is why so many people started taking it last year, but too often when people hear that a supplement is good for them, they start taking it in high doses without understanding the nuances. In some cases you can even OD on a supplement. We talked before about the idea of *Goldilocks immunity*—not too little, not too much, but just right—and this certainly applies to supplements like Zinc, which at too-high levels can cause copper deficiency and actually be *immunosuppressive.* This is just one example of why it can be difficult to know what to do when it comes to supplements.

A useful resource can be found here https://www.ifm.org/news-insights/the-functional-medicine-approach-to-covid-19-virus-specific-nutraceutical-and-botanical-agents/ at the website of the Institute for Functional Medicine.

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Building Block 3: Physical Wellbeing

There are three main topics as they relate to immunity:

1) Movement: Physical activity is critical to immune health, of course, but we use the word "movement" here instead of "exercise" for a reason. The concept of *Goldilocks immunity* comes into play here again. Excessive exercise can be immunosuppressive and lead to chronic injuries, and that 10,000-step goal that so many count toward each day is not really that useful

because it's a one-size-fits-all approach. Getting enough movement into your life to provide the health benefits you need, though, may be easier than you think.

There are easy-to-do-at-home recommendations that require minimal equipment—including walking, rebounding, floor exercises, resistance training with weights and bands, and high-intensity interval training (HIIT)—as well as target levels for people trying to maintain a healthy weight and those trying to lose weight.

2) Hydration: This may seem like a simple topic, but it comes as a surprise to many how important it is to our basic functioning: our energy levels, cognitive function, ability to maintain a healthy weight, detoxify, and so much more—including our immune health. There is a connection between low-grade dehydration and chronic illness and even recent evidence that drinking water may be an effective treatment for metabolic syndrome. And yet most people are dehydrated—as much as 75 percent of Americans by some estimates. Perhaps one of simplest things anyone can do to optimize wellness is to properly hydrate, so we will provide guidance on what it feels like to be hydrated (many don't know) and the best ways to fully hydrate (hint: 8 glasses of water a day isn't one of them).

3) Sleep: The relationship between healthy sleep habits and overall health and wellbeing is well known, but the pandemic has spurred even more research on the subject. Research suggests that in the midst of stay-at-home orders, many people were sleeping more hours but their sleep quality may have declined. All the more reason for a renewed focus for what has long been a chronically sleep-deprived populace. There's an elaborate science behind quality sleep and sleep hygiene practices, sleep maintenance, and certain supplements can promote sleep optimization.

Building Block 4: Mental Wellbeing

Mental wellbeing is not usually the first thing people think about when considering how to optimize immunity, but there is a reliable association between positive emotions and good physical health. Factors that influence their health and resilience, include:

- Stress and the negative impact that the stress hormone cortisol has on the body
- Social support and its role in a healthy lifestyle
- Mental habits associated with good immune health

There are a number of techniques out there that can promote relaxation, stress reduction, and improve mental outlook, including: different meditation techniques, breathing, chanting, binaural beats, and journaling. The point isn't to do all these things (unless you really want to) but to pick what works for you and use it regularly.

This is another area where supplements can sometimes be of use; options include cortisol reducers like *mahonia*, CBD, and so on.

Building Block 5: Detoxification

The final building block can be a bit tricky, because it's less about what we do ourselves and more about the environment in which we live. The role that environmental toxins play in poor immune health is real, and there's substantial science behind it.

But just because we can't completely control our environments doesn't mean there's nothing we can do. The main areas in which toxins can show up in your life, include:

- In the air, indoor and outdoor, including pollutants, mold, etc.
- In your food and water as fungicides and herbicides
- In cosmetics and personal products

• In household products like cleaning supplies, nonstick pans, etc.

There are tactics you can use no matter where you live to minimize your burden, much of which will surround what you eat. This heartens back to advice in the nutrition chapter for optimized eating schedules and periods of caloric restriction because of how they facilitate the body's natural cleanup process. Eating clean, organic foods as much as possible and adopting a diet rich in healthy fibers and foods can support your microbiome; so, too, do probiotics, prebiotics, and fermented foods.

Another useful tactic is to take inventory of your household products—your cleaning supplies and personal products like shampoos, lotions, and makeup. It's important to recognize which toxic ingredients to avoid and how to replace them with cleaner, more natural products.

Finally, we need to take a closer look at our medications and consider how they could be accumulating in toxic ways. There is a recent movement within medicine of *de-prescribing* because of the high rate of side effects, especially for those who take multiple medications over long periods of time (polypharmacy). This can be a tricky subject, but talk with your doctors about whether stepping down your medications might be right for you.