

It's All Connected

**Hormones, Immunity,
Inflammation, and
Whole-Body Health**

In Week 4, we'll explore how multiple body systems work together — and what we can do to support healthier, more resilient aging.

WEEK 4 • THE MIND-BODY CONNECTION



Today's Learning Roadmap

The Mind-Body Connection: How Our Systems Work Together as We Age

One journey.
Multiple connections.
A healthier, stronger you.

1

The
Mind-Body
Connection



2

Hormones
& Aging



3

Stress
& Resilience



4

Immune
Aging



5

Inflammation



6

Gut-Brain-
Immune Axis



7

Sleep &
Nutrition



8

Hearing &
Balance



9

Arthritis



10

Long COVID
in Older Adults



11

Whole-Body
Strategies
for Healthy Aging



Take a Stance!

Let's Think, Discuss, and Debate

During today's presentation, you'll see a few Take a Stance! slides. These are short, interactive debates designed to get you thinking and sharing different perspectives.



1



You'll see a question or statement.

2



Take a stance and **discuss** with a partner.

3



Then, give a **thumbs up or thumbs down** to show your stance.

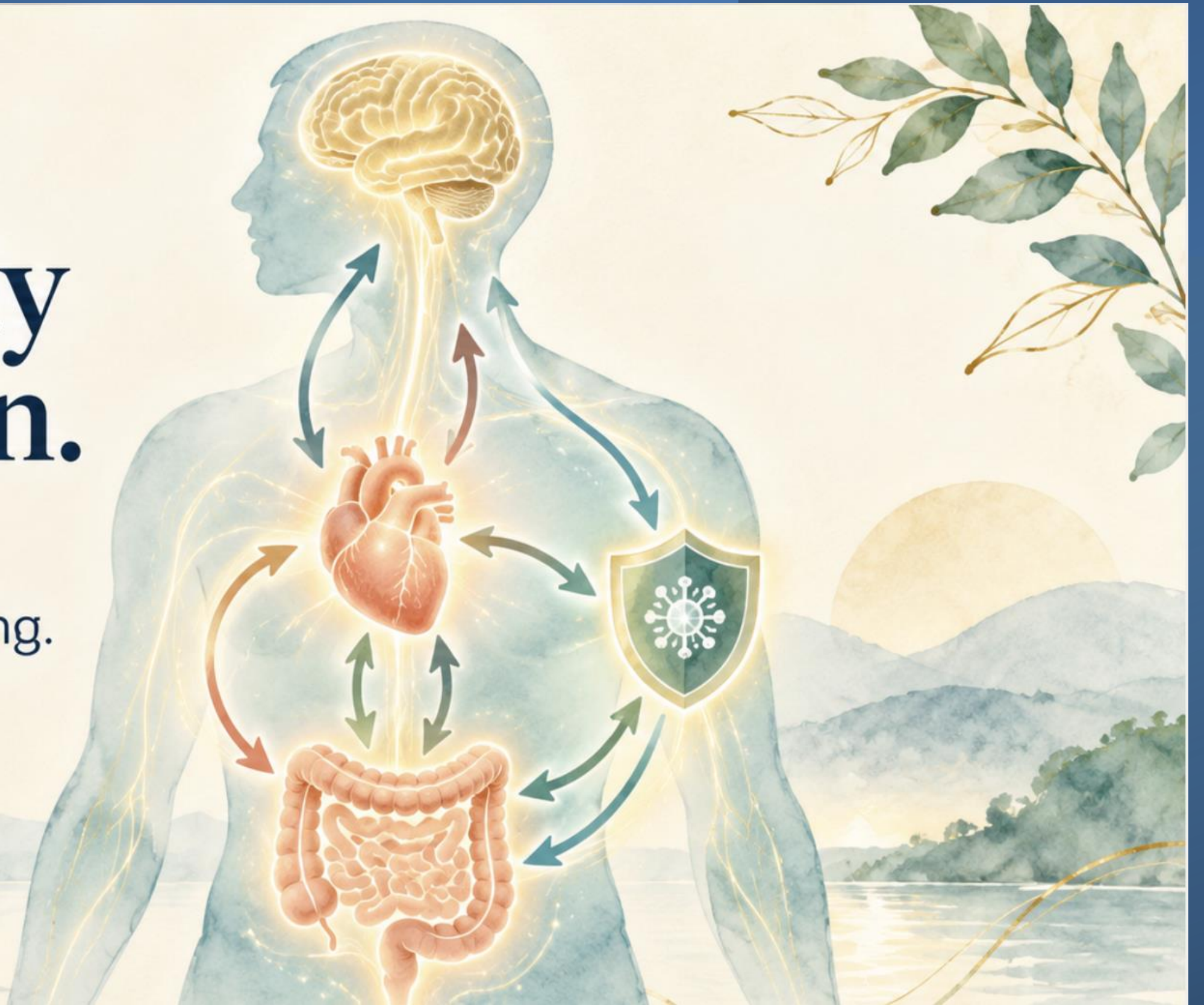
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We'll then review the research and discuss the key takeaways.

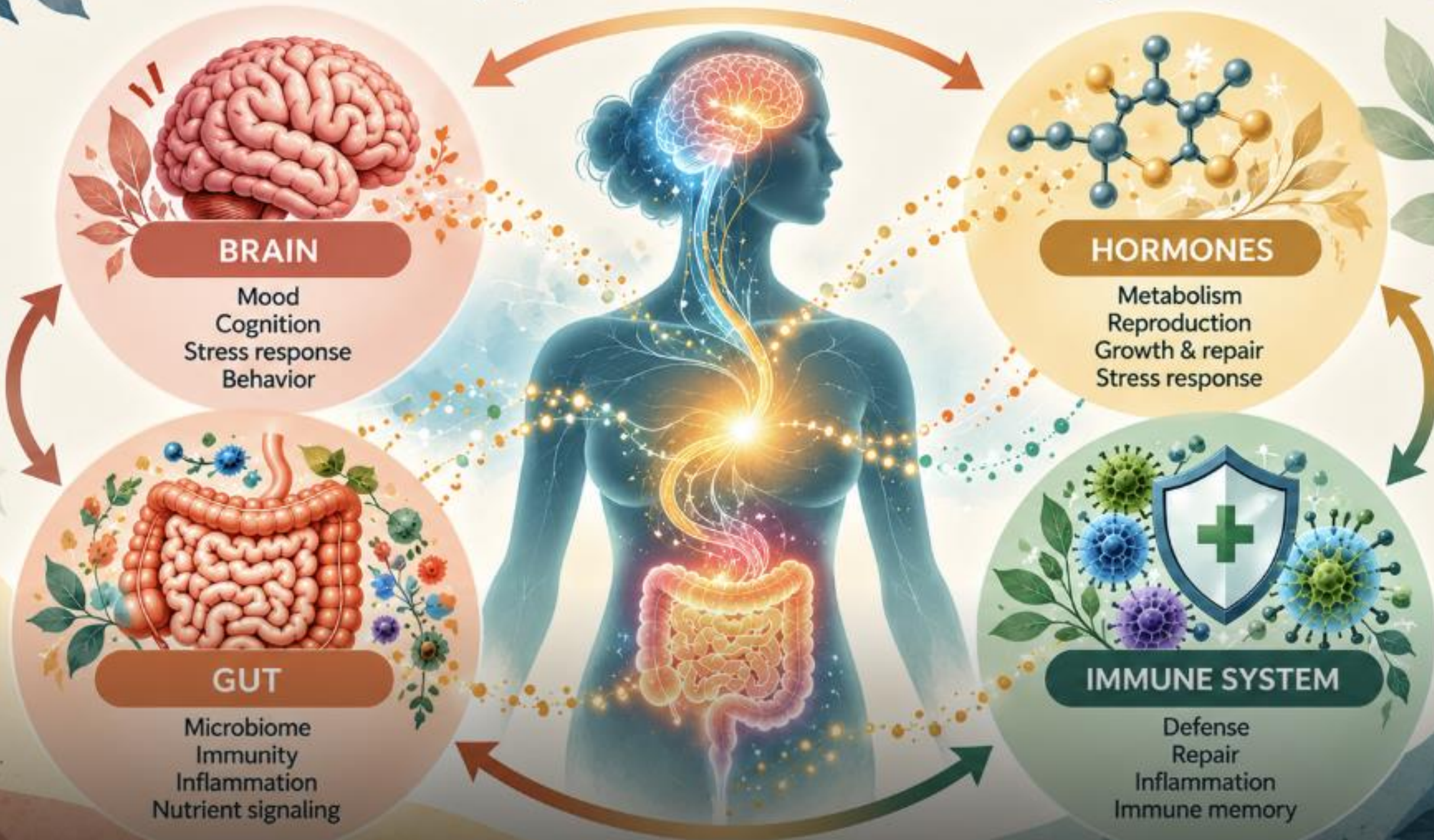
1. The Mind–Body Connection.

Your body systems are constantly communicating.



The Mind-Body Connection

Your body systems are constantly communicating.



Homeostasis: The Body's Balancing Act

The mind and body aren't separate. They interact continuously to maintain internal stability—managing everything from body temperature to blood glucose and immune activity.

Aging changes how we balance, making it harder to stabilize during illness or stress. But it does not eliminate our ability to balance.



Learn,
Think,
Discuss

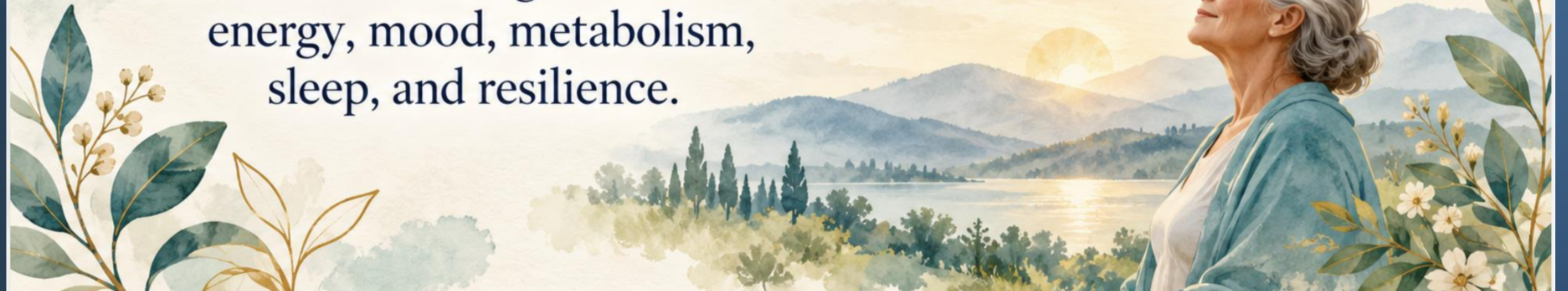
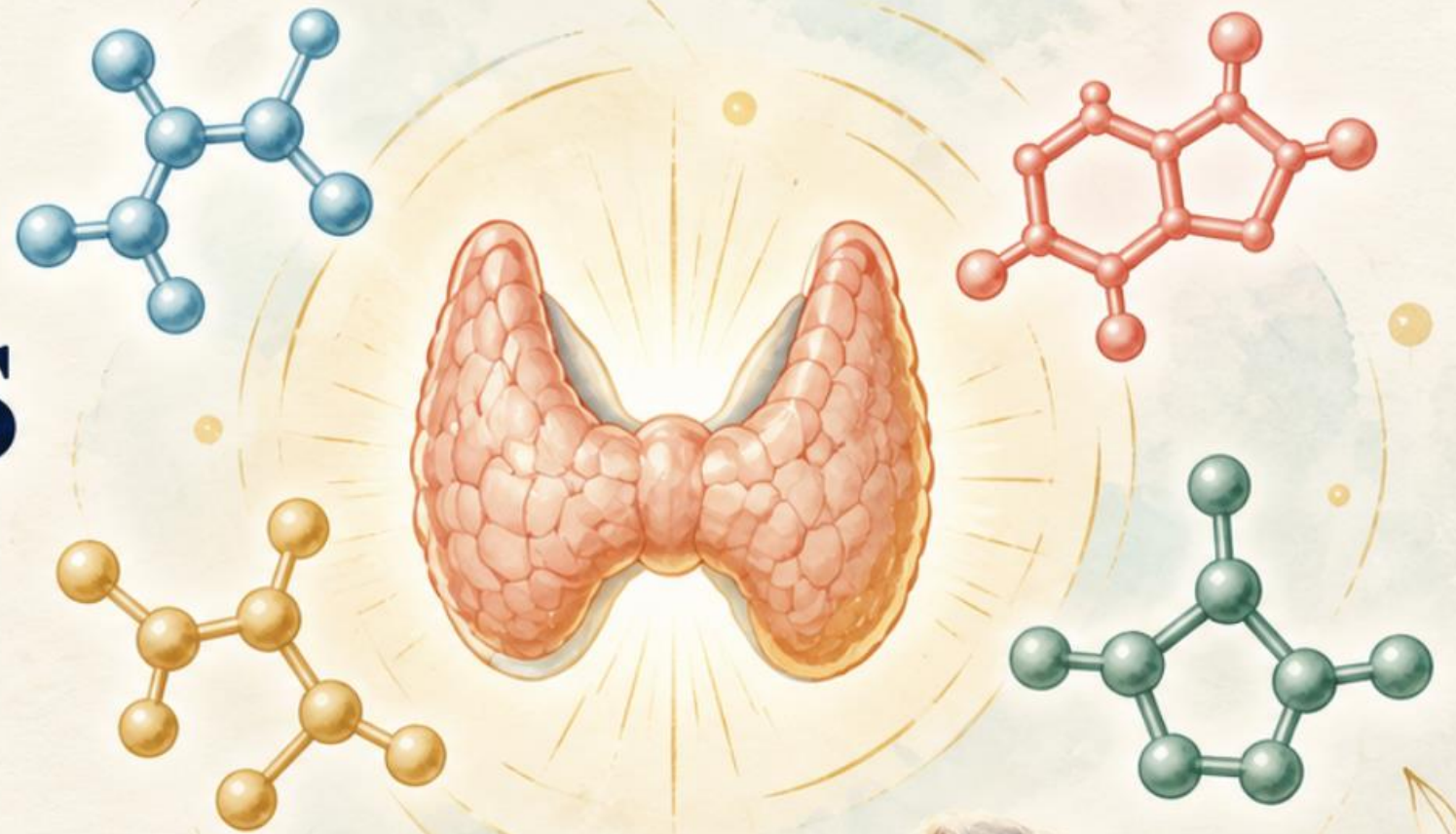
Changes in one system immediately affect the others.

Curiosity ages well.

© Gemini Notebook

2. Hormones & Aging.

Chemical messengers influence energy, mood, metabolism, sleep, and resilience.



What Are Hormones?



Hormones are chemical messengers carried through the bloodstream and produced by glands throughout the body.



They help regulate: metabolism, sleep, stress, appetite, reproduction, bone and muscle health, mood, blood sugar, and energy.



Metabolism



Sleep



Stress



Appetite



Reproduction



Hormones and Aging

Hormones influence nearly every system in the body.



Estrogen & Progesterone

Bone health • Brain function • Mood



Testosterone

Muscle mass • Strength • Energy



Cortisol

Stress response • Inflammation • Sleep • Metabolism



Thyroid hormones

Metabolism • Energy • Body temperature



Insulin

Blood sugar • Appetite • Weight



How Hormones Change With Age



Estrogen and progesterone decline

- Menopause
- Bone loss
- Changes in body composition
- Mood and sleep changes



Testosterone gradually declines in men and women

- Reduced muscle mass
- Decreased strength
- Lower energy
- Changes in sexual health



Other hormone changes

- Altered cortisol patterns (stress response)
- Changes in insulin sensitivity
- Thyroid function may slow

Shifting Gears: Menopause vs. Andropause

Menopause

- A defined biological transition.
- Driven by a rapid drop in estrogen and progesterone.

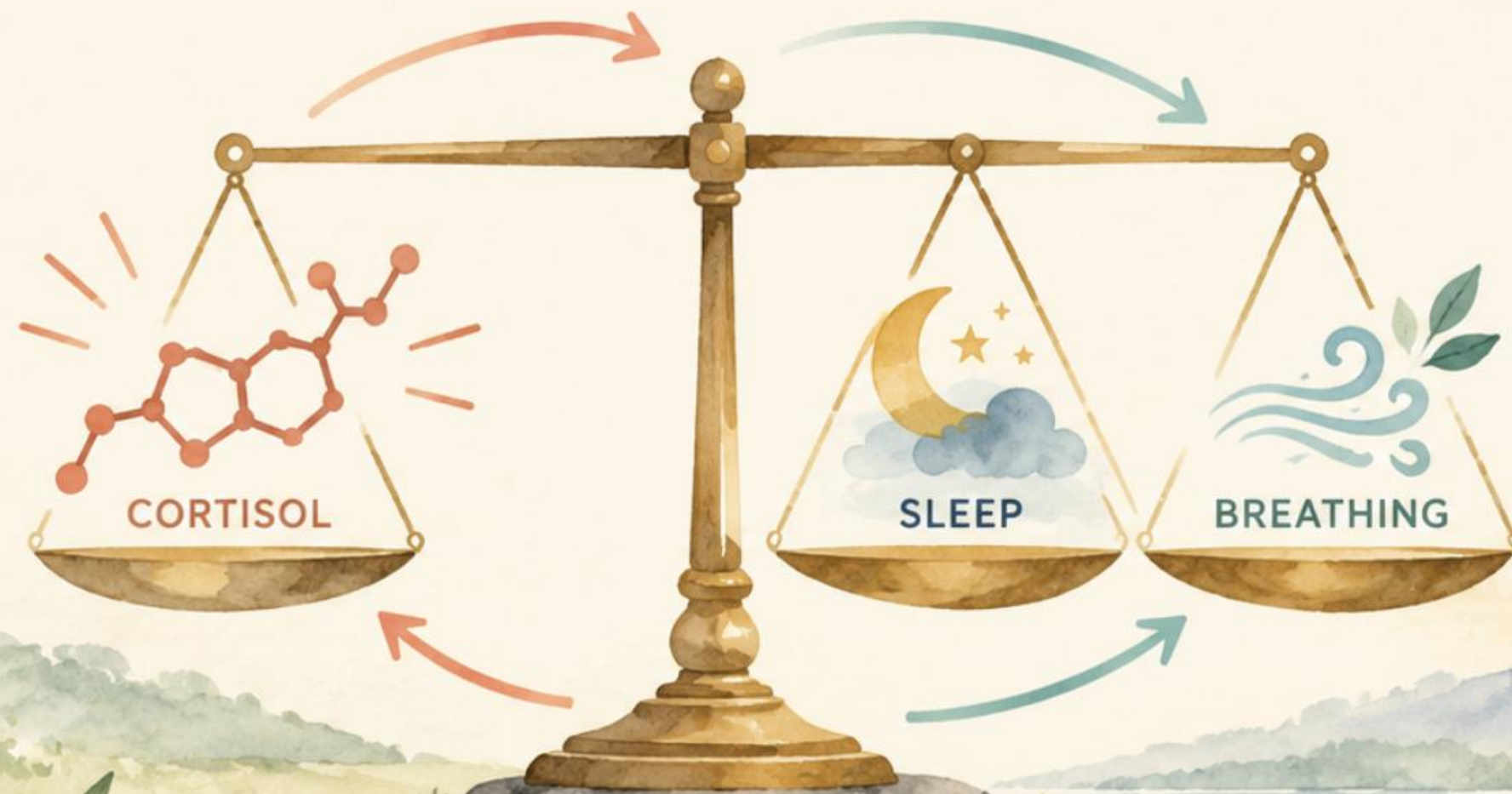
Andropause

- A gradual transition.
- Driven by a slow, steady decline in testosterone.

The Shared Impact: Both transitions influence muscle mass, bone density, sleep quality, energy levels, and mood.

3. Stress & Resilience

*When stress becomes physical —
and where we can interrupt the cycle.*





Take a Stance!

Is cortisol a good hormone, a bad hormone, or both?



**Cortisol is a
GOOD
hormone.**



**Cortisol is a
BAD
hormone.**



Discuss with a partner:

- Which side do you take?
- What is your main reason for your stance?

Cortisol: When Stress Becomes Physical

Cortisol is essential to the stress response; it is not inherently harmful.

Helpful in the Short Term (Acute Stress)

A temporary increase in cortisol helps the body respond to a challenge.



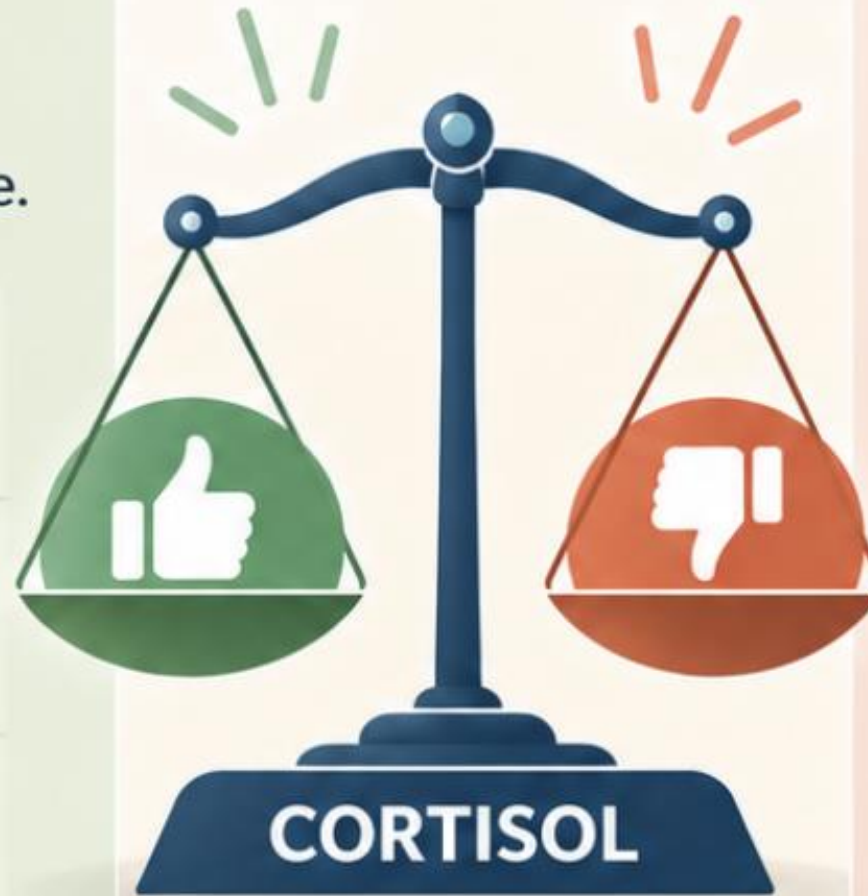
Increases alertness
and focus



Provides energy

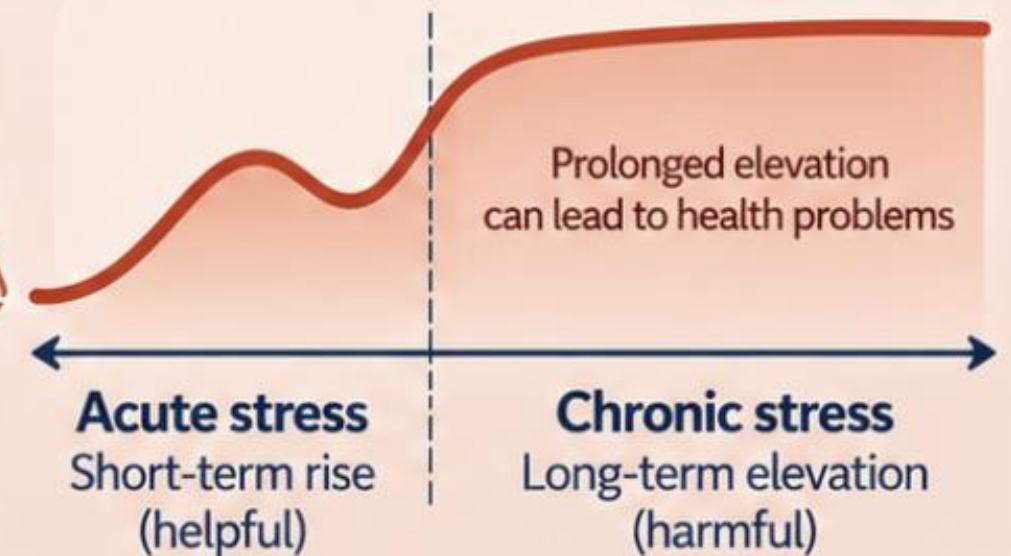


Helps the body respond
to stress and danger



Harmful When Prolonged (Chronic Stress)

When cortisol stays elevated for too long, it can affect many systems in the body.



Chronic Stress Can Make You Sick

When stress stays elevated for too long, cortisol and other stress hormones can affect many systems in the body.



Sleep

Can disrupt sleep quality and make it harder to feel rested.



Blood Pressure

Can increase blood pressure and strain the heart and blood vessels.



Blood Sugar

Can raise blood sugar levels and increase risk for type 2 diabetes.



Appetite & Weight

Can increase appetite, especially for high-calorie foods, and lead to weight gain.



Memory & Cognition

Can affect memory, concentration, and thinking over time.



Immune Function

Can weaken immune defenses, making you more likely to get sick and recover more slowly.



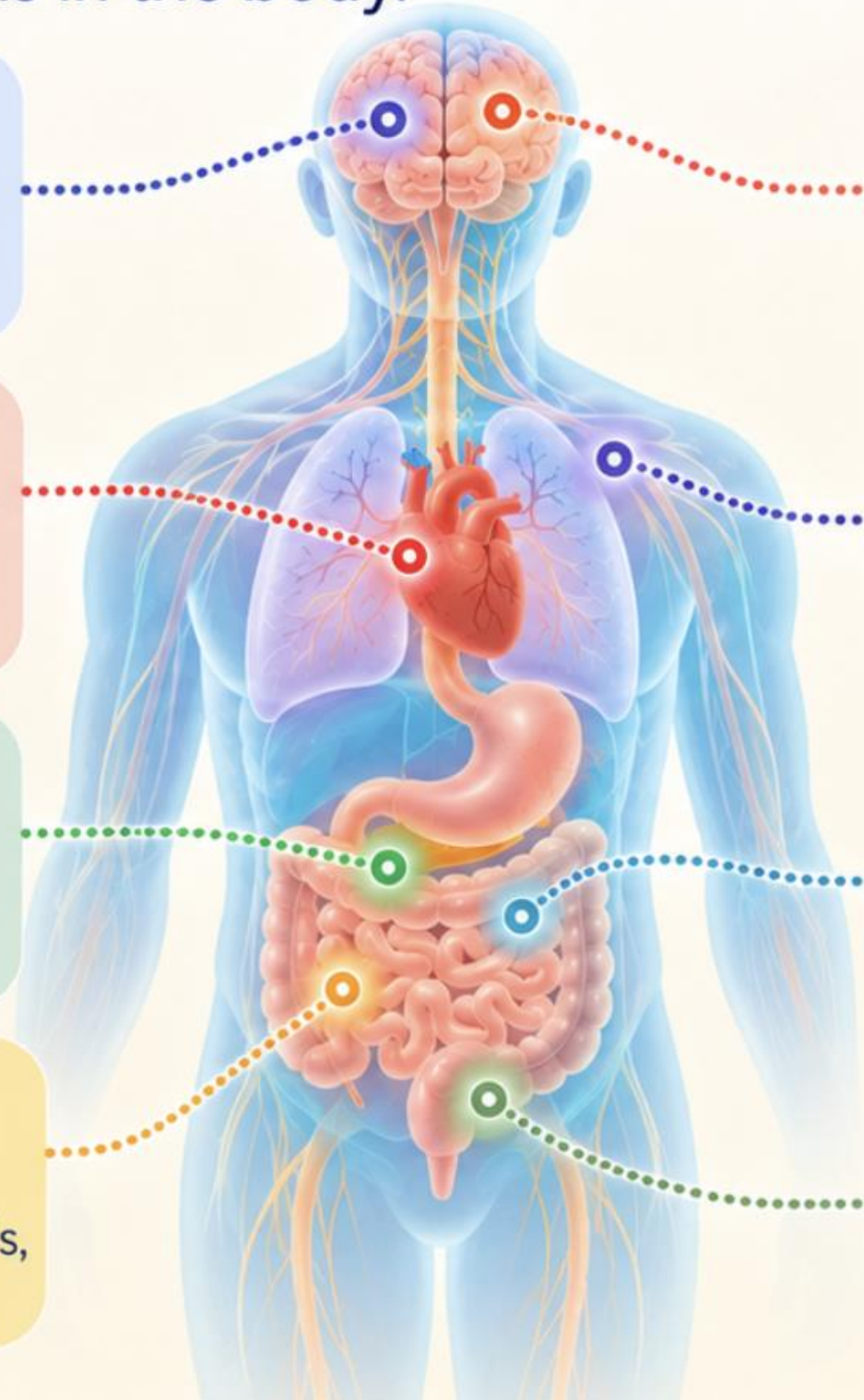
Inflammation

Can increase inflammation, which is linked to many chronic diseases.



Mood & Emotional Health

Can contribute to anxiety, depression, irritability, and emotional burnout.



MIND
BODY
BALANCE
AT ANY AGE

Stress Changes the Body

A CYCLE THAT
CAN AFFECT
YOUR HEALTH



1 Stress

Daily pressures, worries or life changes trigger the body's stress response.



2 Hormonal response

The body releases stress hormones like cortisol and adrenaline.



3 Sleep disruption

Stress hormones make it harder to fall asleep and stay asleep.



4 Immune/inflammatory changes

Ongoing stress can weaken immune function and increase inflammation.



5 Physical symptoms

Can include headaches, muscle tension, stomach upset, higher blood pressure and increased pain.



6 More stress

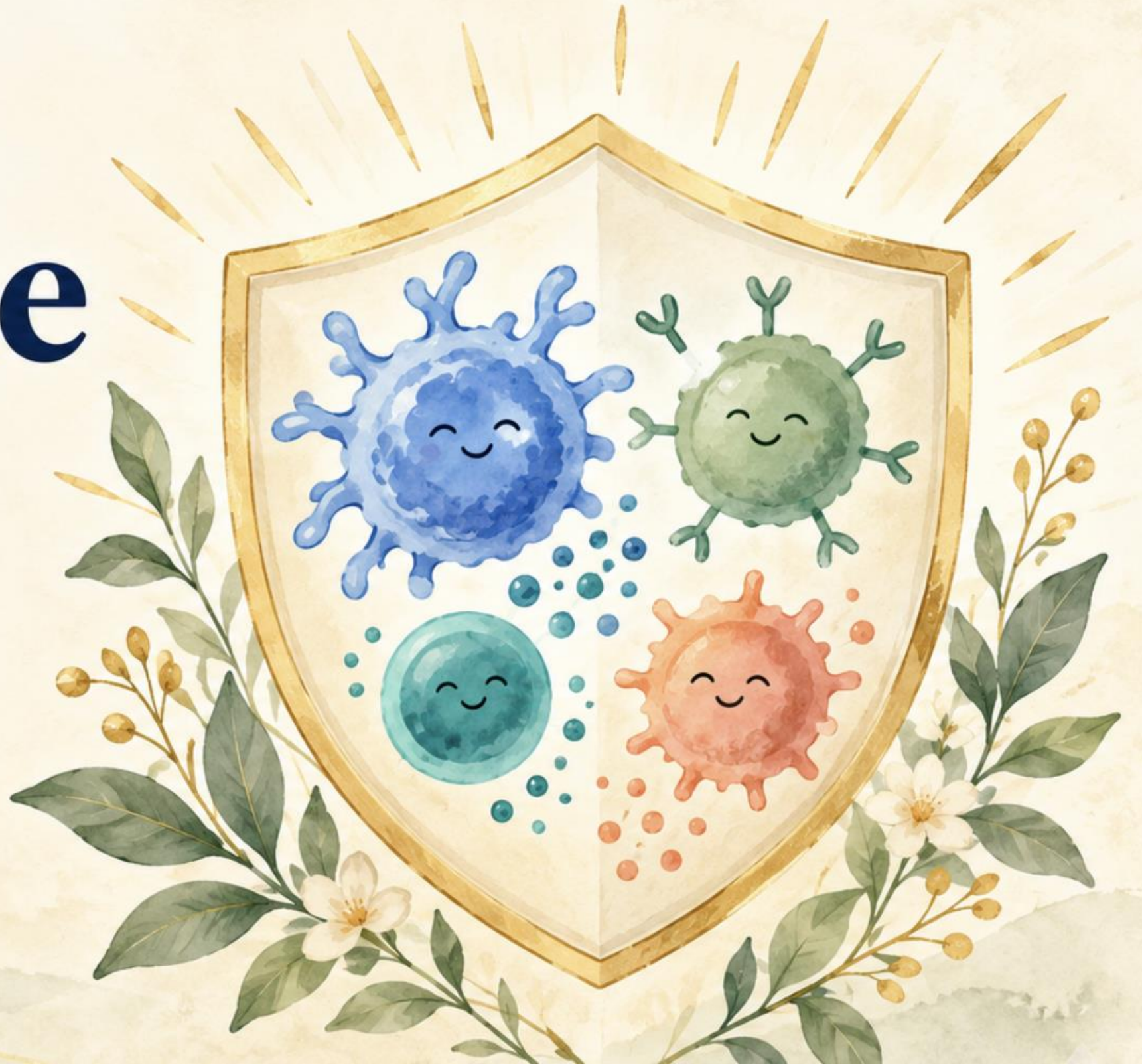
Physical symptoms and ongoing health concerns can create more worry and stress, continuing the cycle.



≡ Where can we interrupt the cycle? ≡

4. Immune Aging.

How immune defenses shift across the lifespan.

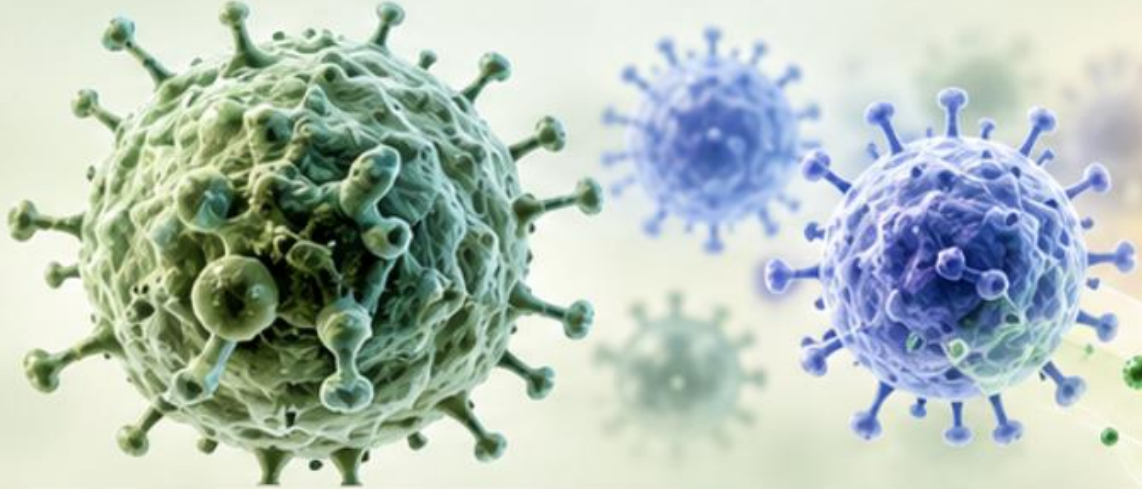


Immunity and Aging

The immune system changes with age.

Innate Immunity

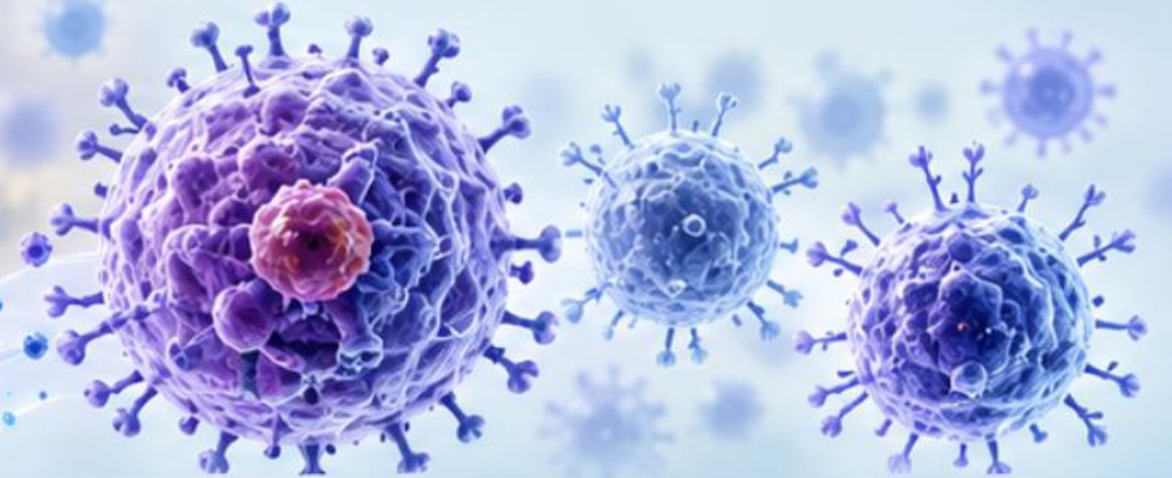
First line of defense



- Slower response
- Less effective at clearing viruses and bacteria
- More inflammation

Adaptive Immunity

Learns and remembers



- Fewer new immune cells
- Weaker response to vaccines
- Less ability to fight new infections



Vaccines and Older Adulthood

Vaccination remains important as immune function changes with age.



Why It Matters

Immune function changes with age, which can increase the risk of serious illness and complications.



Key Vaccines to Discuss

Influenza, COVID-19, shingles, pneumococcal disease, and RSV.



Personalized Recommendations

Recommendations vary by age, health history, previous vaccination, and current clinical guidance.



Stay Up to Date Talk with your healthcare provider about which vaccines are right for you.

Take a Stance!

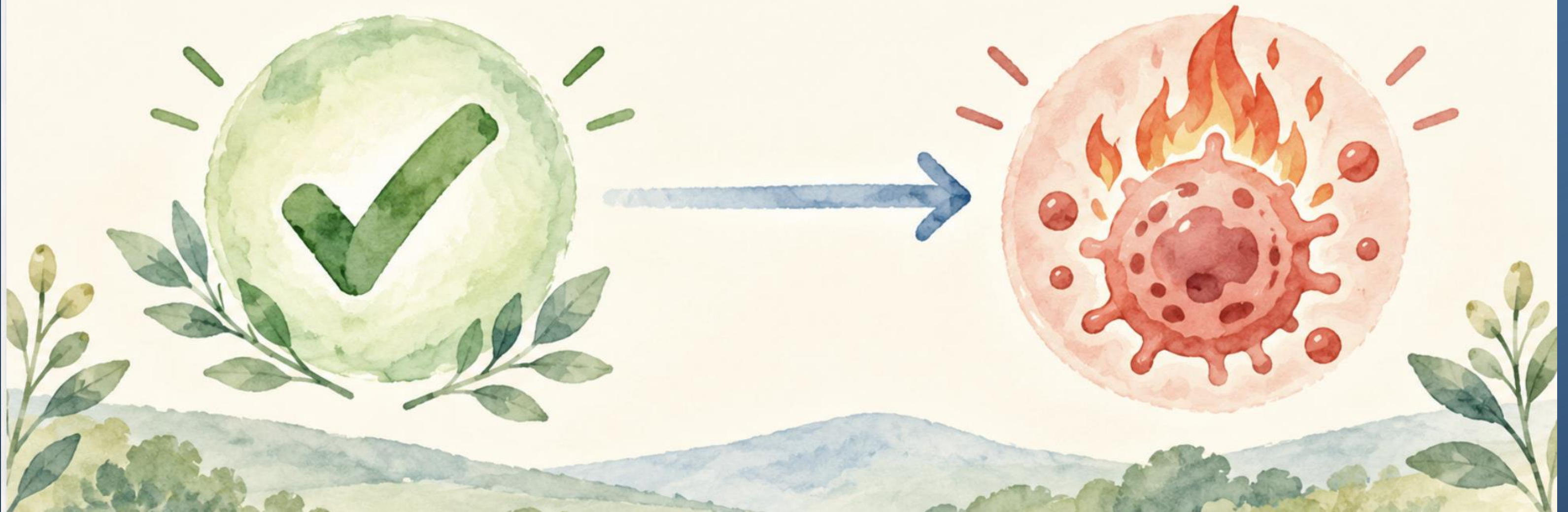
**Is inflammation
GOOD or BAD?**



Choose a side. Be ready to explain your thinking.

5. Inflammation.

Helpful in the short term — harmful when it becomes chronic.



Inflammation: Helpful or Harmful?

Inflammation is a normal and necessary response.
But when it becomes chronic, it can harm the body.

Acute Inflammation (short-term)

- ✓ Helps fight infection
- ✓ Supports healing
- ✓ Protects the body
- ✓ Resolves over time



Chronic Inflammation (long-term)

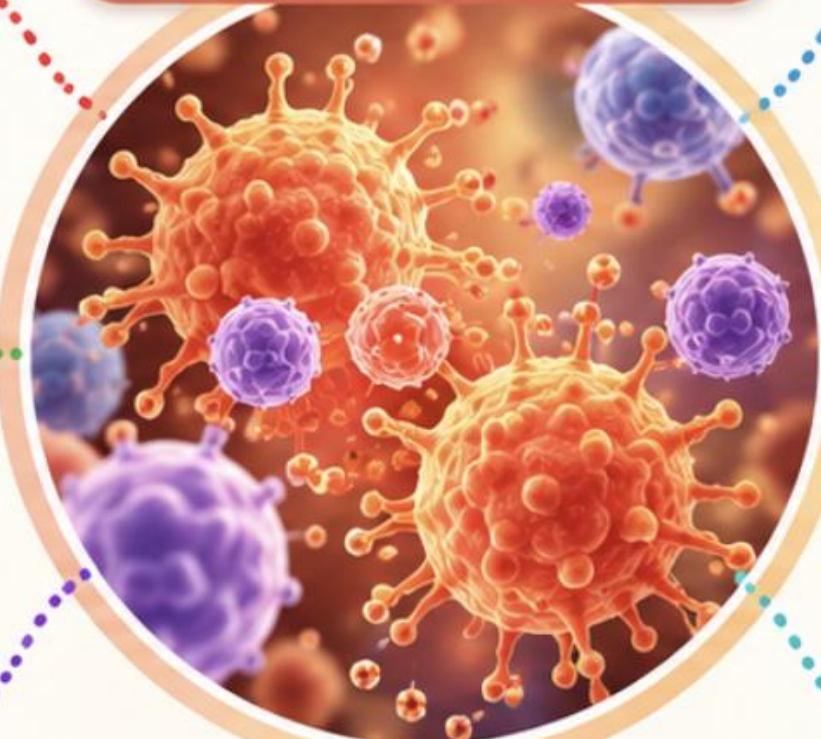
-  Can contribute to heart disease
-  Linked to diabetes
-  Associated with arthritis
-  May affect memory and thinking



Inflammaging

Inflammaging describes the tendency toward increased chronic, low-grade inflammation with advancing age.

Chronic, Low-Grade Inflammation



Cardiovascular Disease

Chronic inflammation can contribute to plaque buildup and increase heart disease risk.



Neurodegenerative Diseases

Inflammation is linked to conditions such as Alzheimer's disease and other dementias.



Type 2 Diabetes

Inflammation can interfere with insulin signaling and blood sugar regulation.



Frailty

Ongoing inflammation can contribute to decreased resilience, higher risk of falls, and greater disability.



Muscle Loss

Chronic inflammation can accelerate loss of muscle mass and strength (sarcopenia).



Arthritis

Inflammation plays a key role in osteoarthritis and rheumatoid arthritis, leading to pain and joint damage.

What Can We Do About Chronic Inflammation?

There are many evidence-based ways to support a healthier inflammatory response as we age.



Regular Physical Activity

Helps reduce inflammation and supports overall health.



Adequate Sleep

Supports immune balance and helps regulate inflammatory processes.



Nutritious Dietary Patterns

A diet rich in fruits, vegetables, whole grains, lean protein, and healthy fats supports lower inflammation.



Maintain Social Connection

Strong social relationships are linked to better immune function and lower inflammation.



Stress Management

Mindfulness, deep breathing, time in nature, and other practices can help reduce stress-related inflammation.



Avoid Smoking

Smoking increases inflammation and raises the risk of many chronic diseases.



Manage Chronic Conditions

Keeping conditions like high blood pressure, diabetes, and high cholesterol well managed can reduce inflammatory burden.



Maintain Oral Health

Good oral hygiene helps prevent chronic inflammation linked to gum disease and other health issues.



Seek Appropriate Medical Care

Stay up to date on preventive care, recommended screenings, and vaccinations.



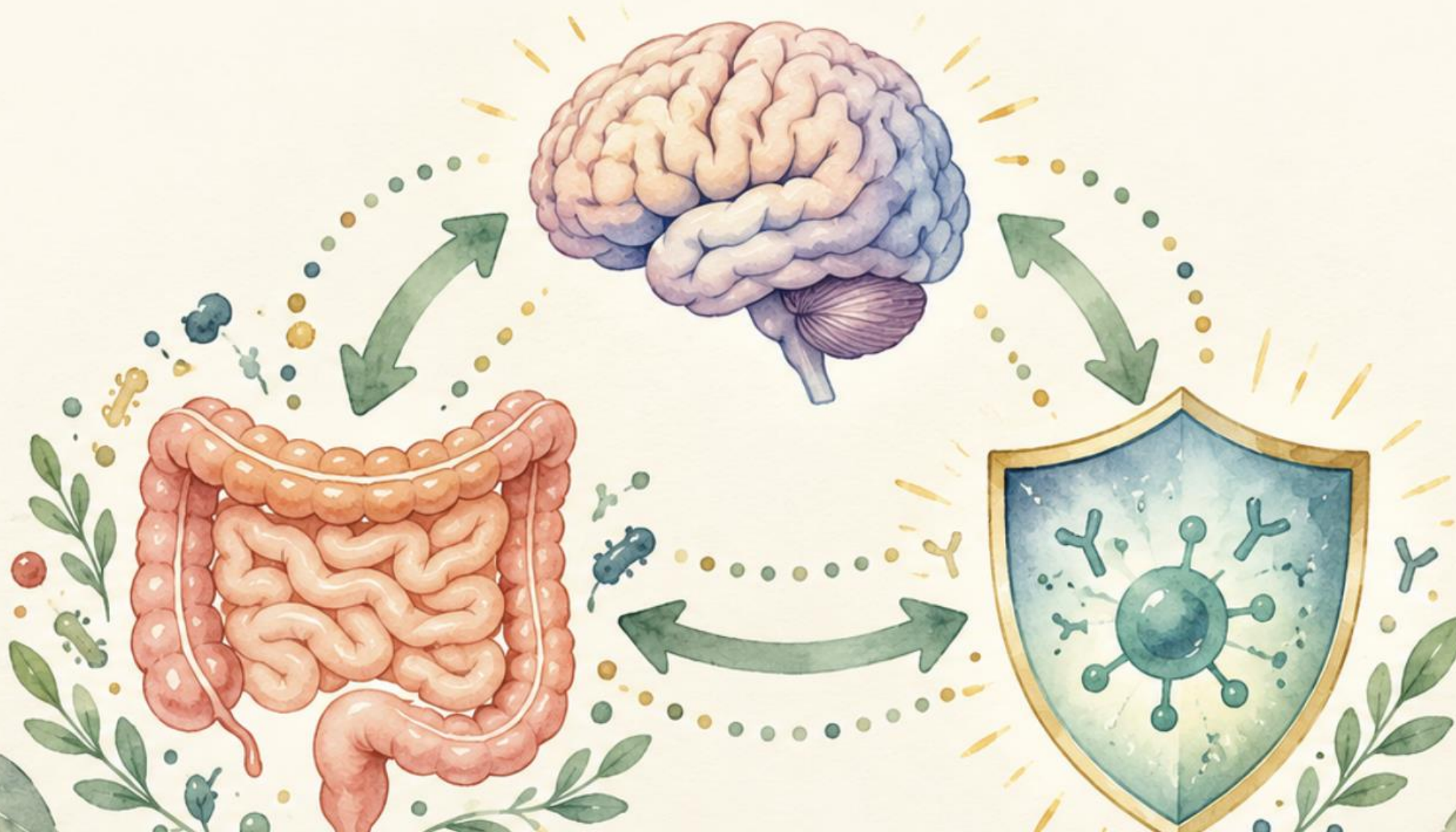
Important Note

There is no single supplement or “anti-inflammatory” food that can prevent or reverse chronic inflammation.

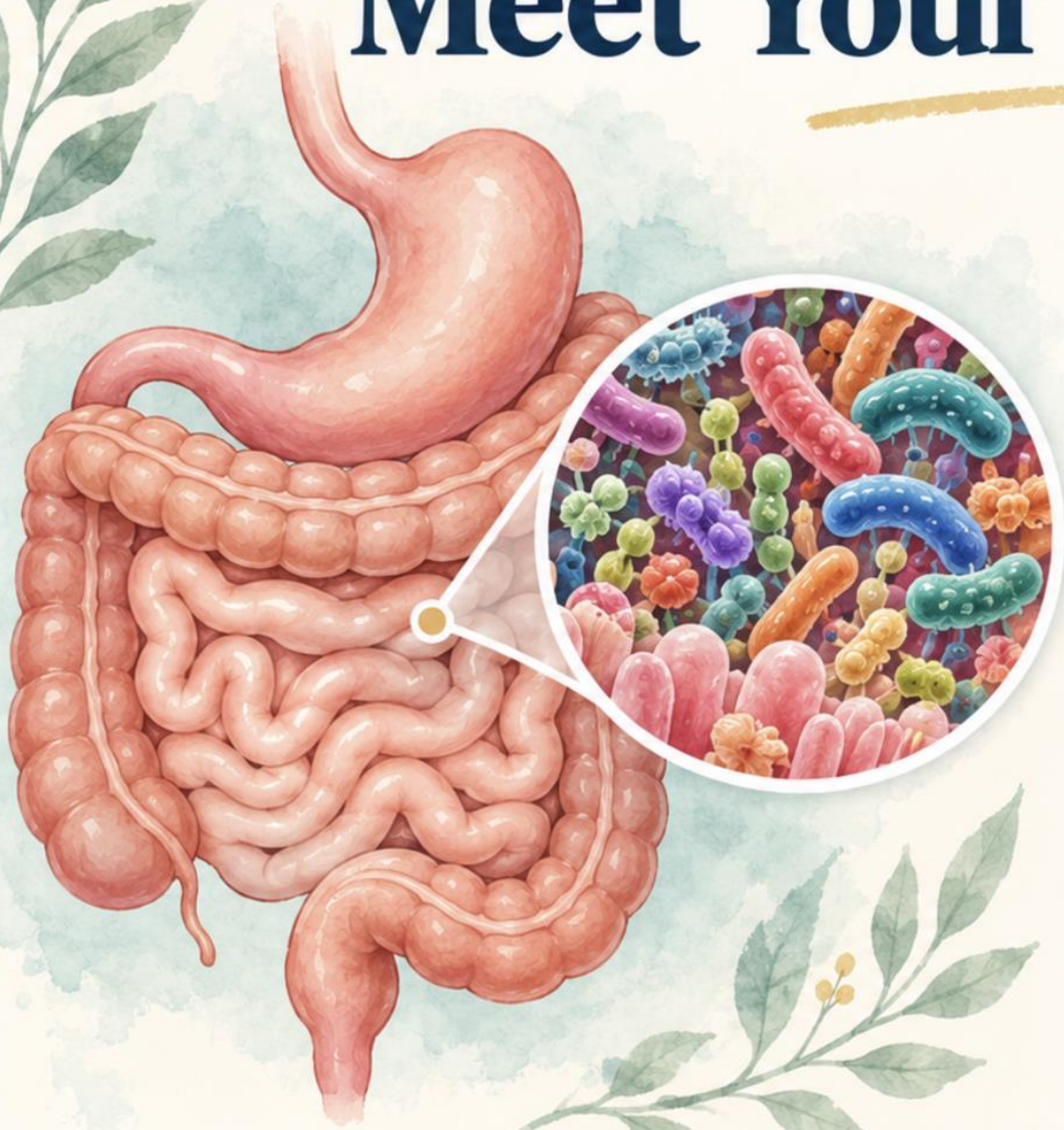
A combination of healthy lifestyle choices and medical care provides the greatest benefit.

6. Gut–Brain–Immune Axis

Your gut, brain, and immune system are in constant conversation.



Meet Your Gut Microbiome



Trillions of microorganisms live in and on the human body.



The gut microbiome participates in **digestion**, **metabolism**, and **immune regulation**.



The microbiome changes **across the lifespan**.

Your Gut Talks to Your Brain



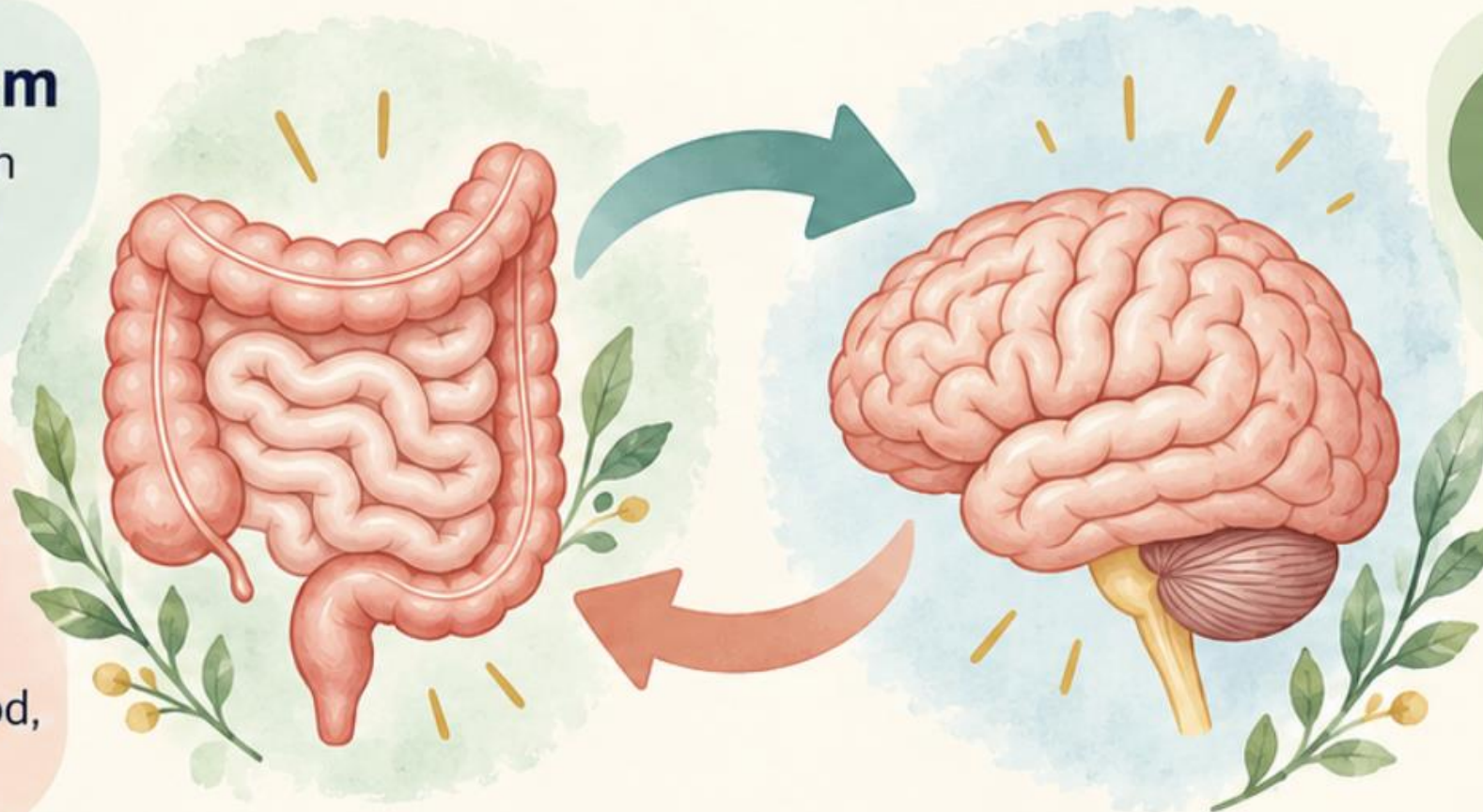
Nervous system

Signals travel through the vagus nerve and other pathways.



Hormones

Gut microbes help influence hormone levels that affect mood, stress, and appetite.



Immune signaling

Gut microbes interact with the immune system and release signaling molecules.



Microbial metabolites

Gut microbes produce beneficial compounds that can affect brain function.

Gut health, brain health, and immune health are interconnected —
but the microbiome is one part of a complex system.

Supporting the Gut as We Age



Dietary fiber



Variety of plant foods



Adequate hydration



Physical activity



Sleep



Medication effects



Antibiotic stewardship



Small daily habits can support gut, brain, and immune health over time.

7. Sleep & Nutrition

Daily habits that support immune, hormonal, brain, and metabolic health.



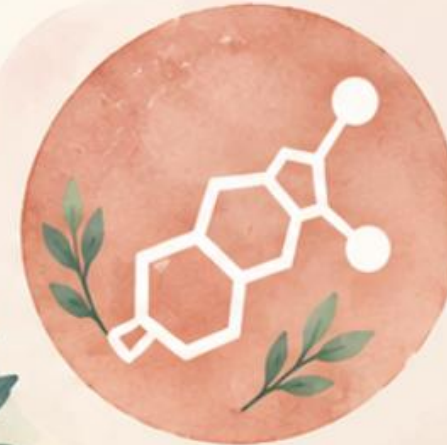
Sleep Is Active Biology

While you rest, your body and brain stay busy — repairing, balancing and preparing you for a healthier, brighter tomorrow.



Immune Regulation

Strengthens your defenses so you can stay healthier and fight off illness.



Hormonal Regulation

Helps balance key hormones that affect mood, energy, growth and overall health.



Memory

Helps your brain organize, strengthen and store what you've learned.



Metabolism

Supports healthy blood sugar, energy use and a healthy weight.



Appetite

Helps regulate hunger and fullness hormones so you're more likely to make healthy food choices.



Emotional Regulation

Supports a calmer mind, better stress management and a more positive outlook.



Physical Recovery

Repairs muscles and tissues, reduces inflammation and restores your body for tomorrow.

Better sleep supports a healthier, fuller life at every age.

Nutrition as an Immune Modulator

A balanced, varied diet helps keep your immune system strong at any age.



Protein

Helps build and repair immune cells.



Fruits & Vegetables

Provide fiber, antioxidants and key nutrients.



Fiber

Supports a healthy gut microbiome, which plays a role in immunity.



Healthy Fats

Help regulate inflammation and support immune cell function.



Hydration

Helps immune cells work effectively.



Micronutrients

Vitamins and minerals (such as A, C, D, E, zinc and selenium) support immune function.



A consistent, balanced eating pattern supports a strong immune system and overall health.

Undernutrition can be a significant concern in older adulthood.

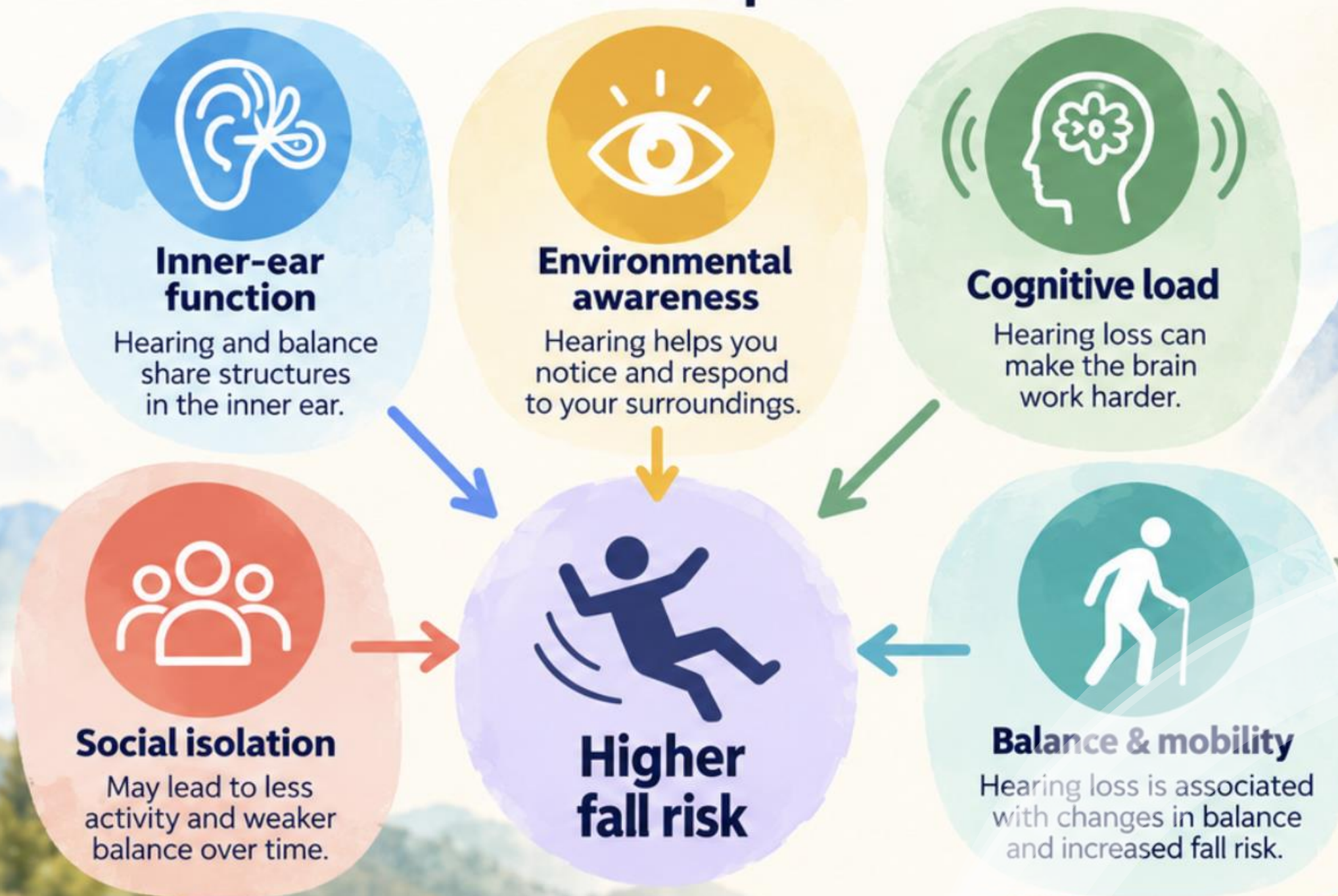
8. Hearing & Balance

Listening, moving, thinking, and staying connected.



Does Hearing Loss Affect Balance?

Yes — and the connection is complex.



Hearing Is Also a Brain-Health Issue

Hearing changes are not just “normal aging.”
They can affect many areas of brain health and quality of life.



Communication

Easier, more meaningful connections.



Social engagement

Stay connected and active.



Cognitive effort

Hearing loss can make everyday listening more mentally tiring.



Brain health

Associated with higher risk of cognitive decline.

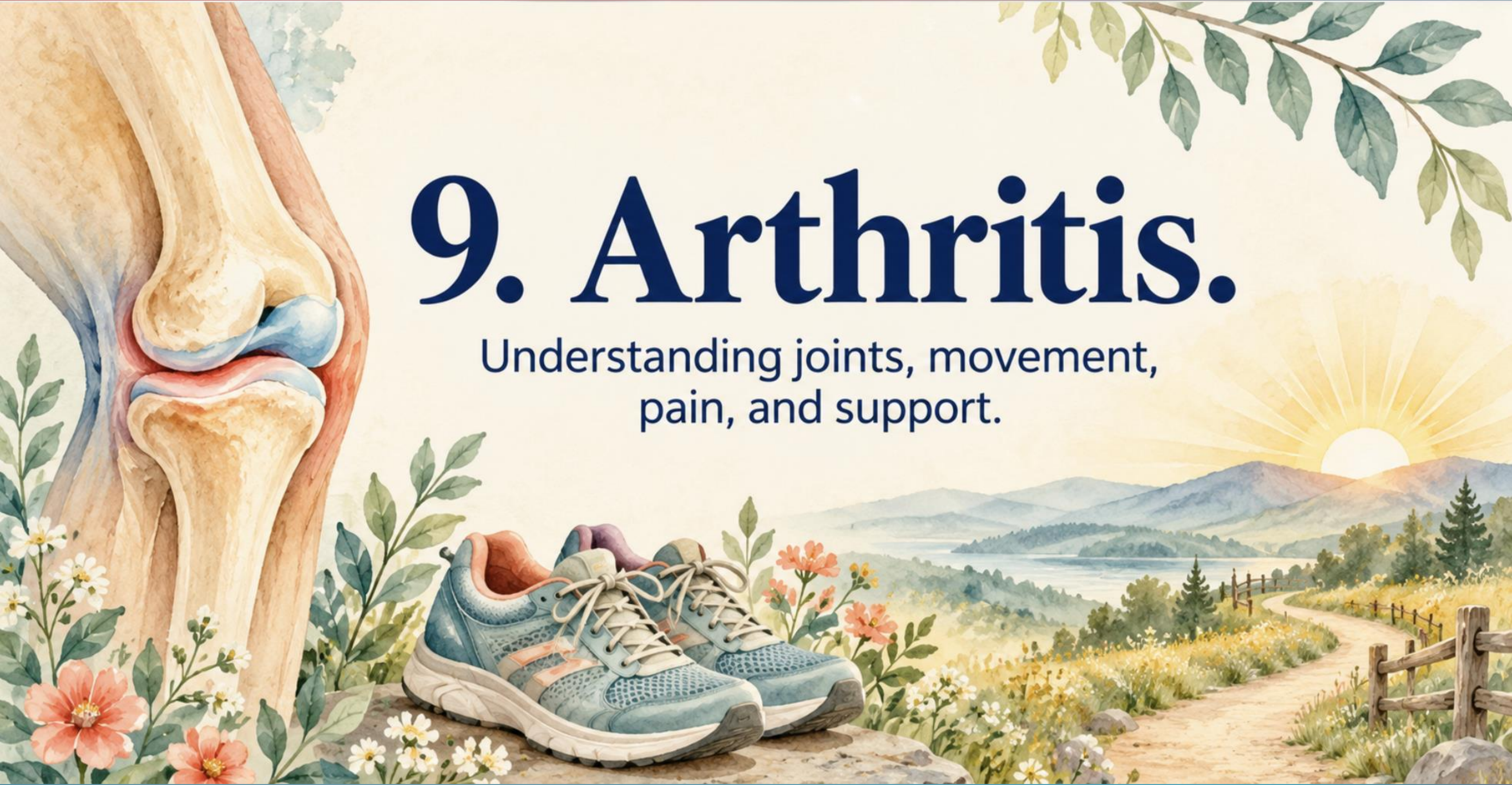


Quality of life

Supports independence, mood, and overall well-being.



Addressing hearing changes early can help protect your brain, your balance, and your quality of life.



9. Arthritis.

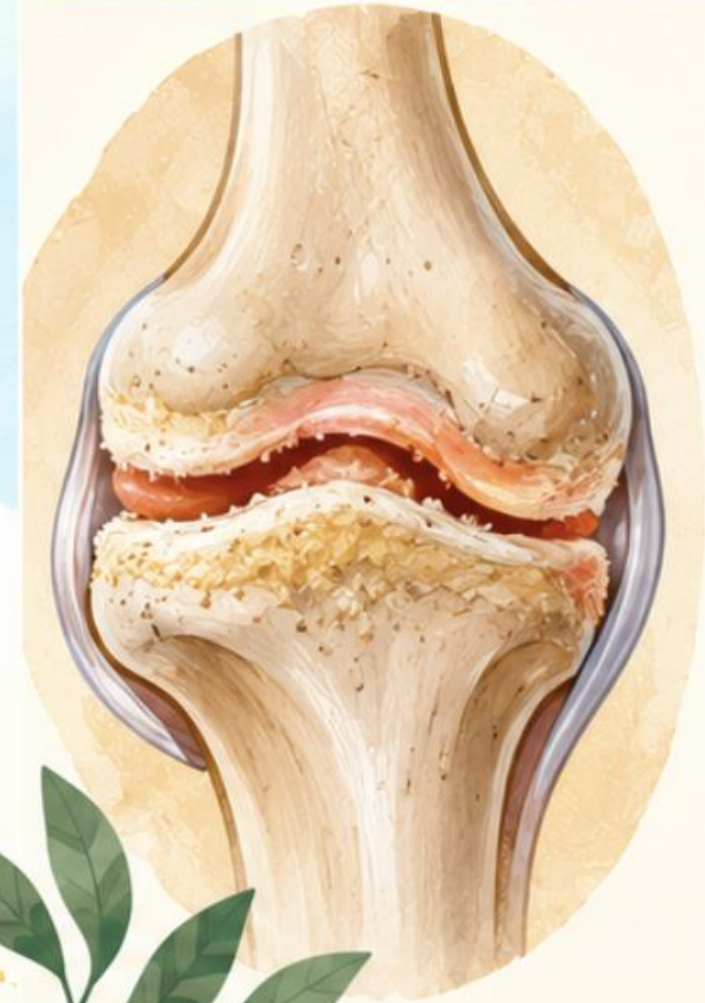
Understanding joints, movement,
pain, and support.

Rheumatoid Arthritis vs. Osteoarthritis

Two common types of arthritis, but different causes and characteristics.

Osteoarthritis (OA)

WEAR AND TEAR



Primarily a **degenerative** joint disease



Changes involve **cartilage** and the **whole joint**



Risk increases **with age**



Often affects **weight-bearing** or **heavily used joints** (e.g., knees, hips, hands)



Pain often **worsens** **with activity**

Rheumatoid Arthritis (RA)

AN AUTOIMMUNE CONDITION



An **autoimmune** disease



The immune system **attacks joint tissues**



Can occur at **many ages**



Often involves **symmetrical joint inflammation** (e.g., both hands, both knees)



Morning stiffness and inflammatory symptoms can be prominent

Arthritis Does NOT Mean “Stop Moving”

The right kind of movement and care can help you stay active, reduce pain, and maintain your independence.



**Appropriate
movement**



Strengthening



Mobility



Joint protection



**Weight
management
(when appropriate)**



**Heat/cold
strategies**



Pacing



**Medical
treatment**

Who Can Help?

A team of healthcare professionals can help you manage arthritis, improve function, and maintain your quality of life.



Rheumatologist

Especially important for rheumatoid and other inflammatory/autoimmune diseases.



Primary-care provider

Assessment and overall management.



Physical therapist

Strength, mobility, function, and pain-management strategies.



Occupational therapist

Adapting everyday activities and protecting joints.



Registered dietitian

Individualized nutrition support.



Orthopedic specialist

Structural joint problems and surgical options when appropriate.



10. Long COVID in Older Adults.

When recovery is complex and symptoms affect multiple systems.



When Recovery Doesn't End With the Infection

Long COVID is a post-infectious condition that can affect multiple body systems.

Possible symptoms include:



Fatigue



Shortness of breath



Cognitive difficulties ("brain fog")



Sleep disturbance



Exercise intolerance



Cardiovascular symptoms



Changes in smell or taste



Pain

Why Long COVID Matters in Older Adulthood



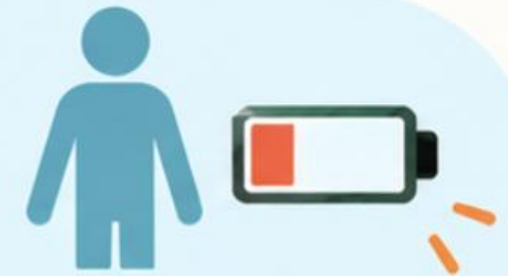
Existing chronic conditions

May increase the risk of long-term effects.



Frailty

Can make recovery more challenging.



Reduced physiological reserve

The body may have less ability to adapt and recover.



Medication burden

Potential for more drug interactions and side effects.



Deconditioning

Prolonged illness and reduced activity can lead to muscle loss and decreased function.



Difficulty distinguishing new symptoms

Can be hard to tell if symptoms are from long COVID or preexisting conditions.

Take a Stance!

**When recovering from Long COVID,
should people PUSH THROUGH activity?**

Choose a side. Be ready to explain your thinking.



Recovery Is Not Always “Push Through It”

Recovery looks different for **everyone**, and more is not always better.



Gradual rehabilitation

may help some individuals, such as pacing activity and slowly rebuilding stamina.



Post-exertional symptom exacerbation

can occur, in which excessive activity worsens symptoms, sometimes for days or longer.



Care should be individualized.

A personalized approach based on symptoms, goals, and overall health is essential.



Work with your healthcare team to develop a safe and realistic recovery plan that supports your health and quality of life.

11. Whole-Body Strategies.

Small changes can reach multiple systems.



Movement



Sleep



Food



**Stress
Management**



**Social
Connection**

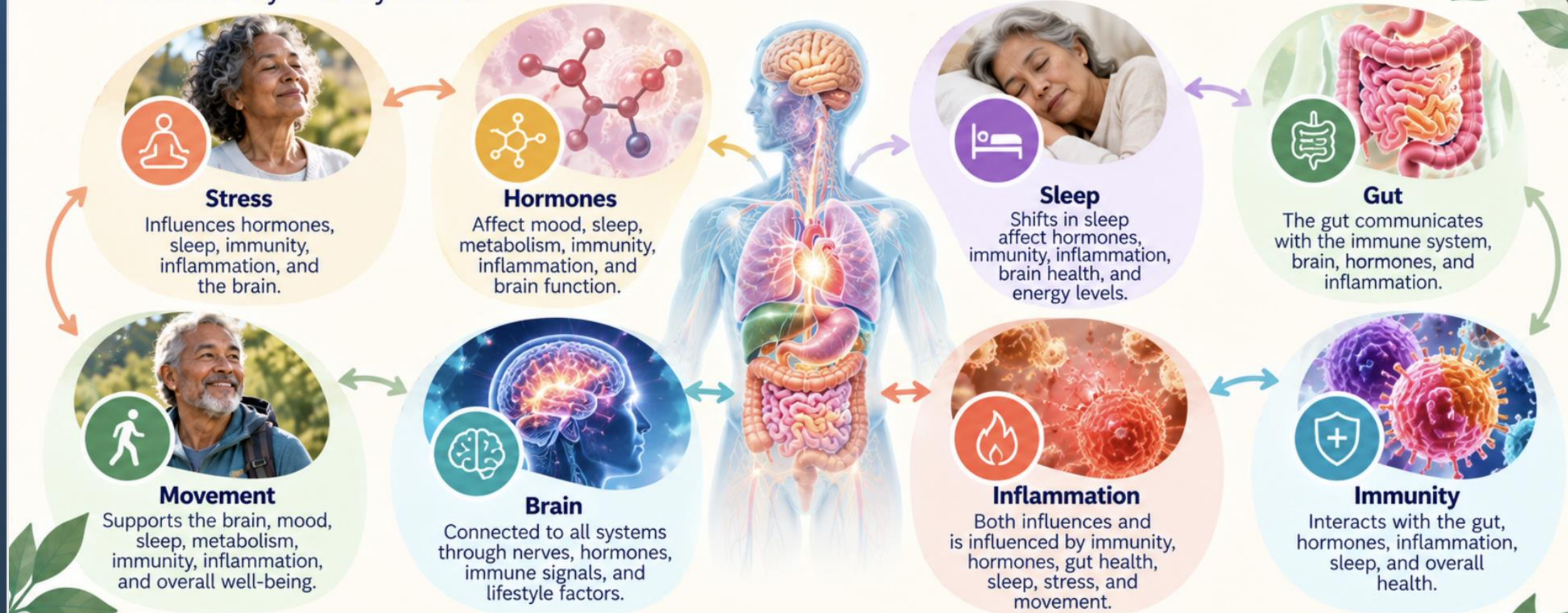


**Medical
Care**



One Body, Interconnected Systems

Our bodies work as an integrated network. Changes in one area can influence — and be influenced by — many others.



The point is not that **one system** causes everything else.



The key idea is that **none of these systems** operates alone.

THE GOOD NEWS

Small Changes Reach Multiple Systems

Healthy habits in one area can have positive effects throughout the body and mind.



Movement can support:

-  Immune regulation
-  Sleep
-  Mood
-  Metabolic health
-  Bone and muscle
-  Brain health



Nutritious food can support:

-  Gut health
-  Immune function
-  Muscle
-  Metabolism



Sleep and stress management can support:

-  Hormonal regulation
-  Immune function
-  Cognition
-  Emotional health



One health behavior can have effects throughout the body.

Looking Ahead

Week 5 • Emotions, Psychology, and Purpose

Next week we'll explore the emotional, psychological, and social dimensions of aging well, including:



The psychology of aging well

Resilience, perspective, and meaning



Emotional regulation

Navigating life's changes



Purpose, relationships, and lifelong learning

Staying connected and engaged



Mental health and identity shifts

Embracing new chapters



ACES and later life

How early experiences show up — and what we tell ourselves



Mindfulness, gratitude, and stress reduction

The mind-body connection in action



Identity, resilience, and living well with disability

Thriving at every stage

