

NIH News in Health

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Breaking Down Food A Closer Look at What You Eat

Food provides energy and nutrients that are essential for your health. These include proteins, carbohydrates, and fats (called macronutrients), and vitamins and minerals (called micronutrients). Having a balanced diet helps ensure you get all the nutrients your body needs.

The Dietary Guidelines for Americans (DietaryGuidelines.gov) offer guidance on what a balanced diet looks like. These recommendations are based on the latest scientific information about nutrition.

The guidelines are updated every five years because our understanding of what's healthy continues to grow. Scientists are working to learn more about how different nutrients affect the body. They're also looking for better ways to personalize nutritional recommendations.

Finding Nutritious Foods • Macronutrients make up the bulk of the **calories** you eat each day. They provide the nutrients that your body needs to make energy. They also give your cells important building blocks needed for all their different functions, like fighting diseases.



Your body needs only small amounts of each micronutrient. But they are critical for healthy development and disease prevention.

Experts advise adults to stay within their recommended calorie limits while choosing food and drinks that are rich in nutrients. The guidelines suggest getting 10% to 35% of your calories from protein; 25% to 35% from fat; and 45% to 65% from carbohydrates. Learn how to personalize nutrition recommendations at MyPlate.gov.

To find the amounts of different nutrients in a food, look at the Nutrition Facts label. You can also find resources about nutrients in foods at Nutrition.gov.

Meeting Your Body's Needs • Your body still might be able to function when it's not getting enough of the different macronutrients, says

Samantha Adas, a nutritionist at NIH, “but that doesn't mean it's optimal.”

Proteins are needed for cells to perform critical functions in your body. They're broken down by your body into amino acids. Amino acids are used by cells to build muscle, skin, and organs; break down toxins; and do many other critical jobs.

Proteins can also be used for energy. “They give a stronger sensation of fullness than carbohydrates,” says Dr.

Christopher Lynch, the acting director of the NIH Office of Nutrition Research.

But, explains Adas, “carbohydrates are the body's preferred source for energy because they provide energy right away.”

Your body turns carbohydrates into glucose, a type of sugar. Nearly every cell in your body uses glucose as its main fuel source.

There are three different types of carbohydrates: simple carbohydrates (sugars), complex carbohydrates (starches), and fiber.

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Definitions

Calories

The amount of energy stored in food.

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Simple carbs are made of one or two sugar molecules. Your body digests and absorbs these quicker than complex carbohydrates. Complex carbs are larger chains of sugars, so they take longer to break down and move into your blood.

Simple carbohydrates may raise your blood glucose higher and faster than complex carbs. Having blood sugar levels that are too high over time can lead to many health problems.

Limiting how much added sugar you eat to no more than 10% of your daily calories can help lower your health risks. So can choosing more complex carbohydrates, like whole grains, beans, legumes, and starchy vegetables. Complex carbs can help you get more fiber, too. Fruits and vegetables are also a great source of fiber and are rich in micronutrients.

Definitions

Genetic

Having to do with genes, the stretches of DNA you inherit from your parents. Genes define characteristics, like how likely you are to get certain diseases.

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“If you eat a meal that is high in fiber, you feel fuller longer,” says Dr. Katherene Anguah, a nutrition researcher at the University of Missouri. This can help you better control your calories.

Most Americans aren’t getting the recommended 14 grams of fiber for every 1,000 calories. Anguah is studying the health benefits of consuming a fiber-rich diet.

Foods rich in fiber are important for gut health. They can also lower the amount of fat and cholesterol (a waxy, fat-like substance) in your blood. Fat and cholesterol buildup can lead to heart disease and stroke. High-fiber foods may help protect against these and other health conditions, like diabetes.

Although too much fat can cause trouble, you still need some in your diet. Fats are broken down into fatty acids. Your body uses these to make energy, build certain cell structures, absorb certain vitamins, and protect your organs. Some organs, like your heart, prefer to use fat as fuel.

Experts recommend limiting a certain type of fat called saturated fats to less than 10% of your daily calories. Saturated fats are solid at room temperature, such as the fats in red meats, lard, and full-fat milk and dairy products. Meanwhile, fats found in nuts, seeds, vegetable oils, and fatty fish have been shown to be beneficial for heart health.

“Healthy fats have a place in the diet, but within reasonable calorie limits,” says Dr. Alison Brown, a nutrition scientist at NIH. It’s important to watch how much of them you eat. Fats have more than twice as many calories per gram as protein or carbohydrates, so can add extra calories to your day. Eating too many calories can lead to weight gain. Excess weight and obesity can increase your risk for many serious diseases.

Getting Personal • Our genetic
makeup interacts with our diet



For more about nutrition, see “Links” in the online article: newsinhealth.nih.gov/2023/08/breaking-down-food

and may affect how each person’s body breaks down food. Scientists are now digging deeper to better understand these differences. NIH has launched a precision nutrition study to learn more about how various food components affect people differently. The study is enrolling 10,000 people to learn what factors predict how people’s bodies will respond to different types of foods.

The researchers hope to learn how to tailor what you eat based on your genes, culture, and environment to improve your health. Learn more at NutritionforPrecisionHealth.org. ■



Wise Choices Get Better Nutrition

- **Stay within your recommended daily calorie limit.** How many calories you need depends on many factors, including your sex, height, age, and activity level.
- **Choose a healthy mix of foods:** vegetables, fruits, whole grains, proteins, low-fat or fat-free dairy, and oils.
- **Limit saturated fat** to less than 10% of daily calories. Replace foods containing it (like butter or lard) with healthier unsaturated fat options, like plant oils.
- **Limit salt** to no more than 2,300 mg per day.
- **Limit added sugars** to less than 10% of daily calories.
- **Vary your protein sources.** Include lean meats, poultry, eggs, seafood, beans, peas, lentils, nuts, seeds, and soy products.
- **Replace highly processed or high-fat meats** (e.g., hot dogs, sausages, bacon) with healthier protein sources.
- **Eat plant-based foods.** Plants often contain healthy fats and important vitamins and minerals.

Pet Dogs to the Rescue!

Furry Friends Can Help Human Health

Dogs share our homes and environments. They grow up with us and grow old with us. And as they age, dogs tend to get many of the same health problems that we do—conditions like obesity, heart problems, cancer, and mental decline. Most of the genes found in dogs are also found in humans.

Because we share so much, it's not surprising that health-related discoveries in people can lead to better medical care for dogs. Likewise, studies of dog biology can lead to better understanding and treatments for people.

That's why NIH supports large-scale projects that aim to learn how aging, genes, and other factors affect the health and biology of dogs. Scientists partner with dog owners who share detailed information about their pets. The researchers analyze the massive amount of data they've gathered. Then they share their data and findings with other scientists to enable even more discoveries.



Wise Choices

Enrolling Dogs in Research

NIH supports several research projects that study pet dogs, including:

- **The Dog Genome Project.** Ongoing studies involve many types of pet dogs, with a preference for purebred dogs.
- **The Dog Aging Project.** This study will follow tens of thousands of pet dogs over years.
- **NIH's Comparative Oncology Program.** If a dog has been diagnosed with cancer, consider enrolling them in a clinical trial to test potential cancer treatments.

“Working with the general public has been one of our most productive and fruitful collaborations,” says NIH’s Dr. Elaine Ostrander, who led the launch of NIH’s Dog Genome Project more than 20 years ago. The project aims to learn how small changes in genes can lead to the many behaviors, body shapes, and diseases seen in different types of dogs.

Her team has collected DNA samples from tens of thousands of dogs. They’ve identified dog genes that helped to shed light on many human disorders. A recent study found genetic factors that raise the risk for an aggressive blood cancer that’s common in a certain dog breed. The findings might lead to improved treatments for both dogs and people with the disease.

Ostrander’s studies often focus on purebred dogs. Since the dogs’ parents and ancestry are well-known, it’s easier to tease out the activities and functions of specific genes.

Another large study—called the Dog Aging Project—seeks to enroll all types of dogs. These include mixed breed and purebred pets of every age.

“The more dogs we have, the better,” says project co-director Dr. Daniel Promislow of the University of Washington. “More dogs will give us more data and more power to ask more questions.”

The Dog Aging Project aims to follow pet dogs over 10 years or more. It will track how genes, diet, exercise, and the environment affect health and aging. “If we can understand what affects health in dogs, that will be good for the dogs and good for the owners who love their dogs,” Promislow says.



One recent study found that active older dogs are less likely to have dementia than inactive dogs. Another found that dogs living in environments with less opportunities to socialize with people and other animals often had worse health outcomes. “These are interesting relationships, but it’s important to note that we don’t yet know what is causing what,” Promislow says.

Studying dogs over time could help to pinpoint potential causes. This may lead to a better understanding of why activity and social relationships can also affect human health.

“The dog research community as a whole is really committed to collaboration. And we openly share our data,” Ostrander adds. In the long run, this type of cooperative approach will help to improve both dog and human health. ■



Web Links

For more about pets helping research and online Q&As with the experts, see “Links” in the online article: newsinhealth.nih.gov/2023/08/pet-dogs-rescue



Health Capsules

For links to more information, please visit our website and see these stories online.

Testing an mRNA Vaccine to Treat Pancreatic Cancer

Pancreatic cancer is one of the deadliest types of cancer. Only about 12% of people with this cancer will be alive five years after treatment.

Scientists have been testing ways to get the body's disease defense system, called the immune system, to fight pancreatic cancer. One research team created personalized vaccines. To do this, they used mRNA—the same approach used to make vaccines for COVID-19.

The researchers took tumor samples from 19 volunteers who had their pancreatic tumors removed. Scientists at BioNTech, a company

that made one of the COVID-19 mRNA vaccines, made mRNA cancer vaccines customized for each patient. Each included genetic instructions for up to 20 proteins unique to the person's pancreatic tumors. The researchers hoped these would trigger the immune system to recognize and attack the cancer cells.

The team was able to make customized vaccines for 18 of the 19 study participants. Each participant received nine vaccine doses over several months. After eight doses, they also received standard chemotherapy.

One and a half years after treatment, eight people remained cancer free. These were the patients who had the strongest immune responses to their vaccine. The researchers now want to learn why half the people did not have a strong response. The approach will also be tested soon in a larger clinical trial.

“It's exciting to see that a personalized vaccine could enlist the immune system to fight pancreatic cancer—which urgently needs better treatments,” says study lead Dr. Vinod Balachandran of Memorial Sloan Kettering Cancer Center. ■

Donate Blood. Save a Life

Every two seconds, someone in the U.S. needs blood. It could be because of surgery or cancer treatments. Or maybe they have a blood disorder or have lost a lot of blood. Whatever the reason, there's always a need for donated blood. Even a single donation can save lives.

Blood gives us energy by bringing oxygen and nutrients to the body's cells. It also carries waste products to the liver and kidneys for removal.

Blood contains different types of cells and other components. Just two drops of blood can include millions of red blood cells, which carry oxygen and carbon dioxide. Blood also includes white blood cells (which fight disease), platelets (which help form blood clots), and plasma (the liquid portion of blood).

Blood has a short shelf life, so blood donations are always needed. Platelets can only be stored for five to

seven days, and red blood cells for up to 42 days.

Blood donation is safe and simple. It usually takes only about an hour of your time. But only 3% of Americans give blood each year.

You can donate blood if you're in good health and are at least 16 or 17 years old (depending on where you live). Learn more about blood donations at www.nhlbi.nih.gov/education/blood/donation. ■



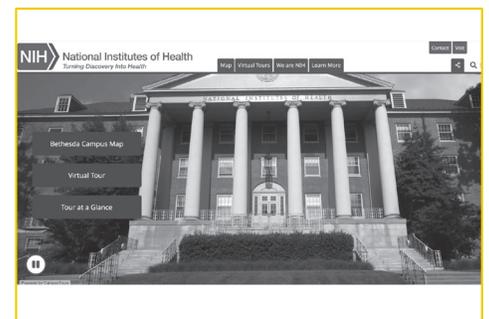
Featured Website

NIH Virtual Tour

www.nih.gov/virtual-tour

Ever wonder what it's like to visit the NIH campus? A new web-based tour lets you “visit” NIH's headquarters in Bethesda, Maryland with an interactive map

and a range of helpful resources. You can make 20 virtual stops. Each stop features interviews with NIH staff and scientists who share information about their work.



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