Macronutrients Guide

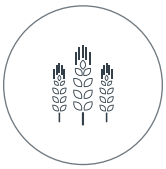
IIN Institute for Integrative Nutrition

Macronutrients Guide

Macronutrients are nutrients your body needs in large amounts and include:

- Carbohydrates
- Protein
- Fat

Read on to learn more about the role each macronutrient plays in the body and which types will offer you the most nutritional benefit.



CARBOHYDRATES

The majority of carbohydrates in a nutritious diet come from whole foods, such as whole grains, fruits, vegetables, and some dairy (such as milk and yogurt).

Choosing whole food carbohydrates provides usable energy, facilitates healthy digestion, and supports a healthy weight. Too many refined carbohydrates (or those stripped of nutrients), on the other hand, increases our risk for chronic inflammation, obesity, insulin resistance, and type 2 diabetes.

Functions of Carbohydrates

The main function of carbohydrates is to provide the body with energy. From powering a workout to boosting brainpower on the job, glucose from carbohydrates is the primary source of fuel for cells. Carbohydrates are broken down into simple sugars during digestion and absorbed into the bloodstream as glucose. Insulin then allows the glucose to enter the cells as a source of energy. Depending on your body's needs, any unused glucose is stored in the liver or converted to fat for later use.

Some types of carbohydrates also contain dietary fiber, which supports gut health and helps with weight management and cholesterol reduction. There are two types of dietary fiber: **soluble** and **insoluble**. Both slow the absorption of sugar into the bloodstream and help maintain more consistent blood sugar levels.

- **Soluble fiber** dissolves in water and becomes "gel-like," which softens bowel movements, making them easier to pass. This type of fiber is also fermented by gut microbes, creating beneficial by-products (such as butyrate) that are anti-inflammatory and help fight disease.[1]
- **Insoluble fiber** adds bulk to stool and speeds up the flow of material through the digestive system, both of which support digestive regularity.

It's worth noting that when adding fiber to your diet, do so slowly to avoid gastrointestinal discomfort and remember to increase your water consumption as well. We are all bio-individual, and not everyone tolerates high-fiber dietary patterns. For instance, individuals living with irritable bowel syndrome (IBS) may be particularly sensitive to fiber's gastrointestinal effects!

Types of Carbohydrates

There are two main categories of carbohydrates: **simple** and **complex**. These terms refer to the chemical structure of the molecules that make up the food.

1| **Simple Carbohydrates**
Simple carbohydrates are small compounds broken down quickly, providing a quick burst of energy when consumed.

Sources of simple carbohydrates include:

- Dairy (lactose)
- Fruit and honey (fructose)
- Glucose
- Malt sugar (maltose)
- Sugar (sucrose)

As a source of simple carbohydrates, fruit naturally contains sugar, but it's also a good source of fiber (unlike most processed foods with added sweeteners). Because

of this, fruit doesn't cause as sharp of a spike in blood glucose levels. In addition, fruit offers much more than just energy – it's also a source of antioxidants, vitamins, and minerals.

1| **Complex Carbohydrates**

Unlike simple carbs, complex carbohydrates are larger compounds that require more time to be broken down, slowing digestion and absorption and preventing extreme changes in blood glucose levels. Complex carbohydrates include starches and fiber.

Sources of complex carbohydrates include:

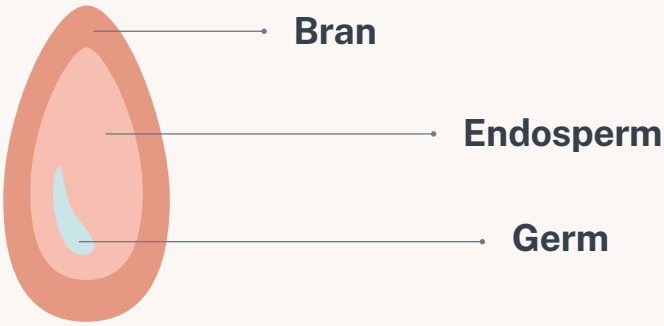
- Beans/legumes
- Vegetables, including starchy vegetables
- Whole grains (brown rice, oats, whole wheat, barley, etc.)

Since these foods are good sources of fiber, they also help manage weight and support cardiovascular health.

Carbohydrate Quality

When it comes to carbohydrates, quality counts! Choosing complex carbohydrates, such as whole grains, is supportive of health, whereas eating a diet full of refined carbohydrates (such as white pasta or white bread) can be detrimental.

Whole grains, such as brown rice, contain three main parts: bran, endosperm, and germ.



The bran and germ are where most of the grain's nutritional value lies; they contain fiber, antioxidants, vitamins, and minerals. Unfortunately, when grains are refined, these parts are typically removed to increase shelf life. The endosperm, which contains carbohydrates and some protein, is typically all that remains. This means the grain no longer contains the fiber that functions to slow digestion and absorption. Because of this, refined grains (like white flour) cause blood glucose to increase quickly, requiring a more concerted hormonal response to clear the glucose from the bloodstream.

Over time, these rapid spikes become increasingly taxing on our system and may lead to decreased insulin sensitivity, a major risk factor for type 2 diabetes.

Tip: Quality is also important when it comes to choosing which grains, fruits, vegetables, and dairy products to eat. If your budget allows, consider choosing organic options to minimize your pesticide exposure.

Dietary Carbohydrate Needs

The recommended daily allowance for carbohydrates is 45%–65% of total daily calories, and each gram of carbohydrate contains four calories.

As with all aspects of your diet, consider bio-individuality and keep your body and lifestyle in mind as you explore the types and amounts of carbohydrates that are best for you. For example, you may choose to lower your carbohydrate allowance due to a health condition, such as diabetes, or perhaps you simply feel best following a lower- or higher-carbohydrate dietary approach.

PROTEIN

Protein is considered the building blocks of life. In fact, our skin, bones, muscles, hair, nails, and cartilage are mainly made of protein. Most enzymes and hormones in our bodies are also proteins. Our protein needs shift as our activity levels change and throughout our life cycle, but most people can easily obtain adequate protein from their diets, whether or not they consume animal foods.

Functions of Protein

Protein has many functions in the body, including providing structure to tissues and supporting growth and immunity. In addition, protein is used to create hormones, which help the body maintain homeostasis by signaling that a particular action should either begin or cease. Enzymes, which help precipitate chemical reactions, are another type of protein in the body.

Protein digestion occurs mostly in the stomach and ends in the small intestine. In short, when food is digested, dietary protein breaks down into usable amino acids in the gastrointestinal tract to be transported to cells throughout the body to perform a variety of functions.

Types of Protein

Proteins are made up of amino acids. Twenty amino acids are found in the human body. Of those, the body is able to synthesize eleven of them. The nine remaining cannot be synthesized in the body and must be obtained from the diet; these are referred to as *essential amino acids*.

There are two types of dietary proteins: **complete** and **incomplete**. Protein that comes from animal food is considered complete because it contains all essential

amino acids. Plant-based proteins are typically lacking one or two of these essential amino acids, which is why this form of protein is considered incomplete. However, soy and quinoa, two plant-based foods, have a more balanced ratio of amino acids and are often considered complete.

Although most plant foods are incomplete on their own, eating a variety of foods ensures that plant-based eaters get all the essential amino acids they need. The idea of protein combining at every meal was once popular, but research shows that it's unnecessary.[2]

Protein Quality

In the nutrition world, how much and what types of protein one should consume are highly debated. Some say that high-quality animal meat is needed for optimal health, while others advocate for a plant-based diet. Experiment with what works for your body right now in your life. This way, you'll be able to successfully guide yourself to the appropriate protein sources.

Here are some high-quality vegetarian protein sources:

- Legumes (beans, peas, lentils)
- Nutritional yeast
- Nuts (almonds, walnuts, cashews)
- Organic soy products (edamame, tofu, tempeh)
- Quinoa
- Seeds (hemp, chia, flaxseeds)
- Spirulina

Plant-Based Diets

There are many reasons why people decide to eliminate animal foods from their diets. Some people find they feel better without these foods, some eat this way for religious reasons, and some do it for ethical reasons. Some cultures have been vegetarian or vegan for many years. Religions like Jainism, Buddhism, and Hinduism have a long history of promoting a vegetarian lifestyle as a way to practice nonviolence. Whatever your reason for choosing a vegan or vegetarian diet, what's most important is ensuring that a variety of high-quality protein sources are regularly on the menu.

Not all vegetarian or vegan diets are nutritious, particularly those that rely heavily on processed foods. Including a variety of whole foods, like beans, nuts/seeds, vegetables, and whole grains, can help those following these dietary approaches easily meet their protein needs and ensure a nutrient-dense diet.

If you want to include more vegetarian sources of protein in your diet, look to grains, beans/legumes, and nuts. Check out the following list to see how plant-based protein sources add up!

Beans: 1/2 cup, cooked	Protein (grams)
Lentils	9
Black beans	8
Adzuki beans	8
Garbanzo beans	7
Navy beans	7
Seitan: 3 ounces	**Protein (grams)**
Seitan	20

Grains: 1 cup, cooked	Protein (grams)
Quinoa	8
Whole wheat pasta	7
Oats	6
Brown rice	5
Nuts: 1 ounce	**Protein (grams)**
Peanuts (legumes)	7
Almonds	6
Pistachios	6
Walnuts	4
Brazil nuts	4
Seeds: 1 ounce	**Protein (grams)**
Hemp seeds	9
Pumpkin seeds	5
Chia seeds	5
Sesame seeds	5

Soy: 1/2 cup	Protein (grams)
Tempeh	15
Soybeans	15
Natto	15
Tofu	10
Edamame	9
Vegetables: 1 cup	**Protein (grams)**
Green peas	8
Potato	4
Broccoli	3
Mushrooms	2

Tip: If your budget allows, consider choosing organic plant-based protein options to minimize your pesticide exposure.

Omnivorous Diets

Diets that include both plant and animal foods are followed by the majority of people around the globe. Some animal foods may even hold special cultural or religious significance among certain people.

Individually, people may decide to include certain animal foods and omit others. For example, someone may eat fish and poultry but avoid dairy products and red meat, or a person might exclude pork and shellfish but eat other animal proteins. When working with clients, be sure to consider their bio-individuality.

Some people may feel more grounded and focused when animal foods are included in the diet. If you choose to include animal foods in your diet, consider local, organic, and/or grass-fed options and be mindful of your portion sizes – opt for quality over quantity. Also remember to balance animal foods with plant foods, like leafy greens, fruits, and nuts/seeds.

Lean meats and animal foods, like eggs, offer a variety of healthful nutrients, including iron, omega-3 fatty acids, vitamin B12, vitamin D, and zinc. Vegans and vegetarians are more at risk for deficiencies in these nutrients, but individuals who follow a well-balanced omnivorous diet can easily obtain sufficient amounts of these nutrients without much effort.

Animal foods can be an excellent source of protein, but remember that some sources may also be high in saturated or trans fat (e.g., deep-fried foods). In addition, when animal foods high in fat and protein are prepared using high-heat cooking methods (such as barbecuing, grilling, or frying), they form harmful compounds known as advanced glycation end products (AGEs) that are linked to accelerated aging of the skin as well as many health concerns, including diabetes and cardiovascular disease.[3]

Preparing animal foods using moist cooking methods (such as stewing or steaming) with shorter cook times can reduce the risk of AGEs.

Review the list on the next page to learn more about choosing high-quality animal-based protein sources.

Dairy	Some dairy products can be an excellent source of protein, including Greek yogurt, which provides a whopping 17 grams of protein per six ounces! When choosing which dairy products to put in your grocery cart, consider those that are organic and grass-fed to minimize your exposure to the antibiotics, pesticides, and hormones often used in the dairy industry. If you choose dairy alternatives, keep in mind that protein content will vary. For example, soy milk is comparable to cow's milk in terms of protein at eight grams per cup, while almond, coconut, oat, and rice milk often have between one and five grams of protein (although this may vary by manufacturer).
Eggs	Organic, pastured, and/or certified humane eggs are good choices. Eggs from free-roaming chickens still offer approximately seven grams of protein per egg, yet have been found to contain more vitamin A, vitamin E, and omega-3 fatty acids.[4]
Meat	When choosing meat, such as pork, bison, beef, or lamb, consider choices that are grass-fed and hormone-free. Grass-fed beef is more nutritious and contains more heart-healthy omega-3 fatty acids than grain-fed.[5] Crowd out processed deli meat and meats that contain preservatives, artificial ingredients, and nitrates (such as bacon).
Poultry	Consider organic, pasture-raised, and antibiotic-free chicken and turkey when possible.
Fish and Shellfish	Wild-caught fish and shellfish tend to offer more nutritional value while being lower in toxins. Some fish, such as swordfish and tuna, contain high levels of mercury, a naturally occurring element that can cause toxicity and neurological effects in high doses. Most adults can safely consume 2–3 servings of low-mercury fish (like cod, salmon, and trout) per week.[6]

Dietary Protein Needs

Protein contains four calories per gram, the same as carbohydrates. Most of us need about 10%–35% of our total caloric intake from protein, although this will vary based on many factors. For example, protein needs are higher during illness, with intense physical activity, and with certain stages of life (e.g., childhood or pregnancy). As always, bio-individuality reigns, so experiment with a nutritional balance that works for you.

FAT

Fats, also known as lipids, are necessary in our diets to achieve optimal health. Although fat was less popular in the nineties, we now know it's the quality of fat, not necessarily the quantity, that plays a big role in overall health. For example, monounsaturated fats, like those included in the Mediterranean Diet, help reduce the risk of chronic disease and support longevity. Health benefits aside, fat helps food taste delicious and, because fat takes longer to digest, keeps us feeling satisfied long after a meal.

Functions of Fat

Fat is necessary for a variety of functions, including the proper absorption of fat-soluble vitamins. Fat also supports proper brain development and cell membrane structure, provides cushioning and insulation to internal organs, and plays a role in hormone synthesis and inflammation control.

Types of Fat

Fat is made up of fatty acids, or chains of carbon atoms with hydrogen atoms attached. There are several types of fatty acids, including:

- **Short-chain fatty acids (SCFAs) (2–4 carbons in length)**
  SCFAs, such as acetate, propionate, and butyrate, are formed due to the fermentation of soluble fiber and resistant starch in the large intestine. They are an energy source for cells in the colon and offer anti-inflammatory and immune system benefits.[7]

- **Medium-chain fatty acids (MCFAs) (6–10 carbons in length)**
  MCFAs, such as caprylic and lauric acid, do not require bile salts for digestion and are quickly broken down by the body. This means they are more easily tolerated by those with fat malabsorption issues.[8]

- **Long-chain fatty acids (LCFAs) (11–21 carbons in length)**
  Many saturated fatty acids, monounsaturated fatty acids, and polyunsaturated fatty acids are long- or very long–chain fatty acids (22 carbons or more in length).

  - **Saturated fatty acids (SFAs)**, which can be SCFAs, MCFAs, or LCFAs, are saturated with hydrogen atoms single-bonded to each carbon atom. They are generally solid at room temperature, and most come from animal-based foods. Coconut oil (an MCFA) is a plant-based source of saturated fat and a great source of lauric acid, which has antimicrobial benefits.[9]

    Sources of SFAs include:

    - Dairy
    - Fatty meat
    - Lard
    - Tropical oils (palm, cocoa, and coconut)

    High saturated fat intake has been associated with an increase in heart disease risk factors; however, it's important to consider the role saturated fat plays within the context of an individual's overall diet.[10]

  - **Monounsaturated fatty acids (MUFAs)** have hydrogens missing from their carbon chain and have one double bond between carbons. MUFAs are heart healthy and help support "good" cholesterol (HDL) and lower "bad" cholesterol (LDL). Monounsaturated fats are typically liquid at room temperature.

Good sources of MUFAs include:

- Avocados
- Extra-virgin olive oil
- Nuts
- Seeds

- **Polyunsaturated fatty acids (PUFAs)** have two or more carbon-to-carbon double bonds and are also liquid at room temperature. Omega-3 and omega-6 fatty acids are PUFAs considered essential to the diet because they cannot be synthesized in the body. There are three main types of omega-3s: **EPA (eicosapentaenoic acid)**, **DHA (docosahexaenoic acid)**, and **ALA (alpha-linolenic acid)**. It's important to note that ALA is a precursor to EPA and DHA; conversion rates in the body often are inefficient and vary, making it beneficial to regularly consume quality sources of EPA and DHA in the diet. Omega-3s help reduce inflammation, bolster immunity, support heart health, reduce symptoms of depression, and reduce the risk of certain cancers and Alzheimer's disease.[12] Western diets tend to be high in omega-6 (linoleic acid) and lacking in omega-3, which has been shown to promote inflammation.

  Sources of omega-3 (EPA and DHA) include:

  - Algal oil
  - Mackerel
  - Salmon
  - Tuna

  Sources of omega-3 (ALA) include:

  - Canola oil
  - Chia seeds

- Flaxseeds
- Omega-3-enriched eggs
- Walnuts

Sources of omega-6 include:

- Corn oil
- Nuts
- Safflower oil
- Seeds
- Soybean oil

- **Trans Fatty Acids**
  Trans fatty acids exist naturally in animal products, such as meat and dairy, but the synthetic version is best avoided. Look out for food labels with ingredients containing the words *partially hydrogenated*, which indicate that trans fats are present. Trans fats have a high association with inflammation, heart disease, and atherosclerosis (hardening of the arteries).

  Sources of trans fats include:

  - Fried foods
  - Frozen foods
  - Margarine
  - Processed baked goods

  In 2015, the U.S. Food and Drug Administration (FDA) ruled that food manufacturers may no longer use partially hydrogenated oils in their food products. Companies were given three years to comply.[11]

Fat Quality

Determining the healthiest fats and oils can be confusing. A good starting point is to consider organic options, if your budget allows. From there, it depends on what source of dietary fat you have in mind. Considerations regarding cooking oils and nuts and seeds are provided below.

Cooking Oils

In most cases, it's best to choose a cooking oil that's unrefined, meaning it is likely higher in nutrients and hasn't undergone processing methods using potentially harmful solvents.

That being said, unrefined cooking oils typically have a lower smoke point, which means they may be easily oxidized when heated to high temperatures. When this overheating occurs, the health benefits may be destroyed as disease-promoting free radicals are created. To prevent this, it's important to choose the appropriate cooking oil when preparing meals. Extra-virgin olive oil, for example, has a relatively low smoke point and is best used in salad dressings or pestos. Avocado, canola, and coconut oils are likely to be more stable at higher heats, making them better choices for cooking methods like stir-frying.

When looking at vegetable oils, keep in mind the balance of omega-6s to omega-3s. Many diets tend to be higher in omega-6 fatty acids (especially from manufactured vegetable oils, such as canola, corn, safflower, soybean, or sunflower) than omega-3 fatty acids, which can be pro-inflammatory. Be sure to add plenty of quality sources of omega-3 fats to your diet, including fatty fish, like cod, mackerel, and salmon, as well as chia seeds, ground flaxseed, and walnuts.

Nuts and Seeds

Raw nuts and seeds are a great option as the fats in them are less likely to be oxidized and contain free radicals; they haven't been exposed to high temperatures unlike those that are roasted. In addition, some nutrients, such as vitamin E and magnesium, may be lost during roasting. Roasting, however, does lower the level of potentially harmful bacteria (such as salmonella) in the nut, which, although rare, can occur due to cross contamination during processing.

When choosing nut and seed butters, look for those with minimal ingredients and without added oils and sugar. Ideally, the only ingredient should be the nut or seed itself!

Dietary Fat Needs

Many of us require around 20% to 35% of total caloric intake from fat, although the amount of dietary fat an individual needs depends on many factors, including stage of life, preference, and health goals. Depending on certain health conditions, a lower- or higher-fat diet may be needed for therapeutic benefits.

Above all, it's helpful to listen to your body and identify what's best for you – physically and mentally – regarding dietary fat intake.

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