

The MIND Diet



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The MIND Diet

- Progressive mental deterioration in older people has been recognized and described throughout history.
- However, it was not until 1906 that a German physician, Dr. Alois Alzheimer, specifically identified a collection of brain cell abnormalities as a disease.
- One of Dr. Alzheimer's patients died after years of severe memory problems, confusion and difficulty understanding questions.
- Upon her death, while performing a brain autopsy, the doctor noted dense deposits surrounding the nerve cells (neuritic plaques).
- Inside the nerve cells he observed twisted bands of fibers (neurofibrillary tangles). Today, this degenerative brain disorder bears his name, and when found during an autopsy, these plaques and tangles mean a definite diagnosis of Alzheimer's disease (AD).

The Mind Diet



- More than 5 million people in the US are living with Alzheimer's, and this number is expected to rise to as many as **16 million by 2050**
- Alzheimer's is the **6th leading cause of death in the US**
- **More than two thirds** of Americans with Alzheimer's are **women.**

The Mind Diet

- **A new diet**, appropriately known by the acronym **MIND**, could **significantly lower** a person's risk of developing **Alzheimer's disease**, even if the diet is not meticulously followed, according to a paper published online in the journal *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*.
- The "Mediterranean-DASH Intervention for Neurodegenerative Delay" (MIND) diet was developed by **Rush University Medical Center in Chicago by nutritional epidemiologist Martha Clare Morris, PhD**, and her colleagues.
- The study shows that the MIND diet **lowered the risk of AD by as much as 53%** in participants who **adhered to the diet rigorously**, and by about **35% in those who followed it moderately well.**

The MIND Diet

- One of the most exciting things about this is that people who adhered **even moderately to the MIND** diet had a reduction in their risk for Alzheimer's by 35%



The MIND Diet

- **The MIND diet** which took two years to develop, stands for **Mediterranean-DASH Intervention for Neurodegenerative Delay**.
- Researchers modified the Mediterranean and DASH diets based on evidence from animal and human studies looking at nutrition and the brain.
- DASH stands for **Dietary Approaches to Stop Hypertension**.

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- In the study, funded by the National Institute on Aging, researchers at **Rush University Medical Center in Chicago compared the MIND diet with the Mediterranean diet and the DASH diet.**
- Researchers scored the diets on a point system, giving participants points if they ate brain-healthy foods frequently and avoided the unhealthful ones.
- The study was **funded by the National Institute on Aging.** All the researchers on this study were from Rush except for Frank M. Sacks MD, professor of Cardiovascular Disease Prevention, **Department of Nutrition, at the Harvard School of Public Health.** Dr. Sacks chaired the committee that developed the DASH diet.

The MIND Diet

- The MIND diet is a **hybrid of the Mediterranean and DASH (Dietary Approaches to Stop Hypertension)** diets, both of which have been found to **reduce the risk of cardiovascular conditions, like hypertension, heart attack and stroke.**
- Some researchers have found that the two older diets provide **protection against dementia as well.**
- In the latest study, the MIND diet was compared with the two other diets.
- People with **high adherence** to the DASH **and** Mediterranean diets also had reductions in AD — **39% with the DASH diet and 54% with the Mediterranean diet** — but got **negligible benefits from moderate adherence to either of the two other diets.**

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- But **even moderate adherence to the MIND diet** produced significant benefits, which **wasn't the case with the other two diets**.
- The **longer a person follows the MIND food plan, the lower the risk of developing Alzheimer's disease**, researchers found.



The MIND Diet

- This is the first study to relate the MIND diet to Alzheimer's disease
- The MIND diet came about because though the Mediterranean and DASH diets reduce the risk of cardiovascular conditions, like hypertension, heart attack and stroke, some studies also found they also **protect against dementia**
- Where the MIND diet differs is **adherence and results**.

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- In this latest study, the MIND diet, Mediterranean diet and DASH diets were compared.
- When study subjects had high adherence to the DASH and Mediterranean diets, they showed reductions in AD — 39% and 54%, respectively.
- However, with moderate compliance to either diet, there were only negligible benefits.
- But in the MIND diet, **even off and on compliance showed positive results**

The MIND Diet

- The study compared the so-called MIND diet with the popular, heart-healthy **Mediterranean diet and the DASH diet**, which is intended to help control high blood pressure.
- The MIND diet **borrowed significantly from the other two, and all are largely plant-based and low in high-fat foods.**
- But the MIND diet places particular emphasis on eating “**brain-healthy**” foods such as **green leafy vegetables and berries, among other recommendations.**

The MIND Diet

- For the study, published recently in *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, the researchers analyzed the food intake of **923 community-dwelling Chicago residents, ages 58 to 98**.
- Participants were scored on how closely their food intake matched the MIND diet, the Mediterranean diet or the DASH diet. (DASH stands for Dietary Approaches to Stop Hypertension.)
- During a **follow-up period of 4 1/2 years**, 144 participants developed Alzheimer's disease.
- All three diets, when closely followed, offered significant protection against Alzheimer's. **The Mediterranean diet lowered Alzheimer's risk by 54%, the MIND diet by 53% and the DASH diet by 39%.**

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- The **Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND)** diet features 15 dietary components including 10 "brain healthy food groups" including leafy greens, nuts, berries, beans, whole grains, fish, poultry, olive oil and wine



The MIND Diet

- The study is part of a small body of research investigating how **nutrition can improve brain health and stave off the cognitive decline and memory impairment that comes with Alzheimer's** disease and other forms of dementia.
- Experts say there is growing awareness that **lifestyle factors—not just genetics—play a prominent role in the development of Alzheimer's**, and researchers hope to come up with an **optimal diet that will lessen the chances of developing the disease**.
- An estimated 5.1 million people in the U.S. have Alzheimer's, a number expected to grow to **7.1 million by 2025**, according to the Alzheimer's Association.

The MIND Diet

- “One of the more exciting things about this is that people who adhered **even moderately** to the MIND diet had a reduction in their risk for AD,” said Morris, a Rush professor, assistant provost for Community Research, and director of Nutrition and Nutritional Epidemiology. “I think that will motivate people.”
- Morris and her colleagues developed the MIND diet based on information that has accrued from years' worth of past research about what foods and nutrients have good, and bad, effects on the functioning of the brain over time.
- This is the first study to relate the MIND diet to Alzheimer's disease.

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- AD, which takes a devastating toll on cognitive function, is not unlike heart disease in that there appear to be “many factors that play into who gets the disease,” including **behavioral, environmental and genetic components**, Dr. Morris said.
- With **late-onset** Alzheimer’s disease **genetic risk factors are a small piece of the Alzheimer’s puzzle**
- Past studies have yielded evidence that suggests that **what we eat may play a significant role in determining who gets AD and who doesn’t**, Morris said.

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- Only the MIND diet, however, was shown to guard against Alzheimer’s when not followed **strictly**.
- Participants who followed the plan **moderately** well were **35% less likely to develop the disease compared with those with the lowest adherence scores**.
- The MIND diet seemed to help counter the disease even when people **followed only some of the diet’s recommendations**.

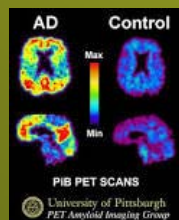
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- The research was observational, not randomized or controlled, which means that it isn't evidence the MIND diet **caused** a reduced risk for Alzheimer's.
- Instead, the research shows there is an **association between the two.**



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- MIND diet **lowered the risk of AD by as much as 53%** in participants who adhered to the diet **rigorously**, and by about **35% in those who followed it moderately well.**



This PiB-PET scan shows a lot of amyloid beta ($A\beta$) in the brain of a person with Alzheimer's. PiB stands for *Pittsburgh compound B (PiB)* which is a type of dye that is injected into a person before the scan is done. The amyloid beta absorbs the PiB; when the PET scan is done the areas where there is PiB *fluoresces* (glows). PiB-PET scans are now being used in research to detect amyloid beta ($A\beta$) in the *preclinical phase* (before there are any symptoms).

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- The MIND diet emphasizes **10 brain-friendly food groups**: green leafy vegetables, other vegetables, nuts, berries, whole grains, beans, fish, poultry, olive oil and wine.
- **Blueberries and strawberries** were called out as especially **powerful in protecting the brain**.
- It also identifies five **unhealthy food categories**: red meats, fried and fast foods, butter and stick margarine, cheese and pastries and sweets.

10 Foods to Eat

- 1. **Green leafy vegetables**: one salad daily
- 2. **Other vegetables**: one serving daily
- 3. **Nuts**: one serving daily
- 4. **Berries**: two or more servings a week, blueberries and strawberries preferred
- 5. **Beans**: Three-four servings per week
- 6. **Whole grains**: three servings daily
- 7. **Fish**: one or more servings per week
- 8. **Poultry**: at least two servings per week
- 9. **Olive oil**: This should be your primary oil
- 10. **Wine**: one glass per day

5 Foods to Avoid

- 1. **Red meats**: eat rarely
- 2. **Butter**: Eat no more than a tablespoon a day; never eat margarine
- 3. **Cheese**: one serving or less per week
- 4. **Pastries and sweets**: Avoid all
- 5. **Fried or fast food**: Less than one serving per week



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- The MIND diet **includes at least three servings of whole grains, a salad and one other vegetable every day — along with a glass of wine.**
- It also involves **snacking most days on nuts and eating beans every other day or so**, poultry and berries at least twice a week and **fish at least once a week.**
- Dieters must limit eating the designated unhealthy foods, especially butter (less than 1 tablespoon a day), cheese, and fried or fast food (less than a serving a week for any of the three), to have a real shot at avoiding the devastating effects of Alzheimer's, according to the study.

The MIND Diet

- Berries are the only fruit specifically to make the MIND diet. **“Blueberries are one of the more potent foods in terms of protecting the brain,”** Morris (head researcher) said, and strawberries have also performed well in past studies of the effect of food on cognitive function.



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- The MIND diet was not an intervention in this study, however; **researchers looked at what people were already eating.**
- Participants earned points if they ate brain-healthy foods frequently and avoided unhealthy foods.
- The one exception was that participants got one point if they said olive oil was the primary oil used in their homes.



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- The study enlisted volunteers already participating in the ongoing **Rush Memory and Aging Project (MAP)**, which began in 1997 among residents of Chicago-area retirement communities and senior public housing complexes.
- An optional “food frequency questionnaire” was added from 2004 to February 2013, and the MIND diet study looked at results for 923 volunteers.
- A total of 144 cases of AD developed in this cohort

The MIND Diet

- Participants who **changed their diets somewhere along the line** — on doctor’s orders or after a stroke for example— were left out of the research analysis.
- Then, “the association became stronger between the MIND diet and [favorable] outcomes” in terms of AD, Morris said. “That probably means that people who eat this diet **consistently over the years** get the best protection.”
- In other words, **it looks like the longer a person eats the MIND diet, the less risk that person will have of developing AD**, Morris said.
- As is the case with many health-related habits, including physical exercise, she said, **“You’ll be healthier if you’ve been doing the right thing for a long time.”**

The MIND Diet

- The study **controlled for genetic predisposition, physical activity, cognitive activity and education.**
- A further analysis **controlled for various chronic medical conditions.**
- It was the first study published on the MIND diet, and researchers **expect additional small changes to be made.**
- **Cocoa and caffeine**, for example, could possibly be added to the diet with more research, Dr. Morris said.

The MIND Diet

- “The **MIND diet may be a triple bonus.** It reduces the risk for **dementia, strokes and heart disease**,” said Murali Doraiswamy, a professor of psychiatry at Duke University Medical Center in Durham, N.C., and an Alzheimer’s expert.
- Dr. Doraiswamy, who wasn’t involved in the MIND diet study, said a randomized controlled study is needed and further research can look at whether combining the diet with lifestyle interventions like **exercise and meditation could provide additional benefits.**

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- Study, which was published in *Frontiers in Aging Neuroscience*, researchers at the Cleveland Clinic in Ohio recruited almost 100 older men and women, aged 65 to 89, many of whom had a family history of Alzheimer's disease.
- In this five year follow-up study involving 4,615 individuals free from cognitive impairments, it was shown that high levels of physical activity were associated with a 42% reduction in the risk of cognitive impairments in the future, suggesting that increased physical activity can benefit brain health.
- Similarly, high levels of physical activity were associated with a 50% reduction in AD risk and a 37% reduced risk of dementia from any other cause. This study has helped to lay the foundation for further research into the role of regular exercise in preventing the cognitive decline in older individuals.

- In a recent six-month, randomized, controlled clinical trial, it was shown that **regular aerobic exercise can have a positive effect on executive functioning and other health parameters.**
- This recent study followed 30 older individuals with an average age of 70 years for six months, with each participant randomized to either a high-intensity aerobic training (at 75-85% of one's heart rate reserve) or stretching (control) group.
- Of these groups, the **high-intensity training group was superior to the stretching group for overall functional cognition, glucose metabolism, cardiorespiratory fitness, and body composition.**
- In addition, there appeared to be a gender specific response among the exercise group, showing that female participants were more likely to receive benefit from the six month protocol than the men.

- Another form of exercise that is beneficial for individuals with dementia and Alzheimer's disease is **resistance training**.
- This type of exercise, also known as strength training, is suitable for a wide range of individuals and is something that is **beneficial for maintaining or improving activities of daily living**.
- A recent 16 week longitudinal study investigated the effects of a strength training program among 34 individuals with AD on daily activities.
- It was found that a **regular strength training program improved such daily activities as climbing stairs, walking and moving around the house, getting up from the floor, and putting on socks**. Improvements in such small tasks significantly improve the quality of life of older person, especially if he or she is suffering from Alzheimer's.



- Strength training is also the best known way to **increase muscle mass in the human body**.
- Studies have shown that **AD is associated with the loss of muscle mass**. This underscores the importance of regular strength training for individuals at risk or diagnosed with AD.
- Studies exploring the possible association between muscle mass and the prevalence of AD have shown similar results.
- In a recent study examining 900 individuals without dementia it was found that there was a **decreased risk of dementia and AD when the individual has greater muscular strength**. This suggests that a lifelong program dedicated to exercise and resistance training can help prevent and reduce the risk of developing neurodegenerative disorders.



The MIND Diet

- When resistance training and aerobic conditioning are **combined**, the effects are improved even further.
- Research has shown that **combining the two forms of exercise can be a great way to prevent cognitive decline.**
- Current research on exercise programs consisting of strength and aerobic training has shown the benefits of one year exercise programs among individuals who have mild to moderate dementia.
- In addition, individuals in this study with a higher cardiorespiratory fitness, or overall fitness level, showed **lower levels of atrophy in the brain due to an exercise program, thus demonstrating that exercise can help maintain brain size.**

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- Regular exercise which incorporates walking, jogging, biking, swimming, stretching, and skipping can all have benefits to help slow the progression of the condition.
- In addition, **regular resistance training at least two days per week at a moderate intensity** of at least 50 percent of one's maximum can have lasting effects on brain health.
- Understanding the importance of being active for overall health is crucial at any age, but it is **especially important for older adults. Creating a daily routine inclusive of aerobic and strength training can help maintain brain size and efficiency for the overall prevention of Alzheimer's disease risk.**

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- A Swedish study is currently investigating lifestyle's effect on developing dementia.
- FINGER, for Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability, is a randomized controlled study with 1,260 at-risk participants ages 60 to 77.
- Subjects assigned to an intervention group were given a diet similar to the Mediterranean diet, an exercise program, cognitive training and management of metabolic and vascular risk factors such as diabetes and hypertension
- A control group was given general health advice.

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- Initial results, based on the study's first two years, were published recently in the Lancet.
- The researchers found the **intervention diet had clear benefits in areas including memory function and processing speed.**
- The control group who did not have a diet intervention had a **30% higher risk for cognitive impairment**

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- The next step would be to separate out the effects of different lifestyle interventions and see how interventions may affect people depending on individual genetic makeup
- For example, there is evidence that **people with a certain variation of the apoe4 gene**—a risk factor for developing dementia—are more vulnerable to unhealthy diets.
- Data from the Finger study could indicate whether such people might especially benefit from a healthy diet.

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- Most cases of Alzheimer's are the **late-onset form**, which **develops after age 60**.
- The causes of late-onset Alzheimer's are not yet completely understood, but they likely include a **combination of genetic, environmental, and lifestyle factors** that influence a person's risk for developing the disease.
- The single-gene mutations directly responsible for early-onset Alzheimer's disease do not seem to be involved in late-onset Alzheimer's.

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- Researchers **have not found a specific gene** that causes the late-onset form of the disease.
- However, one **genetic risk factor that does appear to increase a person's risk of developing the disease** is related to the **apolipoprotein E (APOE)** gene found on chromosome 19.
- APOE contains the instructions for making a protein that helps carry cholesterol and other types of fat in the bloodstream.
- APOE comes in several different forms, or alleles. **APOE ϵ 2, APOE ϵ 3, and APOE ϵ 4**—are the alleles that occur most frequently.

What Do Those Numbers Mean? — Apo E

- Apo E Genotype – What is it?
- Gene found on DNA
 - Apo E is an inherited trait
 - **Like blue eyes, it never changes**
 - **You inherit 1 Apo E protein from Mom and 1 from Dad**
 - There are 3 types of Apo E genotypes
 - Apo E partially influences how you respond to dietary fat
 - Your Apo E type helps determine the right nutrition plan for you

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- **APOE ϵ 2** is relatively rare and **may provide some protection against the disease**. If Alzheimer's disease occurs in a person with this allele, it develops later in life than it would in someone with the APOE ϵ 4 gene.
- **APOE ϵ 3**, the most common allele, is believed to play a neutral role in the disease—neither decreasing nor increasing risk.
- **APOE ϵ 4** is present in about 10 to 15% of the population and in about **40% of all people with late-onset Alzheimer's**.
- People who develop Alzheimer's are **more likely to have an APOE ϵ 4 allele than people who do not develop the disease**.

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- Dozens of studies have confirmed that the **APOE ϵ 4 allele increases the risk of developing Alzheimer's**, but how that happens is not yet understood.
- These studies also help explain some of the variation in the age at which Alzheimer's disease develops, as people who inherit one or two APOE ϵ 4 alleles tend to develop the disease at an earlier age than those who do not have any APOE ϵ 4 alleles.

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- **APOE ϵ_4** is called a **risk-factor gene** because it **increases a person's risk of developing the disease**.
- However, inheriting an APOE ϵ_4 allele **does not** mean that a person will definitely develop Alzheimer's.
- Some people with one or two APOE ϵ_4 alleles never get the disease, and others who develop Alzheimer's do not have any APOE ϵ_4 alleles.

Apo E Review of Literature[†]

It is necessary to monitor your patients' therapeutic responses and modify your treatments accordingly.

		Apo E2		Apo E3		Apo E4	
Genotype		2/2	2/3	3/3	2/4	3/4	4/4
Population Frequency		1%	10%	62%	2%	20%	5%
Dietary Contribution	Soluble Fiber ¹	↓↓ LDL		↓ LDL	↓ LDL		
	Fish Oil ²	↓ TG ↓ small dense LDL ↑ HDL	↓ TG ↓ small dense LDL ↑ HDL		↓ TG ↓ small dense LDL ↓ HDL may ↑ LDL		
	Plant Sterols ³	↓ LDL ↓ Apo B		↓ LDL ↓ Apo B		↓ LDL ↓ Apo B	
	Soy Protein ⁴	↓ Apo B		↓ Apo B		↓ Apo B	
Dietary Fat and Alcohol Effects	Low Fat Diet ^{5,6}	↓ LDL ↑ small dense LDL	↔ small dense LDL		↓↓↓ LDL ↓ small dense LDL		
	Moderate Fat Diet ⁶	↔ LDL ↔ small dense LDL		↓ LDL ↓ small dense LDL	↓ LDL ↑↑ small dense LDL		
	Moderate Alcohol ⁷	↑ HDL ↓ LDL		↑ HDL		↓ HDL ↑ LDL	

Legend: ↓ decreases ↑ increases ↔ no change ↓↓ significantly decreases ↑↑ significantly increases

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- Suzanne Craft, a professor at Wake Forest School of Medicine in Winston-Salem, N.C., also studies the effects of diet on Alzheimer's disease symptoms.
- In a 2011 randomized controlled study published in the *Archives of Neurology*, Dr. Craft and colleagues assigned about half of 50 older people to a Western diet relatively high in saturated fat and sugar for a month.
- The other half followed a more heart-healthy diet with the same number of calories. Meals were delivered to the participants.

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- An analysis of the participants' spinal fluids found that the **Western diet increased inflammation and levels of beta-amyloid proteins**, which play a role in the development of Alzheimer's.
- "If you think of the impact of eating with these kinds of patterns over years and years, it's not hard to see how diet can have a profound effect on your risk for Alzheimer's," said Dr. Craft.

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- A follow-up study currently under way, involving 80 people age 45 to 65 years old, is **comparing the diets' effects on blood flow in the brain.**
- The researchers are checking for **biomarkers** that might indicate early changes that raise a person's risk for Alzheimer's.



The MIND Diet

- Another study led by Gene Bowman of the Oregon Health & Science University in Portland published in the journal *Neurology*
- The average age of study participants was 87
- And 42 of the subjects underwent MRI scans to measure the overall size of their brains.
- Those who tested **high in omega-3 fatty acids and vitamin D**, which are commonly found in fish, and in vitamins C, E and B, which are often found in vegetables, were **less likely to have brain shrinkage** and other abnormalities associated with Alzheimer's disease, and were more likely to **score higher on the memory and thinking tests**

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- The study found that people with diets **high in trans fats** - often found in fast, frozen and processed foods and in baked goods - **were more likely to have brain shrinkage and lower scores on thinking and memory tests.**
- The study generated huge interest not only for its basic findings but also for how the study was conducted.
- Previous studies have relied on the study participants to recall foods eaten over the last year. But the OHSU study **measured the nutrients in study participants' blood** as an objective reflection of dietary intake.

Components of the MIND Diet:



Leafy green vegetables: At least 6 servings/week



- One serving: $\frac{1}{2}$ cup cooked or 1 cup raw (e.g., salad greens)
- Eating plenty of vegetables has been linked to a slower rate of cognitive decline in older adults, but leafy greens (e.g., **spinach, kale, Swiss chard, beet greens, collards, rapini, broccoli, arugula, Romaine lettuce, leaf lettuce**) seem to offer the greatest protection.
- Leafy greens are excellent sources of vitamin K, folate, beta-carotene and lutein, nutrients thought to help preserve brain functioning. (You'll get more beta-carotene and lutein if you eat your greens cooked rather than raw.)

Leafy Greens

- The researchers analyzed green leafy vegetables in relation to cognitive decline.
- Participants who ate **one to two servings of green vegetables a day** had a **“dramatic decrease in the rate of cognitive decline”** compared with people who ate fewer greens, said Dr. Morris.
- “It was about the **equivalent of being 11 years younger in age,**” she said.

Other vegetables: At least 1 serving/day

- *One serving: ½ cup cooked or raw vegetables*
- In addition to salad greens and green leafy vegetables, include other green vegetables (e.g., **asparagus, green beans, green peppers**), orange (e.g., **carrots, sweet potato, butternut squash**), yellow (e.g., **yellow peppers**), red (e.g., **red peppers, tomato, beets**), purple (e.g. **eggplant, purple cabbage**) and white/tan (e.g., **onions, garlic, cauliflower, mushrooms**) to consume a wide range of protective phytochemicals.



Berries: At least 2 servings/week

- *One serving: ½ cup*
- Berries are rich in polyphenols, phytochemicals that protect brain cells by fighting free-radical damage, reducing inflammation and removing toxic proteins that accumulate with age. **Blueberries and strawberries appear to be most potent in terms of brain health.**



Berries

- Fruits, a common recommendation in heart-healthy diets, haven't been shown to slow cognitive decline or prevent dementia, but berries, and especially blueberries, have, Dr. Morris said.
- The MIND diet calls for eating **berries at least two times a week** and doesn't include recommendations for other types of fruit.



Nuts: At least 5 servings/week

- *One serving: 1 ounce, about ¼ cup*
- Nuts (all types) help **lower elevated blood pressure and LDL (bad) cholesterol and guard against Type 2 diabetes**, factors that **contribute to memory loss and Alzheimer's disease**. Nuts are a good source of vitamin E; higher vitamin E levels are linked to less cognitive decline as we age.
- **Walnuts may be the king of nuts when it comes to brain health**. Research suggests **eating more walnuts can help improve memory**, concentration and the speed at which your brain processes information. Walnuts deliver polyphenols (like berries) and an omega-3 fatty acid called alpha linolenic acid.



Legumes: At least 4 servings/week

- *One serving: ½ cup cooked*
- Lentils and beans (e.g., **kidney beans, pinto beans, black beans, chickpeas**), packed with low glycemic carbohydrates, provide a steady stream of fuel (glucose) to the brain. Plus, adding beans to your diet can **help lower blood pressure and cholesterol.**



Whole grains: At least 3 servings/day



- *One serving: 1 slice 100-per-cent whole-grain bread, ½ cup cooked brown rice, quinoa, whole-grain pasta, oatmeal, 1 cup 100-per-cent whole-grain, ready-to-eat breakfast cereal*
- Foods that promote a healthy cardiovascular system, such as whole grains, are also good for your brain.
- That's because your **heart and blood vessels supply nutrient- and oxygen-rich blood to the brain.**
- If your brain doesn't get **the blood flow it needs**, it can impair your memory and thinking abilities.

Fish: At least 1 serving/week

- *One serving: 3 ounces cooked*
- Oily fish such as **salmon, trout, sardines and herring** are plentiful in DHA, an **omega-3 fatty acid essential for brain function**.
- A higher intake of DHA is thought to slow brain aging and improve memory and thinking skills. It may also help prevent the build-up of an Alzheimer's-related protein called beta amyloid.



Poultry: At least 2 servings/week

- *One serving: 3 ounces cooked*
- As part of a healthy eating pattern, eating more **poultry: chicken, turkey** – and less red meat – is associated with a lower risk of Alzheimer's disease.



Olive oil: Use as your primary cooking oil

- Olive oil is a rich source of monounsaturated fat, the type that helps **reduce inflammation and prevents blood-vessel dysfunction**. Extra-virgin olive oil also contains oleocanthal, a phytochemical that may boost production of **two key enzymes believed to be critical in removing beta-amyloid from the brain**.



Wine: One serving/day

- *One serving: 5 ounces*
- Studies suggest that **one glass of wine per day** helps preserve memory and reduces Alzheimer's risk.
- Low levels of alcohol are thought to have **anti-inflammatory effects** in the brain. Too much alcohol, however, can damage the brain.



Limit 'brain-unfriendly foods'

- To get a top MIND diet score you must also **limit**:
- **butter/margarine to less than 1 tablespoon/day,**
- **fast or fried food less than once/week,**
- **red meat fewer than four times/week,**
- **cheese less than once/week and**
- **pastries and sweets less than five times/week.**

Resources

