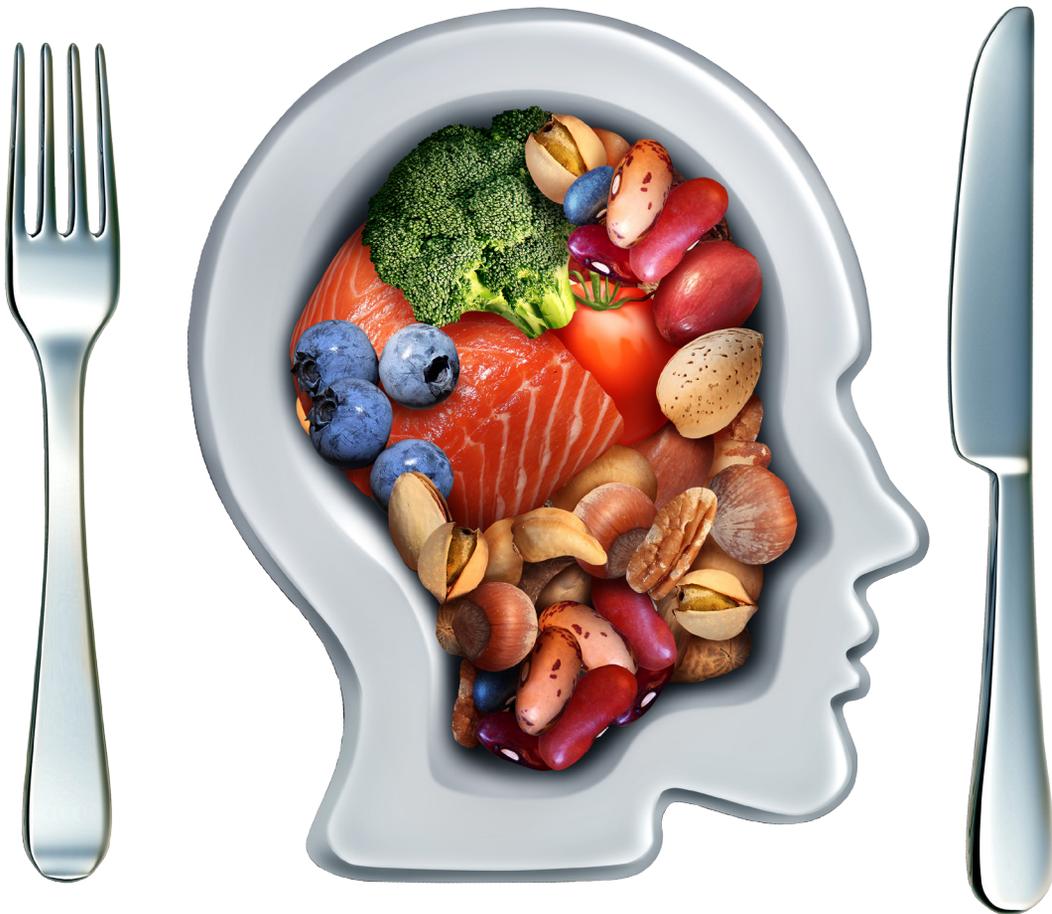


HARVARD
MEDICAL SCHOOL

Best Diets for Cognitive Fitness



Foods linked to better brainpower



Food may not be the first thing that comes to your mind when you think about cognitive health. But food nourishes your body and your brain alike. The range of foods you choose from day to day can have an enormous impact not only on your weight, heart health, and cancer risks, but also on your mood, your mental sharpness, and your risks of developing dementia. Research shows that a diet that contains abundant fruits, vegetables, legumes, nuts, and whole grains — with limited amounts of animal products — is best for cognitive fitness. As you'll see in the following pages, there is even an eating plan called the MIND diet, so selecting a brain-healthy diet makes a very appropriate first step in any program to boost brain health.

Just as there is no magic pill to prevent cognitive decline, no single food can ensure a sharp brain. Nutritionists emphasize that the most important strategy is to follow a healthy dietary pattern that includes a lot of fruits, vegetables, legumes, and whole grains. Protein should come from lean sources, such as fish, and fats should be healthy ones, such as olive oil or canola oil.

That said, certain foods in this overall scheme are particularly rich in healthful components like omega-3 fatty acids, B vitamins, and antioxidants, which are known to support brain health. Incorporating many of these foods into a healthy diet on a regular basis can improve the health of your brain, which could translate into better mental function.

Research shows that the best foods for your brain are the same ones that protect your heart and blood vessels, including the following:

Green, leafy vegetables. Leafy greens such as kale, spinach, and collards are rich in brain-healthy nutrients like vitamin K, lutein, folate, and beta carotene. Research suggests these plant-based foods may help slow cognitive decline.

Fatty fish. Fatty fish are abundant sources of omega-3 fatty acids, healthy unsaturated fats that have been linked to lower blood levels of beta-amyloid — the protein that forms damaging clumps in the brains of people with Alzheimer's disease. Try to eat fish at least twice a week, but choose varieties that are low in mercury, such as salmon, cod, canned light tuna, and pollock. If you're not a fan of fish, ask your doctor about taking an omega-3 supplement, or choose terrestrial omega-3 sources such as flaxseeds, avocados, and walnuts.

Berries. Flavonoids, the natural plant pigments that give berries their brilliant hues, also help improve memory, research shows. In a 2012 study published in *Annals of Neurology*, researchers at Harvard's Brigham and Women's Hospital found that women who consumed two or more servings of strawberries and blueberries each week delayed memory decline by up to two-and-a-half years.

Tea and coffee. The caffeine in your morning cup of coffee or tea might offer more than just a short-term concentration boost. In a 2014 study published in *The Journal of Nutrition*, participants with higher caffeine consumption scored better on tests of mental function. Caffeine might also help solidify new memories, according to other research. Investigators at Johns Hopkins University asked participants to study a series of images and then take either a placebo or a 200-milligram caffeine tablet. More members of the caffeine group were able to correctly identify the images on the following day.

Walnuts. Nuts are excellent sources of protein and healthy fats, and one type of nut in particular might also improve memory. A 2015 study from UCLA linked higher walnut consumption to improved cognitive test scores. Walnuts are high in a type of omega-3 fatty acid called alpha-linolenic acid (ALA), which helps lower blood pressure and protects arteries. That's good for both the heart and the brain.

Best diets for cognitive fitness

The ideal eating plan for a healthy brain incorporates many of the “brain-boosting” foods listed above. A few diets have been promoted specifically for improving cognitive fitness. One of the most rigorously studied of these eating plans, the Mediterranean diet, is also considered one of the healthiest diets over all.

The Mediterranean diet

It’s no coincidence that many of the world’s longest-lived people inhabit the area surrounding the Mediterranean Sea. Those who make their home along the coasts of Spain, Italy, and France eat a diet rich in fresh fruits and vegetables, fish, beans, nuts, olive oil, and red wine, which are filled with healthful fatty acids and antioxidants that combat disease processes. This diet not only contains an abundance of healthy foods — it also minimizes unhealthy ones, such as packaged snack foods and desserts, which tend to be loaded with ingredients that are not good for cognitive health.

Studies have linked the Mediterranean diet to a number of health benefits, including a reduction in “bad” low-density lipoprotein (LDL) cholesterol, which can contribute to heart disease. The diet has also been shown to reduce the risk of cancer, Parkinson’s disease, and premature death. In 2015, Spanish researchers released a rigorous randomized controlled study of the Mediterranean diet’s effects on cognitive performance. It was part of a larger five-year investigation of the diet’s effects on cardiovascular health, called PREDIMED. Participants were randomly assigned to eat one of the following:

- a Mediterranean diet supplemented with 33 ounces a week of extra-virgin olive oil
- a Mediterranean diet supplemented with an ounce a day of nuts
- a low-fat control diet.

In results published in *JAMA Internal Medicine*, researchers reported that people who ate a Mediterranean diet supplemented with olive oil or nuts had improvements in memory and other cognitive functions compared with those who followed a low-fat diet. The authors speculate that the benefits to cognition likely come from the antioxidant and anti-inflammatory effects of foods like olive oil and nuts.

The Mediterranean diet is relatively easy to implement because it isn’t overly restrictive (see “Sample Mediterranean diet plan”). It’s a generally healthy diet that emphasizes plant-based foods and adds a few key components — like the olive oil and nuts in the PREDIMED study. To start adopting a Mediterranean-style eating plan, try these tips:

- Replace red meat with fish — especially fish like salmon, pollock, catfish, and canned light tuna, which are high in omega-3 fatty acids but low in mercury — at least twice a week.
- Cook with an unsaturated fat like olive oil instead of butter, which consists mostly of saturated fat.
- Fill half of your plate with fruits or vegetables. The more colorful the produce you choose, the more antioxidants and nutrients you’ll consume. Berries, carrots, broccoli, red peppers, oranges, and spinach are all good choices.
- Drink wine (in moderation). A little red wine is good for blood vessels, but moderation is key — one glass a day for women, one or two for men. If you have any chronic health conditions, check with your doctor first to make sure it’s safe for you to drink.
- Make your grains whole grains. Check the labels to ensure that the pastas, breads, and cereals you buy contain 100% whole grain. This means the manufacturer incorporated the most nutritious part of the grain. Oatmeal, quinoa, barley, and rye are some of the healthiest whole grains.
- Grab a handful of nuts. Walnuts, almonds, and other varieties make great snacks because they’re packed with hearty protein that fills you up, plus unsaturated fat.
- Have fruit for dessert. A bowl of berries will give your meals a sweet finale, without adding a lot of fat and calories. Plus, berries are high in antioxidants.

The MIND diet

The aptly named MIND diet is a research-based eating approach developed by Rush University nutritional epidemiologist Martha Clare Morris. It combines elements of the Mediterranean diet and the DASH diet, which reduces high blood pressure, or hypertension, through a produce-rich diet. (DASH stands for Dietary Approaches to Stop Hypertension, and MIND stands for Mediterranean-DASH Diet Intervention for Neurodegenerative Delay.)

Sample Mediterranean diet plan

If you'd like to try the Mediterranean diet, but you aren't sure how to get started, try these sample menus as a guideline:

Monday

Breakfast: Whole-wheat couscous with low-fat milk, strawberries, and cinnamon

Lunch: Tomato and mozzarella sandwich on whole-grain bread

Dinner: Pasta salad with multigrain farfalle, artichoke hearts, roasted red pepper, peas, and chopped mozzarella cheese topped with olive oil and lemon juice

Tuesday

Breakfast: Plain Greek yogurt with raspberries, blueberries, and granola

Lunch: Tuna salad with capers and olives over a bed of kale

Dinner: Chicken kabobs with roasted Brussels sprouts

Wednesday

Breakfast: Omelet with spinach and feta cheese

Lunch: Quinoa salad with chicken breast cubes, feta cheese, cucumbers, and kalamata olives

Dinner: Turkey burger topped with yogurt and cucumber on a whole-wheat bun, with side of potatoes, eggplant, and bell pepper roasted in olive oil and balsamic vinegar

Thursday

Breakfast: Egg whites, spinach, tomato, and mozzarella cheese on multigrain sandwich thins

Lunch: Tomato, cucumber, and white bean salad dressed with olive oil and lemon juice

Dinner: Baked whole-grain pasta with zucchini and mozzarella cheese

Friday

Breakfast: Avocado with feta cheese and lemon juice on toasted rye bread

Lunch: Hummus with whole-wheat pita and sliced vegetables (carrots, peppers, tomato, cucumber)

Dinner: Grilled tuna with olives, capers, tomatoes, and artichoke hearts

Saturday

Breakfast: Oatmeal topped with chopped walnuts, honey, and bananas

Lunch: Panini with roasted red peppers, black olives, zucchini, provolone cheese, and olive oil on whole-grain bread

Dinner: Whole-grain spaghetti topped with shrimp, capers, lemon juice, and baby spinach

Sunday

Breakfast: Frittata with onion, feta cheese, roasted red peppers, and kalamata olives

Lunch: Salad of spinach, grilled chicken, yellow pepper, and feta cheese

Dinner: Grilled salmon with black olives, tomatoes, and whole-wheat couscous

Both of these eating plans reduce cardiovascular and cognitive risks, but Morris and her colleagues fine-tuned their approach based on the latest findings on diet and dementia. For example, like the Mediterranean and DASH plans, MIND emphasizes a plant-based diet with few animal products and saturated fats. But unlike those other diets, MIND recommends eating berries specifically rather than fruit in general, and it emphasizes green leafy vegetables. Studies have shown these fruits and vegetables in particular to be most protective against dementia (see “MIND diet: Foods to include and avoid”).

One big advantage to the MIND diet is that it's

flexible and unrestrictive, making it easy to follow and stick with over time. Even if you don't follow it exactly, you can still see results. A 2015 study published in the journal *Alzheimer's & Dementia* showed the diet helped lower Alzheimer's risk by as much as 53% among those who followed it strictly for an average of four-and-a-half years. But even people who were less rigorous in their adherence saw a 35% risk reduction. In other research, Morris's group found that older adults who stuck with the diet experienced slower mental declines, making them the equivalent of 7.5 years cognitively younger than their peers who were following other diets.



MIND Dietary: Foods to include and avoid

The MIND diet spotlights 10 brain-healthy food groups to include in your daily meals and snacks:

1. green leafy vegetables
2. other vegetables
3. nuts
4. berries, especially blueberries
5. beans
6. whole grains
7. fish
8. poultry
9. olive oil
10. wine.

On the MIND diet, you would typically eat

- at least three servings of whole grains a day
- a salad and one other vegetable a day
- a glass of wine daily
- a snack of nuts on most days
- beans every other day
- poultry at least twice a week
- berries at least twice a week
- fish at least once a week.

The diet also spotlights five unhealthy groups to limit or avoid:

1. red meat
2. butter and stick margarine
3. cheese
4. pastries and sweets
5. fried or fast foods.

One limitation of these studies is that they were observational, meaning the researchers only observed the participants' behaviors — they didn't seek to influence them. The authors say a head-to-head test of the MIND diet against other plans is needed to confirm its benefits to cognition.

Brain-draining foods

While some foods are known for enhancing cognitive fitness, others have the opposite effect. Many of the same foods that are damaging to your heart and blood vessels can also be bad for your brain because they increase your risk for artery clogs that lead to strokes. Therefore, you should limit your intake of these foods:

Red meat, butter, cream, whole milk. All of these animal-based foods are high in saturated fat, which raises blood levels of unhealthy LDL cholesterol. When cholesterol builds up in arteries, it can slow blood flow to the brain or create a blockage that produces a stroke. The link between saturated fat and memory may also relate to a gene called apolipoprotein E, or APOE, which helps control the amount of cholesterol in the blood. People with a variation in this gene called APOE4 are at greater risk for Alzheimer's.



Added sugars. Soft drinks, cookies, cakes, and pies are all loaded with sugar. It's in almost everything we eat, including foods not known for their sweetness, like ketchup and salad dressing. Sugar stimulates the brain's reward center in much the same way addictive drugs do. That's why you may have cravings for sweets. But sugar has also been linked to diabetes and obesity, both of which are detrimental to brain health. Try to cut back on foods with added sugars when possible. Substitute berries for cake, and eat eggs for breakfast rather than a muffin or sweet cereal. To find hidden sources of sugar in packaged foods, check the ingredients list on the package for words like honey, molasses, cane sugar, fruit juice concentrate, brown rice sugar, glucose, corn syrup, invert sugar, and sucrose.

Refined flour. When flour is "refined" or "enriched," that means manufacturers have stripped away the healthiest parts of the grain — the fiber-rich bran and vitamin-rich germ — and then added a few vitamins and other nutrients back in. In the process, they have also created an easy-to-digest foodstuff that quickly floods the bloodstream with glucose. The result is that white flour and products made with it (pasta, bread, crackers, cake) cause blood sugar levels to spike and then plummet, leaving you feeling hungry again soon after you eat them. Eating too many foods made with refined flour can affect your blood pressure and diabetes risk over time. Look for foods labeled "100% whole grain" to maximize the fiber and nutrient content of the grain products you buy.

Trans fat. To increase the shelf life of cookies and other packaged foods, and give fried foods like French fries a satisfying crunch, companies have long added hydrogenated vegetable oils. These fats increase

levels of LDL cholesterol and lower levels of healthy HDL cholesterol. By doing so, they raise the risk for heart disease and strokes. In 2015, the FDA took steps to remove artificial trans fat from the food supply for good by taking it off the GRAS ("generally recognized as safe") list. Manufacturers have until 2018 to complete the process. In the meantime, scan the Nutrition Facts label of packaged foods to see if trans fat is listed.

Diet soda. A 2017 study in the journal *Stroke* linked regular consumption of diet soda to a higher risk of strokes and dementia. However, the reasons for the association are not clear, and the study does not prove cause and effect, so the warning is preliminary.

Supplements and the brain

If foods that are rich in nutrients like antioxidants, B vitamins, and omega-3 fatty acids are good for the brain, it would stand to reason that concentrated supplements of these nutrients would be even better. A number of nutritional supplements sold over the Internet and at drugstores embrace this premise, claiming to improve memory, concentration, and focus. They go by names like Brain Shield, Brain Super Boost, and Focus Formula, and they contain blends of supposedly memory-boosting ingredients, many of which are components of the Mediterranean diet.

The trouble with these products is they're largely untested. Without studies to confirm that they work — and with the potential for side effects — brain supplements may be more trouble than they're worth. Table 1 lists some of the supplements that have been touted for brain health, the evidence, potential side effects, and foods that may be better sources of these nutrients.



Supplements for brain health

Many supplements are touted for cognitive health, but the evidence is not as strong as the marketing might suggest. The same ingredients can be found in healthy foods.

NUTRIENT OR SUPPLEMENT	DOES IT HELP?	POSSIBLE SIDE EFFECTS	FOOD SOURCES
Folic acid	Folic acid is essential to brain function and emotional health. It is a component of DNA and RNA, which are part of the body's genetic material, and is used in cells of the brain and central nervous system. Folic acid also affects the production of neurotransmitters in the brain. It increases nitric oxide in the brain, which protects against oxidative damage. Low folic acid levels have been associated with depression. Supplementation can lower levels of homocysteine—an amino acid linked to heart and blood vessel disease as well as to dementia. Research on whether folic acid supplements improve cognitive function is mixed.	In large doses, folic acid can cause stomach problems, sleep issues, confusion, appetite loss, nausea, and seizures.	Dark leafy greens such as spinach as well as chickpeas, pinto beans, lima beans, asparagus, papaya, avocado, and whole grains.
Ginkgo biloba	Ginkgo biloba has antidepressant effects, and it has been marketed for delaying or preventing cognitive decline. Yet the Ginkgo Evaluation of Memory (GEM) study, the largest randomized controlled dementia prevention trial of the supplement to date, showed that it did not reduce the incidence of dementia or improve memory, language, attention, or other measures of cognitive ability.	Bleeding (especially in people who take blood-thinning drugs or who have bleeding disorders), lowered blood pressure and blood sugar levels, drowsiness.	Ginkgo is not a naturally occurring component of foods.
Omega-3 fatty acids	DHA, an omega-3 fatty acid, is an essential component of brain cells. Low omega-3 levels have been found in people with Alzheimer's disease. Research suggests that diets high in omega-3 long-chain polyunsaturated fatty acids might protect cognitive function. Yet recent studies have concluded that omega-3 supplements don't improve cognitive function in healthy older adults or effectively treat dementia.	Bleeding (especially in people who take blood-thinning drugs or who have bleeding disorders); change in blood sugar, blood pressure, or cholesterol levels; allergic reactions in people who are sensitive to fish or fish oil.	Fatty fish like salmon and tuna, flaxseed, vegetable oils.
Vitamins B6 and B12	Vitamins B6 and B12 are essential for normal brain function as you age. Deficiencies in these B vitamins have been linked to elevated homocysteine levels, which are associated with an increased risk for dementia. Yet in studies, supplements of these vitamins did not improve cognition in healthy middle-aged and older adults.	Vitamin B12 is generally safe. High doses of vitamin B6 can cause peripheral nerve damage, leading to trouble with touch, sensation, and movement. May also cause skin sores, nausea, vomiting, stomach pain, appetite loss, headache, and fatigue.	Vitamin B6: chickpeas, beef liver, tuna, salmon, chicken breast, fortified breakfast cereal. Vitamin B12: clams, beef liver, fortified breakfast cereal, trout, salmon, tuna, milk.
Vitamins E	Vitamin E has antioxidant effects, which could potentially combat the oxidative stress linked to cognitive decline and dementia. When taken in supplement form, vitamin E did not affect cognition in healthy middle-aged and older adults, according to one review of studies. However, other research suggests that people who eat a diet high in vitamin E-rich foods are 25% less likely to develop dementia than those with the lowest vitamin E intake.	Increased bleeding risk, skin reactions, changes in cholesterol levels or insulin resistance.	Sunflower seeds and oil, almonds, hazelnuts, peanut butter, corn oil, spinach, broccoli.