

Memory and Brain Health as We Age: Understanding Changes and Dispelling Myths

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An Overview:

- What is memory?
- How does memory function in our brains?
- What are some changes that all of us will experience in healthy aging?
- Dispelling myths about this journey
- Protective factors and tips for keeping your memory sharp:
 - Exercising memory
 - Nutritional and dietary factors
 - Lifestyle factors

What Exactly is Memory?



- A malleable and long-lasting representation that is reflected in thought, experience, or behavior.

What Kinds of Memory Are There?

- Broadly defined into four systems:
 - Episodic
 - Semantic
 - Working
 - Procedural

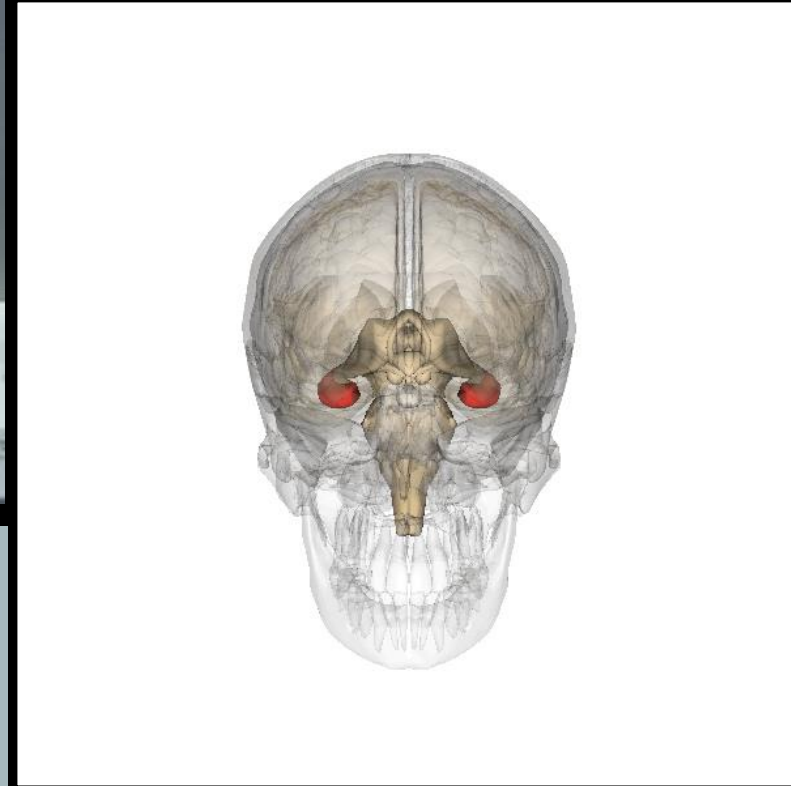




Where is Memory in the Brain?

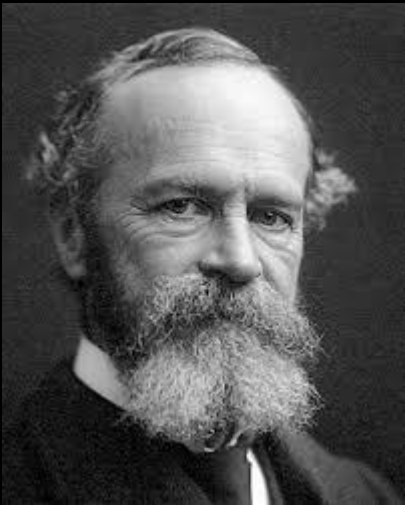
Medial Temporal Lobes and the Hippocampus

- Ammon's Horn
- The Temporal lobes
 - Object recognition
 - Auditory processing
 - Language
- The Hippocampus is a special structure in the middle of the temporal lobe
- It combines different streams of sensory information into episodes
- Hippocampus is heavily connected to frontal lobe



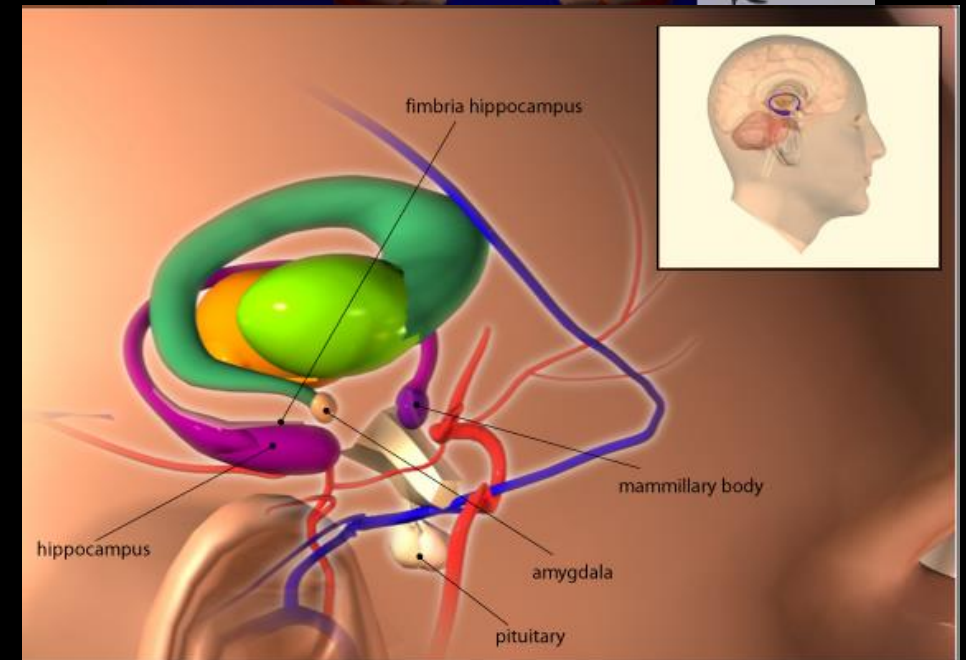
Why is Memory so Dynamic?

- A fundamental process for navigating, understanding, and relating our worlds to others
- Memories are constantly active and flexible
- Metabolic activity is highest in the Hippocampus
- Constant cycle of information exchanged between our external and internal worlds



Why can Memory be so Fragile?

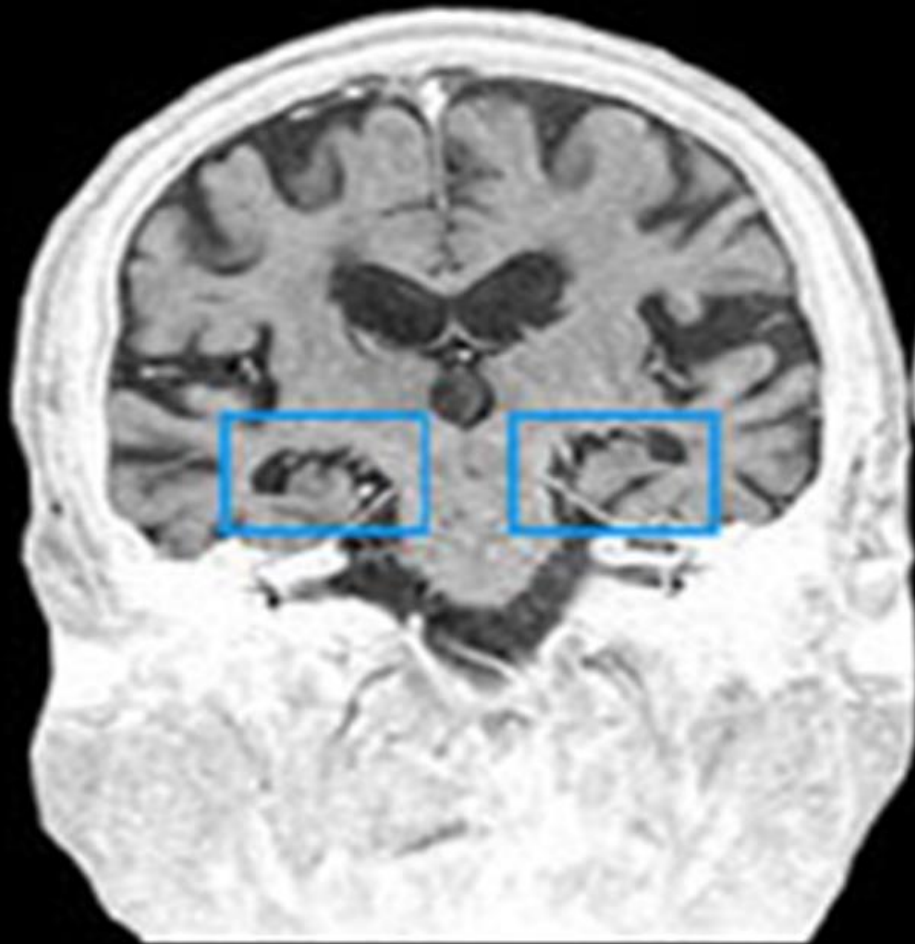
- High metabolic activity also leads to high vulnerability
- Location in the brain and proximity to vasculature
- Vulnerability involves interactive factors including environment, genetics, lifestyle, and cognitive reserve



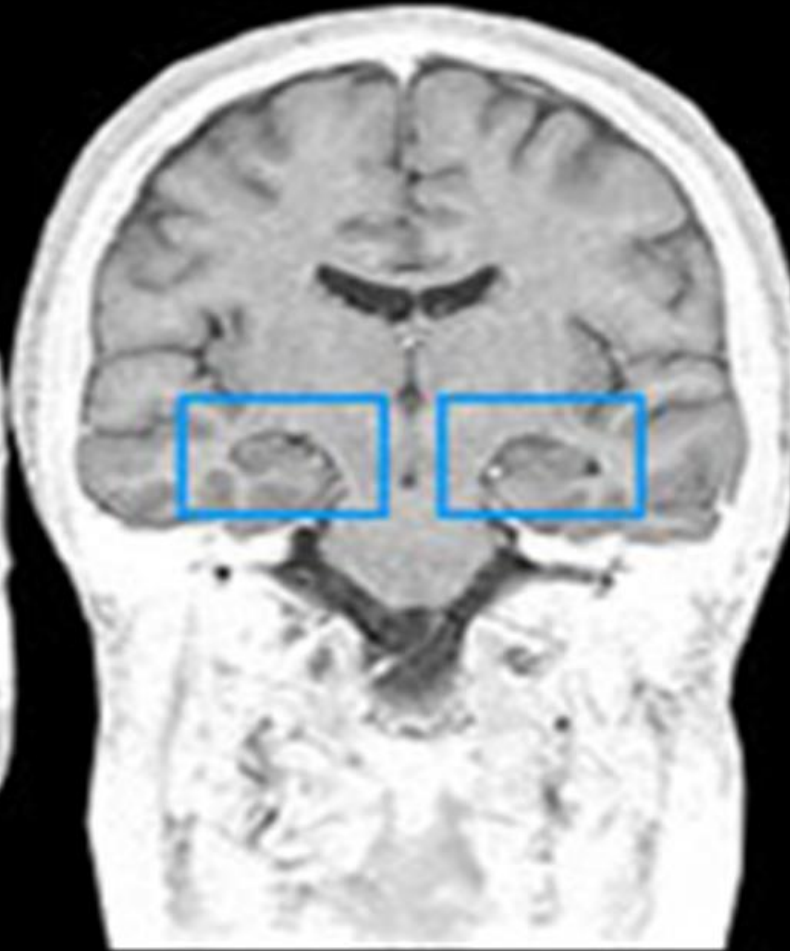
Normal Brain Changes in Healthy Aging

- Blood vessels naturally change with age
- Blood flow reduced as arteries narrow
- The brain loses weight
- Blood pressure commonly increases (medication controlled)
- Increased blood pressure = white matter changes
- The communication between neurons slows
- Activation in the brain becomes more widespread
- Plaques develop in the hippocampus and cortex





87 Year Old



27 Year Old

There is some cell loss and shape change associated with healthy aging, but this by itself does not indicate significant memory loss or impending memory difficulties

Cognitive Changes in Healthy Aging:

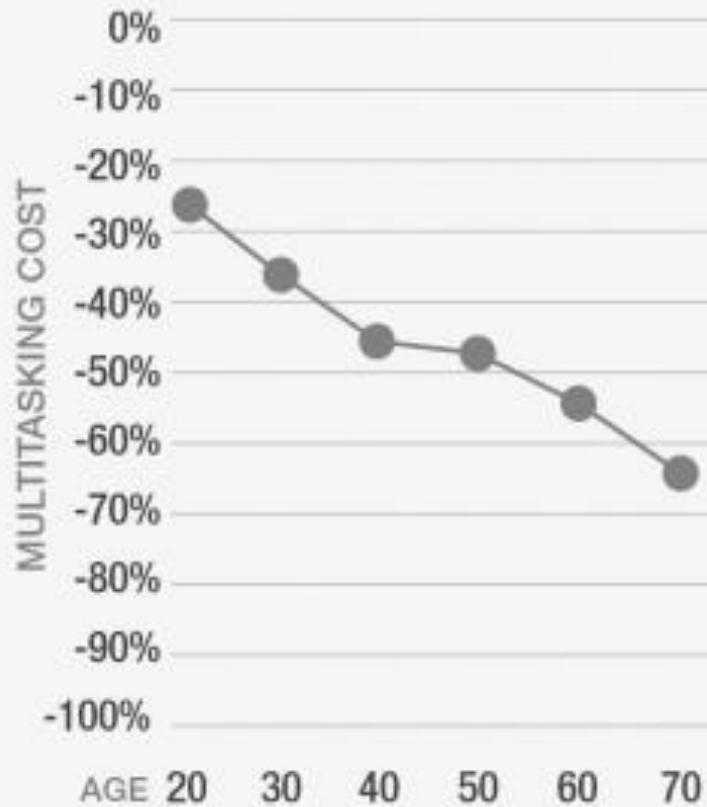
- Recollection becomes more difficult, yet familiarity is preserved
- Working memory slows as well
- However... equated for time,
Older adults = Younger adults



Cognitive Changes in Healthy Aging:

- Multitasking ability declines beginning in early adulthood

Multitasking Ability



Anguera et al., (2013) *Nature* 501(7465), 97

Study Results



Myths about Aging we Can Comfortably Dispel

- ✗ We only use 10-20% of our brains
- ✗ Older individuals can't learn new things
- ✗ Learning a new language is for the young
- ✗ You are stuck with the brain you are born with
- ✗ It's inevitable that everyone will develop dementia in later life
- ✗ Older individuals are doomed to forget things
- ✗ Fancy memory supplements help

Global Council on Brain Health and AARP

[Prevagen link](#)



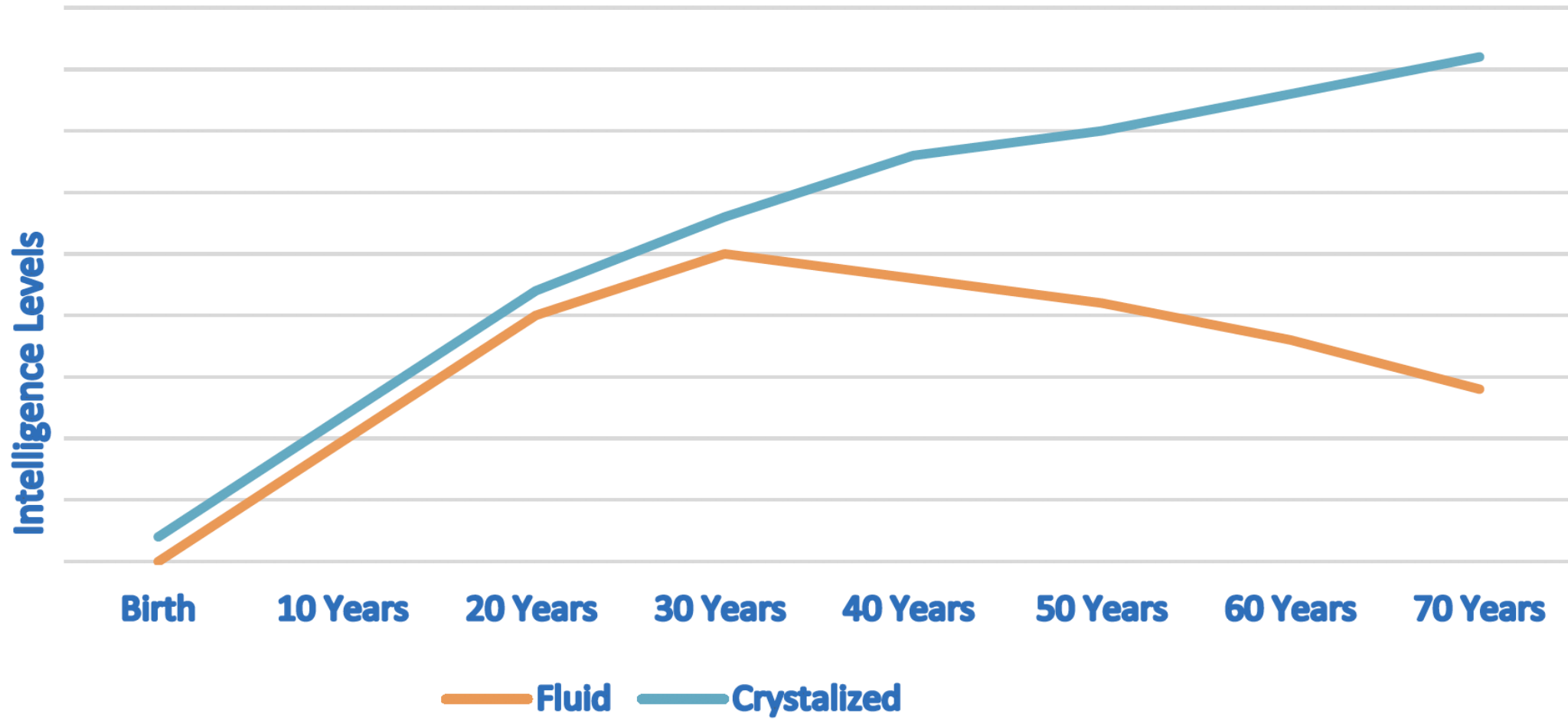
So What does Work?

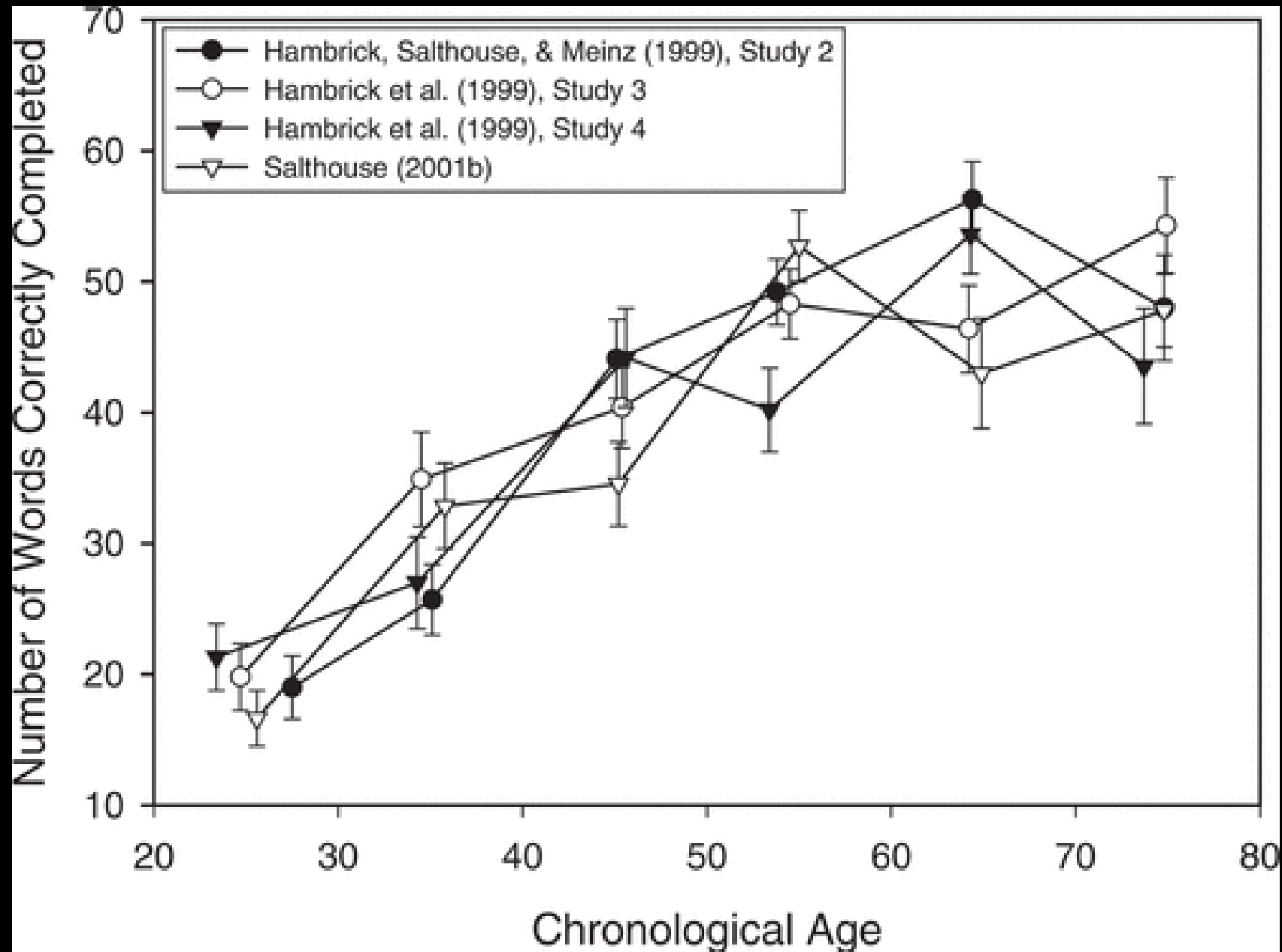
Cognitive Protection and Exercise!

- Learn...Learn...Learn
- Working and semantic memory increases with practice at all ages
- *Mnemonic* strategies are brain tricks for maximizing memory
 - Rhyming
 - Face-name associations
 - Chaining new information to prior information
 - Deliberately attending longer
 - Go for a walk and associate items with your path



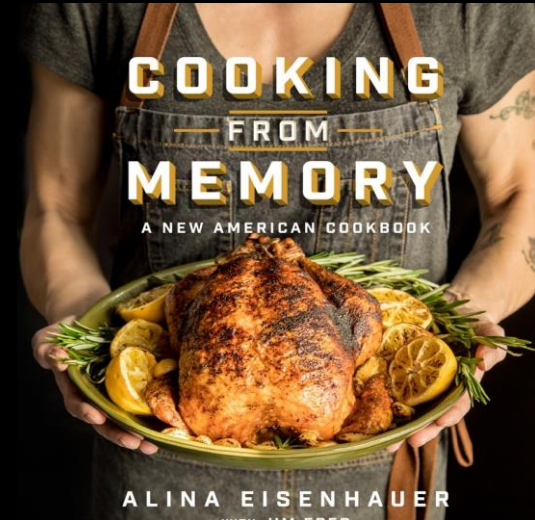
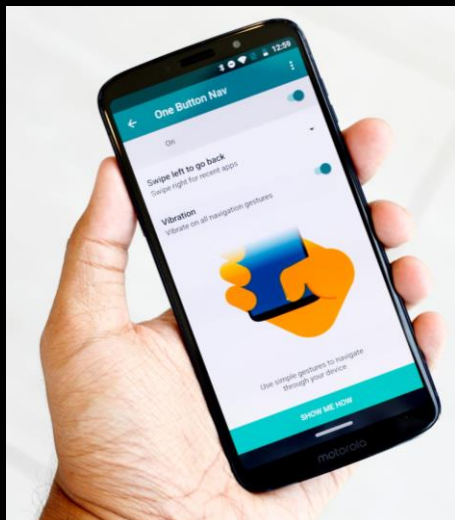
Fluid and Crystallized Intelligence Across the Lifespan





Ways to Exercise your Memory

- ✓ Add to your cognitive reserve!
- ✓ Testing your own recall.. Make lists and quiz yourself
- ✓ Crossword puzzles, Sudoku, Word-Finds, Memory Games, Trivia
- ✓ Lumosity, Fit Brains, Peak, Elevate, MindSparke, Art of Memory
- ✓ Music...Its power cannot be understated
- ✓ Challenge your taste and sense of smell with cooking

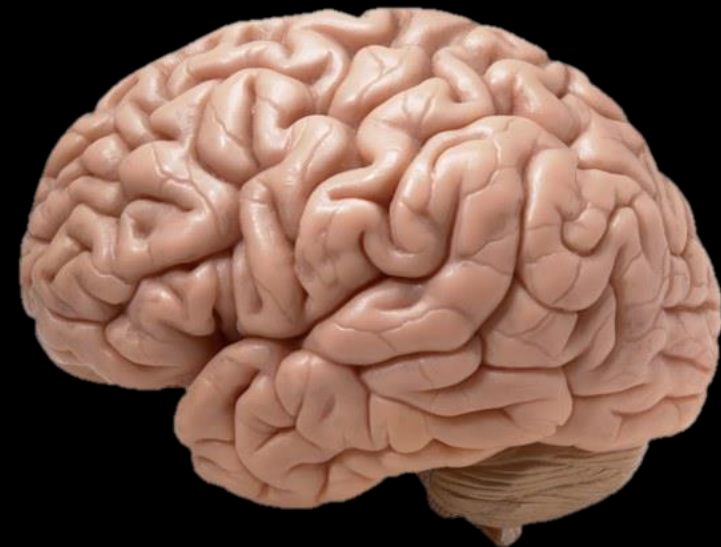


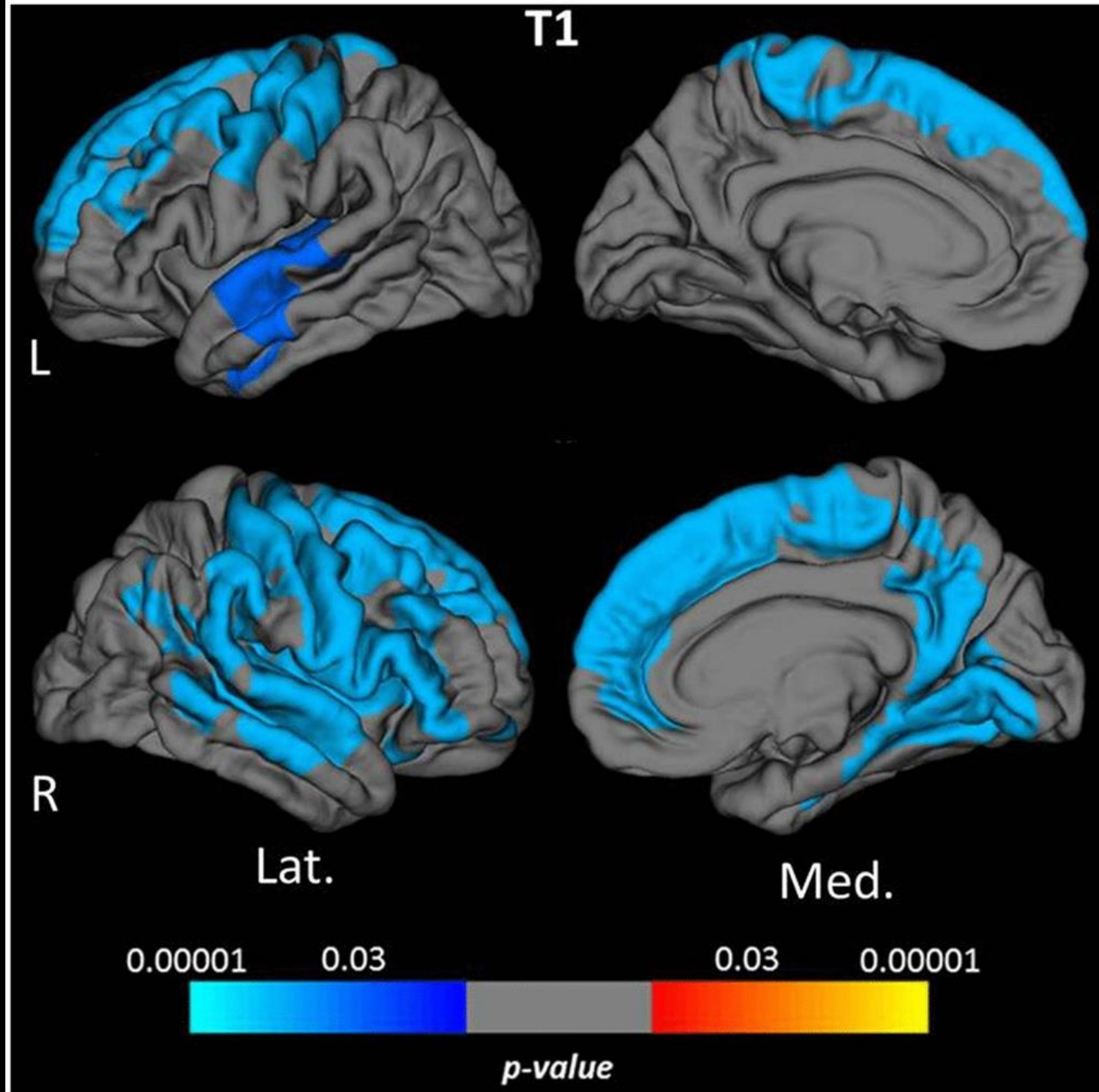
Protective Factors



The Importance of Cortex

- The cortex contains most of our gray matter (i.e., neurons)
- It is critical for higher level cognition and memory
- It is full of gyri and sulci that give it a wrinkled appearance
- Reduction in cortical volume and thickness happens in aging
- But...Data suggest that older adults with thicker cortex have preserved cognition (more cognitive reserve).

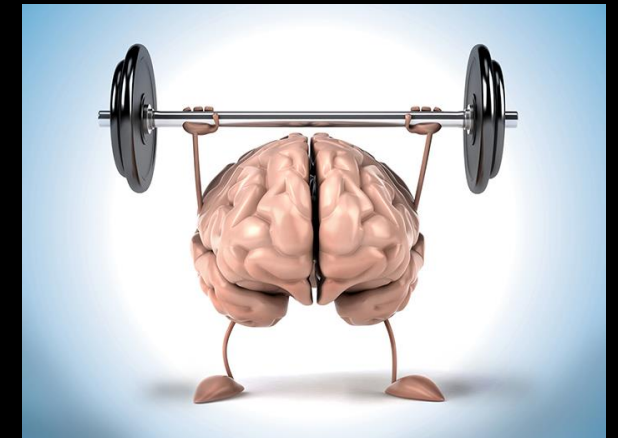




Seiler et al.,
(2020) Aging

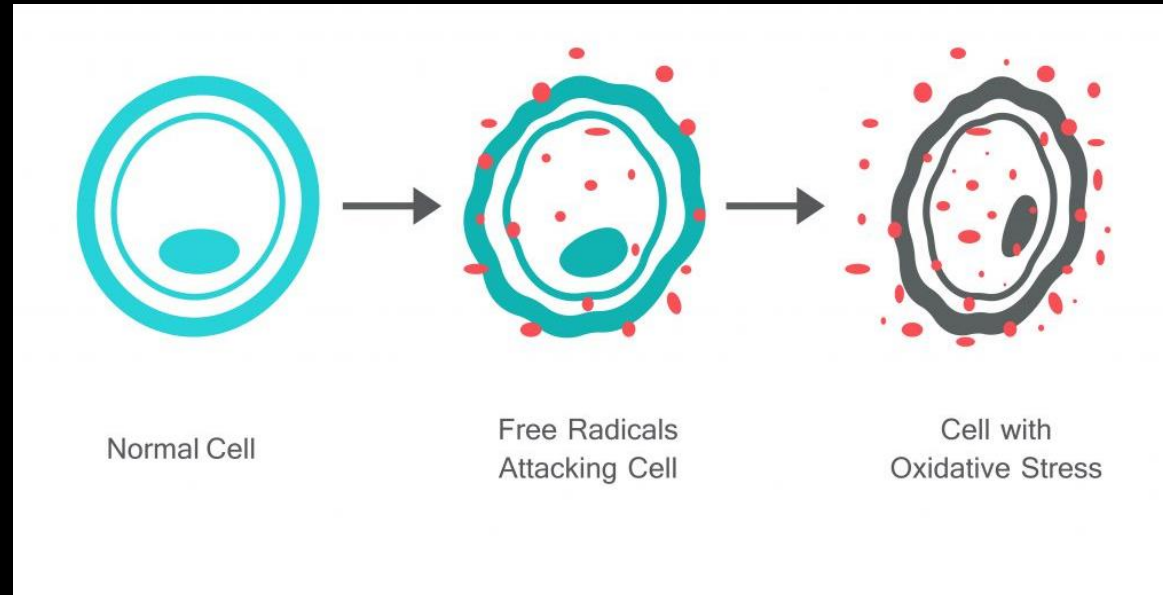
The Protective Role of Exercise

- High fitness older adults have a thicker cortex than low fitness older adults
 - It will not be as thick as that of a younger adult, so while staying active is important, exercise alone is not enough to fight off some of the negative effects of aging
- Something that increases respiration and blood flow (like going for a walk or chair yoga) can help defend your brain



Antioxidants in Nutrition

- Oxidants are a natural byproduct of air we breathe
- Over time, oxidants build up and can be harmful to the nervous system
- Radiation can affect the brain in a similar way, so we use radiation in labs to model this oxidative stress on cognition
- Eating antioxidant rich food can protect your brain



Antioxidant Rich Foods

- Blueberries
- Cherries
- Raspberries
- Spinach
- Walnuts
- Navy Beans
- Avocados
- Omega-3 Fatty Acids
 - Fish
 - Flax seeds/ oil
 - Tofu



The Benefits of Pets/ Animal Interaction

- Pets offer a range of benefits for both mental and physical health
- In a 2023 JAMA Study with 8000 older adults living alone...
- Interacting with a pet was associated with a slower rate of cognitive decline.
- Verbal cognition, verbal memory, and verbal fluency.
- Social interaction
- Less likely to have dementia



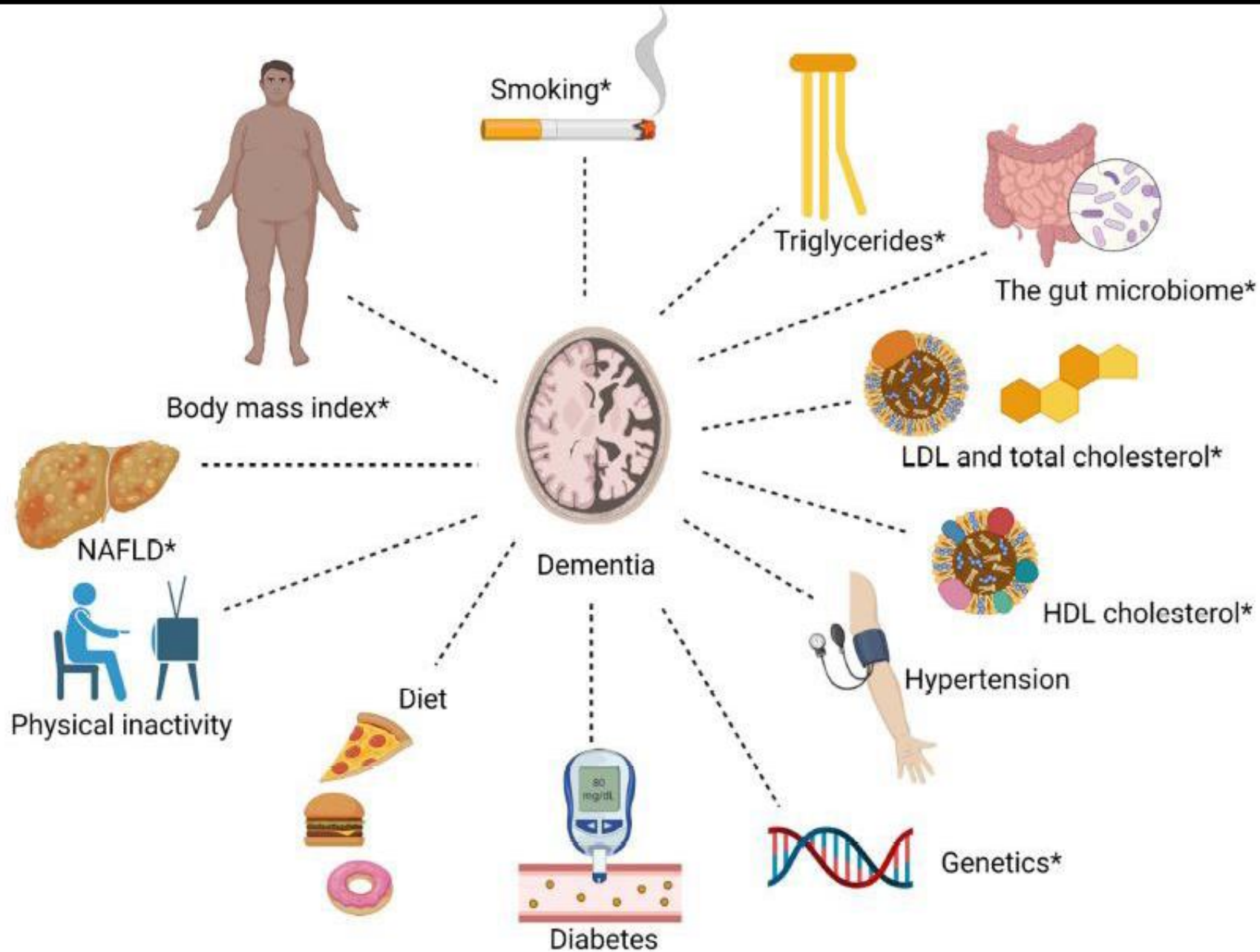
Li Y, Wang W, Zhu L, et al. 2023. Pet ownership, living alone, and cognitive decline among adults 50 years and older. JAMA Netw Open. 2023;6(12).

In Conclusion



“No memory is ever alone; it’s at the end of a trail of memories, a dozen trails that each have their own associations”.

-Louis L’Amour-



NordestgaardLT et al. Shared Risk Factors between Dementia and Atherosclerotic Cardiovascular Disease. International Journal of Molecular Sciences 2022;23:9777.