

## **Nutrition Guidelines for Athletes**

NUTRIENTS are substances that provides nourishment essential for growth and the maintenance of life. Nutrients fall into two categories: MACRO and MICRO nutrients. WATER is also an essential part of an athlete's diet.

### **Water**

Staying hydrated is simple: if you're thirsty, drink! Over half of the human body is water, and for good reason. It serves many functions in the body. If you are dehydrated, you will be stiff rather than pliable, you will be prone to overheating, and your heart will have to work harder to pump its blood.

Athletes should always have water with them in practice, and should always be sipping on their water when they are between repetitions. If athlete complains about feeling bloated or full by drinking in practice, they can overcome this by incrementally drinking more water each day over the course of weeks. The bladder & stomach are muscles, and like all muscles, they can be trained to get bigger & stronger!

### **Macronutrients**

Macronutrients are molecules that your body require in large quantities. Think of your body like a high performance sports car, like a Ferrari. If your body is a car, then Macronutrients are the fuel; without fuel, your car will not run. Also, like a sports car, your body will run more smoothly if you put higher quality fuel into it!

You want your nutrition to be as unprocessed and fresh as possible. The closer your ingredients look like they came from nature, the better they will be for you. This isn't to say that you need to get all "Organic" or "All-Natural" foods; these are NOT federally regulated terms, and can be used as marketing tools to get you to pay more for food.

There are three types of Macronutrients, all of which provide CALORIES. These types include CARBOHYDRATES, PROTEINS, and FATS. Note: while calories are a measurement of energy, they are not a physical substance; a calorie is a unit that measures the amount of energy released from the metabolism (i.e. breakdown) of molecules, such as Macronutrients. Foods that are rich in both macro and micronutrients are said to be NUTRIENT DENSE. Foods that provide calories, but little to no other sustenance are said to be CALORICALLY EMPTY.

In an ideal world, an athlete will not consume sugary, fatty snack foods such as cakes, cookies, candies, etc. There are many success stories of athletes who became better after committing themselves to avoid "junk" foods entirely. However, eating dessert or enjoying pizza is not a "bad" decision! If an athlete wants to enjoy themselves once in awhile, then they just need to budget these things into their daily nutrient allowances. When doing so, it is important to keep in mind how damaging sugary, fatty dessert foods can be to the body. These foods have direct links to diabetes and heart disease, and recent studies have shown that sugary, fatty foods can be as addictive to the brain as opiate drugs such as heroin. Eating them too frequently can rewire your brain and metabolism, and have disastrous effect on athletic performance. Let treat foods be what they are intended to be: treats!

## Carbohydrates

**Quick Summary: Carbs are about 50-55% of your daily nutrition. % of the carbs you eat should come from vegetables, legumes and whole grains, with the remainder coming from fruits and starchy foods.**

Carbohydrates provide the bulk of your fuel, and will be roughly 50-55% of the calories you should eat in a day. 1 gram of Carbs provides approximately 4 calories. Carbohydrates are rapidly digested, making them an ideal part of a pre-workout meal. Carbs exist in your blood as BLOOD SUGAR (glucose), and exist in your muscles & liver as a storage molecule called GLYCOGEN. Glucose is the first fuel source your muscles go to during exercise.

Carbohydrates come in two forms: SIMPLE and COMPLEX. Simple Carbs come from food sources such as cereals, breads, white rice, fruits, and sugary foods. Simple carbs produce a rapid blood sugar response, and are useful for short bursts of energy. However, the rapid response that they cause also tends to come with an energy slump if they are not paired with other nutrients. Try to have 1:5 gram ratio of fiber/whole grain to sugar; this will help prevent that slumping feeling.

Complex carbs come from whole grains, brown rice, some fruits, and vegetables, and should be % of your carbs a day. Complex carbs take longer to digest, but will provide a higher feeling of fullness and will produce a more sustained level of blood sugar. Complex carbs also include FIBER, which is necessary for digestion and water retention.

Unlike protein, there isn't a fixed mass of carbs (ie grams per pound of bodyweight) that an athlete needs in a day. The amount of carbs you should consume is largely determined by the exercise you will be doing after you consume them. For more information, see the guideline in the following link:

[https://www.ausport.gov.au/ais/sports\\_nutrition/fact\\_sheets/carbohydrate\\_how\\_much](https://www.ausport.gov.au/ais/sports_nutrition/fact_sheets/carbohydrate_how_much)

## Protein

**Quick Summary:**

**Proteins are about 25-30% of your daily nutrition. Proteins provide necessary Amino Acids with which the body cannot function. Proteins can come from both plant and animal sources; the former are better for your body in the long run, while the latter are of higher quality and are more readily absorbed. Proteins should come from a balanced mix of legumes, eggs, plain yogurt, fish, and lean meats. Protein supplements can provide a quick diet patch, but with a good diet are not typically needed.**

Proteins are incredibly important molecules! They are associated with building muscle, but this is a silly oversimplification. Proteins are the body's delivery system for ESSENTIAL AMINO ACIDS, compounds that the body needs but cannot produce itself (note: there are non-essential amino acids that your body can produce that are delivered by proteins as well, but if you get these from food then you will save your body some work!). Once proteins are metabolized into Amino Acids, these molecules are then recombined into *new* proteins and enzymes that help keep your body in top shape. Proteins are *also* the

only way for the body to obtain & use Nitrogen, which is a necessary component of our DNA. Proteins can come in two forms: INCOMPLETE or COMPLETE.

An INCOMPLETE protein is missing some essential amino acids, while a complete protein is not. Incomplete proteins come from nuts, seeds, and legumes (beans). With the exception of Soybeans, plant protein sources are incomplete, and the “downside” is that they must be paired with another food source (typically a whole grain or vegetable) to be completed. The “upside” is that they are easier for your body to digest, and are less expensive than meat.

COMPLETE proteins come from fish, eggs, dairy and meat. The “downside” to these protein sources is that they tend to be very calorically dense (high in calories) and are typically paired with fat and/or cholesterol. The “upside” to these sources is that a relatively small portion can provide a large amount of protein. Meats, dairy, eggs and fish all also help the body feel SATIETY, a mental state caused by digestive chemicals that helps prevent overeating.

Proteins provide 4 calories per gram, and should provide about 25-30% of your daily calories. It is recommended that endurance athletes have 0.5-0.75 grams of protein per pound of bodyweight, with female athletes requiring amounts closer to the lower limit and male athletes requiring amounts closer to the higher limit. Protein can be very filling, which can make hitting these quotas difficult. The nitrogen in protein can also cause intestinal discomfort if eaten in large quantities, so it can be best to try to spread your protein throughout the day. Research has also shown that nutrients consumed within the first half hour of exercise are more rapidly utilized, so it is ideal to consume protein as soon as possible after a workout.

If an athlete has a balanced diet, protein supplements are rarely necessary. However, if for some reason an athlete does not have time to prepare a protein-rich meal at the beginning of a day, cannot consume a protein rich meal immediately following a workout, or consistently falls short of their protein quotas, then a protein supplement may be a helpful solution. It is worth noting that protein supplements are not regulated by the FDA, and can be deceptively marketed. Always read the nutrition facts label of a supplement *thoroughly* before buying and consuming it.

## Fat & Cholesterol

**Quick Summary: About 20% of your daily calories should come from fatty sources. Fats and Cholesterol are important regulatory molecules. Fat is a storage molecule, and provides 9 calories per gram. Good sources of fat include nuts, seeds, eggs, dairy, fish, and meat. When using fats for cooking, fats that are liquid at room temperature are generally accepted to be healthier than fats that are solid at room temperature.**

Fats & cholesterol are NOT bad molecules! Fats are the human body’s long term storage molecules. After about 30 minutes of intense aerobic exercise, your body will start to break down its fat stores to synthesize blood sugar. Fats provide insulation & protection for your organs, are necessary structural components of your cell membranes, and compose over half of the tissue of your brain. Cholesterol also composes a large portion of your brain’s tissue, and is an integral molecule for the formation of hormones. Cholesterol is typically found in foods that have animal fat as well.

Fat is very good at its job of storing energy; one gram of fat produces nine calories! Where people can get into trouble, and the reason why fats get a bad reputation, is when people *don't keep track* of fatty foods, such as calorically empty desserts and condiments. An avocado, which can provide 30% of your fat for the day, provides all three macronutrients and at least nine micronutrients. Two tablespoons of butter, which provides roughly the same amount of fat, provides one macronutrient and only four micronutrients.

The above example illustrates the choices you need to make when “picking” your fat sources. You should not need to seek fat in your diet; it is found very easily in meat, fish, eggs, nuts, seeds, and dairy. Like protein, fat helps provide a feeling of satiety. Also like protein, it should be spread throughout the day; fats spend a long time in the stomach and intestines, and can cause feelings of heaviness if consumed too closely to a workout.

Fats are often used in condiments and in methods of cooking. These things will provide empty calories into your diet, so just make sure to account for them & measure them carefully. Also, when using fats for sauces, cooking, or condiments, it is generally accepted that liquid POLYUNSATURATED FATS are better for you than solid SATURATED FATS. TRANSITIONAL FATS, do not occur naturally, and are universally agreed to be bad for your health. They should always be avoided.

Be wary of low fat foods; many of these foods claim to be healthy, but lower fat by filling the void with simple sugar. Once your body has replenished its blood sugar and glycogen stores, excess sugars will be turned to fats.

## **Micronutrients**

If macronutrients are the fuel in the car, then micronutrients are things like engine coolant, oil, tire air, etc. It is possible for the car to run without them, but it won't do so for very long, and running without them can cause irreparable damage to the car!

Micronutrients are things such as vitamins and minerals that the body only needs in very small amounts. Having too much of a vitamin or mineral can have a negative effect on the body, so it is wise to keep track of your micronutrients carefully. Free smartphone fitness applications, such as MyFitnessPal, allow you to log your daily meals & will calculate your macro and micronutrient totals for you. Since there are many micronutrients, it can be quite difficult to track them all off the top of your head, so resources such as that can be very helpful in staying on top of a healthy lifestyle.

The list of micronutrients and their properties is too long for me to list out, so linked below is an FDA chart that describes what these nutrients do and where to get them. As a general rule of thumb though, think BRIGHT and COLORFUL. The more vibrant a fruit or vegetable is, the more micronutrients it will produce. If you are able to eat the seven colors of the rainbow in a day (blue and purple, for the sake of food, are effectively the same), then you probably got all your micronutrients that day!

[https://www.accessdata.fda.gov/scripts/InteractiveNutritionFactsLabel/factsheets/Vitamin\\_and\\_Mineral\\_Chart.pdf](https://www.accessdata.fda.gov/scripts/InteractiveNutritionFactsLabel/factsheets/Vitamin_and_Mineral_Chart.pdf)

## Calorie Tracking & Recovering from Deficits

Each person is different, especially in the case of athletes. The 2000 calorie diet is not an accurate metric for a swimmer who can burn upwards of 1000 calories in a practice!

Each person has a baseline amount of calories they will expend in a day, called the BASAL METABOLIC RATE, or BMR. You can use the equations below to approximate how many calories this is for you. They are generally accepted to be accurate within 200 calories in either direction:

Women:  $BMR = 655.1 + (4.35 \times \text{weight in pounds}) + (4.7 \times \text{height in inches}) - (4.7 \times \text{age in years})$

Men:  $BMR = 66 + (6.2 \times \text{weight in pounds}) + (12.7 \times \text{height in inches}) - (6.76 \times \text{age in years})$

After an athlete calculates the following number, take it and multiply it by 1.5-1.75; this is the range of calories they should be eating in a day. To put it in perspective, a male, 5'10", 150 lb, 24 year old athlete would have a BMR of 1722 calories, and would want to consume approximately 2500-3000 calories in a day of typical exercise.

If an athlete fails to meet their nutrient and calorie quotas, then they will enter a DEFICIT. This means they will have used more than they have consumed, and that their body will have begun to break down its internal reserves to provide nutrients. Small nutrient deficits occur often, and can be easily compensated for by overcorrecting on the following day. However, if an athlete stays in a deficit state for too long, then the stress on that athlete's body will be too much for them to receive any positive benefit from their training, and they will be at high risk for illness and injury. Given the very small amount that micronutrients exits in the body, it is easy to enter a deficit state if an athlete is not diligent about their diet. If an athlete is regularly complaining about lethargy, headaches, pains, soreness, stiffness, irritability, fatigue, or dizziness, they are likely in a deficit state for one or more of their nutrients.

## Meal Frequency & its Effects on Hunger and Body Composition

Studies on Meal Frequency and its effects on the human body are a relatively new area in nutritional science, especially in regard to athletes. Confounding variables make it difficult to draw fixed conclusions. However, there are trends that eating more frequent, smaller meals may have a beneficial impact.

- 1) Eating more frequently (5+ small meals) has been shown to give someone better control over their hunger.
- 2) Eating more frequently causes more nutrients to be immediately used and more nutrients to become immediately *available* for use (ie remain in the bloodstream rather than being stored).
- 3) Eating more frequently may cause lower insulin responses, which can help the body maintain a healthy sensitivity to insulin.
- 4) Eating more frequently may cause lower insulin responses, which can help the body remain more levelly energized throughout the day.
- 5) Eating more frequently may increase lean body mass and anaerobic power in athletes.
- 6) In people of all body types, there did not appear to be a negative correlation between eating frequent meals and weight gain. In some cases, people who ate more meals frequently than three times a day lost weight.

This evidence seems to point to the conclusion that, when paired with calorie and macronutrient tracking, eating frequent, smaller meals rather than 3 larger meals may yield both short-term and long-term positive results for the human body, for both athletes and non-athletes alike.

## References

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