What are macronutrients?

We've heard all the terms before: carbs, fats, proteins, and the modern way fitness marketing is set up is the textbook definition of over-complicating it all. A lot of material out there can often sound contradictory, and confusing, especially with "diet" culture designed to play to your insecurities and sway you to "their one size fits all solution."

Here we want to break down what each macronutrient is, in the simplest form, and then provide general tips on how to approach each throughout the day.

1.) Carbohydrates
2.) Fats
3.) Proteins

I.) Carbohydrates

Carbohydrates are chains of saccharides (sugars) that primarily serve as a source of energy within the body. They are typically found in the following variations:

a.) Monosaccharides

These are single sugar molecules at the base levels of most carbohydrates that serve as the primary energy substrate for cells. In English, our digestive systems aim to break most carbohydrates we consume through various processes to arrive at these easily absorbable strands. Some examples include glucose, fructose, and galactose. Glucose en masse is typically stored in the liver and muscles as a form of stored energy called "glycogen."

Glucose is converted into glycogen and stored at about 15g / kg of Bodyweight.

b.) Disaccharides

These are multi-strand sugar molecules joined together, typically of the above variations. Some examples include Sucrose (glucose & fructose, i.e. table sugar), Lactose (glucose & galactose, i.e. animal milk) & Maltose (glucose doubled, i.e. beer and alcohol). Our digestive processes break these down into monosaccharides to be properly used by the body for energy or stored as glycogen.

c.) Polysaccharides

These are also known as “complex” carbs and what makes them so complex is just how many simple sugars make them up (thousands). The bigger the chain, the relatively longer it takes to digest and the different metabolic effect it may have.

This can be noted in the Glycemic index. This is a ranking in how fast carbohydrates are absorbed and digested, subsequently raising blood glucose levels. We’ve included a table at the end that presents the ranges of the glycemic index and some rules for where they are best applied in your nutrition.

As a basic rule, once a food is ingested, the body moves it through the digestive tract and begins to break it down based on the metabolic process relevant to the macronutrient. As the body takes in a carbohydrate, these chains of saccharides are broken down into their simplest form. The more complex the sugar, the lower on the glycemic index it is. The simpler the sugar, the higher it is.

How is that relevant? When sugars are detected in the bloodstream, insulin is released by the pancreas to take these sugars to the parts of the body that needs them. That response happens quicker with simple sugars and slower with more complex carbohydrates. This affects the level at which you are “energized” and refueled but also acts on a bell curve. Rapid response of insulin to absorb simple sugars will also lead to a “crash” of sorts when not also regulated with proper complex carbohydrates and especially exacerbated by subsequent levels of sedentary activity. Complex carbohydrates replenish and refuel, but on a more moderate level each way.

As a rule, physically active endurance athletes should have **8-10g/ kg** of bodyweight of carbohydrates a day. Strength/Hypertrophy/Speed athletes should have **5-6g / kg** of bodyweight in carbohydrates per day.

On a nutrition label, 1 g of carbohydrate is equivalent to 4 calories.

II.) Fats

Let’s start with the obvious. Fats don’t make you fat. Caloric intake being greater than your expenditure will lead to weight gain and sedentary activity without a commensurate level of strength training will lead to putting on more body fat.

Fats serve a lot of purposes once stored in the body as adipose tissue, including:
1.) insulation and protection of organs
2.) regulating hormones
3.) carrying and storage of fat-soluble vitamins (A, D, E, K)

Fats and lipids are interchangeable in that they are chains of fatty acids that can be found in the following categories:

a.) Triglycerides

Most foods and lipids in the body exist in this form, which is as a glycerol molecule and 3 fatty acids chained together. The process of breaking these down through what is known as “Beta-Oxidation” is a longer process than you’d see with carbohydrates, but ultimately yields more energy, helping serve the body at lower intensity levels more efficiently than many carbohydrate sources would.

b.) Fatty Acids

You see these commonly in terms of saturated and unsaturated fatty acids. The distinctions have to do with their chemical makeup, but the key points are as follows. Saturated fats can be produced by the body, so they have no dietary requirement.

Unsaturated fatty acids come in both mono- and poly- unsaturated fashions. The two most notable polyunsaturated acids the body can’t produce are Omega-6 and Omega-3 fatty acids.

These help with:
a.) forming healthy cell membranes
b.) proper development & functioning of the brain
c.) hormone production

You can find many omega-6 fatty acids in corn, soybean, safflower, etc, and similar oils.

Omega-3’s are commonly marketed supplements that are rarer in the food supply but can be found in fish (hence fish oil). The two Omega 3 acids of note are known by the shorthands of EPA & DHA. These can be shown to show statistically significant decreases in blood pressure, and antiarrhythmic effects for the heart.

c.) Cholesterol

Cholesterol is not all bad like you may hear about in terms of what people refer to it. It’s an important component of all cell membranes, involved in bile salt production, vitamin D utilization and the production of many sex hormones, as well as cortisol. The main key is to look at your level of LDLs, total cholesterol and HDLs.

High levels of LDLs can translate to increased weight gain and various heart issues. High levels of HDLs, while not a target to necessarily aim for, indicate positive heart health. The table on the next page demonstrates what is considered the safe range for each of the classifications of cholesterol and should be talked about with a physician whenever you get your levels assessed.

Classification	LDL Cholesterol	Total Cholesterol	HDL Cholesterol
Low	N/A	N/A	**< 40** mg/dl
Optimal / Desirable	**< 100** mg/dl	**< 200** mg/dl	**40-60** mg/dl
Borderline High	**130 - 159** mg/dl	**200-239** mg/dl	N/A
High	**160-189** mg/dl	**> 240** mg/dl	**> 60** mg/dl
Very High	**> 190** mg/dl	N/A	N/A

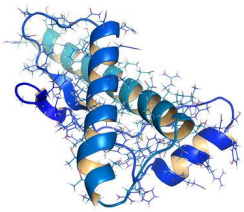
On a nutrition label, 1 g of fat is equivalent to 9 calories. This is due to the elevated levels of carbon and hydrogen present in fats relative to carbohydrates and protein.

The daily amount of fat intake is very relative to someone's goals/body type and nutrition and should be largely factored in once total intakes of carbohydrate and protein are registered (and made sure to ensure the overall energy balance of calories in matches to calories out).

III.) Proteins

Protein is the most widely marketed, and often confusing of the macromolecules due to how the fitness industry has taken an interest on pushing its contribution to muscle growth against people's insecurities of getting bigger or leaner. So there's often tons of misinformation about protein and what it does / is used for.

Protein is the primary structural and functional component of every cell in the human body. Dietary protein serves the following functions:
a.) growth and development & to build and repair cells
b.) enzymes
c.) transport carriers
d.) hormones



Proteins are composed of chains of amino acids (amino means "nitrogen-containing"), that when joined together form all of the proteins we see out in nature.

Many amino acids we'll see are either categorized as essential or non-essential, and the distinction is based on whether or not it can be acquired through the conventional diet.

The essential amino acids are Leucine, isoleucine, valine, histidine, lysine, methionine, phenylalanine, threonine, and tryptophan. The first 3 are the ones typically found in most BCAA (Branched-chain amino acid) supplements and leucine tends to be statistically the most efficient for prompting muscle protein synthesis & growth

Another thing you'll see out there is "**protein quality**." What does this mean?

This refers to how easily a protein's nitrogen is absorbed during digestion and its ability to properly provide the amino acids for growth, repair and maintenance. Higher-quality proteins have all the essential amino acids and are highly digestible. Most animal proteins, as well as soy products, have all the essential amino acids and digest easier. Plant proteins, while having other benefits, don't digest as well, but this can be largely relative to the individual and how their body reacts (i.e. someone might respond to pea protein better than whey or casein if they have a lactose issue). There is also not a lot of regulation in the supplement industry and lower quality proteins do not break down well and may be missing some essential amino acids.

As a note if you are vegetarian or vegan, many essential amino acids won't be found in just one variation of what is included under that umbrella, so a large variety of sources will be needed to help ensure that a full range of essential amino acids are taken in.

Asides muscle building, why are amino acids so important? Our body constantly breaks down and rebuilds itself daily, and the free pool of amino acids is the greatest source of supply to replenishing what we are rebuilding. While some amino acids are replaced in these cycles, many are needed to be taken in by our diet to ensure proper cell function.

Protein contributes to strong bones and acts as an influence to IGF-I, which is produced in the liver, promoting muscle and bone formation. It also plays a role in weight management by encouraging feelings of satiety, and through the "thermic effect" of digestion. It "burns more calories" to consume protein than other macro molecules, and to eat more also helps stave off muscle loss as you go through a weight management program that should prompt a negative energy balance. The following tables shows most peoples daily protein goals to focus on.

Goal	Daily Protein Intake
General Fitness	**0.8 - 1.0** g / kg of body weight
Aerobic Endurance	**1.0 - 1.6** g / kg of body weight
Strength / Hypertrophy	**1.4 - 1.7** g / kg of body weight

On a nutrition label, 1 g of protein is equivalent to 4 calories.

The Glycemic Index

Low Glycemic Index	Medium Glycemic Index	High Glycemic Index
< 55	*55-69*	*70 or more*

Rules of Thumb

1.) Carbohydrates

Follow dietary guidelines listed here for your daily intake:
8-10g/kg per day for Aerobic endurance athletes
5-6g/kg per day for Strength/hypertrophy goals
For weight loss, you want to tailor it to a negative energy balance relative to both your body weight and your actual goals.

For high glycemic index foods, aim to have those **pre- and post-workout** as there is a need for fast-acting insulin response in both cases (fueling and recovery). Complex carbohydrates tend to lead to more grounded energy levels for the rest of the day.

2.) Fats

Set the daily amount once you've determined your carbohydrate & protein sources, but make sure they don't go in contrast to your energy balance (positive energy balance for weight gain or negative for weight loss). Try to avoid them before your workout as they digest slow and can cause gastrointestinal distress, as well as immediately after, to not cause any slowing of the absorption of other macronutrients such as carbohydrates and protein that the body needs to refuel and rebuild. Spreading evenly throughout the day is a far better strategy.

Make sure you are properly supplementing omega-6 & omega-3 fatty acids if you can't get them through your conventional diet.

3.) Protein

Spread these evenly throughout the day 20-25 g per meal, or concentrated but the key idea is to ensure that you meet your daily protein goal, listed below.

Goal	Daily Protein Intake
General Fitness	**0.8 - 1.0** g / kg of body weight
Aerobic Endurance	**1.0 - 1.6** g / kg of body weight
Strength / Hypertrophy	**1.4 - 1.7** g / kg of body weight

Make sure these sources of intake all cover your essential amino acids and know that leucine can provide the most efficient muscle synthesis with all of the given options.