BUL 1100

Macronutrients

Adrianne Griebel-Thompson
Extension Specialist, Margaret Ritchie School of Family and Consumer Sciences, University of Idaho Extension

Contents

1 Introduction
1 Proteins
2 Carbohydrates
3 Fats
3 Summary
4 Further Reading

University of Idaho Extension

Introduction

MACRONUTRIENTS ARE THE components found in food that provide us with the calories (energy) we need to fuel our everyday life. These components consist of proteins, carbohydrates, and fats. Each of these macronutrients plays a unique role in our bodies and are required for normal function. Although popular diets have you believe that it is healthiest to restrict fats, completely avoid carbohydrates, or eat an excessive amount of proteins, maintaining a balance of these nutrients is best. The Institute of Medicine (IOM) has created an Acceptable Macronutrient Distribution Range (AMDR). Table 1 displays the AMDR along with how many calories from each macronutrient you should eat to meet this recommendation. The AMDR may be contrary to what you see in the media, since it is currently popular to avoid carbohydrates, but after reading this bulletin, you will understand why it is important to eat all three of the macronutrients in appropriate amounts.

Proteins

What sets proteins apart from other dietary components is that they are nitrogen-containing molecules. Nitrogen is required for life because it is an important part of our genetic material (DNA). Proteins also provide us with 4 calories per gram and do not have any effect on blood sugar. Milk, meat, fish, eggs, and tofu are good sources of proteins. Our bodies require proteins for normal functioning in roles such as growth, maintenance of tissues, immune function, and transportation of nutrients. Proteins are also an important part of enzymes and hormones. Proteins are made of smaller components called amino acids. There are nine essential amino acids (histidine, isoleucine,

Table 1. Institute of Medicine's Acceptable Macronutrient Distribution Range (AMDR).

Macronutrient	% from Calories	Calories[1]
Proteins	10%–35%	200–700
Carbohydrates	45%–65%	900–1300
Fats	20%–35%	400–700

[1]Based on a 2,000-calorie meal plan.

leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine). Amino acids are essential because we cannot build them in our bodies; therefore, we must get them from foods like meat, dairy, eggs, quinoa, and pistachios or in food pairings like beans with rice.

Although many diet trends recommend consuming large amounts of proteins to make you feel fuller longer, it is not necessary to drastically increase your intake of proteins. Most Americans consume adequate or above adequate amounts of proteins. And, while it is true that eating enough proteins can make you feel fuller for longer, eating a balance of proteins, fats, and carbohydrates does this, too.

We typically base nutritional recommendations on a 2,000-calorie meal plan, which means that we should consume 200–700 calories per day from proteins (Table 1). This can easily be achieved by eating protein-rich food such as two eggs and peanut butter toast for breakfast, ½ cup of tofu for lunch (or beans, if you prefer; however, beans increase your carbohydrates intake by 40+ grams), and 3.5 oz of chicken (or a piece of chicken about the size of the palm of your hand) with 1 cup of milk for dinner. The accumulated calories for this meal plan are on the lower end of the 200-700-calories range, so if you wanted to increase your intake of proteins you can add a protein-rich snack like Greek yogurt paired with carbohydrates like berries and honey.

Carbohydrates

Carbohydrates are sugars, starches, and fiber. Some carbohydrates are simple sugars, meaning they contain single sugars that aren't linked to other sugars. Sugars are added to foods like baked goods, soda, and candies. Sugars are also naturally found in foods like fruit and dairy. It is preferable to consume sugars from natural sources compared to added sugars. Other carbohydrates are more complex, meaning they contain multiple sugars linked together in long chains. You have probably heard of the more complex types of carbohydrates referred to as starch or fiber. We eat these types of carbohydrates in foods like potatoes and other varieties of fruits and vegetables in addition to grain products like rice and bread. Carbohydrates supply us with 4 calories per gram; eating carbohydrates increases your blood sugar.

Carbohydrates currently have a bad reputation. Many fad diets suggest that everyone should eat low-carb food or completely avoid carbohydrates (keto diet regimen). Truthfully, there are good reasons these diets are suggested. For example, eating too many carbohydrates increases blood sugar and insulin, which results in a signal to the body to store energy (a.k.a. fat). What promoters of these diets fail to recognize, however, is that carbohydrates play essential roles in our bodies. Our brain's preferred fuel source is a type of sugar called glucose and carbohydrates are important for maintaining blood sugar and insulin levels. They are also involved in the metabolism of cholesterol. By consuming most of your carbohydrates from complex carbohydrates (i.e., starches and fibers) in foods like whole grain bread, brown rice, oatmeal, and a variety of fruits and vegetables, you get the fuel your brain needs but reduce the increase in blood glucose and insulin observed when eating simple carbohydrates like

candy, soda, juices, and baked goods.

Continuing with the recommendations for a 2,000-calorie meal plan from above, aim for consuming 900–1300 calories per day from carbohydrates (Table 1). This can be achieved by eating one slice of whole wheat toast at breakfast with jam and a medium banana. A ½ cup of rice at lunch with a medium apple and ½ cup of carrots provide additional carbohydrates. Finish the day with a medium potato and glass of milk at dinner to reach the minimum carbohydrates requirements. This doesn't quite meet your carbohydrates needs for the day, so you have room in your day for a snack of carbohydrates with proteins like Greek yogurt with berries sweetened with honey.

Fats

Fats are the third type of macronutrient. There are four different types: monounsaturated fats, polyunsaturated fats, saturated fats, and trans fats. Monounsaturated fats are found in foods like avocados, seeds and seed butters, nuts and nut butters, and oils like olive oil. Monounsaturated fats are considered healthy fats. Next, polyunsaturated fats are found in foods like fatty fish, walnuts, flaxseed, and tofu. Polyunsaturated fats are also considered healthy fats. The next type of fats, saturated fats, are found in animal products like meat and dairy. Saturated fats are one of the types of fats deemed "bad fats," because high consumption is associated with increased risk of heart disease and other chronic health conditions. However, saturated fats are essential for the day-to-day function of our body and need not be considered "bad." Finally, trans fats are produced in food manufacturing and are rarely found in food naturally. Since 2015, it has been illegal to have artificial trans fats in processed foods made in the United States; therefore, trans fats from processed foods are only found in foods that are fried or battered and in shortening, margarine, and some commercially baked goods. Trans fats are also considered "bad fats" because eating high amounts of them has been associated with increased risk of heart disease. As a result, policies in the United States were developed to remove trans fats from our food system. Fats provide 9 calories per gram; therefore, fats have more calories than proteins or carbohydrates. Like proteins, fats do not influence your blood sugar.

In the 1990s popular diets recommended restricting fats intake, because fats have more calories per gram than carbohydrates or proteins. However, even with a higher calorie content, eating enough fats is needed to maintain our body temperature, pad our organs to protect them from injury, and is an essential part of our cell walls. Fats are also needed to fully absorb other nutrients like vitamin D. See *Nutrition Basics: Vitamins* (BUL 1101) for more information regarding vitamin D and the other vitamins.

If we continue to use the 2,000-calorie meal plan as referenced before, we should consume 400–700 calories per day from fats (Table 1). Do this by adding 1 tablespoon of peanut butter to your toast in the morning, cooking your chicken at dinner in 2 tablespoons of olive oil, and adding 1 tablespoon of butter to your potato. These foods, paired with the fats found in the other foods from our menu that have fats (like eggs and chicken), help you to meet your daily fats intake needs.

Summary

Eating balanced meals and snacks that contain good sources of all the macronutrients is important for your body to work at its best. The AMDR was developed by the IOM for exactly that reason—it defines the intake of macronutrients required to meet your needs for essential nutrients, like vitamins and minerals, while reducing your risk of chronic disease. Your optimal macronutrient distribution

depends on many factors. Age, health, and activity level influence the level of carbohydrates, proteins, or fats at which your body works best. For example, older adults may benefit from consuming proteins on the higher end of the range to prevent loss of muscle mass; alternately, those with diabetes might feel best on the lower end of the carbohydrates range. However, it is not necessary to completely eliminate any of the macronutrients to meet your individual goals. If you have questions about your best macronutrient distribution or any other questions related to nutrition, food, and your health, consult your local registered dietitian. Table 2 is a sample menu designed to follow the AMDR.

Further Reading

The Academy of Nutrition and Dietetics. 2025. eatright.org. "Carbohydrates." https://www.eatright.org/health/essential-nutrients/carbohydrates.

The Academy of Nutrition and Dietetics. 2025. eatright.org. "Fats." https://www.eatright.org/health/essential-nutrients/fats.

The Academy of Nutrition and Dietetics. 2025. eatright.org. "Protein." https://www.eatright.org/health/essential-nutrients/protein.

Cleveland Clinic. 2021. "Carbohydrates." https://my.clevelandclinic.org/health/articles/15416-carbohydrates.

Dietary Guidelines for Americans. 2025. https://www.dietaryguidelines.gov/.

Mayo Clinic Staff. 2023. "Nutrition and Healthy Eating." Mayo Clinic. https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/fat/art-20045550.

Otten, J. J., J. P. Hellwig, and L. D. Meyers, ed. 2006. "Table 1: Acceptable Macronutrient Distribution Range." In *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. https://nap.nationalacademies.org/read/11537/chapter/7.

Restivo, J. 2023. "High-Protein Foods: "The Best Protein Sources to Include in a Healthy Diet." Harvard Health Publishing. https://www.health.harvard.edu/nutrition/high-protein-foods-the-best-protein-sources-to-include-in-a-healthy-diet.

United States Department of Agriculture. 2025. MyPlate.gov. https://www.myplate.gov/.

Table 2. A daily menu designed to follow the AMDR.

Meal	Food	Proteins	Carbohydrates	Fats
Breakfast	Eggs, 2 whole	12 g (48 kcal)	1.2 g (4.8 kcal)	10 g (90 kcal)
	Whole wheat toast, 1 slice	3.6 g (14 kcal)	12 g (48 kcal)	0.9 g (8 kcal)
	Peanut Butter, 1 Tbsp	4 g (16 kcal)	3 g (12 kcal)	8 g (72 kcal)
	Jam, 1 Tbsp	0.1 g (0.4 kcal)	14 g (56 kcal)	0 g (0 kcal)
	Banana, 1 medium	1.3 g (5.2 kcal)	27 g (108 kcal)	0.4 g (3.6 kcal)
Lunch	Rice, ½ cup	2 g (8 kcal)	22.5 g (90 kcal)	0.2 g (2 kcal)
	Tofu, ½ cup[1]	10 g (40 kcal)	2.3 g (9.2 kcal)	6 g (54 kcal)
	Carrots, ½ cup	0.6 g (2 kcal)	6 g (24 kcal)	0.2 g (2 kcal)
	Apple, 1 medium	0.5 g (2 kcal)	25 g (100 kcal)	0.3 g (3 kcal)
Dinner	Chicken, 3.5 oz[2]	38 g (152 kcal)	0 g (0 kcal)	19 g (171 kcal)
	Baked Potato, 1 medium	4.3 g (17 kcal)	37 g (148 kcal)	0.2 g (1.8 kcal)
	Broccoli, ½ cup	2.6 g (10.4 kcal)	6.0 g (24 kcal)	0.34 g (3.1 kcal)
	Olive Oil, 2 Tbsp	0 g (0 kcal)	0 g (0 kcal)	14 g (126 kcal)
	Butter, 1 Tbsp	0.1 g (0.4 kcal)	0 g (0 kcal)	12 g (108 kcal)
	Milk, 1 cup	8 g (32 kcal)	12 g (48 kcal)	2.4 g (22 kcal)
Meals Total		**87 g (348 kcal)**	**168 g (672 kcal)**	**74 g (666 kcal)**
Snack	Nonfat Greek Yogurt, 1 cup	19 g (76 kcal)	8.2 g (33 kcal)	0.9 g (8.1 kcal)
	Honey, 2 Tbsp	0.1 g (0.4 kcal)	34 g (136 kcal)	0 g (0 kcal)
	Berries, 1 cup	1.1 g (4 kcal)	21 g (84 kcal)	0.5 g (5 kcal)
Daily Total		**107 g (428 kcal)**	**231 g (924 kcal)**	**75 g (680 kcal)**

[1]If you do not typically consume tofu, use beans, for instance, as a substitute. However, this increases your carbohydrates intake by 43 grams.

[2]One serving of chicken is 3–4 oz. The 3.5 oz of chicken recommended above is the midpoint of this recommendation.

Issued in furtherance of cooperative extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Barbara Petty, Director of University of Idaho Extension, University of Idaho, Moscow, Idaho 83844. It is U of I policy to prohibit and eliminate discrimination on the basis of race, color, national origin, religion, sex, sexual orientation and gender identity/expression, age, disability, or status as a Vietnam-era veteran. This policy applies to all programs, services, and facilities, and includes, but is not limited to, applications, admissions, access to programs and services, and employment.

U of I is committed to providing reasonable accommodations to qualified individuals with disabilities upon request. To request this document in an alternate format, please contact CALS Extension Publishing at 208-885-7982 or calspubs@uidaho.edu.

UI PEER REVIEWED

BUL 1100 | Published August 2025 |