超越百歲 - 長壽的科學與藝術

導讀者：張鑫醫生

壽命和健康年限可塑性大：

Attia 認為壽命（我們活多久）和健康年限（我們沒有疾病，有活力的年歲）都是高度可塑的。我們對健康結果的控制力比我們意識到的要大。

11/6/24 星期三 美西 10:00 am - 12:00pm

實體 + Zoom

南海岸文化中心

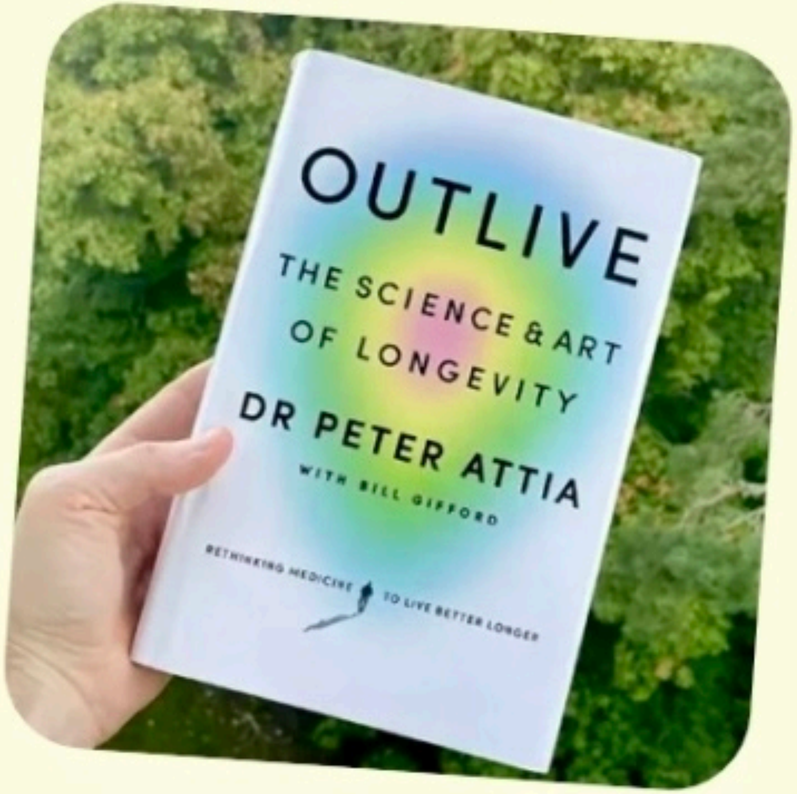
9 Truman St., Irvine, CA 92620

二樓教室 210, 211

Zoom ID: 549 376 9111

Passcode: IBC202425

Outlive



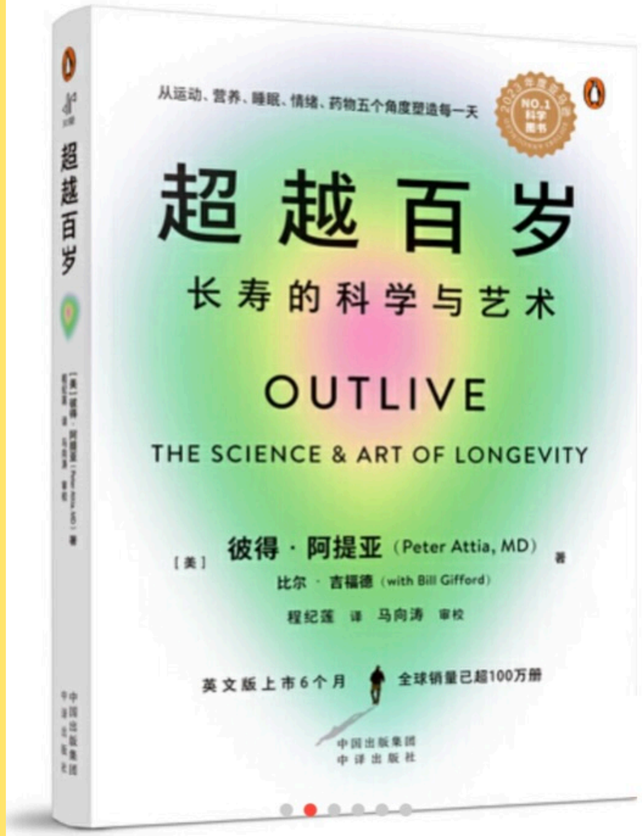
Risk is not something to be avoided at all costs; rather, it's something we need to understand, analyze, and work with.

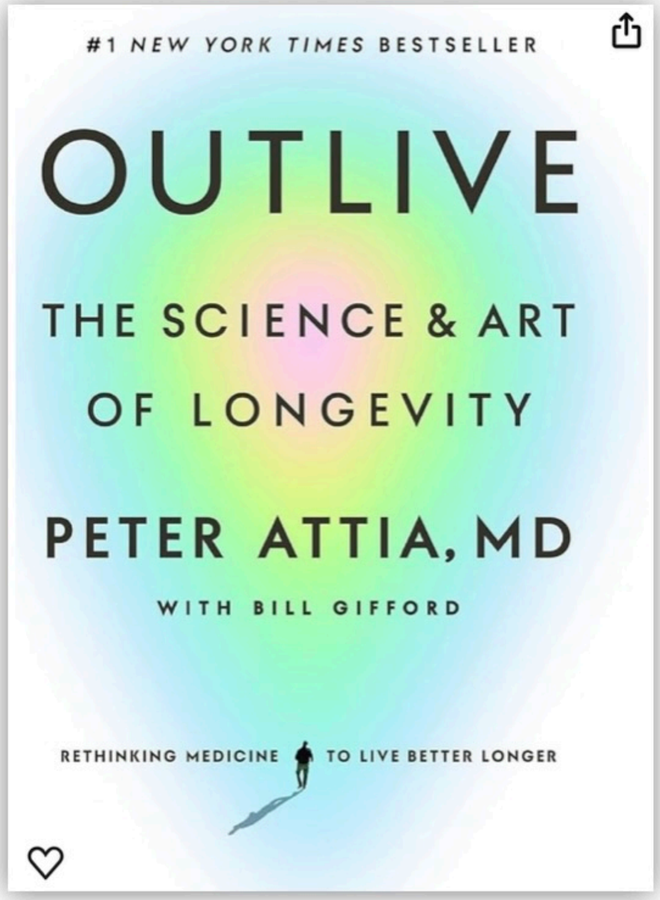
-- Peter Attia, MD

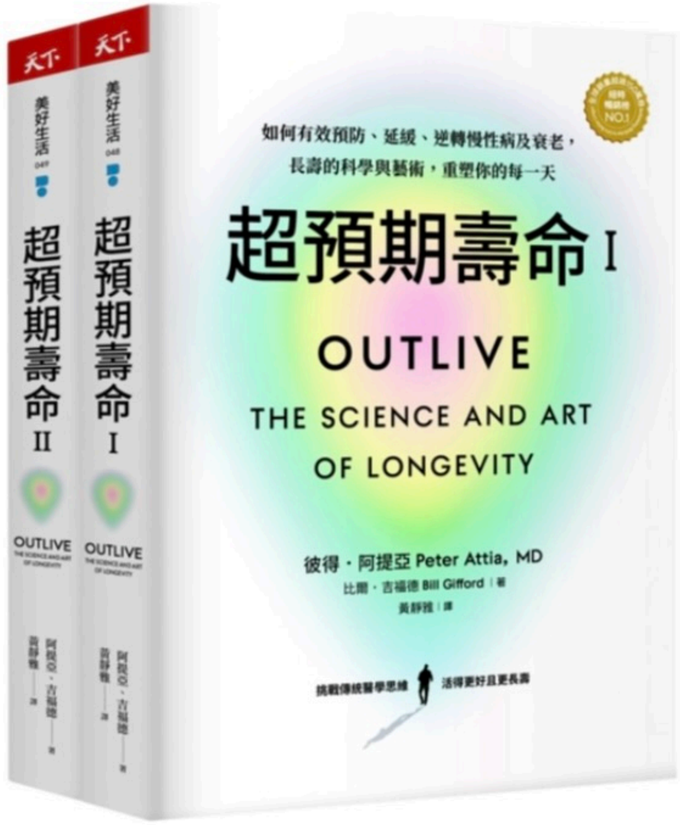
爾灣讀書會

OUTLIVE

THE SCIENCE & ART OF LONGEVITY
RETHINKING MEDICINE TO LIVE BETTER LONGER







Published in March 2023, it has been a New York Times bestseller Since

Peter Attia's Education and Career

- Born : March 19,1973 , Toronto, Canada.
- 1996 Queen's University at Kingston.
  BS in mechanical engineering and applied mathematics.
- 2001 Stanford University MD
- 2001-2006. Johns Hopkins Hospital General Surgery
  NIH: Cancer immunotherapy
- Consulting firm McKinsey & Company as a member of Corporate Risk Practice and Healthcare Practice.
- 2014 founded a private clinic dedicated to longevity medicine.

Why this Book " Outlive"

- **Reason to discontinue medical training**: Disappointed in medicine.
- **Reasons to return to medicine**: Event on 9/8/2009.
- **Knowledge:** We have more than enough knowledge to help us live longer and better.
- **Attia claims :** Not a basic scientist nor clinical researcher, but aims to help you to understand and apply the scientific knowledge along with your specific genes, history, habits and goals to create an actionable manual for longevity.
- **Goal** :A guide that will help you live longer and better, outlive the society's expectation of old age.
- **Potential:** With enough time and practice, you can potentially extend your lifespan by a decade and your health span by two decades.
- **Approach:** This is not a preventative medicine, its proactive. The time to act is now.

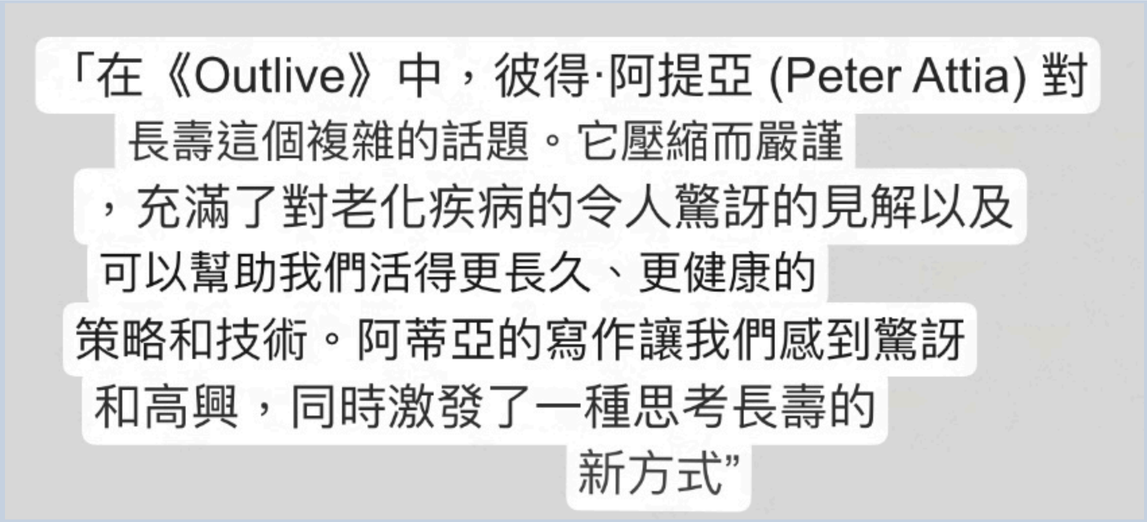
CONTENTS

482 Pages, 38 Pages of References

“In **Outlive,** Peter Attia has delivered the definitive look at the complex subject of longevity. Compressive and rigorous, it is full of surprising insights into diseases of aging and tactics and techniques that can help us live longer and in better health. Attia’s writing surprises and delights us, while provoking a new way to think about longevity”

—Siddhartha Mukherjee, author of Pulitzer winner

The Emperor of All Maladies



「在《Outlive》中，彼得·阿提亞 (Peter Attia) 對長壽這個複雜的話題。它壓縮而嚴謹，充滿了對老化疾病的令人驚訝的見解以及可以幫助我們活得更長久、更健康的策略和技術。阿蒂亞的寫作讓我們感到驚訝和高興，同時激發了一種思考長壽的新方式”

What is Longevity?

Longevity Has Two Components

- **1) Lifespan** 壽命 : The number of years you live. **Quantity.**
- **2) Healthspan** 健康壽命 :
  Conventional definition :
  The period of life when we are free from disability or disease.
- **As well as:**
  Maintain physical and cognitive and emotional function,
  Be able to do the things you like to do. **Quality.**

Live Longer and Better

Longevity is More Malleable than We Think

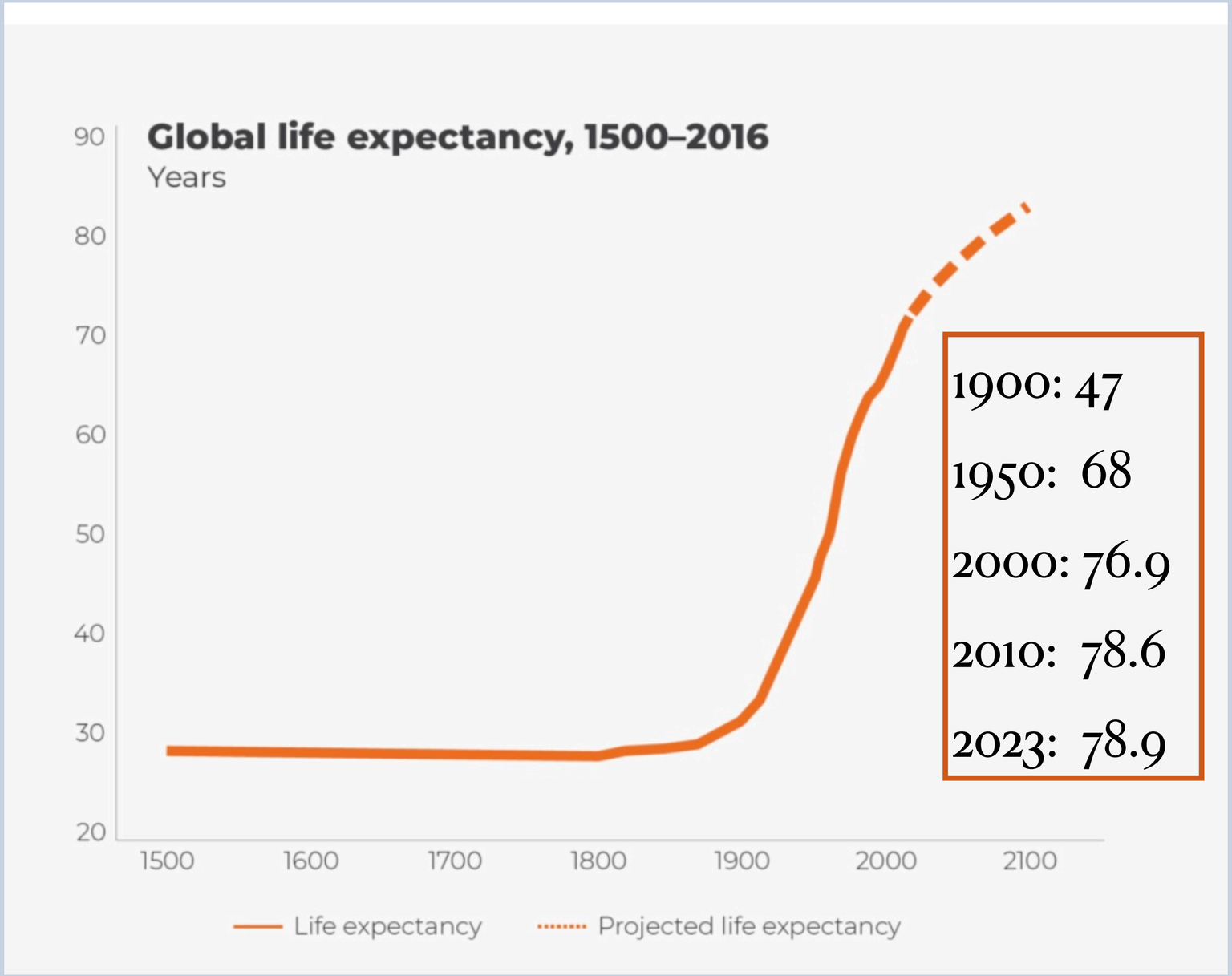
The Story of Tithonus

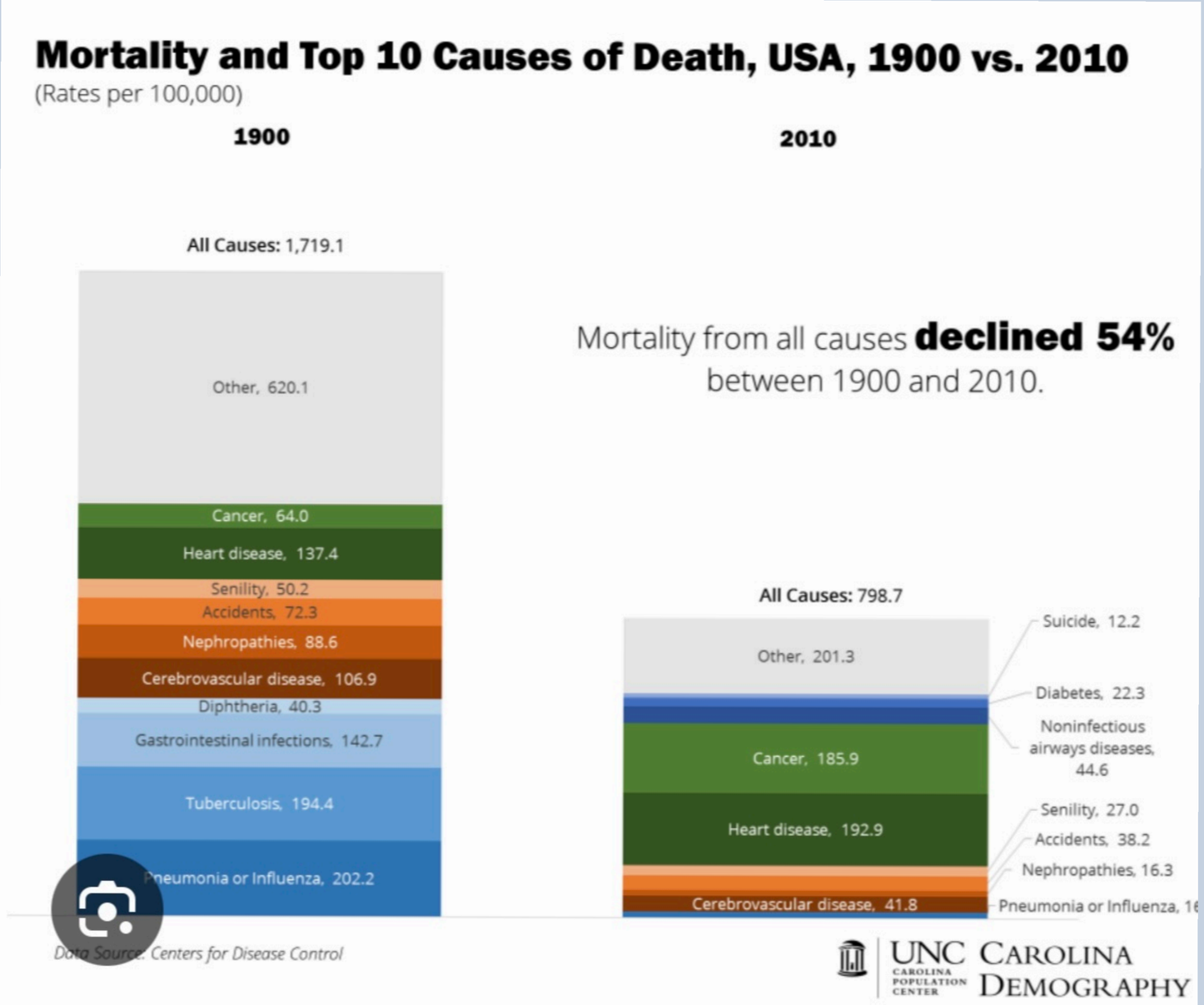
Tithonus

Attic red-figure kylix with Eos and Tithonus, 5th century BC (Museum of Fine Arts, Boston)

Tithonus and Eos - Simon Julien (1735-1800) - PD-art-100

- **Tithonus ,** a legendary prince of Troy who fell in love with **Eos (Aurora),** the goddess of the dawn and wanted to be with her forever. He begged her to make him immortal , which she did with Zeus's help.
- **Alas,** she neglected to make him immortally youthful.
- **Humble mortal fate** that he earlier rejected, death became his only desire.
- "**Please let me die,** take back the gift of immortality"


Global life expectancy, 1500–2016
Years
90
80
70
60
50
40
30
20
1500
1600
1700
1800
1900
2000
2100
Life expectancy
Projected life expectancy
1900: 47
1950: 68
2000: 76.9
2010: 78.6
2023: 78.9

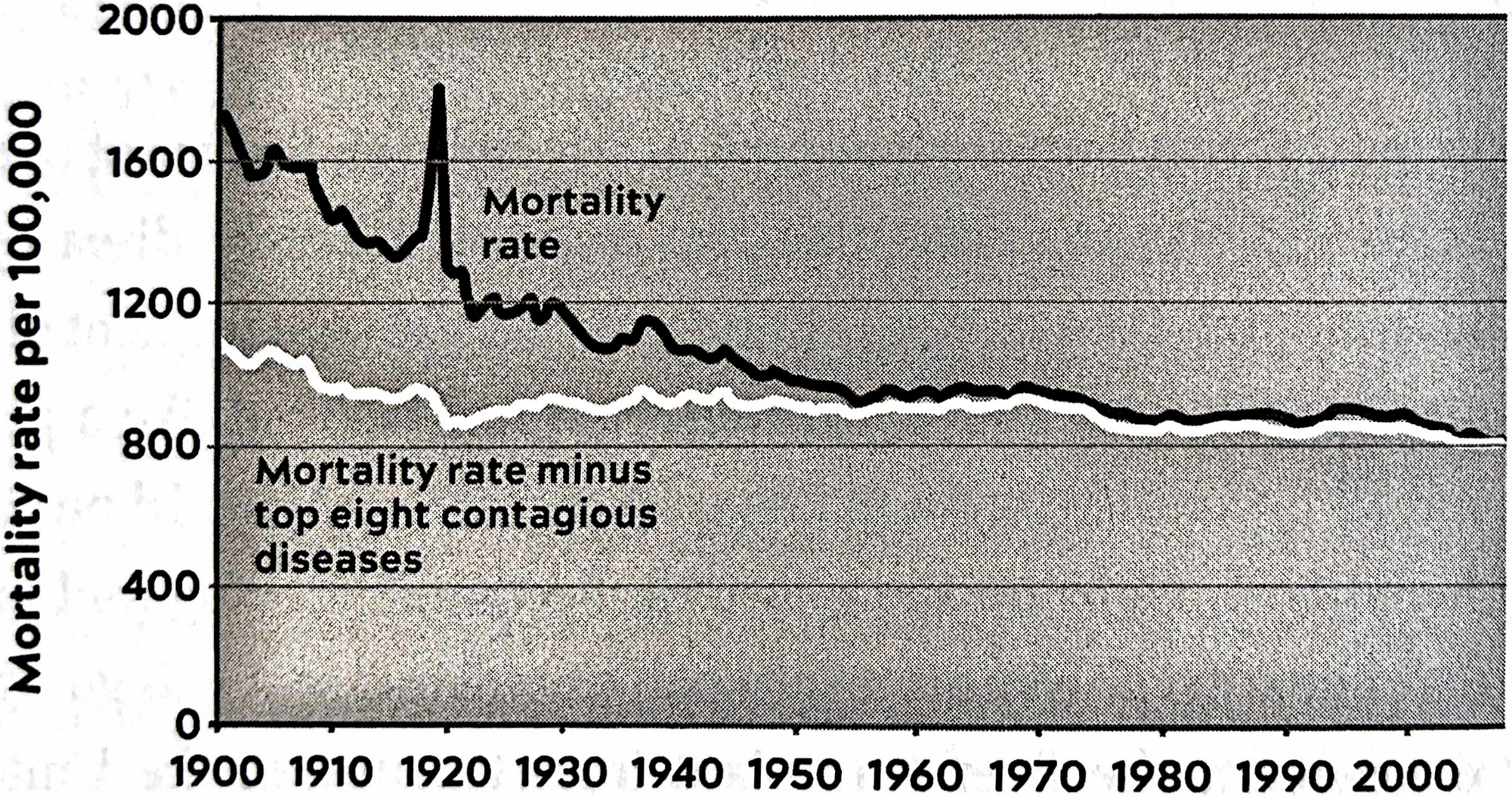


Mortality and Cause of Death, 1900 v. 2010 | Carolina…

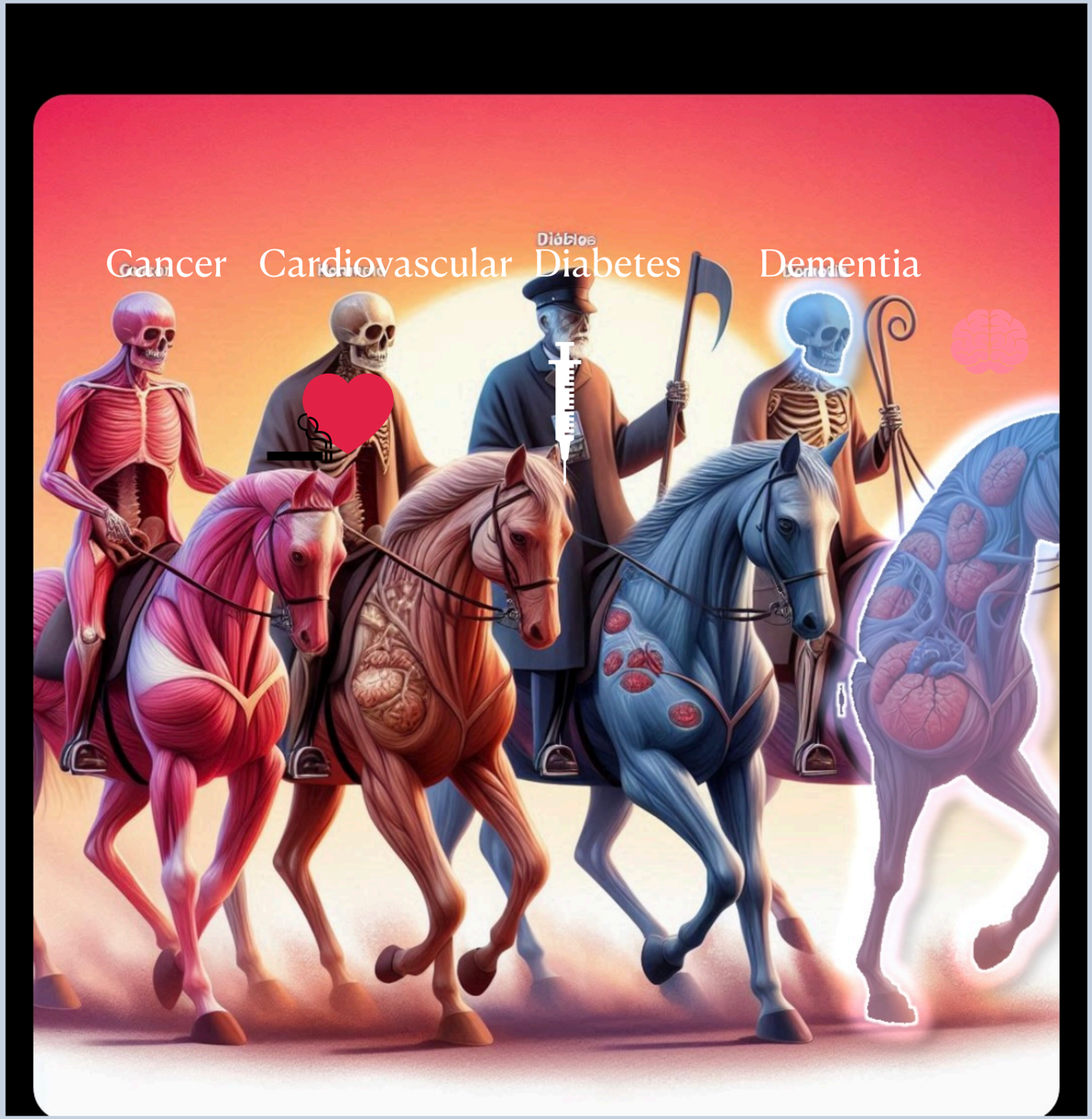
- **1900: Live expectancy was 47.** People die of fast death from accidents, injuries, infectious diseases.

- **2010 Live expectancy is 78.** People die of a slow death as a result of chronic diseases of aging.
  The four horsemen:
  Cardiovascular diseases,
  Cancer,
  T2DM,
  Neurodegenerative Diseases

Figure 1. Change in Mortality Rates Since 1900



Diseases of Civilization, The Four Horsemen



As modern life has helped extend our lifespans and improved living standard.

It has also created conditions that limit our longevity in certain ways. These conditions are referred to as the

“Four Horsemen”:

1) Cardiovascular Diseases

2) Cancer

3) Type 2 Diabetes Mellitus (T2DM)

4) Neurodegenerative Diseases

CHRONIC DISEASES IN AMERICA

6 IN 10

Adults in the US have a **chronic disease**

4 IN 10

Adults in the US have **two or more**

THE LEADING CAUSES OF DEATH AND DISABILITY
Drivers of the Nation's **$4.1 Trillion** in Annual Health Care

94.9%
Adults age 60 and older have a **chronic disease**

78.7%
Adults age 60 and older have **two or more**

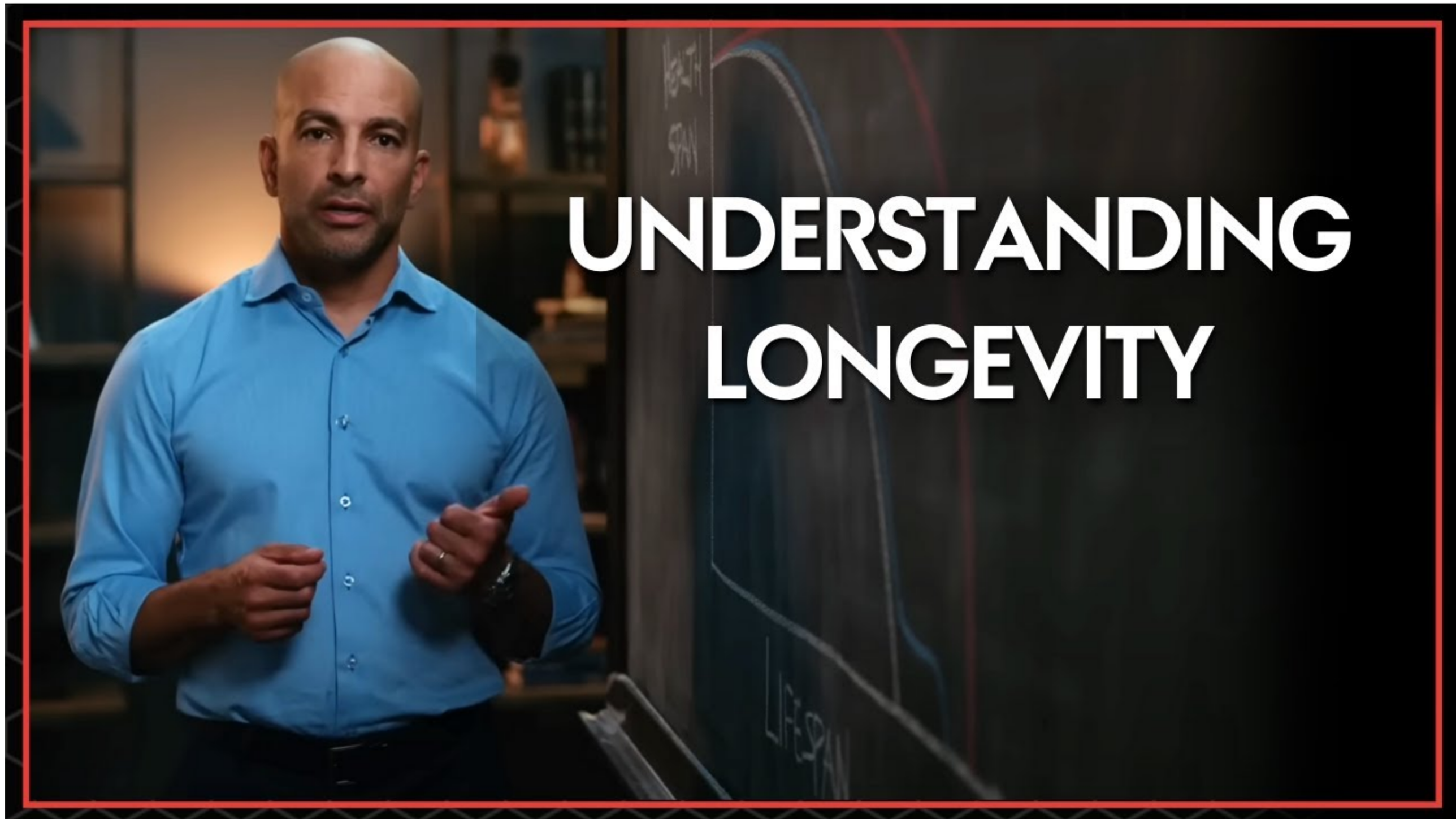
Why? What can be done?

Evolution of Medicine

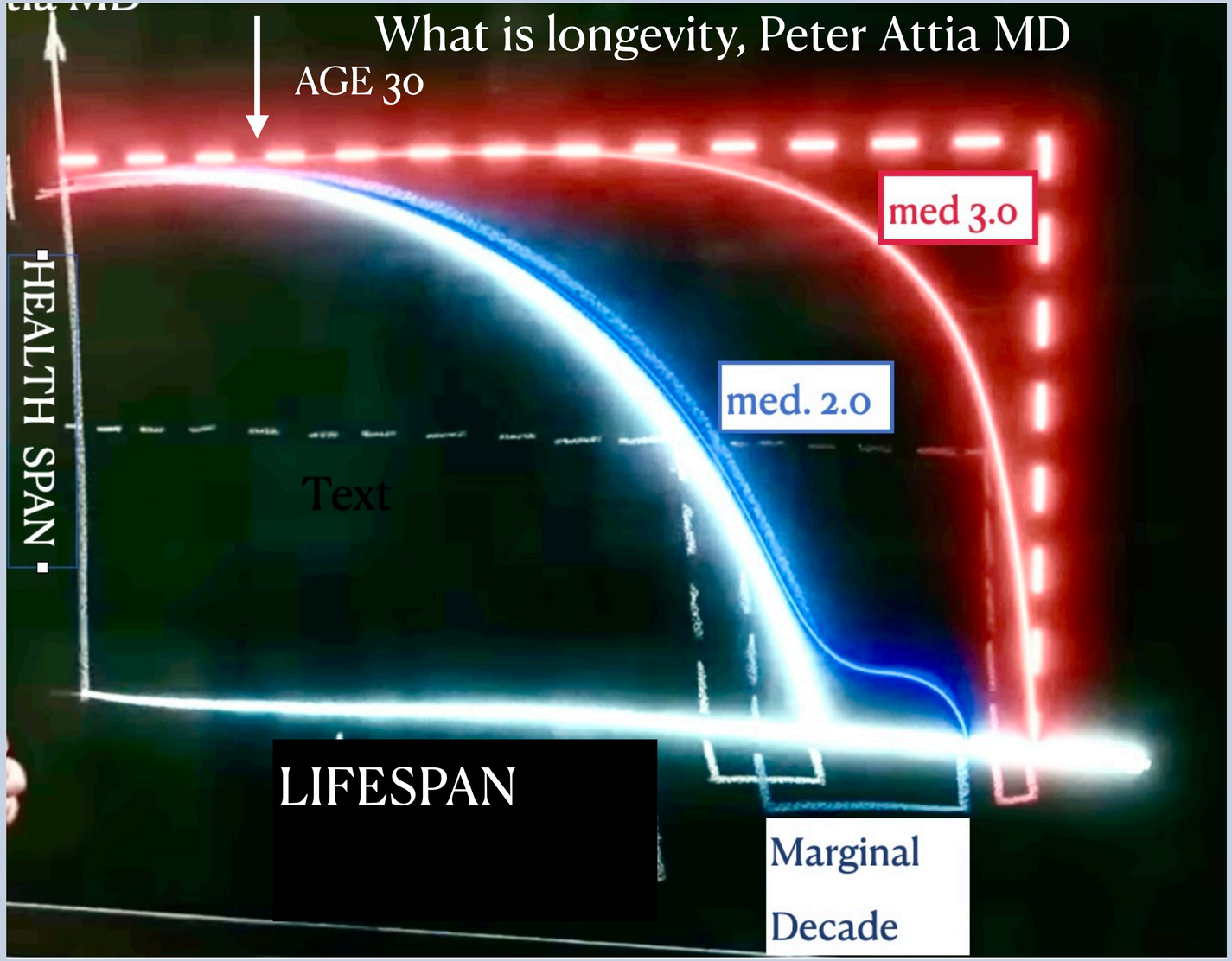
- **Medicine 1.0 :**
  Dominated virtually all of human existence.
  Relied on a belief about gods, spirits, humors.
  Hippocrates (460 -370 BC)
  Diseases were caused naturally, not by superstition and gods.
  Life Expectancy: 30s or 40s.

- **Medicine 2.0**
  Focus on treating diseases after they manifest to delay or avoid death.
  Successful in treating and preventing infectious diseases with antibiotics and vaccines.
  Less successful in dealing with chronic diseases.
  Interventions often occurs too late. Life expectancy: 70s

- **Medicine 3.0**
  1) Proactive approach to health, targeting the root causes of aging and age related chronic diseases, rather than treating diseases after they manifest.
  2) Personalized Medicine: Consider each patient as an unique individual.
  3) Health span is given at least as much effort and attention as life span . Increase health span, and lifespan will follow.

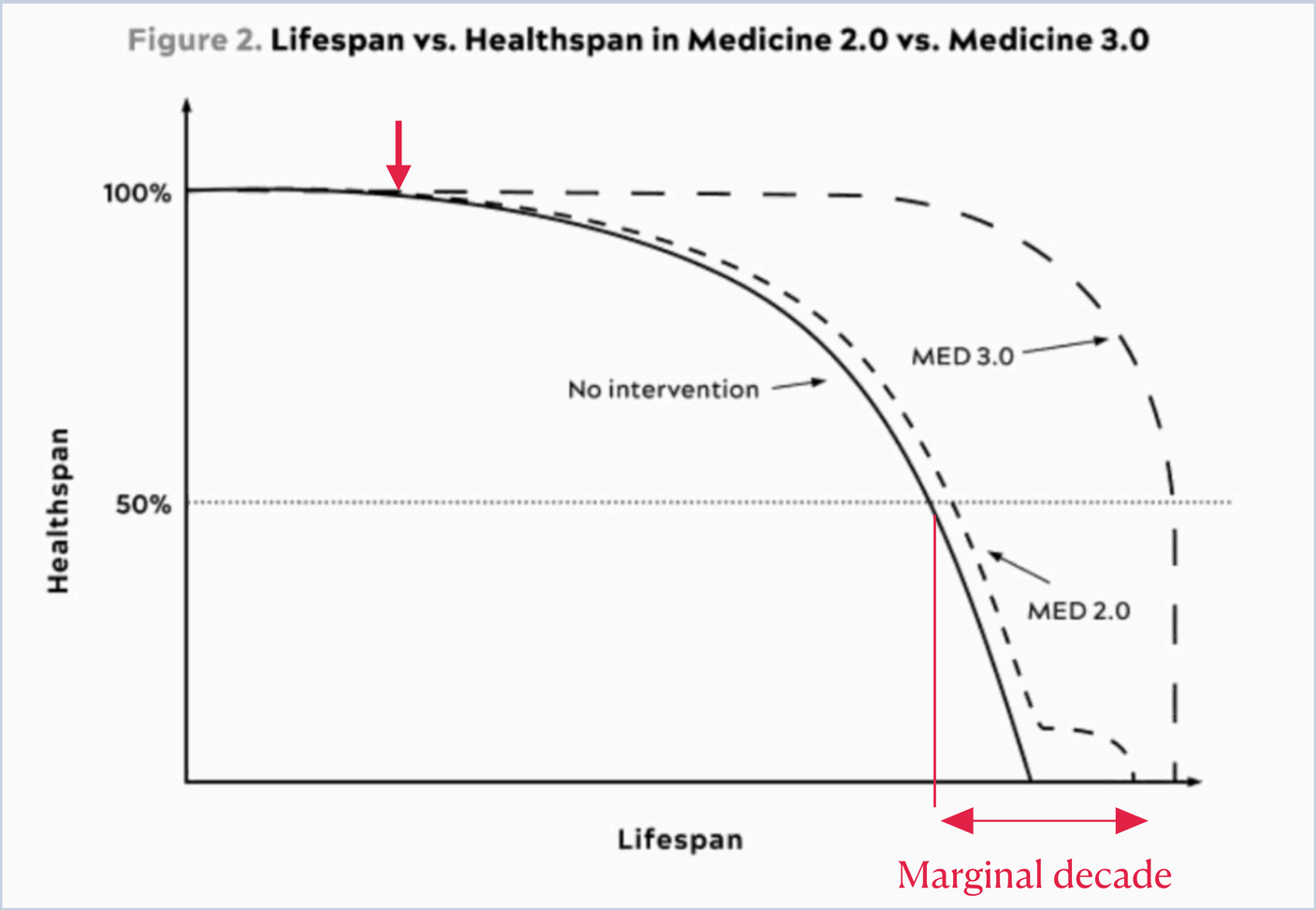

UNDERSTANDING
LONGEVITY

Objective 目標



- **Squaring the longevity curve:**
  Reduce risk of chronic diseases.
  Maintain physical and cognitive function.
  Live longer
  Live better for longer
  Exceed the society's expectation of old age
  OUTLIVE
- **Turn marginal decades (邊緣十年) to bonus decades (紅利十年)**
  The Rest of your life becomes a time to relish rather than to dread.
- **There is no short cut.**

Objective 目標



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- **There is no short cut.**

Aging is inevitable

but

Frailty doesn’t have to be

Marginal Decade

In Japan

- Life expectancy : 81.64 male, 87.74 female
- Health span : 72.68 male, 75.38 female
- Life dependant on others:（失能年齡）
  9 yrs male, 12 yrs female ，台灣七，八年。
  Marginal Decade 邊緣十年
- 團塊世代, **Baby Boomer**
- 年過八十如何生活:
  珍惜現有，放膽去做，輕鬆跨越80歲屏障
  也強調運動的重要性，不要主動放棄自已能做的事

The Limit of Human Lifespan

Jeannie Calment, a French woman who died in 1997 at 122, still holds the world record of the oldest verified age at death

S. Jay Olshansky (U. Chicago)
Jan Vijg (Albert Einstein)

Human lifespan has a limit and we might have reached.

People shouldn't expect to live to 100. Most, will reach 65-90.

Biology is holding us back.Human evolution favors growth and reproduction, not living to excessive ages.

Peter Attia

Kaare Christensen. Danish Aging Research Center in Denmark.

Most babies born in the 2000s would live to 100 if medical progress continues.

Future advances could make up for the stalled life expectancy gains.
Steven Austad, University. of Alabama
Scientist will figure out how to change the biology of aging
First person to live to 150 is already born.

Centenarians & Super-centenarians

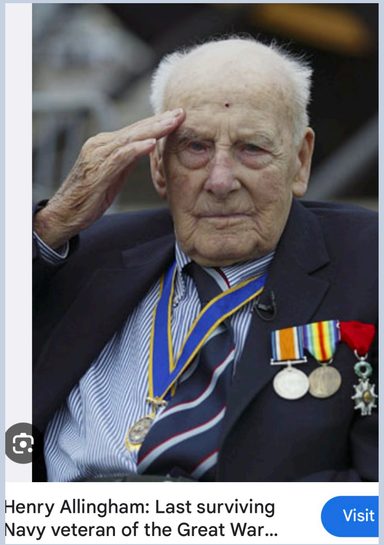
112,
Whiskey's a good medicine, It keeps your muscle tender

Healthy Behavior

Luck ?

Good Gene?

113,
Cigarette , Whiskey and Wild Wild women



122,
Smoke and Drink till age 117,
rode a bicycle till 100

Other Centenarian attribute longevity to
Bacon for Breakfast.
Three eggs a day
Daily coke
Cold beer

Genes and Longevity

- **Centenarians** (over 100): 100,000 worldwide in 2021. 573,000 in 2024.
  Super-centenarians (over 110): 300.
- **Study of people live past 80**: **Gene account for 20-30%.** The older you get, the more gene start to matter. Centenarian's brother 17 times, sister 8 times more likely to live past 100.
  Next best thing: long-lived parents.
- Which gene or genes?
  It's probably combination of effects from hundreds or thousands genes. Most frequently found: *APOE, FOXO3*.
- **Gene Expression:** While your genome is immutable, at least in the near future, gene expression (epigene) can be influenced by your environment and your behavior.
- **Genetics and environment :** Both play a role in longevity and it may be possible to implement interventions that replicate at least some of the centenarian's good genetic luck.
- **Mimicking phenotypes:** For people without the genome, can we mimic the physical traits that enable them to resist disease and live longer ? **YES!!**

Phenotypes of Centenarians

The Older You Get, the Healthier You Have Been.

- **Resilience:**
  1) Able to maintain ideal metabolic health despite a poor diet.
  2) Able to resist and avoid cancer. cardiovascular diseases, even when smoking for decades.

- **Chronic diseases:** Centenarians succumb to chronic diseases(the four horsemen) 16 years later than the general population.
  Super-centenarians(over 110) and semi-super-centarians(over 105) are in better health than centenarians. They not only live longer but also live healthier, enjoying one, or two, or even three Bonus Decades.

- **Medicine 3.0**: Help people live a life course more like a centenarian by
  1) Delaying or avoiding chronic diseases.
  2)Maintaining physical, mental and emotional health

Eat Less, Live Longer

The Science of hunger and Health

- **Experiments** over and over have shown, reducing the food intake of lab animals could lengthen their lives.
- **Calorie restriction** without malnutrition (CR), 25-30% less calorie prolong life 15-45% in lab animals , they are healthier.
  The life-extending effect of CR seems to be almost universal, hamsters, dogs.....
- **CR contributed to our understanding of aging process.**

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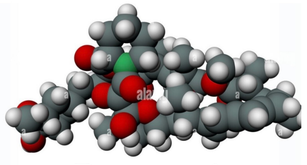
mTOR Signaling Pathway

TOR Switch, Nutrient Sensing Pathway, Regulating cellular metabolism, growth, survival and aging



NUTRIENTS

Exercise

+++

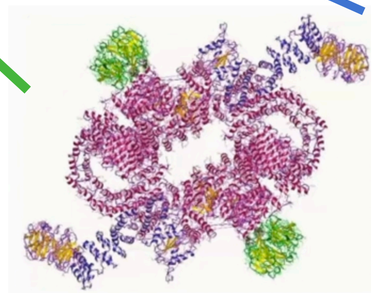
———

+ Growth
+ Inflammation

+Autophagy自噬
+Repair
Recycle, Cleaning

Aging

Anti-aging



mTOR (target of rapamycin)

Rapamycin

Revolutionized the Study of Longevity, One of the most Incredible Saga in Biology

- **Easter Island,** Native name Rapa Nui, Chile.
- **Discovery of Rapamycin in 1964:** Strong anti-fungal effect.
- **Immune system**: Powerful effects on immune system.
  FDA approval (1999) for transplant patients to decrease organ rejection,
- **Prevent Clotting:** It is used in drug-eluting stents (DES) for cardiac patients .
- **mTOR Discovery: The " mechanic target of rapamycin"**, is one of the **most important mediators of longevity at cellular level in all forms of life.**
- **Prolong Life: NYTimes 7/9/2007 " Antibiotics Delayed Aging in Experiments with Mice" -Mice lived 10 % longer,** even when given the drug late in life. The results have been repeated in different labs with diverse animals.
- **Dog Aging Project:** Rapamycin improves cardiac function in older animals and reducs systemic inflammation.
- **Potential:** **It may have the potential as a longevity-enhancing drug,** but there are many formidable obstacles. It is Immunosuppressive and may enhance adaptive immunity with different dosing schedule. It may act more as an immune modulator than an immunosuppressant.
- **Off-Label Use:** A small but growing number of people, including Attia , are taking Rapamycin off label for its potential geroprotective benefits.

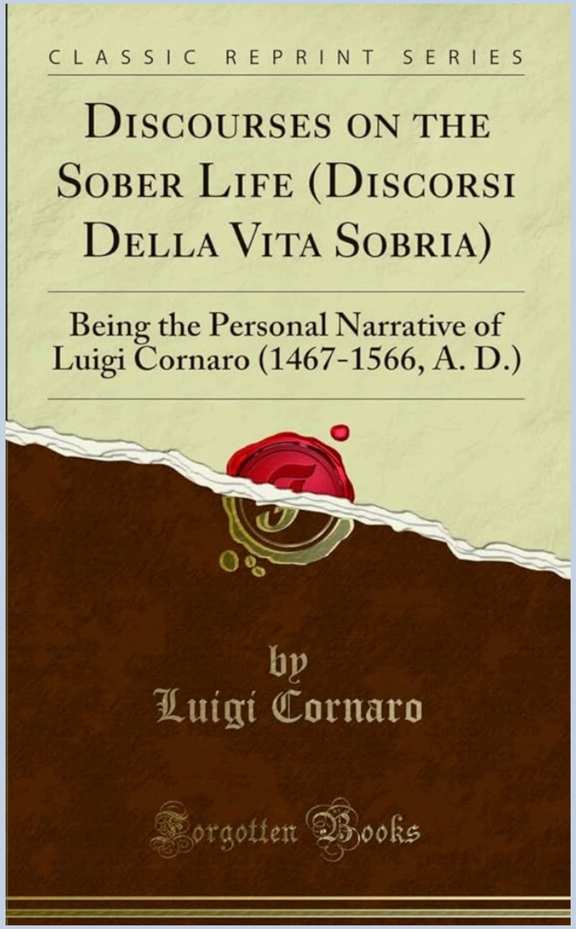
Metformin and Longevity

- **Diabetic patients on metformin:** Have lower cancer rate and live longer. **2014 study** :Diabetic patients on Metformin actually live longer than general population.
- **TAME (Targeting Aging with Metformin)**. FDA approved trial of metformin's potential longevity benefits by delaying the onset of aging -related chronic diseases.
- **GLP-1 (glucagon-like peptide-1):** Includes drugs like Ozempic, Wegovy ? Potential for anti-aging?

Alvis Cornaro

First Person to Put the Idea of Eating Less into Practice

Portrait of Alvise Cornaro by Tintoretto



First best selling diet book in history

- Luigi was Italian businessman and a self made real estate developer with tremendous wealth. He had a beautiful wife and a villa in Venice, where he loved to throw parties.
- At age 40, Luigi suffered from a series of health issues, which were classic symptoms of diabetes.
- He restricted his diet to 12 oz of food daily, leading to a dramatic improvement in his health.
- Luigi was the first person to advocate for eating less as a health practice.
- He lived a productive life and passed away at the age of 98.

The Health Crisis of Civilization

Less Social Connection

Elevated Stress

Sleep Deprivation

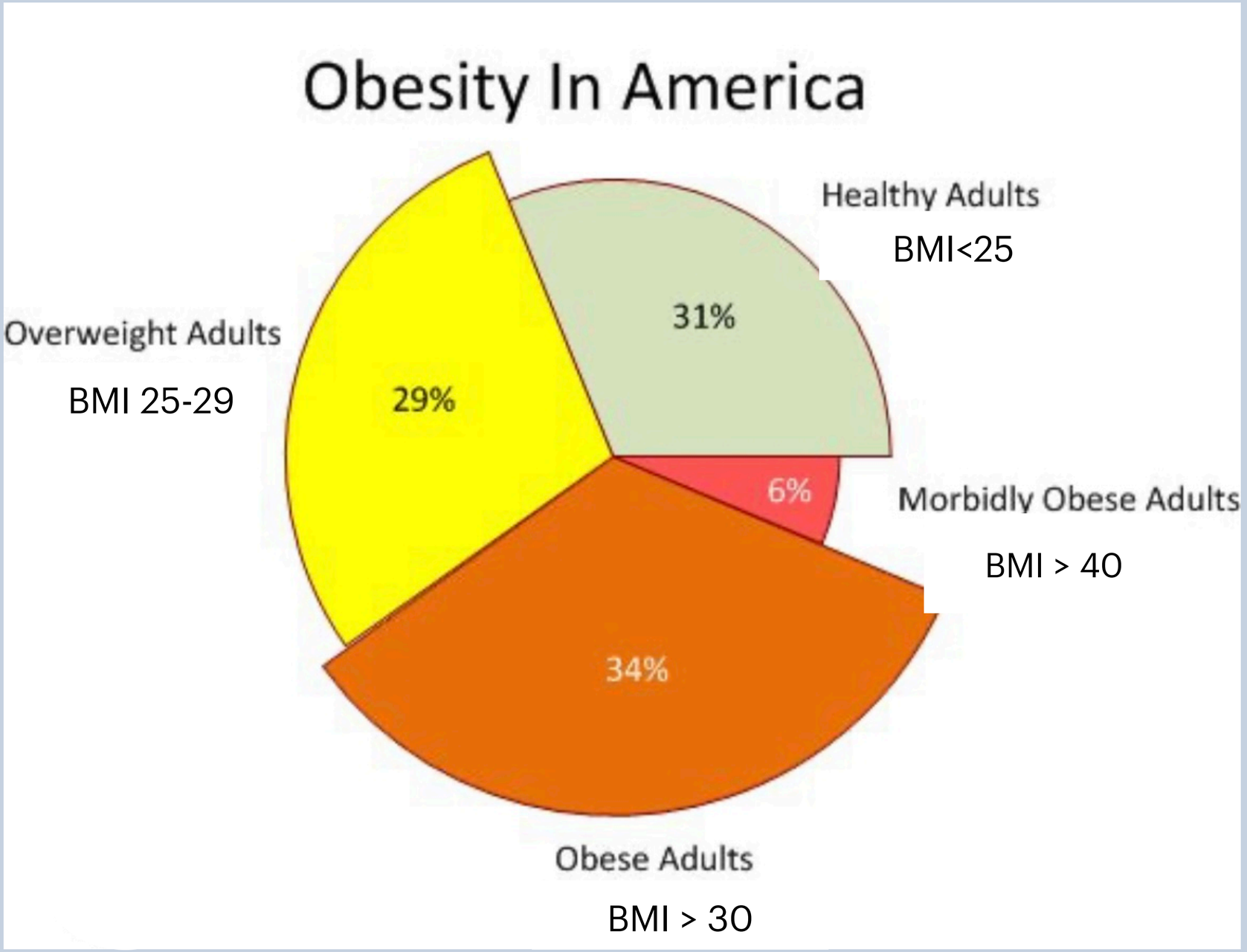
Abundance of Food

Highly Processed Food

Decreased Activity

Our gene is built to move and starve from time to time

Obesity In America



How Excess Fat Increases Cardiometabolic Risk

Individual fat storage capacity are different.

Asians have low fat storage capacity.

Energy Intake

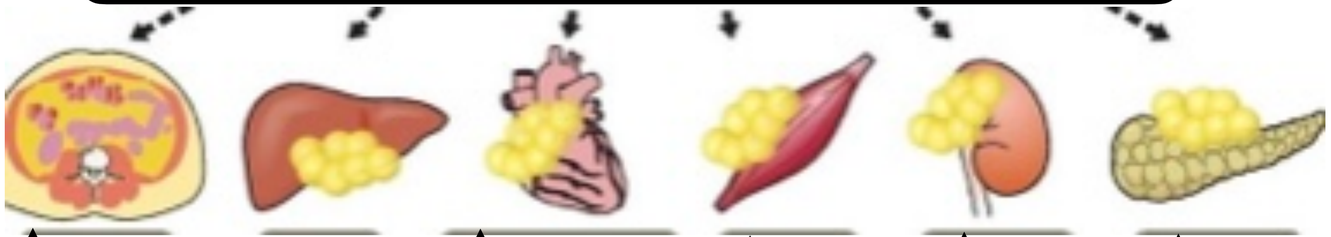
Energy expenditure
↓Physical activity
↑Sedentary time

Positive energy balance

Saturation of expansion capacity of AT (adipose tissue)

Lipid overflow

We are evolutionally endowed with genes to store excessive calorie in fat



Viceral fat | Liver fat | Myocardial fat | Muscle fat | Renal fat | Pancreatic fat

Insulin resistance/inflammation

Impaired insulin secretions

increased cardiometabolic risk

High risk of T2DM

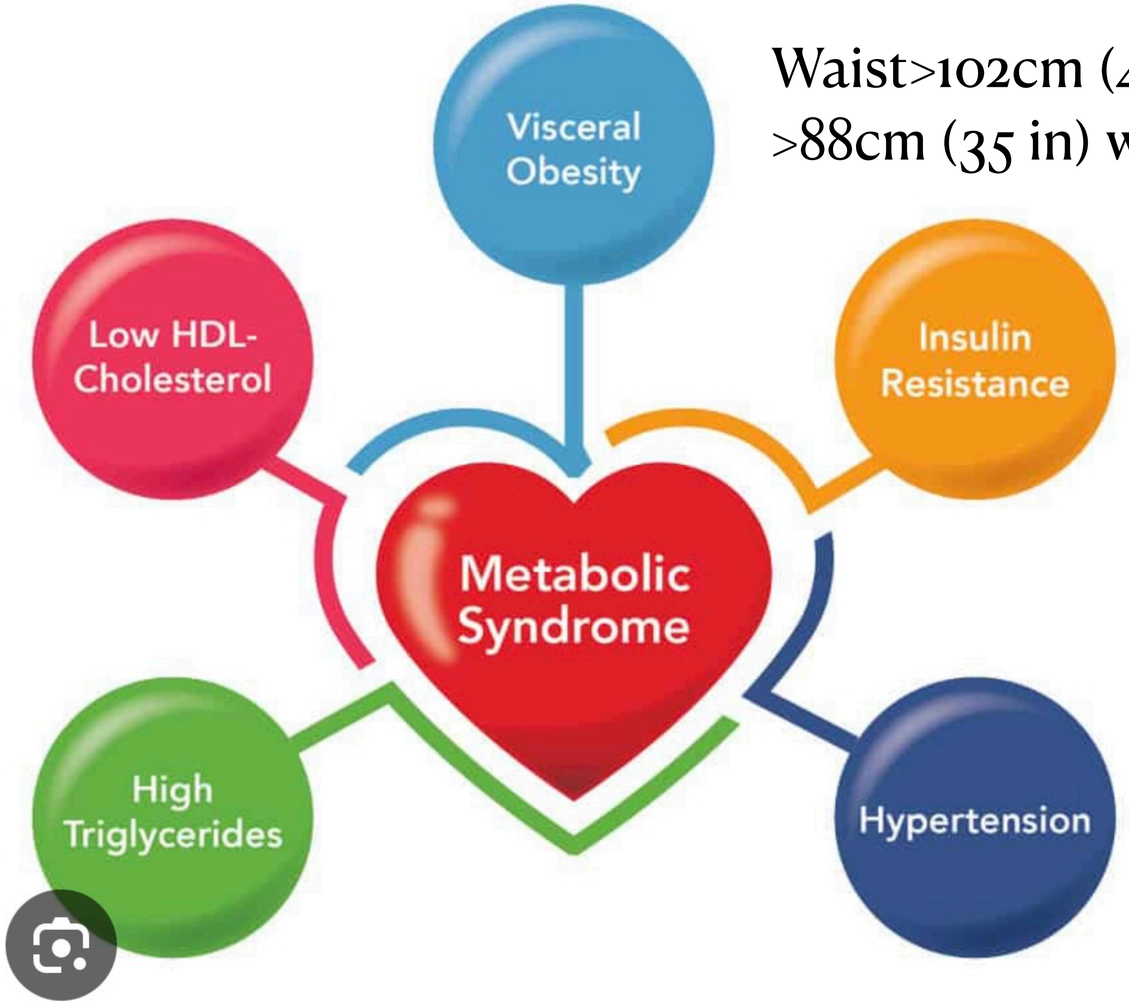
Increases Risk of Cancer , CVD and Alzheimer's

Increased Risk of Cardiovascular Disease

Energy Imbalance, Metabolic Dysfunction

The Root Cause of All Age Related Chronic Diseases

What is Metabolic Syndrome?



Waist>102cm (40in) men
>88cm (35 in) women

<40 mg/dL men
<50 mg/dL women

Fasting Glucose>110 mg/dL or on med.

>150mg/dL

>130/85 mmHg or >120/80 on med.

Diagnosis: Any 3 out of the 5 features above (3/5,)
9/10 of American have at least one box. 1/3 adult have metabolic syndrome.

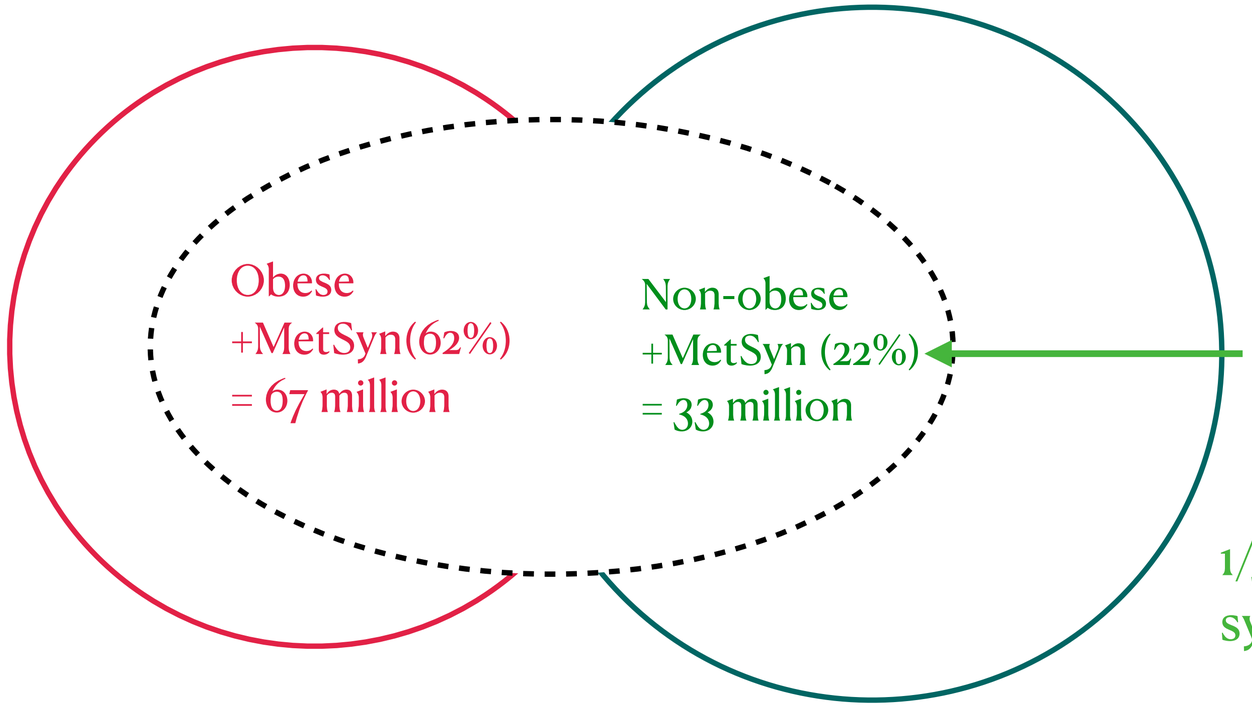
Uncoupling Obesity from Metabolic Health

Relative prevalence of metabolic dysfunction ("MetSyn) across the obese and non obese segments of the population

BMI is not that helpful b/c it doesn't account for body composition or insulin sensitivity

108 million obese

150 million non-obese



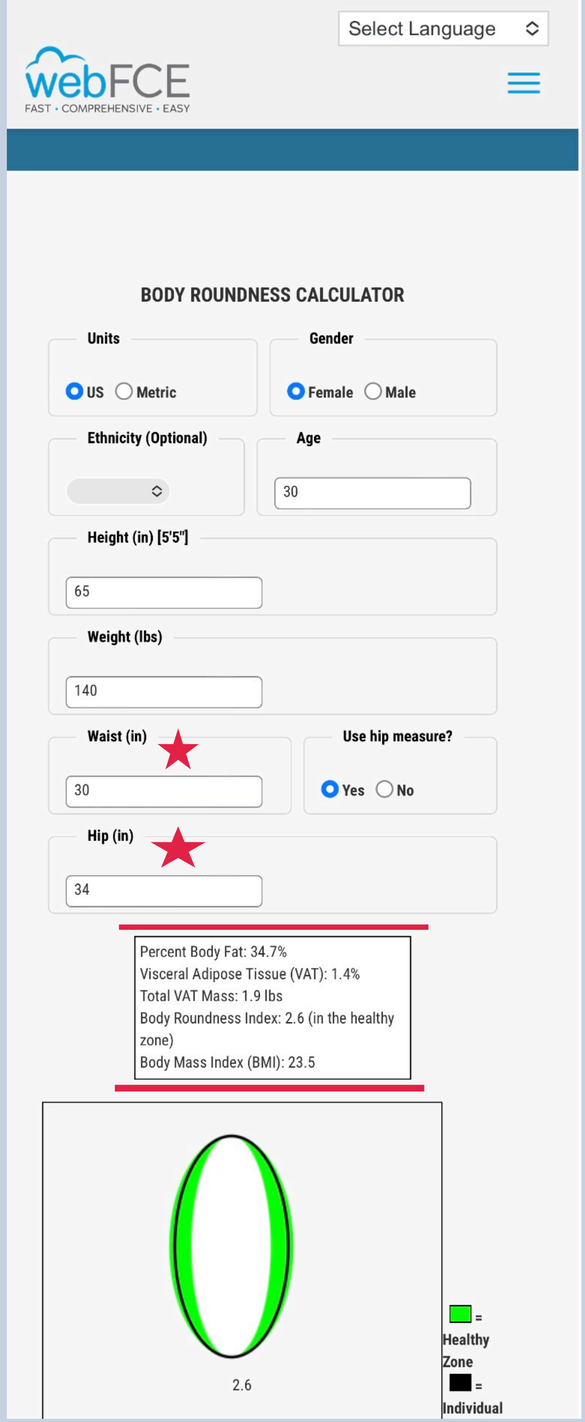
These people are at highest risk
More in Asians

1/3 of people with metabolic syndrome are not obese

Internal analysis based on data from National Institute of Diabetes and Digestive and Kidney Diseases(2021)

Obesity and Type 2 Diabetes in Taiwan and US

	Taiwan	US
Obesity(by BMI)	**22.8%**	**40%**
Type 2 Diabetes	**13.1%**	**11.6%** • 38% of US adult are pre diabetic • people over 65 29% diabetic 50% pre diabetic



$$\mathrm{BMI} = \frac{\mathrm{weight\ (kg)}}{\mathrm{height\ (m)}^2}$$

WHR (Waist to Hip Ratio):
< 0.85 for Women, < 1.0 for Men

BRI Body Roundness Index

BRI webFCE BRI calculator

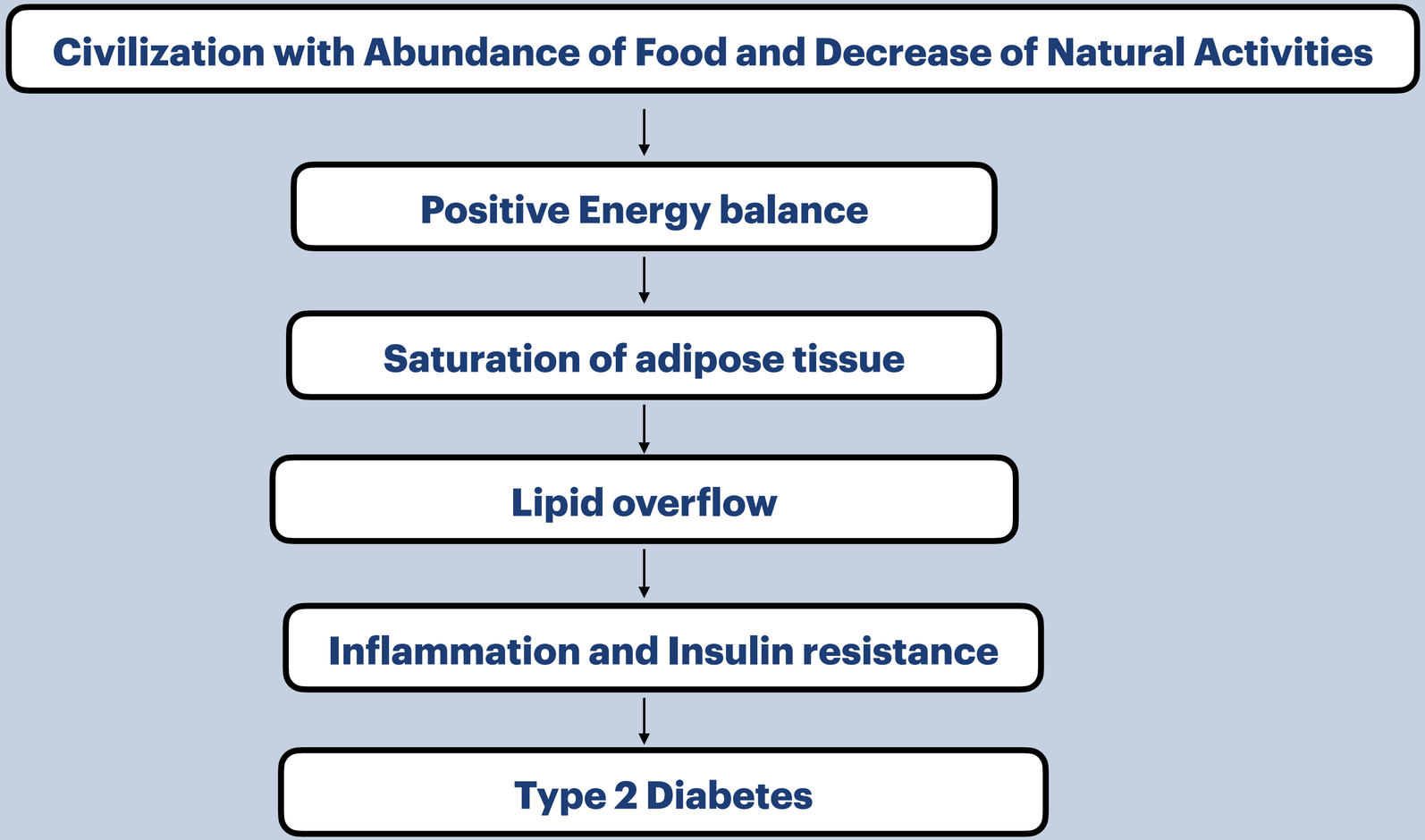
N: 1-10, Ideal Range: 3.4-6.9

Normal Body Fat Percentage

Men: 10%-20% Women: 20%-30%

Visceral fat : less than 10%

Development of T2DM



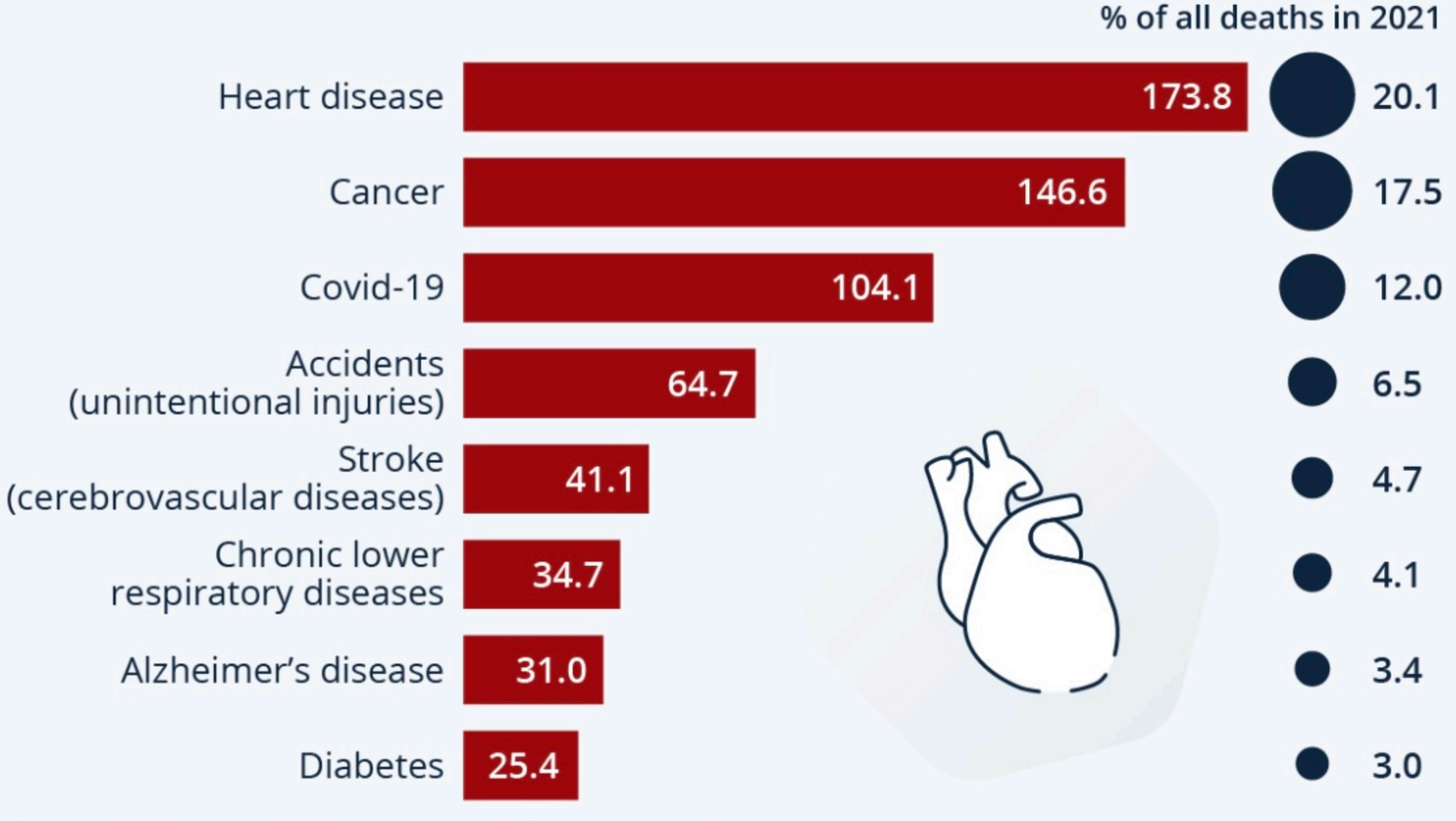
Prevention: Keep energy balance

Early Detection: Check body composition & insulin level

Cardiovascular Diseases

One in Five Deaths in the U.S. Caused by Heart Disease

Number of people who died from the following causes in the United States per 100,000 of population*



* Mar. 2020-Oct. 2021 (latest final data). Age-adjusted death rate

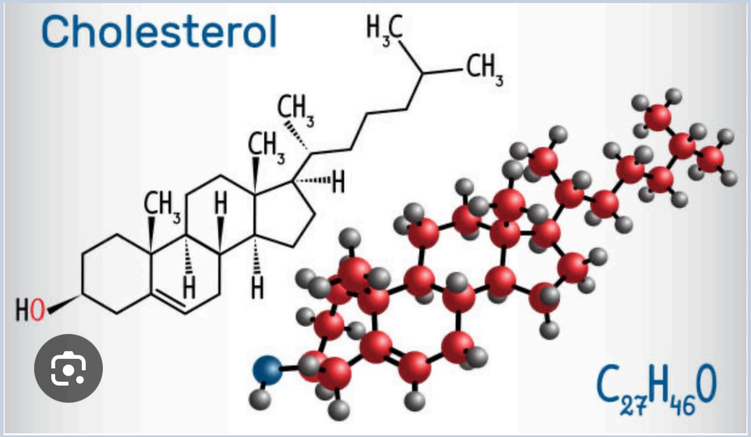
Sources: CDC, NCHS

The Ticker

Confronting and Preventing the Heart Disease, The Deadliest Killer on the Planet

- **Heart disease is the #1 cause of death in the US.**
  One in five deaths in US is caused by heart disease.
  1/3 of CVD and stroke cases occur in people younger than 65.
  1/4 are younger than 54.
- **The event is sudden, but the problem has been developing for years.**
  Early signs of atherosclerosis can be detected in 1/3 of car accident victims as young as 16 to 20 years old.
- 36% of healthy, low risk adults 45-65 yr old with normal routine blood tests show early signs of atherosclerosis through coronary calcium (CAC) or cardiac computed tomography angiogram (CCTA).

Cholesterol Basics

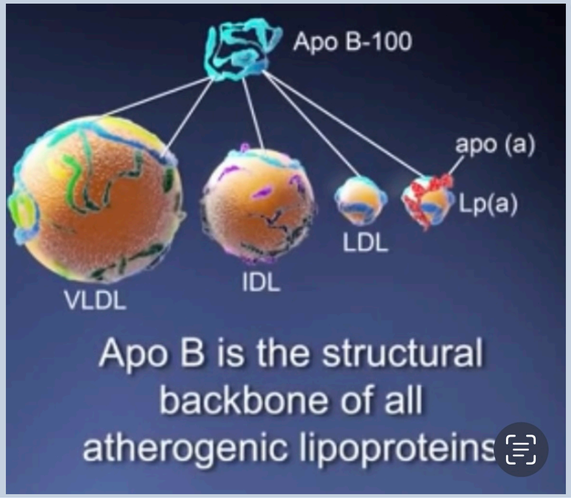


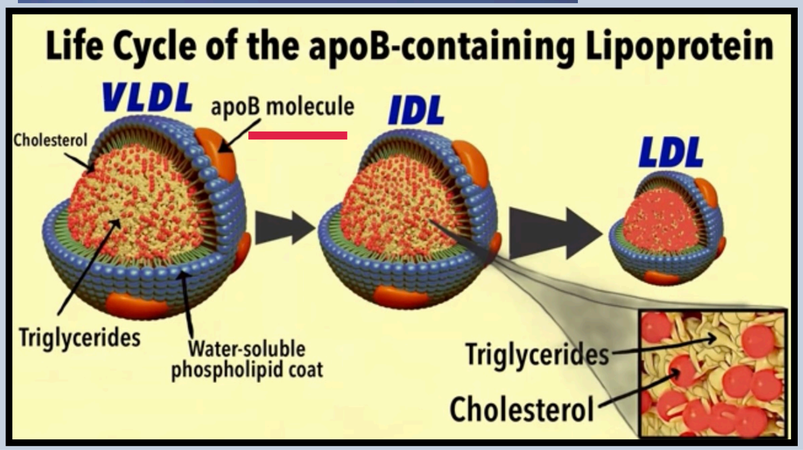
Cholesterol: Essential Yet Misunderstood

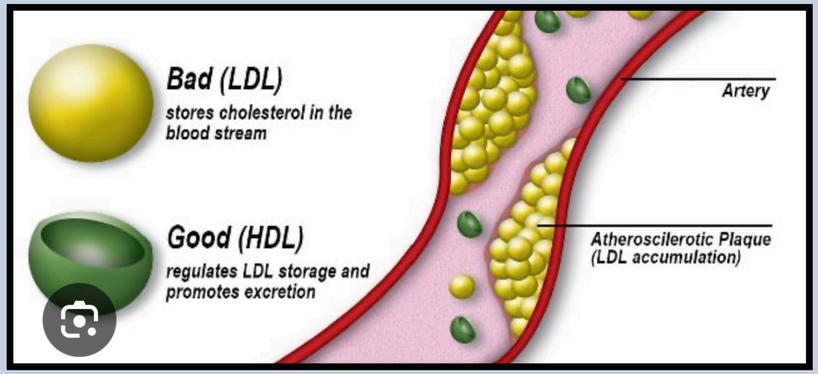
- **Cholesterol is crucial** for the structure of important organs, including cell membranes and various hormones. However it is also key factor in the development of atherosclerosis.
- **Dietary cholesterol may not significantly contribute to atherosclerosis.(動脈粥樣硬化).** Humans have very poor absorption of cholesterol compared to animals like chicken and rabbit.
- The cholesterol found **in our blood stream is primarily produced by our own cells,** with 20% coming from liver.
- **Cholesterol is a type of fat and needs to combine with protein (forming lipoprotein)** to circulate in the blood stream.

Cholesterol and Atherosclerosis

The Good and Bad Cholesterol







- **Bad cholesterol: LDL-C (LDL-apoB)** can damage endothelium of blood vessels. Factors such as **smoking, high blood pressure contribute to the damage,** leading to plaque formation, calcification and eventually occlusion. LDL-Lp(a) a component of LDL-apoB is particularly damaging and accounts for most premature heart attacks.
- **Good cholesterol: HDL-C (apo-A)** can remove cholesterol from blood stream, returning it to the liver and other tissues for reuse.
- **Reduction of ASCVD : Lowering apoB level is associated with a reduction in atherosclerotic cardiovascular diseases(ASCVD)**

Cardiovascular Risk Evaluation and Detection of Atherosclerosis

- **Three blind spots in current risk evaluation:**
  1) Oversimplification of lipid profiles
  2) General lack of knowledge of apoB, Lp(a)
  3) Failure to grape the lengthy time course of atherosclerosis
- **apoB significance: apoB has a stronger correlation with cardiovascular risk than LDL-C.** Each increase in 1 SD increase in apoB increases the heart attack rate by 38%. It should be the primary marker for assessing cardiovascular risk.
  Two most important predictors of ASCVD : apoB, Lp(a)
- **START EARLY :**
  Should start monitor and treat starting from 30-40 yr. of age.
- **Calcium score:** Important for evaluating cardiovascular risk.
  (Implications of breast arterial calcification on mammograms for heart health?)
- **CT angiogram:** Effective in detecting soft plaque.

Early and Aggressive Monitor and Treatment

- **ApoB lowering tactics:**
  1) Weight loss
  2) Replace carb. and saturated fat with unsaturated fat.
  3) Soluble fiber.
  4) Medication.

- **Cholesterol lowering drugs:**
  Attia strongly advocates for the use of statins and PCSK9 inhibitors to improve blood lipid profiles, especially targeting ApoB, which he identifies as the primary culprit behind cardiovascular disease.
  Try to get LDL-C and ApoB as low as possible. Normal is not optimal.

- **Control BP, Stop smoking, Regular exercise, Stress management.**

Cancer

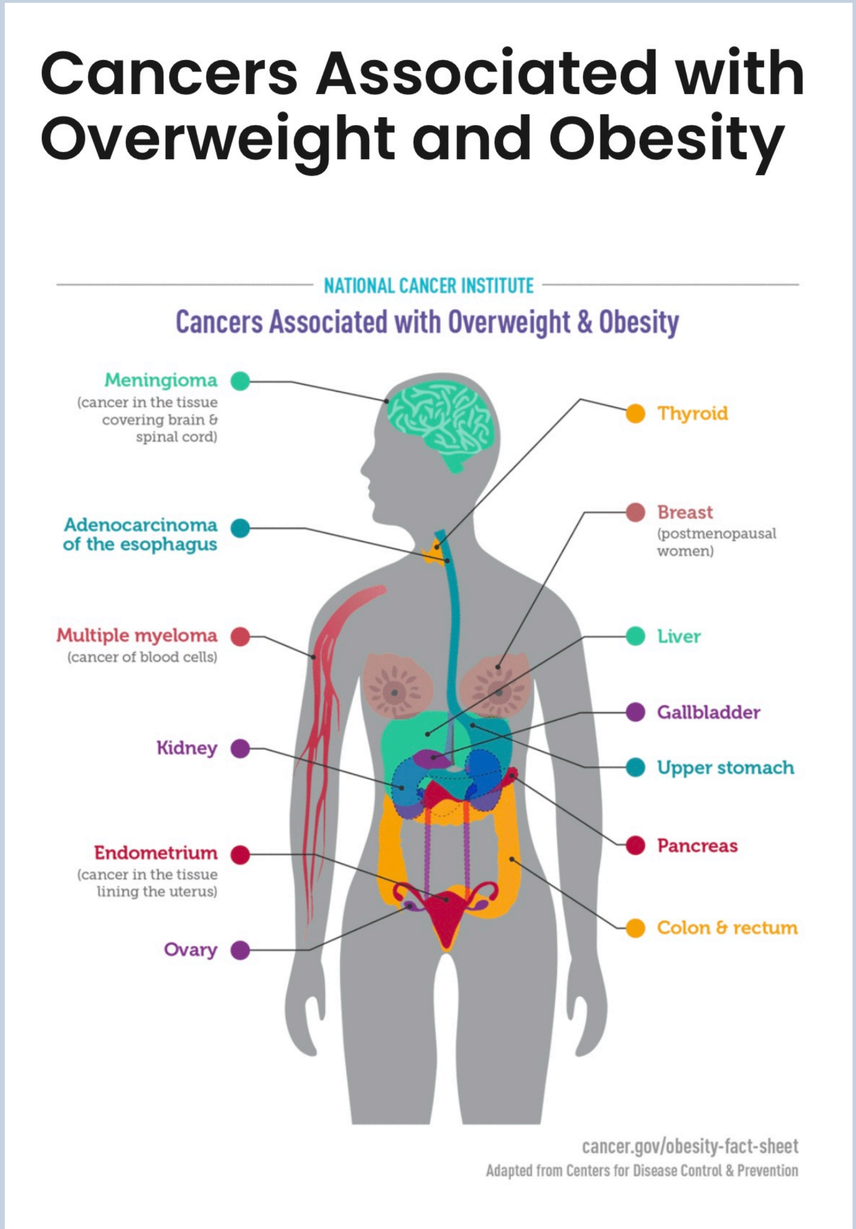
Cancer, the Runaway Cells

- **Like heart disease, cancer is a disease of aging and is the #2 cause of death in US. While there** are some genetic drivers such as *BRCA1, BRCA2.* most cancers are polygenetic. Two significant environment triggers are smoking and obesity. (air pollution) Additionally, random mutations play a significant role.
- **Cancer therapy** has evolved from surgery to radiation therapy, chemotherapy and now to target therapy, immunotherapy, including CAR-T. These advanced treatments can lead to complete remission and long-term remission in some cases, but they are still relatively rare.
- **Treatments for cancer are not as effective as those for CVD and T2DM, but they are better than Alzheimer's disease (AD). Prevention is challenging.**
- **Early Detection is crucial.** Treatment outcomes for early-stage cancers are significantly more favorable compared to those diagnosed at later stages

Early Detection is the Key

- **Current recommendation:** Screening for lung, breast, prostate, colorectal and cervical cancers.
- **Medicine 2.0:** More conservative on screening due to concerns with financial cost, emotional impact, and rare complications.
- **Medicine 3.0: Advocates for early, aggressive Screening,** weighing these risks against the benefits of early detections.
- **Colonoscopy :** Recommended at age 40 instead of 45.
  Lung Screening: Consider low dose lung CT in nonsmokers, especially in Asian women.
  Total Body MRI : For people with high risk of cancer where there is no routine screening.
  Liquid Biopsy: Optimistic about multi-cancer early detection (MCED) using cell-free DNA in plasma. Next- generation data base CCGA (circulating cell free genome atlas) Galleri test(Specificity 95%, Sensitivity still low) for multiple cancer detection.
- Cologuard and recently FDA-approved Shield test, a blood test for colon cancer.

Excess Weight and Cancer



- The American Cancer Society reports that excessive weight is a leading risk factor for both cancer cases and death, second only to smoking.
- **12-13% all cancer cases** are thought to be attributable to obesity.
- **Extreme obesity (BMI>40)** increases cancer rate by 52% in men and 62% in women.
- This is probably caused by chronic inflammation.
- Calorie restriction(CR) decreases cancer risk and slows cancer growth.

Chasing Memory

Understanding Alzheimer's Disease and other Neurodegenerative Diseases.

- **US Statistics:** 6 millions people in the US have Alzheimer's Diseases.
- **Aging and Alzheimer's** : AD is often the last major challenge on the path to becoming centenarian.
- **Public Perception**: Most people fear dementia more than any other consequences of aging, including death.
- **Challenges**: AD is difficult and intractable of all chronic diseases. It is less understood, has no effective treatments, and is not readily reversible like type two diabetes or metabolic dysfunction. It is also less treatable than atherosclerotic cardiovascular diseases.
- **CurrentTreatments:** Medications like Lecanemab (Leqembi) and Donanedab (Kisunla) from Lilly aim to decrease amyloid levels. However, their efficacy limited and they come with significant side effects. These treatments may need to be started earlier. Clinical trial on going with result expected in two years.

Early Screening for Risk of Alzheimer's

- **GeneticTesting:**
  APOE: e4 signals high risk, e3 indicates average risk and is most common, e2 decreases the risk.
  APP, PSEN1,PSEN2: Genes responsible for early onset AD before age 65.
- **Causes:** Not fully understood but the Amyloid theory is prominent.
- **Screening methods:** PET scans for amyloid , CSF biomarker testing, and promising blood tests like SOBA (soluble oligomer binding assay).
  Cognitive tests. Conducted by preventive neurologist to assess executive function, attention, processing speech, verbal fluency, memory, logical memory, associative memory, spacial memory, somatic memory, sense of smell(first to be affected in AD).
  Orange County Vital Brain Program: Available at Hoag and some senior centers.
- **Prevention:** AD is preventible to some degree. **Prevention is not only important but essential.** It needs to start early before symptoms appear, beginning at age 40 in high risk patients. In a broader sense, everyone is at some risk of AD and other neurodegenerative diseases. with age being the main risk factor.

Prevention of Alzheimer's

- **Heart health:** What's good for the heart is good for the brain: Every intervention that lower the risk of ASCVD also reduces the risk of dementia.This include lowering apoB, managing blood pressure, and not smoking.
- **Metabolic Health:** Follow a mediterranean diet maintain calorie balance , avoid processed foods, consume low carbohydrates, good oil, high protein, high fiber. (Alzheimer's is T3DM ? caused by insulin resistance)
- **Exercise: It's the best tool for preventing neurodegenerative diseases.**
  Both cardio and strength training are essential
  Greater grip strength is associated with lower chance of Alzheimer's Diseases (AD).
- **Cognitive stimulation:** Engage in complex activities that combine brain and body such as dancing or learning new skills. These are more beneficial than simpler mental exercises like crossword puzzles.
- **Social connection:** Maintaining social connections is crucial.
- **Sleep:** Sleep is an active form of recovery for the brain. Amyloid cleaning happens during deep sleep.
- **Stress managements:** Sleep deprivation and stress damage the hippocampus.
- **Hearing, Dental health:** Important for overall health.
- **Hormone Replacement Therapy(HRT):** Recommended for peri and early menopausal women.
- **Vitamin D and Omega-3 Supplements:** These are less impactful compared to exercise, metabolic health, and sleep but is still beneficial.

T2DM : Preventable, Treatable, Reversible

CVD: Preventable, Treatable

Cancer: Difficult to Prevent, Somewhat Treatable
Early Diagnosis is Crucial

Neurodegenerative Diseases: Somewhat Preventable,
No Effective Treatment

Prevention of Metabolic Syndrome

- To extend life span and health span

✘ treating 4 Horsemen is too late

✘treat metabolic syndrome is also too late.

✔ Need to monitor and prevent metabolic syndrome.

Preventing metabolic dysfunction is a corner stone of authors's approach to longevity

Act early and aggressively

Enjoy a Short Break

Tactics 戰術

The 4 Fundamental Pillars of Longevity

Reduce risk of diseases and death,

Improve quality of life.

1. Exercise

2. Nutrition

3. Sleep

4. Emotional Health

5.Bonus 5th Pillar:
Exogenous molecules, various supplements, hormones,
metformin?, rapamycin?.....Geroprotective drugs


EXERCISE

Exercise

The Most Powerful Longevity Drug 運動是長壽最強大的特效藥

- **Improve mechanics and Mitochondrial 粒線體 Function:** Enhances energy production and physical performance. Mitochondrial function declines with aging.
- **Extend life span:**
  Delays on set of all chronic diseases across the board.
- **Improve health span: Enhance the quality of life by maintaining physical and mental health.**
  Slow down physical as well as cognitive decline, benefit emotional health.
  Greatest power to determine how you will live out the rest of your life.
- **Magnitude of Exercise Benefits:** Most people fail to recognize the magnitude of the benefits.
- **Every Little Bit Counts:** Any amount of exercise is better than none. Going from zero to just 90 mins per week can reduce dying from all causes by 14%.
- **It's never too late to start.**

Exercise Tactics

Peter Attia's 4 Pillars of Exercise

1) Stability

2) Zone 2 CardioTraining (Aerobic Efficiency)

3) Zone 5 Cardio Training ,VO2max , (Maximum Aerobic Output) HIIT

4) Strength

- **How?** More cardio? More weight?
- **START** Exercise
- **US HHS Recommendation:** 150-180 min moderate- intensity aerobic activity and 2 days strength training per week. However this may not be specific enough for everyone.
- **Peter Attia's four pillars of exercise:**
- **Structure your program :** Design a routine that allows you to enjoy well into your later years.

Stability

Flexibility and Balance Training

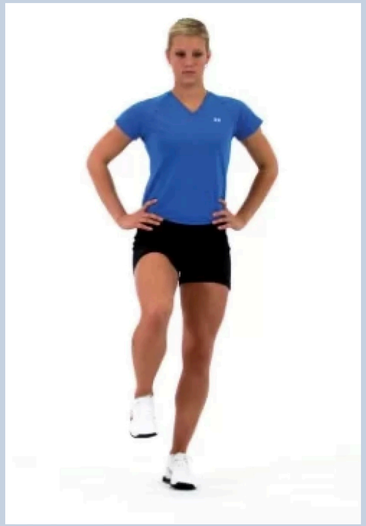
- **Foundation of Training:** Stability is the base for all physical training.
  It's important to have proper form and progress slowly.
  It prevent injury during exercise and daily activities.
- **Subconscious ability:** It allows you to harness force without conscious effort.
- **Reactive Capability**: A stable person can effectively respond to stimuli.
- **Self Correction:** Helps in preventing falls by correcting your posture and movement, such as stepping off a curb of side walk without falling, ...
- **Injury Prevention:** Essential for avoiding injuries and maintaining overall health.

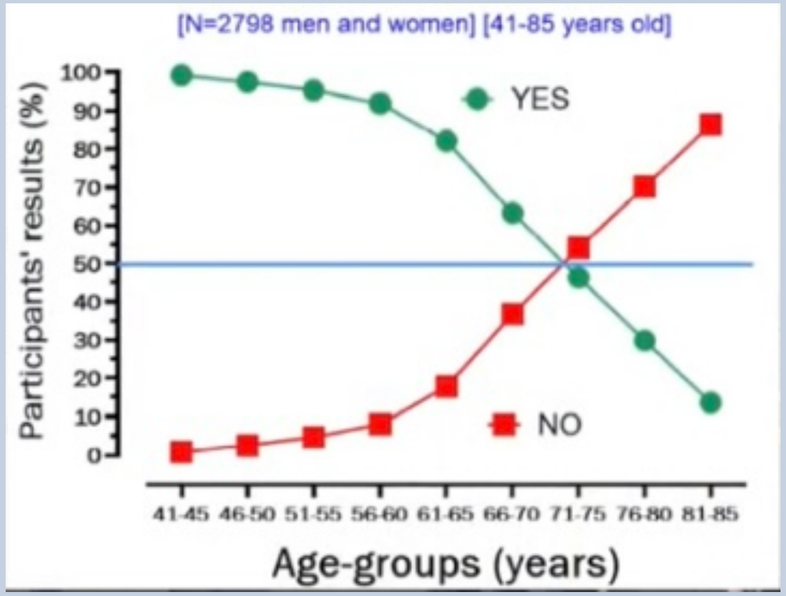
Exercise for Balance and Stability

- **Muscles,** tendons, bones along with brain, vestibular system, visual system are important parts of our body's balance system.
- **Exercise for stability**: 1)Breathing, 2)Core muscle exercise, 3)Shoulder, 4) Spine, 5)Finger, 6) Foot, 7)Toe strength, One leg stand, One leg walk.
- DNS: Dynamic Neuromuscular Stabilization Training.
- Attia claims this is the chapter most difficult to write. Made videos *www.peterattiamd.com/outlive/videos*
- **Yoga, Tai Chi** are probable most practical and comprehensive.

Single Leg Stance Test

Assessment of Balance and Stability





50 yr old: 20-30 seconds

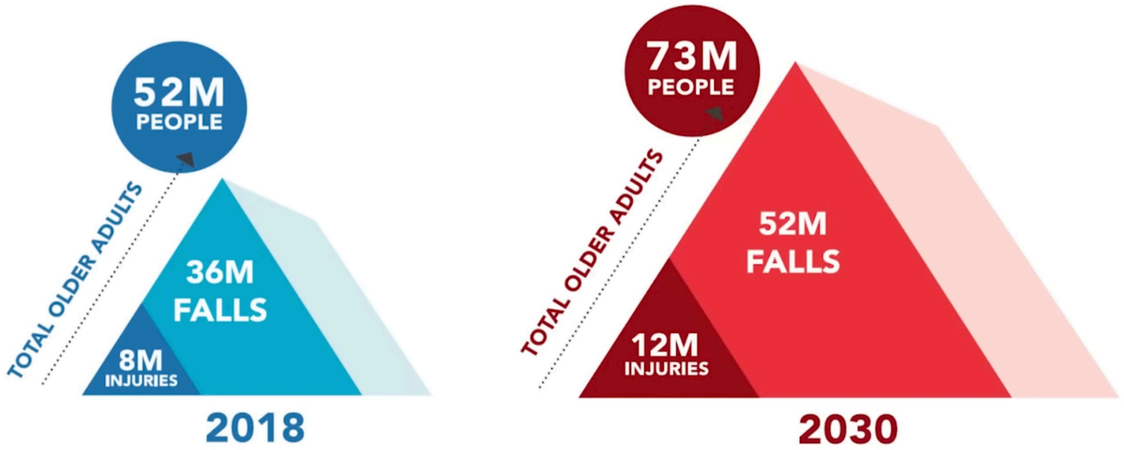
60 yr old: 15-25 seconds

70 yr old: 10-20 seconds

80 yr old: 5-15 seconds

- **Three Attempts Allowed:** Participants may use either leg, eyes open, for 10 seconds.
- **Risk Indication:** Inability to stand one-legged for 10 seconds is associated with 84 percent heightened risk of all-cause death over a median follow-up of 7 years

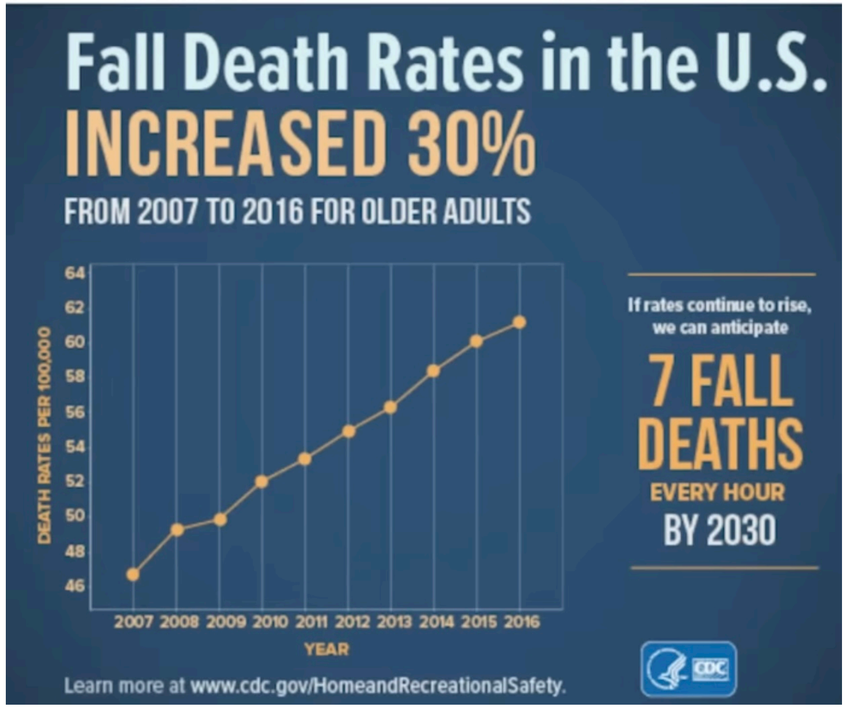
The Danger of Fall in Older Adult



One in two adults female over 50 will suffer a fall, one in 4 males.

One out of five falls lead to a fracture, a blow to the head, or another serious problem.

One in three adults 50 and over dies within 12 months of a hip fracture.



Every 15 mins, an older adult dies from a fall related injury.

Fatal car accident one in 15 mins.

Cardio, or Cardiovascular Training

The type of exercise that increases your heart rate and breathing

also known as

Aerobic Exercise

Zone 2 Cardio Training

- **Zone 2 for endurance:** Slow enough to still able to continue a conversation but a little strained . 60%-70% of Maximum HR. Simple estimate 180 minus age. Talk Test.
- **Benefits of Zone 2 Endurance Training:**
  Mitochondrial Health: Enhance the health, efficiency and the number of mitochondria, which decline with age.
  Base endurance: Build fundamental endurance for daily activities and help prevent chronic diseases.
- **Recommended Routine:** Aim for three hours per week of brisk walk, slow run, biking, swimming, dancing or any other enjoyable activity, preferably out door.
- **Supplement with Zone 5 :** Incorporate one or two Zone 5 exercise to improve VO2max. Maximum pace you can sustain for 4 mins(run or bike) then 4 mins of easy ride . Repeat 4-6X.(HIIT)

5 Zones Of Cardio Training

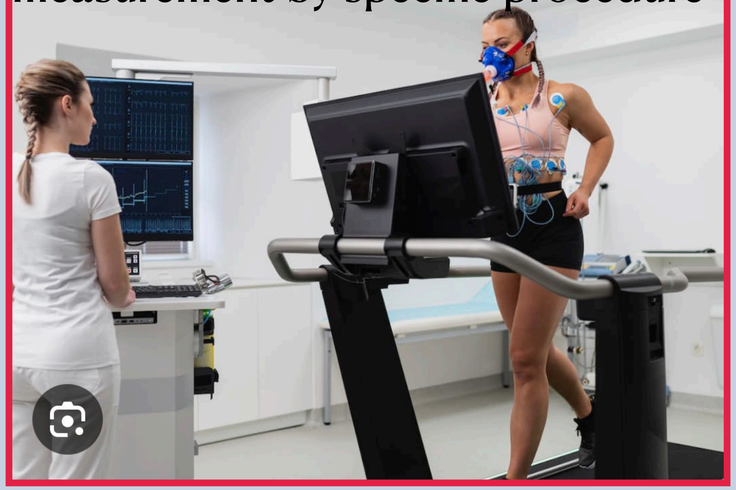
- Zone 1 50%-60% HRmax
- Zone 2 60%-70% HRmax
- Zone 3 70%-80% HRmax
- Zone 4 80%-90% HRmax
- Zone 5 90%-100% HRmax

HRmax
220 minus age in years

Cardiorespiratory (Cardio) Aerobic fitness

Physical Stamina 有氧體能

measurement by specific procedure



BY calculation
maximum HR/resting HR x 15.3

150/60 x 15.3 =38.3

Estimate from apple watch data

- **VO2 max (ml/Kg/min):** 最大攝氧量
  VO2 max indicate the maximum amount of oxygen utilized during intense exercise.
- **Measure of Physical Capacity:**
  VO2 max is a great indicator of overall fitness, a gold standard of cardio fitness. It reflex how well your heart, lung and muscles work together.
- **Correlation with Longevity:**
  Strongly linked to longer lifespan and better health span.
- **Improvement with exercise:** Regular exercise can enhance VO2max levels. It does change overnight.

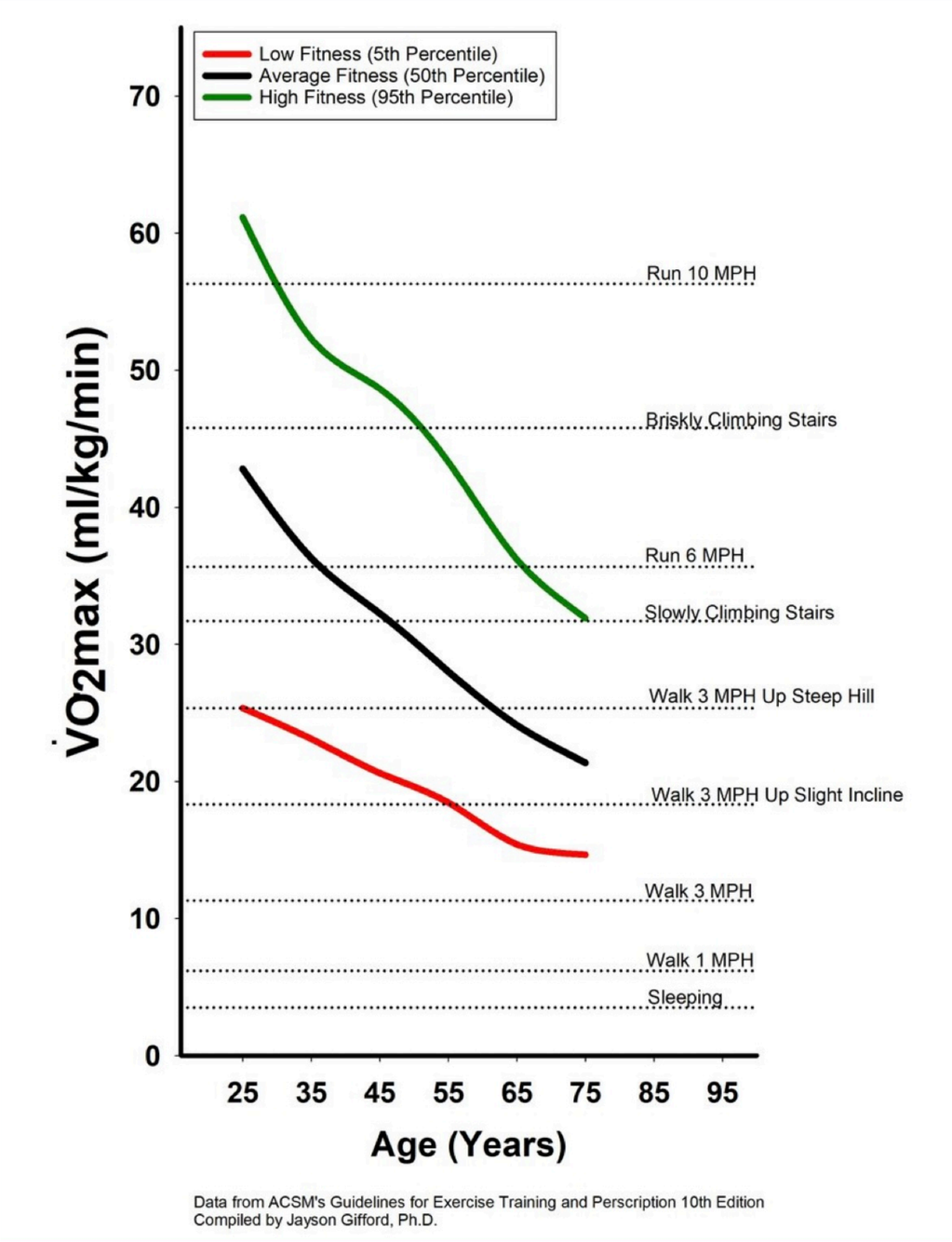
Figure 12. VO_2 Max by Age, Sex, Fitness

	Performance Group by VO_2 max (ml/kg/min)				
Age	**Low**	**Below Average**	**Above Average**	**High**	**Elite**
Women					
18-19	< 35	35-39	40-45	40-52	≥ 53
20-29	< 28	28-35	36-40	41-50	≥ 51
30-39	< 27	27-33	34-38	39-48	≥ 49
40-49	< 26	26-31	32-36	37-46	≥ 47
50-59	< 25	25-28	29-35	36-45	≥ 46
60-69	< 21	21-24	25-29	30-38	≥ 40
70-79	< 18	18-21	22-24	25-35	≥ 36
≥ 80	< 15	15-19	20-22	23-29	≥ 30
Men					
18-19	< 38	38-45	46-49	50-57	≥ 58
20-29	< 36	36-42	43-48	49-55	≥ 56
30-39	< 35	35-39	40-45	46-52	≥ 53
40-49	< 34	34-38	39-43	44-51	≥ 52
50-59	< 29	29-35	36-40	41-49	≥ 50
60-69	< 25	25-29	30-35	36-45	≥ 46
70-79	< 21	21-24	25-29	30-40	≥ 41
≥ 80	< 18	18-22	23-25	26-35	≥ 36

Group comparisons for VO_2 max are Low (bottom 25%), Below Average (26th to 50th percentile), Above Average (51st to 75th percentile), High (75th to 97.6th percentile), and Elite (top 2.3%).

Source: Mandsager et al. (2018).

Aging and VO2max



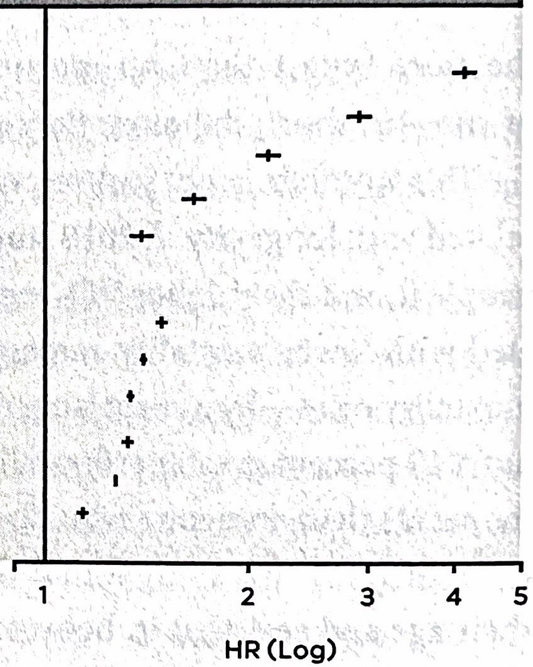
- **Huge gap in fitness** between top and bottom 5% of each age group
- **Steep decline with aging**, correspond to diminished functional capacity
- **Push for as high as possible** so you can maintain a high level of physical activity as you age.
- Set your goal and work on it today.
- **Increasing VO2Max not just how long you live but how well you live today and in the future.**
- **Once drop to below 18 in male and 15 in female, it been to threaten your ability to live independently.**

Cardiorespiratory Fitness and Mortality

Figure 9. Mortality Risk For Non-Elite Fitness and Select Comorbidities

Variable	HR (95%CI)*
Mortality risk relative to extreme fitness	
Least	4.09 (3.94-4.24)
Low	2.88 (2.78-2.99)
Moderate	2.13 (2.05-2.21)
Fit	1.66 (1.60-1.73)
High	1.39 (1.34-1.45)
Mortality risk of comorbidities	
Chronic Kidney Disease	1.49 (1.46-1.52)
Smoking	1.40 (1.39-1.42)
Diabetes	1.34 (1.33-1.36)
Cancer (all)	1.33 (1.30-1.35)
Cardiovascular Disease	1.28 (1.27-1.29)
Hypertension	1.14 (1.13-1.16)

*All *P* values <0.001



This table expresses all-cause mortality risk for different fitness levels compared to individuals in the top 2% of VO_2 max for their age and sex ("extreme fitness") [TOP] and for various comorbidities—that is, people with versus without each illness. [BOTTOM] Fitness groups are divided by percentile: Least (<20th percentile); Low (21st to 40th percentile); Moderate (41st to 60th percentile); Fit (61st to 80th percentile); High (81st to 97th percentile).

Source: Kokkinos et al. (2022).

"Cardiorespiratory fitness is inversely associated with long term mortality with no observed upper limit of benefit

"Being unfit carries a greater risk than any of the cardiac risk factors examined."

What is Strength Training

also known as

Resistance Training, Weight ?

It is a form of training that utilize body weight, weight, resistance bands, or machines to strength muscles

Strength Training, Resistance Training

- **Until recently, aerobic exercise was given the spotlight for improving health while resistance training was often omitted in global public health policy.**
- **Benefit of strength training:**
  1) Increase metabolic rate, burn more calories, not just while exercising even while sitting or sleeping.
  2) Improving metabolic health, with better weight management, decrease blood glucose , lower LDL-C, triglyceride, elevate HDL-C, decrease blood pressure.
  3) Good for joints and bones.
  4) Increase muscle mass, strengthen balance and flexibility, decreasing risk of personal injury.
  5) Reducing anxiety and depression.
  6**) Preventative Aging Diseases:** Critical for extending health span and preventing age-related diseases.
- **Current guidance lines** from HHS recommend 150 minutes every week on moderate intensity aerobic exercise and spending at least 2 days a week on muscle-strengthening activities.
- **Not just for looking good and being strong, but critical for preventing the disease of aging and extending health span.**

Strength Training 肌力訓練

weight training 2-3x per week

Prehab before Rehab

- **Maintain muscle mass at all cost, just as VO2max.**
- **Muscle mass begin to decline after age 30 at a rate of 1% per year. 3% per year after 65**, even more steeply after 75. 40% less at age 80.
- **Muscle strength 肌力 decline more quickly than muscle mass. Muscle power (strength x speed) decline 2-3x faster.** 肌力爆發力
  Strength training is retirement saving. We need to reach older age with enough reserve. Start young, let it accumulate and compound.
- **Sarcopenia** (Extreme form of muscle loss)肌少症 : 45% of older adults. leads to low energy, weakness, problem of balance and prone to falling. Increase in all cause of death and poor quality of life.
- **Short period of inactivity erases many of gains.**
  Prolong inactivity kicks off steep decline.
  10 days of bed rest lose 3.3 lb of muscle mass.
  Sedentary & excess caloric consumption replaces muscle with fat.

Strength and PowerTraining and Tests

- Train different muscle or muscle group with weight, resistant band or machine.
- Grip strength (Farmer's Carry), Rucking, Pulling motions(Rowing), Hip-hinging movements (squat)
- Any sports, tennis, ping pong, pickleball, golf… all are total body strength and power training.

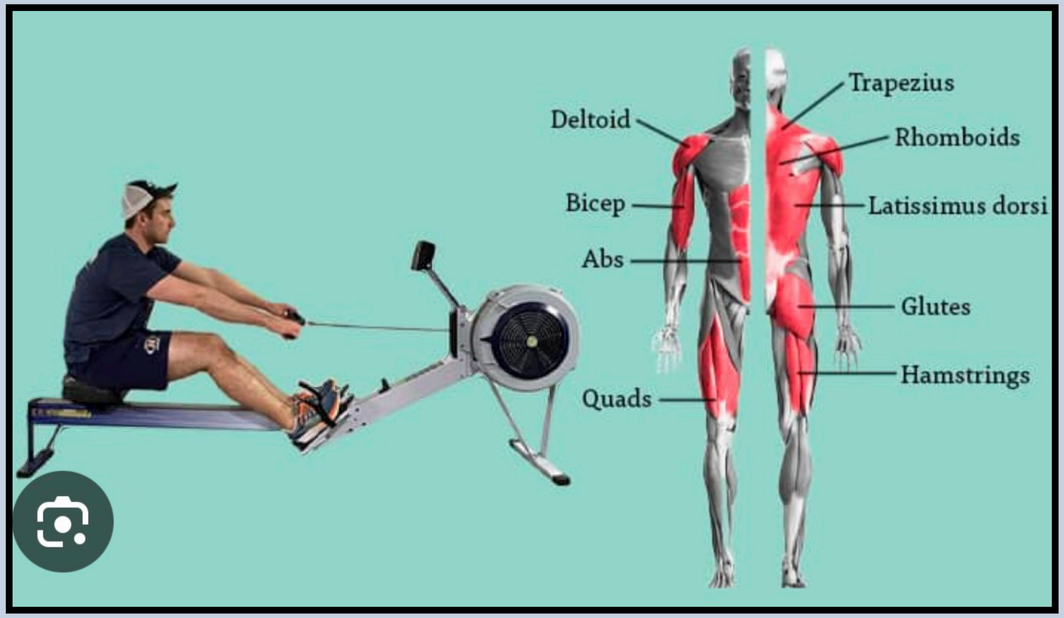
- Grip Strength is Proxy of Muscle Strength

- Lower body: 30 secs Sit to Stand test. For people over 65, male 12 , female 11

Farmer's Carry

Rucking

Asian Squat



Rowing

Squat

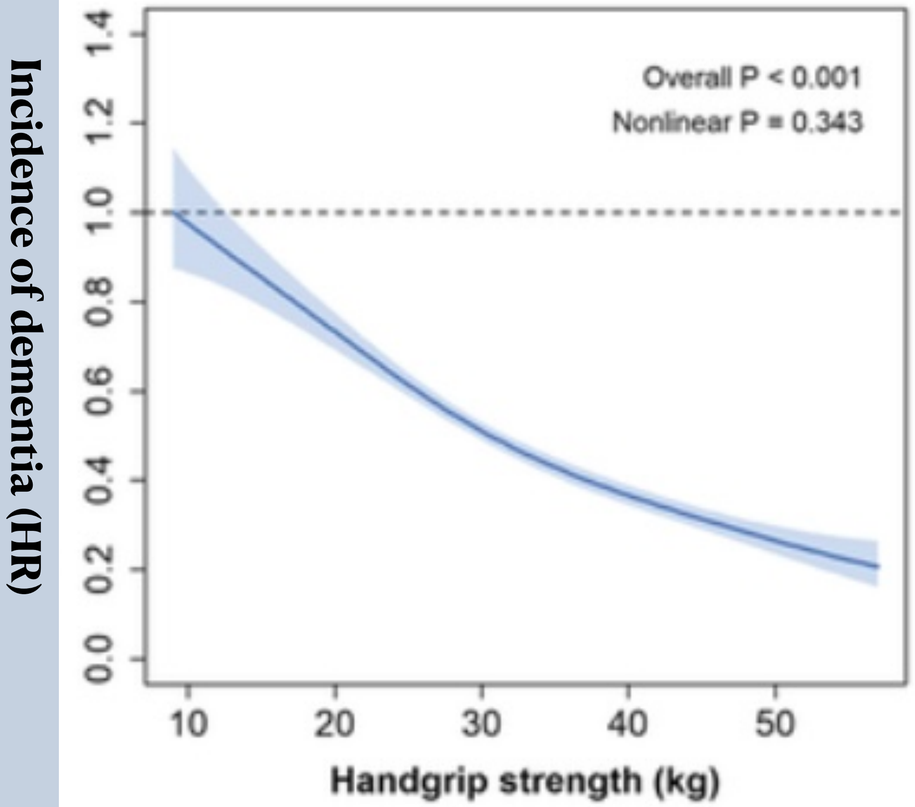
Sarcopenia 肌少症

Progressive loss of muscle mass and function.

- **Incidence**: affects about 5% -13% of people aged 60 to 70, and up to 50% of those 80 and older
- **NIH diagnostic Criteria:**
  1) **Grip Strength:** < 26 kg in males, < 16 kg in females
  2) **Gait Speed:** < 0.8m/sec. (1.7 miles/ hr)
- **Negative Impact on Quality of Life:**
  Muscle weakness, Loss of stamina, Difficulty performing daily activities, Walking slowly, Trouble climbing stairs, Poor balance and falls
- **Association with osteoporosis**
  Increases the risk of fracture with a fall
- **Prevention and Treatment:**
  1)Strength training
  2)Adequate protein intake

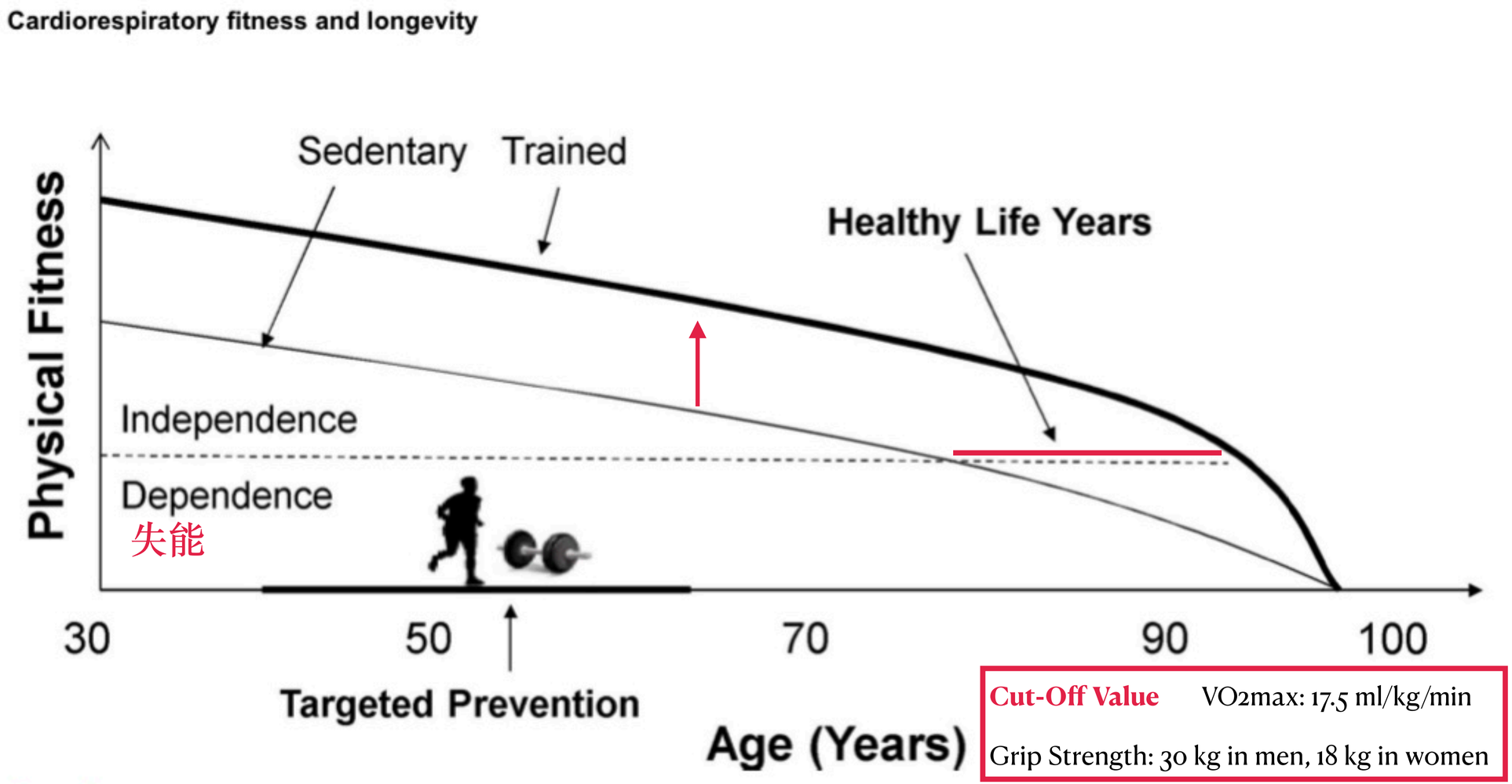
Association of Handgrip Strength with Dementia Incidence

The single most powerful item in our preventive tool kit is exercise



- The incidence of dementia declines with increasing handgrip strength.
- Someone with 40kg grip strength has about 40% as much risk of dementia as someone with 10 kg grip strength.

Physical Fitness and Healthy Life Years



Cut-Off Value VO2max: 17.5 ml/kg/min

Grip Strength: 30 kg in men, 18 kg in women

Figure 2. Hypothesis of physical fitness (cardiorespiratory fitness and muscle strength) on Healthy Life Years (disability-free life expectancy) in trained versus sedentary subjects. The dotted line represents the prognostic exercise capacity generally necessary for an independent lifestyle and associated with an increased risk for mortality. The cut-off values are: 17.5. ml/kg/min (5 METs) for aerobic capacity (28); 30 kg and 18 kg for grip strength in men and women aged over 65 years, respectively (42).

Bank Saving ,Cognitive Reserve, Physiological reserve

Money saved in the bank ($)

Cognitive reserve stored in the brain(Synapsis)

Physiological reserve cardiopulmonary fitness and strength

The younger you start the better

The more you build the better

Financial Health for a Comfortable Life

Cognitive Health for a Meaningful and Dignified Life

Independent and Active life


NUTRITION

Nutrition

- **Most people think too little or too much about this topic.**
- **Every one is different.**
- **Nutritional intervention to correct a serious metabolic problem is different from nutritional plan calibrated to maintain good health.**
- **Finding the best mix of macronutrients for your health status** and come up with a eating pattern that help to reach the goal in a way you can sustain.
  “The best diet is the one you can stick to”
- **Nutritional intervention can be powerful tools to restore metabolic health and reduce risks of chronic disease, but cannot extend life span and health span like exercise does.**

Nutritional Biochemistry

- **Are you over-nourished or under-nourished?**
- **Are you under muscled or adequately muscled?**
- **Are you metabolically healthy?**

Over-nourished Under-muscled	Over-nourished Adequately muscled
Under-nourished Under-muscled	Under-nourished Adequately muscled

Strategy and tactics inform by which box you fall into

Most common problem: ***over nourished, under muscled. poor metabolic health,***

Answer: ***decrease calorie while increase protein intake and pair with proper exercise.***

Body Composition Scan

InBody [InBody570]

SEE WHAT YOU'RE MADE OF

ID	Height	Age	Gender	Test Date / Time
John Doe	6 ft 01.7 in	23	Male	05.24.2020 08:08

Body Composition Analysis

	Values	Total Body Water	Lean Body Mass	Weight
Intracellular Water (lb)	75.6	120.1	164.4	183.1
Extracellular Water (lb)	44.5			
Dry Lean Mass (lb)	44.3			
Body Fat Mass (lb)	18.7			

Muscle-Fat Analysis

Weight	(lb)	183.1
SMM (Skeletal Muscle Mass)	(lb)	94.4
Body Fat Mass	(lb)	18.7

Obesity Analysis

BMI (Body Mass Index)	(kg/m²)	23.7
PBF (Percent Body Fat)	(%)	10.2

Segmental Lean Analysis

Right Arm	(lb)	9.59
	(%)	116.2
Left Arm	(lb)	9.57
	(%)	116.0
Trunk	(lb)	71.4
	(%)	108.4
Right Leg	(lb)	25.77
	(%)	112.3
Left Leg	(lb)	25.46
	(%)	111.0

ECW/TBW Analysis

ECW/TBW	0.371

Body Composition History

		03.14.20	03.26.20	04.09.20	04.16.20	04.23.20	04.30.20	05.08.20	05.24.20
Weight	(lb)	182.5	181.8	184.2	183.2	183.2	182.1	182.5	183.1
SMM (Skeletal Muscle Mass)	(lb)	88.5	89.1	91.9	91.3	92.4	92.4	91.3	94.4
PBF (Percent Body Fat)	(%)	14.3	14.0	12.7	13.2	12.1	11.7	12.5	10.2
ECW/TBW		0.372	0.373	0.371	0.370	0.371	0.370	0.372	0.371

Recent Total

Body Fat - Lean Body Mass Control

Body Fat Mass	-	0.0 lb
Lean Body Mass	+	0.0 lb

(+) means to gain fat/lean (-) means to lose fat/lean

Segmental Fat Analysis

Right Arm	0.4 lb	28.8%
Left Arm	0.4 lb	30.3%
Trunk	9.5 lb	88.6%
Right Leg	2.9 lb	65.7%
Left Leg	2.9 lb	64.9%

Basal Metabolic Rate

1982 kcal

Visceral Fat Level

Level 3 | Low 10 High

Results Interpretation

Obesity Analysis
BMI is an index used to determine obesity by using height and weight. PBF is the percentage of body fat compared to body weight.

Segmental Lean Analysis
Evaluates whether the muscles are adequately developed in the body. In each segment, the top bar shows the comparison of muscle mass to ideal weight and the bottom bar shows that of the current weight.

Body Water Analysis
ECW/TBW is the ratio of Extracellular Water to Total Body Water, which is an important indicator whether the body water is balanced.

Visceral Fat Level
Visceral Fat Level is an indicator based on the estimated amount of fat surrounding internal organs in the abdomen. Maintain a Visceral Fat Level under 10 to stay healthy.

Results Interpretation QR Code
Scan the QR Code to see results interpretation in more detail.

Impedance

		RA	LA	TR	RL	LL
Z(Ω)	5kHz	309.0	308.9	23.4	266.1	272.3
	50kHz	288.2	268.6	18.3	230.2	235.3
	500kHz	228.1	229.6	14.1	198.4	201.6

- Limit of BMI:
  Weight in Kg/height in meter squared.
  People may be light but have more fat and little muscle, People may be heavy but big muscle mass and little fat.
- More accurate body composition tests.
  1) MRI scan
  2)DEXA scan: dual-energy Xray absorptiometry.
  3)InBody scan

Talking About Nutrition Two Things Matter the Most

- **1) Calorie Balance or Not?**
  How many calories are you getting? How many calories are you burning?
  Total calorie intake is more critical than the type of calories consumed,
  A balanced diet with appropriate calorie intake is generally better than over consumption, even with healthier foods.
  Overeating is more likely with highly processed, low nutrient, and high-caloric foods.

- **2) Are you getting enough protein?**
  Adequate protein intake is essential for maintaining muscle mass and preventing sarcopenia and osteopenia, significant concerns of old age.
  Increasing protein intake can help people feel fuller and decrease total calorie consumption.

How to Find the right Eating Pattern

- **Three strategies to eat less:**
  1) CR (Calorie Restriction) : eating less total calorie.
  2) DR (Diet Restriction): eating less of a certain food(Low carb diet, Ketogenic diet…)
  3) TR (Time Restriction): eating restricted to certain time (intermittent fasting……)

- **CR**: Ample animal studies to support.
  Story of " Luigi Cornaro "
  Benefit from DR and TR are mostly from CR.

TR (Time Restricted Diet)

The Case For and Against Fasting

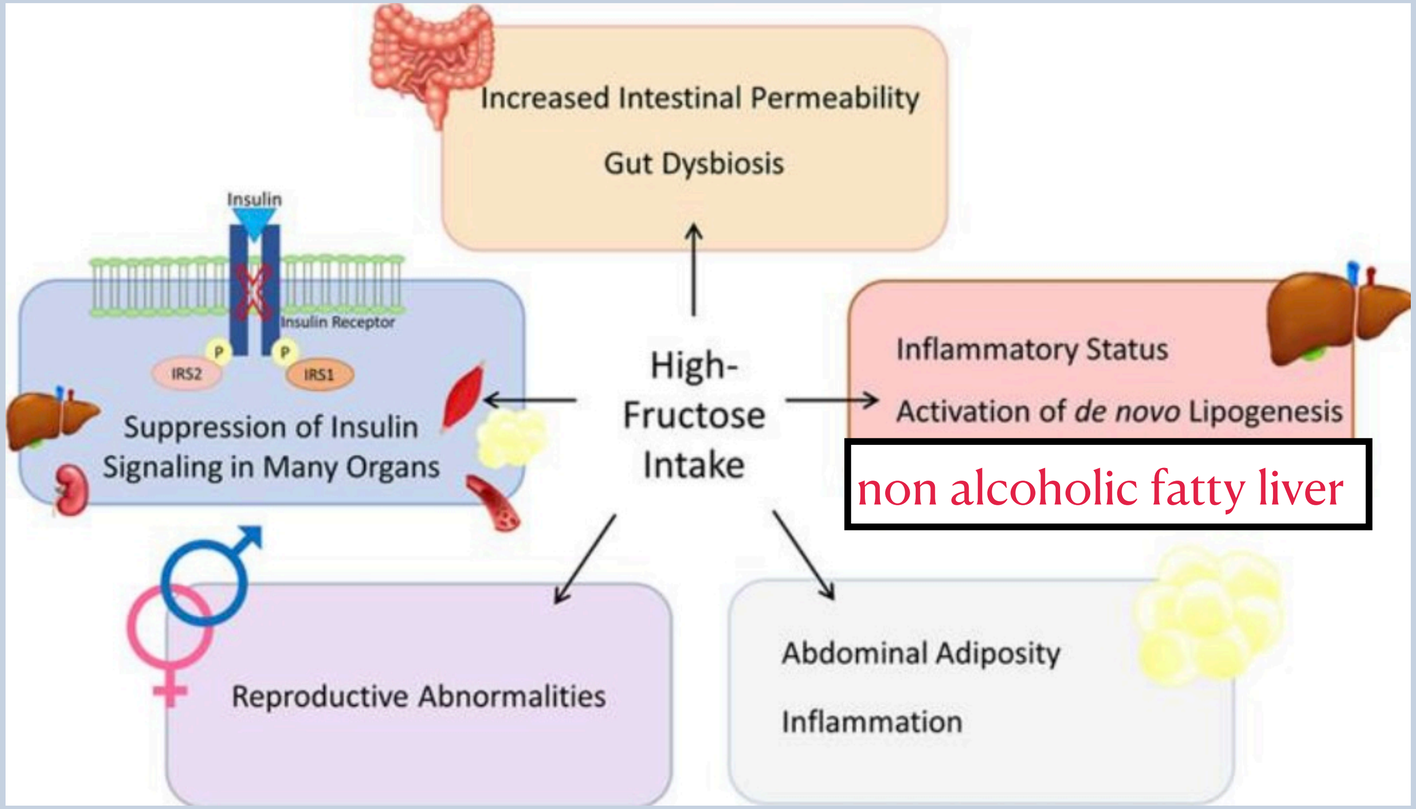
- **Pros:**
  Increase Autophagy: Promotes cellular clean up and renewal.
  Inhibition of mTOR (the pro-growth and pro-aging pathway): May contribute to longevity and reduced disease risk.
- **Cons:**
  Miss protein target (the undernourished, under muscled, should not do).
  Unhealthy Eating Cycles: Potential to indulge in unhealthy food during the eating windows. May end up loosing muscle and gain fat.
- **Skepticism:** Effectiveness of intermittent fasting is still debated.
  8 a.m. to 2 p.m. feeding window is most promising.

Mediterranean Diet

- **Emphasis on Plant-Based Foods:** The diet is rich in fruit, vegetable, whole grain, legumes, nuts, and seed.
- **Healthy Fat:** Olive oil is the primary source of fat, replacing other fats and oils.
- **Moderate Protein:** Fish and sea food are consumed at least once a week. Poultry, eggs, cheese, and yogurt are eaten in moderation.
- **Limited Red Meat.**
- **Minimal Processed Foods and Sugar.**
- **Wine in Moderation.**

Fructose

Not all calorie are the same, fructose is the worst



People with insulin resistance or high risk should watch fructose intake including fruits

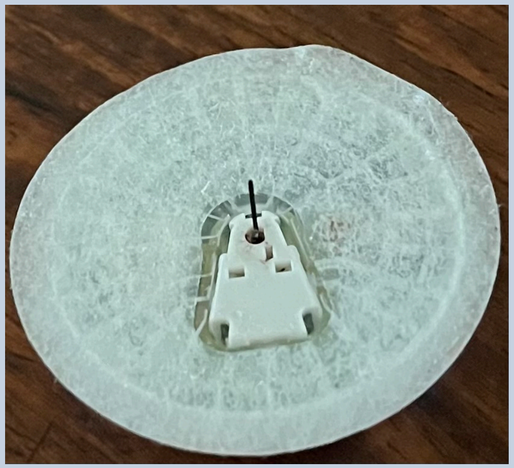
- **Long ago:** when we consumed fructose mainly in the form of fruit and honey, aiding in energy storage for cold winter and scarcity. Fructose was our friend.
- **Present:** overabundant of fructose in diets from processed foods. Much are in liquid forms (soft drinks, bottled salad dressing, flavored yogurt).
- **Health Impact:** Overconsumption linked to disruption in metabolism and a global increase in metabolic disorders.

Carbohydrate

- **Energy Source:** Primary source of energy for the body.
- **Health Risks:** Excessive consumption can lead to obesity, metabolic syndrome and all four chronic diseases of aging(CVD, DM, CA, AD).
- **Monitoring:** In addition to conventional tests fasting blood sugar, HbA1c , **GTT** measures glucose tolerance and insulin level.
  CGM (Continuous Glucose Monitor) to monitor each person's blood glucose response to specific food in real time and and make changes rapidly to flatten the curve.

CGM (Continuous Glucose Monitor)
持續血糖監測儀器

Glucose Levels Management



- **Learning Phase:** Understand how different food, exercise, sleep and stress affect glucose levels.
- **Findings:**
  1) The more refined the carb, the faster and higher the glucose spike.
  2) Rice(including brown rice) and oatmeal are surprisingly glycemic.
  3) Timing, duration, and intensity of exercise matter a lot.
  4) A good versus bad night sleep makes a world of difference in terms of glucose control.
  5) Stress has surprising impact on blood glucose.
  6) Non starchy veggies have virtually no impact on blood sugar.
  7) Foods high in protein and fat have virtually no effect on blood sugar.
- **Recommendations: All adults, not just those with diabetes, may benefit from using Continuous Glucose Monitoring (CGM) for a few weeks.**

PROTEIN CONTENT OF COMMON FOODS

	Portion Size	Grams of Protein
Meats, Poultry, and Fish		
Beef/Turkey Jerky	1 oz dried	10-15
Beef, Chicken, Turkey, Pork, Lamb	1 oz	7
Fish, Tuna Fish	1 oz	7
Imitation Crab Meat	1 oz	3
Seafood (Crabmeat, Shrimp, Lobster)	1 oz	6
Egg	1	6
Soy and Vegetable Protein		
Soy milk	8 oz	7
Edamame, fresh or frozen	½ cup	8
Edamame, dry roasted	1 oz	13
Tofu	1 oz	3
Legumes and Nuts		
Lentils	½ cup	9
Lima beans	½ cup	7
Kidney, Black, Navy, Cannellini beans	½ cup	8
Refried beans	½ cup	6
Hummus	⅓ cup	7
Chili with beans, drained	½ cup	10
Peanut butter	2 Tbsp	7
Nuts	1 oz (¼ cup)	4-6
Sunflower seeds	1 oz	5
Almond milk	8 oz	1
Milk and Dairy		
Milk, skim or 1%	8 oz	8
High protein ultra-filtered milk, fat free or 1%	8 oz	13
Yogurt, fat free, light	6 oz	5
Greek yogurt, plain, nonfat, light	5 oz	12-18
Cheese, hard (low fat)	1 oz	7
American cheese (low fat)	1 slice (0.7oz)	5
Cottage cheese, Ricotta (part skim)	½ cup	14
Sugar free pudding, made with milk	½ cup	4

Protein

- **Functions:**
  Build muscle, produce enzymes and hormones.
- **RDA (Recommended Dietary Allowance):** 0.8gm per kilogram of body weight. Which is minimal to stay alive not to thrive.
- **Higher Recommendation:** 1.6 grams per kilogram (Attia)or more, varies by sex, age, activity levels and renal function **.**
  As you age your requirements go up due to anabolic resistance.
  Divide the total protein into four servings, ideally within 30 minutes to an hour after exercise, provides the best benefit.
- **Tracking:** Older adults should monitor lean body mass using specific tools , body-composition measuring scale or DEXA scan.
- **Booster Protein Intake:** slow the progression of muscle mass loss in seniors.
- **Protein also increase satiety and decrease overall calorie intake overall.**

Fat

- **Carbohydrate is the primary source of fuel.**
  Protein is the building blocks. Fats are both.
  Fat is provides as fuel and building blocks for hormone and cell membranes.
- **Metabolic Balance:** Eating the right mix is essential to maintain metabolic balance, health of brain and leaving one more satisfied especially along with protein.
- **Type of fats and recommendation:**
  1) Monounsaturated Fats (MUFA) : Found in olive oil, canola oil, avocado, and most nuts. 50 -55%.
  2) Saturated Fat (SFA): Found in butter, lard, animal products, less healthy when consumed in excess. 15-20%
  3) Polyunsaturated Fat (PUFA): Found in fatty fish, walnuts, flax seeds, sunflower oil, corn oil, sunflower oil. 25-35%
  Omega -3 : Found in fish and flaxseeds, chia seeds , walnuts. Important to cardiovascular and brain health.
  Omega- 6 : Found in vegetable oils. Good in moderation.
  4)Trans Fats: Found in many processed food, like baked goods, snacks, fried foods. Very Bad, Cut Out.
- **Unless you are eating a lot of fatty fish, you should almost always need to take EPA and DHA supplement. Attia takes EPA and DHA supplements.**
  Attia aims to have the RBC membrane composed of 8-12% of EPA and DHA.
- **In high risk people monitor closely Lipid panel, especially apoB level.**

Peter Attia's Diet

- **Combination of CR,DR and TR:**
  Incorporate Calorie Restriction, Dietary Restriction, and Time Restriction.
- **Meal Time Guidance:**
  Coffee with milk in the morning,
  Lunch at 12noon -2pm ,
  Dinner 6pm .
  Restrict total calories intake.
  Avoid processed food and sugary drink.
  Minimal alcohol consumption.
  Supplement with protein drinks and venison meat jerky.
  Include EPA and DHA supplements.
- **General Dietary Advise:**
  Diet is not Attia's favorite topic to discuss.
  Eat only real food. Avoid processed foods.
  Ensure plenty of fiber intake. Consume enough protein.

Sleep

How to Learn to Love Sleep, the Best Medicine for Your Brain

- **Benefits of Good sleep:**
  Essential for overall health
  Enhance performance
  Long-term positive effects on health span.
- **Consequences of Sleep Deprivation:**
  Insulin resistance, decrease capacity for glucose disposal .
  Increase in triglyceride. Decrease in testosterone.
  Metabolic dysfunction and increase risk of chronic diseases associated with aging.
  Stress is the missing link.
- **Key Points:**
  Good quality sleep is essential to brain health.
  REM sleep and memory consolidation are vital. Amyloid clearance occurs during deep sleep.
  Important for maintaining good cognitive health and decrease risk of Alzheimer's.
  Every thing in the human body worsens with sleep deprivation.

How to Improve Your Sleep

- **Exercise:** Engage in physical activity during the day, but avoid exercising within 3 hours of bedtime
- **Meals:** Avoid eating anything within 3 hours of bedtime. No alcohol.
- **Electronics:** Abstain from stimulating electronics , 2 hours before bed.
- **Create a Sleep-Friendly Environment:** Ensure your room is cool and dark
- **Prioritize Sleep:** Give yourself enough time to sleep each night.
- **Sleeping Routine:** Maintain the same sleep and wake-up time.
- **Relaxation Techniques :** Consider meditation and supplements like ashwagandha to help relax.

Mental, Emotional Health

- **Importance of Happiness:** Living a happy, fulfilled life can boost your immune system, reduce stress, lower the risk of chronic diseases , positively influence health span.
- **Impact of Misery and Unhappiness:** These can destroy health just as severely as cancer, heart disease, T2DM and neurodegenerative diseases.
- **Surgeon General ,Vivek Murthy:** Loneliness is the worst epidemic problem and is linked to much higher mortality.
- **Harvard Study on Adult Development:** Started in 1938, this study highlights the importance of feeling connected and having healthy relationships for happiness and optional mental and physical health.
- **Other Contributing Factors of Happiness:**
  Savor leisure, Laugh often, Nature gratitude, Practice forgiveness, Practice random acts of kindness, Find and use your inner strength, Hang around people with positive thinking.
- Peter Attia's personal journey of fighting emotional problem from abuse from childhood abuse.
  Trauma vs Adversity: Set back can be net positive. Not the event of childhood trauma itself but how the child adapt to it. It may produce resilient and adaptive children.

Thinking Tactics

Absorb what's useful, discard what's useless, and add what's special for you

A | M

Attia Medical
Austin, Texas

thedrive
PETER ATTIA

The Peter Attia Drive Podcast

Early ★

HoagCompass *since April 2022*

- **Rely heavily on data:**
  1) **Static biomarkers**: Routine blood tests. Lipid Panel, ApoB, Lp(a), *APOE* genotype, Fasting blood sugar, HbA1c, Homocysteine , Thyroid test, Liver function test, Vitamin D, Iron & Ferritin, Omega 3 index.
  2) **Dynamic biomarker** : GTT, Insulin Level, CGM.....
  3) **Anthropometric measures人體測量 :** body composition, visceral adipose tissue, bone density. lean body mass.
- **Three Key Questions for New Patients:**
  1) Are they over nourished or undernourished ?
  2) Are they adequately muscled or under muscled?
  3) Are they metabolically healthy or not?
- **Create a Personal Playbook:**
  Encourage patients to take responsibility for their health.
  Guide them to change habits and achieve their goal using the best available science.

What’s Biological Age ?

How to Test It?

Chronological Age : 實際年齡

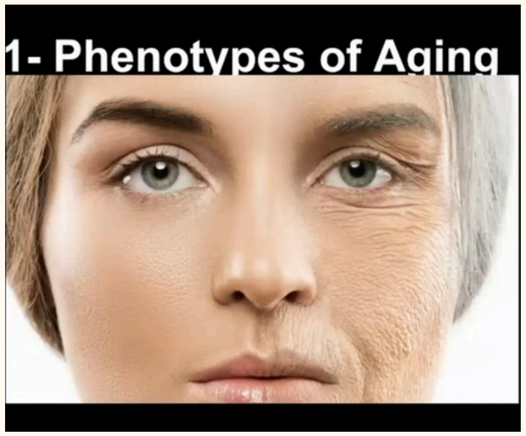
The number of years one has lived.

Biological age: 生理年齡

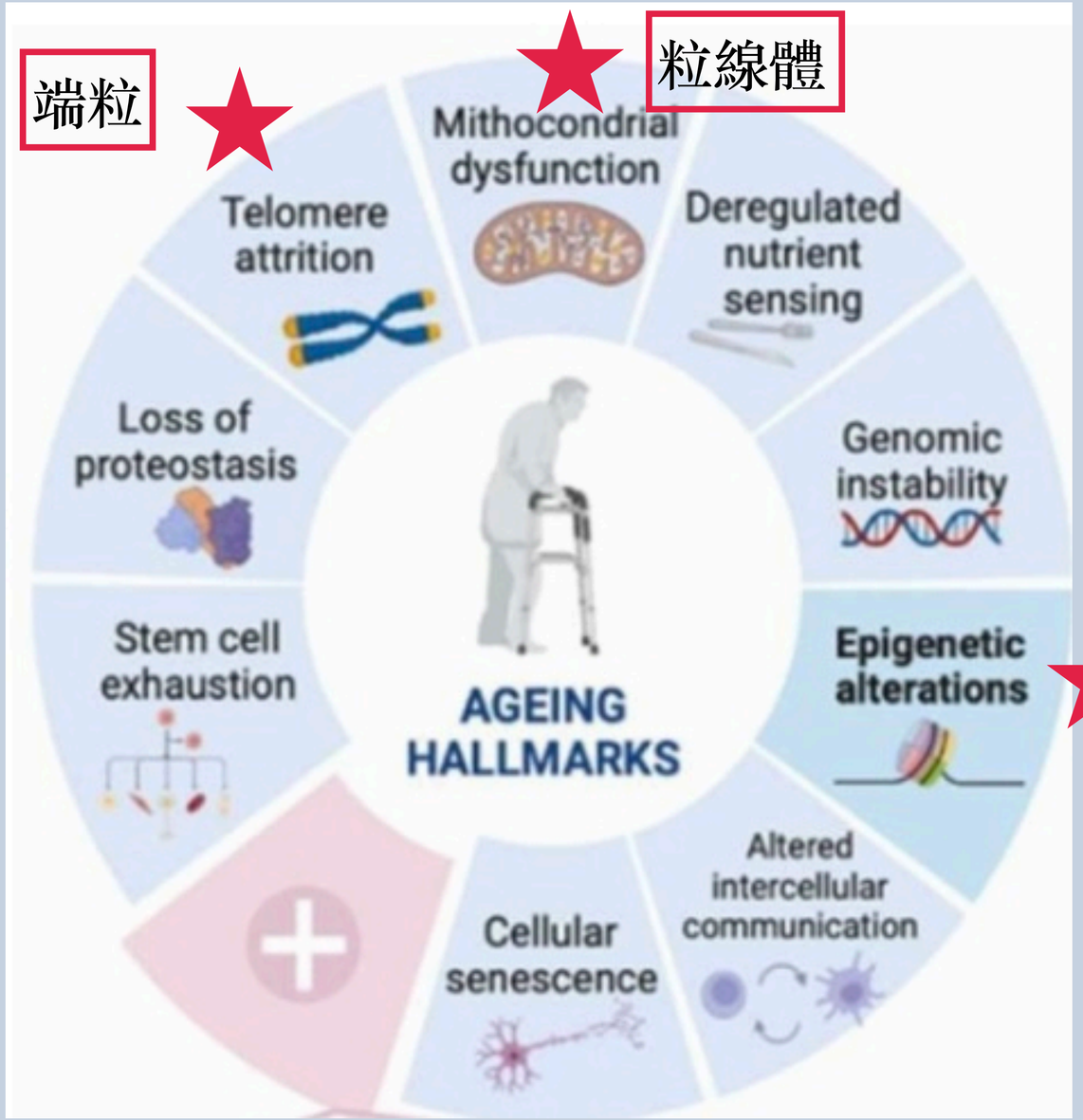
An estimate of one’s age based on various biomarkers that assess your physical and functional state, reflecting how well or poorly the body is aging.

Phenotypic biomarkers

Phenotypic biomarkers	Physical function and anthropometry	Walking speed, chair stand, standing balance, grip strength, muscle mass	Decrease
		Body mass index, waist circumference	Increase
	Facial features	Mouth width	Increase
		Nose width	Increase
		Mouth-nose distance	Increase
		Eye corner slope	Decrease



The Nine Hallmarks of Aging



表觀基因

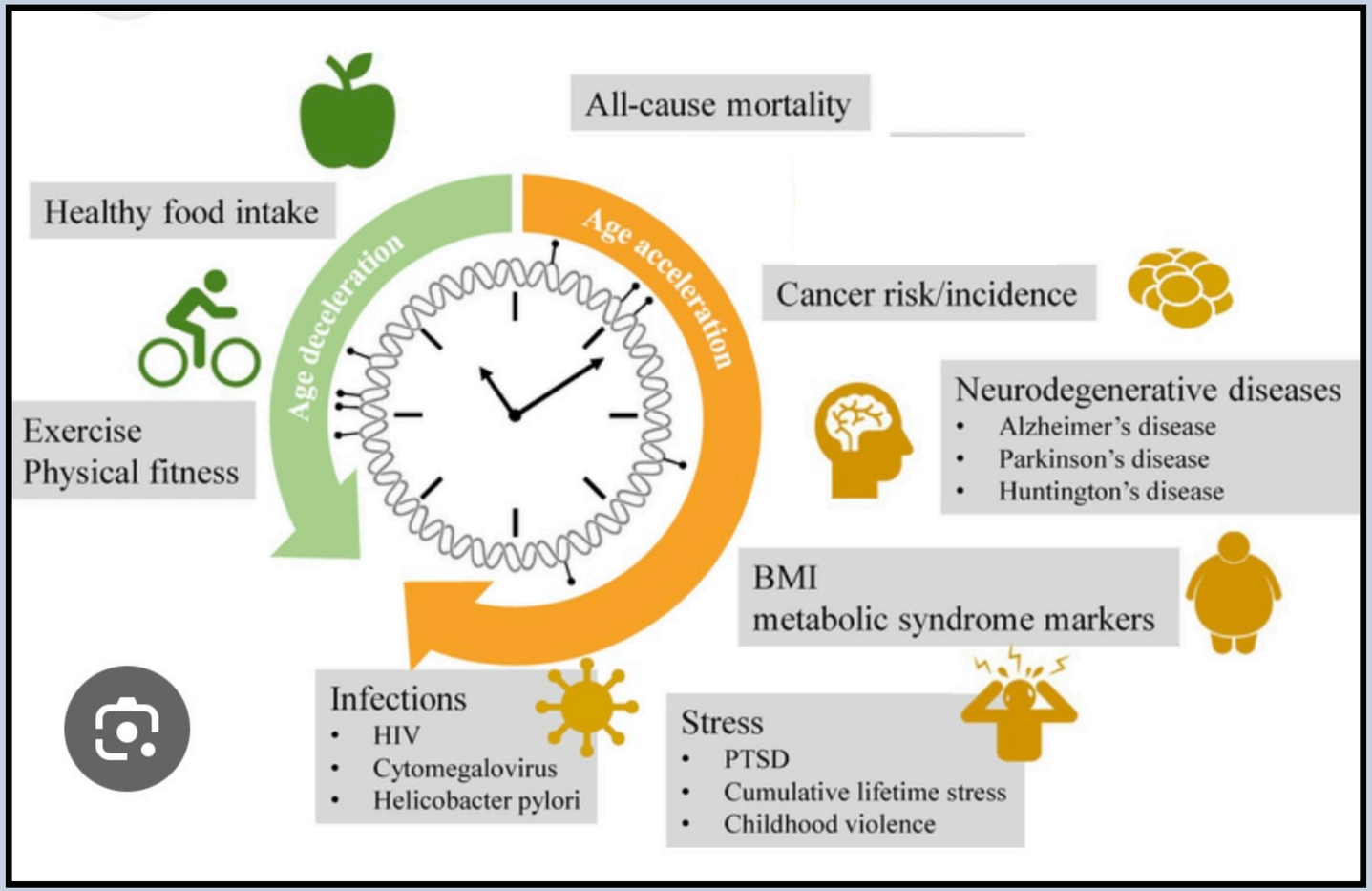
Molecular biomarker

	Biomarker Category	Biomarker Subcategory	Biomarker	Trend with age	Specie
Molecular biomarkers	DNA and chromosome	Telomere	Leukocyte telomere length	Decrease	Huma
		DNA repair	γ-H2A.X immunohistochemistry	Increase	Huma
		Epigenetic modification	DNA methylation	Global hypomethylation and local hypermethylation	Huma

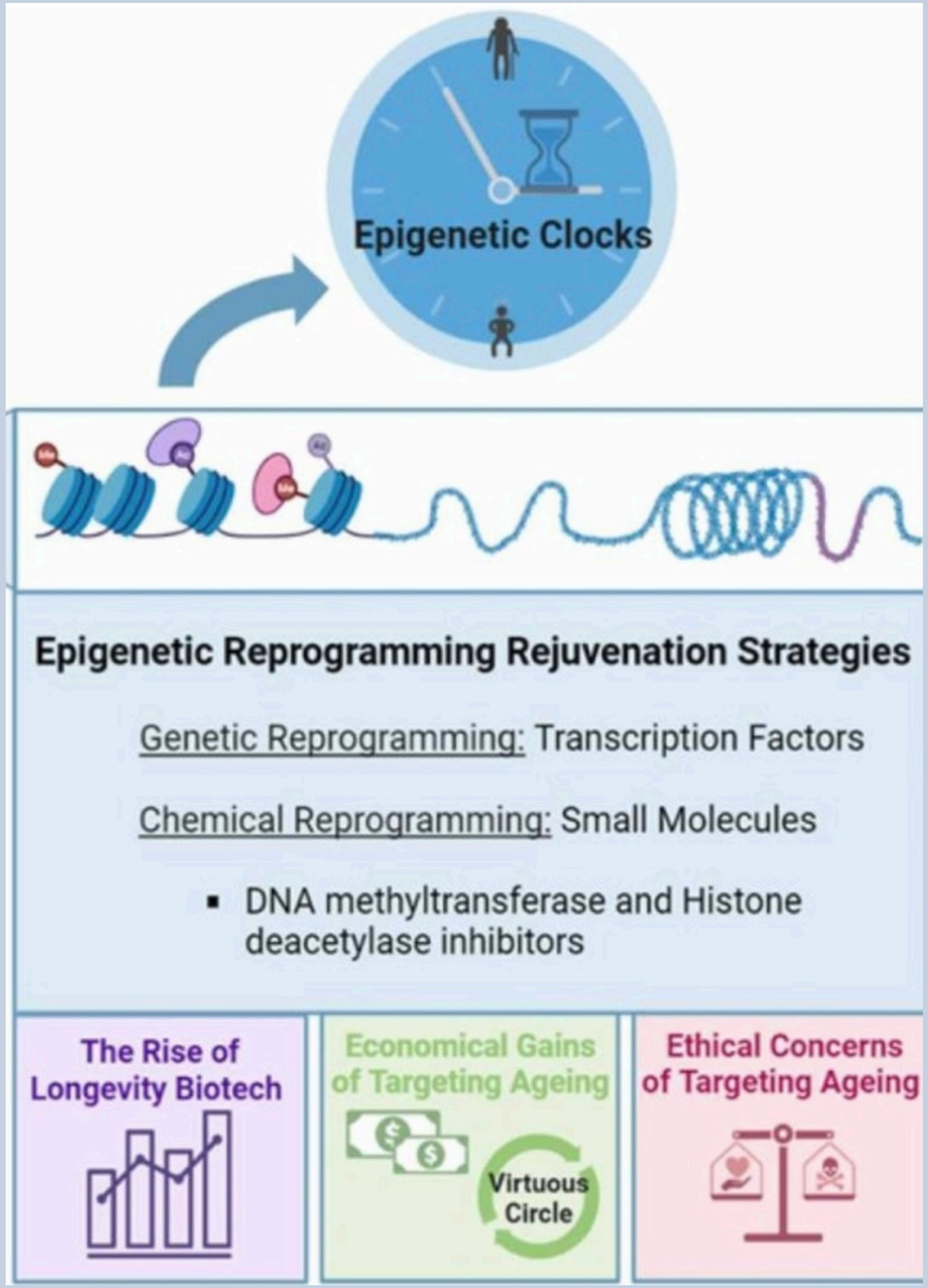
★

Epigenetic Clock (an age estimation method based on 353 epigenetic markers measuring DNA methylation) Horvath Clock

The epigenetic clock as a biological age predictor
表觀生理時鐘



- **DNA Methylation Test:** measures the accumulation of methyl groups on DNA molecules.
- **Developed by Steve Horvath :** Created at UCLA in 2011. also known as Horvath Clock.
- **Commercial Availability:** Many tests of this kind are available commercially.
- **Validity:** The validity of these tests is debatable.



- **Epigenetic modifications:** Changes in gene expression without altering the DNA sequence.
- **DNA methylation-based epigenetic clocks** are essential tools in longevity research
- **Transcription factors** : Factors that can induce cellular age reversal through epigenetic reprograming
- **Complete reprogramming:(修改)** Converting mature cells to stem cells. **Partial reprogramming:** Convert mature cells to younger cells.
- **longevity biotech industry:** The growing field focuses on extending healthy life span through biotechnological advancements.

Takeaways

Longevity

- *Living Longer and Better*: Longevity means living longer and better. It's more **malleable** than we think.
- *Health Span Focus:* Focus on improving health span, and life span will follow.

Strategy:

Understand Key Health Risks:

- *Major Conditions:* ASCVD, Cancer, T2DM, Neurodegenerative Diseases.
- *Early Onset:* These conditions start long before they manifest.
- *Late Detection*: Current medicine often detects risks too late for early preventative actions.

Early Aggressive Prevention :

- *Metabolic Dysfunction:* **Preventing metabolic dysfunction is the corner stone to longevity. Early and aggressive prevention is crucial.**
- ***Body Composition:*** Body composition is a better evaluation of metabolic health than BMI.

- ***ApoB** Testing:* ApoB is a better risk indicator for ASCVD and should be included in lipid panel tests.
- *Insulin Resistance Detection:* GTT and **insulin level** should be used to detect early insulin resistance, in addition to fasting BS and HbA1c. **CGM** can help diet planning of non diabetics.
- *Cancer Detection:* More aggressive and early screening.
  MRI scan and Liquid biopsy may serve as another tool for early detection in certain cancers.

Tactics:

Exercise: The Most Powerful Medicine for Longevity

- *Powerful Medicine*: Exercise is the most powerful medicine for longevity.
- *Cardio and HIIT:* Zone 2 cardio exercise with HIIT increase **VO2max**, a proxy for longevity.
- *Strength and Stability:* Strength and stability training build muscle mass and strength for an active, independent life in old age and prevent falls.
- ***Physical fitness:*** Physical fitness influences longevity more than any chronic disease.

Nutrition

- *Metabolic Health:* Nutritional interventions can restore metabolic health and reduce chronic disease risks but cannot extend life span and health span like exercise.

- *Key Interventions:* Key dietary interventions include **energy balance** and **sufficient protein** to build muscle to prevent sarcopenia with aging. Avoid excessive fructose consumption.

Sleep and Emotional Health:

- *The other two pillars of longevity*: ***Good quality sleep, emotional health*** are important pillars of longevity.

Supplements and Anti-Aging Medications:

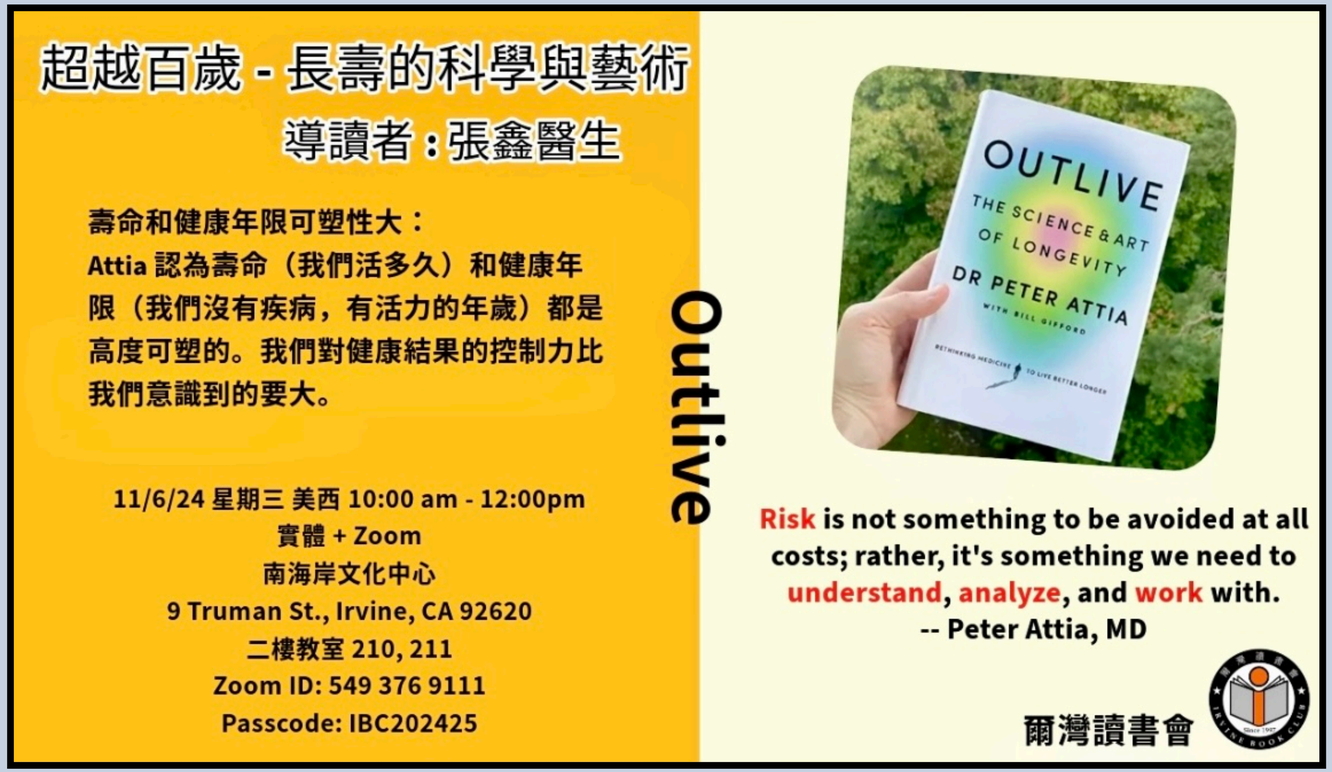
- *Hopeful Treatments*: *Rapamycin, Metformin* and other supplements are controversial but hopeful.

Future Breakthroughs:

- *There is possibility of breakthroughs in epigenetic reprogramming* to extend human life span in the future.

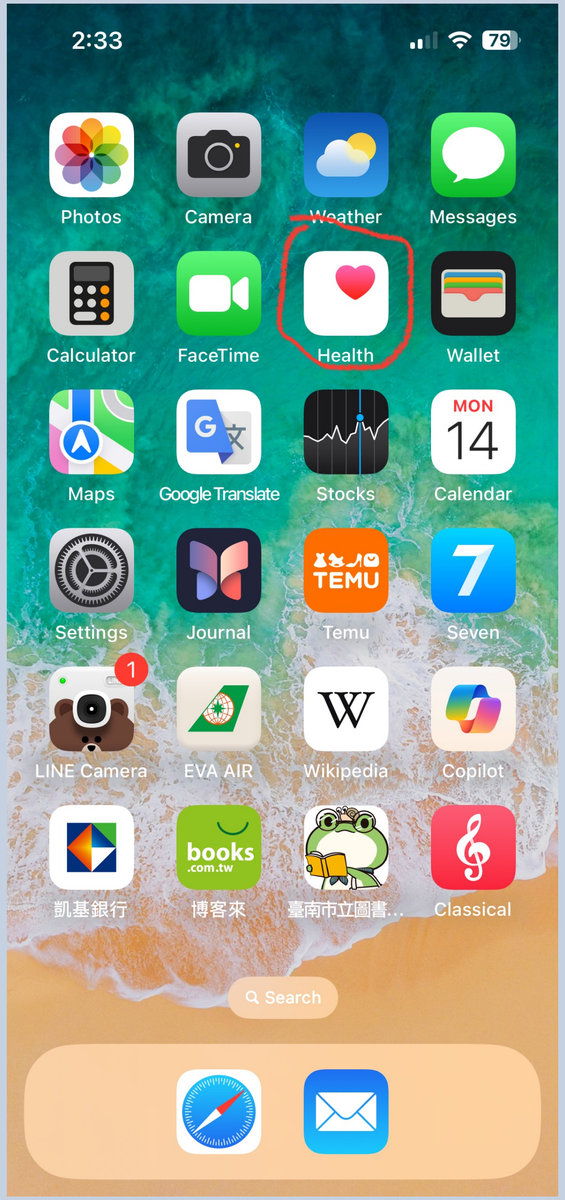
Biggest Takeaway:

It is never too late, Sure, it would've been ideal to have exercised more, eat healthier and been more diligent monitoring your health years ago, but today is the next best day to start. Our inherited genes play a role, it is a consideration they don't determine our fate. We have significant control over our life span and heath span, enabling us to defy society's expectations of old age. ***To Outlive.***



Chauffeur Knowledge vs. True Knowledge

- Charlie Munger shared a humorous story at USC Law School Commencement in 2007.
- Max Planck, after he won Nobel Prize (Physics, 1918), went around Germany giving the same standard lecture on the new quantum mechanics.
- Over time , his chauffeur memorized the lecture and said “Would you mind, Professor Plank, because it’s so boring to stay in our routine, What if I gave the lecture in Munich and you just sat in front wearing my chauffeurs hat?”
- Plank said “ Why not?”
- .....
- Having “chauffeur knowledge “ can be a good place to start, but then you need to dig in deeper and build foundation to really understand and build a workable plan for yourself.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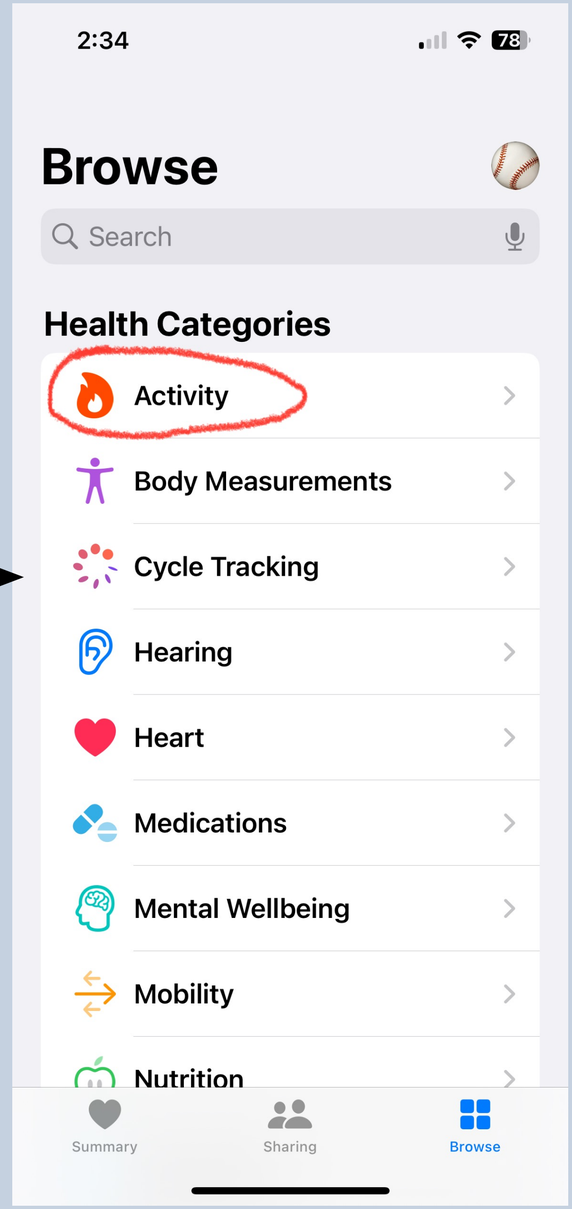
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Medications
Mental Wellbeing
Mobility
Nutrition
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Sharing
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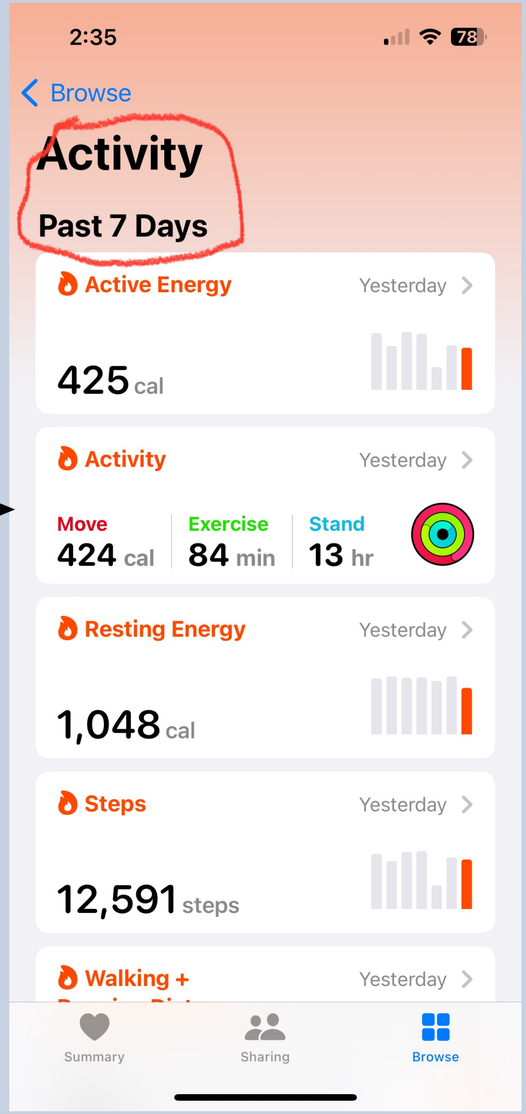
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Activity
Past 7 Days
Active Energy
Yesterday
425 cal
Activity
Yesterday
Move
424 cal
Exercise
84 min
Stand
13 hr
Resting Energy
Yesterday
1,048 cal
Steps
Yesterday
12,591 steps
Walking +
Yesterday
Summary
Sharing
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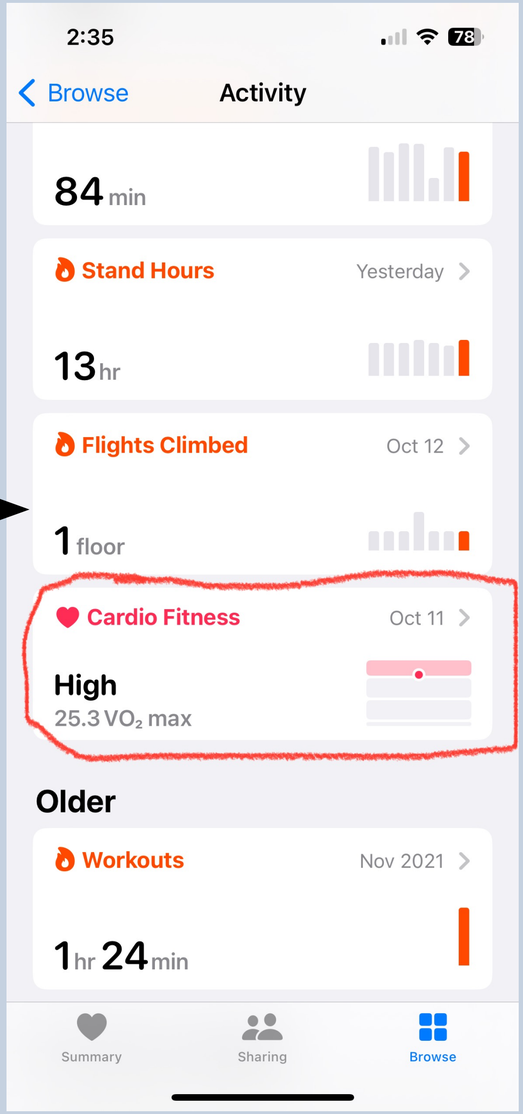
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Activity
84 min
Stand Hours
Yesterday
13 hr
Flights Climbed
Oct 12
1 floor
Cardio Fitness
Oct 11
High
25.3 VO₂ max
Older
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Nov 2021
1 hr 24 min
Summary
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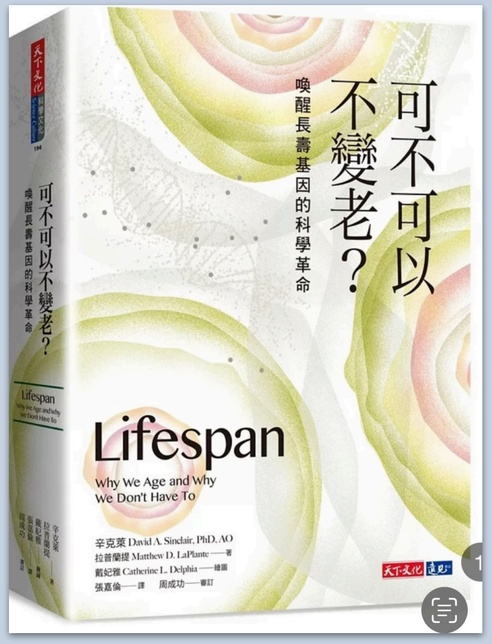
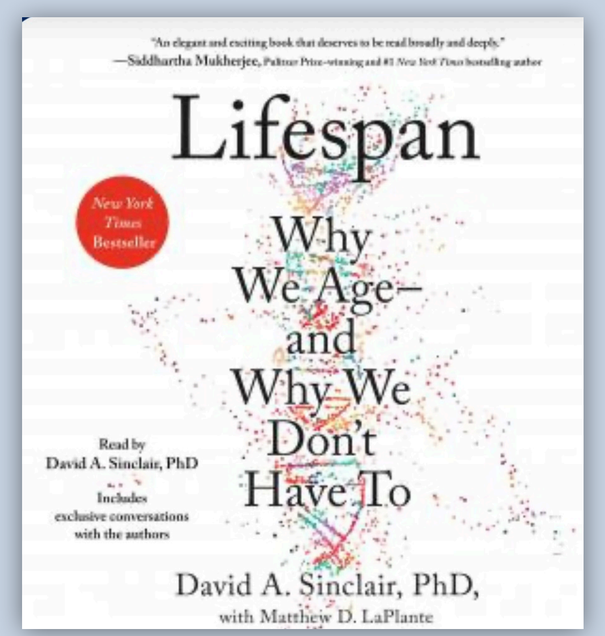




Professional Background:

Australian-American Biologist

Professor of genetics at Harvard Medical School.

Controversial Claims:

Aging and epigenetic reprograming

“Can a pill keep the aging away? “

“A cure for aging”

“Reverse aging in dog experiments”

Commercialization Efforts :

Biological age tests

Supplements

David Sinclair' s Supplement Regimen

Author of "Lifespan"

- Fisetin: 500 mg (sinolytic)
- Lipoic Acid: 300 mg (Antioxidant)
- **Fish Oil (EPA/DHA):** ?(Brain boosting)
- L-Taurine : 2 gm (enhance mitochondrial function health)
- Nicoitnamide Mononucleotide (NMN): 1g
- Resveratrol: 1 g
- Spermidine: 1-2 mg (Activate autophagy)
- **Vit. D3: 4,000-5,000IU**
- Vitamin K2: 180-360 mcg
- Trimethylglycine (TMG): 500-1,000 mg
- **Low Dose Aspirin: 83 mg**
- ***Metformin : 1 G***
- **Rapamycin: ? (**mimic the effect of fasting)

- Harvard scientist, a prominent figure in the field of genetics and longevity, has dedicated his career to uncovering the secrets of longevity.
- He practices what he preaches, incorporating a meticulously curated stack of supplements and drugs into his daily routine , aimed at decelerating the aging process.
- His provocative claim that" somebody who might make it to 150 has already been born " has drawn criticism from main stream academia.

Peter Attia's Supplements

Daytime Supplements

- **EPA and DHA :** Carlson's EPA DHA
- **Vitamin D** : 5,000IU
- **Magnesium** : SlowMag, magnesium L-threonate, magnesium oxide
- **Methylfolate** and Methyl B12
- **Vitamin B6** 50mg 3x per week
- **baby ASA a day**
- Athletic Green: AG1 drink
- **Probiotic**: Glucose Control by Pendulum

Supplements at night

- Ashwagandha: 600 mg solar brand
- **Glycine:** 2 gm Thorne brand
- **Magnesium** L-threonate Magtein brand

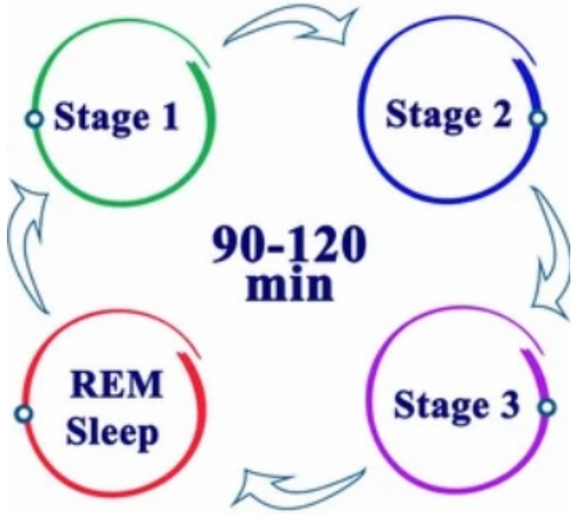
The Supplements may change from year to year

He takes Rapamycin

What occurs in each sleep cycle

Stage 1
- **between being awake and falling asleep,**
- light and easily interrupted
- 入睡期，容易被搖醒

Stage 4
Rapid -eye-movement (REM) sleep
- dreaming
- body is paralyzed
- eyes dart back and force behind closed eyelids
- blood increases, heart rate and breathing speed up to daytime levels
- process and consolidate new informations learned during the day
- 做夢。身體在癱瘓狀態
- 眼睛在眼皮內快速轉動
- 血壓，心跳，呼吸加速至日間速度
- 固化日間所學，經歷



Stage 2
first stage of true sleep
- heart rate and breathing slow
- start to become unaware of surrounding

淺睡期
- 心跳，呼吸減慢，
- 不查週邊事務

Stage 3
slow wave sleep or deep sleep
- breathing and heart rate slowed, blood pressor dropped, muscle relaxed. tissue regenerate
- essential hormone released
- hard time to be awakened

熟睡，深睡期
- 呼吸，心跳減慢，血壓降低
- 肌肉鬆馳
- 荷爾蒙分泌，
- 器官修復，腦子廢物清除
- 如被搖醒，胡裡胡塗

Blue Zones

National Geographic Fellow Dan Buettner's Report in 2016

Live to 100: Secrets of the Blue Zones

Blue Zones

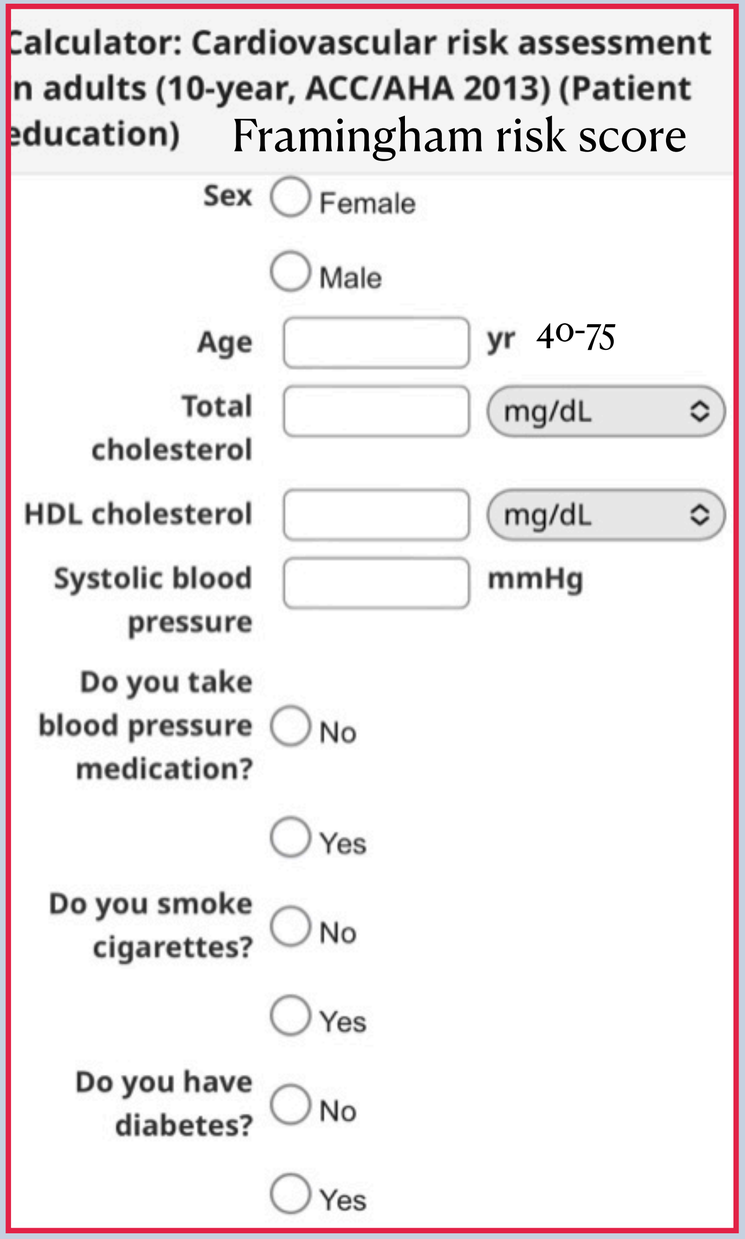
Five specific areas of the world where people consistently live over 100 years of age. They live up to a decade longer than average Americans and spend a fraction of what most of what most of us do on health care.

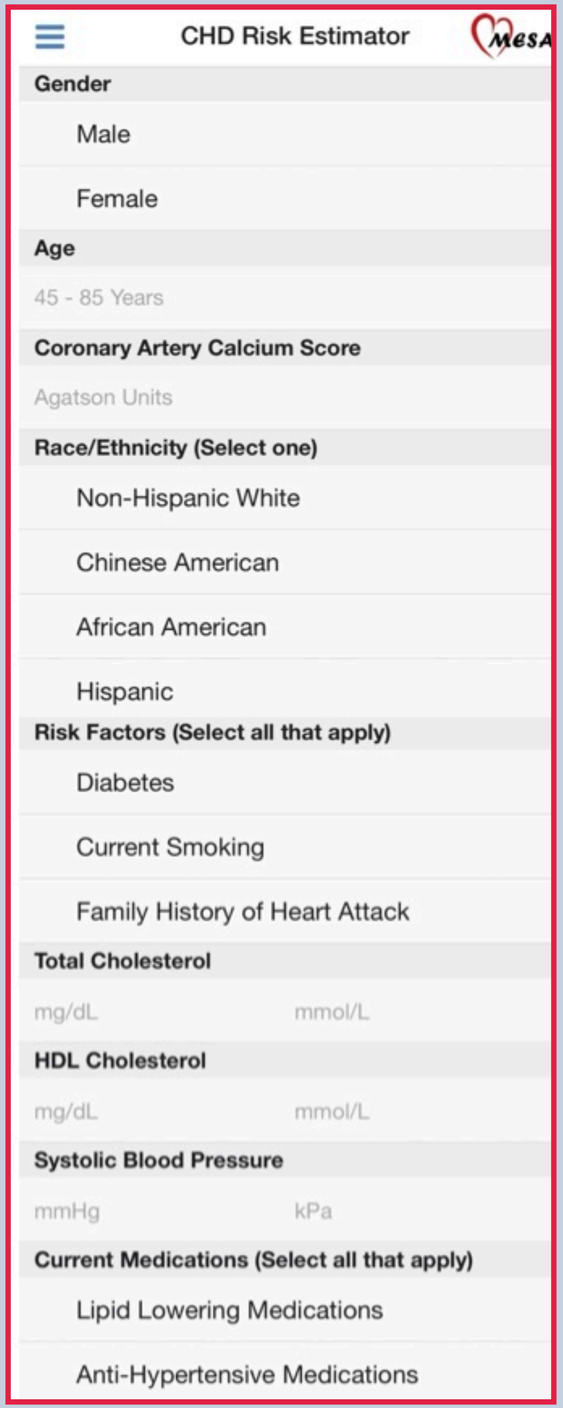
- Sardinia, Italy
- Ikaria, Greece
- Nicola, Costa Rica
- Loma Linda, California
- Okinawa, Japan

Long life largely free of chronic diseases.

Power 9

- move naturally
- have a purpose in life
- reduce stress
- **practice the 80% diet rule, stop eating when 80% full (hara hachi bu)**
- favor a plant-based diet 1) Whole grains 2) Greens 3)Tubers 4)Nuts 5) Beans
- drink alcohol in moderate amounts
- belong to a community
- put family first
- keep a social circle that support healthy behaviors
- **There's no short-term fix (or) supplement for longevity**


Calculator: Cardiovascular risk assessment
n adults (10-year, ACC/AHA 2013) (Patient
education)
Framingham risk score
Sex
Female
Male
Age
yr
40-75
Total cholesterol
mg/dL
HDL cholesterol
mg/dL
Systolic blood pressure
mmHg
Do you take blood pressure medication?
No
Yes
Do you smoke cigarettes?
No
Yes
Do you have diabetes?
No
Yes


CHD Risk Estimator
MESA
Gender
Male
Female
Age
45 - 85 Years
Coronary Artery Calcium Score
Agatson Units
Race/Ethnicity (Select one)
Non-Hispanic White
Chinese American
African American
Hispanic
Risk Factors (Select all that apply)
Diabetes
Current Smoking
Family History of Heart Attack
Total Cholesterol
mg/dL
mmol/L
HDL Cholesterol
mg/dL
mmol/L
Systolic Blood Pressure
mmHg
kPa
Current Medications (Select all that apply)
Lipid Lowering Medications
Anti-Hypertensive Medications

Polygenetic Risk Score

Table 4. Potential Clinical Utility of PRSs

Disease/risk factor	Potential clinical utility of PRS
CAD	Earlier identification for lifestyle therapies and statins, potentially for those with very high CAD PRSs Earlier screening for subclinical atherosclerosis to time the initiation of pharmacotherapies Use as a risk-enhancing factor for primary prevention in middle-aged patients at borderline-intermediate 10-y ASCVD risk
AF	Earlier AF detection and resultant prophylactic anticoagulation, potentially with monitoring devices Rigorous control of additive clinical risk factors for AF
T2D	Earlier lifestyle modification Potential consideration of prophylactic hypoglycemic medications with concomitant additional T2D clinical risk factors Genomic stratification may optimize hypoglycemic choice
VTE	Rigorous VTE risk-reducing strategies in the context of high-risk scenarios (prolonged travel, major surgery, etc)
Hypercholesterolemia	Earlier institution and earlier uptitration of lipid-lowering pharmacotherapies analogous to FH
Pharmacogenomics	Personalized drug therapy regimens that increase drug efficacy and decrease toxicities, eg, personalized β-blocker target dose in patients with HFrEF or the prevention of drug-induced QT prolongation