Nourishing the Brain:
Recommendations for Combating Neurodegenerative Diseases

K-STATE Research and Extension
Family and Consumer Sciences

FACT SHEET

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How does nutrition help brain health?

A varied and balanced eating plan provides essential vitamins that help maintain nervous system health. A steady energy supply to the brain can allow you to think and learn. Plenty of fruits and vegetables provide the brain with antioxidants that can help decrease **inflammation** in the entire body, including the brain. A balanced eating plan can support the tasks that brains perform every day, including balance, posture, coordination, and breathing.

A brief summary of the brain

Brains are complex organs. Think about the brain as a car. The car relies on a well-functioning engine and other components to run smoothly. The brain also depends on complex relationships with a network of brain cells and regions.

The brain weighs around 3 pounds in an adult body, and is about 60% fat, with the other 40% made up of water, protein, carbohydrates, and salts. Your bodies have blood vessels and nerves that connect the brain to the rest of the body. These connections send and receive messages from each other through brain cells called neurons. You rely on neurons for every bodily function, including seeing, touching, smelling, tasting, and hearing. They play a crucial role in how you move, breathe, think, and more.

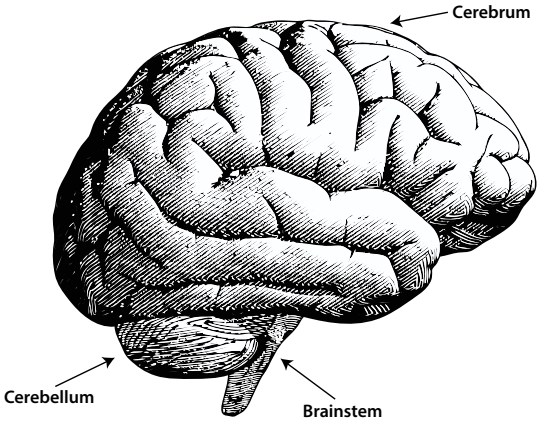
Brains have three main parts:

1. **The cerebrum:** This is the biggest part of the brain, and it controls movement, temperature, speech, thinking, reasoning, emotions, and learning.

2. **The brainstem:** This part connects the cerebrum to the spinal cord at the base of the skull and controls activities like swallowing, breathing, and blood pressure.

3. **The cerebellum:** This small part at the back of the head is responsible for muscle movements, balance, posture, and coordination.

As people get older, their brains change, and some of the activities that they used to do before might become challenging. Good nutrition can help provide essential nutrients the brain needs to continue functioning properly.



What foods aid brains?

Inflammation is a normal process in the body. Too many harmful molecules around the brain and neurons can increase inflammation and, in the long term, might damage neurons and increase the risk of neurodegenerative diseases. The **blood-brain barrier** protects the brain from these harmful molecules that might cause inflammation. Including sources of omega-3 fatty acids can reduce brain inflammation, support new brain cells, and help the neurons communicate better with the rest of the body. Sources of omega-3 fatty acids include fish and seafood, nuts and seeds, plant oils, and **fortified** foods.

B vitamins, especially folate, show evidence of reducing the risk of dementia and slowing cognitive decline. You can find B vitamins in whole grains, legumes, nuts, leafy green vegetables, and eggs.

Vitamin D is an essential vitamin for brain health. A lack of vitamin D (called vitamin D deficiency) can cause issues with memory and thinking and increase the risk of dementia. To ensure you get enough vitamin D, include foods like salmon, tuna, sardines, **fortified** cereals, and **fortified** milk in your eating plan. Vitamin D is also known as the "sunshine vitamin" because you need sunlight to produce vitamin D from the food you eat. Try to get 5 to 30 minutes of sunlight daily on your face and arms, and follow sun protection guidelines. To know how much vitamin D is recommended, based on life stage, visit *https://ods.od.nih.gov/factsheets/VitaminD-Consumer/*.

Research suggests that some herbs and spices can reduce inflammation in the body and the brain. Turmeric, for example, has curcumin that may protect the brain against inflammation. It may fight against brain diseases by slowing down cognitive decline. Other examples with anti-inflammatory properties include cloves, dried peppermint, rosemary, basil, cumin, and marjoram.

Antioxidants, found in colorful fruits and veggies, tea, spices, and olive oil, keep brains healthy by reducing stress and inflammation.

An eating plan focusing on plenty of fruits and vegetables, moderate amounts of protein, and low amounts of saturated fat and sugar is best for optimizing brain health. The MIND eating plan (*ksre-learn.com/mf3602*) was designed to reduce the risk of Alzheimer's disease and related dementias and slow cognitive decline. This eating plan combines the Mediterranean eating plan with the Dietary Approaches to Stop Hypertension (DASH). The MIND eating plan focuses on foods that are associated with brain function. These foods are green leafy vegetables, nuts, berries, beans, whole grains, fish, poultry, and olive oil.

Green leafy vegetables like lettuce, spinach, okra, kale, cabbage, and collard greens contain folate, vitamin K, vitamin C, and other **antioxidants** that may aid memory preservation and prevent cognitive decline.

Nuts like walnuts show evidence of brain protection. Other nuts like almonds, cashews, and pistachios are great sources of omega-3 fatty acids, vitamin E, magnesium, and zinc. These nutrients support mood, protect brain cells, and regulate blood pressure.

Berries like blueberries, cranberries, strawberries, raspberries, and blackberries are rich in antioxidants that support cognitive functions like memory and learning.

Beans and whole grains are great sources of B vitamins that support blood sugar levels and can provide a steady energy supply to the brain.

Fish like salmon, tuna, mackerel, and sardines are rich in omega-3 fatty acids that help reduce brain inflammation and support brain cell growth.

Poultry like lean chicken and turkey are a great source of iron and zinc, which are used when the brain communicates to the body. Zinc might also reduce depressive symptoms.

Olive oil (especially extra virgin olive oil) is rich in antioxidants and healthy fats that promote overall brain health by fighting oxidative stress and improving the blood flow to the brain.

A balanced eating plan with plenty of fruits, vegetables, and whole grains, like the MIND eating plan, can also benefit the bacteria in your gut. Why is this important? The brain and the gut message each

other all the time. Researchers have found a gut-brain connection, called the gut-brain axis, that can affect brain health. A balanced and varied eating plan can feed the good bacteria in your gut and aid in improving cognitive functions and mood.

What are neurodegenerative diseases?

A neurodegenerative disease is a group of diseases characterized by progressive degeneration and abnormal function of the neurons in the brain or spinal cord. These diseases change neurons and can result in reduced cognitive capacity, movement control, and other brain functions. Neurodegenerative diseases can affect activities like bathing, showering, dressing, toileting, and eating. Common examples are Alzheimer's disease and Parkinson's disease.

Alzheimer's disease (AD) is associated with genetics, environmental and lifestyle factors, and age-related changes in the brain that result in the loss of neurons and their connections. This affects behavior, cognitive capacity, memory, and the ability to live independently. Across the United States, about 5.8 million people have AD, and it is expected to be 13 million by 2050.

Parkinson's disease (PD) is a movement disorder characterized by tremors, rigidity, slowness of movement, and postural instability. Symptoms get worse over time and can affect walking, talking, swallowing, and mood. In the U.S., almost 1 million people have PD, and it is expected to be 1.2 million by 2030.

Nutrition and Alzheimer's disease

Good nutrition is important for people with AD to stay healthy and avoid unintentional weight loss. A mix of healthy foods like vegetables, fruits, whole grains, lean meats, and low-fat dairy is best to support cognitive capacity. An eating plan high in saturated fat, cholesterol, sugar, and salt might make the disease progress faster. Hydration is a big concern for people with AD. **Dehydration** can make the brain shrink and affect memory. Offering small cups of water and foods like soups, nutritionally balanced milkshakes, and smoothies often can aid in avoiding dehydration.

People with AD might forget or refuse to eat because they can't recognize food, their sense of smell and taste has changed, or their dentures don't fit right. Sometimes, certain medications can reduce appetite. To assist with these issues, making mealtimes calm and simple by avoiding patterned plates, placemats, or tablecloths, serving one food item at a time, and being flexible with what they like to eat can help a person with AD eat more. During meals, using colored plates that contrast with the food, checking the temperature of the food, giving the person with AD plenty of time to eat, eating together, and making meals social can also improve mealtime.

Nutrition and Parkinson's disease

A balanced eating plan for people with PD might help ease symptoms, slow the disease progression, and improve quality of life. For brain health, nuts like walnuts, pistachios, and macadamia nuts are good choices. They contain omega-3 fatty acids and antioxidants that help keep brain cells healthy. Foods rich in antioxidants, such as turmeric, cinnamon, blueberries, raspberries, and dark leafy greens, can also help fight brain inflammation and promote brain health.

Eating more fruits, vegetables, and fiber-rich foods with plenty of fluids can assist in managing PD symptoms like constipation. Reducing sugary snacks and having more protein and healthy fats can ease fatigue and sleep issues. Even though there is no recommended diet for people with PD, a nutritionally balanced diet can promote overall well-being and quality of life.

People with PD might have issues at mealtimes due to their tremors. Adaptive equipment, such as plate guards, bowls and plates with suction cup bases, weighted utensils, and swivel spoons, can make mealtime more enjoyable. Other issues that might arise are swallowing difficulties. If coughing, choking, or the feeling of food getting "stuck" while eating happens, contacting a speech therapist is a great idea. They will be able to provide strategies to aid with these issues.

Medications that some individuals with Parkinson's may take can be affected by nutritional intake. Talk with your healthcare provider if this is a concern. You can read more about this here *https://www.apdaparkinson.org/article/levodopa-dosing-and-food-intake/*.

In summary

Having an eating plan with plenty of vegetables, fruits, whole grains, and healthy fats keeps the brain in optimal performance. Foods like fish, nuts, and fortified foods with omega-3 fatty acids and vitamin D are especially helpful. Adjusting an eating plan and staying hydrated can help manage or slow down the progression of neurodegenerative diseases like AD and PD. A nutritionally balanced diet can help improve overall quality of life by promoting brain health and cognitive function.

Glossary of Terms

Antioxidants: substances that inhibit or neutralize the damaging effects of free radicals, unstable molecules that can cause damage to cells and tissues.

Blood-brain barrier: a highly selective membrane that acts as a protective barrier shielding the brain from harmful substances.

Dehydration: occurs when the body loses more fluid than it takes in, resulting in an imbalance of water and electrolytes in the body.

Fortified: refers to the process of adding essential vitamins, minerals, or other nutrients to a food or beverage that were not initially present or were present in insufficient quantities.

Inflammation: occurs when the body releases chemicals that trigger an immune response to fight off infection or heal damaged tissue. Once the injury or infection is healed, the inflammatory process ends.

Oxidative stress: occurs when there is an imbalance between the production of free radicals and the body's ability to neutralize them with antioxidants. Excessive oxidative stress can damage cells, proteins, lipids, and DNA, contributing to various diseases and conditions, including inflammation, cardiovascular disease, neurodegenerative disorders, and aging.

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Author

Priscilla Brenes, *Ph.D., Assistant Professor and Extension Specialist, K-State Research and Extension*

Reviewers

Erin Martinez, *Associate Professor/Extension Specialist, K-State Research and Extension*

Melinda Daily, *Sunflower District, K-State Research and Extension, Family and Consumer Sciences Agent*

Christina Holmes, *K-State Research and Extension Southeast Area, Family and Consumer Sciences Specialist*

Christine Sasse, *MS, RD, LD, Nutrition Specialist, Nutrition Instructor – Family and Consumer Science, University of Arkansas System Division of Agriculture, Cooperative Extension Service*

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