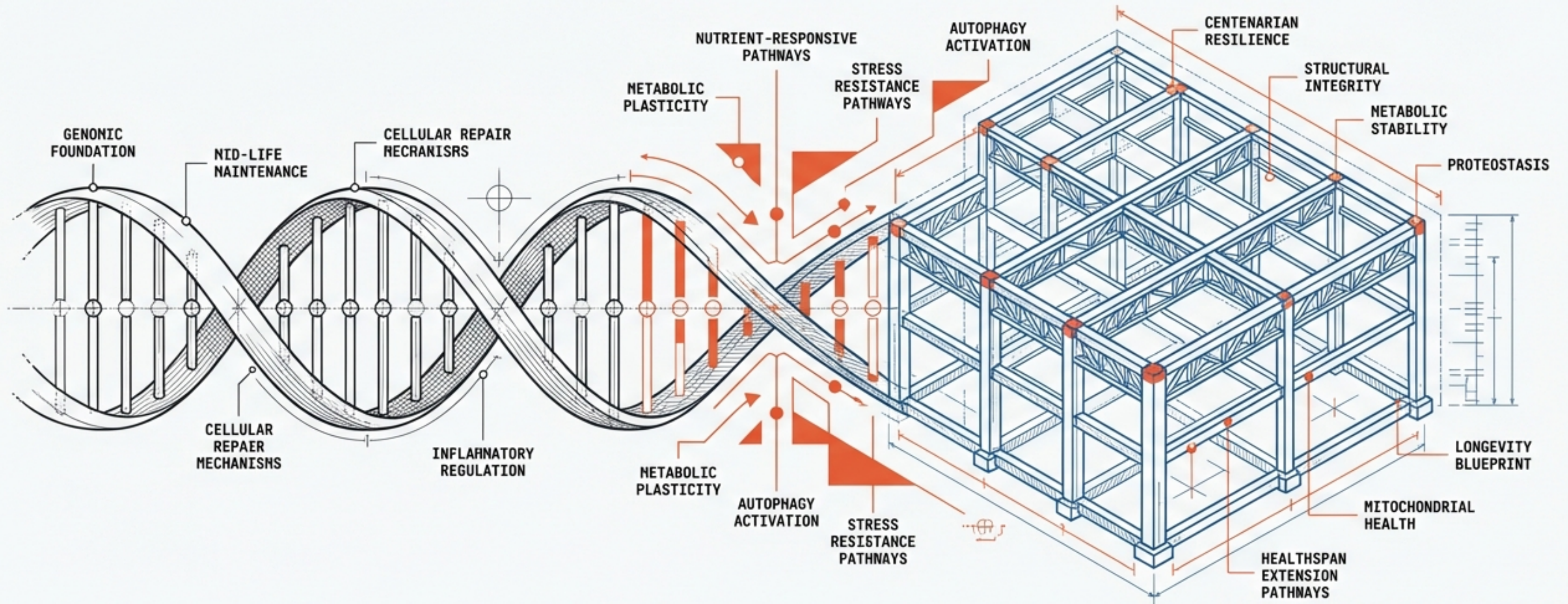


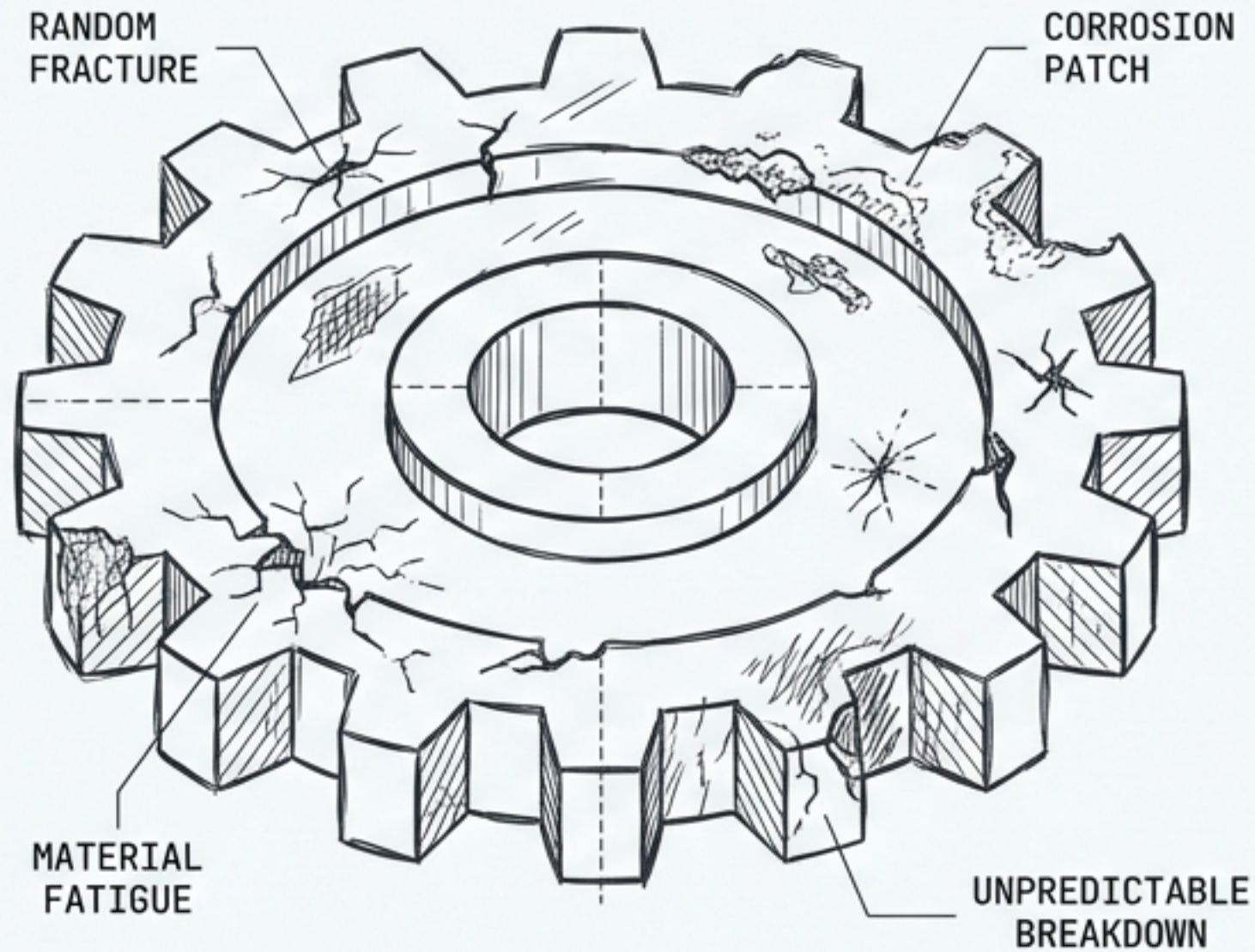
# The Nutritional Architecture of Longevity

Navigating the Metabolic Transition from Mid-Life Maintenance to Centenarian Resilience

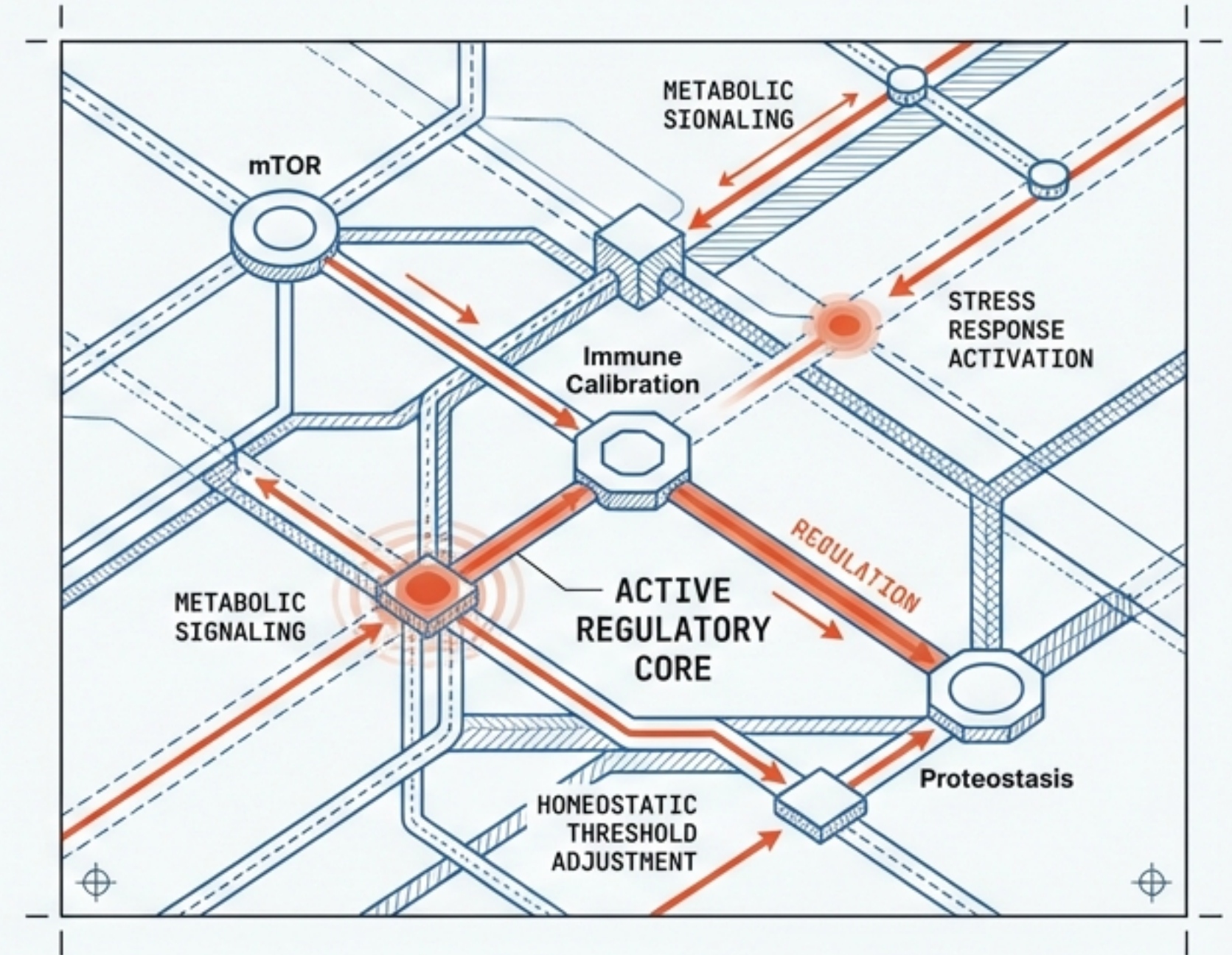


# Aging is Not Stochastic. It is Regulated.

## THE MYTH (Wear & Tear)

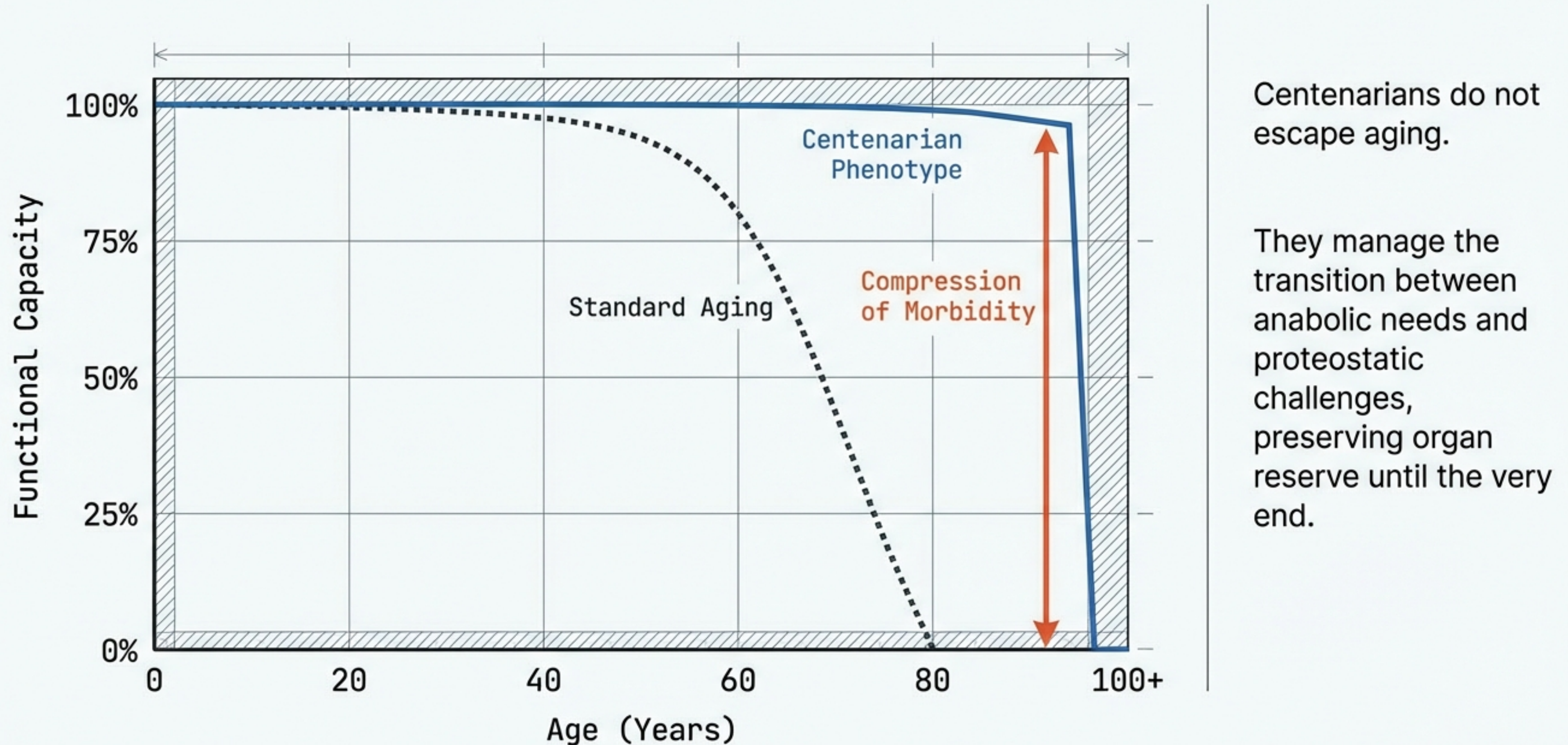


## THE REALITY (Regulated Program)

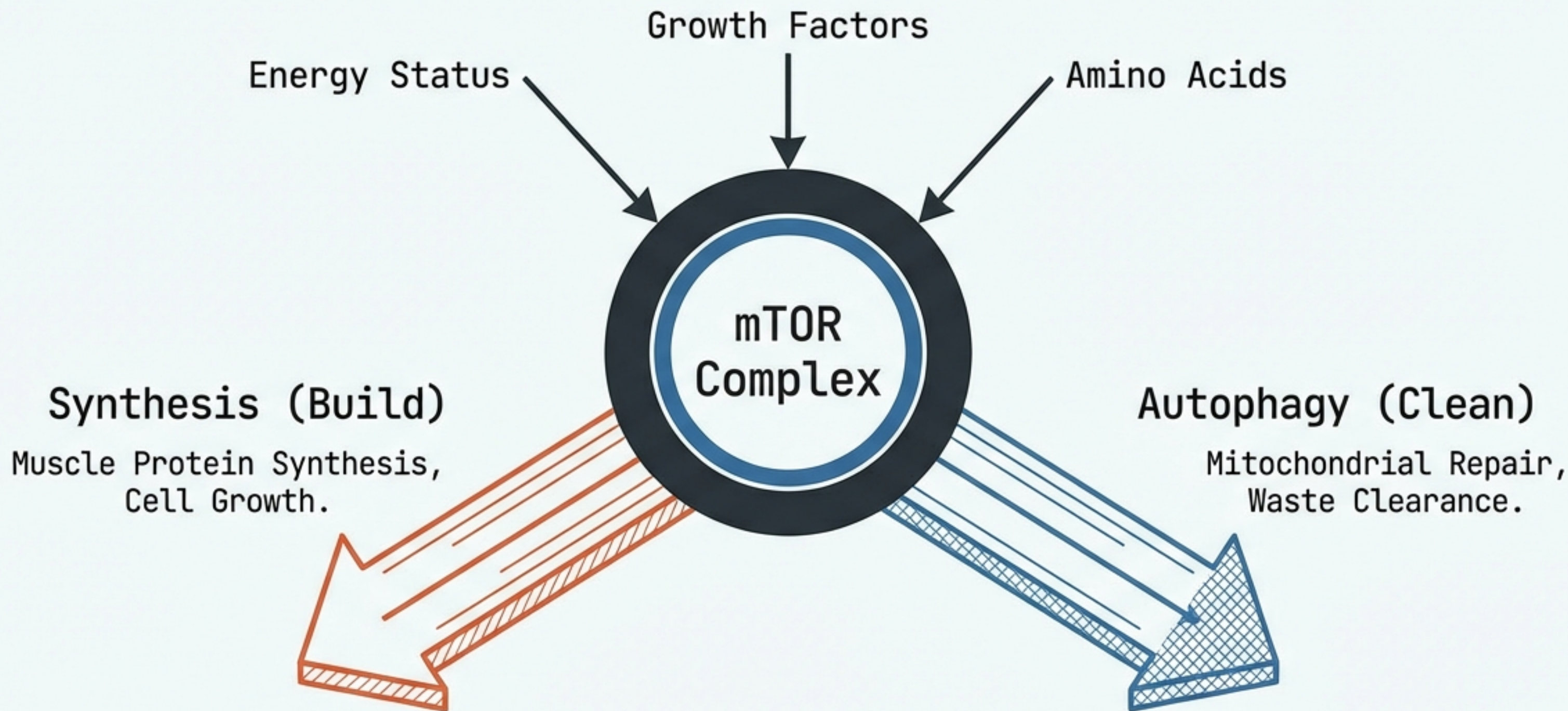


Longevity is defined by nutrient-sensing networks and homeostatic thresholds. It is not a passive accumulation of damage, but an active biological program.

# The Centenarian Phenotype: Compressing Morbidity



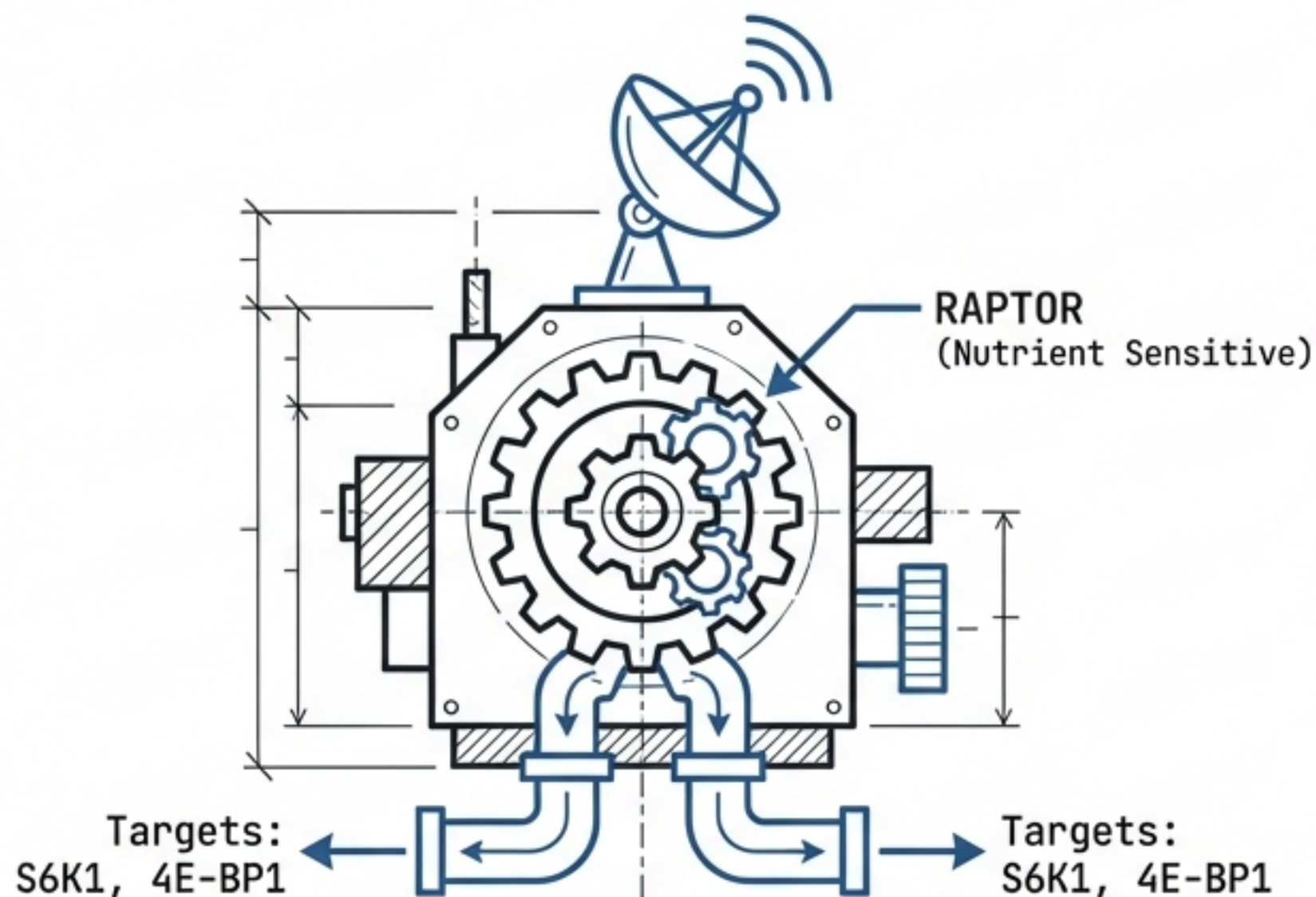
# mTOR: The Master Metabolic Switchboard



The Trade-off: You cannot Build and Clean the house simultaneously.  
Hyperactive mTOR drives growth but blocks repair.

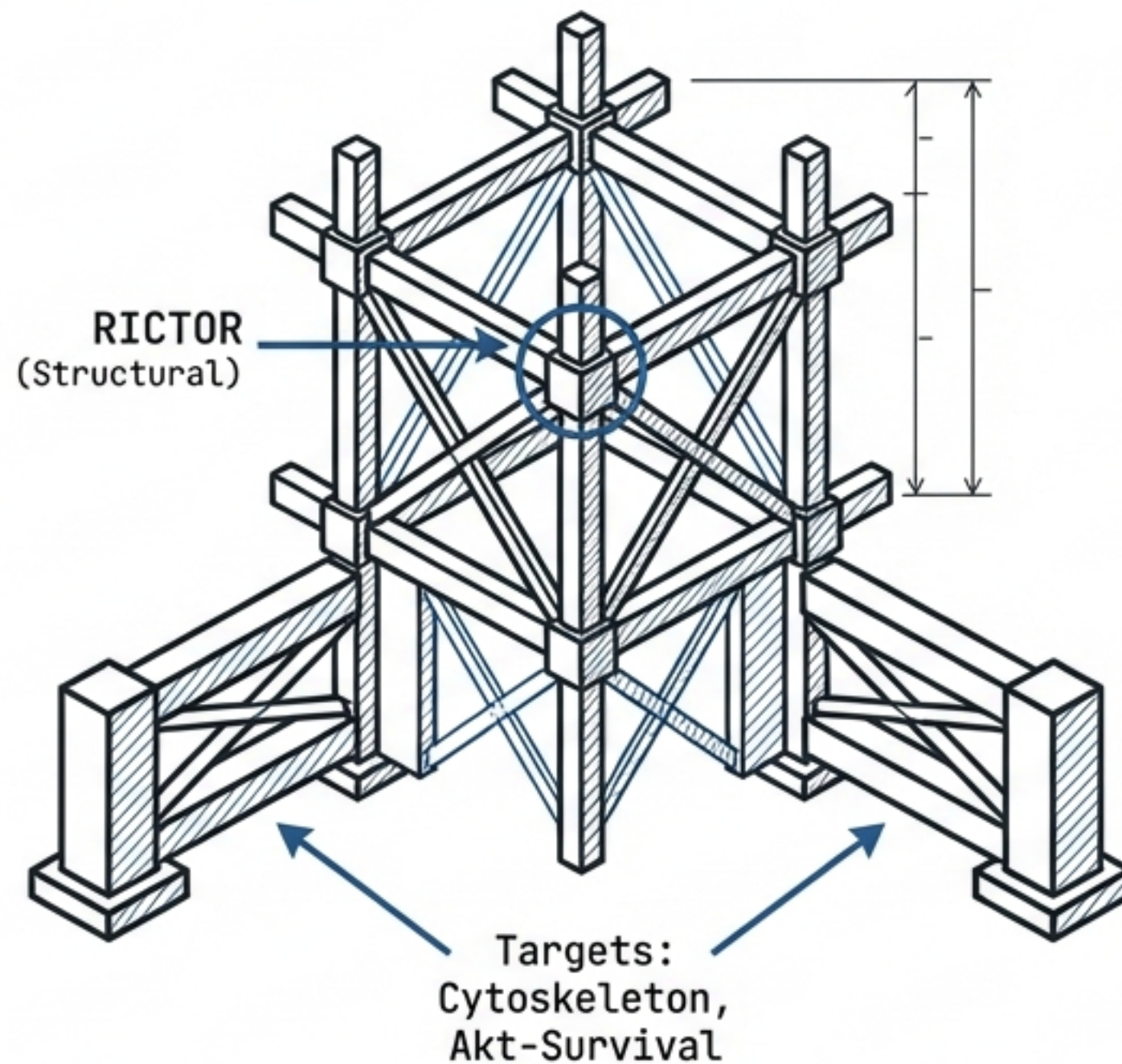
# A Tale of Two Complexes

## mTORC1 (The Builder)



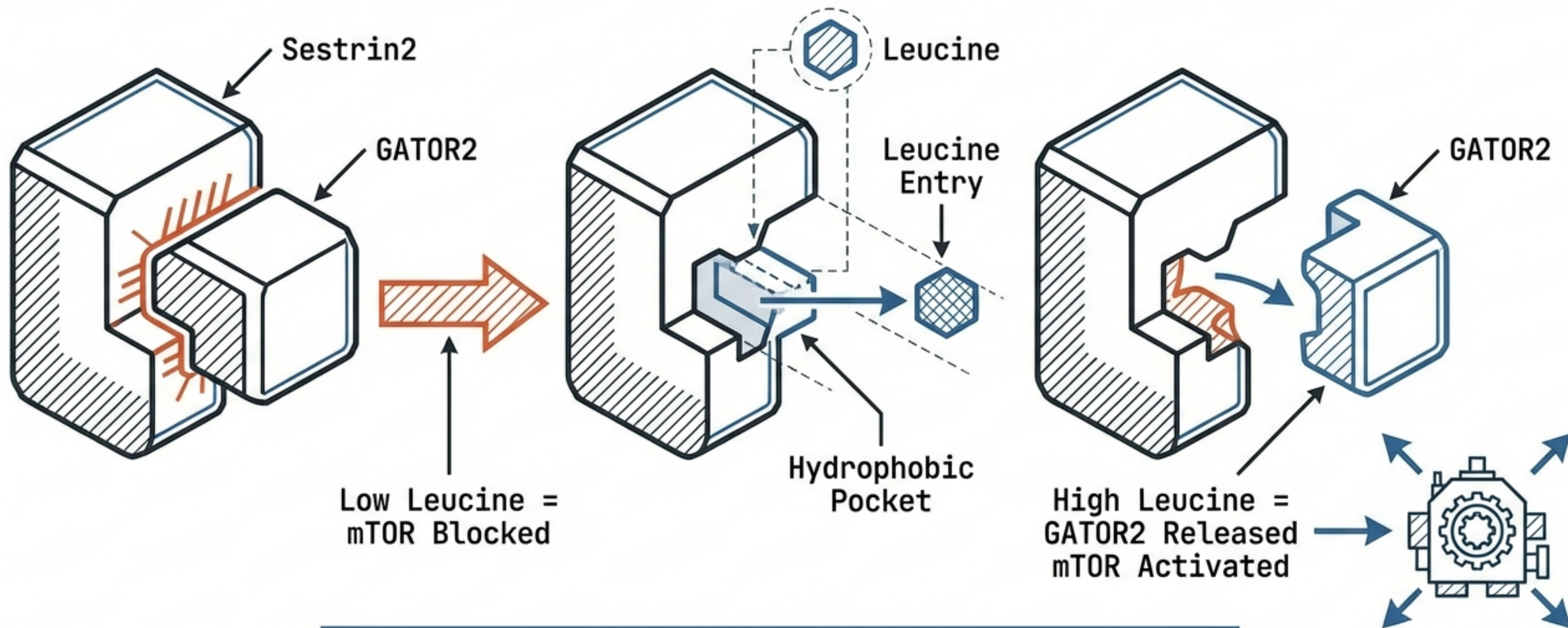
**Risk:** Continuous activity leads to clogged proteostasis.

## mTORC2 (The Structure)



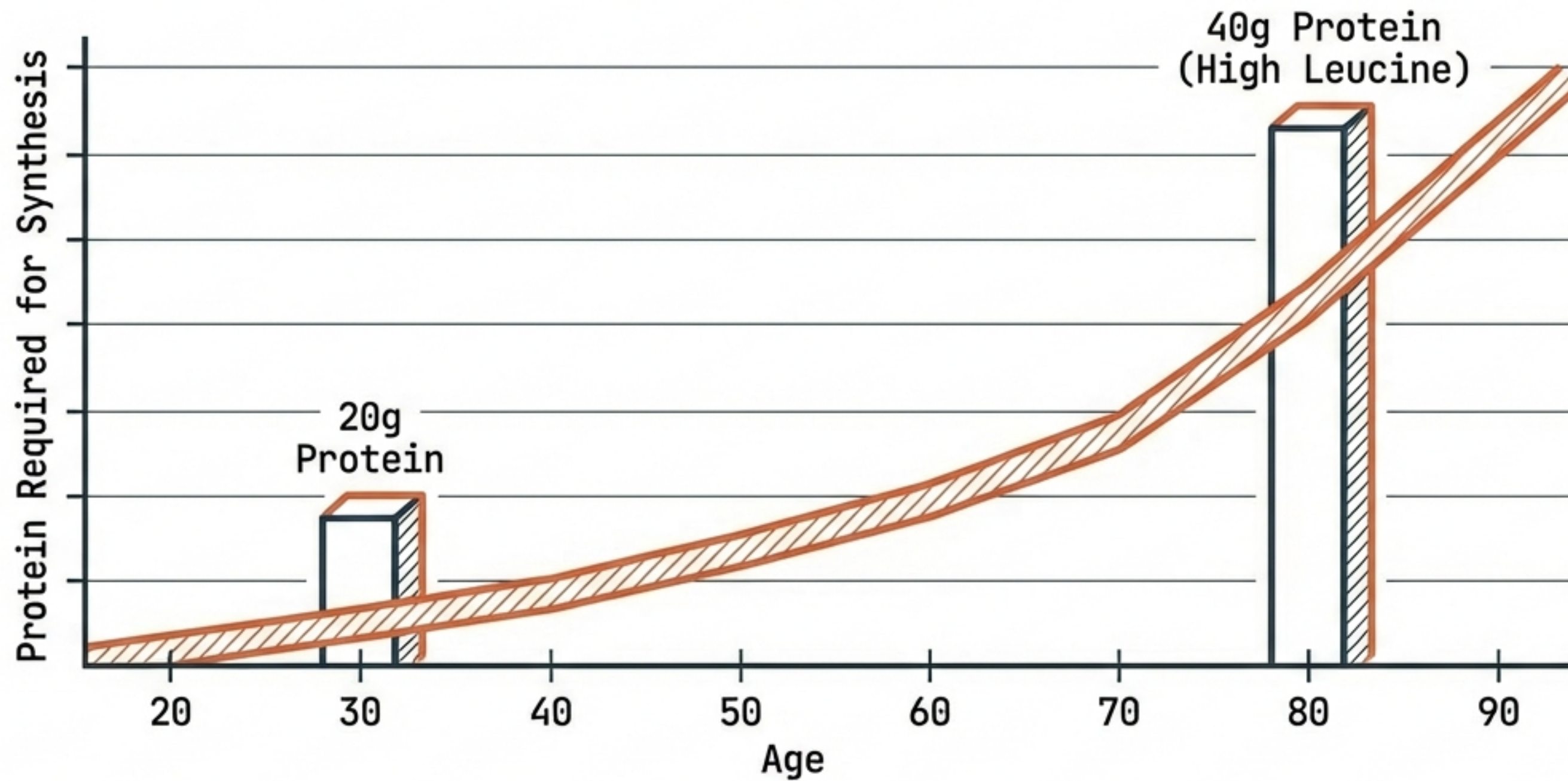
Hyperactive mTORC1 in late life creates a **backlog of misfolded proteins**, driving cellular aging.

# The Sensor: Sestrin2 & The Leucine Key



Leucine is unique. It is both a fuel and a signal.

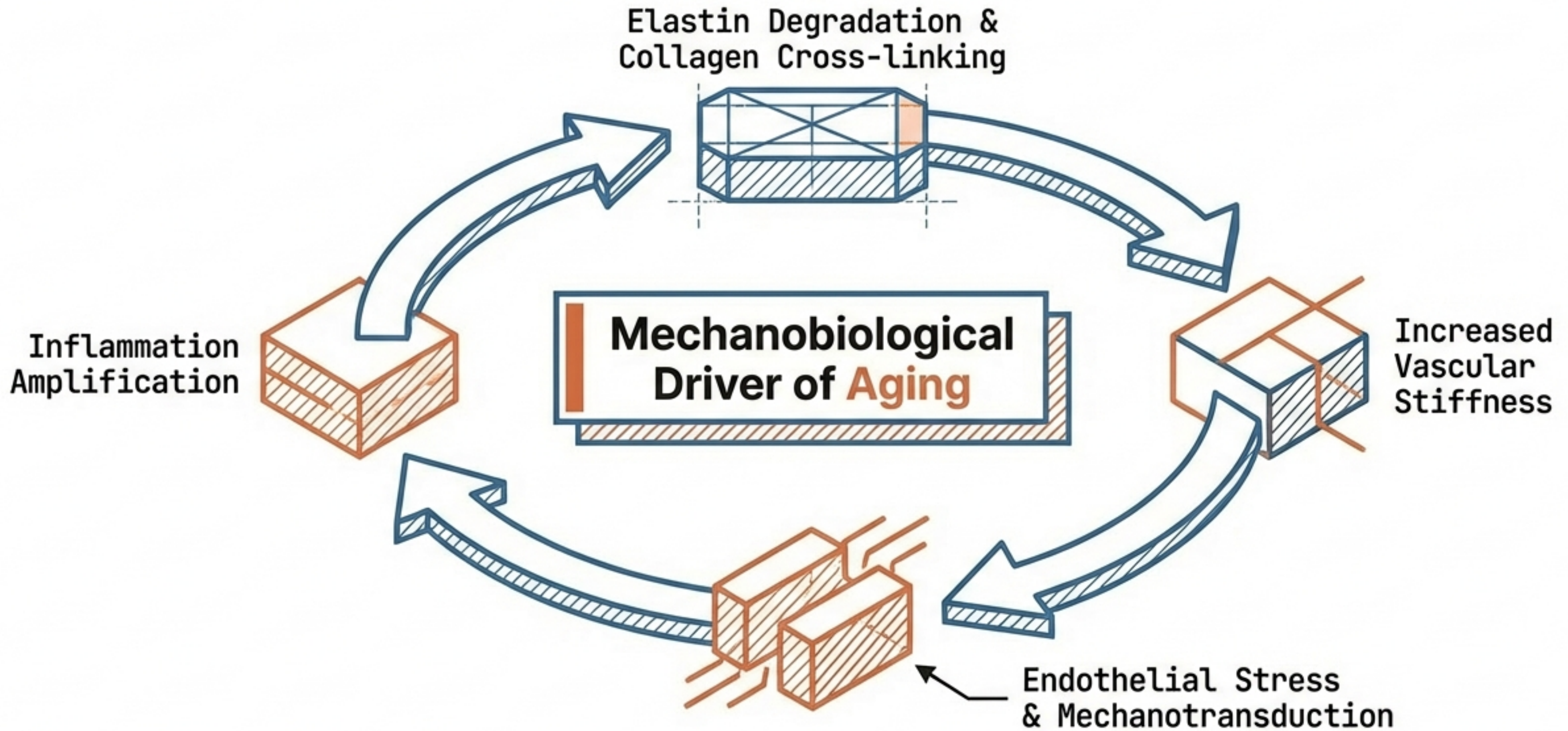
# The Rising Threshold of Anabolic Resistance



## The 'Blunted' Signal:

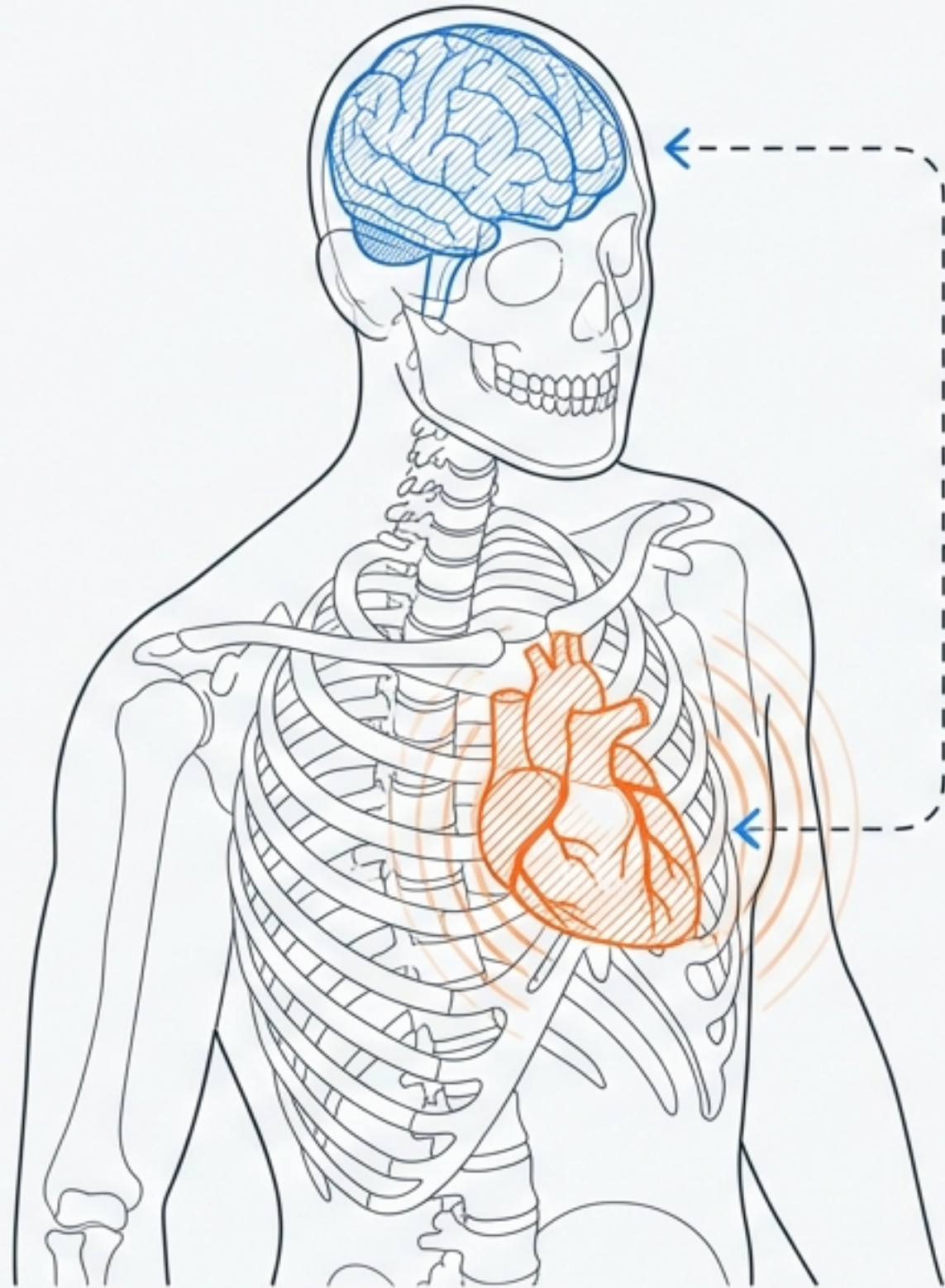
Aging muscle requires a much louder nutrient signal to trigger the same growth response due to impaired perfusion and insulin resistance.

# The Stiffness Loop



Stiffness is not just a symptom. It physically drives endothelial senescence.

# The Heart-Brain Axis & The Vascular Cliff



Calcification (CAC)  
correlates with  
Dementia Risk

## The Truth Teller: NT-proBNP

- Low levels in Centenarians predict survival.
- Signals resistance to myocardial wall stress.

# The Metabolic Switch: Age 65

## STRATEGY: SUPPRESS

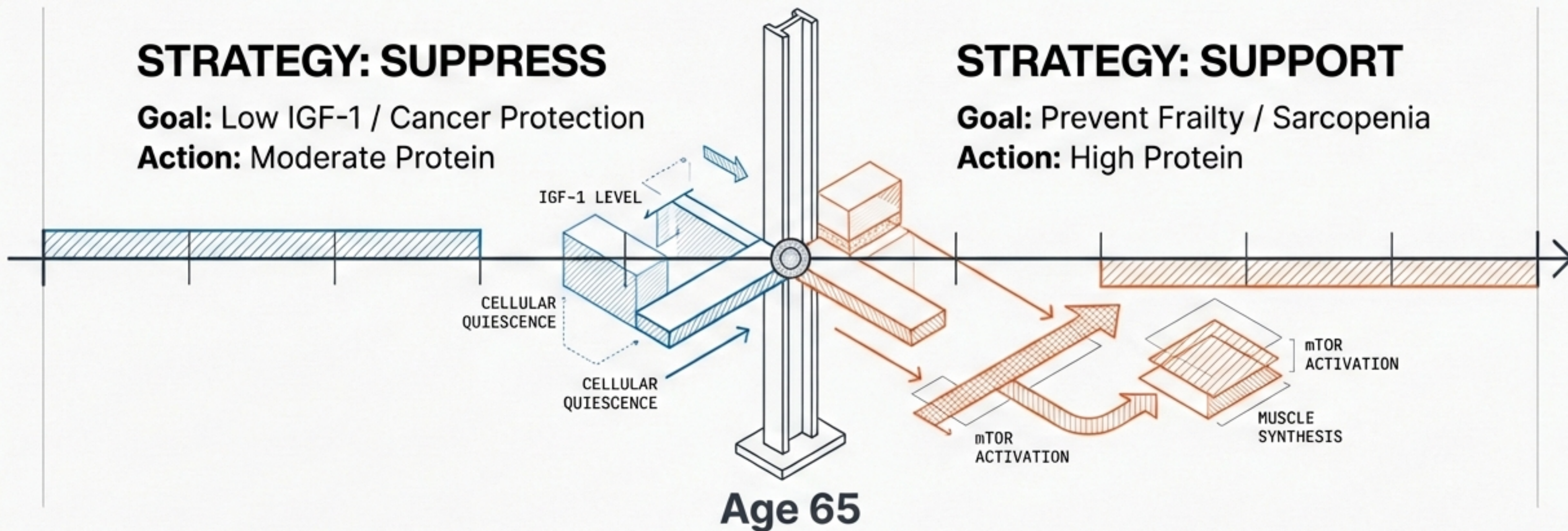
**Goal:** Low IGF-1 / Cancer Protection

**Action:** Moderate Protein

## STRATEGY: SUPPORT

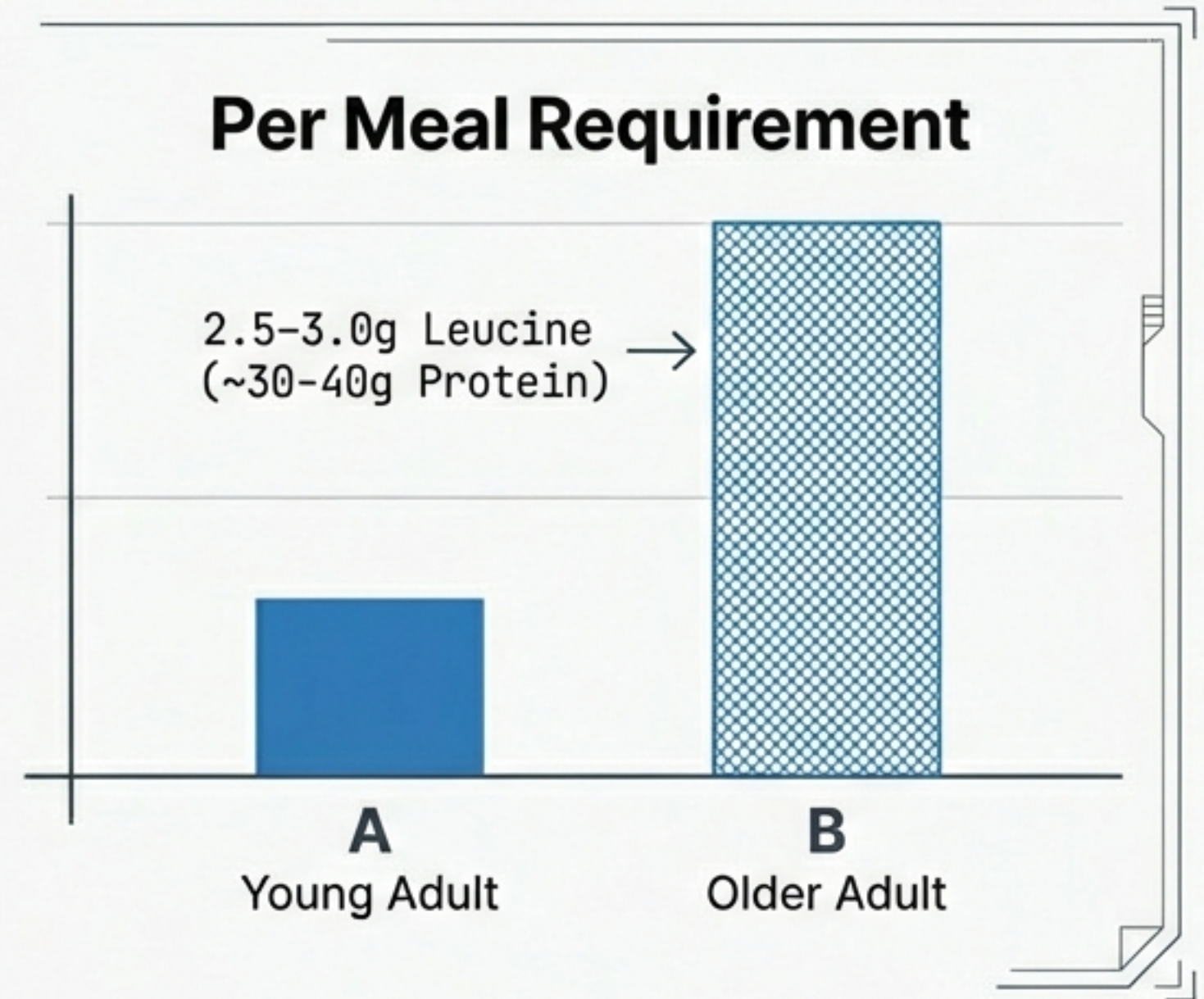
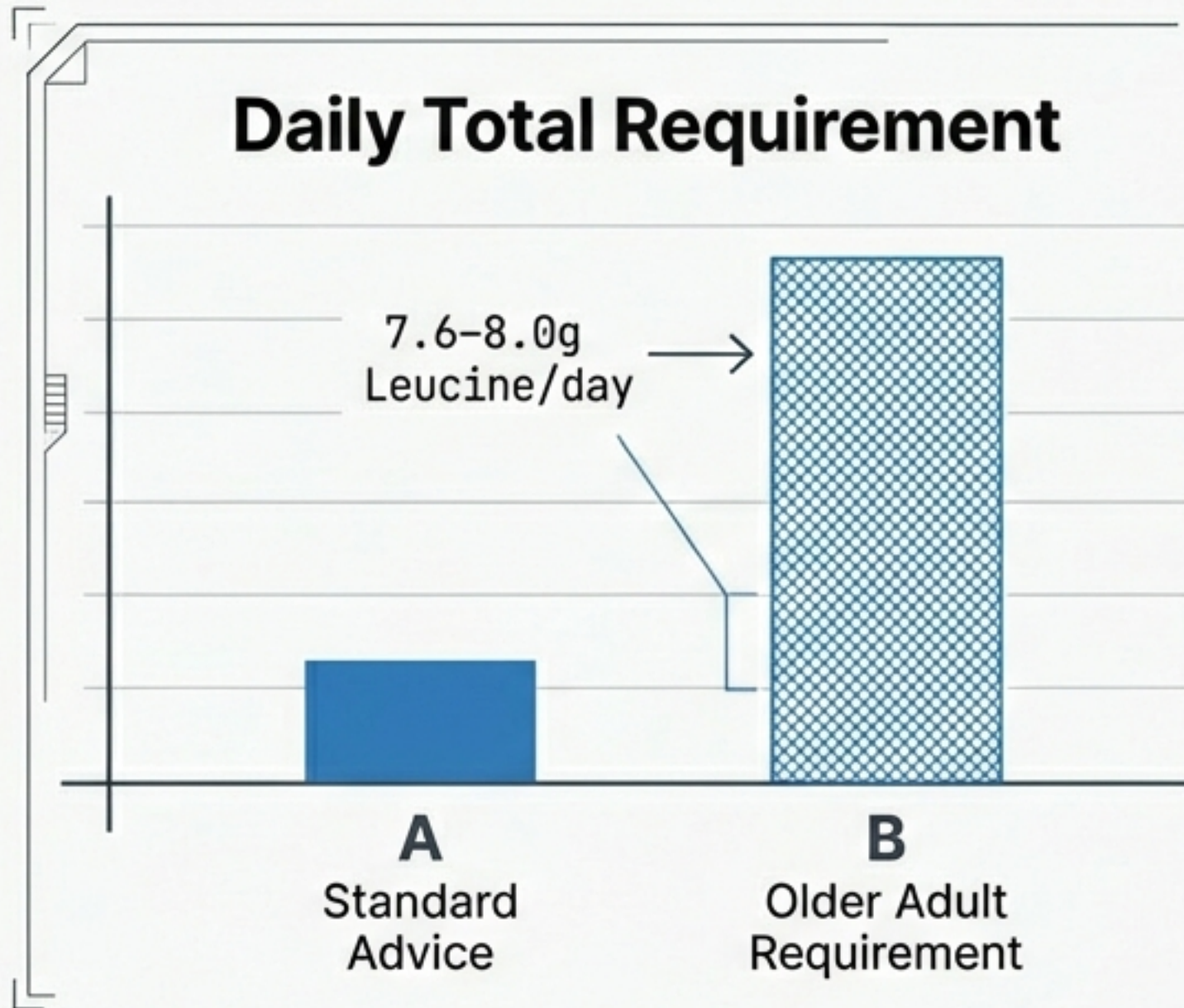
**Goal:** Prevent Frailty / Sarcopenia

**Action:** High Protein



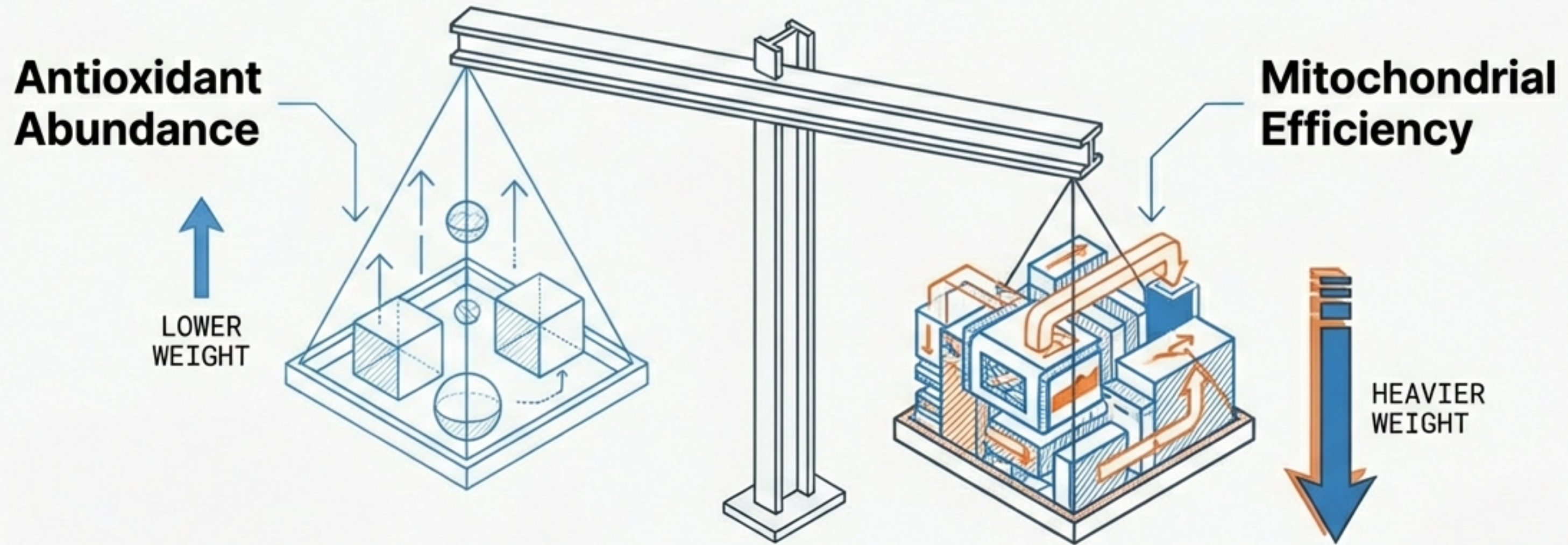
**Doing the 'healthy' mid-life protocol becomes dangerous in late life.**

# Quantifying the Leucine Threshold



**RDA (0.8g/kg) is a prescription for sarcopenia in the elderly.**

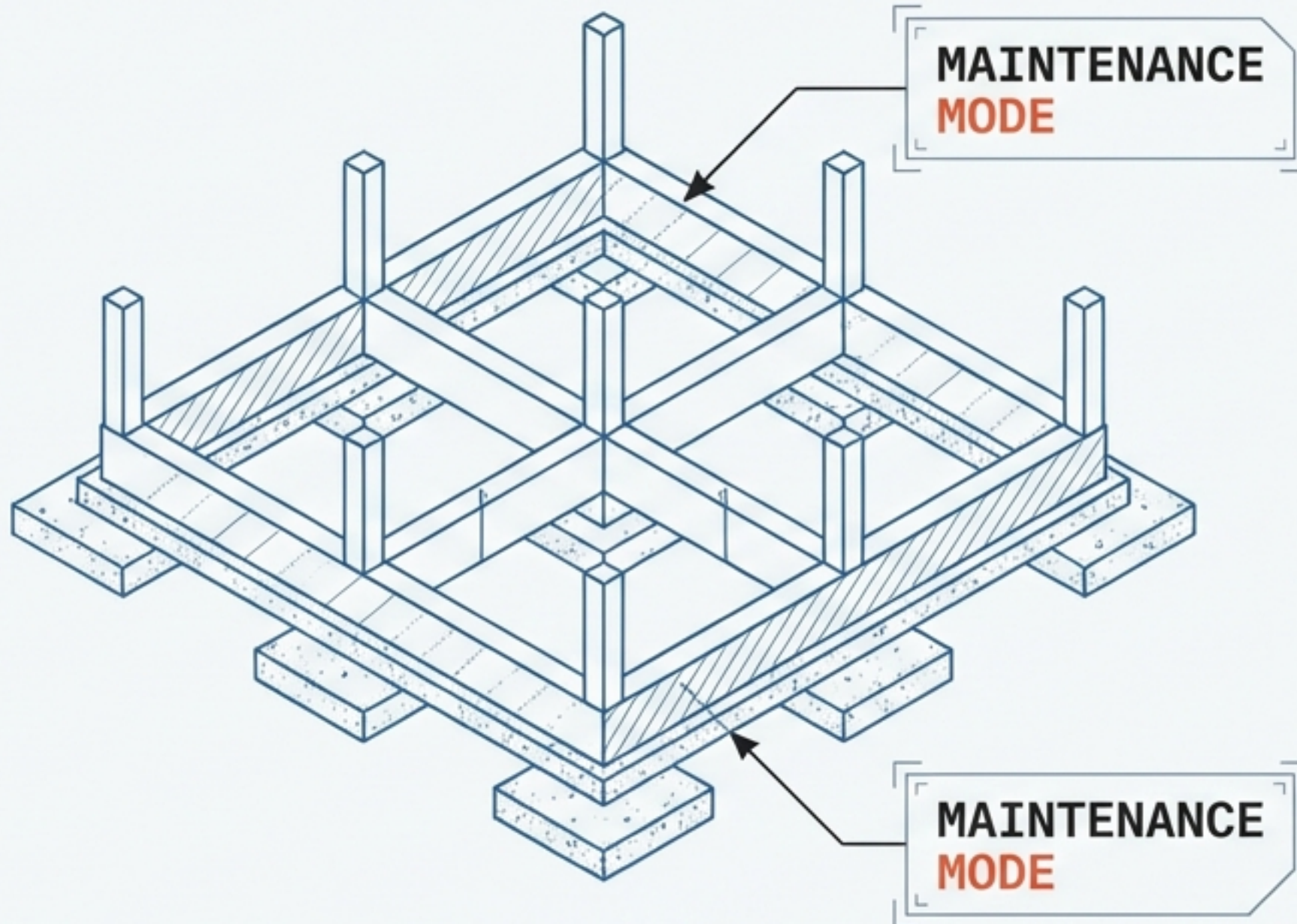
# The Redox Paradox



Centenarians do not rely on massive antioxidant stores. They produce less oxidative waste (ROS) via highly efficient mitochondria.

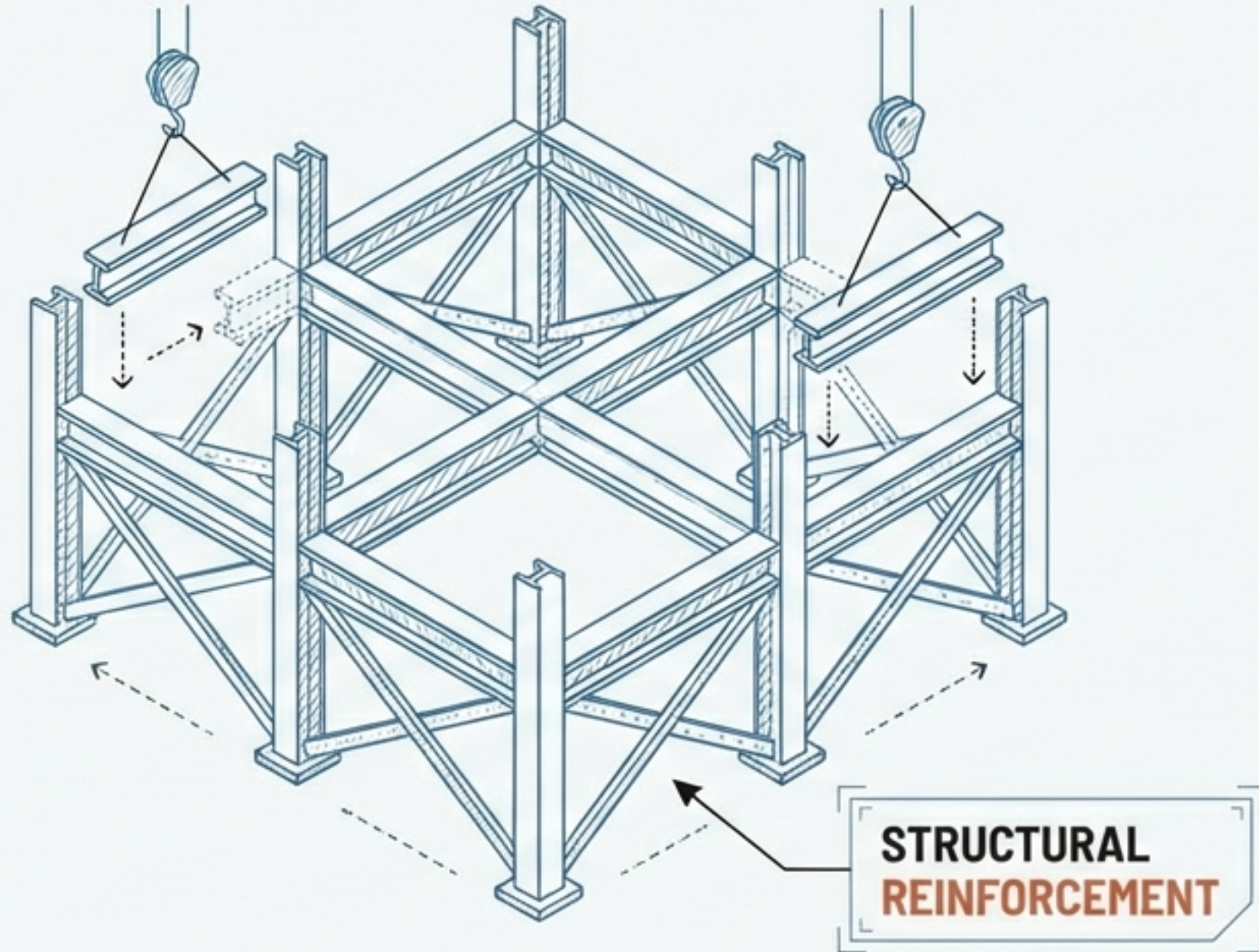
**You cannot supplement your way out of mitochondrial dysfunction.**

# Protocol Phase I: Mid-Life (20–65)



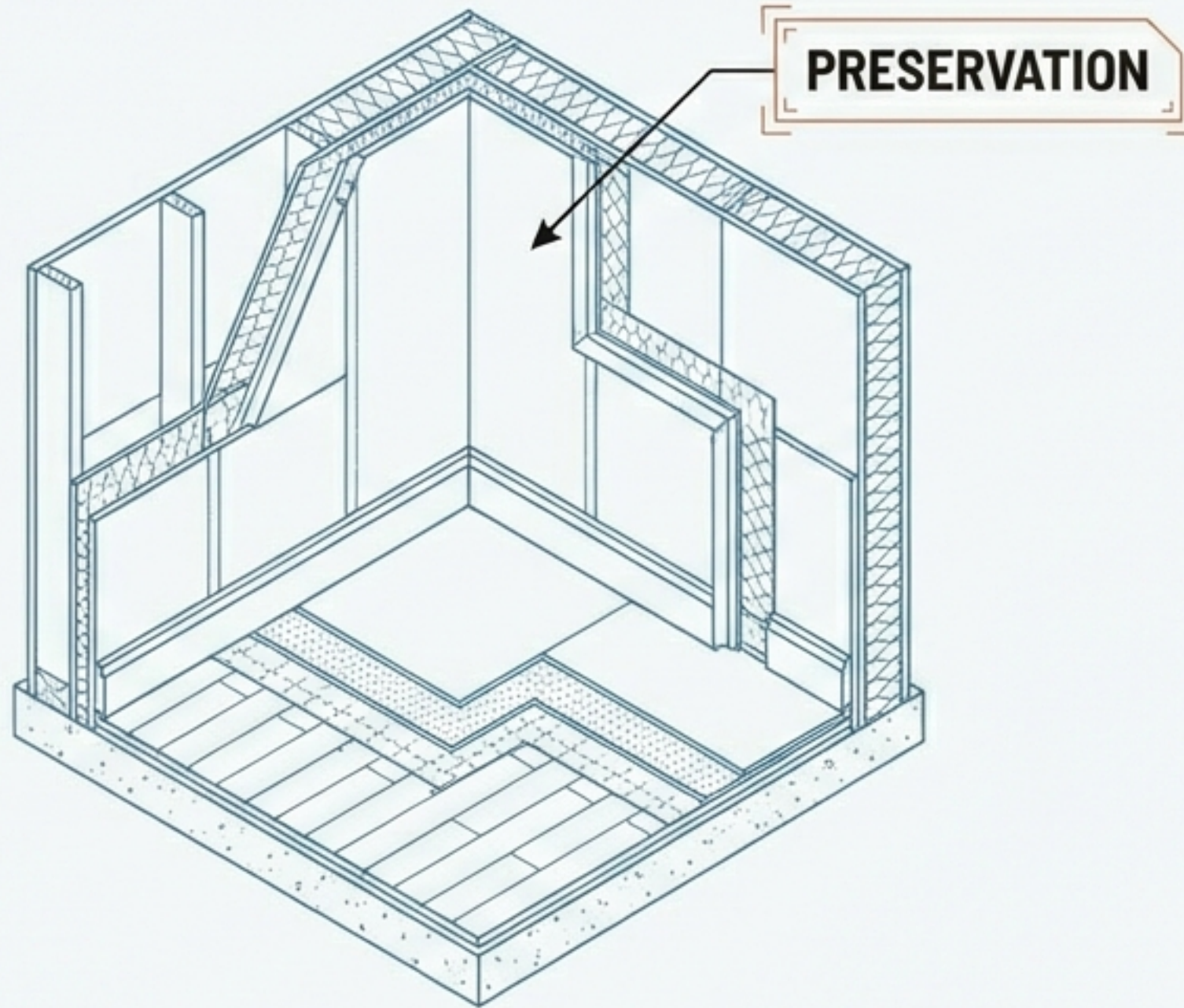
- **Objective:** Metabolic Health & Insulin Sensitivity.
- **Action:** Moderate protein intake.
- **Action:** Time-Restricted Eating to quiet mTOR.
- **Outcome:** Maximize Autophagy & DNA Repair.

# Protocol Phase II: The Transition (65–80)



- **Objective:** Overcome Anabolic Resistance.
- **Action:** Increase protein to **1.0–1.2 g/kg/day**.
- **Action:** Leucine-density focus (**2.5g+** per meal).
- **Ref:** Kawasaki Aging Project (High protein = Survival).

# Protocol Phase II: Extreme Longevity (80+)



- **Objective:** Nutrient Density & Vascular Compliance.
- **Action:** Prioritize texture/density over calories.
- **Action:** Monitor NT-proBNP (**Heart Stress**).
- **Action:** Control Blood Pressure to save microvasculature.

# The Gerotherapeutic Toolkit



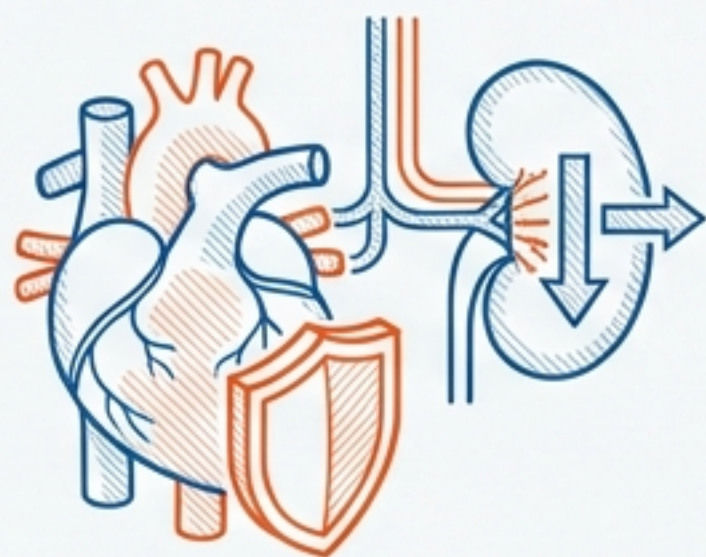
## Rapamycin

mTOR Inhibition /  
Immune Function.



## GLP-1 Agonists

Metabolism &  
Inflammation Control.



## SGLT2 Inhibitors

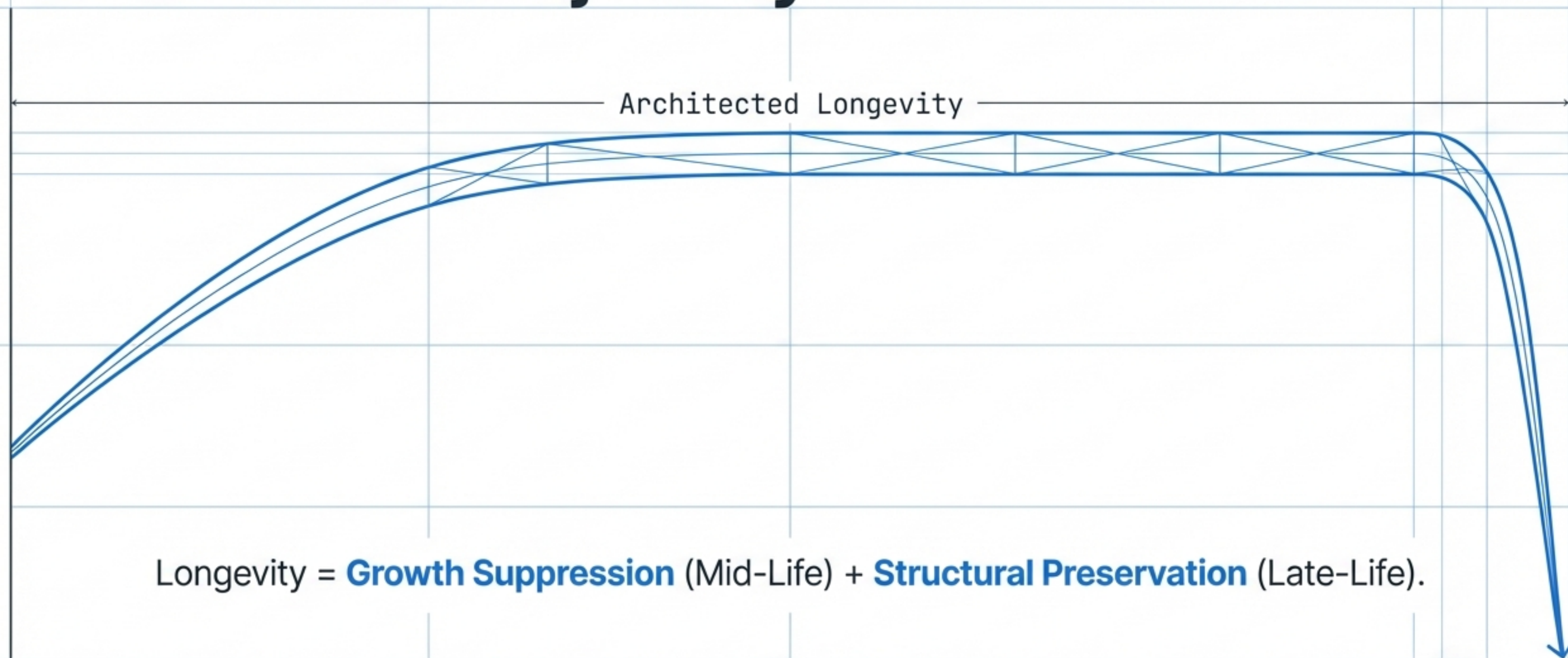
Heart Failure  
Prevention.



## Urolithin A

Mitophagy  
Activation.

# The Resilient Trajectory



**Biologically Aligned. Precision Targeted.**