# Cognitive Longevity

Aspects of cognitive longevity

Assessment questionnaire

Factors of brain energy and brain-body connection

Exercises

Nutrients

“I know my brain could be sharper if only I could…”

Consider what we're expected to accept as we age:

- Decreases in our senses
- Loss of muscle
- Balance decreases
- Incontinence increases
- Stiff  joints occur
- Cognitive slowness

Does this make sense?
Should this occur?

You heal from a cut in a reasonable time

Your breathing stays steady when you climb a flight of stairs – heart and lungs are still working together efficiently  - the speed at which you recover after mild exertion is a sign of heart health

You can taste subtle flavors fully – it's a sign that several systems in your body are still working in coordination – those with a strong sense of taste tend to maintain a healthier appetite and better nutritional balance – food pleasure reaches further than you think

Your eyes adjust moving from light to dark – and the health of your eyes and the nerves that connect to the brain – can reflect the health of the nervous system

Your body tells you when you need rest – a sign of a nervous system that is well-regulated – healthy internal systems

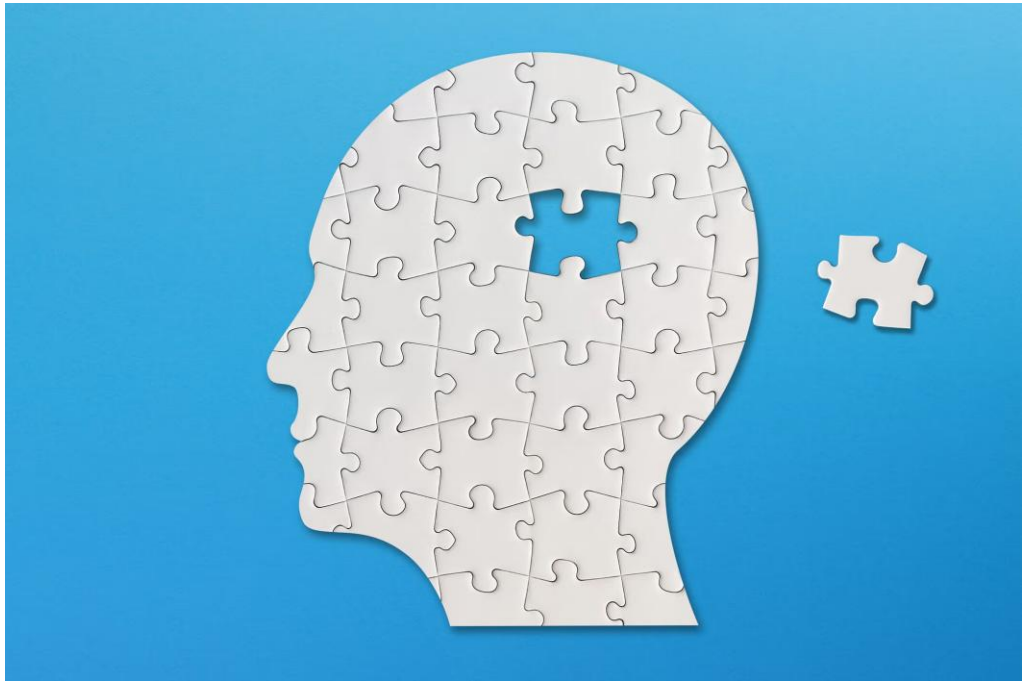
Memory is often viewed as the primary measure of cognitive health, but researchers are increasingly looking beyond memory alone.

A person may have an excellent memory yet struggle with balance, recovery, multitasking, or adapting to physical and mental stress.

Researchers are now exploring how these functions may provide important clues about how the brain is aging long before significant memory changes appear.

Cognitive longevity includes the ability to maintain:

- Processing speed
- Adaptability
- Attention
- Coordination
- Resilience
- Functional independence



## The Brain and Body Do Not Age Separately

The brain depends on constant communication with the rest of the body.

Every movement, step, change in position, and sensory experience requires information to travel between the brain, muscles, joints, nerves, eyes, ears, and other body systems.

Researchers are increasingly studying how factors such as:

Balance

Gait

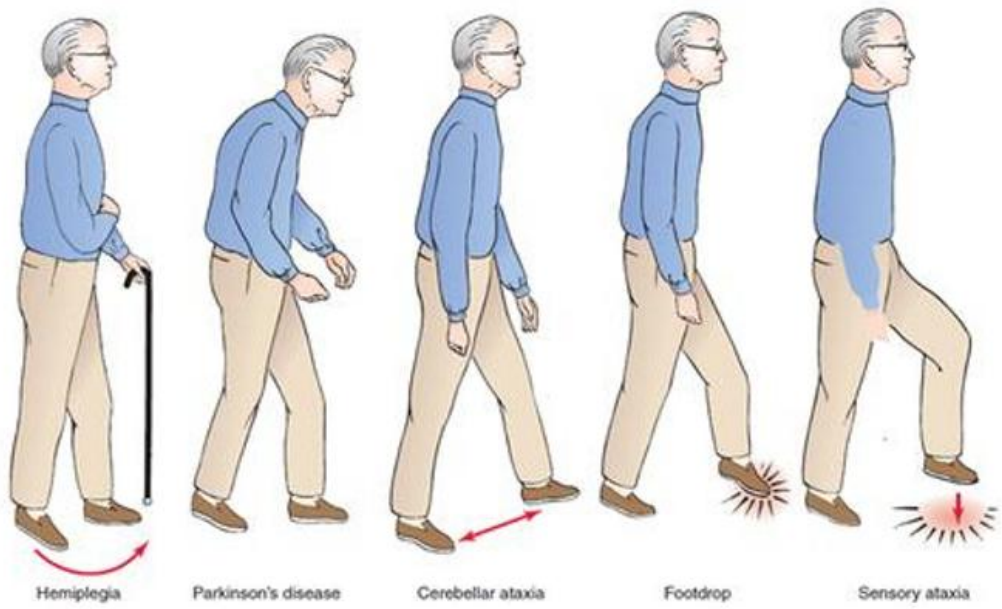
Sensory function

Sleep

Metabolism

Physical resilience

Gut health



The brain combines information from:

**Vision** – where the body is in relation to the environment

**Vestibular system** (inner ear) – head position, movement, and spatial orientation

**Proprioception** – information from muscles, tendons, and joints about body position

**Muscles and nervous system** – carrying out the brain's corrective responses

When balance is challenged, the brain must rapidly process information and coordinate a response. This requires communication between the sensory systems, spinal cord, cerebellum, brainstem, and motor areas of the brain.

Balance can be affected by:

Reduced proprioception

Inner ear (vestibular) dysfunction

Vision changes

Slower processing speed

Reduced muscle strength

Impaired nerve function

Poor sleep

Fatigue

Certain medications

Neurological conditions

Reduced physical activity

Because balance relies on multiple systems working together, researchers often view it as a reflection of overall brain-body communication and functional resilience.

Influencing cognitive function and healthy aging:

Rather than viewing the brain as a separate organ, researchers now recognize that cognitive health is closely connected to how well the entire body functions and adapts over time.

## How Can Balance Training Support Cognitive Function?

Balance is a brain-body activity that requires the brain to process sensory information, coordinate movement, and make rapid adjustments.

Balance relies on multiple brain systems working together, researchers are increasingly studying it as a marker of cognitive resilience.

Research suggests balance training may:

Challenge attention and processing speed

Strengthen communication between the brain and body

Improve proprioception and sensory awareness

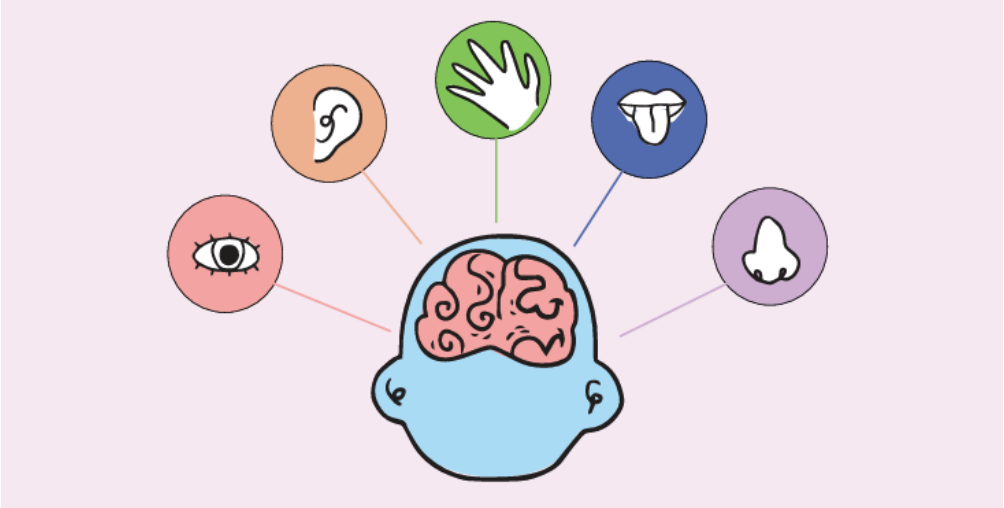
Promote neuroplasticity (the brain's ability to adapt)

Support mobility, independence, and healthy aging

Researchers have found that declines in hearing, vision, smell, balance, and proprioception are associated with an increased risk of cognitive decline and dementia.

The strongest evidence exists for hearing loss.

Several large studies have found that untreated hearing loss is associated with a significantly greater risk of cognitive decline compared with normal hearing.



Researchers have proposed several explanations:

Reduced sensory stimulation reaching the brain

Greater mental effort required to interpret incomplete information

Reduced social engagement

Underlying nervous system changes affecting both sensory and cognitive function

Sensory health is increasingly being viewed as more than a quality-of-life issue. It may provide important clues about how efficiently the brain receives, processes, and responds to information.

**The Forgotten Sense: Proprioception**

Proprioception is the body's ability to sense position, movement, and force without looking.

Examples include:

Touching your nose with your eyes closed

Walking up stairs without watching your feet

Standing on one foot

Reaching for an object without looking directly at your hand

Proprioception depends on continuous communication between receptors in muscles, joints, tendons, and the brain.

Research has linked poorer proprioception with:

Reduced balance

Slower reaction time

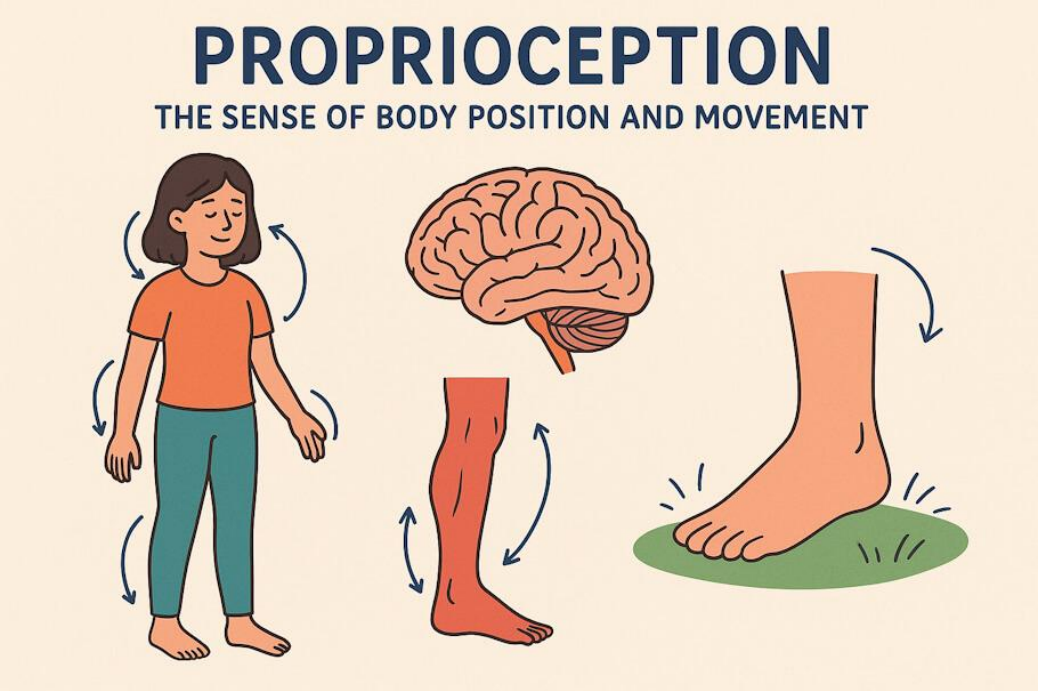
Increased falls

Reduced mobility

Greater cognitive effort during movement

As proprioception declines, the brain must devote more attention to tasks that were previously automatic.

That is why researchers are increasingly studying proprioception as part of cognitive aging and cognitive resilience.



The brain depends on information from the senses to understand and respond to the world.

When hearing, vision, smell, balance, or proprioception decline:

- Brain networks receive less stimulation
- The brain must work harder to process information
- Social and environmental engagement may decrease
- Changes in sensory function may reflect broader nervous system changes

Researchers increasingly believe that sensory health and cognitive health are closely connected because the brain relies on continuous sensory input to function efficiently.

**Brain Clearance: The Brain's Cleaning System**

For many years, researchers believed the brain lacked a dedicated waste-removal system.

In 2012, researchers described the glymphatic system, a network that helps move cerebrospinal fluid through the brain and remove metabolic waste products generated by normal brain activity.

Research suggests this process becomes most active during deep sleep.

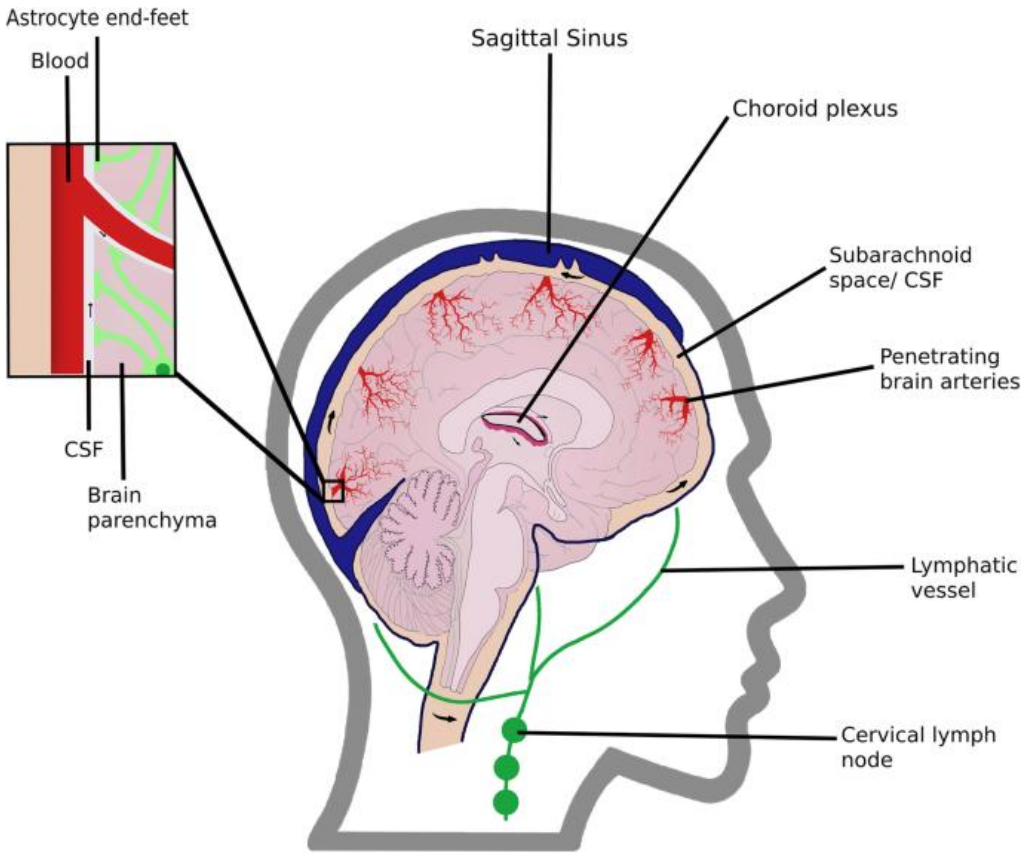
The glymphatic system is now being studied for its role in:

Brain maintenance

Recovery

Healthy aging

Cognitive resilience



## What Influences Brain Clearance?

Research suggests brain clearance may be affected by:

- Sleep quality and deep sleep
- Circadian rhythm disruption
- Physical activity
- Blood flow
- Aging
- Inflammation

Researchers are also investigating the role of the glycocalyx, a carbohydrate-rich layer that lines blood vessels.

The glycocalyx helps regulate blood flow, protect blood vessels, and support the movement of fluids and molecules throughout the body.

In the brain, glycocalyx health may influence:

- Cerebral circulation
- Blood-brain barrier function
- Fluid movement
- Waste clearance

This emerging research highlights that some carbohydrates serve important structural roles in the body, not just energy production.

**Processing Speed: How Quickly The Brain Responds**

Processing speed refers to how quickly the brain can:

- Receive information
- Interpret information
- Make decisions
- Generate a response

It influences nearly every aspect of daily function, including learning, problem-solving, reaction time, coordination, and decision-making.

Researchers increasingly view processing speed as one of the most important indicators of healthy cognitive aging.

## Why Researchers Are Interested In Processing Speed

Many people associate cognitive aging with memory loss.

However, research suggests that slowing processing speed may occur before noticeable memory changes.

Because processing speed affects both mental and physical function, researchers increasingly view it as a marker of cognitive resilience rather than simply cognitive decline.

Reduced processing speed has been associated with:

Slower reaction times

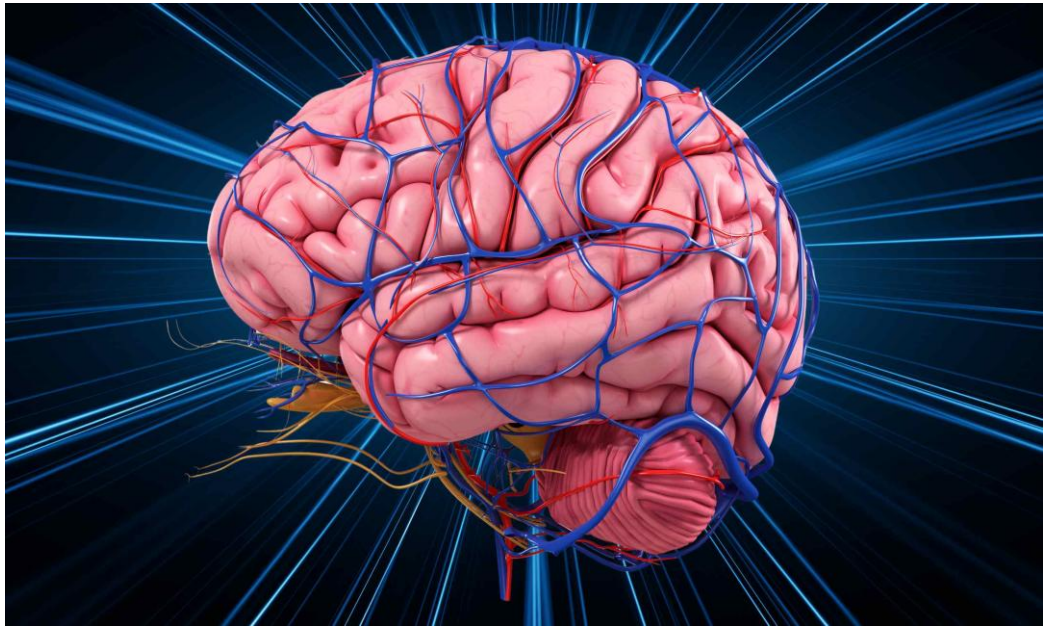
Increased mental fatigue

Reduced adaptability

Difficulty multitasking

Reduced physical performance

Greater risk of loss of independence with aging



**Recovery and Resilience: An Emerging Measure of Healthy Aging**

Researchers are increasingly interested in how well people recover from physical, mental, and emotional challenges.

Resilience refers to the ability to adapt and return to normal function after a disruption.

Examples include recovery from:

- Poor sleep
- Illness
- Injury
- Physical exertion
- Emotional stress
- Major life changes

Two people may be the same age and have similar memory function, yet differ greatly in their ability to recover and adapt.

Researchers increasingly view resilience as an important component of healthy cognitive and physical aging.

**What Recovery May Tell Us**

Recovery depends on communication between multiple systems, including:

The brain and nervous system

Muscles and movement systems

Metabolism and energy production

Sleep and brain clearance

Immune and inflammatory responses

When recovery becomes slower, it may reflect reduced adaptability across these systems.

Researchers are increasingly studying recovery capacity because it may provide insight into biological aging, functional independence, and long-term cognitive resilience.

Compared to ten years ago, how quickly do you recover from:

A poor night's sleep?

Physical exertion?

Emotional stress?

Illness?

The faster the recovery, within reason, the more resilient you are.

# Assessment Questionnaire

**Brain Energy: The Brain's High Energy Demands**

Although the brain represents only about 2% of body weight, it consumes approximately 20% of the body's energy at rest.

Because brain cells store very little energy, they depend on a continuous supply of fuel from the body.

Researchers increasingly recognize that changes in energy production may influence cognitive function long before significant cognitive decline occurs.

The brain requires a constant supply of energy to:

- Process information
- Maintain attention
- Form memories
- Coordinate movement
- Regulate mood and emotions
- Support communication between nerve cells

**Metabolism and Cognitive Function**

The brain depends on healthy metabolism to deliver and use energy efficiently.

Factors that influence brain energy include:

- Blood sugar regulation
- Mitochondrial function
- Blood flow and oxygen delivery
- Sleep quality
- Physical activity
- Nutrient status

Researchers have linked metabolic dysfunction with:

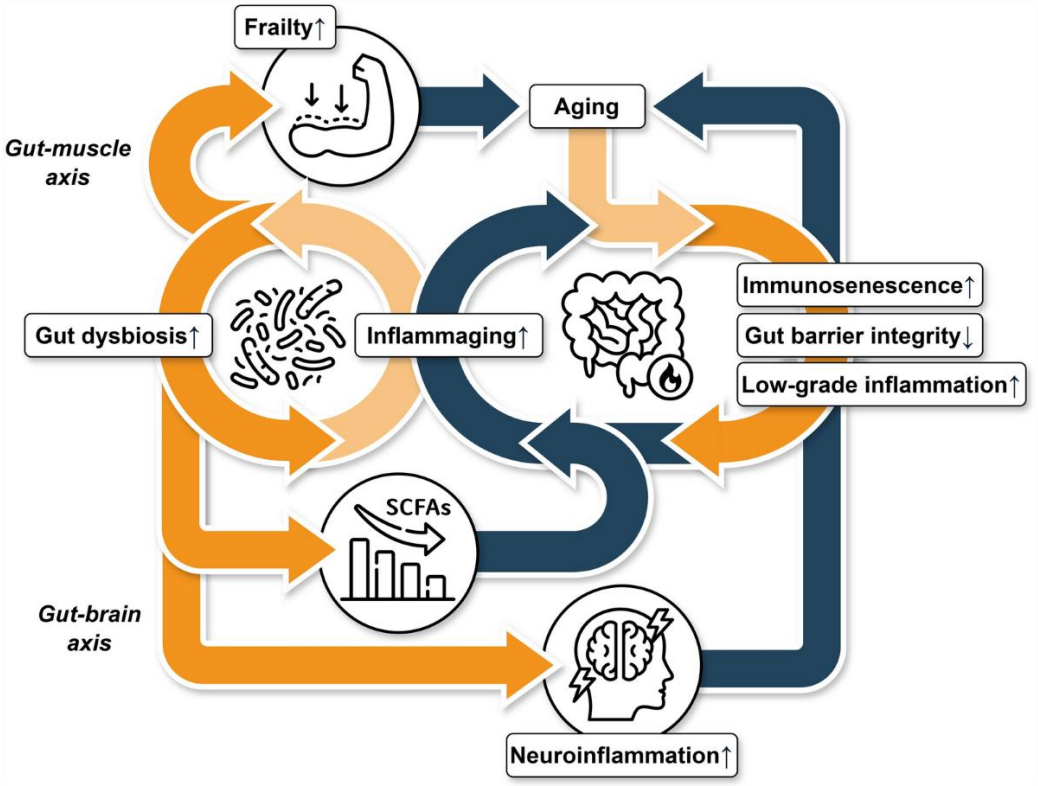
- Mental fatigue
- Reduced processing speed
- Difficulty concentrating
- Reduced adaptability
- Increased risk of cognitive decline

This is one reason cognitive health is increasingly being viewed as a whole-body process rather than a brain-only issue.

## The Gut and Cognitive Longevity

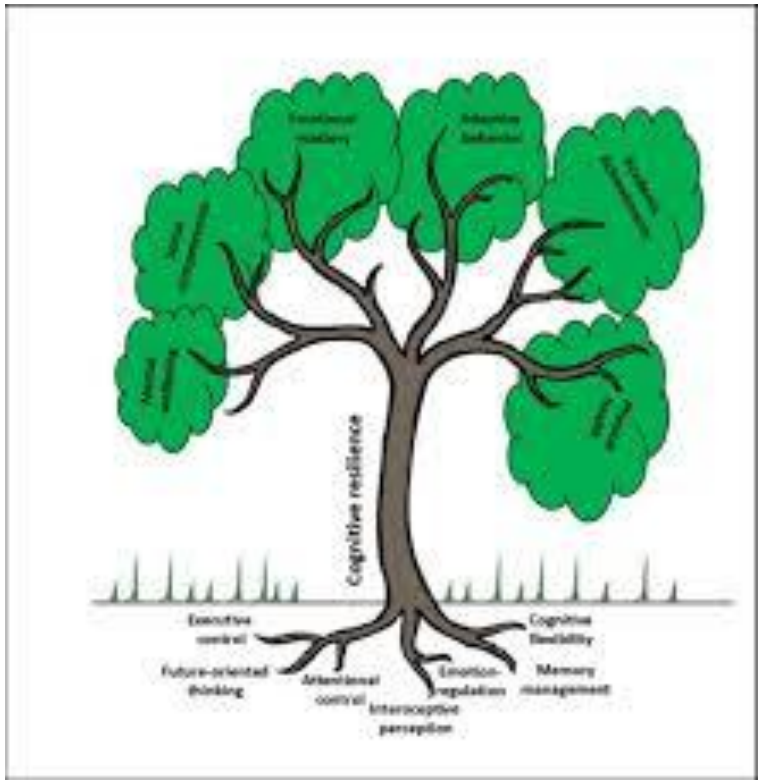
The gut and brain are connected through multiple pathways, including the nervous system, immune system, circulation, and microbial metabolites.

Rather than viewing the microbiome as only part of the digestive system, researchers now recognize it as an important contributor to whole-body health, including brain function.



Researchers are increasingly interested in how the gut microbiome may influence:

- Brain aging
- Cognitive resilience
- Inflammation
- Brain energy metabolism
- Neuroplasticity



## Microbial Metabolites: Messages From The Gut

Gut microbes produce hundreds of compounds that can influence the body and brain.

Researchers are particularly interested in:

- Short-chain fatty acids (butyrate, acetate, propionate)
- Polyphenol metabolites
- Bile acid metabolites
- Indoles produced from dietary compounds

These compounds may influence:

- Inflammation
- Blood-brain barrier integrity
- Brain energy metabolism
- Neuroplasticity
- Communication between the gut and brain

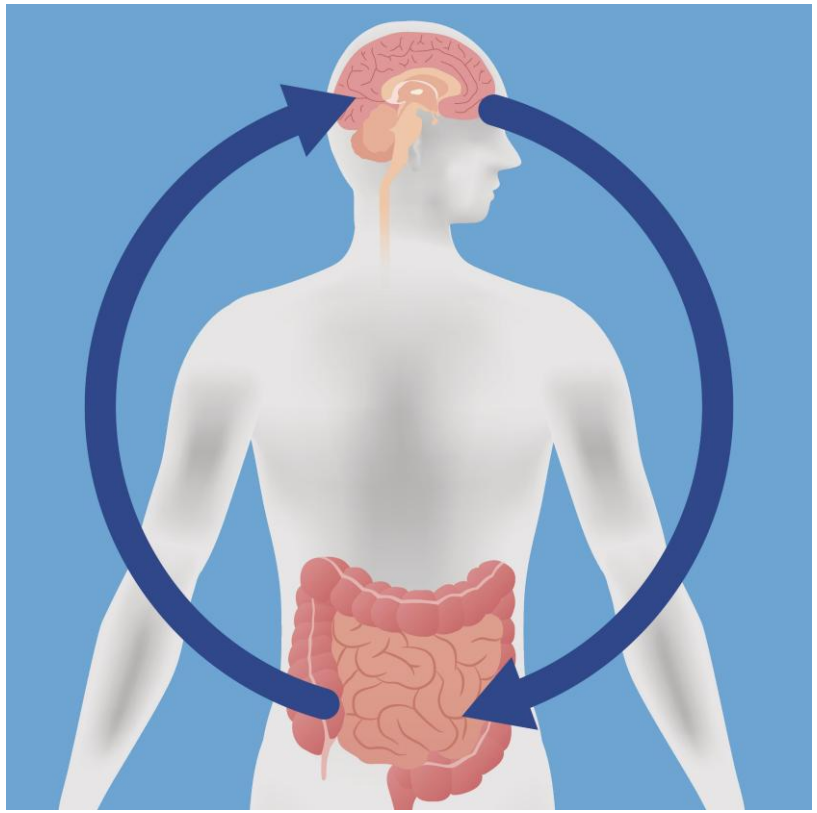
The microbiome may therefore influence cognitive function even though microbes never enter the brain itself.

**The Gut, Inflammation, and Brain Aging**

Researchers increasingly recognize chronic inflammation as a contributor to cognitive aging.

The gut plays an important role because it is one of the body's largest interfaces with the external environment.

When gut function is impaired, inflammatory signals may increase throughout the body.



Researchers are studying how long-term inflammation may influence:

- Processing speed
- Cognitive resilience
- Brain energy production
- Neurodegenerative processes

This is one reason gut health is increasingly being discussed as part of healthy cognitive aging.

**The Gut and Brain Energy**

One of the newest areas of research involves the relationship between the microbiome and energy production.

Microbial metabolites may influence:

- Mitochondrial function
- Glucose regulation
- Insulin sensitivity
- Energy availability

Researchers are increasingly interested in whether supporting microbial diversity may help support the brain's ability to produce and use energy efficiently throughout aging.

The vagus nerve is the primary communication pathway between the brain and many organs, including the digestive system.

Approximately 80% of vagal nerve fibers carry information from the body to the brain.

Through these signals, the brain receives information about:

Digestion

Inflammation

Stress responses

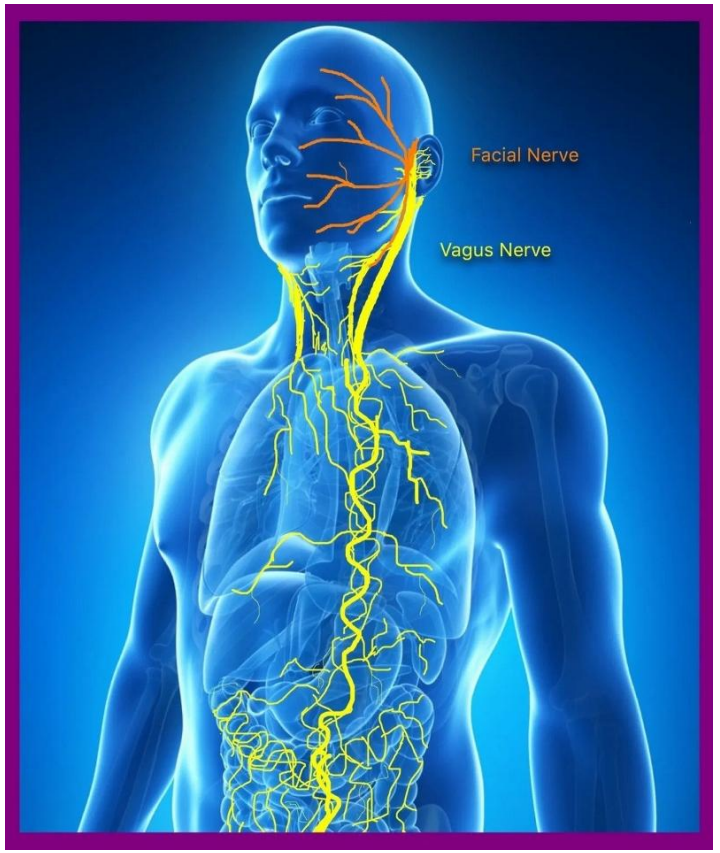
Satiety

Internal body status

The vagus nerve plays an important role in brain-body communication.

The vagus nerve helps connect the brain to systems involved in:

- Stress regulation
- Recovery and resilience
- Inflammation control
- Heart rate variability
- Sleep quality
- Emotional regulation



Reduced vagal activity has been associated with:

- Increased inflammation
- Reduced stress adaptability
- Poorer recovery
- Greater risk of age-related health conditions

Researchers increasingly view the vagus nerve as part of the network connecting the brain and body throughout aging.

**Gut-Brain Communication and Cognitive Longevity**

Researchers are increasingly interested in four major pathways connecting the gut and brain:

- Microbial metabolites
- Inflammation and immune signaling
- Energy metabolism
- Vagus nerve communication

Together, these pathways help explain why cognitive health is increasingly being viewed as a whole-body process rather than a brain-only process.

**The Brain Gives Hands and Feet Special Attention**

The areas of the brain responsible for the hands and feet are disproportionately large compared to their size.

Hands and feet help the brain:

- Sense movement
- Detect pressure
- Maintain balance
- Coordinate actions
- Navigate the environment

Both hand movements and foot stimulation increase sensory input reaching the brain.

Examples include:

- Hand qigong
- Textured hand balls
- Foot rollers
- Balance exercises

These activities challenge coordination, proprioception, and brain-body communication.

The goal is not stronger hands or feet.

The goal is stronger communication between the brain and body.

# Exercises

**Four Nutritional Priorities for Cognitive Longevity**

Energy: B vitamins, magnesium, creatine, and balanced carbohydrates help support brain energy production.

Communication: Choline, phospholipids, omega-3 fats, and amino acids help support signaling between brain cells.

Structure: Omega-3 fats, phospholipids, and quality fats help maintain brain-cell membranes and adaptability.

Protection: Fiber, polyphenols, microbial metabolites, and a diverse diet may help support inflammation control, vascular health, and brain resilience.

The brain depends on:

Protein for neurotransmitters

Fats for structure and communication

Carbohydrates for energy and biological structures

Fiber to support microbial diversity and gut-brain communication

Micronutrients that support energy production and nervous system function

Nutrition works alongside movement, sleep, sensory stimulation, stress regulation, and social engagement to support cognitive longevity.

The goal is not a perfect diet. It is creating the conditions that help the brain and body continue to communicate, adapt, and function well over time.

One more tip: Change your routine

The body needs to adapt to “new” – this increases neuroplasticity