Macronutrients: the Importance of Carbohydrate, Protein, and Fat

What are macronutrients?

Macronutrients are nutrients that provide calories or energy. Nutrients are substances needed for growth, metabolism, and for other body functions. Since "macro" means large, macronutrients are nutrients needed in large amounts. There are three macronutrients:

- Carbohydrate
- Protein
- Fat

While each of these macronutrients provides calories, the amount of calories that each one provides varies.

Carbohydrate provides **4 calories per gram**.

Protein provides **4 calories per gram**.

Fat provides **9 calories per gram**.

This means that if you looked at the Nutrition Facts label of a product and it said 12 grams of carbohydrate, 0 grams of fat, and 0 grams of protein per serving, you would know that this food has about 48 calories per serving (12 grams carbohydrate multiplied by 4 calories for each gram of carbohydrate = 48 calories).

Besides carbohydrate, protein, and fat the only other substance that provides calories is alcohol. Alcohol provides 7 calories per gram. Alcohol, however, is not a macronutrient because we do not need it for survival.

Why do we need carbohydrates?

Carbohydrates are the macronutrient that we need in the largest amounts. According to the Dietary Reference Intakes published by the USDA, 45% - 65% of calories should come from carbohydrate. We need this amount of carbohydrate because:

- Carbohydrates are the body's main source of fuel.
- Carbohydrates are easily used by the body for energy.
- All of the tissues and cells in our body can use glucose for energy.
- Carbohydrates are needed for the central nervous system, the kidneys, the brain, the muscles (including the heart) to function properly.
- Carbohydrates can be stored in the muscles and liver and later used for energy.
- Carbohydrates are important in intestinal health and waste elimination.
- Carbohydrates are mainly found in starchy foods (like grain and potatoes), fruits, milk, and yogurt. Other foods like vegetables, beans, nuts, seeds and cottage cheese contain carbohydrates, but in lesser amounts.

Fiber refers to certain types of carbohydrates that our body cannot digest. These carbohydrates pass through the intestinal tract intact and help to move waste out of the body. Diets that are low in fiber have been shown to cause problems such as constipation and hemorrhoids and to increase the risk for certain types of cancers such as colon cancer. Diets high in fiber; however, have been shown to decrease risks for heart disease, obesity, and they help lower cholesterol. Foods high in fiber include fruits, vegetables, and whole grain products.

Why do we need protein?

According to the Dietary Reference Intakes published by the USDA 10% - 35% of calories should come from protein. Most Americans get plenty of protein, and easily meet this need by consuming a balanced diet. We need protein for:

- Growth (especially important for children, teens, and pregnant women)
- Tissue repair
- Immune function
- Making essential hormones and enzymes
- Energy when carbohydrate is not available
- Preserving lean muscle mass

Protein is found in meats, poultry, fish, meat substitutes, cheese, milk, nuts, legumes, and in smaller quantities in starchy foods and vegetables.

When we eat these types of foods, our body breaks down the protein that they contain into amino acids (the building blocks of proteins). Some amino acids are essential which means that we need to get them from our diet, and others are nonessential which means that our body can make them. Protein that comes from animal sources contains all of the essential amino acids that we need. Plant sources of protein, on the other hand, do not contain all of the essential amino acids.

Why do we need fat?

Although fats have received a bad reputation for causing weight gain, some fat is essential for survival. According to the Dietary Reference Intakes published by the USDA 20% - 35% of calories should come from fat. We need this amount of fat for:

- Normal growth and development
- Energy (fat is the most concentrated source of energy)
- Absorbing certain vitamins (like vitamins A, D, E, K, and carotenoids)
- Providing cushioning for the organs
- Maintaining cell membranes
- Providing taste, consistency, and stability to foods

Fat is found in meat, poultry, nuts, milk products, butters and margarines, oils, lard, fish, grain products and salad dressings. There are three main types of fat, saturated fat, unsaturated fat, and trans fat. Saturated fat (found in foods like meat, butter, lard, and cream) and trans fat (found in baked goods, snack foods, fried foods, and margarines) have been shown to increase your risk for heart disease. Replacing saturated and trans fat in your diet with unsaturated fat (found in foods like olive oil, avocados, nuts, and canola oil) has been shown decrease the risk of developing heart disease.

A note on micronutrients

Although macronutrients are very important they are not the only things that we need for survival. Our bodies also need water (6-8 glasses a day) and micronutrients. Micronutrients are nutrients that our bodies need in smaller amounts, and include vitamins and minerals. (See the Vitamins and Minerals handout for more information).

If you are a registered University of Illinois student and you have questions or concerns, or need to make an appointment, please call: **Dial-A-Nurse at 333-2700**

If you are concerned about any difference in your treatment plan and the information in this handout, you are advised to contact your health care provider.

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