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Dietary Approaches to Support Brain Health in Aging

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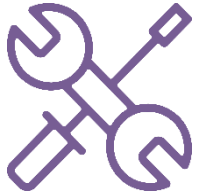

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This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, and the Office of Military Family Readiness Policy, U.S. Department of War under Award Number 2023-48770-41333.

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Today's Presenter

Jenna Anding, Ph.D., RD, LD

Professor & Extension Specialist
Senior editor – Journal of Extension
Department of Nutrition
Texas A&M AgriLife Extension Service

About

Dr. Anding has more than 25 years of experience in developing and evaluating Extension education programs on topics that include food preservation, food safety, and nutrition.

Dietary Approaches to Support Brain Health in Aging

Jenna Anding, PhD, RDN, LD
Professor & Extension Specialist

TEXAS A&M AGRILIFE EXTENSION

In this Session

- Trends in aging
- What we can do to promote brain health/cognition as we age
  - Diet

What is brain health?

Brain health refers to how well a person's brain functions across several areas.

Motor function
Controlling movements and balance

Sensory function
Seeing, hearing, tasting, and smelling

Tactile function
Feeling and responding to sensations of touch, including pressure, pain, and temperature

Cognitive health
Thinking, learning, and remembering

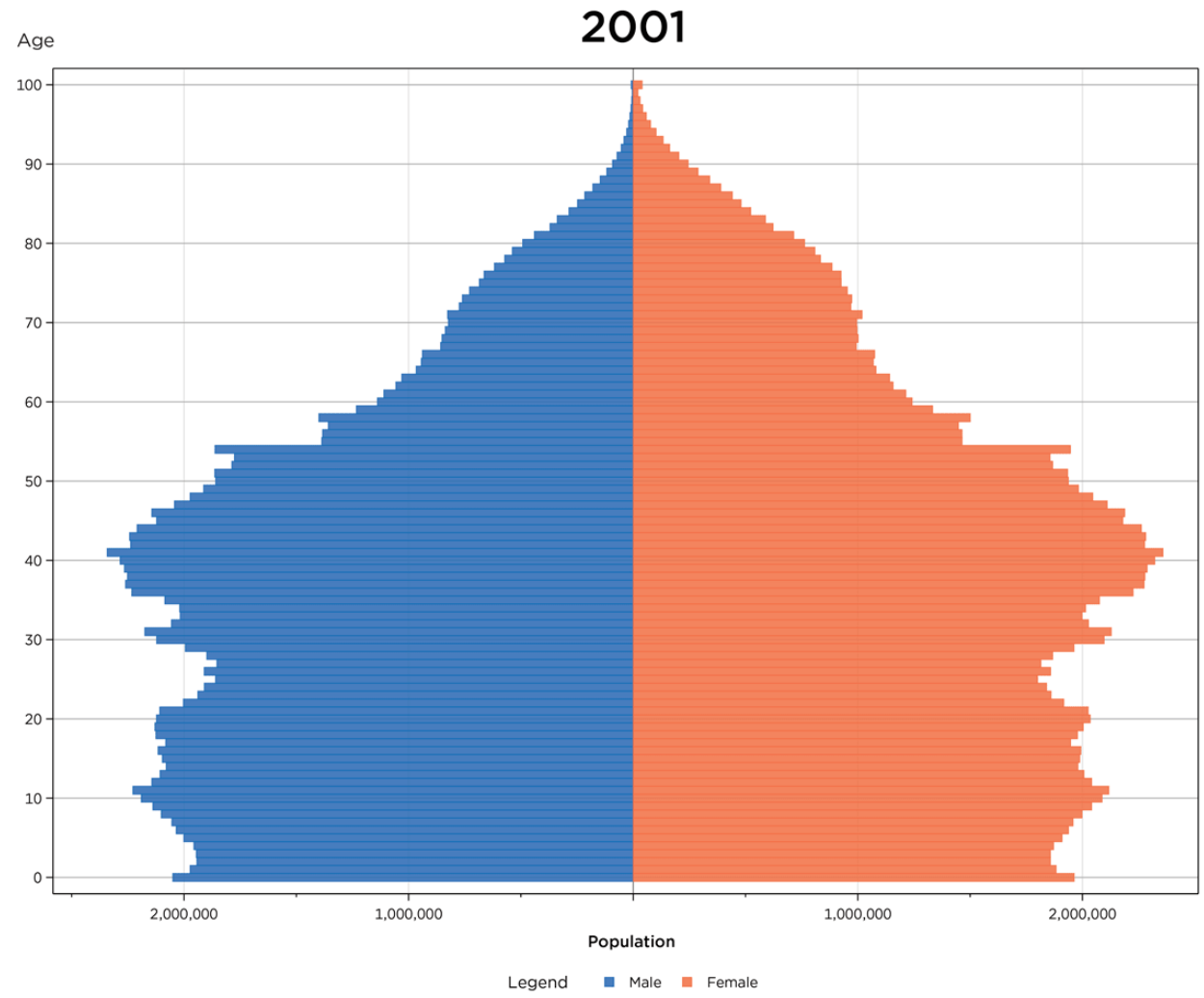
Emotional function
Interpreting and responding to emotions

Learn more about keeping your brain healthy as you age: **www.nia.nih.gov/brain-health**.

NIH National Institute on Aging

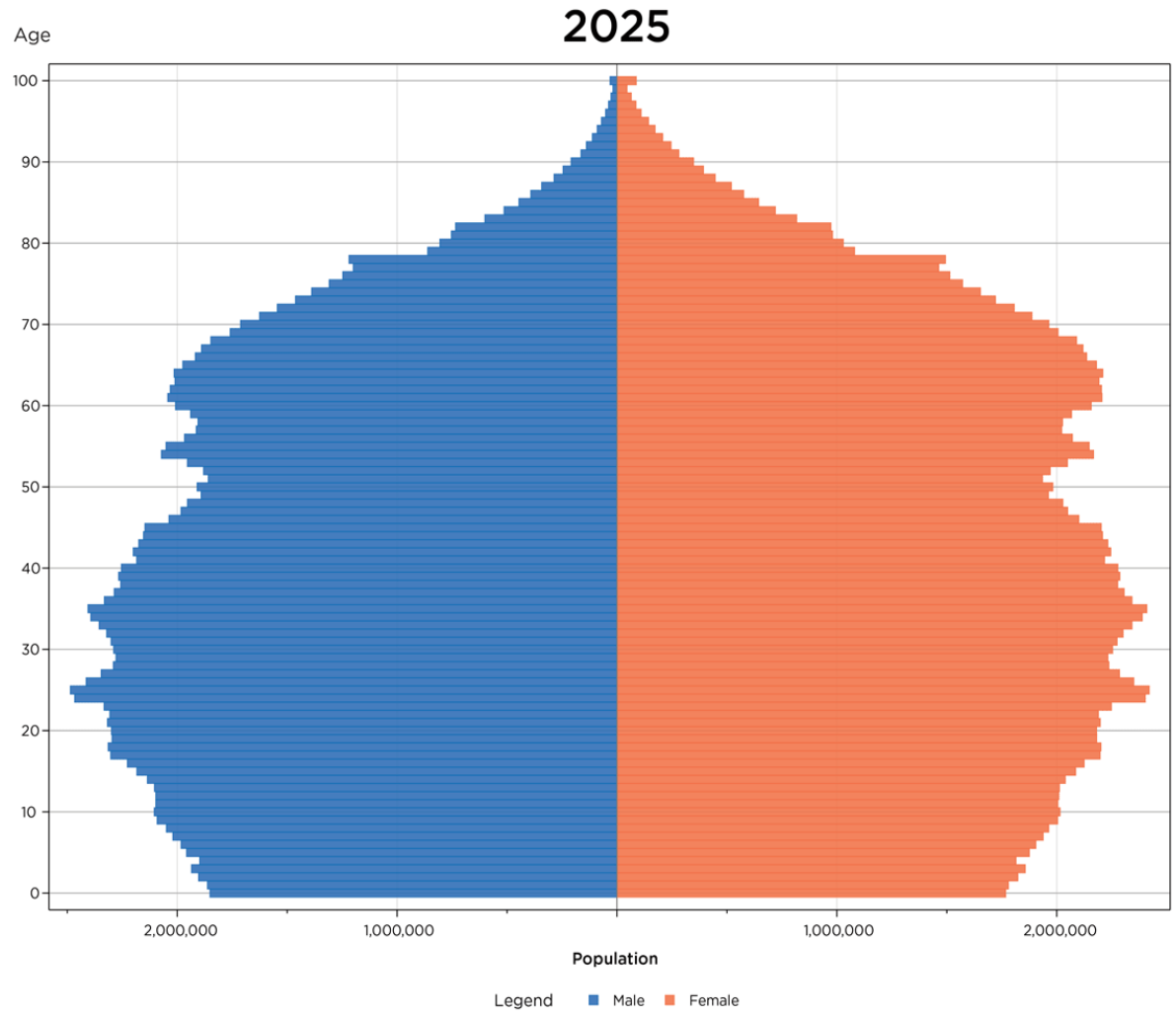
Our country is getting older

Figure 3.
U.S. Resident Population Pyramid: 2001–2025



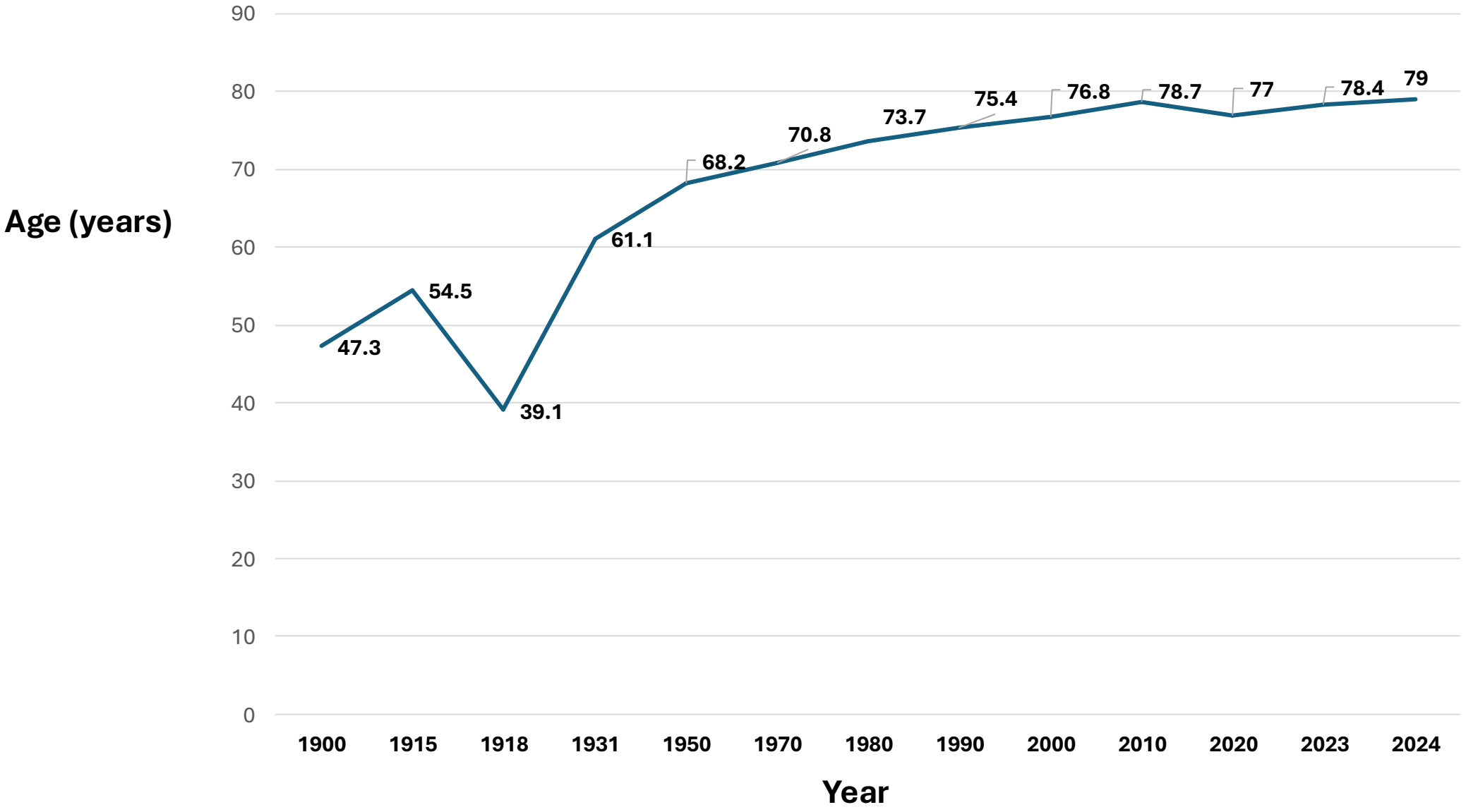
Source: U.S. Census Bureau, 2000-2020 Intercensal Estimates and Vintage 2025 Population Estimates.

Figure 2.
U.S. Resident Population Pyramid: 2025



Source: U.S. Census Bureau, Vintage 2025 Population Estimates.

Average Life Expectancy



Source: Centers for Disease Control and Prevention, National Center for Health Statistics

Aging vs Mild Cognitive Impairment vs Dementia

Aging

- Body and brain may gradually slow, but intelligence remains relatively stable

Mild Cognitive Impairment (MCI)

- Notable problems with memory or other core brain functions but **not sufficient to interfere with daily life**

Dementia

- Range of neurodegenerative brain disorders causing severe mental decline that **interferes with daily life; most common form is Alzheimer's Disease**

Leading causes of death in the United States

2000

1. Heart disease
2. Cancer
3. Stroke
4. Chronic lower respiratory disease
5. Accidents (unintentional)
6. Diabetes
7. Influenza and pneumonia
8. **Alzheimer's disease**
9. Kidney disease
10. Septicemia

2024

1. Heart disease
2. Cancer
3. Accidents (unintentional)
4. Stroke
5. Chronic lower respiratory disease
6. **Alzheimer's disease**
7. Diabetes
8. Kidney disease
9. Liver Disease/Cirrhosis
10. Suicide

Source: Centers for Disease Control and Prevention

Alzheimer's Disease (AD)

- Most common form of Dementia (7.4 million in the US)
- In the U.S., someone is diagnosed with AD every 65 seconds.
  - Women have a higher risk than men
  - Older Black American and Hispanics more than Whites and Asian Americans
- 74% of people with AD are 75 years of age or older
- 6th leading cause of death in the US
  - 1 in every 3 older Americans die with some form of dementia
- Cost of Alzheimer's and other forms of dementia are estimated at more than $380 billion

Source: 2026 Alzheimer's Disease Facts and Figures, Alzheimer's Association.

Accessed at: https://www.alz.org/alzheimers-dementia/facts-figures

WHAT ARE THE RISK FACTORS FOR ALZHEIMER'S DISEASE AND COGNITIVE DECLINE?

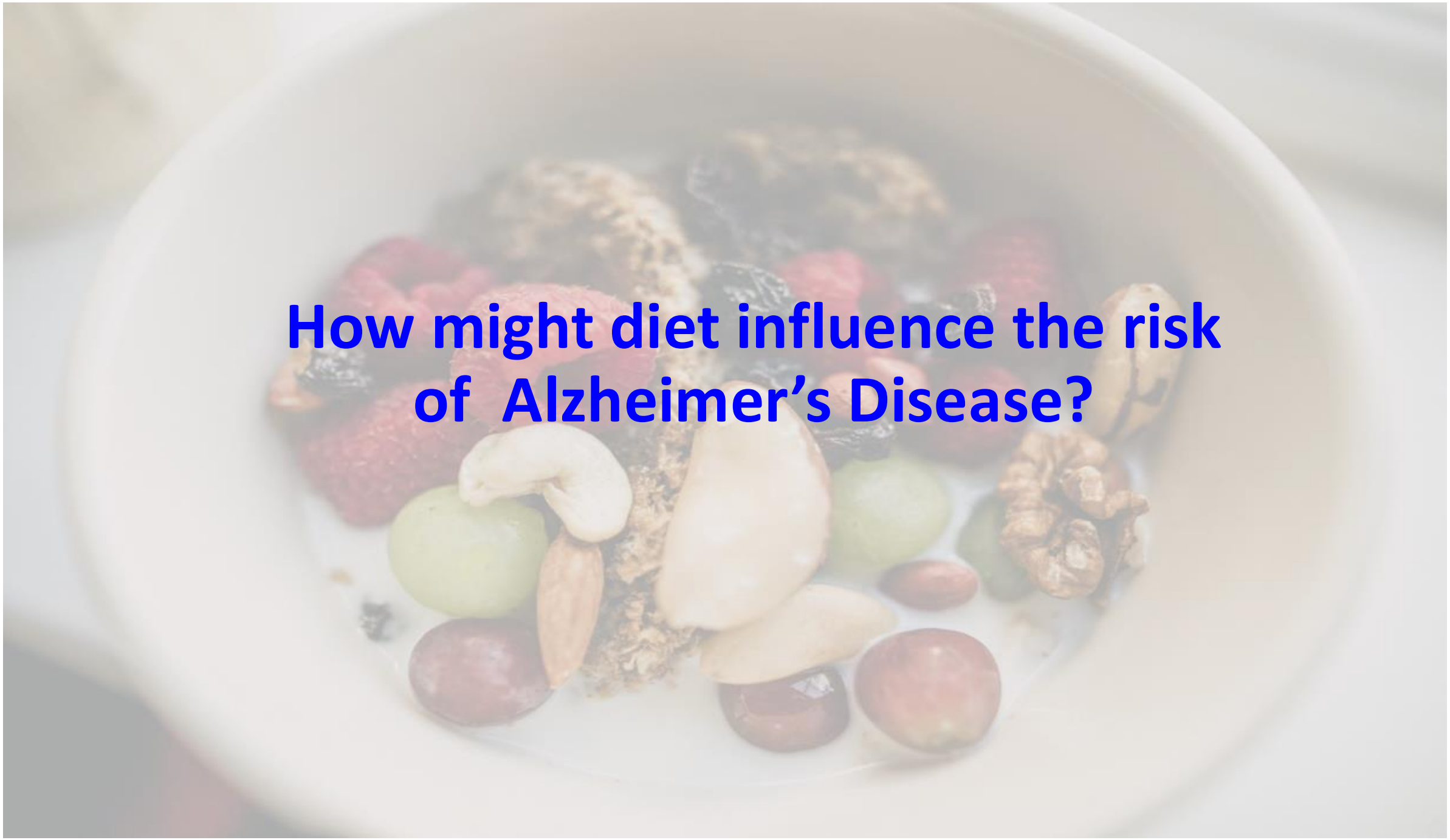
Image generated with Microsoft copilot

Risk factors for Alzheimer's Disease

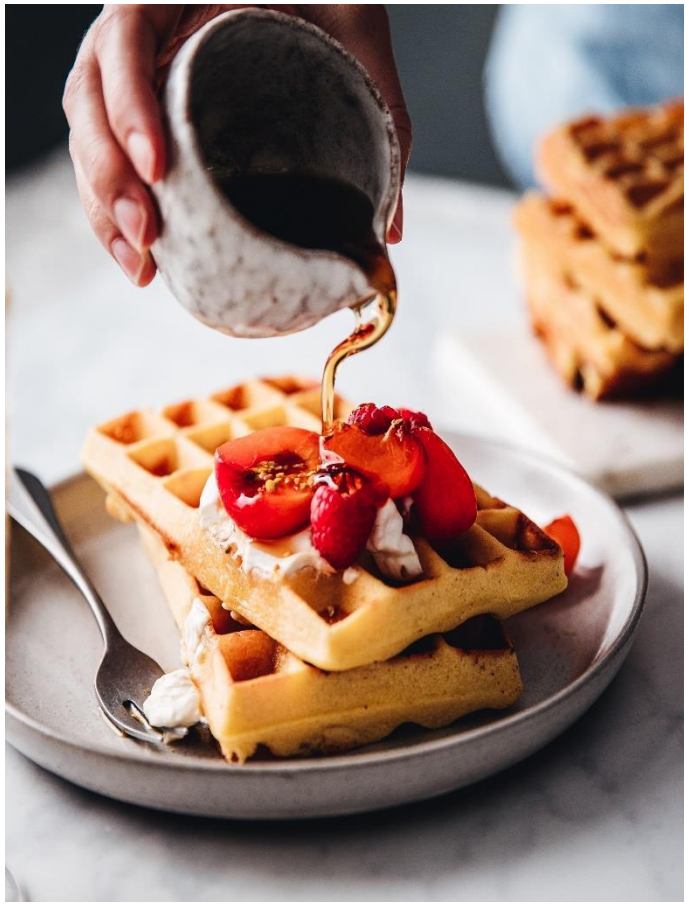
- Age (esp. 85 years and older)
- Family History
- Genetics
- Education
- Sensory loss (untreated)
- Heart disease (high LDL-C)
- Depression
- Traumatic brain injury
- Physical inactivity
- Smoking
- Diabetes
- Hypertension
- Obesity
- Excessive alcohol consumption
- Social isolation
- Air pollution
- Poor sleep/sleep quality
- Diet

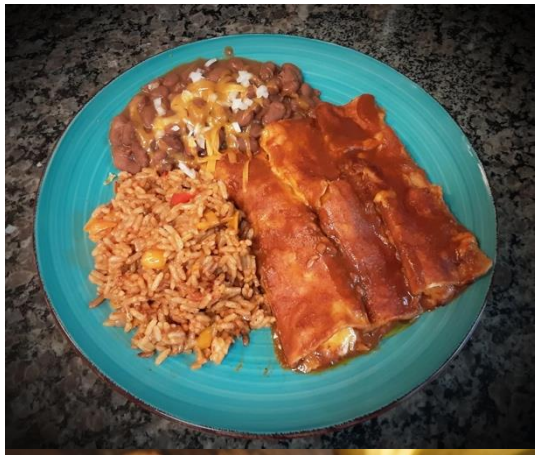
Alzheimer's disease begins up to 20 years before symptoms appear.

Sources: Livingston G. et al., Dementia prevention, intervention, and care: 2024 report of the Lancet standing Commission, Lancet, 2024.
Accessed at: https://www.thelancet.com/action/showPdf?pii=S0140-6736%2824%2901296-0 and 2026 Alzheimer's Disease Facts and Figures, Alzheimer's Association.



How might diet influence the risk of Alzheimer's Disease?





Let’s chat: How would you describe a typical American diet?

What components of a healthy diet might help prevent dementia?

- Antioxidant vitamins and minerals
  - Vitamins C & E
  - Beta carotene (Vitamin A)
  - Selenium and Zinc
- Phytonutrients
- Healthy fats
- B-vitamins
  - B_{12}
  - Folic acid

Image generated with Microsoft Copilot

Antioxidants

- Protect against free radicals; reduce inflammation in the body
  - Imbalance of free radicals and antioxidants can lead to oxidative stress
- May be ***associated*** with a reduced risk for Alzheimer's disease
- A 2021 systematic review of published research found an overall positive impact of antioxidant-rich plant foods on *cognition*.
- A meta-analysis of 52 studies found that patients with Alzheimer's disease had lower blood levels of beta-carotene, lycopene, lutein, Vitamins, A, C, and E compared to individuals without the disease
- A 2025 meta-analysis found that consuming at least 75 mg of Vitamin C per day was linked to a 14 to 40% risk reduction for Alzheimer's disease.
- Choose vegetables and fruits (red, orange, dark green), citrus fruits, berries, whole grains, nuts, seeds, and vegetable oils as part of a healthy diet.

Source: Stefaniak, O. et al., *Nutrients*, 2022; Baroni, L. et al, *Antioxidants*, 2021; Mullan K., et al., *J Alzheimers Disease*, 2018; Hu et al., *Aging Clinical and Experimental Res*, 2025

Polyphenols

- A class of phytochemical; Strong antioxidant and anti-inflammatory
- Berries, citrus, vegetables, tea (green), certain spices, nuts, cocoa, red wine.
  - Cocoa flavanols **may** help improve cognitive function in older adults
  - Blueberries have been shown to improve performance on some cognitive tests but not others
  - Consuming strawberries more than 1x a week was **associated** with a 32% reduced risk of Alzheimer's.
  - A 2021 study of older adults found that consuming 24 grams of freeze-dried strawberries a day for 90 days led to improved cognition.
  - Research regarding low-moderate alcohol and Alzheimer's disease is mixed.
    - Excessive alcohol consumption (>14 drinks/week) may increase risk for dementia.

Sources: Gomez-Pinilla and Nguyen. *Nutritional Neuroscience*, 2015; Coley, Vaurs, and Andrieu. *Clini Geriatr Medicine*, 2015; Travica et al. *Brain, Behavior, and Immunity*, 2019; Langballe et al. *European Journal of Epidemiology*, 2015; Alonso-Alonso, M. *American Journal of Clinical Nutrition*, 2015; Agarwal, P. et al. *Strawberry Consumption Associated with Reduced Alzheimer's Dementia Risk.* Nutrition 2019 conference, Baltimore, MD.; Paloma K, et al. *Plant Foods for Human Nutrition*, 2020; Miller MG et al. *British Journal of Nutrition*, 2021; Zieba et al., *Beverages*, 2025; Drouka et al, *European J of Nutr*, 2025; Zhang et al., *Internal Medicine Journal*, 2025; Hayibor et al., *Alcohol Clinical & Experimental Research*, 2026.

Healthy Fats

- Diets rich in omega-3 fatty acids are beneficial for health
  - ↓ inflammation
  - ↓ risk for heart disease and autoimmune diseases
- Omega-3 fatty acids have been **linked** with improved brain health and the slowing down of cognitive decline
  - Has not been shown to be a treatment for Alzheimer's disease; not sure if they prevent cognitive decline
- High fat diets that consist of omega-6 fats, saturated fats, and trans fats **have been associated** with poor cognitive function and possibly an increased risk for Alzheimer's disease.
- Food vs. Supplement debate (omega-3) continues
- Use of ketogenic diets as a treatment/prevention model are being explored

Sources: Wei et al., American Journal of Clinical Nutrition, 2023; Gustafson et al., *Alzheimers Dement*, 2020; Hoost SS, et al., *Journal of Prevention of Alzheimer's Disease*, 2025; Burckhardt et al., *Cochrane Database Syst Rev*., 2016; Andrieu et al., *Lancet Neurol*, 2017; Watanabe and Tatsuno, *Expert Review of Clinical Pharmacology*, 2017

B-vitamins (folate, B_6, and B_{12})

- Homocysteine – a type of amino acid found in the blood
- High homocysteine levels in the blood are **linked** with increased risk for heart disease as well as cognitive decline
- B-vitamins (B_6, B_{12}, and folate) can help lower homocysteine levels in the blood
  - B_6 include chickpeas, potatoes, bananas, and fortified cereals
  - B_{12} include beef, fish, clams, and fortified cereals
  - Folate include liver, spinach, peas, fortified cereals, asparagus, and Brussels sprouts
- Supplements may reduce homocysteine levels but have not been proven effective in preventing or delaying the onset of dementia.

Source: McCleery et al. *Cochrane Database Syst Rev*, 2018; Zhang et al., *Journal of Geriatric Psychiatry and Neurology*, 2016; Kwok et al. *Clinical Nutrition*, 2020; Olaso-Gonzalez et al., *IUBMB Life*, 2021; Ahmed et al., *Journal of Alzheimer's Disease*, 2025;

Growing link between gut microbiome and brain health

- Definition of a *healthy gut microbiome* is loosely defined in terms of numbers of bacteria as well as diversity (how many different types of bacteria).
  - "beneficial" vs "pathogenic" bacteria
- Foods that **promote a healthy gut microbiome** = fruits, vegetables, fermented foods, plant-based proteins, polyphenols, mono- and unsaturated fats
- Foods that have a **negative impact on gut microbiome** = foods high in saturated fat, animal protein, highly refined carbohydrates, processed meats, foods high in added simple sugars
- Stay tuned!

Sources: Berding K., et al. *Adv Nutrition*, 2021; Borrego-Ruiz and Borrego, *Current Opinion in Neurology*, 2025;

What should we be eating?

Diet Options

- DASH
- Mediterranean
- MIND

Components of the DASH Diet*

Per Day

- 6 to 8 servings of grains per day
- Up to 6 ounces of meat, poultry, or fish
- 4 to 5 servings of vegetables
- 4 to 5 servings fruit
- 2 to 3 servings of low-fat dairy
- 2 to 3 servings of fats and oils
- 2300 mg sodium (from food and added)
  - 1500 mg sodium is better!

Per Week

- 4 to 5 servings of nuts, dry beans, & peas
- No more than 5 servings of sweets/week

*** Based on a 2,000 calorie diet**

Benefits of the DASH diet

- Has been shown to reduce systolic and diastolic blood pressure
  - Recommended by the AHA for the non-pharmacological mgmt. of hypertension
- Linked with lower total and LDL-cholesterol levels and overall reduction in heart disease risk by as much as 20%
- Improvements in insulin sensitivity and inflammation
- Possible neuroprotective benefits; associated with a reduced risk of cognitive decline in some studies but not others
  - Impact on blood pressure and reduced risk of vascular dementia

Sources: Siervo et al., *British Journal of Nutrition*, 2015; Salehi-Abargouei et al., *Nutrition*, 2013; Juraschek et al. *J Am College Cardiology*, 2017; Samadi M et al, *Neurological Sciences*, 2019; van den Brink et al., *Advances in Nutrition*, 2019; Daniel GD, et al. *Clinical Nutrition ESPEN*, December 2021; Hosseinpour-Niazi S. et al., *Nutr Metab* (Lond), 2022.

Mediterranean Diet

- No single Mediterranean diet but the countries share similar characteristics.
  - Primarily a plant-based diet
  - Olive oil is the primary fat source
  - Low in saturated fat
- Benefits of the diet were first reported **over 60 years ago**.

Map created with Microsoft Copilot

Components of a Mediterranean Diet

Per Day*

- 3 or more servings of vegetables
- 3 servings of fruit
- 3 to 6 servings of whole grains and starchy vegetables
- Up to 4 tablespoons of extra virgin olive oil
- Up to 1 serving poultry**
- Up to 1 serving dairy
- Up to 1 glass wine (optional)

Per Week*

- 3 servings of legumes (serving = ½ cup)
- 3 servings of fish**
- 3 or more servings of nuts (serving = ¼ cup or 2 tablespoons nut butter)
- Up to 2 servings red meat**
- Up to 4 eggs
- No more than 2 servings sweets/desserts
- Limit processed meats, sweetened beverages

* Depending on calorie needs

** Serving size = 3 ounces

Benefits of the Mediterranean Diet (MedD)

- **May reduce** the risk of diabetes, heart disease and inflammation.
- **Associated** with a reduced risk of memory problems and dementia
- Has been shown to slow the rate of cognitive decline in some populations but not others.
- A UK study found that individuals with the highest adherence to the MedD had a 23% reduced risk of developing dementia compared to those with lowest level of adherence.
- Two systematic reviews have linked adherence to the Mediterranean Diet with a reduced risk of Alzheimer's disease and MCI.

Sources: Martin-Pelaez et al., *Nutrients*, 2020; Shannon et al., *BMC Med, 2023*; Becerra-Toomas et al., *Critical Rev in Food Sci & Nutr*, 2020; Nucci et al., *Aging Clinical and Exp Res*, 2024;

Benefits of the Mediterranean Diet (MedD)

- Higher adherence of the MedD was related to better memory in a group of 512 adults in Germany with varying levels of cognitive health.
- In a study of 612 older adults across 5 European countries, adherence to a MedD for 1 year was **associated** with changes in the gut microbiome and was positively associated with reduced frailty and improved cognitive function.
- A 2021 meta-analysis of studies of older adults (60+) found that high adherence to a MedD was associated to reduced risk of cognitive decline in older adults **without dementia**.
- A 2025 meta-analysis of 23 published studies found that following a MedD is linked to a reduced risk for cognitive impairment (18%), for dementia (11%), and Alzheimer's disease (30%)

Sources: Ballarini et al., *Neurology*, 2021; Coelho-Junior et al., *Ageing Res Rev*, 2021; Ghosh et al., *Gut*, 2020; Fekete et al., *GeroScience*, 2025.

Mediterranean-Dash **I**ntervention for **N**eurodegenerative **D**elay) - **MIND** diet

- Combination of the DASH and Mediterranean diets
- Emphasis on whole grains, leafy vegetables, nuts and berries
- Early research (2015) found that individuals who follow this style of eating could reduce their risk of Alzheimer's by as much as 35%
  - Ongoing research and clinical trials
- Linked with a **reduced** risk for depression

What is in the MIND diet?

Per day

- ≥3 servings of whole grains
- 1 serving of dark leafy greens (salad)
- ≥ 1 serving of “other” vegetables
- 2 tablespoons extra virgin olive oil
- < 1 teaspoon butter/margarine
- 1 glass of wine (optional)

Per week

- 5 or more servings of berries (½-cup = serving)
- 1 or more servings of fish (at least one)
- 2 or more servings of poultry
- 3 or more servings of beans (1/2 cup = serving)
- 5 or more servings of nuts (1 ounce = serving)
- Up to 3 servings of red meat per week
- Up to 2 ounces of cheese per week
- Up to 4 servings of sweets
- ≤ 1 serving of fried/fast food

Benefits of the mind diet

- Early research (2015) reported those who followed the MIND diet could reduce their risk of Alzheimer's by as much as 35%.
- 2021 systematic review of 13 different studies found that following the MIND diet was positively *associated* with aspects of cognitive function in older adults.
- MIND, DASH, and Mediterranean diets have been *linked* with a **reduced** risk for depression in some studies but not others.
- A 2023 study did not find any differences (cognition and brain MRIs) between those who followed the MIND diet compared to those who followed a control diet with a mild caloric restriction.
- A 2026 systematic review of 26 published studies concluded the MIND diet can reduce risk of dementia and can enhance cognitive health.

Sources: Morris et al. *Alzheimer's & Dementia*, 2015; Kheirouri S. and Alizadeh S. *Critical Reviews in Food Science and Nutrition*, 2021; Adjibade et al. *J Neurol*, 2019; van den Brink et al., *Adv Nutr*, 2019; Berendsen et al., *J Nutr Health Aging*, 2018; Salari-Moqhaddam et al. *J Affect Disord*, 2019; Cherian L. et al. *Journal of Gerontology*, 2021; Fresan U. et al. *European Journal of Nutrition*, 2019. Barnes et al., *New England Journal of Medicine*, October 2023. Bartarseh, N. & Abdulla, F.A. *Nutritional Neuroscience*, 2026

Limitations to the research on diet and cognition/Alzheimer's disease

- How dietary intake was measured and how often (longitudinal studies)
- How cognitive function was assessed (memory, processing, language, global cognition and more)
- Ages of the subjects in the studies; comorbidities; cognitive function; location of the study
- Race/ethnic differences
- **There is no single diet or food that will prevent Alzheimer's Disease**
- **Diet CAN play a role in chronic diseases that ARE linked to Alzheimer's Disease**

Can dietary supplements stop cognitive decline?

- We spend up to $60 **billion** dollars a year on supplements
  - Includes vitamins, minerals, herbs, and other substances
- No conclusive evidence they improve brain health or stop cognitive decline
  - Possible exception: A supplement to address a ***nutrient*** deficiency
- Dietary supplements are not regulated like prescription medications
  - Some supplements can interfere with prescription medications
  - Some supplements may include excessive doses of vitamins or minerals.
- Be aware of claims that a supplement is “clinically proven”
- If it sounds too good to be true, it probably is. Save your money!
- Talk with your doctor/pharmacist before taking a dietary supplement.

Sources: NIH, Office of Dietary Supplements, ODS Director’s Message, April 2024; Global Council on Brain Health (2019). “The Real Deal on Brain Health Supplements: GCBH Recommendations on Vitamins, Minerals, and Other Dietary Supplements.” Available at www.GlobalCouncilOnBrainHealth.org.

Feeding the brain and body – where do we start?

- Increase vegetable and fruit intake
  - Dark red, orange and green veggies
  - Include berries (goal of **at least five times** a week)
- Choose healthy fats over saturated and trans fats
- Choose highly processed/refined carbohydrates **less often**
- Progress, not perfection
- Don’t wait until you are “older” to start

The secret to getting ahead is getting started.

~Mark Twain

Along with a healthy diet, what else can we do?

Address the modifiable risk factors including:

- Get moving – be active
- Stop smoking/vaping
- Use it (your brain) or lose it
  - learn a new language, brain games, musical instrument
- Get diabetes, hypertension, and obesity under control
- Watch for depression and social isolation
  - Have a social network

Source: 2026 Alzheimer's Disease Facts and Figures, Alzheimer's Association.

Memory…… is the diary that we all carry about with us.

~ Oscar Wilde

Memory is more indelible than ink

~ Anita Loos

Thank you!

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