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Longevity and Biological Ageing: Enhancing Health into Advanced Age



SESSION 7

Dr. Laurens Maas

From Decline to Resilience: Functional Medicine Strategies to Extend Healthspan

5:00-5:45pm

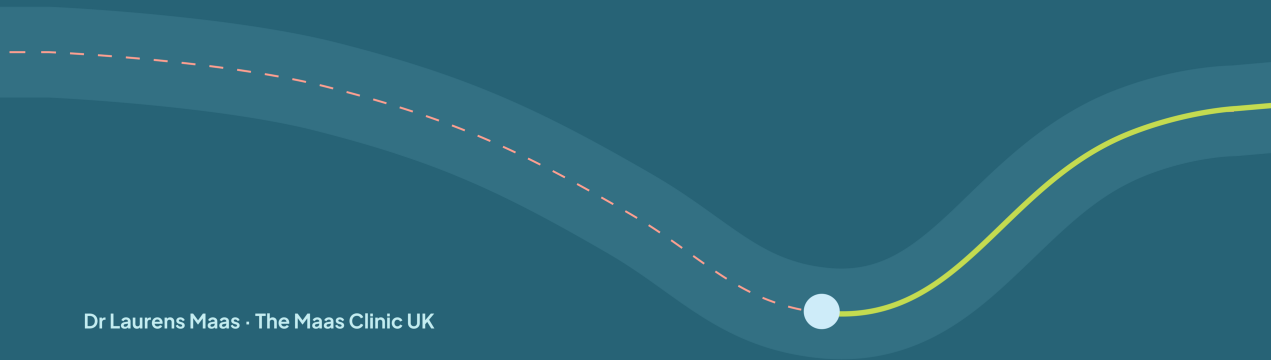
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# FROM DECLINE TO RESILIENCE

Functional Medicine Strategies to Extend Healthspan

Dr Laurens Maas · The Maas Clinic UK



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## DR LAURENS MAAS

Osteopath, Doctor of Integrated Medicine, Functional Medicine Practitioner



SURFER  
(WARM WATER ONLY)



AUTHOR TO 3 BOOKS



FATHER TO 3 KIDS



PRACTICING INTEGRATED  
MEDICINE FOR 30+ YEARS



X3 EUROPEAN AWARD  
WINNER IN MEDICINE



CHESS  
ENTHUSIAST

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# AFFILIATIONS & DECLARATIONS OF INTEREST

## AFFILIATIONS

Dr Laurens Maas  
Founder, The Maas Clinic — Functional & Integrative Medicine, United Kingdom

## DECLARATIONS

No relevant declarations of interest to declare

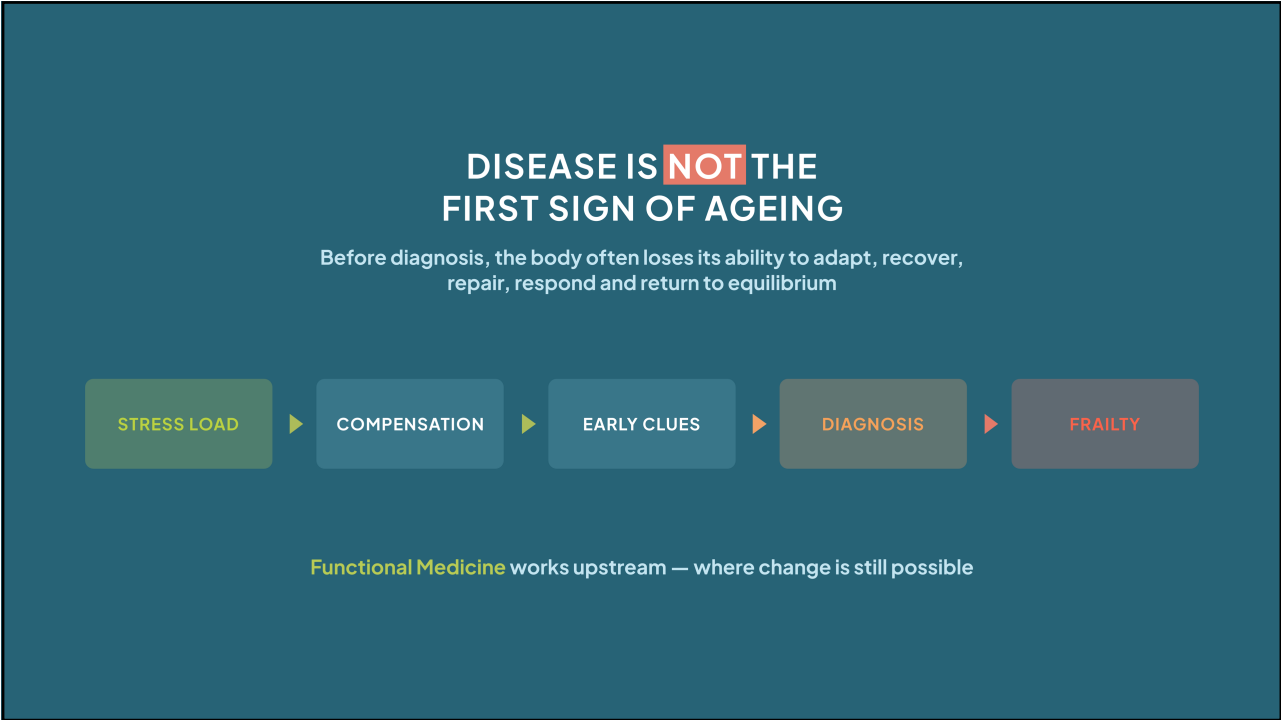
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# TWO PATIENTS, SAME STRESSORS

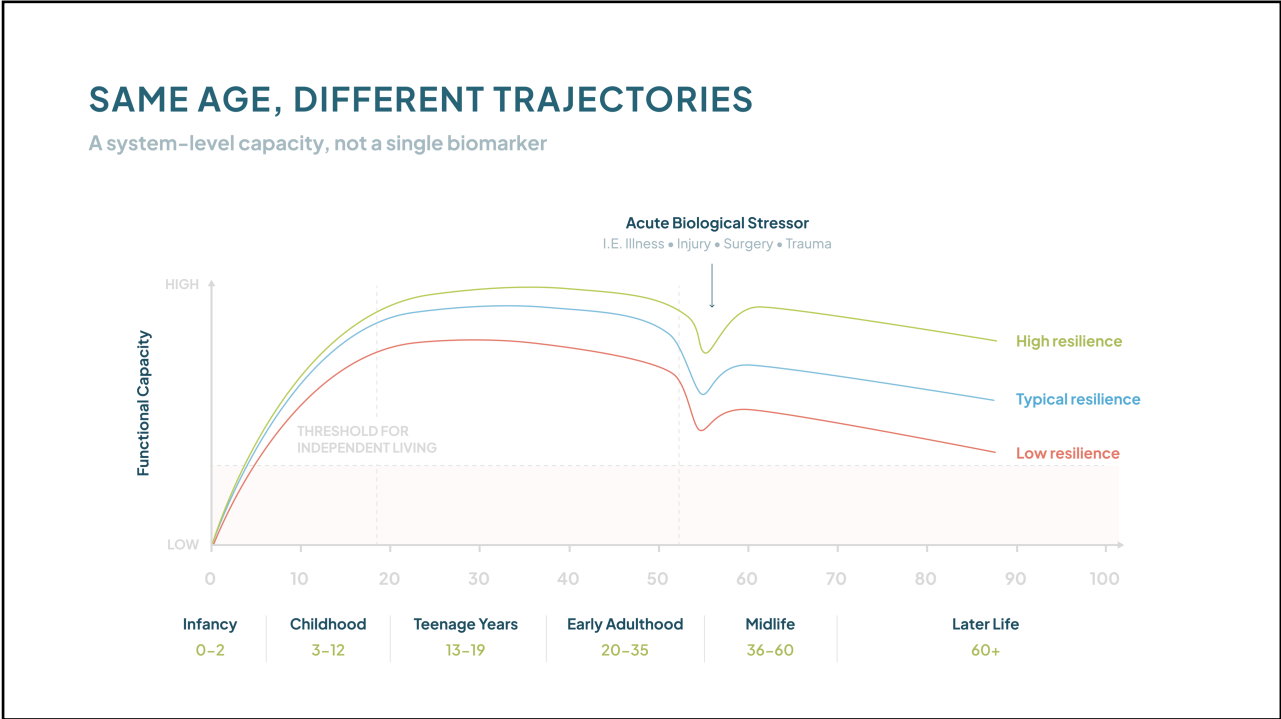
The difference is not simply age — it's recovery capacity



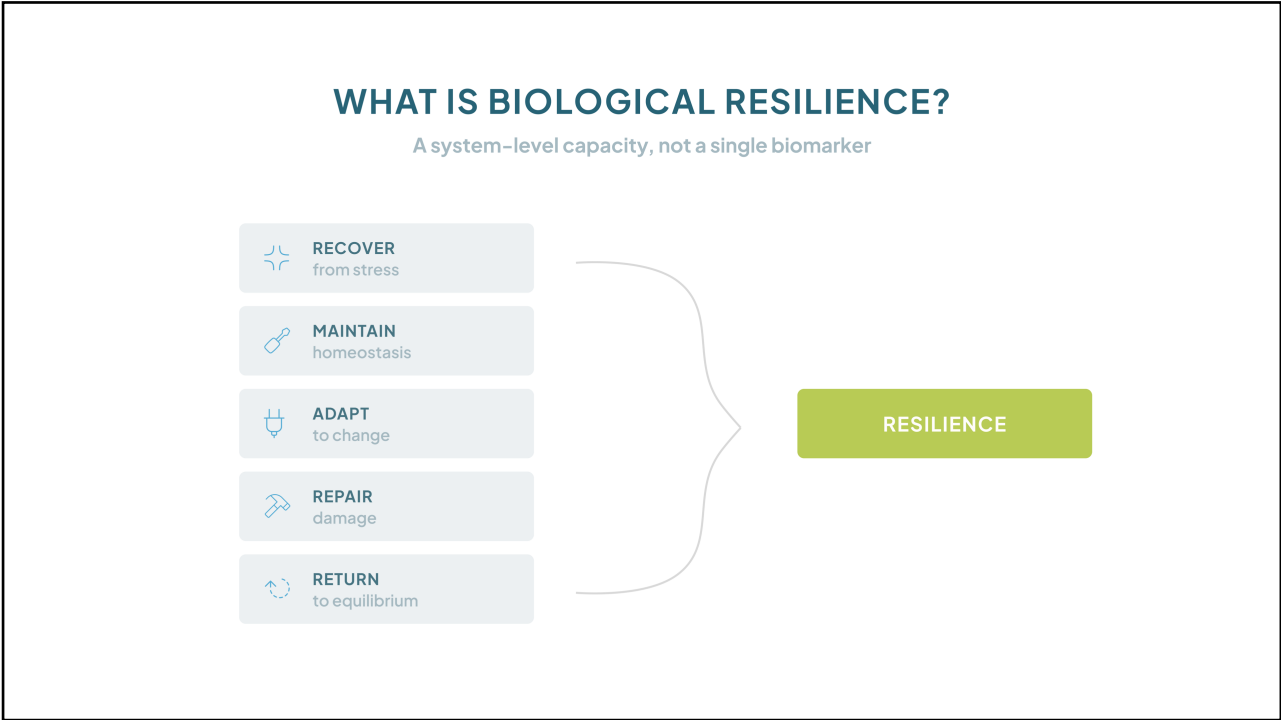
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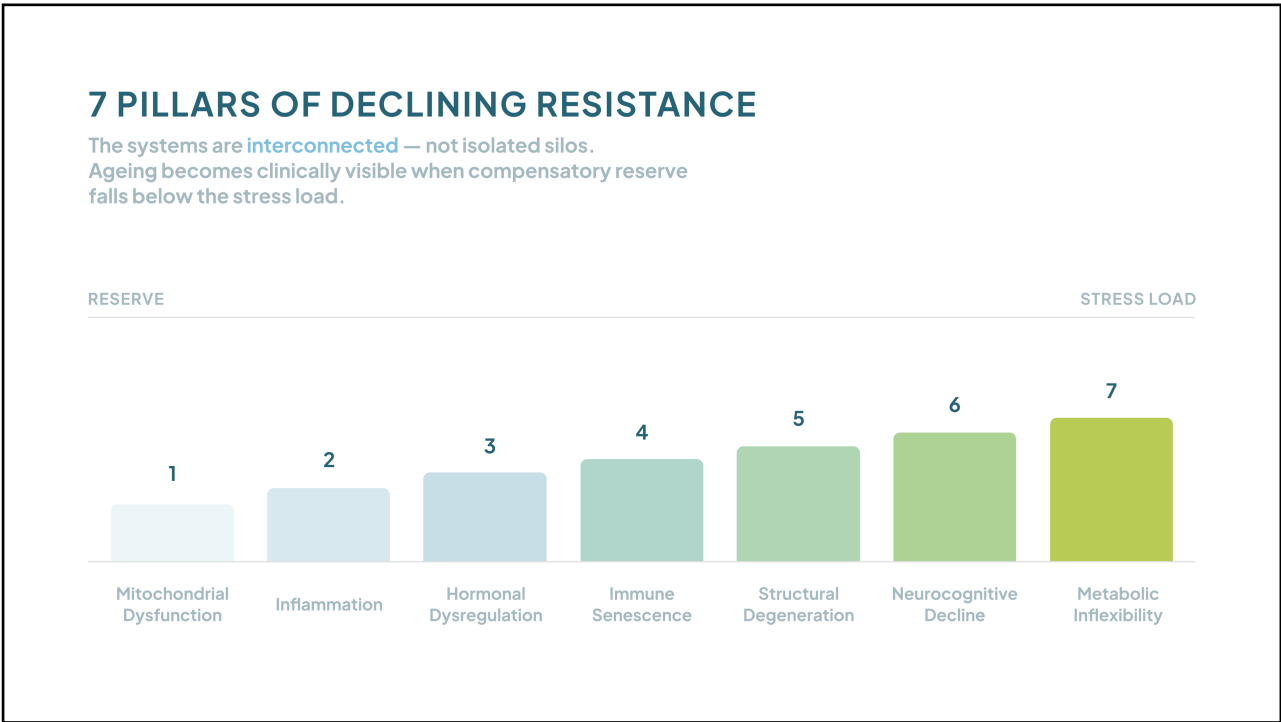
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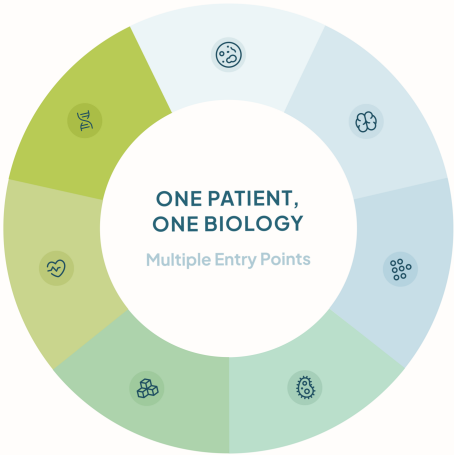


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THE WEB OF RESILIENCE

Functional Medicine asks how each system contributes to recovery capacity.

- Mitochondria
- Brain
- Hormones
- Immune
- Structure
- Cardiometabolic
- Methylation



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FOUNDATIONS OF RESILIENCE

ENERGY WITHOUT INSTRUCTION IS CHAOS,  
INSTRUCTION WITHOUT ENERGY IS THEORY

Longevity biology begins where repair, adaptation  
and recovery become energetically possible

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ATP

ROS SIGNALLING

MITOPHAGY

APOPTOSIS

HORMESIS

Mitochondria determine how well the organism responds to stress

Mitochondria are not only power stations. They are stress-response organelles.

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FUNCTIONS

ATP

cellular energy

ROS SIGNALLING

hormetic stress

AUTOPHAGY

cell recycling

APOPTOSIS

programmed repair

HORMETIC LEVERS

EXERCISE

SLEEP QUALITY

GLUCOSE REGULATION

FASTING WINDOWS

CLINICAL CLUES

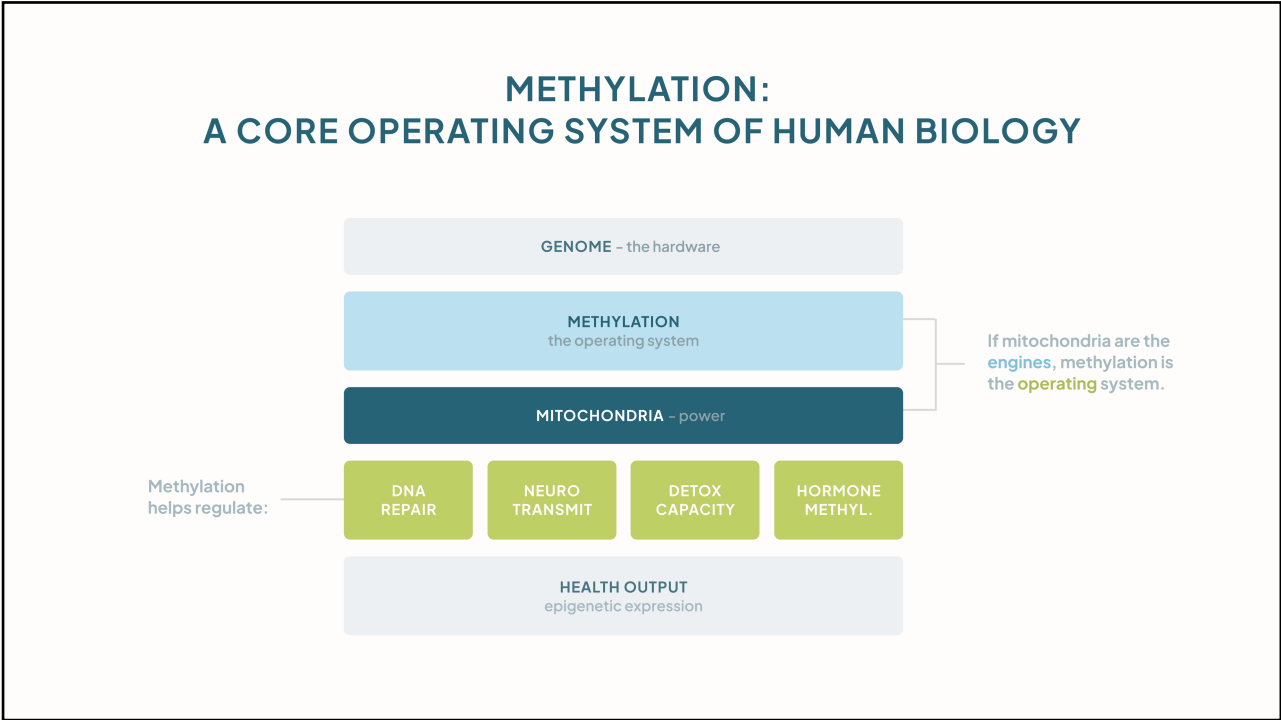
FATIGUE & BRAIN-FOG

POOR RECOVERY

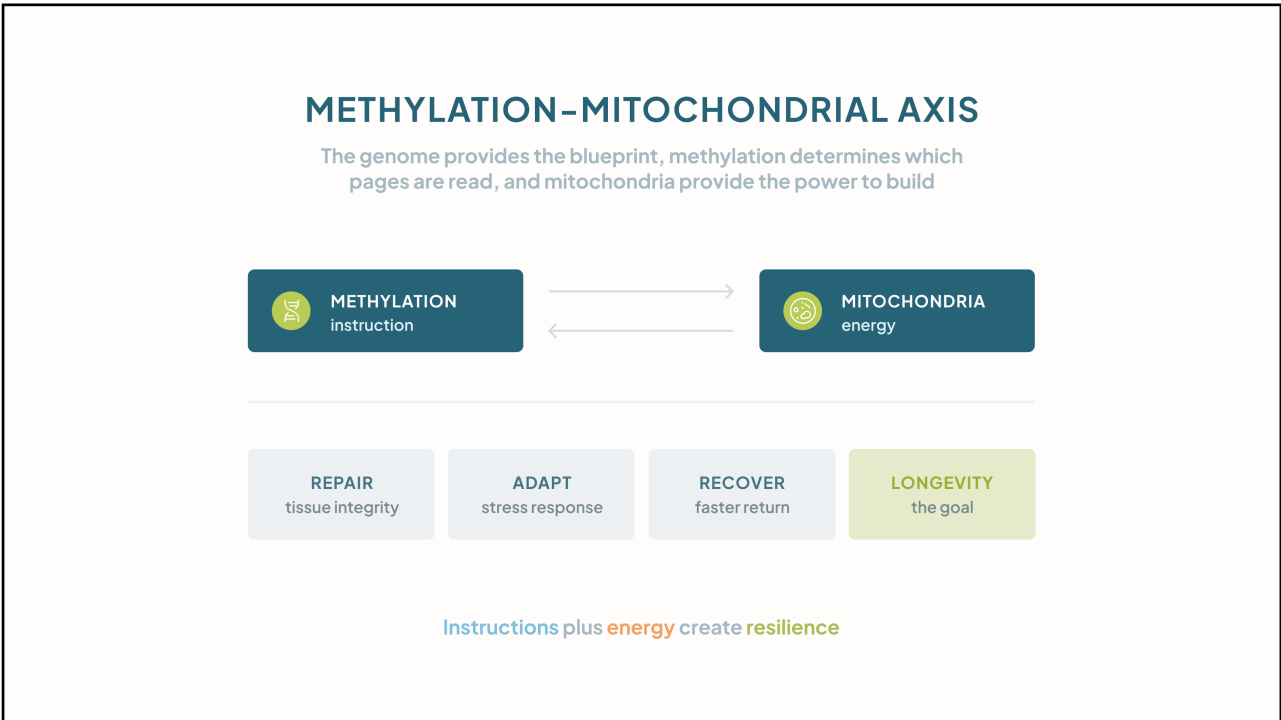
COLD INTOLERANCE

POST-VIRAL DRIFT

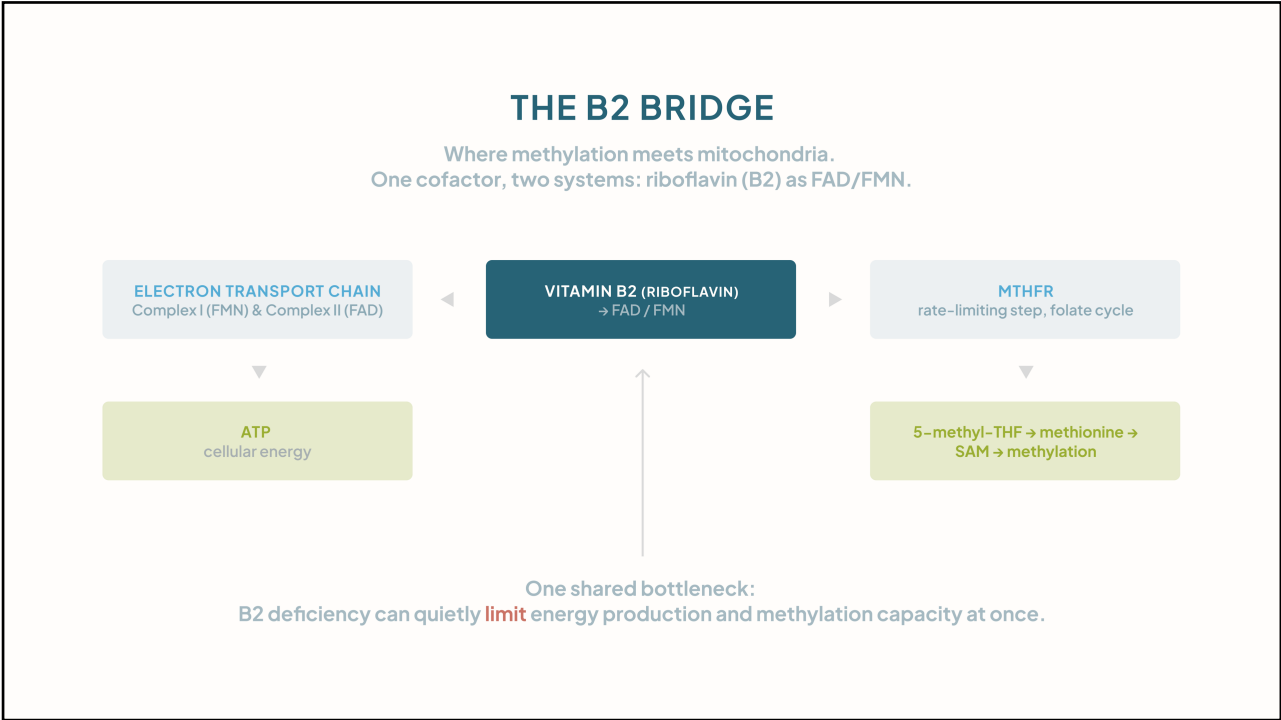
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MAPPING RESILIENCE ACROSS SYSTEMS

EVERY SYSTEM COMPENSATES FOR EVERY OTHER.  
DYSFUNCTION IS NEVER PURELY LOCAL.

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One biology, six lenses:  
Hormones, immunity, gut, brain, structure, metabolism.

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# COMMUNICATION UNDER PRESSURE

Ageing is increasingly a signalling disorder

 **CORTISOL**  
Survival timing —  
circadian rhythm  
anchors all repair

 **THYROID**  
Metabolic speed  
— the body's  
thermostat

 **INSULIN**  
Fuel partitioning —  
glucose, fat, protein  
allocation

 **SEX HORMONES**  
Repair, reproduction,  
and musculoskeletal  
reserve

ADAPTIVE AIM

restore rhythm

restore sensitivity

restore feedback

not simply push levels

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# IMMUNE RESILIENCE: SMARTER, NOT STRONGER

Defence must be balanced by tolerance and resolution

 **INFLAMMAGING**  
Low-grade chronic inflammation  
that erodes tissue repair capacity.  
It is sterile, persistent, and self-  
amplifying with age

 **IMMUNE SENEESCENCE**  
Reduced precision immunity with  
age — slower response, higher  
background noise, less effective  
pathogen clearance

ADAPTIVE AIM

resolution

immune intelligence

remove persistent triggers

restore tolerance

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## NUTRIENT, BARRIER AND IMMUNE INTELLIGENCE

The gut is a signalling organ, not merely a digestive tube

 **NUTRIENT ACQUISITION**

protein, minerals, vitamins, fibre-derived metabolites

 **BARRIER INTEGRITY**

immune discrimination between food, microbe and threat

 **MICROBIAL SIGNALLING**

SCFAs, bile acids, inflammatory tone, gut-brain signalling

 **IMMUNE EDUCATION**

tolerance, defence and mucosal pattern recognition

When the gut loses resilience, the whole system receives **noisier** signals

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## PREDICTION, PLASTICITY & AUTONOMIC BALANCE

The nervous system conducts the whole orchestra — it does not only react to biology, it shapes survival

**SLEEP**  
Glymphatic clearance & memory

**STRESS**  
HPA axis calibration

**NEUROPLASTICITY**  
Structural adaptation

**AUTONOMIC TONE**  
HRV as resilience proxy

**HRV**  
Wearable-accessible, clinically actionable

“Train the conductor, and the whole orchestra responds”

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## THE OVERLOOKED LONGEVITY PILLAR

Muscle, balance and gait are clinical biomarkers of reserve



Preserve muscle mass, movement quality, proprioception, connective tissue integrity and confidence in motion

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## CARDIOMETABOLIC RESILIENCE

Insulin, endothelium and lipoproteins shape vascular ageing

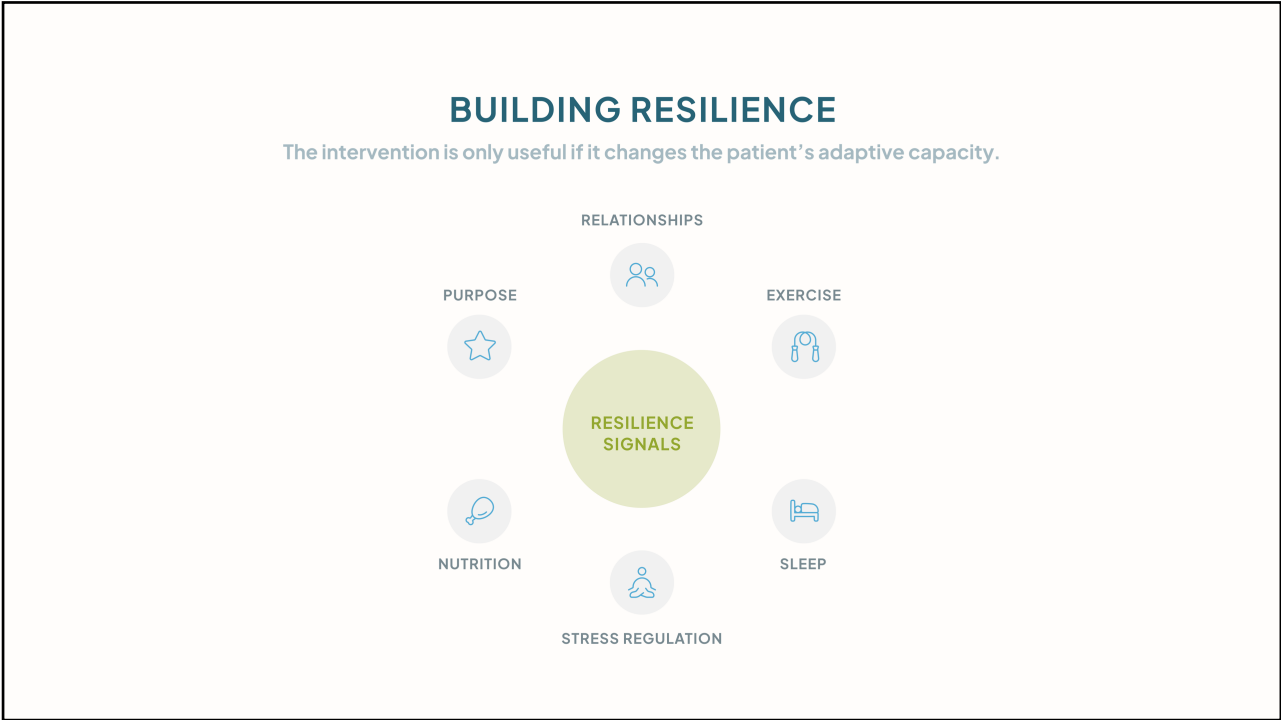
### CORE FAILURE PATTERNS



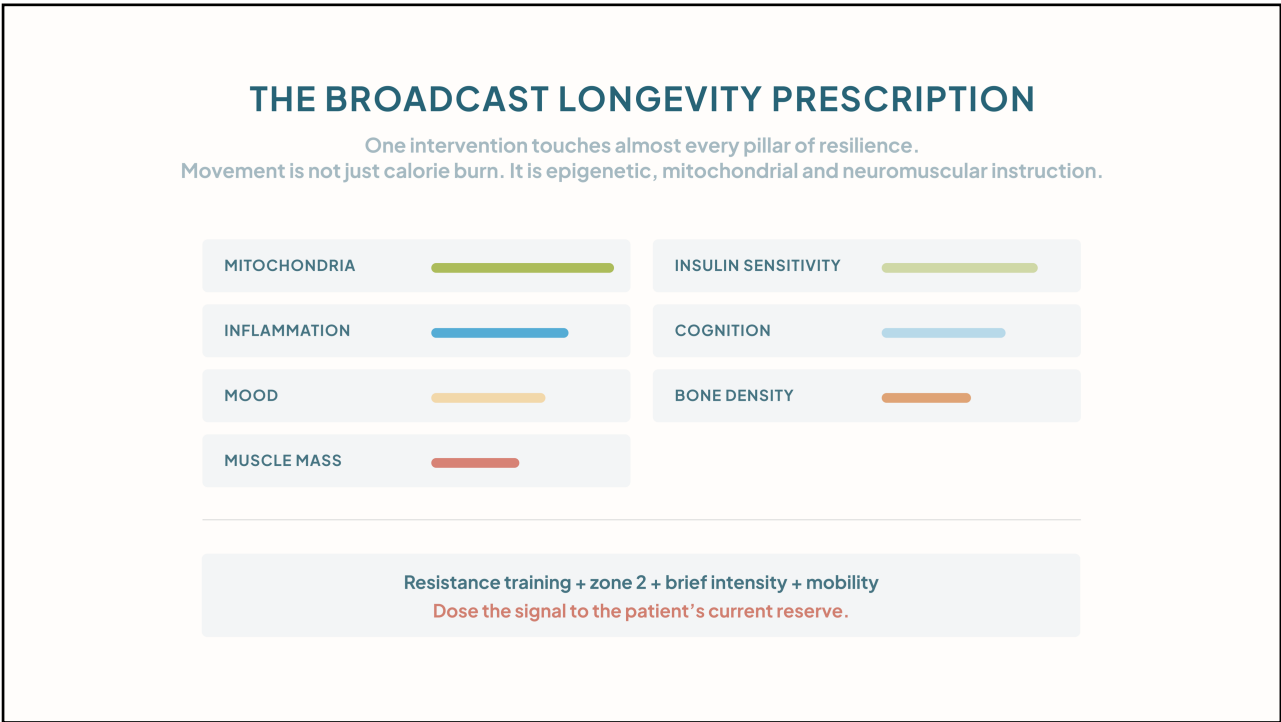
In 2023, cardiovascular disease remained the leading global cause of death and disease burden.

**CLINICAL AIM**  
Detect metabolic drift early, before vascular injury becomes clinically loud

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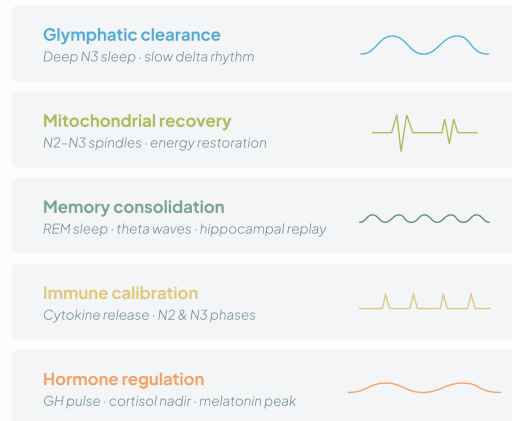
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## THE FORGOTTEN REGENERATIVE THERAPY

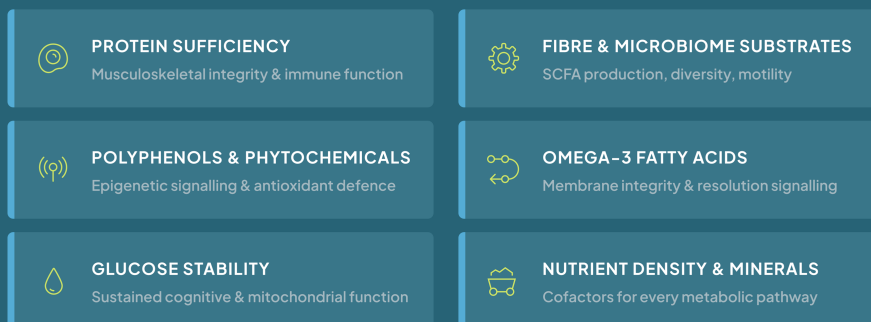
Recovery biology is largely nocturnal. Sleep is not a passive state, it is **active repair**



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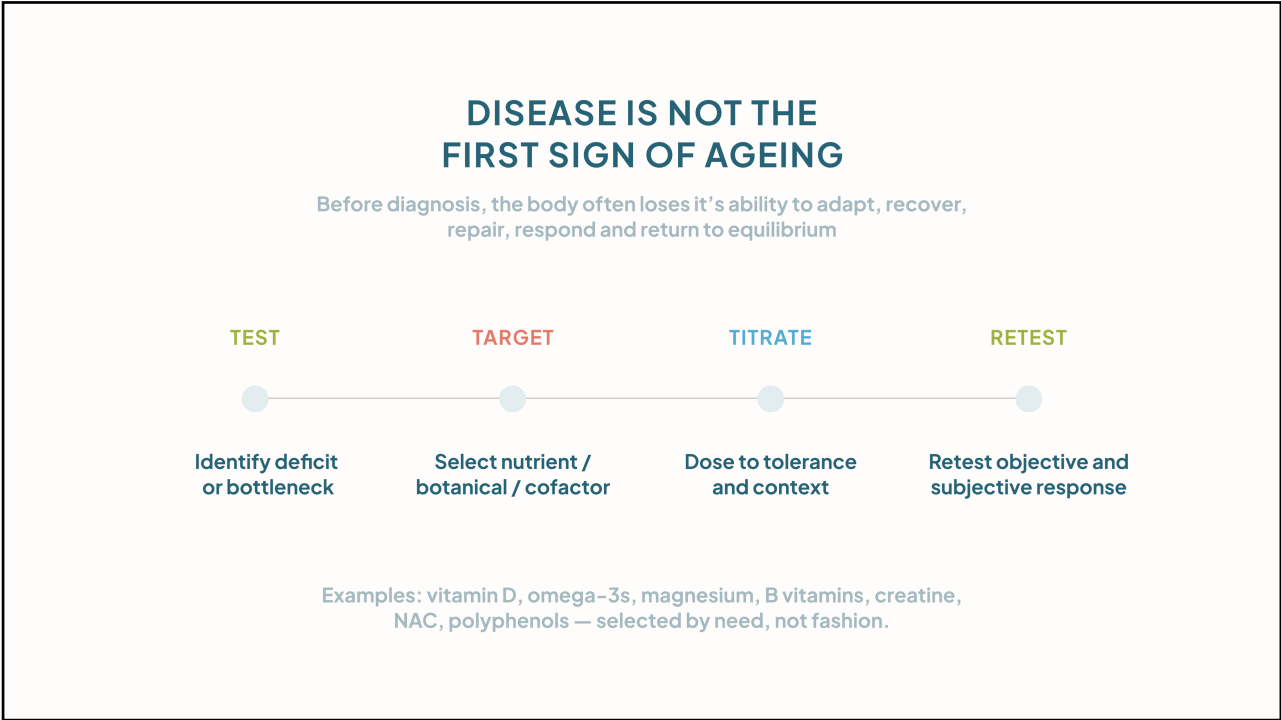
## PRINCIPLES OVER TRIBALISM

**Nutrition for resilience: biological sufficiency, metabolic stability, and signal quality. Avoid dietary ideology. Match nutrition to the patient's biology, context, and tolerance.**



**Not one-size-fits-all — guided by biochemistry, not trend**

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## MEASURING THE INVISIBLE

Resilience leaves clues before disease appears.  
Blood chemistry as an early warning system — not diagnostic labels,  
but directional signals about biological drift.

CORE BIOMARKER PANEL

 HBA1C

 FASTING INSULIN

 HSCRP

 HOMOCYSTEINE

 APOB

 TG/HDL RATIO

 VITAMIN D

 FERRITIN / IRON

Biomarkers do not replace clinical judgement. They reveal biological drift and help prioritise intervention

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## HYPOTHESIS GENERATION, NOT DIAGNOSIS BY SPREADSHEET

Advanced tests clarify mechanisms and monitor direction of travel

### GUT REPORT CARD

Dysbiosis, diversity, inflammation,  
barrier clues

### DUTCH / HORMONE PANEL

Cortisol rhythm, sex hormone metabolism,  
thyroid context

### ORGANIC ACIDS

Mitochondrial metabolites, nutrient cofactors,  
microbial by-products

### DETOXIFICATION ASSESSMENT

Phase I/II burden, bile flow,  
exposure clearance

### OXIDATIVE STRESS MARKERS

DNA damage, antioxidant capacity

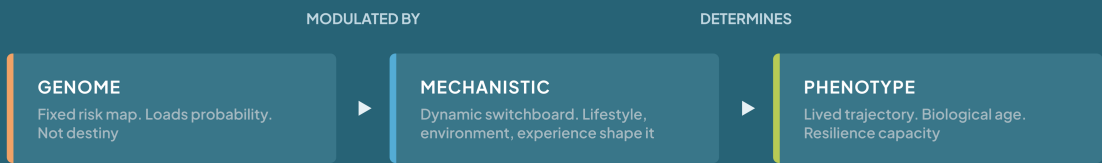
### GENETIC / EPIGENETIC

SNP panels, methylation clocks,  
biological age estimation

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# GENETICS AND EPIGENETICS: MAP, SWITCHBOARD, TRAJECTORY

Genes influence risk — biology remains responsive  
They load probability, lifestyle shapes expression, environment modifies both



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## ONE CASE, SIX MONTHS

The interventions weren't exotic. What changed was the framework:  
treat resilience as the target, not the diagnosis.

| PRESENTING                 |           | 6 MONTHS                 |            |
|----------------------------|-----------|--------------------------|------------|
| Fatigue not lifted by rest |           | Energy restored          |            |
| Poor exercise recovery     |           | Faster recovery          |            |
| Afternoon brain fog        |           | Cognitive clarity        |            |
| Fragmented sleep           |           | Restorative sleep        |            |
| Low stress resilience      |           | Improved stress response |            |
| HBA1C                      | 6.2%      | HBA1C                    | 5.4%       |
| HOMOCYS.                   | 14.0      | HOMOCYS.                 | 7.0        |
| HSCRP                      | 3.1 mg/L  | HSCRP                    | 0.8 mg/L   |
| VIT D                      | 42 nmol/L | VIT D                    | 150 nmol/L |
| HRV                        | 22 ms     | HRV                      | 41 ms      |
| GUT                        | SIBO      | GUT                      | Stable     |
| DUTCH                      | Stage 2   | DUTCH                    | Stable     |

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## EVIDENCE STRENGTH: WHAT THIS TALK RESTS ON

The true measure of longevity is not only how long we live, but how well we continue to live.

Longevity medicine adds life to years by **restoring adaptability**.

A diagram consisting of seven interconnected hexagons arranged in a circular pattern. Each hexagon contains a text label representing a pillar of longevity. Starting from the top and moving clockwise, the labels are: 'EFFICIENT MITOCHONDRIA' (light blue), 'METABOLIC FLEXIBILITY' (light green), 'STRUCTURAL STRENGTH' (yellow-green), 'PURPOSE DRIVEN' (dark blue), 'COGNITIVE ADAPTABILITY' (medium blue), 'IMMUNE INTELLIGENCE' (green), and 'BALANCED METHYLATION' (yellow-green) in the center.

Med 1.0

Med 2.0

★ Med 3.0

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## THANK YOU FOR JOINING US

GOT A QUESTION? WE'D LOVE TO ANSWER IT

A square QR code with a dark blue and black pixelated pattern, used for quick access to additional content or contact information.

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REFERENCES

METHYLATION & B2 / MTHFR

Frosst P, Blom HJ, Milos R, et al. A candidate genetic risk factor for vascular disease: a common mutation in methylenetetrahydrofolate reductase. *Nat Genet.* 1995;10(1):111–113. doi:10.1038/ng0595–111

McNulty H, Strain JJ, Hughes CF, Ward M. Riboflavin, MTHFR genotype and blood pressure: a personalized approach to prevention and treatment of hypertension. *Mol Aspects Med.* 2017;53:2–9. doi:10.1016/j.mam.2016.10.002

INFLAMMAGING & IMMUNE SENESCENCE

Franceschi C, Bonafè M, Valensin S, et al. Inflamm-aging: an evolutionary perspective on immunosenescence. *Ann N Y Acad Sci.* 2000;908:244–254. doi:10.1111/j.1749–6632.2000.tb06651.x

Pawelec G. Age and immunity: what is "immunosenescence"? *Exp Gerontol.* 2018;105:4–9. doi:10.1016/j.exger.2017.10.024

AGING AND HEALTHSPAN

López-Otín C, Blasco MA, Partridge L, Serrano M, Kroemer G. The hallmarks of aging. *Cell.* 2013;153(6):1194–1217. doi:10.1016/j.cell.2013.05.039

Sun N, Youle RJ, Finkel T. The mitochondrial basis of aging. *Mol Cell.* 2016;61(5):654–666. doi:10.1016/j.molcel.2016.01.028

MITOCHONDRIA

GUT & MICROBIOME

Valdes AM, Walter J, Segal E, Spector TD. Role of the gut microbiota in nutrition and health. *BMJ.* 2018;361:k2179. doi:10.1136/bmj.k2179

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EXERCISE AS MEDICINE

Pedersen BK, Saltin B. Exercise as medicine — evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scand J Med Sci Sports.* 2015;25(suppl 3):1–72. doi:10.1111/sms.12581

SLEEP AS REGENERATIVE THERAPY

Xie L, Kang H, Xu Q, et al. Sleep drives metabolite clearance from the adult brain. *Science.* 2013;342(6156):373–377. doi:10.1126/science.1241224

Diekelmann S, Born J. The memory function of sleep. *Nat Rev Neurosci.* 2010;11(2):114–126. doi:10.1038/nrn2762

BIOMARKERS & TESTING

Seshadri S, Beiser A, Selhub J, et al. Plasma homocysteine as a risk factor for dementia and Alzheimer's disease. *N Engl J Med.* 2002;346(7):476–483. doi:10.1056/NEJMoa011613

Horvath S, Raj K. DNA methylation-based biomarkers and the epigenetic clock theory of ageing. *Nat Rev Genet.* 2018;19(6):371–384. doi:10.1038/s41576–018–0004–3

AUTONOMIC BALANCE & HRV

Shaffer F, Ginsberg JP. An overview of heart rate variability metrics and norms. *Front Public Health.* 2017;5:258. doi:10.3389/fpubh.2017.00258

MUSCULOSKELETAL RESERVE

Studenski S, Perera S, Patel K, et al. Gait speed and survival in older adults. *JAMA.* 2011;305(1):50–58. doi:10.1001/jama.2010.1992

Leong DP, Teo KK, Rangarajan S, et al. Prognostic value of grip strength: findings from the Prospective Urban Rural Epidemiology (PURE) study. *Lancet.* 2015;386(9990):266–273. doi:10.1016/S0140–6736(14)62000–6

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SUMMIT

2026

Longevity and Biological Ageing:  
Enhancing Health into Advanced Age

Friday 9<sup>th</sup> October

Featuring Dr. Jeffrey Bland, Professor Helene McNulty, Natalie Burrows,  
Professor Anna Nicolaou, Dr. Sally Moorcroft, Dr. Nina Fuller-Shavel  
and Dr. Laurens Maas

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