

CROSSFIT NUTRITION I TRAINING GUIDE

CrossFit
EDUCATION

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DISCLAIMER

This course is for educational purposes only. Before changing current nutrition or exercise regimens, participants should ensure they have undertaken a recent physical examination and consulted their physician.

None of the information presented as part of this nutrition course constitutes the practice of medicine or undertakes the diagnosis, prevention, treatment, or cure of any disease, pain, deformity, injury, or physical or mental condition, and specifically does not authorize any person other than a licensed health practitioner to state any product might cure any disease, disorder, or condition.

HOW TO USE THIS TRAINING GUIDE

There are a few ways to use this training guide, depending on your goals:

1. If you are familiar with CrossFit's training and nutrition recommendations and want to start implementing them right away, head directly to the "[Quality](#)" chapter and read all the way through the "[Put It Into Practice](#)" chapter. This information will give you what you need to get started quickly.
2. If you are new to CrossFit's training and nutrition recommendations, you may choose to read this training guide from start to finish to understand the context behind the recommendations before you implement them.
3. If you recently took a [CrossFit Level 1 Certificate Course](#) and are ready to go deeper on specific subjects, you may choose to use this as a reference as you bring more precision and accuracy to your nutrition plan and learn to help others do the same.

Choose the path that works for you and get ready to increase your performance and health on every level.

**CrossFit®**

INTRODUCTION

CrossFit's constantly varied functional movements executed at high intensity prove remarkably effective in developing a broad, general, and inclusive fitness. With this training, athletes of all levels gain the fitness life demands, from the physical competence needed to pick up a grandchild to the physical dominance required to compete at the highest levels of sport.

CrossFit defines fitness as **work capacity** across broad time and modal domains. One's fitness is determined by their ability to complete tasks ranging from running, biking, rowing, and swimming over long, medium, and short distances, to gymnastics movements, lifting heavy weights, and everything in between in as many different ways, variations, and combinations as possible. Based on measurable, observable, and repeatable data (the weights, rounds, and times recorded from workouts), this definition allows our athletes to gauge their current level of fitness accurately, determine deficiencies in their fitness, and assess any method put forward for improving fitness.

Years of observing our athletes led us to understand health and fitness ultimately are intertwined, as both are expressions of an individual's work capacity. Our work capacity accurately reflects everything we do in our lives, both inside and outside the gym. It is a direct product of lifestyle factors, training protocol, and, as is outlined in great detail in this training guide, diet. The greater our work capacity and the more broadly it is expressed across different time and modal domains, the greater our potential for health.¹

II

WORK CAPACITY:

the ability to generate power to accomplish tasks."

¹ For a deeper dive into CrossFit's definition of health, refer to pages 36-39 and 50-52 of the [CrossFit Level 1 Training Guide](#), where the topic is discussed in detail.

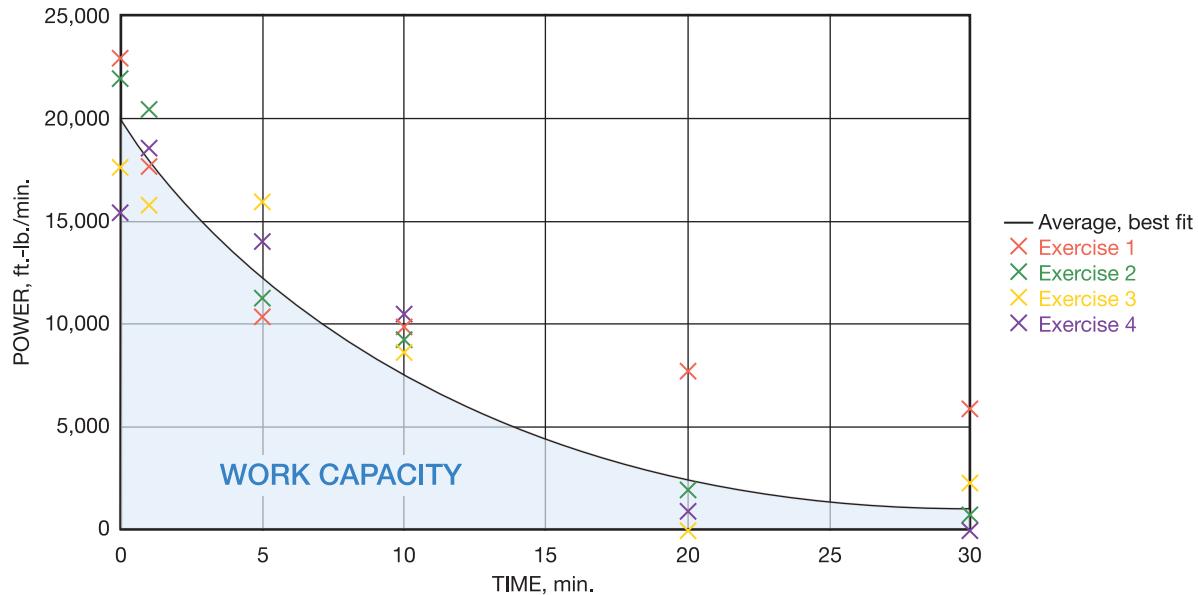
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Figure 1. A Graphical Representation of One's Fitness (Work Capacity) at Certain Times in Their Life

The bridge between fitness and health is nutrition, because how we eat either supports or undermines our fitness over time. Eating is something we are guaranteed to do frequently throughout our lives, and the choices we make about what, how much, and when to eat determine how we look, feel, think, sleep, learn, move, and thrive (or not) in every area of our lives. Nutrition is perhaps the most potent variable in determining health, which is why it forms the base of the pyramid that illustrates CrossFit's theoretical hierarchy of the development of an athlete.

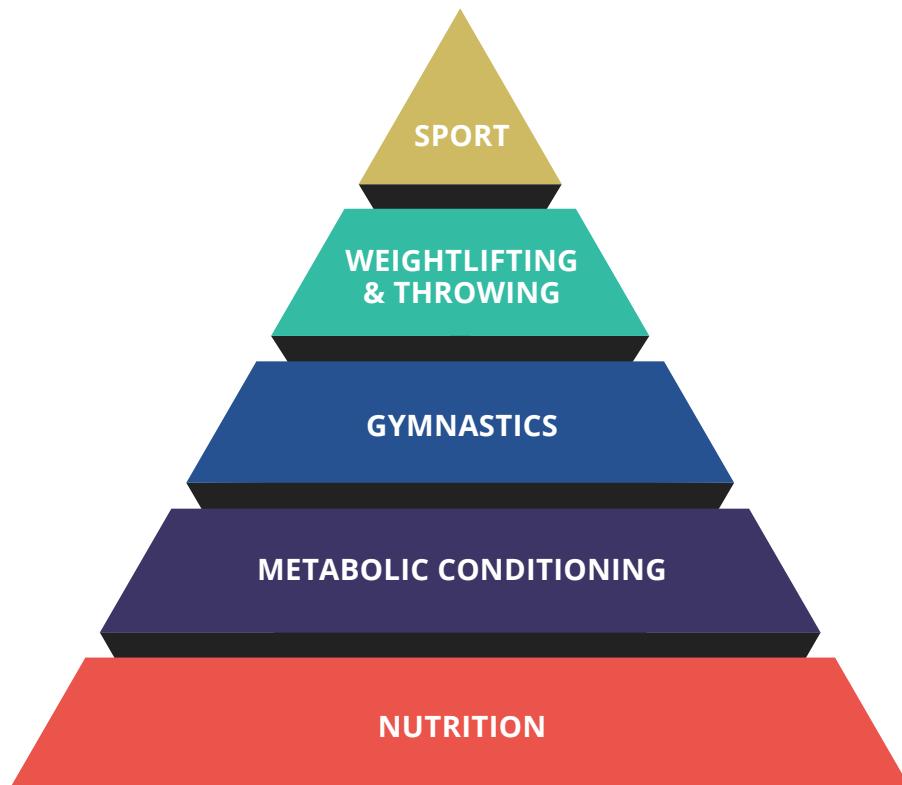
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Figure 2. CrossFit's Theoretical Hierarchy of the Development of an Athlete

The hierarchy starts with nutrition and moves to metabolic conditioning, gymnastics, weightlifting, and finally, sport. This hierarchy reflects foundational dependence, skill, and to some degree, time ordering of development. We do not deliberately order these components, but nature will. If you have a deficiency at any level of the pyramid, you will find all the components above will suffer. Similarly, if you hone and develop each level of the pyramid, you will find the components above are primed for development.

With that context in mind, it's important to note that the cellular and molecular adaptations that result from what we eat either support or detract from our fitness. Whether the goal is avoiding chronic disease or performing athletically at the highest level, nutrition is the critical and foundational piece of the puzzle.



The bridge between fitness and health is nutrition, because how we eat either supports or undermines our fitness over time."

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The good news is that CrossFit's nutrition recommendation matches CrossFit's training recommendation in terms of effectiveness and applicability to any individual. Our nutritional recommendation is simple but powerful:

"Eat meat and vegetables, nuts and seeds, some fruit, little starch, and no sugar. Keep intake to levels that will support exercise but not body fat."

These two sentences capture a nutritional approach that, when applied with our workouts, yields incredible health and fitness. By combining the potent training stimulus of constantly varied functional movements executed at high intensity with a sound diet of whole, unprocessed foods eaten in the proper amounts, the results are nothing short of life-changing.

This training guide is a thorough introduction to CrossFit nutrition. It starts with a theoretical foundation of "[Quality](#)" and "[Quantity](#)" before progressing to the more practical side of nutritional implementation: "[Put It Into Practice](#)." We encourage you to take your time gaining a deep understanding of our nutrition recommendations but do not delay improving your own nutrition. Furthermore, if you're interested in helping others with their nutrition, a critical first step is to take the necessary steps today to address your own nutrition. To meet you where you are, we have also provided different "[Tactics](#)" to act as potential stepping stones as you work toward fully implementing the CrossFit nutrition recommendation. And, though our recommendation is independent of any specialized diet, it can be fully adapted to meet the needs of practitioners following any of the listed "[Specializations](#)." You will achieve the bulk of your results by focusing on the basics of nutrition. That said, we have provided topics you can explore to further increase your knowledge, with the possibility of incrementally increasing health and performance.

Let's start the course by exploring the science of sickness and why nutrition is essential to creating better health.



THE SCIENCE OF SICKNESS

To truly grasp the significance of nutrition as the foundation for health, it helps first to understand the role poor nutrition plays in sickness. There is overwhelming evidence to show the growth of a worldwide epidemic of obesity and preventable disease. Globally, obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults aged 18 or older were overweight, and over 650 million were obese. The numbers are increasing every year. Overweight- and obesity-related noncommunicable diseases (also called chronic diseases) are largely preventable with improvements to diet and lifestyle.² It is estimated these preventable conditions account for up to 70% of deaths globally.³ Shockingly, this amounts to 41 million deaths worldwide each year.⁴ In 2017, 11 million deaths were attributable to dietary risk factors, with some researchers suggesting dietary improvements could prevent one in every five deaths.⁵

THE BURDEN OF CHRONIC DISEASE

Chronic diseases are those lasting a year or more, requiring ongoing medical attention, and/or limiting activities of daily living (ADL). These diseases fall into two primary groups:

1. **Disorders of structure** — arthritis, bone thinning, muscle wasting, obstructive lung disease, etc.
2. **Disorders of metabolism** — high blood pressure, Type 2 diabetes, cardiovascular diseases, and obesity

It should be noted there is a fair bit of overlap between the two groups.

² World Health Organization. (2021). Obesity and Overweight. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>. (accessed Aug. 10, 2021)

³ Australian Institute of Health and Welfare. (2018). Chronic conditions. <https://www.aihw.gov.au/getmedia/6bc8a4f7-c251-4ac4-9c05-140a473efd7b/aihw-aus-221-chapter-3-3.pdf.aspx>. (accessed Aug. 17, 2021)

⁴ World Health Organization. (2021). Non-communicable diseases. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>. (accessed Aug. 17, 2021)

⁵ GBD 2017 Diet Collaborators. (2019). Health effects of dietary risks in 195 countries, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet*, 393(10184):1958–1972. doi: 10.1016/S0140-6736(19)30041-8. Epub 2019 Apr 4.

The Science of Sickness

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The entire cluster of metabolic diseases includes far more than those four, and it continues to grow, now including conditions such as Alzheimer's disease, sleep apnea, fatty liver, non-alcoholic cirrhosis, gallbladder disease, GERD (gastroesophageal reflux disorder), PCOS (polycystic ovary syndrome), blood-clotting disorders, gout, acne, and possibly even cancer, another vast category of deadly chronic diseases that some researchers believe might be metabolic.

In the modern world, these disorders take a staggering toll on both health and wealth. According to the Centers for Disease Control, one in four people die each year from heart disease in the U.S. alone. This has become the biggest killer among metabolic diseases and is suffered by more than 30 million Americans, costing more than \$11 billion per year to treat. It is not just a problem in the U.S., though; it's a global problem. According to the World Health Organization, heart disease is also the biggest killer worldwide, accounting for approximately 17.9 million deaths per year.

When you add annual deaths from Type 2 diabetes, stroke, cancer, and the rest, it becomes clear how grave and pernicious a worldwide threat chronic diseases have become. Thirty-four million people in the U.S. (about 10% of the population) have diabetes, with Type 2 diabetes accounting for 90-95% of that, and as many as 88 million are estimated to have prediabetes. Together, Type 2 diabetes and prediabetes afflict one-third of all Americans at some level. Again, the problem is far from unique to the U.S.; the World Health Organization estimates over 400 million people are living with Type 2 diabetes worldwide. And unfortunately, traditional medical and nutritional remedies deployed to address these threats have been ineffective.

THE ROLE OF INSULIN

What you eat determines what happens metabolically within you: This means what you eat affects whether you store fat or burn it. The foods you consume have metabolic consequences, which can add up over time and result in disease if you consistently make poor choices. The good news is you have a significant amount of control over these consequences. If you eat the right foods in the right amounts, metabolic disease can be mitigated or avoided altogether.

KNOW THE DIFFERENCE

It is important to know that there is a difference between Type 1 and Type 2 diabetes.

Type 1 diabetes is a chronic condition that develops between adolescence and adulthood, where the pancreas produces little or no insulin.

Type 2 diabetes is a chronic condition resulting from consistently elevated blood sugar leading to insulin resistance. It is often a product of the overconsumption of refined and processed carbohydrates.

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HOW THE BODY USES INSULIN

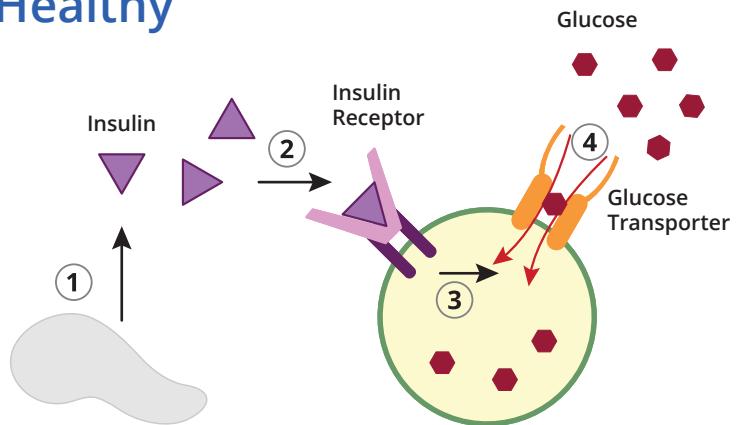
Insulin functions as an anabolic (storage/building) hormone to pack away nutrients for later use.

Insulin encourages muscle cells to take up protein building blocks (amino acids), directs incoming fat into the fat cells, and stores excess glucose, in the form of glycogen, in the muscles and liver.

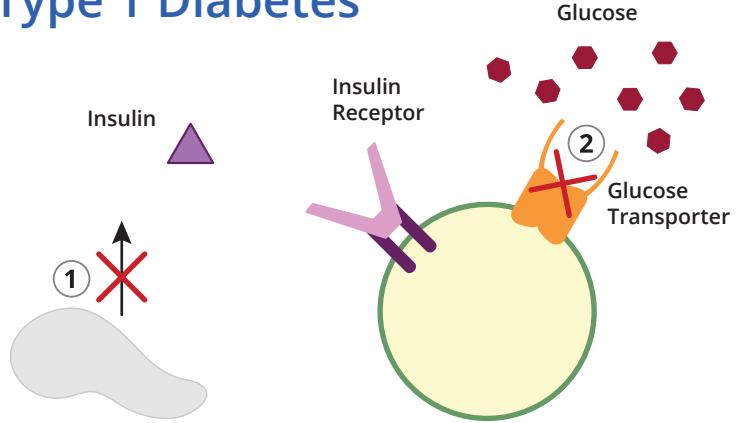
When we have hormonal control, we eat, our insulin rises, insulin does its job of removing sugar from the blood, and then it falls back to normal levels.

Key	
	Pancreas
	Body Cell
	Insulin
	Glucose
	Insulin Receptor Open / Closed
	Glucose Transporter Open / Closed
	Path of Action
	Blocked Path of Action

Healthy



Type 1 Diabetes



Type 2 Diabetes

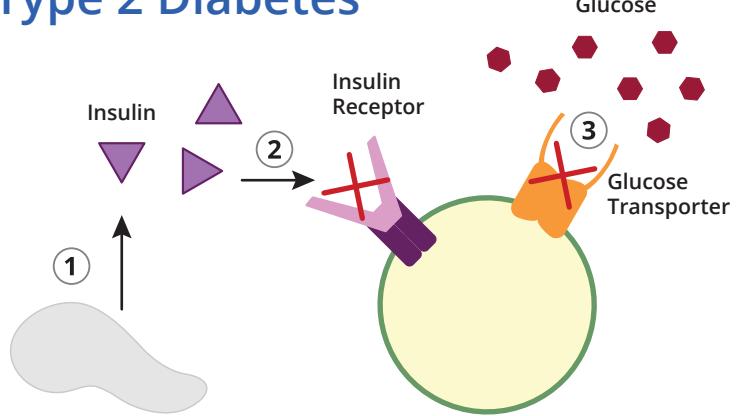


Figure 3. Insulin Metabolism in a Healthy Body System and With Type 1 and Type 2 Diabetes

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A key feature of eating high-quality foods in optimal amounts is that it manages how effectively the body uses insulin. Insulin is best known as a therapeutic injection some people with diabetes require. Its primary, minute-by-minute job is to control blood sugar (glucose) by driving it out of the blood and into the tissues to be used for energy. But insulin also functions as an anabolic (storage/building) hormone to pack away nutrients for later use. Insulin encourages muscle cells to take up protein building blocks (amino acids), directs incoming fat into the fat cells, and stores excess glucose, in the form of glycogen, in the muscles and liver. When we have hormonal control, we eat, our insulin rises, insulin does its job of removing sugar from the blood, and then it falls back to normal levels.

Although insulin has many positive hormonal actions, chronically high insulin levels can make us ill. For example, insulin drives the liver to make cholesterol; it stimulates the kidneys to retain salt and fluid, elevating blood pressure; it promotes inflammation and blood clotting; and much more, even in the absence of Type 2 diabetes. Insulin is critical for life, but too much of it is not a good thing.

In the face of chronically elevated insulin, the body's cells ultimately become resistant to insulin signals. This means glucose cannot enter the cells as readily, causing it to build up in the blood. In response, the pancreas secretes more insulin to force glucose into cells. A troublesome cycle of higher insulin levels required to store glucose leads to increased insulin resistance, resulting in even higher insulin levels. Insulin resistance brings devastating consequences, including an increased risk of developing Type 2 diabetes and other metabolic diseases. As illustrated below, insulin resistance is the common denominator driving this cluster of medical conditions — abdominal obesity, high blood pressure, cholesterol and other blood-lipid abnormalities, Type 2 diabetes or prediabetes, GERD (reflux), fatty liver, non-alcoholic cirrhosis, PCOS, sleep apnea, and more. All are driven by elevated insulin and/or resistance to insulin's primary action on blood sugar.

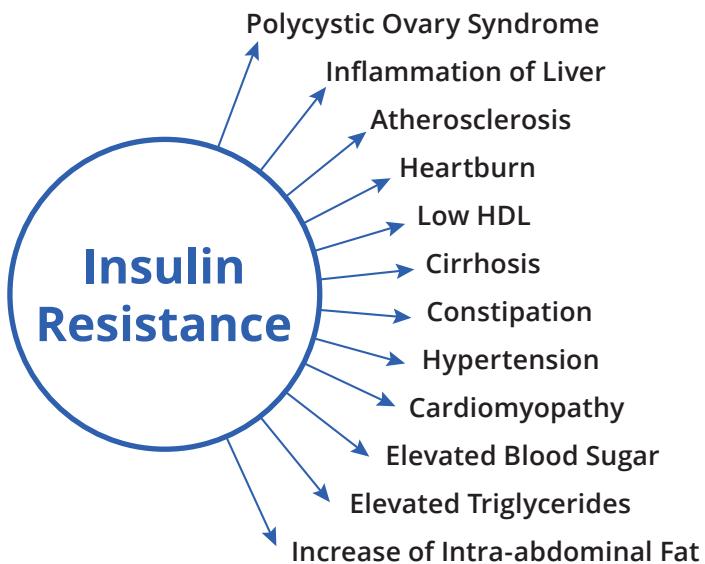


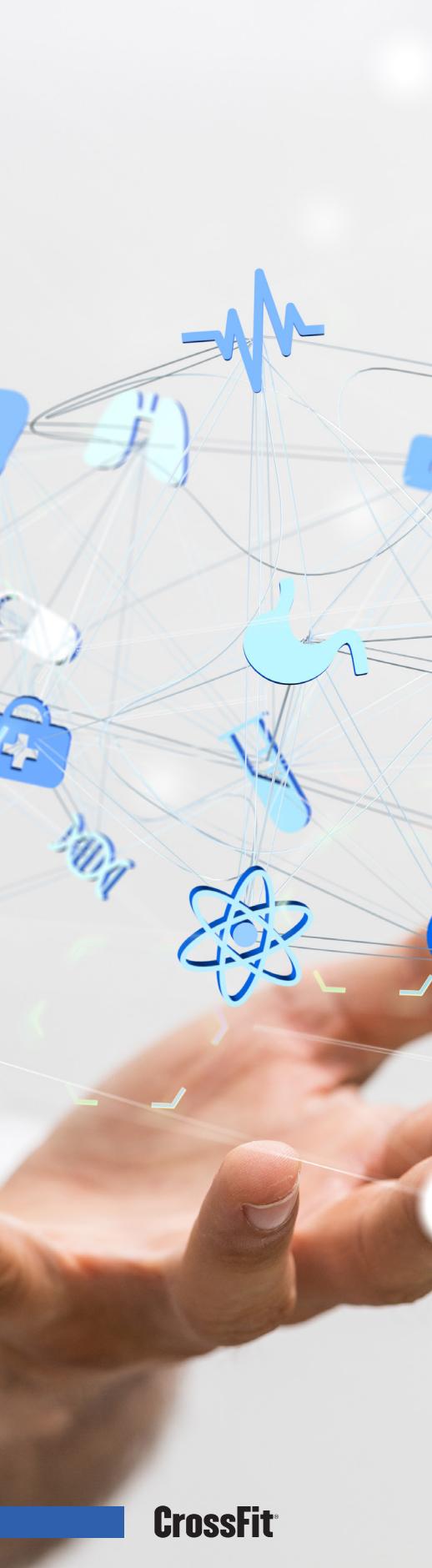
Figure 4. Medical Conditions Often Associated With Insulin Resistance

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The critical takeaway is that controlling insulin and improving insulin sensitivity are the primary requirements for resolving these health issues. Your insulin sensitivity reflects your cells' effectiveness at using insulin to pull glucose out of the blood and into the cells. The more sensitive you are, the less insulin you need to produce.

So, what drives insulin up? Overeating in general but particularly the overconsumption of dietary carbohydrates, both sugars and starches (long chains of sugars hooked together in easily broken links). The digestive process breaks apart the links to yield glucose (blood sugar).

To bring elevated insulin levels down, you must limit or decrease dietary carbohydrates, especially highly processed ones. Dietary change can reverse the effects of chronically elevated insulin, and its positive impact on insulin is a remedy to the global health crisis driven by preventable metabolic disease.



HEALTH MARKERS

INTRODUCTION TO HEALTH MARKERS

The role of nutrition in preventing sickness is unmistakable. At any point in your life, your state of health exists somewhere on a continuum that runs from sickness to wellness to fitness.

On the left side of the continuum is sickness, exemplified by the presence of one or more of the chronic diseases discussed previously. In the center is wellness, where disease is absent and health markers are normal. And on the right is fitness, or super-wellness, where health markers are optimal. An individual with all their markers on the side of fitness has a buffer against sickness, given the amount of decline that would need to occur before reaching wellness, let alone sickness. An individual on the side of wellness has less room for decline before the impact of sickness is felt.

A variety of measurements can illuminate your health status and let you track your progress as you improve it, including values such as:

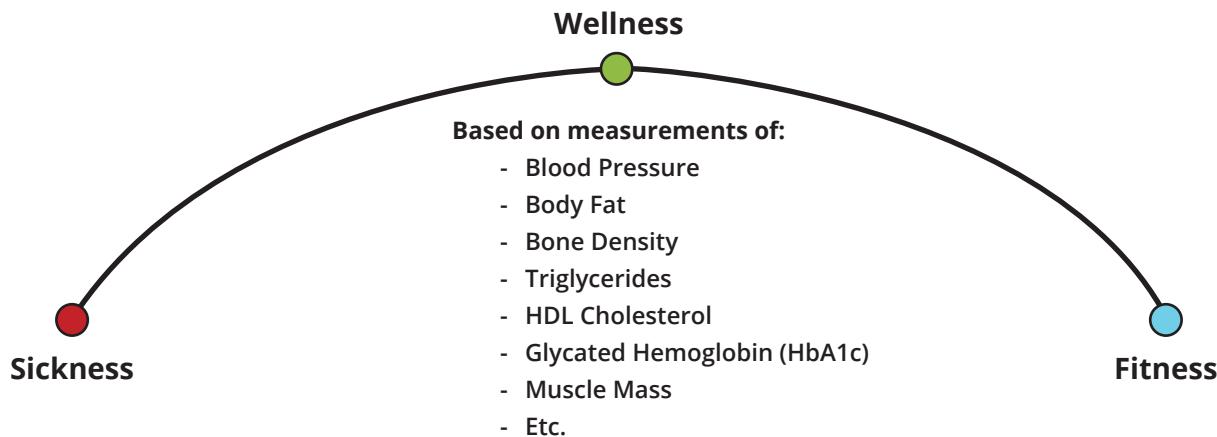
- Fasting blood sugar and glycated hemoglobin (Hgb A1c) level, which is a red blood cell measurement that indicates your average blood sugar over the previous three months
- Lipid levels, especially triglycerides and HDL, and the TG/HDL and HDL/LDL ratio
- Inflammatory markers, such as C-reactive protein (CRP)
- Blood pressure and heart rate at rest and during exercise
- Body-fat percentage and lean body mass
- Bone density
- Waist circumference and waist-to-hip ratio

Combining diet and exercise is necessary to derive the most significant health benefits. CrossFit's training and nutrition recommendations work together beautifully to lower insulin and improve insulin sensitivity, thereby resolving the problems insulin resistance drives.

If you are currently at your ideal weight and carry a healthy body-fat percentage; normal blood pressure, heart rate, blood sugar, and blood lipids; low measures of inflammation; and are not taking medications to achieve those goals, you are likely to be well. If any of those markers are out of the normal range and you aren't enjoying total wellness, your level of health will fall somewhere to the left of center on the continuum. The more chronic diseases you suffer, the further toward the sickness end of the curve your health status will be.

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The dial also moves in the other direction. If all your health measures are normal and you can lift, jump, run, swing, row, bike, and swim, you are very likely between wellness and fitness on this continuum. The more consistently you perform these activities, and the more competent you become at doing them, the more likely you are to be closer to fitness. When assessing your health against this model, it is easy to appreciate that if you fall on the right side (fitness) of this continuum, you would have to move back through wellness before you approach sickness. Fitness is a hedge against sickness and disease.



The Sickness-Wellness-Fitness Continuum:

Our assumption is that everything we can measure about health will conform to this continuum; therefore, sickness, wellness, and fitness are measures of a single quality: health.

Figure 5. Health Markers on the Sickness-Wellness-Fitness Continuum

We all fall somewhere on this continuum. The goal of our nutrition and training recommendations is to enable you to move to the right side of the continuum and help you stay there for the duration of your life. We can identify health markers that correlate with various points on this continuum.^{6, 7, 8, 9} See Table 1 as an example.

⁶ Frisch RE. The right weight: body fat, menarche and ovulation. *Baillieres Clin Obstet Gynaecol*. 1990;4(3):419–439. doi: 10.1016/S0950-3552(05)80302-5. - DOI - PubMed

⁷ Ness-Abramof, R., & Apovian, C. M. (2008). Waist circumference measurement in clinical practice. Nutrition in Clinical Practice, 23(4), 397–404. <https://doi.org/10.1177/0884533608321700>

⁸ U.S. Department of Health and Human Services. (n.d.). Bone mass measurement: What the numbers mean. National Institutes of Health. <https://www.bones.nih.gov/health-info/bone/bone-health/bone-mass-measure>. (accessed July 23, 2021)

⁹ CrossFit. What is fitness? CrossFit Journal. 1 Oct 2002 <https://journal.crossfit.com/article/what-is-fitness>. (accessed July 28, 2021)

[<< Table of Contents](#)**Table 1 —** Health Markers on the Sickness-Wellness-Fitness Continuum

PARAMETER	SICKNESS	WELLNESS	FITNESS
Blood Pressure	>140/90	120/80	105/60
Heart Rate (bpm at rest)	>100	70	50
Measurements (in inches)			
Waist (Male) *	>40	34-38	<34
Waist (Female) *	>35.5	32-34	<32
Waist-to-Hip Ratio (Male)	>1.0	<0.9	<0.9
Waist-to-Hip Ratio (Female)	>.86	<.85	<.85
Body Fat % (Male)	>25	approx 18	approx 6
Body Fat % (Female)	>32	approx 20	approx 12
Laboratory Tests			
HDL-C (Male)	<40	40-50	>50
HDL-C (Female)	<50	50-60	>60
LDL-C	>160	120	<100
HDL/LDL Ratio	>5	<5	<3.5
Triglycerides	>200	<150	<100
Triglyceride/HDL Ratio	>5	<4.5	<2
Hemoglobin A1c	>7	5	<5
C-Reactive Protein	>3	<3	<1
Bone Density (DEXA)	<-3	-2.5 to -1.25	-1 to 0

* Waist circumference depends on height. Taller/larger frames will come with a larger "normal" waist and the reverse.

These measurements, in aggregate, can illuminate your current health status and offer solid, measurable benchmarks against which to track your progress. Coupled with measurements such as weight and body fat, which we will break down next, they will give you a great set of factors to track.

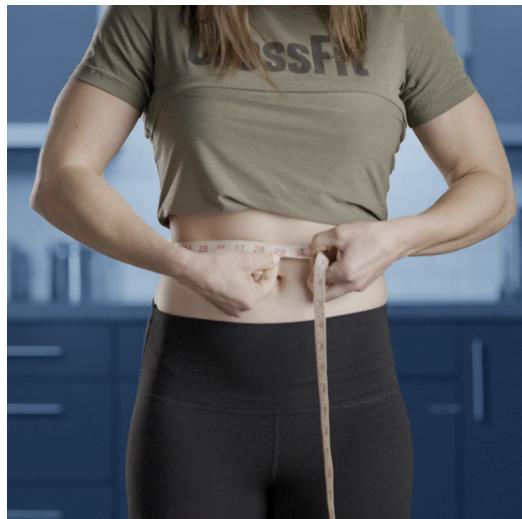
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HEALTH MARKERS AND METABOLIC FITNESS

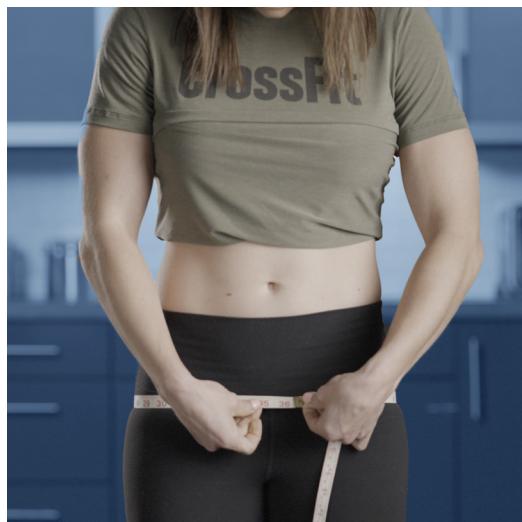
Anthropomorphic Measurements

Anthropomorphic measurements, such as height, weight, waist circumference, waist-to-hip ratio, lean body mass, and body-fat percentage, are easy data points to gather as you start your journey toward wellness and discover clues about your level of metabolic fitness. Especially useful are waist circumference and waist-to-hip ratio. Both are easily determined and easy-to-follow progress markers needing nothing more than a measuring tape and pencil to get started. To be meaningful and trackable, the data should be from actual measurements and calculations, not estimates.

A **waist circumference** (taken at the belly-button level) of greater than 35 inches (88 cm) for women or 40 inches (102 cm) for men¹⁰ indicates abdominal obesity (in all but the very largest body frames) and, therefore, some degree of insulin resistance and metabolic syndrome.



A **waist-to-hip ratio** (measured at the belly button and widest point of the hips) of greater than 0.9 for women or 0.85 for men¹¹ indicates abdominal obesity and strongly suggests some degree of metabolic syndrome, insulin resistance, and associated risk of chronic disease.



¹⁰ National Heart, Lung, and Blood Institute. (n.d.). Metabolic syndrome. National Institutes of Health. <https://www.nhlbi.nih.gov/health-topics/metabolic-syndrome>. (accessed July 28, 2021)

¹¹ WHO Expert Consultation. (2008). Waist circumference and waist-hip ratio. World Health Organization. http://apps.who.int/iris/bitstream/handle/10665/44583/9789241501491_eng.pdf;jsessionid=A24634227EB8C2D34B5BB513AA77D5FA?sequence=1. (accessed July 28, 2021)

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Body Composition and Body Fat

The body is composed of fat tissue and lean tissue. The fat portion is the calorie reservoir stored under the skin and the fat in and around the organs and within the abdominal cavity. The lean tissue comprises almost everything else: bones, muscles, organs, and blood. When you step on a scale, it weighs everything — the fat, the lean mass, and even the contents of your stomach, bladder, and bowel. **What's more important than the weight, though, is what the weight is made of.** This is a critical point that is often overlooked. For a healthy, strong body, it's essential to strike a good balance between having an adequate amount of fat to draw on when food isn't available, having a cushion to protect vital organs, and having robust enough muscle mass to handle the demands of life. Too much stored fat signals the presence (usually) of insulin resistance and a heightened risk for chronic disease. Be aware that women — even fit ones — naturally carry more body fat and less muscle mass than men.

When evaluating risk due to body fat, use the following as a guide:

- Obese (female): 32%+
- Normal (female): ~20%
- Fit (female): ~12%*
- Obese (male): 25%+
- Normal (male): ~18%
- Fit (male): ~8%

**It's important to be aware that a fat percentage that is too low in young women can interfere with fertility because fat is a reservoir for estrogen and a site for its conversion. However, this is typically seen when there is a hypocaloric diet without any regard to macronutrient ratios and micronutrient content. When consuming optimal amounts of food with proper macronutrient ratios and focusing on micronutrient content, a female athlete can achieve a body composition of 12% or slightly less without risk.¹²*

You can determine your body-fat measurement using a bioimpedance machine, which is a device that is simple to use, much like a weight scale. You can use fat calipers to estimate your body fat, or you can use electron-beam computed tomography (EBT) and underwater weighing to measure your body fat with a high level of accuracy. You can also estimate it using simple measurements and tables with accuracy that approaches bioimpedance technology. Once you know your fat mass, it's easy to determine your lean mass, as it's just everything else!

However, before we talk about how to determine your body composition, we need to address a number you've probably heard of before that many in the healthcare field use to assess health: BMI, or body-mass index. BMI is a calculation of your weight in kilograms divided by your height in meters squared.

¹² Sundgot-Borgen, J., Meyer, N. L., Lohman, T. G., Ackland, T. R., Maughan, R. J., Stewart, A. D., & Müller, W. (2013). How to minimise the health risks to athletes who compete in weight-sensitive sports: Review and position statement on behalf of the ad hoc research working group on body composition, health and performance, under the auspices of the IOC Medical Commission. *British Journal of Sports Medicine*, 47(16), 1012–1022. <https://doi.org/10.1136/bjsports-2013-092966>

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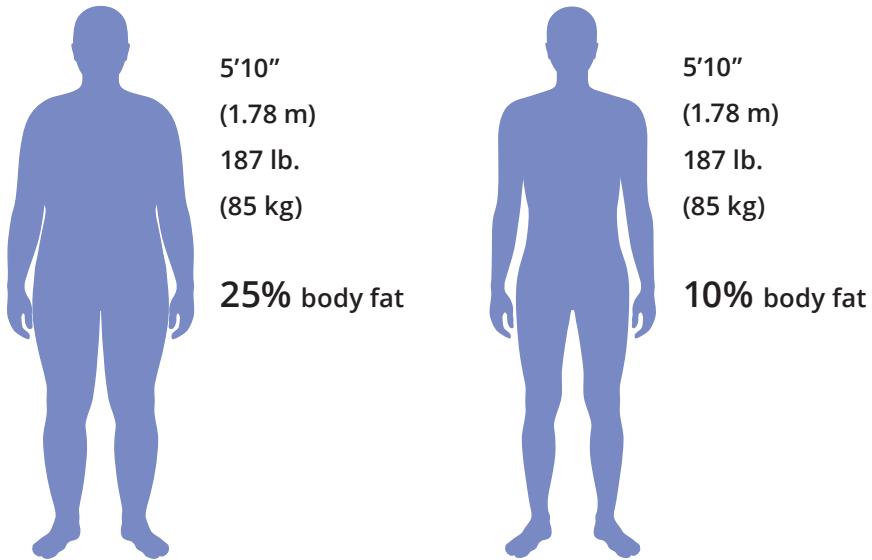
$$\text{BMI} = \frac{\text{Weight (kg)}}{[\text{Height(m)}]^2}$$

Figure 6. Body Mass Calculation

The problem with BMI is that it only takes into account your height and weight to determine health risks, while body composition is specific to how much of your weight is fat, protein, mineral (bone), and water.

Two people with equal BMIs can have drastically different body compositions, affecting health, performance, and aesthetic appeal, which is why BMI isn't an ideal measurement to use. For an example, see below.

- Athlete 1: 187 lb. (85 kg), 5'10" (1.78 m), 25% body fat
- Athlete 2: 187 lb. (85 kg), 5'10" (1.78 m), 10% body fat

**Figure 7.** Body Profiles of Two Athletes With Different Body Fat Percentages

13 Centers for Disease Control and Prevention. (2020, September 17). *About adult BMI*. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html. (accessed July 13, 2021)

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Body composition, on the other hand, breaks the body down into its core components: fat, muscle, bone, and water. Typically, a two-component model is used, where there is an assessment of your fat mass (both essential and nonessential) and fat-free mass (muscle, organ, bone, and water).

Body Composition

(what the body is made of)

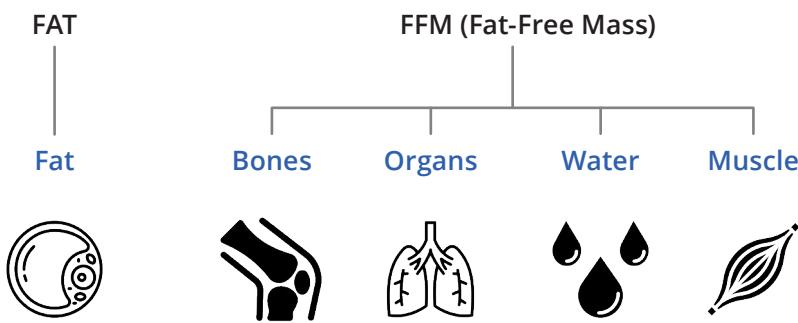


Figure 8. Fat and Fat-free Mass in the Composition of the Human Body

ESSENTIAL VS. NONESSENTIAL FAT

Not all body fat is treated the same. Your body consists of essential and nonessential fat. Essential body fat is necessary for normal bodily functions such as insulation, hormone regulation, energy production, vitamin storage, and the protection of vital organs. This fat is found in the marrow of the bones, organs, muscles, and throughout the nervous system. Nonessential fat is considered storage fat and is typically found in the subcutaneous regions of the body, or, in other words, under the skin. It is also found surrounding the internal organs (visceral fat), which is a high-risk condition termed central obesity. Central obesity has been associated with impaired insulin functionality, high blood glucose, hypertension, and increased risk of cardiovascular disease and Type 2 diabetes.¹⁴

¹⁴ Magriplis, E., Andreou, E., & Zampelas, A. (2019). The Mediterranean Diet: What it is and its effect on abdominal obesity. *Nutrition in the Prevention and Treatment of Abdominal Obesity*, 281–299. <https://doi.org/10.1016/b978-0-12-816093-0.00021-5>

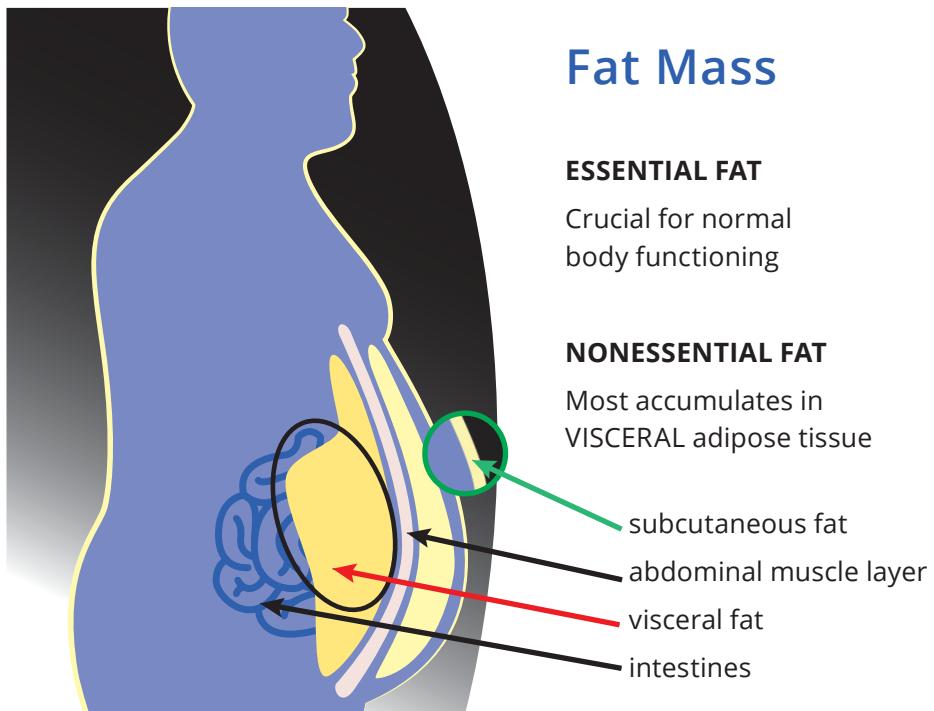
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Figure 9. Essential and Nonessential Fat

BODY COMPOSITION AND HEALTH

Your lean body mass is a mix of muscle mass (including tendons and ligaments), bone, organs (including your skin), and water. The ratio of muscle mass to nonessential fat mass is likely the most telling factor regarding health, performance, or aesthetics. The loss of muscle mass, or sarcopenia, has been associated with metabolic issues, cardiovascular-disease risk, low physical performance and impairment, and disability.¹⁵

In research, you will hear of an interesting phenomenon called the obesity paradox. This seemingly contradictory state is where those in the BMI category of overweight have a decreased risk of all-cause mortality. This is likely not a paradox but rather due to an ineffective assessment of body mass using BMI. When looking specifically at body composition, however, the picture is much clearer:

- At extremely low fat mass, and as fat mass continues to increase above the ideal range, the risk for all-cause mortality also increases.
- Counter to this, at extremely low levels of muscle mass and extremely high levels of muscle mass, there is an increase in all-cause mortality.

¹⁵ Wannamethee, S. G., & Atkins, J. L. (2015). Muscle loss and obesity: The health implications of sarcopenia and sarcopenic obesity. *Proceedings of the Nutrition Society*, 74(4), 405–412. <https://doi.org/10.1017/s002966511500169x>

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The takeaway is that increases in LBM are health protective. Although, if an increase in LBM is also coupled with an unhealthy increase in fat mass, the risk for mortality will go up. High fat mass is associated with higher risks of chronic disease, cardiovascular disease, high blood pressure, neurodegeneration, tumorigenesis (development of tumors), and faster rates of aging.

DECREASING BODY FAT CAN IMPROVE YOUR HEALTH

Reductions in excess body fat improve insulin sensitivity, lipid profiles, and glucose tolerance while reducing inflammation, which results in improved metabolic function.¹⁶ In addition, body-fat reduction has been associated with decreased cardiovascular disease risk; improved neurological function, autoimmunity, and cancer protection; and increased life spans.

Each individual's body-composition endpoint depends on their goals. Table 2 below¹⁷ provides insight into what the ideal body composition might look like. You should strive, at a minimum, to be somewhere between wellness and fitness. This range should be protective against mortality risk while supporting your performance endeavors. As you decrease or increase your body-fat percentage, you should always compare it to how your health markers and performance markers are trending.

Table 2 — Body-fat Percentage on the Sickness-Wellness-Fitness Continuum

Males	Females	Health
5–10	8–14	Fitness
11–14	15–22	Between Wellness and Fitness
15–20	23–29	Wellness
21–25	30–32	Between Sickness and Wellness
25+	32+	Sickness

Improving body composition requires long-term behavior change, which consists of dietary improvements often coupled with an increase in exercise. If implemented correctly, behavior changes can help you lose body fat and achieve an ideal body composition to support your goals. In general, any increase in LBM and decrease in nonessential body fat will move you further toward fitness. As we will discuss in the section on “Quality,” improvements in body composition come from eating more of the right foods instead of merely reducing calories.

¹⁶ Fontana, L., & Hu, F. B. (2014). Optimal body weight for health and longevity: Bridging basic, clinical, and population research. *Aging Cell*, 13(3), 391–400. <https://doi.org/10.1111/acel.12207>

¹⁷ Jeukendrup, A. E., & Gleeson, M. (2010). *Sport nutrition: An introduction to energy production and performance*. Champaign, Illinois: Human Kinetics.

Resting Heart Rate

Resting heart rate represents the average number of times your heart beats in a minute (BPM) while at rest. Resting heart rate can represent the efficiency of the heart in circulating blood. Up to a certain point, a lower resting heart rate is a sign of improved health because it is an indication of a strong heart muscle that can pump a greater amount of blood with every beat so it doesn't have to beat as frequently. It also indicates healthy circulatory and nervous systems and blood vessels. An elevated resting heart rate, on the other hand, can be caused by a sedentary lifestyle, heart problems, stress or anxiety, sleep deprivation, dehydration, illness, low levels of potassium in the blood, an overactive thyroid gland, or anemia. Women tend to have slightly higher resting heart rates than men because their hearts are generally smaller.

Resting Heart Rate

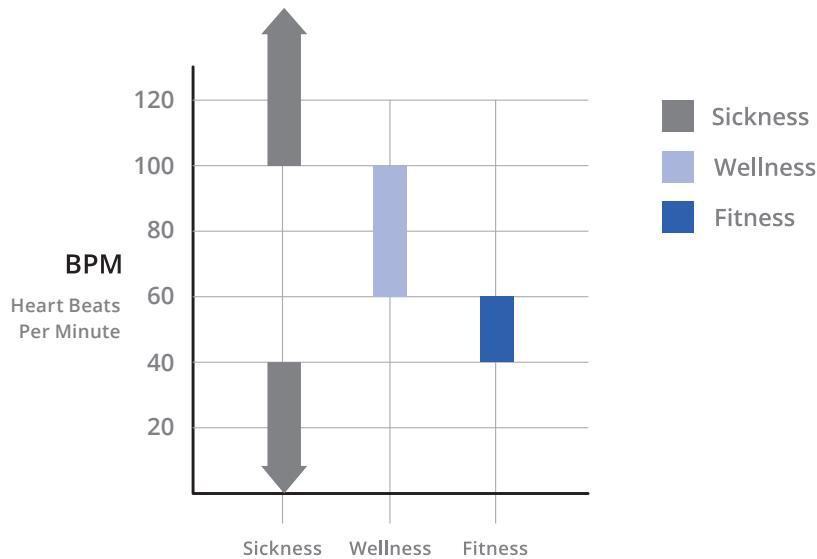


Figure 10. A General Guide to Heart Rate Measures

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The best way to lower your resting heart rate is through exercise. Managing stress and anxiety, improving sleep, staying properly hydrated, maintaining a healthy body weight, and avoiding excessive caffeine and nicotine are also effective methods for lowering resting heart rate.

Heart-Rate Variability (HRV)

Heart-rate variability is a measure of the variance in time (measured in milliseconds) between heartbeats. This variability is a response to the competing signals sent to the heart by two branches of the autonomic nervous system: the sympathetic branch (fight or flight) and the parasympathetic branch (rest and digest). If the sympathetic nervous system is the dominant signal, the variation between heartbeats tends to be lower. If the parasympathetic nervous system is dominating, the variation between beats tends to be higher. Research has shown a relationship between low HRV and increased risk of depression, anxiety, and cardiovascular disease. Those with higher HRV may have greater cardiovascular fitness and be more resistant to stress.

The best way to determine HRV is with an electrocardiogram conducted at a medical office. In recent years, various apps, heart-rate monitors, straps, bands, and rings have been introduced to measure HRV. The accuracy of these devices is still being examined. While HRV values are highly individual, younger people tend to have higher HRV than older individuals. With no definition for what a “normal” HRV is, we cannot plot HRV values for sickness, wellness, or fitness. Instead of aiming for specific HRV values, the overall trend is most important. Take your baseline measurement and try to structure your lifestyle to increase it.

Without relying on any device, you can use your resting heart rate in a similar fashion to HRV to gain insight into how your nervous system is functioning. By taking your resting heart rate when you wake each morning and paying attention to significant jumps of 5-10 BPM, you will gain insight into when your sympathetic nervous system is overriding your parasympathetic nervous system. At this point, you can take various actions to bring your resting heart rate back down to your normal average.

Here are a few actions you can take to decrease your resting heart rate and improve your HRV values:

- Allow sufficient recovery from training.
- Stay properly hydrated.
- Avoid alcohol.
- Eat a healthy diet like the one we describe in this training guide.
- Get quality sleep.

Blood Lipids (Cholesterol Numbers)

Most blood panels include the following readings:

- Total cholesterol (TC): a measure of the total amount of cholesterol in your blood
- Low-density lipoprotein cholesterol (LDL-C): transports cholesterol from your liver to the tissues in your body
- High-density lipoprotein cholesterol (HDL-C): absorbs cholesterol and carries it back to the liver
- Triglycerides (TG): the main constituents of natural fats and oils in your blood

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Despite the medical community's focus on LDL-C, HDL-C and triglycerides are the most meaningful markers for assessing metabolic and cardiovascular fitness and risk.

Here's why:

- HDL-C, the so-called "good" cholesterol, isn't cholesterol at all but rather a protein carrier that ferries triglycerides (the storage form of body fats), cholesterol (a waxy structural lipid alcohol), and a few other molecules through the blood.
- Triglycerides and cholesterol are water insoluble, and the blood through which they must travel is a water-based fluid. So, to keep them in solution, the body has carrier proteins (VLDL, IDL, LDL, HDL) onto which the fats and cholesterol are packed for transport.
- The first three (VLDL, IDL, and LDL), for the most part, are proteins that transport triglycerides and cholesterol to the tissues for deposit, and HDL-C picks up cholesterol from the tissues and transports it back to the liver for disposal or recycling.
- HDL also has important antioxidant and anti-inflammatory properties.

Many people worry about elevated TC or LDL-C readings as risk factors for cardiovascular disease, but the predictive value of TC and LDL-C are weak regarding who is most at risk for a heart attack. More important are the number and size of the LDL particles than the absolute reading. Small, dense LDL particles are dangerous. These smaller, dense particles seem to be more susceptible to oxidation and more easily enter the arteries through the endothelium. Research has shown that a diet rich in whole, natural foods can be used effectively to lower the levels of small, dense LDL particles.¹⁸ When it comes to the larger particles, higher readings are not much of a problem. And TC can be utterly meaningless because it does not differentiate between LDL particle size and includes HDL, LDL, and triglycerides. Someone could have a high TC by having high levels of HDL, normal or low levels of LDL, and normal levels of triglycerides. Although many physicians treat LDL and TC by aggressively prescribing medications to chase ever-lower readings, determining what's going on with the HDL-C level is a much more predictive marker of metabolic and cardiovascular health.

An HDL-C reading below 50 mg/dL for women or 40 mg/dL for men correlates well with cardiovascular risk and poor metabolic fitness, and if the reading is high (50-60 mg/dL or higher), that generally points to metabolic health and less risk.

If raising HDL is a good thing for health, how do we do it? Three things have been shown to raise HDL-C:

- Moderate your alcohol intake to a maximum of two or fewer drinks per day for men and one for women.
- Perform a regular mix of moderate-intensity and vigorous exercise (three to five days per week).
- Consume dietary saturated fat from quality sources, such as high-quality meats, coconut oils, butter, and cheeses.

HDL-C is a marker you can follow for evidence of improvement in metabolic and cardiovascular fitness.

¹⁸ Talebi, S., Bagheri, M., Atkin, S. L., Askari, G., Orafi, H. M., & Sahebkar, A. (2020). The beneficial effects of nutraceuticals and natural products on small dense LDL levels, LDL particle number and LDL particle size: A clinical review. *Lipids in Health and Disease*, 19(1). <https://doi.org/10.1186/s12944-020-01250-6>

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Triglycerides (TG)

The form in which fats circulate in our blood and the storage form of fat in our bodies are potent markers of metabolic health. Triglyceride levels act as a very good, readily available, and inexpensive indicator of insulin sensitivity. Low triglyceride levels (under 150 mg/dL) indicate insulin sensitivity, while elevated triglyceride levels indicate insulin resistance and metabolic syndrome risk (or presence). Regarding health status, lower is better and higher is worse.

In determining the risk of cardiovascular disease (especially the risk of heart attack), a scientific review found support for looking at the ratio of the triglyceride level divided by the HDL-C level (TG/HDL).¹⁹ The combination of these two values might be the most predictive blood value to illuminate risk of future heart attack. A ratio under 5 is good, and the further under 5 the better.

If lowering triglycerides is a goal, what dietary factors influence their levels? Two behaviors make triglycerides go up:

- Eating excess carbohydrates (sugar and starch)
- Drinking excess alcohol

What lowers them? Reducing carbohydrates and alcohol can cause a rapid reduction in triglycerides.

Triglyceride levels and the TG/HDL ratio are an important pair of markers you can follow to assess improvements in your cardiovascular and metabolic fitness.

Blood Sugar

A fasting blood-sugar reading outside the normal range (above 108 mg/dL) can indicate Type 2 diabetes or prediabetes, with all the attendant vascular and inflammatory issues that come with those diagnoses.

The blood-sugar reading taken two hours after a meal can offer insight into how well the body handles incoming carbohydrates and how quickly they clear the blood. A better option, now available, is the use of a continuous glucose monitor (CGM). This device can give minute-by-minute data input to help guide food choices (toward those that don't cause as big an upward bounce in blood sugar) and warn of exercise-induced low blood sugar in those on blood-sugar-lowering medication.

A simple fasting blood-sugar measurement is but a snapshot in time and may not tell as clear a tale about the condition of the metabolism in question as the hemoglobin A1c (HbA1c) level, which reflects average blood-sugar levels over a three-month period.

- People with Type 2 diabetes will have an HbA1c level in excess of 7% or sometimes much, much higher.
- In people whose metabolism is in good shape (those enjoying wellness), HbA1c levels will generally fall in the 4–5% range.

¹⁹ Welty, F. K. (2013). How do elevated triglycerides and low hdl-cholesterol affect inflammation and atherothrombosis? *Current Cardiology Reports*, 15(9). <https://doi.org/10.1007/s11886-013-0400-4>

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Working toward an HbA1c level of 5% or less with effective diet and exercise is a readily attainable goal for those with Type 2 diabetes or prediabetes, and changes to HbA1c can provide an easy marker with which to track progress.

C-Reactive Protein (CRP)

CRP is a nonspecific marker of inflammation. Inflammation is the body's natural way of protecting itself. When inflammation is acute, such as during an injury or illness, white blood cells are released to prevent festering and further infection. This is a quick process. Inflammation can also be chronic, which is a long-lasting response to an inflammatory stimulus, such as prolonged exposure to a toxin or irritant in the body. When it comes to nutrition, these toxins and irritants include processed sugars and refined carbohydrates, trans fats and industrial vegetable/seed oils, excessive alcohol consumption, and processed meats. With chronic inflammation, the white blood cells may end up attacking healthy tissue. This can last weeks, months, years, or a lifetime. Elevated CRP indicates an inflammatory process of some type is occurring somewhere in the body, but it doesn't tell you what or where. It rises with infection, inflammatory conditions such as some forms of arthritis, and traumatic injury, such as a heart attack. It can also rise transiently following a hard physical workout or long-distance run, so testing should not be completed within 48 hours of such activities.

There are two types of tests used to measure CRP levels: the standard test and a high-sensitivity test. Typically, these tests are performed to measure inflammation and determine cardiovascular disease and heart-attack risk.

CRP levels can vary quite a bit, so measurements should be taken two weeks apart and averaged when used to assess risk. Risk ranges are as follows:

Standard test:

- Normal: Less than 10 mg/L
- High: Equal to or greater than 10 mg/L

High-sensitivity test:

- Lower risk of heart disease: hs-CRP level less than 2.0 mg/L
- Higher risk of heart disease: hs-CRP level equal to or greater than 2.0 mg/L

When trying to reduce CRP levels, the three most impactful actions you can take are:

- Getting regular exercise
- Reducing excess body fat (which, in turn, can lower visceral fat)
- Eating a diet low in processed foods and high in omega-3 fatty acids

NOTE!

If you have diabetes and are taking medication to control your blood sugar, it is crucial to work with your healthcare providers as you adopt a new nutritional or exercise program.

Changes to diet and exercise may reduce elevated blood sugar quickly and require reductions in medication that must be managed by a physician.

For safety, you should never attempt to alter doses or stop medications abruptly without your doctor's input.

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Bone Density

Tracking bone density is another touch point for assessing your progress on the sickness-wellness-fitness continuum.

Bone density can be determined by special X-ray scans (DEXA is the most common) that assess bone strength by quantifying mineral content and telling us how much calcium and other bone minerals are packed into the protein/collagen framework that makes up a bone. The results are reported as a T-score or a Z-score, which compare the bone tested to the known densities of normal bones of a 30-year-old or someone relative to your own age, sex, and body size, respectively.

- T-scores
 - A score of 0 means a density equal to a young normal bone.
 - T-scores falling within one standard deviation (SD) of that young-bone standard (0 to -1) are considered normal.
 - T-scores from -1 to -1.25 SD below the standard indicate low bone density (osteopenia).
 - At -2.5 SD or more below the standard, bones are said to be frankly osteoporotic (thin, weak, low in mineral content).
 - The further below -2.5, the more severe the bone mineral loss and therefore the higher the risk for fracture.
- Z-scores
 - Z-scores are used most often with children, premenopausal women, and men under the age of 50.
 - This score is the number of SDs above or below the mean for people matching your age, sex, and body size.
 - A score below -2.0 is considered outside the normal range of bone health.
 - A score above -2.0 is considered within the normal range of bone health.

Dense bones are strong bones, for the most part. Bone thinning, softening, and weakness leave the skeleton vulnerable to fractures, especially breaks of the hip and spine, which can be devastating in the older population. Bones thin with age (over 50) for both genders but for women especially. The major contributing factors to bone loss include vitamin and hormone deficiencies (vitamin D and estrogen/progesterone/testosterone, especially), living a sedentary lifestyle, certain metabolic diseases (particularly those of the thyroid, parathyroid, adrenal glands, and kidney), and some medications (notably corticosteroids, but also a few others).

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What can you do to strengthen your bones?

- Move and bear weight daily, using both high- and low-impact training, to keep bones strong.
- Eat complete protein²⁰ so the body can repair the scaffolding onto which the bone minerals affix themselves.
- Ensure sufficient vitamin D from sunlight or supplementation so the body can mineralize bones effectively.
- Maintain production levels of reproductive hormones with age to avoid bone loss (estrogen and progesterone in women and testosterone in men).

Weight-bearing activities keep young bones strong, strengthen the musculoskeletal system of older individuals, and over time — sometimes with the help of supplemental hormone or vitamin therapies — help older people rebuild bone density.

HEALTH VS. HEALTH MARKERS

When it comes to treating chronic disease, most physicians prescribe medication to treat symptoms and move health-marker values. If the value doesn't move enough, a physician's recommendation for the next step is usually to increase the medication dosage. However, when the protocol ends there, which it often does, the root of the problem is ignored and not treated.

For most of these chronic diseases, the root cause is insulin resistance caused by excess consumption of processed carbohydrates. Fixing this should be the focus of the treatment, and fortunately, the fix is within your control. The solution is simple: Minimize your consumption of refined carbohydrates by eating natural, unprocessed foods and combine this with constantly varied functional movements performed at high intensity. This will help control blood glucose throughout the day, and if practiced consistently (for three to six months), it will increase insulin sensitivity. (NOTE: Those on medication should routinely see their physician during this process. As insulin sensitivity increases based on nutritional and exercise behaviors, the medication dosage will likely have to decrease.)

II

THE SOLUTION IS SIMPLE:

Minimize your consumption of refined carbohydrates by eating natural, unprocessed foods, and combine this with constantly varied functional movements performed at high intensity."

Behavioral changes that lead to insulin being used more effectively in the body severely decrease the risk of chronic disease. So yes, the health markers we have outlined above provide useful data and perhaps an early warning system for disease, but we should not conflate health markers with health. At best, health markers are correlates of health. However, they are not the definition of health. That's because **health is much more than acceptable health markers or the absence of disease.**

Consider the person who looks healthy on paper but is not strong enough to perform basic tasks. Or the person who has no red flags on their blood panel and is at a "healthy" weight and body composition, but they can't play with their kids because their joints ache and they lack energy. And at the far extreme, imagine the person who

²⁰ Refer to the later section on "[Protein Supplements](#)" for an explanation of complete protein.

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gets regular bills of health from their physician, but they lack mobility to the point that they depend on others to help them with activities of daily living. All three of those people would be considered to be on the sickness side of the continuum.

For true health, you need good health markers and high functional capacity. **The good news is the major drivers of health are well within your control**, and the remedy for poor health markers is simple, inexpensive, and the same as what we do to improve fitness: Train constantly varied functional movements at high intensity and eat meat and vegetables, nuts and seeds, some fruit, little starch, and no sugar in quantities that support exercise but not body fat.

But you don't have to take our word for it. In the upcoming chapters, we will walk you through the process of determining what to eat, how much to eat, and how to make any necessary changes based on the results you receive. You will learn at the heart of the problem is excessive carbohydrate intake. Industrialized oils are also problematic. (Both carbohydrates and industrialized oils are common in processed foods.) We will also provide insight on how alcohol affects your health and performance, we'll examine a host of supplements, and we'll explore more specialized diets after you have the basics set. Couple that knowledge with what you know about the importance of continuing to increase your work capacity across broad time and modal domains, and you can then undertake your own experimentation and use observable and measurable results to optimize your health and performance.



QUALITY

EATING FOR WELLNESS

The following paragraph connects nutrition and exercise with the common goal of improved health and fitness.

CrossFit's "WORLD-CLASS FITNESS IN 100 WORDS"

Eat meat and vegetables, nuts and seeds, some fruit, little starch, and no sugar. Keep intake to levels that will support exercise but not body fat. Practice and train major lifts: deadlift, clean, squat, press, clean and jerk, and snatch. Similarly, master the basics of gymnastics: pull-ups, dips, rope climbs, push-ups, sit-ups, presses to handstand, pirouettes, flips, splits, and holds. Bike, run, swim, row, etc., hard and fast. Five or six days per week, mix these elements in as many combinations and patterns as creativity will allow. Routine is the enemy. Keep workouts short and intense.

Eat Real Food

The first sentence — “Eat meat and vegetables, nuts and seeds, some fruit, little starch, and no sugar” — addresses the quality of the food we eat and indicates how to eat to avoid chronic disease. This way of eating reduces overall carbohydrate intake with the words “some fruit, little starch, and no sugar” and eliminates the excessive consumption of refined, processed carbohydrates. As we learned in the previous chapter, excess consumption of refined, processed carbohydrates has been linked to chronic disease through insulin resistance and hyperinsulinemia.²¹ (Hyperinsulinemia is when the amount of insulin in your blood is higher than what’s considered normal and is often caused by insulin resistance.) Removing these foods promotes improved health and significantly reduces the chance of developing hyperinsulinemia and the associated cascade of chronic diseases.

²¹ See “[The Science of Sickness](#)”

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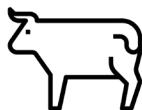
Eating a diet of quality foods will push one's health markers²² away from sickness toward wellness on the sickness-wellness-fitness continuum and is a critical first step in developing a diet that supports health and performance.

To understand the types of food included and the benefits they confer, we first need to establish what we mean by "whole, unprocessed" foods, as this phrase is ubiquitous in the nutrition space but is often defined in different ways. Generally speaking, whole, unprocessed foods are those found in nature and that we've consumed for the majority of human history. These foods do not have many ingredients, and they go bad if not consumed relatively quickly. Typically, you find them around the perimeter of the grocery store. While we emphasize the term "unprocessed" as an ideal, "minimally processed" foods do have a place in our recommendation. Various forms of cooking, chopping, heating, blending, preserving, and fermenting are acceptable. To help identify acceptable levels of processing, we provide the characteristics below for unprocessed or minimally processed foods. This is a set of standards against which we can compare any food to determine if it should be in our diet.

High-quality food includes unprocessed or minimally processed foods that:

- Are not processed in a way that negatively affects our insulin response
- Are not processed in a way that decreases their nutrient value
- Do not contain extra ingredients such as sugars, industrial seed oils, preservatives, food coloring, or other additives

Now, we can move from understanding what constitutes high-quality food in general to understanding the role macronutrients play in your nutritional plan. A macronutrient is a food source that provides energy to the body. Macronutrients come in the form of protein, carbohydrate, and fat. While most foods contain more than one macronutrient, we categorize foods on our list based on their most prevalent macronutrient.



1. "**MEAT**" includes any form of **protein**, from animal protein (beef, chicken, pork, turkey, etc.), to eggs and seafood, to vegan sources of protein such as tofu, tempeh, beans, and lentils. In addition to fulfilling protein requirements, these foods provide a large variety of bioavailable vitamins and minerals. As a side note, many animal protein sources also contain a nontrivial amount of fat. In contrast, non-animal protein sources often include a significant carbohydrate load. Both will be important to keep in mind when it comes time to plan your meals.

²² See "[Health Markers](#)"

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2. "**VEGETABLES**" are plant-based items, such as greens, onions, carrots, zucchini, peppers, etc. While these foods are classified as **carbohydrate** sources, they provide a relatively small amount of digestible carbohydrates. Vegetables are, however, a significant source of fiber (a nondigestible source of carbohydrate), many vitamins and minerals, and in some cases, nontrivial amounts of protein.



3. "**NUTS and SEEDS**" is a catch-all phrase for **fat**. It refers to nuts (walnuts, pecans, almonds, etc.) but also coconuts, peanuts, and plant-derived fat sources such as avocados and olives. Oils, such as coconut oil, olive oil, and avocado oil, fall into this category, as do butter, cream, and lard. Fats contain a variety of vitamins and minerals. Nuts and seeds also contain some protein and carbohydrate but in small amounts compared with the amount of fat they provide. (Note: Vegetable oils are NOT included in this category due to the negative effects they have on health. More on this topic below.)



4. "**SOME FRUIT**" applies to the higher-density **carbohydrate** source we find with common fruits: apples, oranges, berries, bananas,²³ pineapple, and melon, to list a few. In addition to sugars such as glucose and fructose, fruits contain fiber, vitamins, and minerals. Fruits such as guava, jackfruit, and kiwi also provide a small amount of protein. The word "some" is added in the phrase to moderate carbohydrate intake.



5. "**LITTLE STARCH**" refers to another plant-based carbohydrate source consisting of long chains of glucose molecules (starch), a **highly digestible form of carbohydrate**. Starch exists in vegetables in small quantities. The foods in this category, however, contain a higher density of starch. Examples of such foods include all types of grains (wheat, rye, barley, rice, millet, corn, quinoa, oats, etc.), all types of potatoes, and legumes (beans, lentils, chickpeas, etc.). Starchy foods contain varying amounts of vitamins and minerals, though generally at a lower density than meats, vegetables, or fruits. They also provide a small amount of protein. The word "little" is again added to moderate carbohydrate intake.



6. "**NO SUGAR**" refers to added **sugar in any form**, including table sugar, high-fructose corn syrup, maple syrup, agave, honey, or other natural sweeteners. Artificial sweeteners like sucralose and aspartame are also excluded from the diet, as they have been found to negatively affect gut bacteria and hormones such as insulin.

²³ Technically, bananas are an herb and not a fruit, but they share many of the same characteristics of fruit and for practical reasons are included within that category.

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More on Sugar

More than any other ingredient, the “no sugar” aspect of our recommendation is critical for supporting health. Before modern civilization, finding energy-rich foods high in sugar or fat in nature could mean the difference between life and death. Today, that’s not the case. However, food companies are well aware of our affinity for energy-dense foods, and their food scientists work diligently to create products much higher in fat and sugar than anything found in nature.²⁴ These highly palatable, addictive, processed foods fill store shelves and have become staples of the Western diet.

An astounding 74% of packaged foods sold in supermarkets contain added sugars.²⁵ Items such as pasta sauce, canned and frozen fruit, canned and frozen vegetables, packaged meats, salad dressings, cereals, and breads contain enough high-fructose corn syrup or other sweeteners to rival packaged desserts. Moreover, while the FDA now requires gram quantities of added sugars to be shown on nutrition labels, added sugar comes in so many forms (at least 61!) that it’s difficult to isolate on the ingredient list.²⁶ Agave nectar, barley malt, evaporated cane juice, carob syrup, corn-syrup solids, dextrin, fruit-juice concentrate, maltodextrin, rice syrup, and sweet sorghum are just some of the names used for added sugar. To see a list of 56 different names for sugar, visit <https://www.virtahealth.com/blog/names-for-sugar>.

Regardless of the names used, mounting evidence continues to link the excess consumption of sugar to insulin resistance, hyperinsulinemia, and a host of chronic diseases such as cardiovascular disease and Type 2 diabetes. Americans, who suffer the highest rates of chronic disease in the world, also consume the most added sugar, ingesting 57 lb. of added sugar each year.²⁷ Only by greatly reducing or eliminating these sugars are you able to move away from sickness toward improved health.

Replacing added sugar with artificial sweeteners to reduce sugar intake and avoid metabolic disease has been touted as a viable strategy. However, recent research on non-caloric sweeteners suggests these chemicals may directly or indirectly affect our metabolism. The common sweeteners sucralose and acesulfame potassium have been shown to increase insulin levels directly.²⁸ Other sweeteners, such as aspartame, may cause negative changes in gut bacteria resulting in increased insulin resistance. Ultimately, artificial sweeteners are highly processed chemicals and are not suitable for a diet consisting of whole, unprocessed foods.

Note that “natural” sweeteners, like Stevia, have become popular as “no-sugar” or “zero-calorie” substitutes, but even Stevia has its drawbacks. New research has shown this natural sweetener might disrupt gut health, possibly leading to gastrointestinal issues such as irritable bowel syndrome.²⁹ These types of gut microbiome disruptions have also been associated with other metabolic disorders like obesity and Type 2 diabetes.

²⁴ EcoWatch. “Food companies are making their products addictive and it’s sickening (literally)”. <https://www.ecowatch.com/food-companies-making-products-addictive-2632845184.html>. 26 March 2019. (accessed July 26, 2021)

²⁵ Sugarscience.ucsf.edu “Hidden in plain sight.” <https://sugarscience.ucsf.edu/hidden-in-plain-sight/#YVTz5GZKgg> (accessed July 26, 2021)

²⁶ Ibid.

²⁷ Ibid.

²⁸ Rother K. I., Conway E. M., Sylvetsky A. C. (2018). How Non-nutritive sweeteners influence hormones and health. *Trends Endocrinol Metab*. 29(7):455-467. doi: 10.1016/j.tem.2018.04.010. Epub 2018 May 30. PMID: 29859661.

²⁹ Hernandez, N. B., Jimenez Cruz, B. L., Zavala Solares, M., & Melendez Mier, G. (2018). Association of natural and artificial nonnutritive sweeteners on gastrointestinal disorders: A narrative review. *Journal of Nutrition & Food Sciences*, 08(04). <https://doi.org/10.4172/2155-9600.1000711>

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Oils

While added sugar is explicitly eliminated from our plan, vegetable oils are also tacitly excluded.

Vegetable oils, or industrially produced seed oils such as canola, corn, cottonseed, soy, sunflower, safflower, and grapeseed oils, are prevalent in the majority of processed foods. For decades, these oils have been touted as heart-healthy, cholesterol-free alternatives to butter and lard. In reality, the production process for these oils, which includes high heat, chemical bleaching, and deodorizing, delivers an end product stripped of nutrients and containing chemical residues, trans fats, and oxidized byproducts.³⁰

The health impact of vegetable oils is that they cause an imbalance in the omega-6-to-omega-3 ratio in the body. Omega-6 fatty acids and omega-3 fatty acids are polyunsaturated fats known as essential fatty acids. They are required for numerous bodily processes, but our bodies cannot produce them; we must get them from our diet. In simple terms, when consumed, omega-6 fatty acids tend to be inflammatory by nature, and omega-3 fatty acids tend to be anti-inflammatory. This does not mean omega-6 fatty acids are “bad” and omega-3 fatty acids are “good.” We need both. Indeed, for optimal health, we must maintain a delicate balance between omega-6 and omega-3 fatty acids.³¹ Ideally, this ratio of omega-6 to omega-3 is 2:1.³² In the modern Western diet, omega-6 consumption exceeds omega-3 consumption by 10-20 times. While some of this is due to low omega-3 consumption, the real culprit for this skewed fatty-acid ratio is vegetable oils, which are much higher in inflammatory omega-6 fatty acids than omega-3s.



³⁰ Kresser, C. How industrial seed oils are making us sick. <https://chriskresser.com/how-industrial-seed-oils-are-making-us-sick/>. 19 February 2019. (accessed August 1, 2021)

³¹ Ibid.

³² Note that there is likely an acceptable range of ratios anywhere from 1:1-4:1. We use 2:1 as the median value of the range.

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Essentially, we choose oils that keep inflammation low. That said, not all inflammation is bad. We want to reduce chronic inflammation while understanding acute inflammation is a necessary reaction in the body. Acute inflammation is a typical response to an injury or even when recovering from a tough workout. As previously stated, chronic inflammation occurs when this inflammatory process becomes prolonged over long periods. During chronic inflammation, the immune system works overly hard, thinking it is being constantly attacked, and continues to release white blood cells. These white blood cells can end up attacking nearby tissue and organs. Chronic inflammation has been associated with diseases and conditions such as cardiovascular disease, cancer, Type 2 diabetes, arthritis, and digestive diseases.³³

Because vegetable oils are so prevalent in our food supply, consumption of omega-6 fatty acids in the standard Western diet quickly exceeds what could be ingested on a diet consisting only of whole, unprocessed foods. This imbalance in fatty-acid consumption produces a state of chronic inflammation conducive to the development of poor health and the chronic diseases listed above.³⁴

To avoid sickness and promote health, remove vegetable oils from your diet. Replace these industrial seed oils with healthy oils such as olive oil, coconut oil, avocado oil, or fats such as butter and lard. Essential omega-6 fatty acids can be obtained through whole food sources such as nuts, poultry, and avocados. Finally, omega-3 fatty acids can be added to the diet through the consumption of fish such as salmon, mackerel, and sardines, oysters, or grass-fed beef a few times a week, as well as via supplementation, such as with a high-quality fish oil.³⁵

Overall, our recommendation promotes the relatively balanced consumption of all three macronutrients. Meats and vegetables have no limiting terminology, as these foods are highly satiating and difficult to overeat in the long term. Feeling fuller longer helps control overall intake. While there is no explicit limit on nuts and seeds, you must be careful not to overeat these foods due to their caloric density. Strong limits are clearly placed on sources of carbohydrates such as starch and sugar; generally, the more carbohydrate-dense a food is, the greater the limit. The main focus is on limiting the quantities of processed foods that contain a higher density of simple sugars and

³³ U.S. Department of Health and Human Services. (n.d.). *Office of dietary supplements - omega-3 fatty acids*. NIH Office of Dietary Supplements. <https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/>. (accessed July 22, 2021)

³⁴ Kresser, C. How industrial seed oils are making us sick. <https://chriskresser.com/how-industrial-seed-oils-are-making-us-sick/>. 19 February 2019. (accessed July 29, 2021)

³⁵ Refer to the later section on "[Supplements](#)" for further information on adding omega-3 via supplementation.

FOOD SYNERGY

Food synergy happens when non-randomized combinations of food elements work in concert to produce improvements in health.

This concept opposes common nutritional research that isolates one food, food type, or element of food to see how it affects health, usually with null or negative health outcomes.

Eating foods that are as close as possible to their natural form, in a variety of combinations, provides the food synergy necessary for increasing health and avoiding disease.

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eliminating added sugar outside the range attainable from “meats and vegetables, nuts and seeds, some fruit, and little starch.” Together, these strategies become the primary reason this diet regulates insulin and prevents hyperinsulinemia.

Consuming a variety of whole, unprocessed foods is also the best way to obtain all the micronutrients — vitamins and minerals — necessary to support metabolic processes and overall health. Micronutrients ingested through whole foods are often delivered in a more absorbable form and in better balance when compared with supplements. Because of the variety of micronutrients found in meats, vegetables, and fat sources, you experience synergistic benefits from combining these nutrients that are not available when taken in isolation as with a supplement.

Now that you know what you should and shouldn’t eat for optimal health and performance, you can begin the process of bringing the good food in and taking the bad out.

SET YOURSELF UP FOR SUCCESS

Adopting a new diet filled with whole, unprocessed foods isn’t easy initially. It requires preparation, planning, and the development of new habits, but there are steps you can take to ensure your success.

An essential first step is setting up your home environment for success. This involves removing all processed and packaged foods from your pantry, fridge, and freezer. Remove everything with added sugar, industrial seed oils, and foods that do not generally fit the “meat and vegetables, nuts and seeds, some fruit, little starch, and no sugar” recommendation. Willpower is not a feasible strategy. Any tempting processed treat, snack, meal, or beverage that remains in the house will likely be eaten. Just knowing they are there and that you have to resist them takes up unnecessary mental energy. Keeping all highly refined, packaged foods out of the house is a critical (and simple!) first step for successfully implementing a healthy diet.

The next step is to restock your pantry, fridge, and freezer with whole, unprocessed foods. Using our recommended starter shopping lists below is a great way to stay organized and focused on making the best food choices possible.

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Table 3 — Sample Starter Shopping List

[PRINT
SHOPPING LIST](#)

PROTEINS	
Meat	Vegetarian / Vegan*
Meat	
<input type="checkbox"/> Beef	<input type="checkbox"/> Beans and peas: lentils, garbanzos, etc.
<input type="checkbox"/> Bison	<input type="checkbox"/> Chia seeds
<input type="checkbox"/> Chicken	<input type="checkbox"/> Hemp
<input type="checkbox"/> Duck	<input type="checkbox"/> Spirulina
<input type="checkbox"/> Game meat	<input type="checkbox"/> Sprouted grains
<input type="checkbox"/> Pork	<input type="checkbox"/> Soybean: tofu, tempeh, edamame
<input type="checkbox"/> Seafood and fish	<input type="checkbox"/> Quinoa and barley
Dairy (if tolerated)	<input type="checkbox"/> Vegan protein powders
<input type="checkbox"/> Whole milk	
<input type="checkbox"/> Cheese	
Eggs	
<input type="checkbox"/> Chicken	
<input type="checkbox"/> Duck	

*Many vegetarian and vegan protein options are also high in carbohydrates. For example, one cup of black beans contains 15 g of protein and 40 g of carbohydrates. Be sure to account for both when planning your meals.

FRUITS AND STARCHES	
Fruits	Starchy Vegetables (and Other Foods)
<input type="checkbox"/> Apples	<input type="checkbox"/> Beans (if tolerated)
<input type="checkbox"/> Bananas	<input type="checkbox"/> Chestnuts
<input type="checkbox"/> Blackberries	<input type="checkbox"/> Corn
<input type="checkbox"/> Blueberries	<input type="checkbox"/> Parsnips
<input type="checkbox"/> Cantaloupe	<input type="checkbox"/> Peas
<input type="checkbox"/> Cherries	<input type="checkbox"/> Potatoes
<input type="checkbox"/> Grapes	<input type="checkbox"/> Plantain
<input type="checkbox"/> Grapefruit	<input type="checkbox"/> Pumpkin
<input type="checkbox"/> Honeydew	<input type="checkbox"/> Ezekiel bread
<input type="checkbox"/> Kiwi	<input type="checkbox"/> Squash
<input type="checkbox"/> Oranges	<input type="checkbox"/> Sweet potatoes
<input type="checkbox"/> Peaches	<input type="checkbox"/> Whole grains (if tolerated)
<input type="checkbox"/> Pears	<input type="checkbox"/> Yams
<input type="checkbox"/> Raspberries	
<input type="checkbox"/> Strawberries	
<input type="checkbox"/> Tomatoes	
<input type="checkbox"/> Watermelon	

VEGETABLES, NUTS, AND SEEDS	
Vegetables	Nuts / Seeds (Healthy Fats)
<input type="checkbox"/> Asparagus	<input type="checkbox"/> Almonds
<input type="checkbox"/> Beets	<input type="checkbox"/> Animal fat (high-quality)
<input type="checkbox"/> Bell peppers	<input type="checkbox"/> Avocado
<input type="checkbox"/> Bokchoy	<input type="checkbox"/> Avocado oil
<input type="checkbox"/> Broccoli	<input type="checkbox"/> Butter
<input type="checkbox"/> Brussels sprouts	<input type="checkbox"/> Cashews
<input type="checkbox"/> Carrots	<input type="checkbox"/> Chia seeds
<input type="checkbox"/> Cauliflower	<input type="checkbox"/> Coconut oil
<input type="checkbox"/> Cabbage	<input type="checkbox"/> Flax seeds
<input type="checkbox"/> Celery	<input type="checkbox"/> Ghee
<input type="checkbox"/> Collard greens	<input type="checkbox"/> Hazelnuts
<input type="checkbox"/> Cucumber	<input type="checkbox"/> Macadamia nuts
<input type="checkbox"/> Lettuce	<input type="checkbox"/> Macadamia oil
<input type="checkbox"/> Mushrooms	<input type="checkbox"/> Nut butters
<input type="checkbox"/> Onions	<input type="checkbox"/> Olive oil
<input type="checkbox"/> Spinach	<input type="checkbox"/> Pecans
<input type="checkbox"/> Turnip greens	<input type="checkbox"/> Pine nuts
<input type="checkbox"/> Zucchini	<input type="checkbox"/> Pumpkin seeds
	<input type="checkbox"/> Sesame seeds
	<input type="checkbox"/> Sunflower seeds
	<input type="checkbox"/> Tahini
	<input type="checkbox"/> Tallow
	<input type="checkbox"/> Walnuts
	<input type="checkbox"/> Walnut oil



HEALTHY MEALS AND SNACKS

With the kitchen fully stocked, you'll be ready to prepare your meals.

Prepare simple meals consisting of a serving of protein, several servings of vegetables, a side of starch or fruit, and some good fats.

Over time, creating healthy, delicious meals will become routine."

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Kitchen Essentials

You can also stock your kitchen with basic items for food preparation. Here is a list of basic kitchen essentials you can find at most grocery stores, secondhand shops, or garage sales:

- Frying pan
- Pot
- Mixing bowls
- Measuring cups
- Measuring spoons
- Simple food scale
- Good-quality knives
- Casserole dish
- Baking sheets
- Storage containers, various sizes
- Ziplock bags, 1 gallon

With the kitchen fully stocked, you'll be ready to prepare your meals. Having healthy meals and snacks readily available will prevent you from defaulting to convenient packaged foods when you're hungry. Initially, a good strategy is to prepare simple meals consisting of a serving of protein, several servings of vegetables, a side of starch or fruit, and some good fats. Water, sparkling water, tea, and coffee (no added sugar) are good beverage choices. Your first meals may not be overly delicious or inspiring, but over time, with some inspiration from cookbooks and online recipe sites and much experimentation, creating healthy, delicious meals will become routine.

In the next chapter, we explain the second-most important part of our nutrition recommendation: **Eat food in amounts that support exercise but not body fat.**





QUANTITY

OPTIMIZE — MOVING FROM WELL TO FIT

Recall the sickness-wellness-fitness continuum. This model speaks to the concept that fitness is a buffer against sickness because if we are fit, we'd need to move through well before we get sick. If we want to move toward this protective measure of fitness, we have to not only eat quality foods, we have to eat them **in the right amounts**. That is, we need to consume real food in quantities that "support exercise but not body fat."

Our wellness recommendation ("meat and vegetables, nuts and seeds, some fruit, little starch, and no sugar") offers general guidelines around quantities; if you want to optimize your results, you need to bring more precision and accuracy to the quantification of what you are eating.

CrossFit's starting quantity recommendation for most people is to eat .8-1.2 grams of protein per pound of body weight, depending on your goals, body composition, and activity level. Carbohydrates should represent roughly 40%, protein 30%, and fat 30% of total caloric intake (40C/30P/30F).

We recommend starting with an eating window of 12 hours and eating three to five meals a day. Balance each meal to achieve the 40C/30P/30F ratio. It can be challenging at first to be exact with meal-composition ratios; however, using the 40C/30P/30F breakdown is a useful guideline.

This approach will:

- 1) Ensure you get a steady caloric intake throughout the day to maintain your energy levels.
- 2) Help increase satiety and limit cravings that lead to overeating.
- 3) Provide a moderate and sustainable starting point from which you can learn what works or does not work and make adjustments as needed.

Adopting this strategy, along with diligently recording workout and nutrition data, analyzing the numbers, and making specific improvements is what will allow you to optimize your results.

Quantity

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Effective nutrition experimentation involves a data collection process. This process requires you to measure both your inputs and your outputs with precision. Your nutrition inputs are the types of foods you eat, the grams of each macronutrient you eat, and the total ratio of macronutrients in your diet. The outputs are your workout results, your subjective sense of well-being (how you look and feel), and your health markers.

Matching a specific quantity of food and macronutrient ratio (inputs) with specific workout numbers or health-marker readings (outputs) allows you to understand the impact of your current diet on your results. The first time you match diet to results, you establish a baseline. From here, you can make measured changes to your diet — based on advice from a coach, research, or your own best guess — and run further experiments as you seek to improve your results.

Whether you are focused on losing body fat, gaining muscle, improving your health markers, getting faster times in your workouts, or achieving peak performance in your sport, you cannot achieve optimal results without this level of detail. From a nutrition standpoint, quantifying food intake is required to go from wellness all the way to fitness on the sickness-wellness-fitness continuum. Without attending to the quantity of food you eat, fluctuations in schedule, appetite, portion size, and macronutrient ratios will be too significant. More accuracy and precision are required to find the optimal level of consumption.³⁶

This cycle of refining your eating and assessing the outcomes relative to your goals is how you become your own expert and a master at personalizing and optimizing your results. Once you know how your body responds to your inputs — what and how much you eat — you have the ticket you need to reach whatever health and fitness goals you set for yourself.

Weighing and measuring does add a layer of complexity to your daily food selection, meal planning and prepping, travel, and eating out. However, once you get the hang of it, weighing and measuring your food won't feel complicated or terribly time consuming.

³⁶ Accuracy vs. precision: Accuracy is how close something is to a known value. To use a shooting analogy, an accurate shot hits the bull's-eye. Precision is how repeatable something is. Several shots grouped closely together are considered precise, regardless of how close to the bull's-eye they are. A shooter who puts five rounds right through the bull's-eye is both accurate (hitting the bull's-eye) and precise (repeatedly hitting the same spot on the target). Applying this analogy to nutrition, the accuracy goal is to determine our own optimal macronutrient ratio. While our initial macronutrient ratio "starting point" — for example, 40:30:30 — may not accurately reflect our true optimal macronutrient ratio, the act of weighing and measuring our macronutrients at every meal provides precision. Then, as we assess our results and make measured adjustments to our macronutrient ratio, we become more accurate, moving closer to our nutrition bull's-eye while maintaining precision through weighing and measuring. Over time, we can achieve both precision and accuracy as we weigh and measure our food and adjust based on results.

ACCURACY GOAL

The accuracy goal is to determine our own optimal macronutrient ratio. While our initial macronutrient ratio "starting point" — for example, 40:30:30 — may not accurately reflect our true optimal macronutrient ratio, the act of weighing and measuring our macronutrients at every meal provides precision. Then, as we assess our results and make measured adjustments to our macronutrient ratio, we become more accurate, moving closer to our nutrition bull's-eye while maintaining precision through weighing and measuring. Over time, we can achieve both precision and accuracy as we weigh and measure our food and adjust based on results.

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"How Long Do I Have To Weigh and Measure My Food?"

This may be the most common question we receive from our community. Here's how we address it.

Long-term maintenance of a quality-foods diet, which is precisely weighed and measured, generally requires a burning desire to shave 10 seconds off your Fran time, overcome poor genes to defeat the family disease, or dominate the competition in your sport. In other words, it has to really matter to you. If it does, and you commit to the plan for the foreseeable future, your results will be nothing short of amazing, which is another reason why people stick to this plan over the long term — they experience the benefits and don't want them to end.

But what if you don't have extreme performance goals, a chronic disease, or the need to target a genetic disadvantage? What if you just want to live a healthy and active life and shed a few pounds of body fat, move from scaled to Rx'd workouts in the CrossFit Open next year, chase your kids around the soccer field, or improve your HDL-C by a few points? If these are your goals, perhaps you don't have to think of this as a long-term project that never ends. Perhaps you're better off taking this on as a 30- to 60-day challenge and then reworking your plan from there.

In the short term, 30-60 days of weighing and measuring mostly whole foods using the methods we outline in the next chapter will give you a balanced baseline for eating, and it will show you exactly how much control you have over your health markers, how you feel, and how you perform.

The education you'll receive and the experience you'll get by going through this process will be profound. It is not an exaggeration to say it will likely inform how you eat for the rest of your life, even if you never apply this specific method or degree of rigor again. Many people who start their challenge thinking it will only be 30 or 60 days often end up doing some form of weighing and measuring throughout their lives. The results and the control they achieve over their health by doing so is just too good to go back to old ways. And if you are a coach, doing this will (and should) undoubtedly inform how you help others with their eating for the duration of your career.

II

WEIGHING AND MEASURING

The education you'll receive and the experience you'll get by going through this process will be profound. It is not an exaggeration to say it will likely inform how you eat for the rest of your life."



PUT IT INTO PRACTICE

So far, we've provided the information you need to make necessary nutritional adjustments toward optimizing health and performance. Now it's time to put the information together to create your personalized nutrition plan. Putting it into practice involves taking the following four steps:

Step 1 — Determine how much to eat

Step 2 — Select your benchmarks and get a baseline

Step 3 — Implement your plan

Step 4 — Assess your results

“

Our goal: Make it simple so you can get started right now.”

These four steps will not only help you get started right now; they also are steps we'll encourage you to return to each time you need to get back on track, want a reset, or find yourself hitting a plateau.

Determining how much to eat may be the most complicated part of our nutrition recommendation, but it is also absolutely essential if you want to improve your performance and health.

STEP 1 — DETERMINE HOW MUCH TO EAT

The easiest way to determine how much you should eat is by stepping on a scale to figure out how much you weigh and then choose the activity level below that best describes your current situation. Once you have that information, you can use our handy “Macronutrient Chart by Body Weight and Activity Level” to determine how many grams of each macronutrient you should eat each day. Here are the four activity levels to choose from:

Inactive/Sedentary — You currently do not do any regular physical activity, or you spend most of your day sitting at a desk.

Moderately Active — You work out at least three times per week, and you are moderately active throughout your day.

Active — You work out at least four to five times per week.

Very Active — You are an athlete training seven or more hours per week.

Put It Into Practice

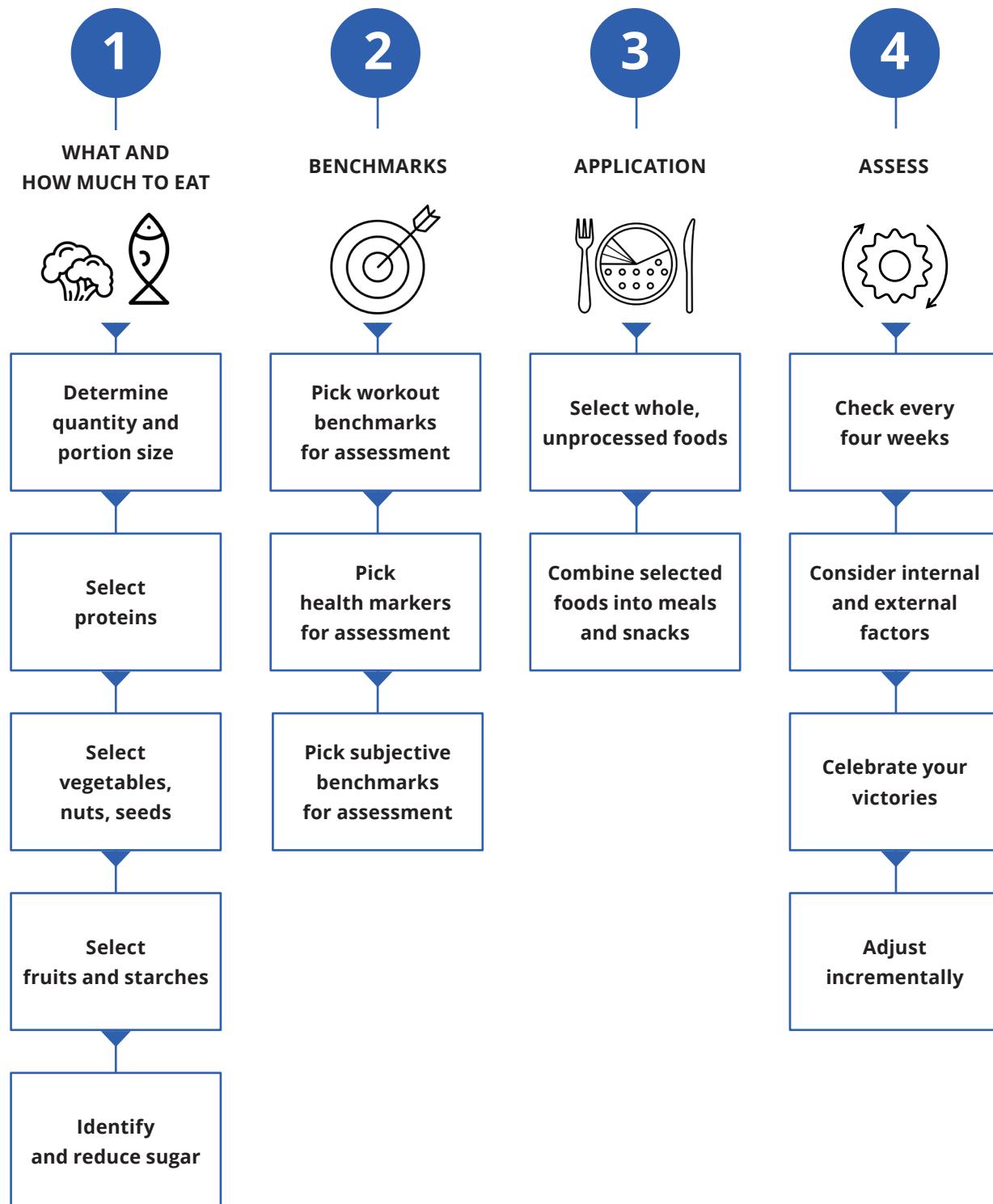


Figure 11. Four Steps To Create Your Personalized Nutrition Plan

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NOTE: If one of your goals, aside from getting healthier and losing body fat, is to lose or gain weight, you'll want to design your plan so you do so incrementally. For example,

- If your goal is to lose weight, subtract 10 lb. (4.5 kg) from your current weight and find this number in the chart below to determine your starting macros. If you weigh 200 lb. (91 kg) and your goal weight is 150 lb. (68 kg), then you would base your macronutrient amounts on 190 lb. (86 kg). Once you reach that weight, you can modify your quantity based on 180 lb. (82 kg). Repeat that process until you reach your goal weight.
- If your goal is to gain weight, add 10 lb. (4.5 kg) to your current weight and use this number to determine your macros. Similar to above, if you weigh 150 lb. (68 kg) and your goal weight is 180 lb. (82 kg), you will base your macronutrient amounts on 160 lb. (72 kg) and modify your quantity once you achieve that weight, repeating that process until you reach your goal weight.

Now, take a look at the chart below and find your weight — plus or minus 10 lb. if your goal weight is different from your current weight — and your activity level.

Table 4 — Macronutrient Chart by Body Weight and Activity Level

*The numbers below reflect an individual's body weight and activity level, with daily consumption broken down into 40% carbohydrate, 30% protein, and 30% fat.
We find this balanced starting point works very well for most individuals.*

[VIEW AND PRINT FULL CHART](#)

Body Weight	Grams of Protein	Grams of Carbohydrate	Grams of Fat
100 lb. (45 kg)			
Inactive/Sedentary	80	106	36
Moderately Active	90	120	40
Active	100	133	44
Very Active	110	146	49

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TO CALCULATE MACRONUTRIENTS FOR 40/30/30

1) Enter your Body Weight in pounds (BW)	= _____
2) Enter your Activity Level (AL)*	= _____
3) Calculate your grams of Protein (PRO)	= BW x AL = _____ PRO
4) Calculate your grams of Carbohydrate (CHO)	= PRO x 1.33 = _____ CHO
5) Calculate your grams of Fat (FAT)	= $\frac{PRO \times 4}{9}$ = _____ FAT

* YOUR ACTIVITY LEVEL

- 0.8 Inactive/Sedentary: You currently do not do any regular physical activity, or you spend most of your day sitting at a desk.
- 0.9 Moderately Active: You work out at least three times per week, and you are moderately active throughout your day.
- 1.0 Active: You work out at least four to five times per week.
- 1.1–1.2 Very Active: You are an athlete training seven or more hours per week.

Now, write down the weight and activity level you are going to base your macronutrients on and fill in the chart below.

Body Weight	Activity Level	Grams of Protein	Grams of Carbohydrate	Grams of Fat

Put It Into Practice

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Here's what a chart would look like for a 170-lb. inactive individual who wants to lose 20 lb.

Body Weight	Activity Level	Grams of Protein	Grams of Carbohydrate	Grams of Fat
*160 lb.	Inactive	128	170	57

*Note that macronutrients are based on a 160-lb. body weight. The person currently weighs 170 lb. but wants to weigh 150. This person would begin their program based on a 10-lb. loss in order to make the loss incremental and sustainable. Once they reach 160 lb., they would adjust their macronutrients for a 150-lb. body weight.

Now that you have determined the daily grams of protein, carbohydrate, and fat you need to achieve your goals, the next step is to set up a system to track your daily intake. The easiest way to do that is to either write down everything you eat or use an app.

How To Track Your Intake With the Pen and Paper Method

If you'd prefer to write everything down, you will need to convert your macronutrient grams to calories. Here's how you do that:

HOW TO CONVERT GRAMS TO CALORIES

One gram of protein = 4 calories

One gram of carbohydrate = 4 calories

One gram of fat = 9 calories

Using our example above, the 170-lb. individual would have a total caloric intake of ~1,705 calories/day based on the following calculation:

Protein: 128 g x 4 calories = 512 calories

Carbohydrates: 170 g x 4 calories = ... 680 calories

Fat: 57 g x 9 calories = 513 calories

Total calories: 512 + 680 + 513 = 1,705 calories

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How To Track Your Intake With an App

Food-tracking apps make tracking daily intake easy. Most macronutrient apps provide tools such as a food database and the ability to scan foods that have a barcode.

Here's how you set up an app to track your daily intake.

STEP**1**

DOWNLOAD A MACRO-TRACKING APP TO YOUR PHONE.

We highly recommend you use a macronutrient-tracking application on your phone or computer. This will help drive results because it will bring precision and accuracy to your efforts while also giving you a detailed record of what you've eaten (your inputs). There are a number of macronutrient apps on the market. Look for an app that allows you to enter and easily track macronutrient targets each day, comes with a robust food-list database, and includes the ability to scan foods with a barcode. You might also ask a friend or someone at your gym which apps they like and ask them to give you a tutorial.

STEP**2**

SET YOUR DAILY MACRONUTRIENT TARGETS.

Once you have downloaded the app to your phone, enter the daily protein, carbohydrate, and fat targets you determined from the macronutrient chart above. Most apps will calculate total daily calories needed vs. total grams. This is not a problem as long as you're tracking against 40C/30P/30F grams of protein, carbohydrates, and fat.

STEP**3**

RECORD A MEAL!

Enter a meal into your app. We recommend that for the first week, you plan out your daily meals and enter them the previous day. This will help you learn the process of tracking foods and enable you to determine if the foods you have planned to eat will align with your daily food needs.

STEP**4**

AIM FOR A BALANCED APPROACH TO MEALS.

While it is possible to consume your daily grams of protein, carbohydrate, and fat in any ratio throughout your meals, we recommend taking a balanced approach.

Put It Into Practice

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Whether you choose to write everything down or use an app, keep these recommendations in mind:

- Eat within a 12-hour window.
- Spread your meals out across the day by eating three meals and one or two snacks in regular intervals throughout the day.
- Eat protein, carbohydrate, and fat at every meal. The closer to the 40C/30P/30F ratio you can get at each meal, the better.
- Eat more vegetables than fruit and more fruit than starch.

See the sample below of how our 170-lb. (68 kg), inactive individual (with a goal of losing 20 pounds) would divide 128 grams of protein, 170 grams of carbohydrate, and 57 grams of fat across three meals and two snacks.

Table 5 — Sample Macronutrient Breakdown by Meal

Macronutrients	Breakfast	Lunch	Dinner	Snack 1	Snack 2	Totals
Protein	30	30	30	15	15	120
Carbohydrate	40	40	40	20	20	160
Fat	13	13	13	7	7	53

Following these guidelines will ensure you get a steady caloric intake throughout the day to maintain your energy levels, increase satiety to limit cravings that lead to overeating, and provide a moderate and sustainable starting point from which you can learn what works or does not work. From there you can make adjustments as needed.

This tracking piece can take some getting used to, but once you get more comfortable choosing meals and snacks you like, you can start to mix and match those in a way that makes weighing and measuring easier.

Now that you know how much you should eat and have a plan for tracking your intake, it's time to move onto the next step of putting it into practice.

STEP 2 — SELECT YOUR BENCHMARKS AND GET A BASELINE

As part of your efforts to track and record progress, we recommend establishing a number of benchmarks to evaluate and guide how your nutritional efforts are panning out. A benchmark is simply a measurable, repeatable data point that informs health and performance. These are your outputs. Benchmarks can come in the form of workouts and health markers as well as subjective measures. Select one to three benchmarks for each of the categories listed below. Test or measure each benchmark prior to changing your diet.

IF YOU DON'T WANT TO USE AN APP

The Zone Diet, described in the "Tactics" chapter, is the best option.

It offers simple tools to help you determine total intake and create meals in the ideal ratio of 40C/30P/30F.

Put It Into Practice

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Workout Benchmarks: A workout benchmark is a measurable, repeatable physical test. Selecting a lift you would like to improve or a workout that contains a specific weakness are great places to start when creating your list of two to three benchmarks.³⁷

Here is a suggested set of three benchmarks to test prior to changing your diet:

Helen

3 rounds for time:
Run 400 meters
21 kettlebell swings,
1.5 pood
(or 55-lb. dumbbell swing)
12 pull-ups
Intake time: _____
Retest time: _____

Deadlift 3-3-3-3-3

Record heaviest set of 3 lifted.
Intake load: _____
Retest load: _____

Run or row 5K

Intake time: _____
Retest time: _____



Health Marker Benchmarks: As you remember, a health marker is a clinical indicator used to assess the state of an individual's health. Examples include blood pressure, body-fat percentage, resting heart rate, and cholesterol. Each indicator has a value or range that promotes sickness, wellness, or fitness.

We recommend you select two to three health markers to test prior to changing your eating habits. Select health markers that are meaningful to you and refer back to the chapter on health markers to get ideas on what to track.

Here is a suggested set of three health markers to test before changing your diet:

Body-fat percentage: Intake _____ / retest _____

Blood pressure: Intake _____ / retest _____

A1C: Intake _____ / retest _____

BEFORE & AFTER PHOTOS

An accessible, at-home version of body composition assessment is taking progress photos.

This can be a good way to assess body-composition changes that include a mix of fat loss and lean-muscle gain, which might either show as stagnant or increasing weight on a scale.

³⁷ The benchmarks you choose are not limited to the official CrossFit benchmarks like Fran, Cindy, etc.

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Subjective Benchmarks: A subjective benchmark is one that may not have a precise value assigned to it but is still important in assessing whether your plan is working. Examples of subjective measures include mood, sleep quality, energy, overall feelings of well-being, etc. If there's something in particular you want to improve, find a way to track it. For example, if you want to improve sleep quality, rate your perceived sleep quality on a scale of 1-10 as you change your dietary intake. Many apps have a space for daily notes where you can record your daily assessment. For each subjective benchmark, you're looking for trends rather than daily fluctuations.

Here is a suggested set of three benchmarks to test prior to changing your diet:

Sleep quality:

Rate daily on a scale of 1-10

Mood:

Rate daily on a scale of 1-10

Energy:

Rate daily on a scale of 1-10

You'll want to test each benchmark now or have tested them very recently and then map out a plan for when you will retest them. We'll talk more about retesting and assessing your results in Step 4.

STEP 3 — IMPLEMENT YOUR PLAN

It's time to take action. Refer to the shopping list we gave you earlier or write down a long list of whole, unprocessed foods you'd like to use to create your meals. Then, based on your quantity calculations, figure out how much of each item you need to buy for at least a week.

A great way to set yourself up for success is to prepare a bunch of meals ahead of time and put them in easy-to-grab containers. Lack of convenience is one of the most common challenges people experience when implementing a nutrition plan. They have big plans that go out the window the minute they're under a time crunch. By preparing a variety of meals or foods you can easily combine into meals ahead of time, you ensure that when you open your fridge, there's always a balanced meal ready for you to grab or quickly assemble.

If preparing meals is new for you, or you have never found much pleasure in doing so, look for ways to add joy to the process. Invite a friend who loves to cook over and have them help you plan, cook, and store. Make it a Sunday ritual while you drink your coffee and listen to podcasts or an audiobook. If you can make it fun, easy, and convenient, your chances of sticking with it go way up.

TO STAY ON TRACK

Create a shopping schedule and prepare your food in advance.

Always have high-quality food on hand. You don't want to be hungry and tired with no quality food to eat, as that will inevitably lead to poor decisions.

Planning ahead will save you.

Every day you adhere to your plan is a victory.

Be proud of yourself and use it as motivation for the next day.

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Then, once you begin implementing your plan, make sure to celebrate all your victories along the way. Any increase in performance or an improved health marker should be considered a legitimate accomplishment. Share this experience with friends and family and create your own social support network. A social support network can help with accountability and the celebration of successes big and small.

STEP 4 — ASSESS YOUR RESULTS

As you adopt this new nutrition plan and fine-tune it in pursuit of your goals, it's important to assess how you look, feel, and perform regularly. This will help you determine if you're on the right track or if something needs to be modified. **A good rule of thumb is to review the benchmarks you identified in Step 2 every four weeks.** Your results on the benchmarks will help you determine whether you are moving in the right direction based on your goals. If after four weeks the majority of your benchmarks are improving, then you're probably on the right track. If after four weeks all benchmarks are stagnant — or worse yet, have declined — then it's time for you to make an adjustment. Some health-marker benchmarks should be tested a little less frequently due to cost and accessibility. These include markers such as bone density and blood panels for lipids, glucose, insulin, and inflammation. These may be better tested approximately every eight weeks.

Adjustments should be incremental, as they will help you figure out the exact dose-and-response relationship you need to achieve your goals. Making extreme changes can cause you to overshoot your goals. For instance, decreasing food intake too much too soon may sabotage your efforts because that decrease is unsustainable. Similarly, increasing overall food intake too much too soon will likely bypass increases in lean muscle mass and result in increases in body fat. Then you will have to backtrack to figure out the optimal adjustment. This is not only inefficient; it can create new problems and require you to change your original goals. In this hypothetical example, if you make extreme changes, you are no longer looking to gain lean muscle mass but trying to lose body fat and then gain lean muscle mass. Incremental adjustments are the best way to avoid this pitfall.

Once the first four weeks have passed, retest your benchmark workouts and health markers and review your subjective measures. Benchmarks should be performed in exactly the same manner and order as the original tests, and your health markers should be measured the same way each time. You want to analyze all the data recorded to understand the big picture. It is important that you don't let one single data point define the effectiveness of your diet.

When assessing your results, be on the lookout for the following:

False negatives in your benchmark workouts

For example, perhaps you tracked a 10-lb. decrease in your 1-rep-max back squat after the first 30 days. On the face of it, this decrease in capacity is not what you wanted to see. However, if the drop in your back-squat number is accompanied by a 15-lb. decrease in body weight, "after" photos that show a leaner physique, more energy at the end of the day, and a faster Helen time, your decreased back squat should not be perceived as a negative. In fact, your strength-to-weight ratio, an important athletic quality influencing performance, has likely improved, and that's a good thing. And over time and with continued work, it's quite possible your back squat will eclipse your previous best.

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False positives in your benchmark workouts

An increase in your max deadlift may look like a good thing until you realize you increased body weight and body fat at the same time and got worse in your max pull-up reps and overall energy throughout the day.

A change in programming at your affiliate that impacts your results

Decreases in performance may occur if changes in programming transpire or if previous workouts affect benchmark testing. For example, if your affiliate switches to a phase of strength-biased programming, you might not perform as well on your 3-mile benchmark test when it comes up. Or, if you perform a workout like Murph two days before you test max-rep push-ups in 2 minutes, you might not match your previous results. These are variables you need to be aware of and take into account before you decide if a dietary modification is necessary.

Up-and-down results

It's easy to look at one bad result and think your plan was a failure, but remember, you are looking at benchmark results, health markers, and trends in your subjective measures over time. Together these offer a picture of your total health and well-being. Resist the temptation to let one detail, one lift, one number on a scale, one bad day, or one meal gone bad lead you astray.

You experience significant life changes

Decreases in results may also occur due to other factors in your life such as sleep, stress, illness, injury, pregnancy, etc. Perhaps you're getting ready for a move, you sprain your ankle, a deadline for a big project at work is coming up, you have family visiting, your kids need you more than usual, or your relationship is under tension. All these factors can create stress and uncertainty that affect not only how well you stick to your plan but your general mood and attitude. Combined, they can dramatically impact your results. Does this mean you should press pause because it's not a good time? No. There will always be reasons why it's not the right time. It just means it's time to review your plan, make adjustments as necessary, and dive into the next 30 days.

An all-or-nothing mindset

When you're going through a process like this, it's easy to go from feeling like it's going great to feeling like it's a complete failure. One day you're weighing, measuring, working out, and feeling great and the next day you're stressed, forgot your scale, ran out of prepared meals, and missed your workout. It is important not to let this disrupt your resolve or snowball into a series of self-defeating thoughts and actions. Remember you are only one day, maybe even just one meal, away from getting yourself back on track. This isn't an all-or-nothing process. Bad meals or bad days may happen, but the most important thing is to get right back to it the next chance you get.

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Fine-Tune Based on Results

As you pursue specific goals, you may consider several modifications when adjusting your nutrition plan. Ideally, you select ONE type of modification, implement it for a few weeks, assess its effect on the parameters you're testing, and then decide whether you need to make another change. Here are five possible inputs to adjust:

1. Adjust total calories.

Objective: Weight gain or weight loss

To implement this strategy:

- For weight loss, select a body weight that is 10 lb. lighter than your current starting point.
Select a body weight that is 10 lb.
- heavier than your current body weight for weight gain.
- Calculate your macronutrients based on your new body-weight goal. For example, if you weigh 150 lb. and want to lose weight, determine your macros based on 140 lb. and your activity level using the macro chart in the "Putting It Into Practice" section.
- The same process holds true if your goal is to gain weight. Select a body weight 10 lb. heavier than you currently weigh. Then use the macro chart to determine your macros at that new goal weight.
- Test your new intake level for a few weeks to see if this moves you toward your weight-loss or weight-gain goal.
- As a cautionary note, while it may be tempting to select body-weight changes in greater than 10-lb. increments, we do not recommend doing this. Sustained weight loss or gain is better achieved through a steady decrease or increase in total intake, not drastic changes.

2. Adjust macronutrient ratio (while keeping total intake the same).

Objective: Change in body composition

If an athlete's change in body composition has stalled before they have reached their goal, manipulating macronutrient ratios is an effective way to help reignite body recomposition. For instance, the baseline recommendation of 40% carbohydrate intake might still be too high for some to reduce insulin enough to achieve their desired fat loss. In this case, a further decrease in carbohydrates and increase in fat while keeping protein the same might be explored. For a 150-lb., moderately active female athlete who is consuming 135 g of protein, 180 g of carbohydrates, and 60 g of fat, a macronutrient adjustment might look like this:

- Protein stays the same at 135 g
- Carbohydrates shift down to 30% of total calories, or 135 g
- Fat shifts up to 40%, or 80 g

The end result is the athlete is now consuming 135 g of protein, 135 g of carbs, and 80 g of fat daily. Total caloric intake is unchanged, while the macronutrient ratio shifts to 30% carbohydrates, 30% protein, and 40% fat. This example illuminates the importance of starting at a baseline, even if it is not perfect. Without the experience of starting at 40C/30P/30F, the athlete would not have the data necessary to test adjusting the carbohydrate intake. By toggling fat or carbohydrate consumption up or down, you can experiment with a variety of macronutrient ratios.

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3. Adjust macronutrient ratio (without regard to total intake).

Objective: Performance

Altering daily intake (up or down) of a specific macronutrient, regardless of the impact on total calories, can be the key to achieving better performance when progress has stalled. For example, an athlete who experiences a decrease in performance in conjunction with a significant decrease in body fat may choose to experiment with increasing dietary fat intake. Consider a lean male athlete who weighs 160 lb. and engages in high-intensity CrossFit training five days per week. He's been consuming 213 g of carbohydrates, 160 g of protein, and 71 g of fat (a 40C/30P/30F ratio) for several weeks. During this time, he's noticed he is significantly leaner, as his abs are far more defined than when he started this diet. He's also noticed that in the last couple weeks, he's struggling to match his previous times in many workouts. It is possible this athlete has become too lean to drive optimal performance. As a remedy, the athlete may initially double or triple his fat intake. Note that chasing high performance is this athlete's primary goal. If that wasn't the case, getting "too lean" would not necessarily be of any concern.

- Doubling his fat intake, called a 2x fat recommendation, would result in a daily consumption of 213 g of carbohydrate, 160 g of protein, and 142 g of fat.³⁸ This increase in fat consumption shifts his macronutrient ratio to 31% carbs, 23% protein, and 46% fat.
- A 3x fat recommendation would bump daily fat intake to 213 g. At 3x fat, the athlete's macronutrient ratio shifts to 25/19/56.

A recent trend has seen CrossFit Games athletes consume large amounts of refined, processed carbohydrates (candy bars, gummy bears, etc.) to fuel multiple daily training sessions and the rigors of competition. Suppose a 150-lb., very active CrossFit Semifinals CrossFit competitor consumes 165 g of protein, 219 g of carbohydrates, and 73 g of fat each day and is feeling fatigued by her last workout every day. She might experiment with increasing her carb intake. At 330 g of carbs per day (not at all uncommon for a Games athlete), her new macronutrient ratio is 50% carbs, 25% protein, and 25% fat. While this strategy may be effective for short-term performance gains, the long-term health consequences of ingesting high levels of refined carbohydrates must be considered. Also, following a high-carb Games-athlete diet without training with the same volume and intensity is a recipe for gaining body fat. The underlying point here is that for the vast majority of us who are not attempting to be professional athletes, such a high level of carbohydrate consumption — especially from processed sources — will not help us achieve our fitness and health goals.

³⁸ Original fat intake was 71 g per day, so 2x fat is $71 \times 2 = 142$ g, 3x fat is $71 \times 3 = 213$ g of fat per day, and 5x fat is $71 \times 5 = 355$ g of fat per day.

[<< Table of Contents](#)**4. Adjust macronutrient sources.****Objective:** Decrease cravings

Choosing which foods to eat can have a dramatic impact on meal size as well as satiety (feeling of fullness) between meals. For example, 100 g of carrots or butternut squash each have roughly half the carbohydrates and protein as sweet potatoes, with fat content in all three roughly negligible. An athlete who is eating a lot of sweet potato and feeling like their meals are too small on this plan might want to consider changing their carbohydrate source from sweet potato to carrot or butternut squash to fit a larger quantity of food into their meals. Conversely, an athlete who has selected romaine lettuce as a carbohydrate source and is lacking time or interest in eating that volume of food may want to consider swapping some volume of lettuce for something like green beans, which contain nearly three times as much carbohydrates and equivalent fat and protein by weight.

To a large degree, eating balanced meals and snacks containing protein, carbohydrates, and fat will help athletes feel full between meals, but for some, another consideration in selecting carbohydrate sources may be the time it takes for the body to digest them, represented in part by the glycemic index. Some foods, like white rice and watermelon, have a relatively high glycemic index and might be a good choice for someone who has limited time to digest food prior to a workout. Other foods, like asparagus and spaghetti squash, have a relatively low glycemic index and could be a good choice for someone who is trying to avoid feeling hungry between meals. Adjusting your carbohydrate sources to those that are faster- or slower-digesting may result in faster nutrient availability or longer feelings of satiety between meals.³⁹

5. Adjust meal size and/or frequency.**Objective:** Sustainability

Sometimes a meal plan looks perfect on paper but doesn't pan out in application. This may be because it is not sustainable given lifestyle demands or the training needs of the athlete. As an example, someone with a busy work schedule may not have time to sit down and commit to a plan of eating five or six meals each day. Conversely, to support phases of intense training, an athlete may need to eat more frequently than their usual breakfast, lunch, and dinner plan. The possibilities for varying meal size and frequency around schedules, preferences, or performance goals are endless. As long as a plan can be adhered to and the total quantity of food consumed and macronutrient ratio remains constant, almost any meal frequency and meal-size permutation can be successful.

³⁹ A glycemic index chart can be a useful tool for understanding how specific foods will affect blood sugar and how long the body may take to digest the carbohydrates they contain. White rice and watermelon correspond to 74 and 76 on the glycemic index chart, respectively, whereas asparagus is assigned a value of 15. This means watermelon and white rice are faster-digesting nutrient sources that will lead to greater increases in blood sugar while being less effective at quelling hunger over long periods between meals.

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Meal Timing and Pre-/Post-Workout Nutrition

Once you have established your habit of eating whole, unprocessed foods in the right amounts, you may want to experiment with when you eat as well as when and how you fuel and recover from your workouts. This kind of experimentation may also prove to be effective as a fine-tuning strategy if you aren't seeing consistent results.

MEAL TIMING

The subject of meal timing has to do with when you should eat, how many meals and snacks you should eat, and how much you should eat at each meal and snack. Meal timing plays a role in performance and health improvements, but that role is minuscule compared to eating quality foods in the right amounts. There are many conflicting recommendations out there when it comes to meal timing, and for the most part, the average person doesn't follow any of these recommendations. Typical recommendations for meal timing range from eating small meals every couple hours to stabilize blood glucose all the way to eating one meal a day — or sometimes even less. In reality, research shows Americans are eating somewhere between 4.2 and 10.5 times per day, stretched over 14.75 hours or more.

The flurry of recommendations probably has to do with human variation and the fact that different strategies work for different people. Despite the differences, one commonality among the many recommendations out there is consistency. Consistency is a key factor in a meal-timing strategy. This means you should eat your meals and snacks at the same time every day. Using a consistent meal frequency rather than eating at irregular intervals often results in better insulin sensitivity and lipid profiles. Knowing when you are planning to eat also makes it easier to do meal preparation.

We also recommend reducing your eating window. This does not mean everyone should be on a 16/8 fasting protocol (described in the "[Tactics](#)" chapter below) or a one-meal-a-day program. Reducing your eating window can be as simple as eating within a 12-hour period and fasting the other 12. A fasted state, even as low as 12 hours, has been shown to increase insulin sensitivity, improve resting blood glucose, increase metabolic rate, and utilize stored fuel (glycogen and fat) when you're not eating.

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How many meals you fit into the eating window and when you start/end the window is up to you. It might take some time to figure out what works best, starting earlier with breakfast or starting later with lunch for instance. Though there have been some mixed reviews about the importance of breakfast, its importance is likely irrelevant and really depends on what fits into your lifestyle better. If starting your eating window earlier in the morning and finishing earlier in the day works best, then that's what you should do. The idea is not to follow the advice of religiously eating breakfast because you've heard it's the most important meal of the day. The idea is to find what works for you.

A similar rule has to do with when you should have your dinner or final snack for the day. It's best to finish eating a couple hours prior to sleep. Eating too close to bedtime has been associated with a number of health consequences, including melatonin binding to insulin-producing cells in the pancreas, sleep disruptions, acid reflux affecting the quality of your sleep, and decreases in insulin sensitivity the following day.

In summary, a simple baseline for meal timing is: Eat half the day, mostly at regular meal times, and not too late.⁴⁰ From here, you can explore what works best for you.

PRE- AND POST-WORKOUT

The simplest recommendation for pre- and post-workout nutrition is to eat a well-formulated meal within three hours pre-workout, and eat a well-formulated meal within two hours post-workout. This general recommendation will satisfy the pre-workout energy needs and post-workout recovery needs for most CrossFit athletes training once a day, multiple days per week. A meal consisting of approximately 40% carbs, 30% protein, and 30% fat provides enough energy to fuel performance pre-workout while also providing enough of each macronutrient to increase protein synthesis, promote glycogen replenishment, and provide vitamins and minerals, which are all necessary to promote optimal recovery.

Pre-workout nutrition is highly individualized. Some people do well with food prior to exercise, and others prefer exercising in a fasted state. Research suggests either of these approaches could be useful for performance and substrate utilization.

In some instances, it may be worth experimenting with having a small meal closer to the beginning of a workout. Some people work out early in the morning and benefit from eating a quick snack an hour or so before the workout to increase energy levels. Others simply prefer or perform better when they eat something small approximately an hour before exercise. Either way, the recommendation is the same: Consume a good ratio of macronutrients — if you are at your baseline, it would be 40C/30P/30F — in a rapidly digestible form. This could be where protein supplementation comes in. A protein shake with milk, nuts, seeds, and some fruit blended together could provide all the necessary nutrients you need in liquid form, which would promote faster digestion prior to working out.

⁴⁰ CrossFit (2020). Meal timing: When should we eat? <https://www.crossfit.com/essentials/meal-timing-when-should-we-eat>. 22 June 2020. (accessed July 14, 2021)

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A similar approach can be taken for post-workout nutrition. The post-workout meal might be the most important out of the two. All the post-workout nutritional needs can be satisfied by a quality meal. That said, some people need to leave the gym and go straight to work or school, and eating a full meal is not an option. Others do not tolerate a full meal after working out and would rather eat something small. For these situations, a recovery shake consumed within an hour after training is ideal. This protein shake would consist of your prescribed macronutrient ratios. If at your baseline, it would be 40C/30P/30F.

No matter what method you employ or when you eat, it's critical that you continually assess your results. Be sure to refer back to Step 4 in the "Put It Into Practice" chapter every four weeks to determine whether your current plan is moving you closer to your goals. If not, consider refining your strategy.

Finally, as a general rule, when you make a dietary change that leads to improved results overall, **you should stick with that formula until it stops delivering the results you're looking for**. It's a fundamental truth that what works today will not work forever. Constantly assessing your results will give you insight into when you are experiencing diminishing returns or plateauing with a specific plan. You should not, however, rush to change your diet before you have reaped the vast majority of its rewards.

Match Precision to Lifestyle and Goals

In a perfect world, implementing your ideal plan of weighed and measured meals consisting of whole, unprocessed foods to optimize health and performance would be easy. However, while the theory behind this nutritional approach is relatively simple to grasp, implementation requires dedication and perseverance.

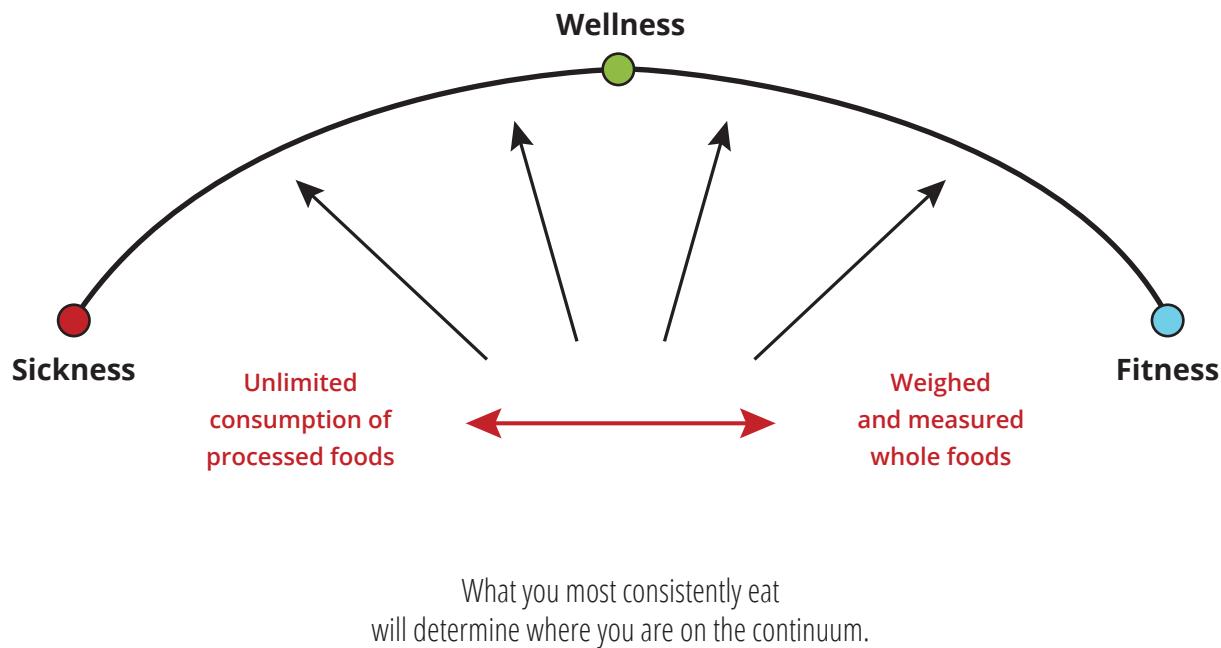


Figure 12. Food Consumption and the Sickness-Wellness-Fitness Continuum

To maintain our food sanity and enjoy some of the culinary pleasures in life, we need to find the level of nutritional commitment we're willing to accept based on our goals and lifestyle preferences. We all fall somewhere on a spectrum. At one end, there is not caring at all about health and performance and eating whatever we want. At the other end, we consume only real foods in weighed and measured quantities. Top athletes who want to set records, win world championships, and optimize performance should consider weighing and measuring quality foods most of the time. Someone who does not want to commit to weighing and measuring food can trade a small decrease in performance for a diet where they focus more on the quality of food they eat and use the eyeball method (described in the next chapter) to control consumption levels. If wellness is the main concern, then eating a diet consisting mainly of whole, unprocessed foods with less attention paid to getting the quantity perfect every time is most likely sufficient. The key point to remember is that any time you increase your consumption of processed foods, you will push yourself further from health (wellness) and closer to metabolic derangement and disease (sickness).



TACTICS

In some circumstances, individual preference, psychology, starting point, and physiological variation call for prioritizing sustainability over precision when managing food quantities. This is very important if you have trouble succeeding when you have to weigh and measure everything you eat or if any form of dietary restriction becomes counterproductive. Using proven and effective tactics like those highlighted in this section can help you optimize your nutrition. In this chapter, you'll find there are many ways for you to manage the quantification of your intake to suit your needs and circumstances. Here, we highlight the eyeball method, the Zone Diet, flexible dieting, and intermittent fasting. You may notice calorie counting is not included in this list. While many come to us with a long history of counting calories, this is not a tactic we endorse, and we have deliberately left it out so you can focus on the tactics we believe will get you the best results.

THE EYEBALL METHOD

The eyeball method is a quick and easy way to measure your food portions. It is a great method if you're implementing a nutrition plan for the first time and feel overwhelmed by precisely weighing and measuring with a food scale, measuring cups, and measuring spoons. It is also a good choice for those who obsess over every detail and might get a little neurotic about weighing and measuring. It is important to note, however, that while the eyeball method is a step in the right direction for quantifying food portions, it will not lead to optimized health and performance. It is not precise enough.

With this method, start by determining your protein quantity using the palm of your hand as a guide. A palm-sized portion of chicken, beef, fish, or turkey is approximately 4 oz. and delivers approximately 28 g of protein. If you are eating out and weighing and measuring, you can use this to determine how many grams of protein you need for the meal: how many palms of protein do you need — 1, 1.5, 2, etc.? You can then use the size of the protein on the plate to determine the size of the carbohydrate portion. If vegetables are being used as the main carbohydrate source, the serving should be double the size of your protein portion. If using a denser carbohydrate source such as fruit or a starch such as rice or potatoes, then the serving size should be the same size as the protein source. To round out the meal, add a thumb-sized portion (approximating a tablespoon) or two of good fats.

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The Eyeball Method of Food Portioning



PROTEIN

A palm-size portion of chicken, beef, fish, or turkey is approximately 4 oz. and delivers 28 g of protein.



CARBOHYDRATE

If vegetables are being used as the main carbohydrate source, the serving should be double the size of your protein portion.



If using a denser carbohydrate source such as fruit or a starch such as rice or potatoes, then the serving size should be the same size as the protein source.



FAT

To round out the meal, add a thumb-sized portion (approximately a tablespoon or two) of good fats.

Figure 13. The Eyeball Method

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A key reason the eyeball method is a favorite in the CrossFit community is because it's a great way to keep yourself on track when you eat out. It's just not practical to take a scale, measuring cups, and measuring spoons with you to a restaurant. And if you do, you may never be invited out again! Don't worry, though. You might not achieve the kind of precision you would get with the exact measurements, but you can still have a somewhat accurate way of measuring your protein, carbohydrate, and fat intake.⁴¹

SOCIALIZING AND STICKING TO YOUR PLAN

One thing to keep in mind is that the fat sources available in restaurants may not align with your plan. For example, most sauces and dressings contain undesirable vegetable oils, and most foods will be cooked in these same oils. Still, requesting that your food be cooked without fat or with butter is an accommodation many restaurants are happy to make. You can also ask for your sauces or dressings on the side so you can control how much you use. Finally, most restaurants will gladly provide olive oil and vinegar as a substitute for salad dressings.

Eating out does not have to be stressful. You can still enjoy being social while maintaining your nutritional plan. Just be sure to plan ahead. Know where you're going, see what's on the menu, and have an idea of what you will eat prior to showing up. Another trick people use to great success is to have a small snack about an hour before heading out to the restaurant. This prevents you from showing up starving and mitigates the temptation to make poor choices or overeat.

⁴¹ For a definition and explanation of precision and accuracy, see the "[Optimize - Moving From Well to Fit](#)" section.

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THE ZONE DIET

The Zone Diet was developed by Dr. Barry Sears more than 30 years ago. The original intention was to create a diet that would reduce inflammation and risk of disease. Later, the diet was also used to increase performance in different types of training and sport, to great success.

A key feature of the Zone Diet is that it brings precision and accuracy to meal planning through the Zone block system of weighing and measuring. This system provides a simple entry point into weighing and measuring, avoiding the need for apps and technical knowledge.

The Zone Diet sets a macronutrient ratio of 40% carbohydrates, 30% protein, and 30% fat, and it encourages eating five meals a day (three meals and two snacks), with five blocks or less at each meal and no more than five hours between meals.

The Zone Diet, and the resulting resources that came from it back in the mid-1990s, has had a significant influence on the CrossFit community and CrossFit's nutrition recommendations for decades. Before apps and other technology were available, the Zone Diet provided sound principles and simple tools for making weighing and measuring meals easy. To this day, the Zone informs CrossFit's nutrition recommendations, and many in the CrossFit community continue to consult charts of Zone blocks that make meal planning, quantifying, and quality control easy.

Zone Blocks

A Zone block consists of one block of carbohydrate, one block of protein, and one block of fat. Because of this, each meal or snack will always have a 40C/30P/30F balance. A carbohydrate block is 9 g of carbohydrates, a protein block is 7 g of protein, and a fat block is 1.5 g of fat. (This is true if your protein comes from animal sources such as meat, but it is 3 g if it comes from vegetarian sources.)

When getting started with the Zone Diet, you can use the calculation below to determine a precise starting point. The Zone website also offers an easy-to-use [body fat calculator](#) that will read out your recommended starting point. Finally, [CrossFit Journal Issue #21](#) offers a simple chart for determining a good starting point based on simple body type descriptions. Find where you fit best on this chart and use the prescribed number of blocks. There are block charts that take common foods in each macronutrient category and provide the measurements for one block of each. It becomes effortless to create a meal by choosing foods off the chart, cooking them, weighing and measuring them, and then putting them on your plate to eat. If you are interested in bringing greater accuracy and precision to your diet without using apps, the Zone Diet may be a good fit for you.

[**<< Table of Contents**](#)**Zone Diet Calculation**

$$\text{Number of Blocks} = \frac{\text{Lean Body Mass (lb.)} \times \text{Activity Level}}{7 \text{ g Protein}}$$

Figure 14. Zone Block Calculation

Use the scale* below to determine your activity level:

- 0.5 – Sedentary lifestyle
- 0.6 – Light activity
- 0.7 – Moderate activity
- 0.8 – Active
- 0.9 – Very active
- 1.0 – Elite athlete

*Note the Zone Diet recommends eating less overall than CrossFit does.

Once you have determined your total blocks for the day, split them up between meals and snacks. For instance, if you have 20 blocks allotted for the day, you could split them up into meals and snacks that look like this:

20-Block Day

- 5-block breakfast
- 3-block snack
- 5-block lunch
- 2-block snack
- 5-block dinner

The simplicity and effectiveness of the Zone Diet have helped it become a staple in the CrossFit community. It is an incredible tool for creating precision and accuracy in the diet while increasing health and performance.

FLEXIBLE DIETING

With flexible dieting, also known as “If It Fits Your Macros (IIFYM)” or “counting macros,” the macronutrient ratio is considered most important for influencing body composition, and this method accepts several different formulas and equations for determining macronutrient quantities and ratios. Regardless of how the macronutrient ratio is calculated, flexible dieting requires the same rigor in tracking macronutrients through weighing and measuring as the CrossFit nutritional program does. On the other hand, flexible dieting has a different stance when it comes to food quality, promoting the idea that there are no “bad foods.” A flexible dieter can select any food as part of their meal plan as long as it fits within their macronutrient ratios at the end of the day. In all fairness, while the internet is replete with examples of people filling their flexible diet with donuts,

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alcohol, pizza, and breakfast pastries, most who advocate for this plan caution food quality is important and at least 80% of the diet should be made up of whole, unprocessed foods. Flexible dieting is also less rigorous in terms of balancing meals, as the macronutrient ratios apply only to total food consumed over the course of the day rather than balancing at each meal as per our recommendations.

A popular way to determine total food consumed and the macronutrient ratio for a flexible diet plan involves calculating the total daily calories required and then adjusting this number up or down based on the primary goal: weight loss or weight gain. The overall macronutrient ratio is then derived from suggested percentages of total daily calories for each macronutrient. There are many calculators available to determine your total caloric needs and the necessary macronutrient ratios to achieve your goals. In general, these are 45-65% of total daily calories from carbohydrates, 10-35% of total calories from protein, and 20-35% of total calories from fat.⁴²

If you choose this route, you will need to weigh and measure all your food and keep a tally of how many calories (or grams) of each macronutrient you consume with every meal. Apps are very helpful for this. At the end of the day, your total consumption should match your recommendation. Over time, as you match your results to food intake, you will be able to fine-tune the total calories and macronutrient ratio to help you achieve your weight-loss or weight-gain goal.

If you prioritize consuming whole, unprocessed foods, a flexible dieting plan is a viable option for optimizing your health and performance because total consumption and macronutrient ratios are tracked precisely. While following this plan, you can set your macronutrient intake and ratio to match your preferred way of eating — for example, lower carbs and higher fat — and then weigh and measure your food to achieve these numbers daily. This allows known quantities of food to be paired with results and adjusted over time. In practice, however, flexible dieting is heavily marketed as a plan where you can “have your cake and eat it too.” The importance of food quality is diminished so adherents can eat all their favorite foods and not feel deprived. Moreover, it is not uncommon for flexible dieters to save carbohydrates for the end of the day. Then, during the last meal of the day, the dieter indulges in desserts or other refined carbs up to their daily limit. While this is technically “allowed,” it is not a recipe for optimizing health and performance over the long term. A consistent intake of processed, packaged, sugar-laden foods exacerbates hunger and cravings, making a flexible diet based on poor food choices hard to stick to. And, with poor food quality, long-term health suffers due to the lack of micronutrients in processed foods and the metabolic effects of refined carbohydrates and vegetable oils, as discussed previously. For optimal results, **both quantity of food and quality of food must always be addressed.**

⁴² Kubala, J. (2018). Flexible dieting: A simple macro diet plan that works. Healthline. https://www.healthline.com/nutrition/flexible-dieting#TOC_TITLE_HDR_2_30_January_2018. (accessed Aug. 6, 2021)

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Flexible dieting could be a useful tactic for someone who eats a diet composed mainly of whole, unprocessed foods and wants to quantify their intake but is not ready to give up a few of their favorite indulgences. Those who are not ready to weigh and measure are not good candidates, but for those who are, flexible eating can be a good strategy. By allowing flexibility over the content of each specific meal and removing food-choice restrictions, flexible dieting can be an effective way to avoid disordered eating behaviors among individuals who are susceptible to binge eating and/or respond poorly to dietary restraint in relation to food choice.

INTERMITTENT FASTING

Intermittent fasting is a diet that cycles through periods of fasting and periods of eating. Fasting involves deliberately withholding food. There are multiple formats for intermittent fasting that are used within the CrossFit community. Some of the common intermittent-fasting protocols are the 16:8 method (where one fasts for 16 hours and eats within an eight-hour window), the 5:2 method (where one eats normally for five days and two days are restricted to 500-600 calories per day), and the 1:1 method (where one eats normally for one day and fasts for the next). See Table 1 below for more details.

Intermittent-fasting protocols provide several significant benefits:

- Fasting can impact the quantity of food consumed, at least indirectly, by decreasing the amount of time food is available.
- During periods of fasting, the body uses its stored fat reserves as the main fuel source.
- Fasting leads to extended periods of low insulin production, which allows for improved insulin sensitivity and the cleaning out of damaged cells through the process of autophagy, both of which are tremendously beneficial from a health perspective.

Which intermittent-fasting protocol you select depends on your performance goals, health goals, and preexisting conditions. Those who have metabolic conditions such as hyperinsulinemia may have to fast for longer periods of time (24 hours or more) to see insulin levels decline and stored fat begin to be used as a fuel source. For weight loss, a shorter fast of 16 hours per day has proven beneficial for leaning out. If you're interested in increasing performance through fasting, you will have to experiment with different intermittent-fasting protocols to find out which works best for you.

Like most dietary changes, there is an adaptation period when initiating intermittent fasting. Typically, it takes two to four weeks for the body to adjust to using fat as a primary fuel source. During this transition time, decreases in energy, strength, and overall performance are common. These issues do resolve, and improved energy, strength, and performance may be experienced in the post-adaptation period. Those who habitually binge on processed foods when they feel hungry or have cravings may struggle initially with maintaining food quality while practicing intermittent fasting. Having quality meals and snacks on hand and ready to eat when the fast ends is key for experiencing success with a fasting protocol.

[<< Table of Contents](#)**Table 6 — Common Protocols of Intermittent Fasting**

16:8 Method
<ul style="list-style-type: none">• This is 16 hours of fasting and eight hours of eating. This is not necessarily a caloric restriction diet.• Daily caloric needs can be eaten during the eight-hour eating window.• When starting, specific macronutrient ratios are not required, but food choices should be high quality.• Fasting can be used in conjunction with the keto diet, 40-30-30, or with any other approach.• This can be used by an athlete looking to maintain a high level of insulin sensitivity and increase workout performance.
5:2 Method
<ul style="list-style-type: none">• This protocol consists of eating normally for five days and fasting during the other two days.• On eating days, caloric intake should be normal.• On the fasting days, women should limit caloric intake to 500 calories and men should limit to 600 calories.• This protocol is a good introduction to fasting. Food intake on eating days does not have to follow any particular ratios but should consist of quality foods. Calories on fasting days should be consumed 200-300 calories at a time, separated by at least 12 hours.
1:1 Method
<ul style="list-style-type: none">• This is an alternate-day fasting method. Caloric consumption on non-fasting days might increase slightly past normal.• Structurally, this protocol would have an athlete eating normally on eating days all the way up to dinner. After dinner, they would fast until dinner the following day.• On fasting day, if calories are needed to curb cravings or for energy, limit caloric intake to 500 calories for women and 600 calories for men. This 500- and 600-calorie limit offers a good stepping stone into the full fasted version of this protocol.• For best results, once you are ready for the full version, keep the fasting days fasted. Do not eat any calories from dinner to dinner.

Overall, intermittent fasting is a timing protocol designed to elicit specific health benefits while restricting feeding times. Fasting protocols do not specifically address the quality of food, total quantity of food, or macronutrient ratios consumed. Initially, fasting with quality foods alone may be enough to provide desired health and performance results. Ultimately, for optimal results, weighing and measuring food quantities and macronutrient tracking must be added to ensure the right amount of food, in the correct ratios, is being consumed in the feeding windows.

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The biggest drawback when practicing intermittent fasting is dealing with hunger and other side effects associated with the adaptation period. Skipping meals can be very difficult for some when starting a fasting program. We become preoccupied with food when we can't have it! **That is why we always recommend people begin their 30- to 60-day challenge by eating within a typical 12-hour window and spreading their meals out evenly throughout that window.** That said, once you are in the habit of eating high-quality foods in the right amounts, you may consider giving intermittent fasting a try and easing into a 16-hour or 24-hour protocol with a week of 12-hour fasting to help the transition. For example, if you want to try this protocol, you might initially eat three meals between 8 a.m. and 8 p.m. then fast from 8 p.m. to 8 a.m. After just a few days, and up to four weeks, symptoms such as lack of energy, headaches, and hunger pangs should resolve. Staying busy, drinking lots of water, and using tea or coffee to quell hunger are simple techniques that typically improve compliance.

Ideal candidates for an intermittent-fasting protocol include those who already go long periods of time without eating because of work or life demands. Those who do not want to be concerned about what to eat throughout the day and prefer eating larger meals in the evening hours will likely enjoy the feeding rhythm of intermittent fasting. Finally, those who suffer from metabolic issues and want to lose weight might benefit greatly from adopting an intermittent-fasting protocol. Those who are unable to adjust to restricted feeding windows or feelings of hunger may have difficulty following an intermittent-fasting protocol. Also, individuals who are extremely active, are overly stressed, sleep poorly, or are prone to eating disorders may not be able to cope with the added stress associated with fasting.

In the next chapter, we detail several dietary approaches used by people in the CrossFit community that may be a good fit for you as well. These specialty diets are not substitutes for weighing and measuring high-quality foods. Rather, they are ways of eating that take ethics, preferences, and other factors into account.



SPECIALIZATIONS

There are many and varied dietary approaches in the CrossFit community, some driven by particular beliefs or preferences and others by specific individual dietary needs or health conditions. Our nutrition recommendation of high-quality whole foods and quantification of intake is independent of any specific diet and can be readily adapted to work with any dietary specialization. Each specialization has its own advantages and disadvantages, and the CrossFit nutrition principles of quality and quantity can be applied with varying degrees within these different contexts. For example, vegetarians and vegans can eat high-quality foods in the right amounts as well. They may have fewer pure protein sources to choose from, and they may have more foods in their diet that contain protein as well as high levels of carbohydrates, but as long as they account for both, they can follow CrossFit's nutritional recommendations. Understanding the different specializations will help you navigate the diverse approaches to nutrition that exist within the CrossFit community.

ELIMINATION DIETS

Elimination diets exclude a specific food or food group for either a short or long period of time. The purpose of exclusion is to determine whether there are adverse food reactions or allergic responses from eating these food types. These diets become a way to diagnose and treat food sensitivities, food allergies, and their resulting medical conditions, such as autoimmune conditions. These diets often include a four-step process.

Four-Step Elimination Process

STEP 1 — NOTICE AND PLAN

The first step of the plan is simply noticing you are experiencing symptoms related to common food allergies or intolerances. These may include but are not limited to an itchy mouth, skin rashes, difficulty swallowing, headache, gastrointestinal issues, and shortness of breath. Your noticing may also be the result of getting a food-allergy test and receiving results that highlight potential food allergies and sensitivities. From this data, you can create a list of potential trouble foods and a hierarchy of elimination. There are a couple ways to plan elimination:

1. Eliminate one food at a time.
 - a. This allows you to determine which specific food type is actually causing the issues.
 - b. This is more time-consuming, as you must narrow down by one food at a time.

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2. Eliminate all possible culprits.
 - a. This involves introducing the eliminated foods back into your diet one at a time.
 - b. This reduces the number of steps and helps zero in on the culprit more quickly.

STEP 2 — ELIMINATE

This step can vary in intensity, depending on which food or foods you think are causing the problems. For instance, you may begin by eliminating chicken eggs or all foods containing gluten. Either way, it is important to set a date when you will reintroduce the food. We recommend removing your target foods for at least two to four weeks and taking notes on whether your symptoms improve or worsen.

STEP 3 — REINTRODUCE

If you notice symptoms are alleviated after removing certain foods from your diet, depending on the severity of your symptoms, it is a good idea to reintroduce those foods to see if symptoms reappear. This can provide a level of certainty in determining allergic reactions and sensitivities. We recommend you reintroduce foods for at least four days before you assess your situation because it could take time for symptoms to reappear. When reintroducing foods, take it slowly at first. Introduce small quantities on Day 1 and progress to full and normal quantities by Day 4 and beyond. If the symptoms reappear, it is a good idea to keep these foods out of your diet, although it's up to you.

1. Are you able to remove this from your plan? (This will determine your level of dependency, if any.)
2. What impact does removal have on your health and performance?
3. Should you reintroduce this back into your plan? If so, how much is the minimum and maximum dose you can have and still achieve your goals?

STEP 4 — CREATE YOUR NUTRITION PLAN

Now that you know you have a negative reaction to certain foods and have determined you want to avoid them, plan how long your elimination period will last. For some situations, it may be for a lifetime. For others, it might be six to 12 months. It really just depends on symptom severity and your comfort level. It might be a good idea to reintroduce the foods every month or so to determine whether the sensitivity still exists. There are some conditions, such as celiac disease, that might require a total and lifelong elimination.

Food Allergies

When it comes to food allergies, there is often confusion between what is actually a food allergy and what is a food intolerance. The mechanisms behind the symptoms are very different.

Food allergies are a result of an immunoglobulin E (IgE)-mediated reaction. IgE is an antibody that is produced when the body perceives a threat. The wheat allergy discussed above can be IgE mediated.

Food intolerances are typically defined as having trouble digesting or metabolizing certain food types and don't involve the immune system.



FOOD INTOLERANCE

A food intolerance is generally dose dependent, meaning the symptoms get worse as the dosage increases.

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These conditions affect somewhere around 15-20% of the population. Food intolerances generally affect the gastrointestinal system but can also affect other parts of the body. Symptoms of food intolerances include gas, bloating, abdominal pain, and diarrhea but can also include skin irritations, irritability, and nervousness. A food intolerance is generally dose dependent, meaning the symptoms get worse as the dosage increases. As an example, someone who is lactose intolerant might be able to put a little cream in their coffee without any problems; however, they would have severe gastrointestinal issues if they were to drink a whole glass of milk.

Common food intolerances include the gluten intolerances and FODMAP intolerances discussed below: lactase deficiency, fructose malabsorption, glucose-6-phosphate dehydrogenase deficiency, sulfate sensitivity, and aldehyde dehydrogenase deficiency. Typically, these intolerances are due to a lack of enzymes necessary for digestion, gut microbiome issues, added chemical ingredients, and added sulfites.

Table 7 — Common Food Intolerances

Intolerance	Description
Gluten Intolerance	Reactions to ingested gluten that vary in severity and often result in abdominal cramping and constipation, diarrhea, joint pain, headaches, and fatigue.
FODMAP Intolerance	Reactions to poorly absorbed short-chain carbohydrates, often resulting in bloating, gas, constipation, diarrhea, and vomiting.
Lactase Deficiency	Lactase enzyme deficiency resulting in bloating, stomach cramps, and other gastrointestinal issues after consuming dairy products.
Fructose Malabsorption	Inability to effectively absorb fructose resulting in bloating and other gastrointestinal issues after consuming fruit or fruit-based sweeteners, such as high-fructose corn syrup.
Glucose-6-Phosphate Dehydrogenase Deficiency	This deficiency can result in hemolysis, a rupture or destruction of red blood cells after consuming foods such as red wine, blueberries, legumes, and soy.
Sulfite Sensitivity	This sensitivity tends to affect asthmatics the most, in whom sulfite consumption can result in severe wheezing.
Aldehyde Dehydrogenase Deficiency	This deficiency results in flushing, or redness in the face, chest, and neck after drinking alcohol.

Food intolerances can be diagnosed and treated using the four-step elimination process. Plan by making a list of potential foods causing the intolerance. Eliminate all potential foods or eliminate them one at a time. Reintroduce one at a time while documenting when the symptoms reappear. Based on the results, create a nutritional plan excluding the trouble foods.

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Food allergies, contrary to food intolerances, are the result of an immune-system response. As mentioned above, the body perceives a threat and produces IgE as a response to proteins found in trigger foods. Research has shown around 10.8% of U.S. adults have received a food-allergy diagnosis, while 19% have self-reported food allergies.⁴³

Food allergies can show up at any age, though most develop during childhood. Symptoms from a food allergy appear rapidly, and they usually are not dose dependent. A severe reaction can occur from minimal exposure. Though there are usually no predisposing factors that lead to an allergic reaction, there are some instances where exposure to an external irritant can lead to allergic reactions from food. These factors include exposure to pollen or occupational irritants through inhalation or contact, and repeated bites or stings from ticks and jellyfish.

Common symptoms of food allergies include rashes, hives, itchy skin, stomach cramps, nausea, chest pain, shortness of breath, wheezing, lightheadedness, and hypotension. That said, symptoms can become severe quickly and unpredictably, and can include anaphylaxis and death. Some factors can exacerbate the severity of the symptoms, too. These include having asthma, alcohol- or aspirin-induced permeability, exertion, stress, lack of sleep, menstruation, underlying illness, and certain medications (ACE inhibitors and beta blockers).

The vast majority of food allergies are due to proteins found in foods. The most common types of food allergies are from oral allergy syndrome (OAS), seafood and shellfish allergies, and peanut and tree-nut allergies.

OAS allergies are the most common and are due to contact with certain foods and vegetables in the mouth. Symptoms of this type of reaction include swelling and itchiness in and around the mouth, including the lips, tongue, and throat. Typically, these reactions take place when the foods are in their raw form and do not occur when the foods are cooked. Because the symptoms are not severe, the four-step elimination process can be used to diagnose and treat these allergic reactions. This can help determine whether the raw version is causing a problem or the cooked version is.

Seafood and shellfish allergies are the next most common food allergy. This allergy tends to develop in adulthood rather than developing in childhood and continuing into adulthood. This allergy is usually either to finned fish or to shellfish or mollusks. A small percentage of people are allergic to both.

Tree nuts and peanuts are also very common food allergies. These allergies tend to show up in childhood and persist into adulthood.

⁴³ Gupta, R. S., Warren, C. M., Smith, B. M., Jiang, J., Blumenstock, J. A., Davis, M. M., Schleimer, R. P., & Nadeau, K. C. (2019). Prevalence and severity of food allergies among us adults. *JAMA Network Open*, 2(1).<https://doi.org/10.1001/jamanetworkopen.2018.5630>

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Both the fish/shellfish allergies and the tree-nut/peanut allergies can range from subtle to severe, so it is best to refer to a specialist for a diagnosis. A professional diagnosis typically includes a clinical history check, skin testing, and an immunoassay test (tests antibodies in the blood). A positive test still might require some level of elimination and reintroduction to determine the severity of the reaction. Once again, because these reactions can be severe, this should be performed under the supervision and evaluation of a food-allergy specialist.

Gluten-Related Issues

When it comes to gluten intolerance, there are three main categories: celiac disease, wheat allergies, and non-celiac gluten sensitivity (NCGS). Each of these create similar symptoms but have different causes. Celiac disease and NCGS share very similar symptoms, such as abdominal cramping and constipation, diarrhea, joint pain, headaches, and fatigue.⁴⁴

Possibly the most serious of the three types of gluten intolerance is celiac disease. Celiac disease is a genetic autoimmune disorder. The individual must have the predisposition to the celiac-disease gene. The symptoms are triggered by eating gluten, and the severity is often mediated by some interaction of external factors, such as a stressful lifestyle, a traumatic event, some type of viral infection, or other environmental factors conducive to triggering a reaction. Research has shown the celiac gene might be present in approximately 30% of the population, yet only about 1% will actually develop the condition.⁴⁵

Celiac disease causes inflammation, erosion of the villi of the intestinal wall, and flattening of the cells lining the small intestine. Because of this, nutrients aren't absorbed properly. Gluten ataxia is also a potential problem. This is when the body attacks its own nervous system as a response to eating gluten. Other symptoms associated with celiac disease include behavioral changes, stunted growth, confusion (or brain fog), anemia, infertility, and dermatitis. Celiac disease can be diagnosed via blood screening and intestinal biopsy if there is a positive blood-test result. If celiac disease is diagnosed, gluten will likely have to be eliminated for the patient's lifetime.⁴⁶

Wheat allergies initiate an immune-system response due to the proteins in wheat. Unlike celiac disease, the wheat-allergy response is not autoimmune. When wheat is consumed, the immune system sends out B cells, which are a type of white blood cell. The B cells attack the proteins found in wheat, and because of the attack, the body's tissues send out a bunch of different chemical messengers, causing the body to react negatively with symptoms such as swelling, itching, and irritation of the mouth, throat, and skin. Breathing problems, congestion, nausea, vomiting, and diarrhea may also occur.⁴⁷

⁴⁴ Gluten Intolerance Group. Celiac disease, non-celiac gluten sensitivity or wheat allergy: What is the difference? <https://gluten.org/2019/10/15/celiac-disease-non-celiac-gluten-sensitivity-or-wheat-allergy-what-is-the-difference/>. 30 July 2021. (accessed 29 Sept. 2021)

⁴⁵ Ibid.

⁴⁶ Gujral, N. (2012). Celiac disease: Prevalence, diagnosis, pathogenesis and treatment. *World Journal of Gastroenterology*, 18(42), 6036. <https://doi.org/10.3748/wjg.v18.i42.6036>

⁴⁷ Gluten Intolerance Group. Celiac disease, non-celiac gluten sensitivity or wheat allergy: What is the difference? <https://gluten.org/2019/10/15/celiac-disease-non-celiac-gluten-sensitivity-or-wheat-allergy-what-is-the-difference/>. 30 July 2021. (accessed 29 Sept. 2021)

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Wheat allergies are typically diagnosed by performing a radioallergosorbent test (RAST), which is a blood test that tests for antibodies. If antibodies are present, the person has the allergy. Adults who are diagnosed with a wheat allergy typically have the allergy for life and will have to eliminate wheat entirely. It is possible for children to grow out of the allergy, so they would have to eliminate wheat but might be able to slowly add it back in over time. This, of course, should only be done under the supervision of a trained professional.

The least understood in this group of diseases is non-celiac gluten sensitivity (NCGS). This condition is neither an immune reaction, like wheat allergies, nor an autoimmune reaction, like celiac disease. Though it has similar symptoms to celiac disease, it cannot be diagnosed via a blood test, biomarker tests, or any other type of tests. To diagnose NCGS, celiac disease and a wheat allergy must be ruled out. From here, gluten should be eliminated to determine whether it was the cause of the symptoms. The four-step process above is ideal for this level of determination: Notice and plan, eliminate, reintroduce, and create.

Completely removing gluten from your diet is challenging and involves a significant level of inconvenience and effort. Some people remove gluten as a preventative measure, which is a significant cost for potentially minimal benefit in the absence of a diagnosis. We recommend the degree to which you eliminate gluten should be commensurate with the extent to which you are impacted by one of the above conditions.

FODMAP

FODMAPs are fermentable oligosaccharides, disaccharides, monosaccharides, and polyols. These are poorly absorbed short-chain carbohydrates that can be the source of food intolerances in certain individuals. A lot of the foods discussed earlier in this module, such as gluten-containing foods, wheat, dairy, and certain fruits and vegetables, are foods that contain these types of sugars.

Oligosaccharides are natural sugars found in wheat, rye, legumes, nuts, artichokes, asparagus, onions, and garlic. Humans do not have naturally occurring enzymes to break down these foods, so they tend to be malabsorbed. The disaccharide FODMAP is lactose. Lactose requires the enzyme lactase to properly break it down. Lactase activity can be reduced in some people, leading to malabsorption. The monosaccharide FODMAP is fructose, which is found in many fruits (apples, cherries, pears, watermelon, mango, and peaches), vegetables (such as sugar snap peas), and sweeteners (such as high-fructose corn syrup and even honey). Fructose is not absorbed well and can pull water into the bowel, creating bloating, pain, and diarrhea. Polyols are found in certain fruits and vegetables, such as apples, pears, mushrooms, and cauliflower. They are also found in artificial sweeteners such as xylitol. The causes and effects of polyol malabsorption in the gut are similar to those associated with fructose.

The four-step elimination process is the perfect way to diagnose and treat FODMAP intolerance. Since a lot of foods fit into this category, it makes sense to eliminate all and slowly reintroduce one group at a time. A food diary can be very helpful in this process.

THE PALEO DIET

The paleo diet is an evolutionary diet that mimics the foods eaten by our Paleolithic ancestors. Made popular by Dr. Loren Cordain, it is essentially an elimination diet that removes all foods that would not have been available to Paleolithic humans. The theory behind the exclusion of these foods is that modern humans have not had enough time, through evolution, to adapt to the changes of the post-agricultural food environment. It is proposed that this inability to adapt has created an environment where humans are now genetically predisposed to a myriad of health conditions, including metabolic diseases. By removing these foods and eating the way humans are genetically programmed to eat, you remove the exposure and decrease the risk of developing a chronic disease.



Paleo Foods

Foods included in the paleo diet are meats, vegetables and fruits, nuts and seeds, and high-quality fats. For meats, the diet encourages its practitioners to eat grass-fed and free-range meats and wild-caught seafood, those most similar to the meat available in the Paleolithic era. Meats also include organ meats, as these would not be wasted during those times. When it comes to fruits and vegetables, the paleo diet encourages choosing locally grown or organic over those grown commercially with pesticides. It also promotes the avoidance of any processing, such as canning or freezing. Nuts and seeds can be a little controversial within the paleo diet parameters. It is recommended these foods be eaten sparingly due to their phytate content, which, according to proponents of the diet, bind to minerals and interfere with the digestion and

absorption of micronutrients. Fats are a little more straightforward. Eat fats that come from animal sources, natural vegetable and fruit sources (e.g., avocados), and a little from nuts and seeds. Any processed fats or oils should be completely avoided.

Foods excluded from the paleo diet are grains, potatoes, legumes, dairy, added sugar, and processed foods. One of the issues with the paleo diet's excluded-food list is it is commonly dependent on the practitioner. Some people consider foods like coffee or nut butters to be processed because they have to go through some level of processing before they are consumed. The same might be said for delicatessen meat, even that of high quality. Others who consider themselves "paleo" might think these are perfectly acceptable and include them in their diet.

There are other diets that are similar but have different names, such as ancestral diets. The main differences between an ancestral diet and the paleo diet is the consumption of starchy vegetables such as potatoes, the allowance for a limited amount of grains and legumes, and the inclusion of dairy. Though dairy might not have been part of our ancestors' diets — especially that of the Paleolithic human — a lot of humans have evolved

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to hang on to the lactase enzyme into adulthood. This allows us to process and digest dairy throughout our lifetimes. Not everyone maintains the lactase enzyme, which leads to a dairy intolerance.

As mentioned above, chronic-disease risk reduction is a proposed benefit of eating a paleo or ancestral diet. Other touted benefits include increased longevity (meaning a higher quality of life throughout the later years of life), weight loss, better gut health (due to microbiome diversity developed through eating natural meat, vegetable, and fruit sources), and lower levels of inflammation (due to a reduction in C-reactive proteins and improved lipid profiles).

Though these diets can be restrictive, it is best to understand the common elements within them that likely lead to their success. The big one is the avoidance of processed foods, where you make up the bulk of your diet with natural food sources. When it comes to the inclusion of starchy vegetables, coffee, delicatessen meat, gluten-free grains (rice, quinoa, oatmeal, etc.), or even making sure you buy organic or free-range products, be your own test subject. How do those foods affect health and performance when you take them out or add them? Also, can you afford to eat all locally grown, organic, free-range, or wild-caught foods? If not, make the best choices you can and stay as close to the natural-foods guideline as possible. The paleo or ancestral diet can provide guidance on food choices, but ultimately, the final decision about which foods to include and how much to eat will come from personal experimentation.

While the paleo diet is a successful approach for many people, CrossFit does not expressly forbid grains, dairy, or legumes, as there could be benefits for some in consuming these foods. Instead, we suggest individuals test whether these foods are supportive of their goals through a process of elimination and reintroduction. Utilize the four-step elimination process discussed in the “Elimination Diet” section to determine if these excluded foods can be beneficial to your health and performance.

Generally, restrictive dietary rules applied to everyone can be counterproductive for individuals who would benefit from the excluded foods. We encourage you to experiment and discover for yourself which foods best support your health, performance, and compliance.

LOW-CARB DIETS

The excessive consumption of refined, processed carbohydrates is a leading factor contributing to the rise of chronic disease throughout the world. Low-carb diets aim to control carbohydrate intake to improve health markers and spur fat loss.

As the name suggests, low-carb diets restrict carbohydrate intake. Popular examples include the ketogenic diet and carbohydrate-cycling diets. While the paleo diet is not low carb by definition, in practice, the removal of grains, dairy, and legumes makes it relatively low carb. Across these various diets, carbohydrate intake ranges from 0 to 150 g per day. Keto practitioners recommend fewer than 50 g of carbs daily, carnivore dieters try to eliminate carbs entirely, and carbohydrate cyclers minimize carbohydrate intake to 30 g or fewer for five out of seven days. For the most part, these plans address quantity simply through the limitation or elimination of carbs. There are no limits placed on protein or fats, and macronutrient ratios and total consumption are generally not measured. Most plans promote quality indirectly by reducing the amount of processed, refined carbohydrates available to the dieter.

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The Ketogenic Diet

The ketogenic diet is very low in carbohydrate, moderate in protein, and high in fat. It is characterized by the presence of molecules in the blood called ketone bodies.

In its first clinical application 100 years ago, the ketogenic diet was used to treat pediatric epilepsy. Remarkably, 94.5% of children saw either an improvement or complete remission of their seizures without any of the negative side effects associated with anti-convulsant prescription drugs. Presently, there are [hundreds of studies registered at clinicaltrials.gov](#) exploring the application of ketogenic diets for a wide variety of conditions, including Type 2 diabetes, obesity, nonalcoholic fatty liver disease, stroke, heart disease, cancer, Alzheimer's and dementia, depression, anxiety, schizophrenia, bipolar disorder, traumatic brain injury, PCOS, binge eating and anorexia, alcoholism, migraines, and autism.

Before digging into the details of the ketogenic diet, we should define some important terms.

Ketones — *molecules produced in the liver via the breakdown of fatty acids. The primary ketone bodies are beta hydroxybutyrate and acetoacetate (which can be further broken down into acetone).*

Ketogenic — *a word derived from “ketone” and “genesis,” which means “the origin or coming into being of something.” This is the endogenous state in which the liver creates ketones from fatty acids.*

Ketosis — *generally recognized as a metabolic state in which blood concentrations of beta hydroxybutyrate (BHB) are above 0.5 mmol/L.*

Ketoacidosis — *a metabolically deranged state that is typically the result of end-stage Type 2 diabetes. Diabetic ketoacidosis is a serious medical condition, with pathological blood concentrations of BHB of 10-13 mmol/L and ranging as high as 25-30 mmol/L in severe cases. The excessive acidification of the blood can lead to death if left untreated.⁴⁸*

Exogenous ketones — *orally consumed ketone salt or ketone-ester supplements, usually in liquid form, that rapidly elevate blood-ketone levels. These supplements can provide some, but not all, the benefits of natural nutritional ketosis.*

The ketogenic diet functions to provide alternative fuel for the brain and many of the body's tissues. Glucose and its storage form, glycogen, serve as rapid energy sources for the body and brain but are available in finite amounts. Fat, on the other hand, contains more calories per gram and can provide a lot more energy. This is the idea behind the ketogenic diet: Use fat for fuel and spare glucose for those cells that need it.

⁴⁸ Although ketosis and ketoacidosis are commonly confused, even among healthcare professionals, the two physiological states are entirely different. Conflating the two is like saying drinking a glass of water is the same as your house being destroyed by a flood because they both involve water.

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Though the brain can run primarily on glucose, the ketogenic diet utilizes fat to create ketone bodies as an alternative fuel source. Since the fat you store cannot cross the blood-brain barrier, it is shuttled to the liver and converted into ketone bodies. Ketones are much smaller, water-soluble molecules that are able to pass through the protective barrier of the brain. Under the conditions of the ketogenic diet, the brain will meet up to 70% of its energy needs from ketones rather than glucose.

Almost all cells of the body can use fatty acids or ketones for fuel except those that do not contain mitochondria: red blood cells and a specific type of brain cells called astrocytes. The energy needs of these cells must be met with glucose. To make sure we are never without essential glucose, the body has a built-in mechanism to create its own glucose through a process called gluconeogenesis. During gluconeogenesis, the body creates glucose out of stored fat, amino acids, and lactate.

A ketogenic diet is generally considered to be 5% carbohydrate, 20% protein, and 75% fat, though the starting point can change according to individual circumstances. The macronutrient ratios can vary widely depending on the starting point of the individual (obese vs. lean), the types of foods ingested (gummy bears vs. broccoli), or the goal of the diet (epilepsy management vs. athletic performance). Because carbohydrates are kept very low, the ketogenic diet is usually successful in eliminating processed foods rich in sugar and refined grains.

When experimenting with the ketogenic diet, it is best to still prioritize eating whole, unprocessed foods. A well-formulated ketogenic diet should be built on:

- Fatty cuts of nutrient-dense animal foods (pastured or grass-fed if possible) such as red meat/organs, poultry, eggs, pork, and seafood⁴⁹
- Healthy, natural fats such as beef tallow, lard from healthy pigs, grass-fed butter, ghee, coconut oil, olive oil, avocados, etc.
- Plentiful salt and electrolyte minerals

It can include (but doesn't have to for those who have sensitivities to these foods):

- Above-ground vegetables (leafy greens, broccoli, peppers, cucumber, celery)
- Nuts (almonds, macadamia nuts)
- Full-fat dairy (cream, butter, cheese, cream cheese, sour cream, unsweetened yogurt)
- Fruit (avocado, olives, coconut, and berries)

It contains very little or zero:

- Sugar
- Refined grains (wheat flour, cornmeal, white rice)
- Starchy vegetables (potatoes, yams)
- Processed seed oils (corn, canola, soybean)

⁴⁹ It is possible to achieve a state of nutritional ketosis with only plant foods by focusing on coconut, olives, avocados, etc., but it is impossible to meet all micronutrient requirements this way. A vegan diet requires careful monitoring and supplementation of nutrients that are absent in plant foods and can only be found in animal sources (i.e., B12).

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THE PROPOSED BENEFITS OF KETOSIS

The ketogenic diet can offer dramatic benefits when it comes to weight loss and metabolic health. Some of the proposed benefits are due to the ketone body beta hydroxybutyrate (BHB). BHB is more than just an energy substrate; it can also be a signaling molecule.

The presence of BHB in the blood:

- Lowers oxidative stress and inflammation
- Has a neuro-calming effect in the brain
- Upregulates the neurotransmitter BDNF in the brain for improved memory and learning
- Spares glucose
- Spares leucine (the most anabolic amino acid) to preserve muscle
- Suppresses osteoclasts to prevent bone mineral loss
- Suppresses appetite at the hypothalamus
- Stimulates mitochondrial biogenesis (creation of more cellular powerhouses)
- Activates favorable “longevity” gene expression

Ketosis has been shown to suppress the appetite, spare glucose for the cells that need it, create more efficient energy production, preserve muscle and bone, increase longevity, and increase focus and cognition.

In particular, the metabolism of ketone bodies in the brain creates a balance between excitatory and inhibitory neurons. Ketone-body metabolism has been associated with many neurological benefits, such as the reduction or elimination of epileptic seizures; reduced symptoms of ALS, Huntington’s, and Parkinson’s; and reduced symptoms of mental-health disorders such as depression, anxiety, bipolar disorder, and schizophrenia.

The biggest proposed benefit of the ketogenic diet, however, is the relief it provides from the burden of insulin. For more on the dangers of chronically elevated insulin levels, revisit the “Science of Sickness” section. The ketogenic diet has the ability to lower the amount of glucose in the blood back to a normal level and eliminate the need for chronically high insulin. It has become an effective intervention to treat Type 2 diabetes and its associated metabolic diseases with the possibility of triggering remission.

THE POTENTIAL PITFALLS OF A KETOGENIC DIET

Some potential pitfalls must be navigated when following the ketogenic diet:

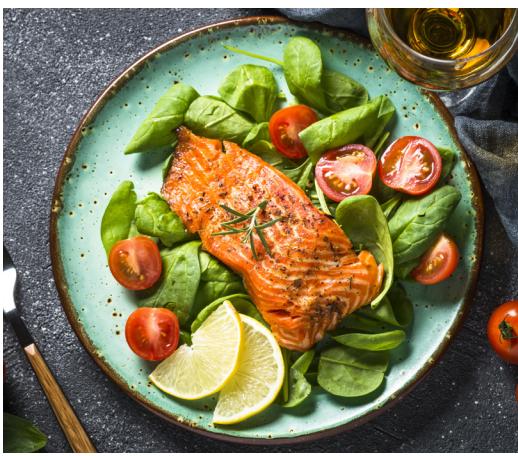
1. A diet of processed meats, processed vegetable oils, and processed “keto” bars and snacks, while potentially ketogenic, will have a negative long-term impact on health. This is called the “dirty keto” diet and is not recommended.
2. The keto diet will cause dramatically lowered insulin (a good thing), but people with Type 1 or Type 2 diabetes who take pharmaceutical drugs like exogenous insulin, sulfonylureas, or metformin will need to work closely with their healthcare provider to adjust medications appropriately to avoid hypoglycemic events.
3. Some keto practitioners suffer from dizziness, nausea, headache, and fatigue — symptoms known as the “keto flu.” They will have to pay close attention to electrolyte intake.

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4. Those prone to gout, a painful type of arthritis caused by the accumulation of uric-acid crystals in the joints, may experience a flare-up during the early weeks of a ketogenic diet and should work closely with their doctor to monitor uric-acid levels.
5. The process of adapting to a ketogenic diet will take approximately four months on average and will come with ups and downs in energy and performance. Competitive athletes should be cautioned not to attempt this adaptation phase during competition season.
6. While those training once a day will be able to replenish muscle glycogen endogenously, competitive athletes training multiple high-intensity sessions per day will need to supplement with dietary carbohydrate. To maximize training benefit and minimize metabolic damage, this can be accomplished in a cyclical fashion with “safe starches” like oats, rice, bananas, or supplements.
7. Insulin is a growth factor influencing the growth of fat tissue and muscle mass. While research has shown excellent *preservation* of lean body mass on a ketogenic diet, muscle *growth* will happen at a faster rate with the elevation of insulin from a higher-carbohydrate diet.^{50, 51} Those wishing to pack on a substantial amount of muscle in a short period of time (“bulking”) will do better to add carbohydrates in a cyclical or seasonal fashion.

Carbohydrate Cycling

Carbohydrate cycling is a strategy promoted for shedding body fat while preserving muscle mass or for enhancing endurance performance. It involves alternating between high-carb days and low- or no-carb days. Examples include the anabolic diet, carb-night diet, and cyclical ketogenic diet, where a very low-carb diet is followed for several days (e.g., five days of fewer than 30 g of carbs per day), then a high-carb diet (55-65% of total calories up to an unrestricted carbohydrate “refeed”) is adopted for one to two days.



⁵⁰ Gregory, R. M., Hamdan, H., Torisky, D. M., Akers, J.D. (2017). A low-carbohydrate ketogenic diet combined with 6-weeks of CrossFit training improves body composition and performance. *Int J Sports Exerc Med*, 3(2):1-10.

⁵¹ Paoli, A., Grimaldi, K., D'Agostino, D., Cenci, L., Moro, T., Bianco, A., and Palma, A. (2012). Ketogenic diet does not affect strength performance in elite artistic gymnasts. *J Int Soc Sports Nutr* 9, 34.

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Another method has the practitioner eating a greater amount of carbs on more intense or longer workout days and fewer carbs on days when activity is less intense or limited. As with low-carb diets, the only quantity concern is the control of carbohydrates on low-carb days. Neither total food consumption nor macronutrient ratios are explicitly measured in these plans. Protein and fat consumption is basically unlimited yet is often self-regulating, as these two macronutrients are quite satiating. Again, similar to low-carb diets, the quality of food is addressed on low-carb days through the unavoidable elimination of refined, processed, sugary foods. On high-carb days, the quality of food commonly deteriorates as practitioners often turn to processed foods to get their carbs. The tracking of total daily intake and macronutrient ratios can definitely be added to these plans. This would allow for a better understanding of the results achieved, especially at different levels of carbohydrate consumption.

POTENTIAL BENEFITS OF CARBOHYDRATE CYCLING

Low-carbohydrate plans seem to work well for those who are suffering from metabolic disease and need to decrease insulin levels and lose body fat. They also work well for those looking to improve health markers without weighing and measuring. Low-carbohydrate diets are generally more sustainable than low-fat diets or low-calorie diets. For those who engage in high-intensity activities such as CrossFit, carb cycling can help support performance more than a purely low-carb approach.

POTENTIAL PITFALLS OF CARBOHYDRATE CYCLING

Carb-cycling plans may result in a general lack of energy as well as decreased performance during high-intensity exercise on the low-carb days. This style of eating also requires significant willpower and discipline on both low- and high-carb days. On low-carb days, it can be hard not to add in some of the carbohydrates enjoyed on high-carb days. On high-carb days, it can be difficult not to binge-eat all the carbs that are forbidden on low-carb days.

VEGETARIANISM AND VEGANISM

Vegetarianism and veganism are two types of diets that abstain from meat and other animal products. There are similar characteristics between both, but the main difference is the extent to which animal products are included in the diet, with veganism being the more restrictive of the two.

Vegetarianism is the practice of abstaining from meat and animal products to varying degrees. Practicing a very strict vegetarian diet might be considered by some as the practice of veganism, though there are some subtle differences that will be discussed below. Vegetarians may wholeheartedly avoid animal products such as meat, eggs, dairy, and any additives or other products derived from animals (such as honey, whey protein, etc). From here, there are other, less restrictive practices, as shown below:

Table 8 — Common Diets That Eliminate Animal Products

Pescatarian	Avoids all animal products except fish and other seafoods
Lacto-ovo-vegetarian	Avoids all animal products except dairy and eggs
Ovo-vegetarian	Avoids all animal products except eggs
Lacto-vegetarian	Avoids all animal products except dairy

Specializations

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Veganism is a very strict form of vegetarianism that not only includes total abstention from meat, eggs, dairy, and any other food derived from an animal but also abstention from products outside the diet, such as leather, wool, silk, beeswax, etc. This abstention might also be found in vegetarians, but it is the strict combination of the two that defines veganism.

There are many reasons one might become a vegetarian or vegan, ranging from ethical to health reasons. Ethical reasons typically have to do with respect for an animal's life and can stem from individual belief and/or religion. Some of the biggest misconceptions about such diets are those regarding their health benefits. It is often thought that a diet consisting of just vegetables and fruits is healthier and leads to an increase in quality of life and reduction of disease risk. Research doesn't necessarily agree with these claims. For one, a vegetarian or vegan diet doesn't necessarily imply a diet rich in fruits and vegetables and might provide practitioners with an excuse to eat processed foods, especially when trying to increase protein intake. A big concern with these diets is deficiency of vitamins and minerals associated with eating meat, such as vitamins B12, B2, D, niacin, potassium, selenium, iodine, calcium, iron, and zinc. Such deficiencies in these diets have been shown to result in increased risk of bone fracture and stroke as well as declines in cognitive function, mental health, and physical performance.^{52, 53} These increases in risk and decreases in performance might not only be associated with vitamin and mineral deficiency but also deficiencies of protein, essential amino acids, and omega-3 fatty acids.



To minimize risk, vegans and vegetarians will have to be very thoughtful in their supplement programs while also combining the right foods so they consume the right amounts of protein, essential amino acids, omega-3 fatty acids, and necessary vitamins and minerals. Often, this means vegans and vegetarians are forced to eat a diet that is higher in processed foods, which can offer its own set of problems in health and performance outcomes.

⁵² Tong, T. Y. N., Appleby, P. N., Perez-Cornago, A., & Key, T. J. (2020). Vegetarian diets and risks of total and site-specific fractures: Results from the prospective EPIC-Oxford study. *Proceedings of the Nutrition Society*, 79(OCE2). <https://doi.org/10.1017/s002966512000021x>

⁵³ Tong, T. Y., Appleby, P. N., Bradbury, K. E., Perez-Cornago, A., Travis, R. C., Clarke, R., & Key, T. J. (2019). Risks of ischaemic heart disease and stroke in meat Eaters, fish eaters, and vegetarians over 18 years of follow-up: Results from the prospective EPIC-Oxford study *BMJ*, i4897. <https://doi.org/10.1136/bmj.i4897>

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Research on the vegetarian and vegan diets is not entirely negative. Some research has shown a well-formulated vegan or vegetarian diet can lead to weight loss, decreases in Type 2 diabetes risk, and a slight decrease in overall mortality.⁵⁴ It is important to understand these positive impacts of a vegetarian or vegan diet are shown only when the practitioner is avoiding processed foods, such as refined grains, sugars, and industrial oils.

CrossFit's recommendation to eat meats, vegetables, nuts and seeds, some fruit, little starch, and no sugar in the optimal quantities remains applicable for vegetarian and vegan needs, with the exception of meat consumption. A vegetarian or vegan can thrive by eating high-quality carbohydrates and fats in ideal amounts while minimally supplementing with processed foods to fulfill their protein needs. Furthermore, some of the risks presented above decrease for those who include fish, eggs, or dairy products due to the natural addition of proteins, essential amino acids, omega-3 fatty acids, and naturally occurring vitamins and minerals.

⁵⁴ Tonstad, S., & Clifton, P. (2017). Vegetarian diets and the risk of type 2 diabetes. *Vegetarian and Plant-Based Diets in Health and Disease Prevention*, 355–367. <https://doi.org/10.1016/b978-0-12-803968-7.00020-4>



TOOLS TO STAY (OR GET BACK) ON TRACK

Now, what if you realize after a few days or weeks that your original plan of eating whole, unprocessed foods in quantities that will support exercise but not body fat is not working, but it's not because your calculations were incorrect or you didn't care about following through on your plan? What if you go to bed every night promising yourself that you're going to follow the plan but somewhere between waking up and lunchtime, you've already veered off track? First of all, you're not alone. Adopting a totally new way of eating is difficult. Second, there are other strategies you can try to help you get back on track and stay there. Let's first consider two of them: motivation and habits. After that, we'll touch on some mindful eating practices that can help prevent overeating.

MOTIVATION

Eating well requires motivation. Motivation is defined as "the process whereby goal-directed activities are initiated and sustained."⁵⁵ This simply means wanting to achieve a goal and actively working toward achieving it. The two key factors that will drive your motivation are:

- 1) Whether you value the goal
- 2) The degree to which you believe you can achieve it

This is called the "expectancy-value theory of motivation," which states the value placed on a goal or task is a function of its importance, interest, cost, and utility, and the belief in being able to achieve it — expectancy — is a function of previous experience and social influence.⁵⁶

Based on this theory, in order to be motivated to achieve your nutrition goal, you need to believe it's worth the effort. Then, if you put the effort in, you are likely to succeed. In other words, if you perceive the cost of weighing and measuring and diligently tracking your nutrition and fitness is too high and the chance of success is too low, you likely won't stick with it. These perceptions make perfect sense if you have "failed" on previous diets that require very high willpower or restraint.

⁵⁵ Cook, D. A., Artino, A. R., Jr. (2016). Motivation to learn: An overview of contemporary theories. *Medical Education*, 50(10), 997–1014. <https://doi.org/10.1111/medu.13074>

⁵⁶ Ibid.

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If you can relate to this, here are two strategies to consider:

Reframe

Instead of focusing on what you can't do, must do, and can't have, focus on what will happen for you if you embrace the challenge. Dialing in your nutrition and fitness to fall somewhere between wellness and fitness on the continuum will have a significant positive effect on the rest of your life. You have the power and the control to make that happen.

Take small steps: Sometimes a wholesale revamp of every move you make in a day is too overwhelming and often unsustainable. So, what is a small step you can take now to be prepared to begin your 30-day challenge a few weeks from now? Maybe you make no changes at all for the first 30 days except to clear out all the processed foods from your house and replace them with whole foods you love. What if you took a cooking class on how to prepare healthy meals or cooked your way through a whole-foods cookbook to find your favorite recipes? What if you asked a friend at your affiliate to do it with you? You can be accountable to someone else and be their cheerleader when they need it, too. Think of small steps you can take now and celebrate those victories as you prepare for the challenge ahead.

The key takeaway is that if you have struggled to eat well throughout your life, your level of motivation will be very low to start. This is because the mountain seems too high and hard to climb, and you aren't sure why you should bother climbing it anyway. In addition, you're not convinced you will make the climb even if you try your hardest. In this situation, consider an easier way up the mountain, break your route into many small checkpoints, connect with others who have successfully made the ascent, and constantly remind yourself how good the view will be from the top.

Set Realistic Expectations

It's important to set realistic expectations about the amount of progress possible within a given time frame. Setting unrealistic expectations will lead to disappointment, which in turn will dramatically undermine motivation. This is especially important when nutrition goals are centered on weight loss and changes in body composition.

For weight loss in particular, steady continuous changes that occur gradually over time are ideal. This is important to prevent weight regain and assist with compliance.⁵⁷ A major pitfall is to try to achieve too much too quickly. When initial results are followed by a rebound or plateau, this can sap you of your motivation. Recent research has identified a pre-established body-weight set point that signals to the body the amount of energy required for homeostasis. Rapid weight loss creates an energy gap between the reduced number of calories consumed and the calories required to maintain the set point, and as a result, hunger increases and metabolic rate slows, which leads to weight regain. When weight loss is more gradual and combined with increasing physical activity levels, your body can create a new weight set point, which makes long-term success more likely.⁵⁸ Basically, you want the rate of weight loss to be gradual enough to allow your body to adapt to the change and not fight the weight-loss process.

⁵⁷ Koliaki, C., Spinos, T., Spinou, M., Brinia, M. E., Mitsopoulou, D., Katsilambros, N. (2018). Defining the optimal dietary approach for safe, effective and sustainable weight loss in overweight and obese adults. *Healthcare* (Basel, Switzerland), 6(3), 73. <https://doi.org/10.3390/healthcare6030073>

⁵⁸ Melby, C. L., Paris, H. L., Foright, R. M., Peth, J. (2017). Attenuating the biologic drive for weight regain following weight loss: Must what goes down always go back pp? *Nutrients* 9(5), 468. <https://doi.org/10.3390/nu9050468>

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In terms of realistic goals for weight loss, studies have shown that in a 12-month period, across different dietary approaches, the average sustained weight loss for obese people without Type 2 diabetes was 5% of their baseline starting weight.⁵⁹ For a 250-lb. individual, this equates to approximately 1 lb. per month or 12.5 lb. per year. This indicates that the more gradual the change, the more likely the person is to cope both psychologically and physiologically. A key point is the amount of weight that realistically can be lost in a year, and kept off, is less than most people expect and somewhere in the range of 5-10%. Expectations beyond this should be adjusted to avoid weight regain after initial success.⁶⁰

Set and Track Nutrition Goals

To drive motivation, nutrition goals should be achievable and within your control. Progress tracking should be frequent enough to measure improvement but not so frequent that there hasn't been enough time for adaptation to occur.

An example of a goal that is achievable and within your control is to commit to attending CrossFit class or working out at home five to six days per week. At the end of each week, you can look back and agree you either did or did not accomplish your goal.

Another one of your goals may be attached to the process of adopting a healthy lifestyle and eating pattern, which is also achievable and within your control. The guiding principle is that if you follow the process with a high degree of compliance, the desired outcomes will follow automatically. Importantly, process goals build competence and autonomy, both of which drive further motivation.

An example of a well-constructed process goal related to nutrition is to set a target for the number of macro-balanced meals prepared at home and eaten with the family at the dinner table each week. This goal can be tracked with a simple tally system, and every tick in the box will be motivating. Success in this case would be entirely within your control. Also, regardless of individual differences in dietary responses or plans, everyone can strive for this goal with equal chance of success. As you pursue this goal, you will learn you have power over your situation while developing better habits that will endure and can be further leveraged once the initial goal has been achieved.

⁵⁹ Gardner C. D., Trepanowski J. F., Del Gobbo L. C., et al. (2018). Effect of low-fat vs low-carbohydrate diet on 12-month weight loss in overweight adults and the association with genotype pattern or insulin secretion: The DIETFITS Randomized Clinical Trial. *JAMA*. 319(7):667–679. doi:10.1001/jama.2018.0245

⁶⁰ Hall, K. D., & Kahan, S. (2018). Maintenance of lost weight and long-term management of obesity. *The Medical Clinics of North America* 102(1), 183-197. <https://doi.org/10.1016/j.mcna.2017.08.012>

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An example of a goal that may not be entirely within your control is to say you are going to lose 5 lb. of body fat in a certain amount of time. The reason this might not be the best goal to set is because there is a huge amount of variability in how individuals respond to dietary strategies: “Nutrition research provides evidence that the risks and benefits of diet and lifestyle choices do not affect people equally, as people are inherently variable in their responses to nutrition and associated interventions to maintain health and prevent disease.”⁶¹ Putting an exact number on the amount of weight to be lost within a given time frame has the potential to backfire and set you up for failure because it relies on physiological changes within the body that can’t be scheduled and often don’t happen in a predictable or linear manner. To drive motivation, set and track goals that are within your control and then set up the habits that will help you achieve them.

HABITS

Have you ever found yourself taking a break from something and automatically walking to the refrigerator to see what’s inside? That is an example of a habit. It is likely that a large percentage of the actions we take each day are habits we may not even be aware of.⁶² A habit is defined as “a well-learned behavior or automatic sequence of behaviors that is relatively situation-specific and over time has become motorically reflexive and independent of motivational or cognitive influence — that is, it is performed with little or no conscious intent. For example, the act of hair twirling may eventually occur without the individual’s conscious awareness.”⁶³

Habits are maintained because practiced behavior is rewarded. A reward is anything that enhances the act that preceded it.⁶⁴ In simple terms, we form habits by repeating a rewarded behavior until it becomes automatic. The initial behavior starts as a choice in response to a stimulus. In the refrigerator example, at some point you made a choice to open the refrigerator because you were hungry. This is a routine (open the refrigerator and eat) that is triggered by a cue (a feeling of hunger) that results in a reward (food, taste sensation, and satiety). When this happens frequently enough, you stop thinking about it and the habit is formed. Along the way, the habit can become associated with new cues that may coincide with the learned behavior. Open the refrigerator enough times when you happen to be bored and the habit can start to become cued by boredom rather than hunger. This then leads to eating every time you are bored and becomes a pathway to overconsumption. This cue-routine-reward system is the mechanism behind emotional eating. The habit loop can become self-reinforcing, and it is easy to see why habits can lead to a loss of behavior control. Learning to consciously recognize cues and rewards will allow you to regain control over the habits associated with them.⁶⁵

⁶¹ Drew J. E. (2020). Challenges of the heterogeneous nutrition response: interpreting the group mean. *Proc Nutr Soc*. 79(2):174-183. doi: 10.1017/S002966511900096X. Epub 2019 Jun 26. PMID: 31239000.

⁶² Duhigg, C. (2014). *The power of habit: Why we do what we do*. New York: Random House.

⁶³ American Psychological Association. Habit. <https://dictionary.apa.org/habit> (accessed July 28, 2021)

⁶⁴ Alonso-Alonso, M., Woods, S. C., Pelchat, M., Grigson, P. S., Stice, E., Farooqi, S., Khoo, C. S., Mattes, R. D., & Beauchamp, G. K. (2015). Food reward system: current perspectives and future research needs. *Nutrition Reviews* 73(5), 296–307. <https://doi.org/10.1093/nutrit/nuv002>

⁶⁵ Duhigg, C. (2014). *The power of habit: Why we do what we do*. New York: Random House.

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Changing Nutrition Habits

The psychology behind behavior modification and habit formation is complex, but the actual process to change a habit is straightforward and can be summarized as follows:

1. Identify the behavior you want to change (the routine).
2. Monitor when that behavior occurs, paying close attention to what precedes it (the cue) and how you benefit from the behavior (the reward).
3. Create a new routine that will replace the behavior but maintain the reward.
4. Practice the new routine whenever the cue occurs until it becomes a new habit that replaces the old one.
5. Be mindful of how the new routine is rewarding.

Done correctly, this process does not require willpower, just conscious awareness and consistency. Think about all the habits you have formed in your life. The more you do something, and the more consistently you do it, the easier it is to do. And when you add a reward to the frequent and consistent behavior, it's more likely the habit will stick.⁶⁶

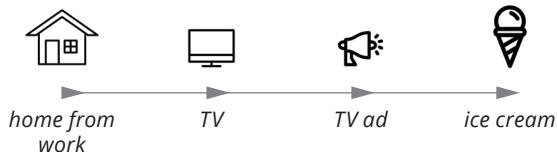
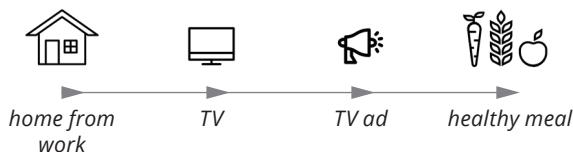
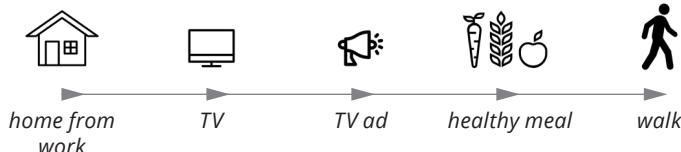
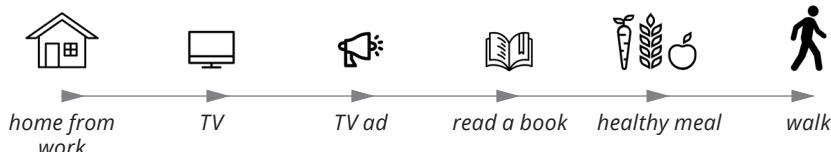
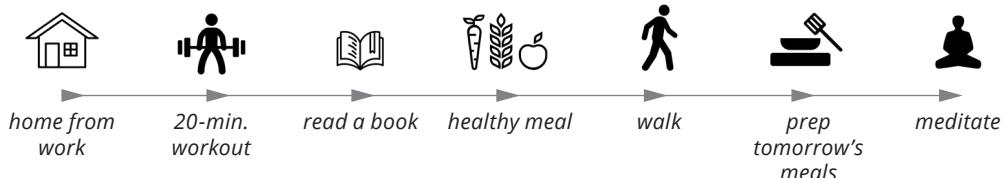
Let's apply this behavior-change process to an example involving ice cream:

Table 9 — Example of Habit-Changing Behavior

<i>Identify the behavior you want to change (the routine).</i>	Stop eating ice cream during the week.
<i>Monitor when that behavior occurs, paying close attention to what precedes it (the cue) and how you benefit from the behavior (the reward).</i>	I eat ice cream when watching TV (cue 1) before dinner. I am hungry (cue 2), and I see ice cream advertised (cue 3). I am rewarded by the taste (reward 1) and having my hunger satisfied (reward 2).
<i>Create a new routine that will replace the behavior but maintain the reward.</i>	My new routine will be to heat up and eat a pre-prepared meal. Instead of getting the ice cream out of the freezer, I will get out one of my pre-prepared dinners and microwave it. This will take about the same amount of time, and I can return to my show while it is heating. The meal will be tasty and filling. I can either turn off the TV and eat (ideal) or take it back to the TV and eat there (less ideal but maybe a good starting point).
<i>Practice the new routine whenever the cue occurs until it becomes a new habit that replaces the old one.</i>	To support practicing the new routine, I am placing a note on the ice cream that says "eat a meal instead." I will also ask my partner to prompt me to warm up my meal whenever an ice cream advertisement is played. This is to help bring awareness to the behavior.
<i>Be mindful of how the new routine is rewarding.</i>	As I am eating the meal, I will pay attention to how much I enjoy eating it. After the meal, I will pay attention to feeling full and satisfied.

⁶⁶ van der Weiden, A., Benjamins, J., Gillebaart, M., Ybema, J. F., de Ridder, D. (2020). How to form good habits? A longitudinal field study on the role of self-control in habit formation. *Frontiers in Psychology* 11(560). <https://doi.org/10.3389/fpsyg.2020.00560>

Tools To Stay (Or Get Back) On Track

[<< Table of Contents](#)**The poor habit was:****The initial habit change resulted in:****By chaining on another positive habit (walking) at the end it becomes:****By inserting a positive habit (reading) in the middle of the chain it can become:****Once well established, we can then remove unwanted behaviors (TV):****Add in more healthy behaviors (workout, meditate, meal prep) to build further success:****Figure 15.** Habit Chains

Repetition is very important when creating new habits, as is allowing enough time for the habit to become fully developed. Start with small habits that are easy to change and then build upon them to develop new habits and substitute in more productive cues and behaviors. This is called habit chaining and habit swapping.⁶⁷ In the example above, once the new habit is established, it can then be leveraged and linked to another new habit, such as going for a walk after dinner.

⁶⁷ Wood, W. (2019). Good habits, bad habits: The science of making positive changes that stick. Farrar, Straus and Giroux.

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Consider all the habits you have now that you do every day without even thinking, such as brushing your teeth, feeding your pet as soon as you wake up, drinking your morning coffee while you water your plants, journaling before bed, etc. Now, make a list of two to three habits you'd like to add to your list by the end of the next four weeks. Once you have your target habit in mind, consider the triggers and cues you can use to begin practicing these habits. For a great resource on habits, follow Stanford professor B.J. Fogg at TinyHabits.com.

OVEREATING

We've all experienced overeating due to a craving, stress, anxiety, or boredom. This can quickly derail your progress, so it's a good idea to have a method in place to help you prevent overconsumption. One strategy is to adopt mindful eating practices. This involves being aware of the present moment while eating, paying close attention to the effect of the food on your senses, and noting the physical and emotional sensations you have in response to eating.⁶⁸

Examples of mindful eating include:

- **Eating slowly.** This can be accomplished by putting your eating utensils down between bites so you can relax and breathe before taking the next bite. Another option is to extend the time you allocate for completing your meal. Doing so will allow you to eat more slowly and in a more relaxed manner. For example, instead of gobbling up your food in 15 minutes, take a full 30 or 45 minutes to enjoy the same amount of food.
- **Chewing your food completely.** Savor every bite and explore all the flavors. Initially this will be difficult, even uncomfortable, but consciously chewing each bite fully is a great way to stay present while eating. Set a minimum number of chews per bite, say 10 or so, and stick with this through the entire meal.
- **Eating at the dinner table instead of in front of the television.** This will help you avoid mindlessly consuming food as you watch your favorite shows. As an added bonus, the conversation you usually engage in when eating with friends and family at the dinner table will help you relax and slow down your eating.
- **Spreading out your meals and snacks evenly throughout the day.** Some athletes end up overeating because they try so hard to follow a plan that they err on the side of undereating during the day but then become so hungry they overeat in the evening. In this case, undereating during the day essentially leads to the body seeking to make up for the lost calories at night. This can take the form of giving in to cravings, eating processed foods, or eating significantly more calories overall than is recommended for their plan. By spreading your meals and snacks out throughout the day, you are more likely to feel satiated enough that you won't be tempted to overeat late in the day.

Regardless of the approach selected, the primary goal of mindful eating is to take eating off autopilot so you can adhere to and feel satisfied from the meals that fit your plan.

⁶⁸ Warren J. M., Smith N., Ashwell M. (2107). A structured literature review on the role of mindfulness, mindful eating and intuitive eating in changing eating behaviors: Effectiveness and associated potential mechanisms. *Nutr Res Rev.* 30(2):272-283. doi: 10.1017/S0954422417000154. Epub 2017 Jul 18. PMID: 28718396.



HYDRATION

HYDRATING FOR WELLNESS

How Much Water Do You Need?

There are many misconceptions when it comes to hydration, specifically about how much to drink, what to drink, and when to drink. We're going to start our hydration discussion with how much you should drink. The short answer is you should drink when you are thirsty and until you have quenched your thirst. Our thirst mechanism is a natural calculator for how much to drink and when to drink. Following this guideline, there is no need to pre-hydrate or rehydrate if you do not feel thirsty. This becomes even more important during exercise. The risk for complications due to improper hydration increases as we exercise. More on this later in the section.

Everyone's hydration needs are different and affected by how much they exercise and what environment they are in — both of these variables impact sweating and fluid loss. The goal is to pay attention to how thirsty you are. In other words, you don't have to guess what your potential fluid loss and hydration needs are because your thirst will guide you. Another factor that can change hydration needs is overall health: Being sick, having a fever, or even being pregnant or breastfeeding can increase thirst.

Proper hydration is fairly simple:

- 1) Drink when thirsty.
- 2) Drink until you're no longer thirsty.
- 3) Eat a quality meal post-exercise to replenish lost electrolytes.

This may be simple advice, but it can be difficult to follow when common hydration myths are constantly circling around us.⁶⁹

⁶⁹ Achauer, H. (2017). Top five hydration myths busted. *CrossFit Journal* 5 May 2017. (accessed July 07, 2021) <https://journal.crossfit.com/article/top-five-hydration-myths-busted-2>.

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Hydration Myths

Here are the five most common myths about hydration:

MYTH 1: DRINK UNTIL YOUR URINE IS CLEAR

Clear urine is not necessarily the best marker for proper hydration. In fact, it might mean you are overhydrated. Urine color is constantly changing during exercise due to sweating and drinking; and food, supplements, and vitamins can cause urine color to change dramatically without any changes in hydration levels. Drinking when you're thirsty and stopping when you are no longer thirsty is your best guide to being properly hydrated.

MYTH 2: WHEN YOU FEEL THIRSTY, YOU ARE DANGEROUSLY DEHYDRATED

The feeling of thirst is like the feeling of hunger. When you first feel hungry, you are not in a dangerous situation; you are hungry but still properly nourished. The same can be said for thirst. When you feel thirsty, you are not in a dangerously dehydrated state; you are just thirsty. Pick up your water and drink until the feeling goes away.

MYTH 3: YOU NEED SPORTS DRINKS TO REPLACE ELECTROLYTES

Most sports drinks do not provide enough electrolytes to replenish those lost during exercise. Most drinks don't even provide half of what is lost. The risk comes from drinking too much of a sports drink while exercising. Overconsumption to try to meet electrolyte needs can increase the risk of exercise-associated hyponatremia (EAH), a condition in which diluted sodium levels can cause issues as mild as fatigue and irritability and as severe as exercise-associated hyponatremic encephalopathy (EAHE).

Another way to replace electrolytes is through the food you eat. For example, spinach, kale, broccoli, avocados, almonds, oranges, bananas, tomatoes, and fish also contain electrolytes.

MYTH 4: DEHYDRATION RESULTS IN DECREASED PERFORMANCE

Dehydration is actually common during high levels of physical output, and there are dehydration levels that will negatively affect performance. That said, if exercise is started at normal hydration levels, athletes can expect to perform well with up to about a 3-4% decrease in body weight due to water loss. If an athlete starts exercising while thirsty, they can expect to perform well up to about a 2% decrease in body weight. The important thing to remember is that dehydration is the opposite of being fully hydrated, which doesn't necessarily mean all dehydration is detrimental.

MYTH 5: YOU CAN'T DRINK TOO MUCH WATER

You can definitely drink too much water or any other type of fluid. The risks of such behavior are discussed below, with the major risk being exercise-associated hyponatremia (EAH). You can avoid EAH by drinking when you're thirsty and stopping when your thirst subsides.

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Hyponatremia

Hydration misconceptions can have serious consequences, the most serious being EAH. This condition is the result of overhydration and is most common when athletes follow the hydration advice to "stay ahead of thirst," a recommendation that suggests prehydrating and drinking 8 oz. of fluid every 20 minutes during exercise. During exercise, the body protects itself from losing too many fluids, the exercise essentially signaling the body to hold on to extra water. EAH occurs when blood-sodium levels become diluted and fall below normal (135 mmol/L).⁷⁰ Athletes trying to stay ahead of thirst, rather than drinking when thirsty and stopping when thirst subsides, run the risk of flooding the body with too much water. When sodium levels fall, the body's cells, including the brain cells, pull in water. The swelling of these cells can cause major problems, such as muscle cramps, nausea, vomiting, weakness, headache, confusion, changes in mental status, seizure, coma, and even death.

There are multiple theories behind EAH. The most accepted are that the athlete is drinking excess hypotonic fluids, which means the fluid consumed has fewer solutes (in this case, sodium) than the fluid in the cells. In this case, the athlete is flooding the body with water, which further dilutes blood-sodium levels. These athletes will actually gain weight over the course of the event. The other theory involves weight loss. In this case, athletes have excessive sodium losses through heavy sweating. A hormone called arginine vasopressin (AVP),⁷¹ also called antidiuretic hormone (ADH), is released, and the body is forced to hold on to water and reduce cellular osmolality.^{72,73} When external hypotonic water comes into the picture, the problem becomes even more severe. These two theories do not have to act independently of each other; they actually tend to happen simultaneously. It is important to note that most sports drinks do not have enough sodium to match the sodium levels we have in our blood. As a result, they act as a hypotonic fluid as described above. The best protection is to drink when thirsty and only until thirst subsides.

⁷⁰ Achauer, H. (2015). Confronting the drinking problem. *CrossFit Journal*. 11 Feb. 2015. http://library.crossfit.com/free/pdf/CFJ_2015_02_Conference1_Achauer2.pdf. (accessed July 7, 2021)

⁷¹ Arginine vasopressin (AVP): a hormone that regulates water excretion in response to cellular osmolality.

⁷² Hew-Butler, T., Loi, V., Pani, A., & Rosner, M. H. (2017). Exercise-associated hyponatremia: 2017 update. *Frontiers in Medicine*, 4. <https://doi.org/10.3389/fmed.2017.00021>

⁷³ Osmolality, here, refers to the concentration of dissolved sodium in serum.

SUPPLEMENTS

Whole, unprocessed foods are the best source of both macronutrients and micronutrients in terms of composition, variety, and density and should make up the foundation of how we eat. Without this dietary element in place first, supplementation is of limited value. For greatest efficacy, nutritional and performance supplements should be used in conjunction with a quality diet and consistent exercise rather than as a shortcut to looking, feeling, or performing a certain way.

MAKE AN INFORMED DECISION

The supplement options presented in this section are listed for educational purposes only. We provide information on options you have probably heard people in your gym, trainers, or medical professionals talk about often. You have to make the choice about whether to use supplements based on how you feel and what you need. We also encourage you to consult with your doctor if you take any regular medications, as some supplements may weaken your medications or make them more potent.

Follow these five steps to determine the efficacy of any supplement when it comes to increasing performance and health.

1. Find out which high-quality foods work best for you.
2. Determine your optimal food amount and macronutrient ratios.
3. Maximize your results with quality and quantity.
4. Choose one supplement to experiment with and be sure to:
 - a. Start at a low dosage.
 - b. Test it for two weeks.
 - c. Incrementally increase the dosage until you find your optimal amount.
5. Determine whether the impact on your health and performance is worth the cost of the supplement. This can be done through the same means we use to benchmark overall diet. In adding this supplement, did your health markers improve? Performance? Subjective measures?

FISH OIL

Fish oil supplements include a group of omega-3 polyunsaturated fatty acids (PUFA), specifically eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The body can use alpha-linolenic acid (ALA) to convert to EPA and DHA, but the process is very inefficient. The best way to increase EPA and DHA in the body is through food or supplementation. It is best to choose sources of EPA and DHA that come from smaller fatty fish when supplementing. It is also a good idea to pay close attention to the amount of EPA and DHA in the recommended dose. Cheaper fish oils will have less EPA and DHA and more fillers.

Fish oil is the one supplement we generally recommend adding to your diet because as discussed previously, the current food environment is typically pro-inflammatory, and it can be difficult to take in optimal amounts of omega-3 fatty acids from food alone. Therefore, early supplementation with a high-quality fish oil can help you achieve an omega-6-to-omega-3 ratio that mitigates chronic inflammation. Current diets tend to be loaded with omega-6 fatty acids and have an omega-6-to-omega-3 ratio of approximately 20:1, which is pro-inflammatory. A more ideal ratio, typically found in less-industrialized cultures, is closer to 2:1. This ratio is anti-inflammatory. Not all inflammation is bad. With fish oil, we are trying to reduce chronic systemic inflammation, not acute inflammation. Remember the explanation of inflammation provided in the section on oils in the “Quality” chapter: Acute inflammation is the typical response to injuries, illness, or a taxing workout, while chronic inflammation is prolonged inflammation leading to poor health and increased chronic-disease risk. The main goal of fish-oil supplementation is to decrease chronic inflammation.



Research has shown EPA and DHA can reduce blood pressure and triglycerides, improve mood in those with major depressive disorder, and reduce the risk of recurrent stroke.⁷⁴ There is some evidence for their ability to decrease cardiovascular events, but the research is inconclusive at this time.⁷⁵ Fish oil is also an anti-coagulant, so intake should be reduced or halted prior to surgery. Be sure to discuss this with your doctor well before the scheduled surgery date.

⁷⁴ U.S. Department of Health and Human Services. (n.d.). Office of dietary supplements - omega-3 fatty acids. NIH Office of Dietary Supplements. <https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/>. (accessed Sept. 29, 2021)

⁷⁵ Ibid.

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It is possible to avoid fish-oil supplementation altogether, but it would require a high level of dedication to eating the highest quality foods. One would have to avoid all industrial vegetable and seed oils and severely limit nuts and seeds. All meats would have to be grass fed and free range. Eggs would have to be pasture-raised, and fish would have to be wild caught and consumed often. This approach is not practical for most people, which is why supplementation is highly recommended.

PROTEIN SUPPLEMENTS

Protein supplements are typically used to add more protein to a diet because of inadequate protein intake from natural sources or to supplement high levels of training. Protein supplements come from different sources, such as dairy, eggs, plants (soy, pea, hemp, rice), and meat. They also come in a variety of quality levels depending on what types of sweeteners are added to them and what types of additives are used for smoother blending. The higher-quality products tend to have better and minimal ingredients. The goal of protein supplementation is usually to increase muscle mass, promote greater recovery, and/or improve performance.

When it comes to protein supplementation, importance should be placed on the essential amino acid (EAA) profile of the protein, branched-chain amino acid (BCAA) content, and its biological value, with the goal of consuming sources that are of high biological value (HBV). Natural protein sources such as meat, fish, poultry, eggs, and dairy are considered complete proteins with an HBV.

Essential amino acids (EAAs) are amino acids that cannot be created within the body. They must be acquired from food or supplementation. Branched-chain amino acids are a subset of EAAs. Research shows EAAs, and therefore BCAs, can be used for increased recovery based on stimulating muscle protein synthesis and reducing muscle breakdown and damage. These amino acids can also be used as a fuel source and help reduce fatigue during exercise:⁷⁶

EAA: Histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine

BCAA: Leucine, isoleucine, and valine



⁷⁶ Bagchi, D., Nair, S., & Sen, C. K. (2018). *Nutrition and enhanced sports performance: Muscle building, endurance, and strength*. Academic Press.

Dairy Proteins

Dairy proteins are the most commonly used protein supplements. This is due to their high amino-acid content and bioavailability as well as their ability to be digested and assimilated quickly in the body. There are two main types of dairy proteins: whey protein and casein protein. Whey protein is rich in BCAAs and EAAs that are rapidly digested for more immediate benefits. Whey is typically used prior to exercise, during exercise, and post-exercise when protein needs are greatest. Casein protein is a slower-digesting protein due to its ability to clot in the stomach's acidic environment, creating a slower release. This type of dairy protein is typically used to increase satiety and recovery between meals and at night.⁷⁷

Plant Proteins

Plant proteins, such as soy, rice, and pea proteins, are incomplete because they are insufficient in some essential amino acids. Plant proteins are typically higher in carbohydrates and have a gritty texture and odd taste. They are low in lysine and methionine. These are essential to the human diet because they cannot be synthesized in the body. Though these proteins are incomplete on their own, combinations of pea and rice have been shown to have a similar EAA profile as whey protein. This can be ideal for vegans and vegetarians.



Egg Proteins

Egg-white protein is a complete protein that is typically lower in fat and carbohydrates than whey. It is lactose-free, so it is generally better tolerated. A downside is that it tends to be a little more expensive than whey or casein.

Collagen Protein

Collagen protein is animal-sourced protein consisting of collagen from the animal's bone and connective tissues. This type of protein is not a complete protein and should not be used as a primary protein source. That said, it does have some potential positive benefits, including joint, hair, skin, nail, and possibly bone health.

⁷⁷ U.S. Department of Health and Human Services. (n.d.). Office of dietary supplements - omega-3 fatty acids. NIH Office of Dietary Supplements. <https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/>. (accessed Sept. 29, 2021)

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Creatine

Creatine is a naturally occurring molecule synthesized in the body, mainly in the liver and kidneys. Creatine can be consumed through the diet. You get it mainly from meats but also from vegetables or through supplementation. One of the main characteristics of creatine is its ability to store high-energy phosphates in the form of phosphocreatine and donate them to adenosine diphosphate (ADP) to regenerate adenosine triphosphate (ATP). ATP is our energy currency in the body.

Creatine tends to affect the anaerobic pathway that supports high-intensity exercise of less than 30 seconds and heavy lifts. This is because it can quickly donate high-energy phosphate to create energy. This one-step process is efficient and capable of producing high amounts of power.

The issue is that we are limited in how much phosphocreatine we store within our bodies. A 154-lb. athlete has approximately 120 g of creatine stored in their body.⁷⁸ This is where supplementation comes in. By increasing your creatine intake through food or creatine powders, you can potentially increase the amount of available phosphocreatine in your body, decreasing time to fatigue during extremely high efforts such as weightlifting and sprinting. There are many different types of creatine, but the most commonly used form is creatine monohydrate.

There aren't many drawbacks to supplementing with creatine. One major drawback is that not everyone responds positively. Some people are non-responders and are spending money on a supplement that is providing no benefits. Other drawbacks include potential stomach issues such as nausea and diarrhea.

Vitamins and Minerals

B VITAMINS

Vitamin B1 (thiamine) — This water-soluble vitamin is a known catalyst for energy generation; it aids in nerve-impulse propagation and myelin-sheath maintenance. Thiamine is naturally occurring in foods such as meats, legumes, and nuts. It is also found in grains, but the processing involved in making these foods edible removes it. There are also other foods that contain thiaminases, which are enzymes that destroy thiamine. These are tea, coffee, and raw fish.

A thiamine deficiency can affect many of the body's systems, including the cardiovascular system (congestive heart failure), nervous system (cognitive impairment), and immune system (beriberi and Wernicke-Korsakoff syndrome). A deficiency in thiamine can be caused by diets high in processed foods, alcoholism, malnutrition, Type 2 diabetes, and gastric-bypass surgery.⁷⁹

When supplementing with thiamine, it is recommended to take 1.2 mg/day for men aged 19 years or older and 1.1 mg/day for women of the same age group.

⁷⁸ Ibid.

⁷⁹ U.S. Department of Health and Human Services. (n.d.). Vitamin and mineral supplement fact sheets. NIH Office of Dietary Supplements. <https://ods.od.nih.gov/factsheets/list-VitaminsMinerals/>. (accessed July 19, 2021)

Supplements

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Vitamin B2 (riboflavin) — This water-soluble vitamin plays major roles in energy production, cellular function, growth, and the metabolism of fats and drugs. Riboflavin is naturally occurring in foods such as meats, dairy, eggs, organ meats, and green vegetables. Some grains and cereals are fortified with riboflavin, but it does not occur naturally in these foods.

Riboflavin deficiencies can lead to conditions such as cracked lips, sore throat, swelling of the mouth and tongue, anemia, cataracts, hyperemia (excess blood), hair loss, reproductive problems, and nervous system and liver problems. Groups that are at the highest risk of a riboflavin deficiency include vegetarians and vegans (especially athletes) and pregnant and lactating women. Vegans and vegetarians are at a higher risk due to the exclusion of many of the foods that are high in riboflavin, such as meat, dairy, and eggs.

When supplementing, it is recommended that men 19 and older take 1.3 mg/day, while women of the same age group take 1.1 mg/day.



Vitamin B3 (niacin) — The water-soluble vitamin niacin is converted to coenzyme nicotinamide adenine dinucleotide (NAD) in the body. NAD can also be converted to coenzyme nicotinamide adenine dinucleotide phosphate (NADP), except in skeletal muscle. NAD and NADP are required for many metabolic processes. NAD is primarily involved in reactions where energy is transferred from protein, carbohydrates, and fats into adenosine triphosphate (ATP), the body's energy currency. NAD is also a key player in genome integrity and other cellular functions such as gene expression. NADP is key to anabolic processes such as synthesis of cholesterol and fatty acids.

Niacin is naturally occurring in foods such as meats, nuts and seeds, legumes, bananas, and some fortified grains. Tryptophan is a major food source of niacin and is found naturally in turkey. Tryptophan is converted to NAD in the liver. Deficiencies in niacin can lead to pellagra, a severe skin condition, and depression, headache, fatigue, memory loss, and hallucinations.

Groups at the highest risk of niacin deficiency include the undernourished (due to poverty, eating disorders, or disease), vegetarians and vegans (due to avoidance of foods containing niacin), and those with conditions that disturb tryptophan absorption and conversion, such as Hartnup disease and carcinoid syndrome, respectively.

The recommended daily intake of niacin for men and women 19 years or older is 16 mg for men and 14 mg for women.

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Vitamin B6 — Vitamin B6 is an extremely versatile water-soluble vitamin. It plays a role in many different functions within the body, including protein metabolism, amino-acid metabolism, fat and carbohydrate metabolism, cognitive development, immune function, gluconeogenesis, and glycogenolysis.

Vitamin B6 is naturally found in meats, starchy vegetables, and non-citrus fruits. Grains can be fortified with B6, but it does not occur naturally in them. Vegetarians and vegans who are not careful with how they formulate meals are at risk of a B6 deficiency. Other groups at risk of deficiency include those with impaired renal function, autoimmune disease, and alcoholism. A vitamin B6 deficiency can lead to cognitive decline, microcytic anemia, skin conditions, lower immunity, and a potentially increased risk for some cancers.



The recommended daily intake of B6 for men and women 14-50 years of age is 1.3 mg. For men and women 51 and older, the recommendation is 1.7 and 1.5 mg, respectively.

Vitamin B9 (folate) — Folate is a water-soluble vitamin responsible for DNA and RNA synthesis, methylation, and amino-acid metabolism. Folate is found naturally in leafy green vegetables, beans, peanuts, sunflower seeds, fruit, whole grains, liver, eggs, and seafood. Other grains are fortified with folate. Supplementation of B9 comes in the form of synthetic folic acid, which can be incompletely and inefficiently converted into B9 in some people. Taking folic acid without food has been shown to increase bioavailability.

Folate deficiency can lead to megaloblastic anemia, fatigue, irritability, headache, irregular heart beat, troubled concentration, and shortness of breath. Those at greatest risk of a folate deficiency are alcoholics, pregnant women, and those with gastrointestinal disorders affecting absorption (such as irritable bowel syndrome and celiac disease).

The recommended daily intake of folate in men and women 19 and older is 400 mcg dietary folate equivalents (DFE). For pregnant or breastfeeding women, it increases to 600 mcg DFE.

Vitamin B12 — Vitamin B12 is a water-soluble vitamin required for a healthy central nervous system, healthy red blood cell formation, and DNA synthesis. B12 is naturally found in meats, liver, fish and shellfish, eggs, dairy, and fortified grains. Alternative milks, such as soy and rice, can also be enriched with B12.

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B12 deficiency can lead to some major issues, including anemia, fatigue and weakness, memory loss and confusion, dementia, heart palpitations, weight loss, infertility, and neurological issues (numbness and tingling in the hands and feet). Those most at risk of a vitamin B12 deficiency are older adults, those with gastrointestinal disorders (such as celiac disease and Crohn's disease), vegetarians and vegans, and infants of vegans. Older adults have a higher prevalence of atrophic gastritis, which affects B12 absorption. Vegetarians and vegans are at risk due to their lower or nonexistent intake of animal products, such as meat, fish, eggs, and dairy. Breastfed infants of vegan and vegetarian women are at risk due to the possible deficiency in the mother. Even a light deficiency in the mother can cause a deficiency in the infant. B12 deficiencies in infants can lead to neurological damage, developmental issues, and anemia, resulting in failure to thrive.

The recommended daily intake for men and women 14 and older is 2.4 mcg. For women who are pregnant and breastfeeding, 2.6 and 2.8 mcg are recommended, respectively.

VITAMIN D

Vitamin D is a fat-soluble vitamin found in few foods, so it is either taken as a supplement or produced in the body due to sun (UV rays) exposure. Vitamin D promotes calcium absorption in the gut and helps with bone mineralization and growth. Vitamin D also acts as an anti-inflammatory while lending a hand in cell growth, neuromuscular function, immune function, and glucose metabolism. It also plays a role in increased protein synthesis.



The few foods that do contain vitamin D include fatty fish, fish-liver oils, beef liver, cheese, and egg yolks. Milk and milk alternatives tend to be fortified with vitamin D. That said, most people reach their vitamin D requirements through sun exposure.

A prolonged vitamin D deficiency can lead to rickets (a bone deformity in infants and children) and osteomalacia (a soft-bone condition in adults). Those at highest risk are older adults (due to the decline in the skin's ability to synthesize vitamin D), people with limited sun exposure, people with darker skin (darker skin has more melanin, which protects the cell from UV rays, therefore inhibiting vitamin D synthesis), and those who have undergone gastric-bypass surgery (they have lost part of their small intestine, where vitamin D is absorbed).

The recommended daily intake of vitamin D for men and women 19 and older is 600 IU. This increases to 700 IU for adults 70 and above. Current evidence indicates supplementation of vitamin K in conjunction with vitamin D is more effective than the consumption of either alone for bone and cardiovascular health. The recommended daily dose for vitamin K is 1 mcg for each kilogram of body weight.

For natural sun exposure, it is recommended to get five to 30 minutes of direct sunlight (without sunscreen) on the face, arms, hands, and legs between 10 a.m. and 4 p.m.

Supplementing with too much vitamin D can be toxic due to the excess absorption of calcium in the digestive tract, resulting in a condition known as hypercalcemia. Hypercalcemia can lead to nausea, vomiting, kidney stones, muscle weakness, dehydration, and more.

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VITAMIN C

Vitamin C is a water-soluble vitamin found in some foods and often supplemented in an individual's diet. Vitamin C is required for the synthesis of collagen and L-carnitine and also positively affects neurotransmitters. Vitamin C plays an integral role in reducing or controlling infections and healing wounds. It is also a powerful antioxidant and is involved in protein metabolism.



Fruits and vegetables are the best natural sources of vitamin C. Deficiencies in vitamin C can lead to scurvy, fatigue, and iron-deficiency anemia. Those most at risk of a vitamin C deficiency are smokers, drug and alcohol abusers, and those with limited variety in their diet. Keto- and carnivore-diet practitioners should be sure to include eggs and/or organ meats so they get enough vitamin C in their diet, or they should add vitamin C supplementation.

The recommended daily intake of vitamin C for men and women 19 or older is 90 and 75 mg, respectively.⁸⁰

MAGNESIUM

Magnesium is a naturally occurring mineral in the body. It can be found in many different types of foods and is supplemented often. Magnesium assists in over 300 enzymatic reactions within the body, including those that play a part in muscle and nerve function, blood-sugar and blood-pressure regulation, protein synthesis, and bone health.

Magnesium is found in many different foods, such as nuts and seeds, legumes, leafy green vegetables, whole grains, meats, and fruits. A magnesium deficiency can result in fatigue, weakness, muscle cramps, poor appetite, nausea and vomiting, seizures, numbness and tingling, and heart arrhythmias.

⁸⁰ U.S. Department of Health and Human Services. (n.d.). Vitamin and mineral supplement fact sheets. NIH Office of Dietary Supplements. <https://ods.od.nih.gov/factsheets/list-VitaminsMinerals/>. (accessed July 19, 2021)

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Those at the greatest risk of a magnesium deficiency are those who have gastrointestinal issues, such as Crohn's disease and celiac disease, due to malabsorption and magnesium loss. Others at risk are people with Type 2 diabetes (due to excretion), older adults (due to lower levels of absorption and higher levels of excretion), and alcoholics.

The daily recommended intake of magnesium for men and women 19 and older is 400-420 and 350-360 mg, respectively.⁸¹

Magnesium comes in many supplemental forms, such as oxide, sulfate, aspartate, citrate, lactate, and chloride. Those that dissolve well in liquid are the most completely absorbed.

Prebiotics and Probiotics

Before addressing the utility of prebiotics and probiotics, we should discuss the importance of the human gut microbiome. There are trillions of microorganisms in the small and large intestines. These organisms consist of bacteria, fungi, viruses, and parasites working symbiotically, making up the gut's microbiome. A healthy microbiome helps maintain gastrointestinal motility, stimulates the immune system, breaks down potentially toxic foods, synthesizes vitamins and amino acids, breaks down short-chain fatty acids, protects against pathogens, supports the integrity of the gut barrier, and influences brain functionality, among other functions.

Initially, your gut microbiome is based on your DNA and was first established when you were an infant. Essentially, the first exposure to microorganisms is provided through the birth canal and the breastmilk of the mother. So, exposure depends on the microorganism species present within the mother. As a child grows, their microbiome can become influenced by their environment, food, and pharmaceuticals.

If these factors — possibly a chronically stressful environment, an unhealthy diet, or overuse of antibiotics — are prevalent, dysbiosis can occur. This is an imbalance between the good microbes and the bad microbes within the gut. As these factors occur, and if they occur frequently, the bad microbes take over and the risk of disease increases. An unhealthy gut can lead to chronic disease, autoimmune disorders, neurodegenerative disorders, cardiovascular disease causing inflammation, gastrointestinal disorders, and decreased immunity, among others. Other factors negatively affecting the gut are cesarean-section birth, sleep deprivation, chronic infections, and other non-antibiotic pharmaceuticals.

There are four major groups, or phyla, of bacteria in the gut, and their diversity is associated with better health outcomes. They are bacteroidetes, firmicutes, actinobacteria, and proteobacteria. Though diversity is key, bacteroidetes and firmicutes make up approximately 90% of the gut bacteria. Maintaining a healthy gut microbiome is very important, and there are supplements that can assist in maintaining gut health.



⁸¹ Ibid.

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Before supplementation, though, try to get the most out of proper nutrition (eating whole foods dense in nutrients such as fiber and polyphenols), optimize your sleep routine, eat fermented foods, and even drink coffee and tea.⁸² Activities such as exercise and meditation have also been shown to be effective in improving gut health.

Prebiotics and probiotics are two types of supplements that can help support a healthy gut microbiome. Prebiotics are typically found in a healthy diet. They are non-digestible carbohydrates that help healthy gut bacteria grow. There are supplements that can help add these to your diet, but first, focus on a diet that contains fiber and resistant starches, such as garlic, onions, leeks, bananas, chicory root, onions, Jerusalem artichokes, dandelion greens, and seaweed. Cooking potatoes, cooling them, and then reheating can help build up resistant starch. Every time this process is repeated, more resistant starch is created. Prebiotic supplementation can be very effective for those who have limited variety in their diets, such as those on the ketogenic or carnivorous diets. Most prebiotic supplements contain low-digestible carbohydrates such as fructooligosaccharides (FOS), galactooligosaccharides (GOS), or inulin. Those on a FODMAP-elimination diet might have to avoid prebiotic supplementation due to the FOS and GOS content.

Probiotics are beneficial bacteria and yeast that create a healthy gastrointestinal tract by replacing harmful microbes.⁸³ Similar to prebiotics, they can also be found in a healthy diet. The best way to naturally add probiotics to your diet is to include fermented foods, such as aged cheeses, yogurt (dairy and non-dairy), kefir, buttermilk, pickles, sauerkraut, kimchi, tempe, and fermented teas (kombucha), to name a few. As a side note, be careful of the sugar content in some kombucha drinks and yogurts.

The use of probiotic supplements has been researched but has received mixed results. Seven microbial organisms are found in probiotic supplements: lactobacillus, bifidobacterium, saccharomyces, streptococcus, enterococcus, escherichia, and bacillus. Though results are mixed, there are some occasions when supplementation is useful, such as if suffering from atopic eczema, irritable bowel syndrome, obesity, or hypercholesterolemia; or to replenish good bacteria after pathogen-related diarrhea or after a round of antibiotics.⁸⁴

Probiotics are measured in colony-forming units (CFUs). This is a description of the number of living cells per dose. Typically, supplements have somewhere between 1-10 billion CFUs. When choosing a probiotic supplement, look for a high CFU at the end of its shelf life. Because the number of living organisms in the product will deteriorate over time, the CFU content at the manufacturing date is somewhat meaningless.

⁸² Coffee contains chlorogenic acid, which aids in the production of short-chain fatty acids. Tea contains phytochemicals that prevent gut pathogen growth.

⁸³ Williams, N. T. (2010). Probiotics. *American Journal of Health-System Pharmacy*, 67(6) 449–458, <https://doi.org/10.2146/ajhp09016>

⁸⁴ U.S. Department of Health and Human Services. (n.d.). Office of dietary supplements - probiotics. NIH Office of Dietary Supplements. <https://ods.od.nih.gov/factsheets/Probiotics-HealthProfessional/>. (accessed July 19, 2021)

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Beta-Alanine

Beta-alanine (β -alanine) is a nonessential amino acid produced in the liver. It is the precursor to the synthesization of carnosine. Taking exogenous beta-alanine has been shown to raise carnosine levels in skeletal muscle. Increased carnosine in working muscle has been shown to improve the muscle's contractile capabilities and also reduce fatigue due to hydrogen ion buffering and increases in pH under anaerobic conditions. The greatest performance improvements are seen in high-intensity tasks lasting one minute or more, especially when performed to exhaustion. That said, efficacy starts to decrease as the time domain reaches four minutes and the aerobic system really starts to take over control of metabolism.⁸⁵

Most research shows that 4-6 g of beta-alanine a day for at least two weeks — but ideally four to six weeks — is most advantageous in increasing muscle carnosine concentrations. Significant results have been shown in muscular-endurance improvements, anaerobic improvements, and fatigue reduction. The only side effect reported is a tingling sensation called paraesthesia.

⁸⁵ U.S. Department of Health and Human Services. (n.d.). Office of dietary supplements - dietary supplements for exercise and athletic performance. NIH Office of Dietary Supplements. <https://ods.od.nih.gov/factsheets/ExerciseAndAthleticPerformance-HealthProfessional/>. (accessed July 20, 2021)



STIMULANTS AND INTOXICANTS

CAFFEINE

Caffeine has been shown to have some positive performance effects due to its impact on the central nervous system, how it affects substrate utilization (how the body uses fats, carbohydrates, and proteins as fuel), and possibly through an increase in endorphins. Caffeine can also improve memory, decrease fatigue, and improve mental functioning.

The question of how much caffeine is necessary to increase performance and overall health is a simple one, and yet there is not a simple answer. This may be because different athletes are genetically different responders. Research has shown the optimal amount to be somewhere between 2-9 mg/kg of body weight.⁸⁶ The performance effects of caffeine are found to be small yet significant.⁸⁷ This means the increases in performance can differentiate top athletes, where small percentage increases in performance can make the difference between first and second place. Another way to look at it is that caffeine usage might be less about you gaining a performance edge and more about you not losing an edge to those using caffeine as a performance supplement. That said, excess caffeine (if concentrations in urine exceed 15 mcg/mL)⁸⁸ in a competition can lead to a failed drug test.

One common form of caffeine supplementation is coffee. One issue with coffee is that it is hard to determine the caffeine content in different blends. For the most part, an 8-oz. cup of coffee contains about 100 mg of caffeine. This can be used as a gauge when determining how much coffee to drink prior to an event. Another way to consume caffeine is in an anhydrous state, which is a powder or pill form. This type of caffeine intake has been shown to be more effective than coffee, with the theory that compounds in coffee render it less effective.⁸⁹ When it comes to timing, most research shows caffeine intake should take place approximately 60 minutes before performing due to the optimal absorption window. Lastly, if you are going to use caffeine to aid in performance, make sure to cycle on and off to prevent habituation.

⁸⁶ Pickering, C., & Grgic, J. (2019). Caffeine and exercise: What next? *Sports Medicine*, 49(7), 1007-1030. <https://doi.org/10.1007/s40279-019-01101-0>

⁸⁷ Southward, K., Rutherford-Markwick, K. J., & Ali, A. (2018). Correction to: The effect of Acute caffeine Ingestion on ENDURANCE Performance: A systematic review and meta-analysis. *Sports Medicine*, 48(10), 2425-2441. <https://doi.org/10.1007/s40279-018-0967-4>

⁸⁸ CrossFit (2021). NOBULL CrossFit Games 2021 Drug Testing Program. <https://games.crossfit.com/drug-policy>. (accessed July 20, 2021)

⁸⁹ Goldstein, E. R., Ziegenfuss, T., Kalman, D., Kreider, R., Campbell, B., Wilborn, C., Taylor, L., Willoughby, D., Stout, J., Graves, B. S., Wildman, R., Ivy, J. L., Spano, M., Smith, A. E., & Antonio, J. (2010). International society of sports nutrition position stand: Caffeine and performance. Journal of the International Society of Sports Nutrition. <https://jissn.biomedcentral.com/articles/10.1186/1550-2783-7-5>

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ENERGY DRINKS

Energy drinks are drinks formulated and marketed to increase energy, endurance, stamina, and concentration. These drinks are typically confused for or even marketed as sports drinks, and they tend to target adolescents and young adults. Research on energy drinks has shown mixed results, ranging from performance and cognitive benefits to severe health risks. Many of the health risks come from the adolescent and young-adult populations who abuse energy drinks. According to the Centers for Disease Control and Prevention, more than 50% of U.S. adolescents consume energy drinks, with a substantial number of adolescents visiting the emergency room each year due to energy-drink consumption.⁹⁰

Most energy drinks are loaded with significant amounts of caffeine: anywhere from 47-80 mg per 8 oz. to 207 mg per 2 oz. In addition, they contain other ingredients, such as B vitamins, guarana, ginseng, taurine, and high amounts of sugar, high-fructose corn syrup, and artificial sweeteners.⁹¹ Ingredients such as guarana, ginseng, and taurine are marketed as a combination that increases caffeine content and promotes vasodilation and anti-inflammation. The B vitamins are typically added to increase energy production. These effects have the potential to provide athletes with nervous-system stimulation, increased blood flow, better substrate utilization, and also some cognitive benefits.⁹² More specifically, the caffeine content of energy drinks has been associated with increases in aerobic performance without changes in perceived exertion in professional cyclists and runners. The high caffeine content has also been shown to improve focus, reaction time, concentration, and memory. Any potential benefits of energy drinks can likely be replicated by drinking coffee and taking B vitamins, avoiding the unnecessary ingredients and sweeteners.

Problems arise when energy drinks are consumed regularly. Like most stimulants, regular caffeine consumption creates a tolerance. The athlete who regularly consumes energy drinks will need to consume more to get the desired effect. To preserve any benefit, athletes should learn how to cycle on and off energy drinks, which would ensure larger effects at a minimal dose. This is important because at high doses, the risk for caffeine toxicity increases. This is the issue: The combination of these ingredients, the high caffeine content, and the sugar or sugar substitutes, ingested frequently, are associated with negative health effects.

⁹⁰ There were 1,145 adolescent emergency room visits in 2007, and 1,499 in 2011, according to the Centers for Disease Control and Prevention.

⁹¹ For more information on the health effects of artificial sweeteners, see the "Frankenfoods" section in the "[Quality](#)" chapter.

⁹² Alsunni A. A. (2015). Energy drink consumption: Beneficial and adverse health effects. *International Journal of Health Sciences*, 9(4), 468-474.

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The following have been shown to be the most common health effects due to consuming energy drinks:⁹³

Risk-seeking behavior — Adolescents who consume energy drinks have been shown to be more likely to experiment with alcohol, cigarettes, marijuana, and amphetamines.

Mental-health effects — Studies have shown energy-drink consumption to be positively associated with mental disorders such as anxiety, stress, depression, and suicidal ideation.

Cardiovascular effects — The high levels of caffeine in energy drinks have been shown to result in caffeine toxicity, especially in adults, adolescents, and children. Some of the cardiovascular effects of caffeine toxicity include increased blood pressure (systolic and diastolic), increased heart rate, increased cardiac output, seizures, dysrhythmias, increased respirations, heart palpitations, agitation, and tremors. These effects might be amplified by the high amounts of sugar usually included in these drinks.

Metabolic effects — Most energy drinks are considered sugary sweetened beverages (SSB), and these drinks have been linked to metabolic effects such as obesity and Type 2 diabetes due to their high glycemic load leading to increased blood glucose, increased insulin levels, and insulin resistance. Also, it has been shown that acute caffeine intake can reduce insulin sensitivity. The addition of glucose to a high caffeine load can cause sudden spikes in blood glucose.

Dental effects — SSBs have been associated with dental erosion and dental cavities because of their low pH and high amounts of sugar.

Renal effects — Chronic kidney-disease progression has been shown to be accelerated due to the high-fructose corn syrup in SSBs. High amounts of caffeine have also been associated with sodium loss due to increased urination. Sodium loss during exercise, especially in hot environments, can affect cardiovascular performance and the ability to produce force.

Neurological effects — Neurological complications include sleep disturbances, stomach distress, headaches, and irritability. Some studies have shown the caffeine dose in energy drinks to contribute to ischemic stroke and epileptic seizures, while consuming over 300 mg of caffeine has been shown to induce hallucinations.

⁹³ Al-Shaar, L., Vercammen, K., Lu, C., Richardson, S., Tamez, M., & Mattei, J. (2017). Health effects and public health concerns of energy drink consumption in the United States: A mini-review. *Frontiers in Public Health*, 5(225). <https://doi.org/10.3389/fpubh.2017.00225>

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ALCOHOL

Alcohol, or ethyl alcohol, is the active ingredient in wine, beer, cocktails, and other spirits. It is produced through fermentation of different yeasts, fruits, or other types of sugars and starches. Alcohol has been researched a lot with mixed results. It has been shown to provide health benefits such as decreasing the risk of cardiovascular disease and Type 2 diabetes and increasing health markers related to the nervous system, sensory organs, autoimmune disease, and rheumatological health. The theory is that that protection is due to different compounds, called polyphenols, that are found in higher amounts in red wine compared with other forms of alcohol. Though red wine might have more polyphenols than an alcoholic beverage like beer, it is relatively low in polyphenols when compared to the amount provided from eating a diet consisting of whole foods, especially those containing fruits and vegetables. This has led others to believe it is not the polyphenols that are actually offering the protection but rather the ethanol itself. It seems it might be most important to focus on how much and how often alcohol is consumed rather than what type.⁹⁴ For instance, there is more protection for men and women when any type of alcohol is lightly or moderately consumed for three and four or more days per week, respectively, as compared with heavy drinking for one and two days per week.

On the other side, alcohol has also been shown to present a whole host of negative health side effects. These include inflammation and cirrhosis of the liver, pancreatitis, increased risk of cancers (liver, larynx, mouth, throat, and esophagus), high blood pressure, and a high risk of accidents and unintentional injuries. The dosage is what separates the risks from the rewards when it comes to alcohol. Most benefits have been found in light to moderate drinking, while the risks increase as dosage moves from moderate to high, including binge drinking. The problem is there is no consensus on what defines light, moderate, or high amounts of drinking. According to the National Institute on Alcohol Abuse and Alcoholism, moderation, which might be considered light to moderate drinking, is two drinks or fewer for men and one drink or fewer for women in a day.⁹⁵ Heavy drinking is four or more drinks in a day, or 14-plus in a week, for men. For women, heavy drinking is considered three or more drinks in a day, or seven or more in a week.

When it comes to performance, alcohol tends to have minimal benefit. While consuming alcohol 60 minutes after exercise has been shown to not have any impact on recovery of muscle function, high consumption does increase cortisol levels (stress hormone) and decrease testosterone, which would negatively affect long-term performance. Excessive drinking after exercise has also been shown to decrease myofibril protein synthesis. In other words, drinking after working out, which is typical after a weekend training day or after an event, can decrease testosterone, increase cortisol, and decrease your ability to use protein to repair muscle damage.⁹⁶,⁹⁷,⁹⁸ This combination can have a dramatic effect on lean muscle mass. Remember, the key to increasing the

⁹⁴ Harvard T. H. Chan School of Public Health. (2020). Alcohol: Balancing risks and benefits. *The Nutrition Source*, 21 Nov. 12. <https://www.hsph.harvard.edu/nutritionsource/healthy-drinks/drinks-to-consume-in-moderation/alcohol-full-story/>. (accessed July 27, 2021)

⁹⁵ U.S. Department of Health and Human Services. (n.d.). Drinking levels defined. National Institute on Alcohol Abuse and Alcoholism. <https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/moderate-binge-drinking>. (accessed July 27, 2021)

⁹⁶ Parr, E. B., Camera, D. M., Areta, J. L., Burke, L. M., Phillips, S. M., Hawley, J. A., & Coffey, V. G. (2014). Alcohol ingestion impairs maximal post-exercise rates of myofibrillar protein synthesis following a single bout of concurrent training. *PLoS ONE*, 9(2). <https://doi.org/10.1371/journal.pone.0088384>

⁹⁷ Haugvad, A., Haugvad, L., Hamarsland, H., & Paulsen, G. (2014). Ethanol does not delay muscle recovery but decreases testosterone/cortisol ratio. *Medicine & Science in Sports & Exercise*, 46(11), 2175–2183. <https://doi.org/10.1249/mss.0000000000000339>

⁹⁸ Parr, E. B., Camera, D. M., Areta, J. L., Burke, L. M., Phillips, S. M., Hawley, J. A., & Coffey, V. G. (2014). Alcohol ingestion impairs maximal post-exercise rates of myofibrillar protein synthesis following a single bout of concurrent training. *PLoS ONE*, 9(2). <https://doi.org/10.1371/journal.pone.0088384>

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power-to-weight ratio is increasing lean muscle mass while decreasing nonessential body fat. In terms of health, lower levels of lean muscle mass can lead to conditions such as sarcopenia, metabolic issues, cardiovascular-disease risks, low physical performance and impairment, and disability. There is research that shows alcohol negatively affects sleeping patterns, which, in turn, can reduce recovery and decrease insulin sensitivity^{99, 100}. Consuming alcohol at night has the potential to reduce nighttime growth-hormone levels. Excessive drinking has also been linked to vitamin deficiencies, specifically of the B vitamins.

Alcohol also can lower inhibitions, making it harder to stay on an optimal diet and make good food choices. Moderate to heavy drinking can easily lead to binge-eating of processed foods, which can result in a surplus of processed sugar and industrial-oil consumption if done weekly. This can easily lead to a negative impact on your health and performance markers.

The recommendation is to consume alcohol sparingly, and if you do so, understand the potential impacts on your health and performance. Drinking alcohol for the health benefits is a drop in a bucket compared to the health benefits received from CrossFit training and optimal nutrition. It is imperative to focus mainly on the big-picture items: eating quality foods in the right quantities and performing constantly varied functional movements executed at high intensity. From there, adding one to three drinks a week could potentially add a little extra benefit.

You can use an N=1 experiment similar to what was suggested for elimination diets to determine your personal plan for alcohol. Maintain a consistent pattern of consumption for four weeks and assess the impact to your health and performance. Remove it, note the changes, and assess by again asking these three questions:

1. Are you able to remove this from your plan? (This will determine your level of dependency, if any.)
2. What impact does removal have on your health and performance?
3. Should you reintroduce this back into your plan? If so, how much is the minimum required dose to receive a benefit?

If you determine alcohol is worth keeping in your nutrition plan, you might have to figure out how to weigh and measure it so it fits in your macronutrient ratios. Though alcohol is considered similar to sugar in terms of insulin response, it does not hold the same caloric load per gram as carbohydrates. A gram of alcohol has seven calories compared to four calories in a gram of carbohydrate. It has also been shown that drinking alcohol suppresses fat oxidation, and it can cause fat synthesis in the liver.^{101, 102} Because of this, some practitioners track alcohol as half carbohydrates and half fat. For instance, a 200-calorie cocktail would be measured as 100 calories from carbohydrates and 100 calories from fat. Take a look at the math below:

⁹⁹ Sleep Foundation. (2020, September 4). Alcohol and sleep. <https://www.sleepfoundation.org/nutrition/alcohol-and-sleep>. (accessed Sept. 29, 2021)

¹⁰⁰ Koren, D., & Taveras, E. M. (2018). Association of sleep disturbances with obesity, insulin resistance and the metabolic syndrome. *Metabolism*, 84, 67–75. <https://doi.org/10.1016/j.metabol.2018.04.001>

¹⁰¹ Raben A., Agerholm-Larsen L., Flint A., Holst J. J., Astrup A. (2003). Meals with similar energy densities but rich in protein, fat, carbohydrate, or alcohol have different effects on energy expenditure and substrate metabolism but not on appetite and energy intake. *Am J Clin Nutr.* 77(1):91-100. doi: 10.1093/ajcn/77.1.91. PMID: 12499328.

¹⁰² Siler, S. Q., Neese, R. A., & Hellerstein, M. K. (1999). De novo lipogenesis, lipid kinetics, and whole-body lipid balances in humans after acute alcohol consumption. *The American Journal of Clinical Nutrition*, 70(5), 928–936. <https://doi.org/10.1093/ajcn/70.5.928>

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- Drink = 200 calories
- Carbohydrates: 100 calories/4 g = 25 g of carbohydrates
- Fat: 100 calories/9 g = 11 g of fat

So, you would track this drink as 25 of your carbohydrate grams for the day and 11 of your fat grams for the day. This is only one way to track alcohol, but it might be the one that most closely accounts for how metabolizing alcohol affects the body. Another way is tracking alcohol as a carbohydrate only, so the same drink would count as 50 g of carbohydrates. It could also be tracked as a fat only, which means the same drink would count as 22 g of fat.

If you want to explore the potential performance or health benefits of supplements, caffeine, energy drinks, or any other substance or food, introduce it, note the changes, remove it, note the changes, then assess the cost/benefit of keeping it within your nutrition plan.



CONCLUSION

Our nutritional recommendations are based on **universal principles** that are the bedrock of healthy eating and apply to everyone, regardless of specific dietary approach and preference:

"Eat meat and vegetables, nuts and seeds, some fruit, little starch, and no sugar."

Implementing these principles diligently and consistently will create a platform for performance and health. To build upon that platform and optimize results, determine the quantity of food and the ratio of macronutrients you should consume each day and at each meal so you can **"keep intake to levels that will support exercise but not body fat."** The process of weighing and measuring is beyond what is required to drive wellness and may not be appropriate for all individuals, but it is necessary to achieve optimal fitness. Weighing and measuring also create a baseline that allows for further fine-tuning and adjustments based on individual goals.

Once you have made the switch to eating high-quality foods in the right amounts, there are several tactics you can choose from to fit your preferences, psychology, starting point, and physiological situation. These tactics are biased toward sustainability over precision and are a great tool if weighing and measuring everything you eat is demotivating or becomes a roadblock rather than a way forward. Using different tactics can move you toward optimization when more gradual steps are required to build success and compliance.

Another important aspect of our nutrition recommendation to remember is that it is independent of any specific diet and can be readily adapted to work with any dietary specialization. There are many and varied dietary approaches in the CrossFit community, some driven by particular beliefs or preferences and others by specific individual dietary needs or health conditions. Each specialization has its own advantages and disadvantages, and the principles of quality and quantity can be applied to varying degrees within these different contexts. Understanding the different specializations helps navigate the diverse approaches to nutrition that exist within the CrossFit community.

Conclusion

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Implementing these recommendations and developing skills in nutrition is very similar to developing skills in CrossFit: It takes time, practice, and reinforcement. And as in CrossFit training, trying to do too much too soon can be a detriment to overall progress. Start by eating high-quality foods and then progress to quantification when you're ready. This is the same approach used to improve performance in the gym. The principles of mechanics, consistency, and intensity hold even when it comes to nutrition. Learn how to do the basics properly, be consistent, and then adjust and progress. Consistent small successes build upon each other to create transformation that at first may not seem possible.

Remember: You are your own laboratory. Whether it comes to choosing which foods work best for you, determining your optimal macronutrient ratios, deciding how lean you should be, or experimenting with a specialized diet, make incremental changes, evaluate your results, and make necessary adjustments.

Start today. Whether for yourself or others, following these nutrition recommendations is a profound and life-changing journey that unlocks health, happiness, and performance.