



# Is epigenetics the hidden key to understanding health and insurance risk?

Christelle Oosthuizen (FASSA), Insight Life Solutions

Poonam Vala (FASSA), Insight Actuarial Solutions

# About the speakers



## **Christelle Oosthuizen – *Consulting Actuary, Insight Life Solutions***

She has 6 years of experience working across a range of areas including valuations, risk management and modelling. She has a passion for innovation within the life insurance industry and is interested in how non-traditional rating factors can be used to make a positive impact to both insurers and the lives they protect.



## **Poonam Vala – *Consulting Actuary, Insight Actuarial Solutions***

In her role, Poonam provides consultative support to a variety of healthcare insurers and provider groups, with the aim of delivering data-driven solutions to address the complex challenges within the healthcare industry. Her career has been defined by a diverse array of projects for various stakeholders and she remains passionate about making a difference.

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**Insight** is a dynamic firm of actuaries, clinicians, engineers, developers, and data scientists, offering innovative problem-solving supported by cutting-edge technology. Based in Cape Town, Johannesburg, and Sydney, we serve a global clientele. Our **Life Solutions** division provides comprehensive actuarial consulting, including advisory services and backfill resourcing for Life Insurers, while our **Actuarial Solutions** team specialises in independent clinical, actuarial, and analytic services tailored to the healthcare sector's unique needs.



# DUTCH HUNGER WINTER



# FAMINE IMPACT



○ LDL Cholesterol

○ Schizophrenia

○ Obesity

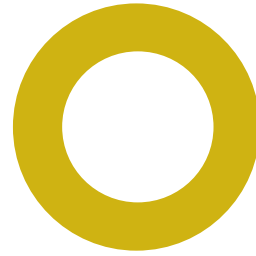
○ Diabetes



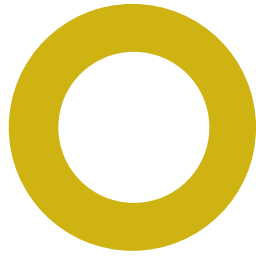
# ENVIRONMENTAL OR BEHAVIOURAL TEST



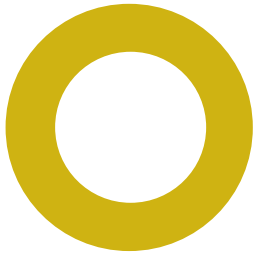
# AGENDA



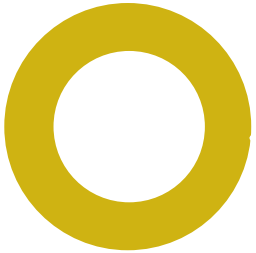
What is epigenetics?



How can it be implemented in life insurance industry?



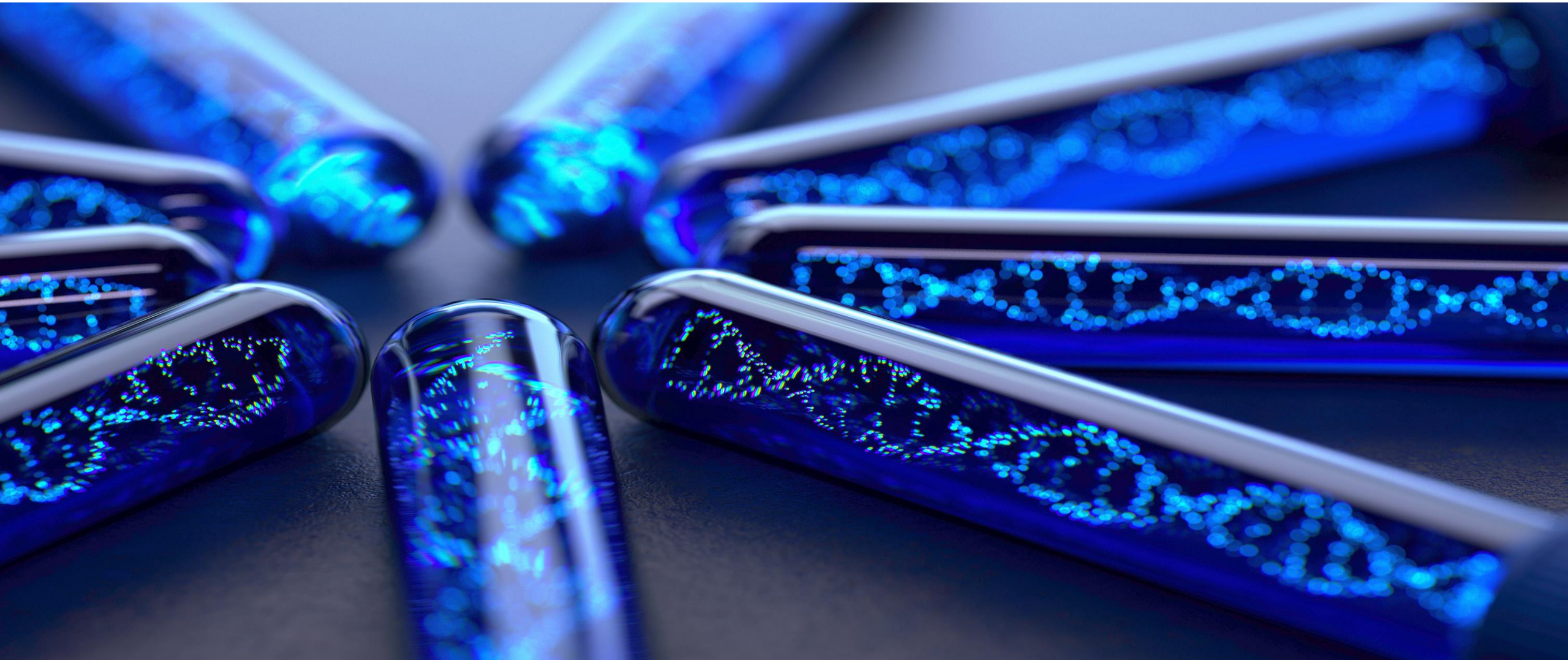
Ethical, legal and social implications



Concerns when implementing it in insurance



# WHAT IS EPIGENETICS?



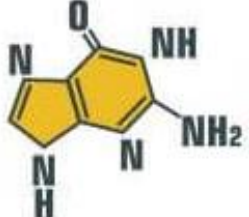
# GENETICS EXPLANATION



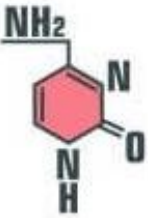
DNA  
DEOXYRIBONUCLEIC  
ACID



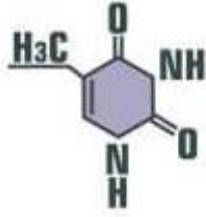
Adenine (A)



Guanine (G)



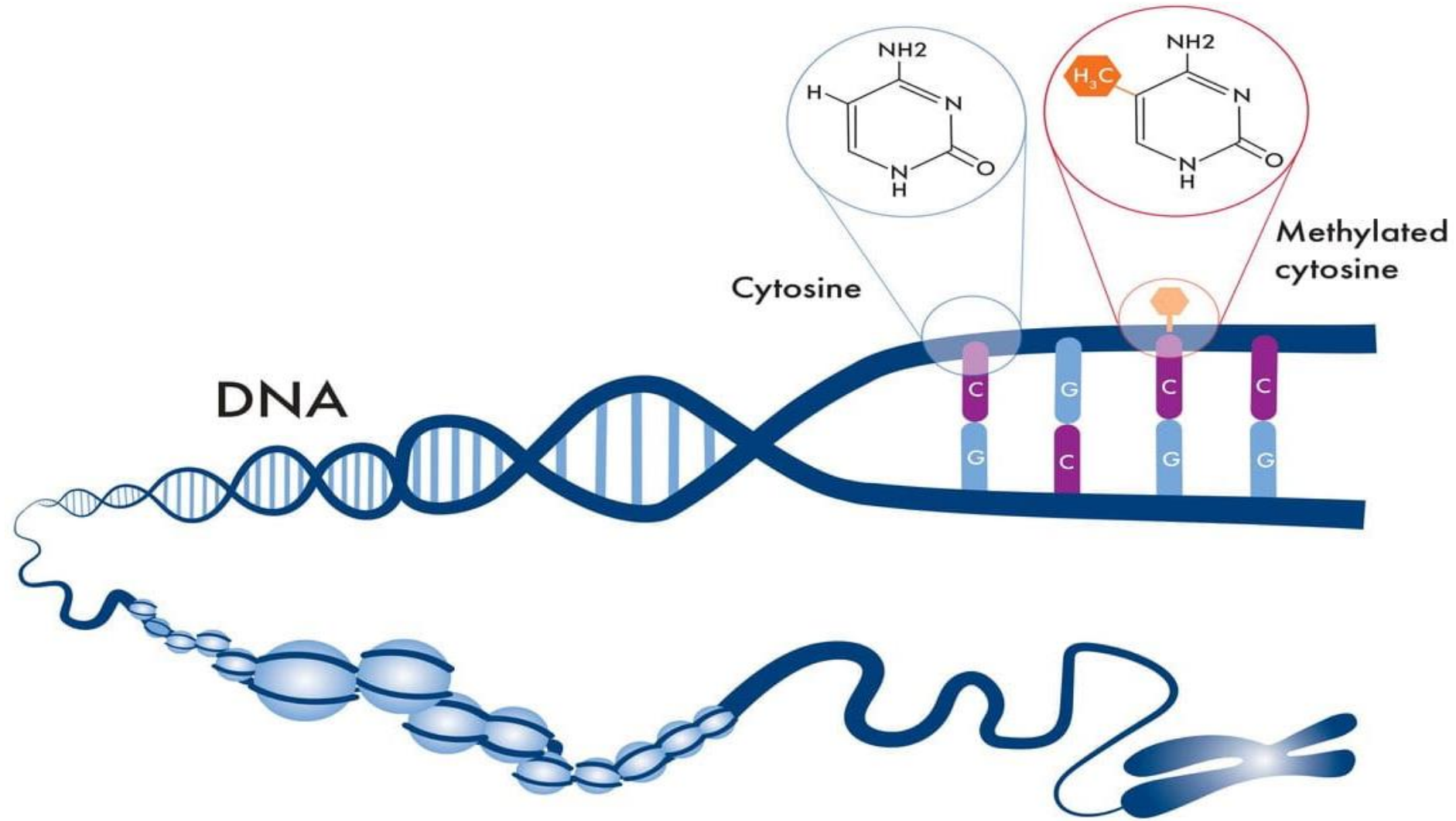
Cytosine (C)



Thymine (T)



# EPIGENETICS AND GENE EXPRESSION



# EPIGENETICS EXAMPLE



rhungy slte tea dramnga

# EPIGENETICS EXAMPLE



Hungry lets eat grandma



# EPIGENETICS EXAMPLE



“Hungry? Let’s eat, Grandma.”

“Hungry . . . let’s eat grandma!”



# FACTORS AFFECTING EPIGENETICS

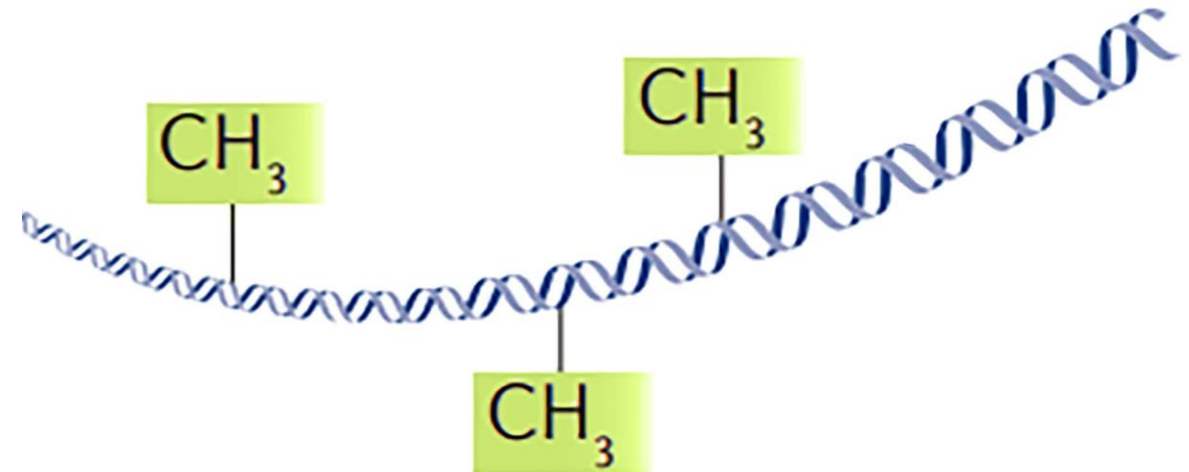
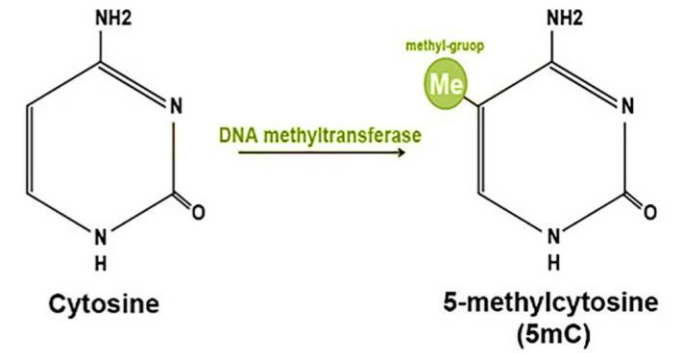
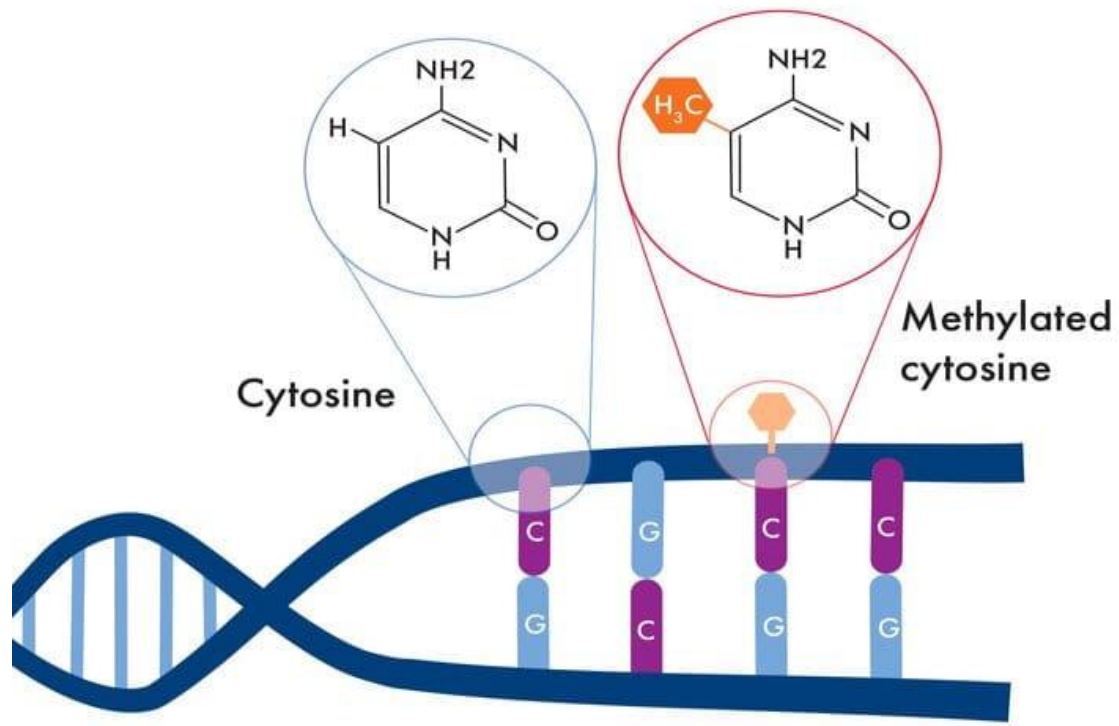


Commercial  
environment



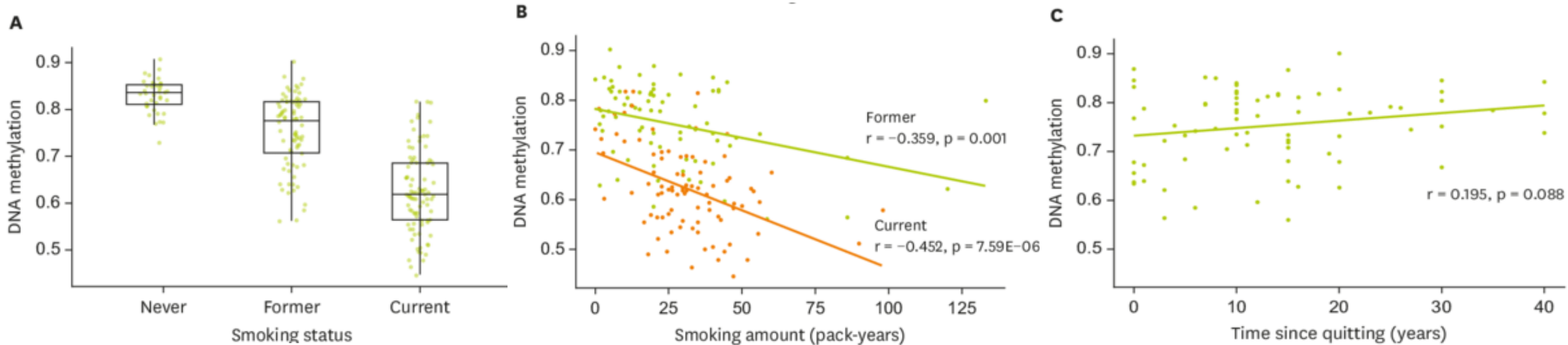
External  
environment

# DNA METHYLATION





# DNA METHYLATION FOR SMOKING



**Source:** Smoking May Affect Pulmonary Function through DNA Methylation: an Epigenome-Wide Association Study

# DNA METHYLATION AND BIOLOGICAL AGEING

## Epigenetic Clock



## Example ElasticNet Cox Model

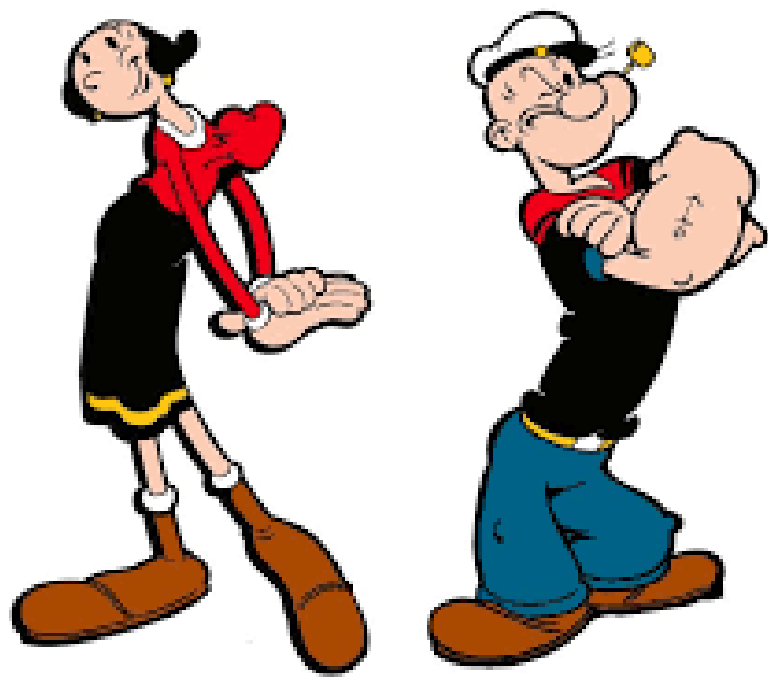




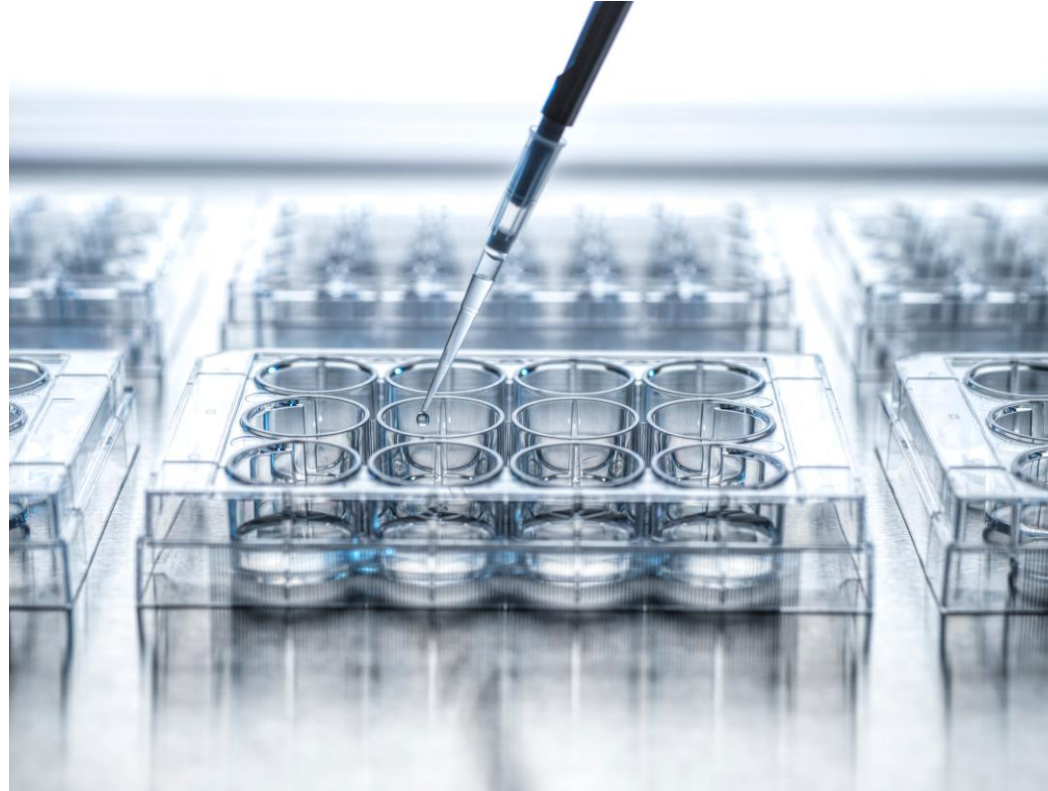
## HOW CAN IT BE IMPLEMENTED IN LIFE INSURANCE?



# POPEYE TAKEN THROUGH THE LIFE INSURANCE PROCESS



# EPIGENETIC TEST



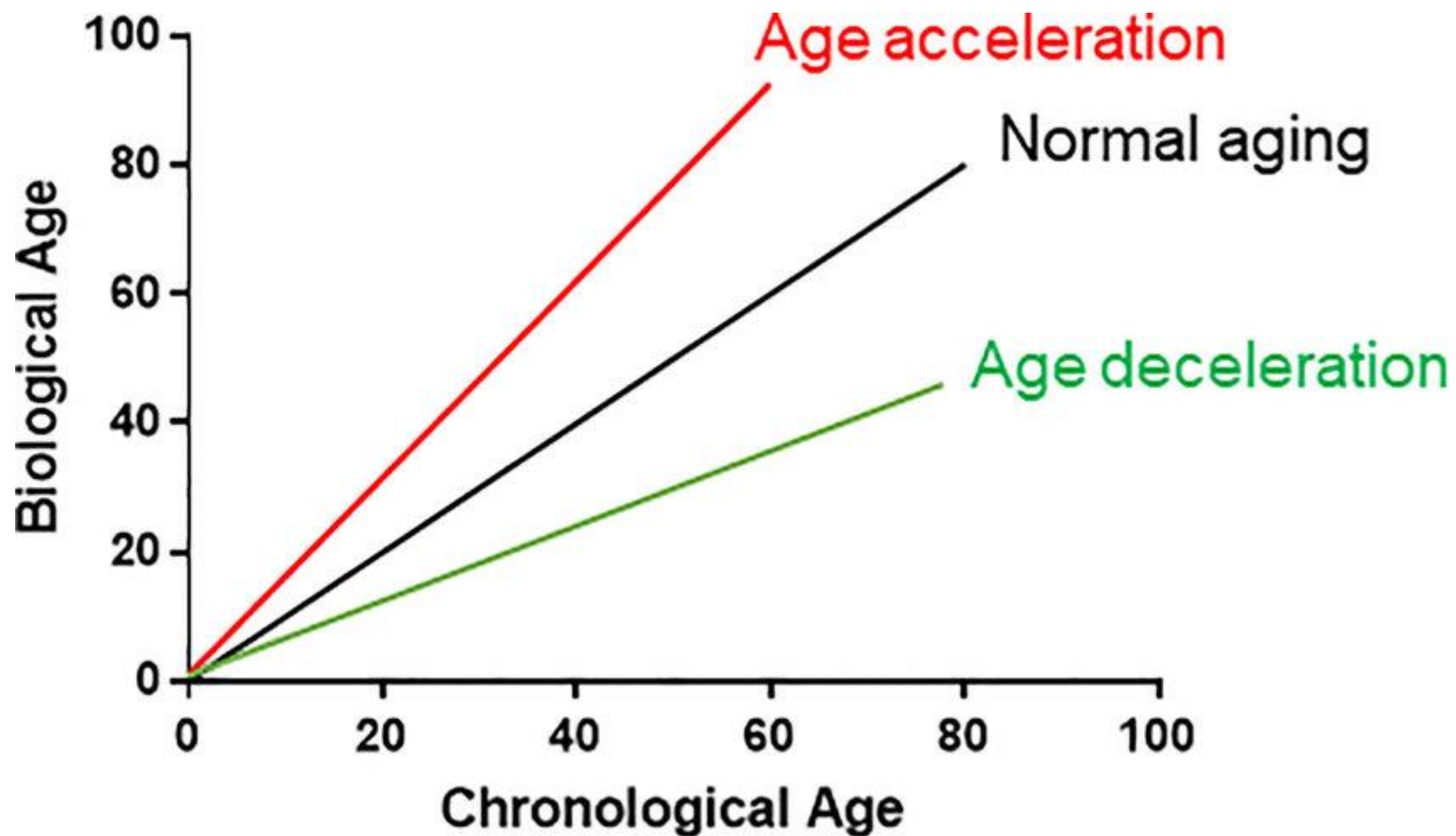
Non-invasive saliva sample  
Improved Customer Experience

# EPIGENETIC / BIOLOGICAL AGE

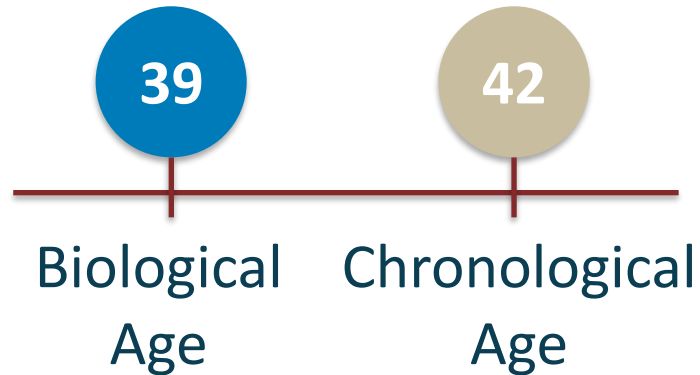




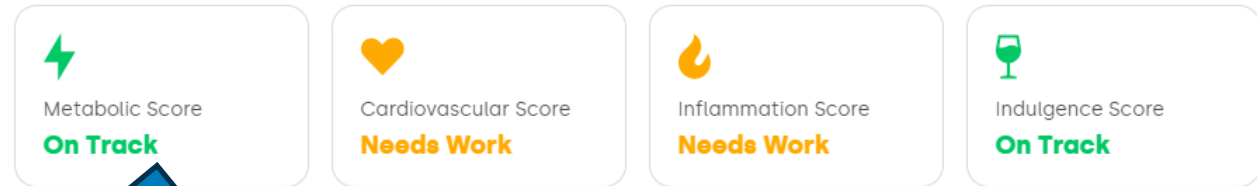
# AGE ACCELERATION VS DECELERATION



# SAMPLE EPIGENETIC REPORT



Based on your biological age and calendar age, your delta age is:

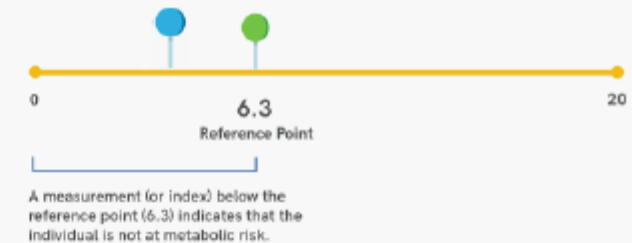


## Epi-Metabolic Index

A measurement based on DNA methylation loci that have been scientifically shown to be significantly associated with metabolic disorders.



Your  
Epi-Metabolic  
Index



# IMPROVE BIOLOGICAL AGE



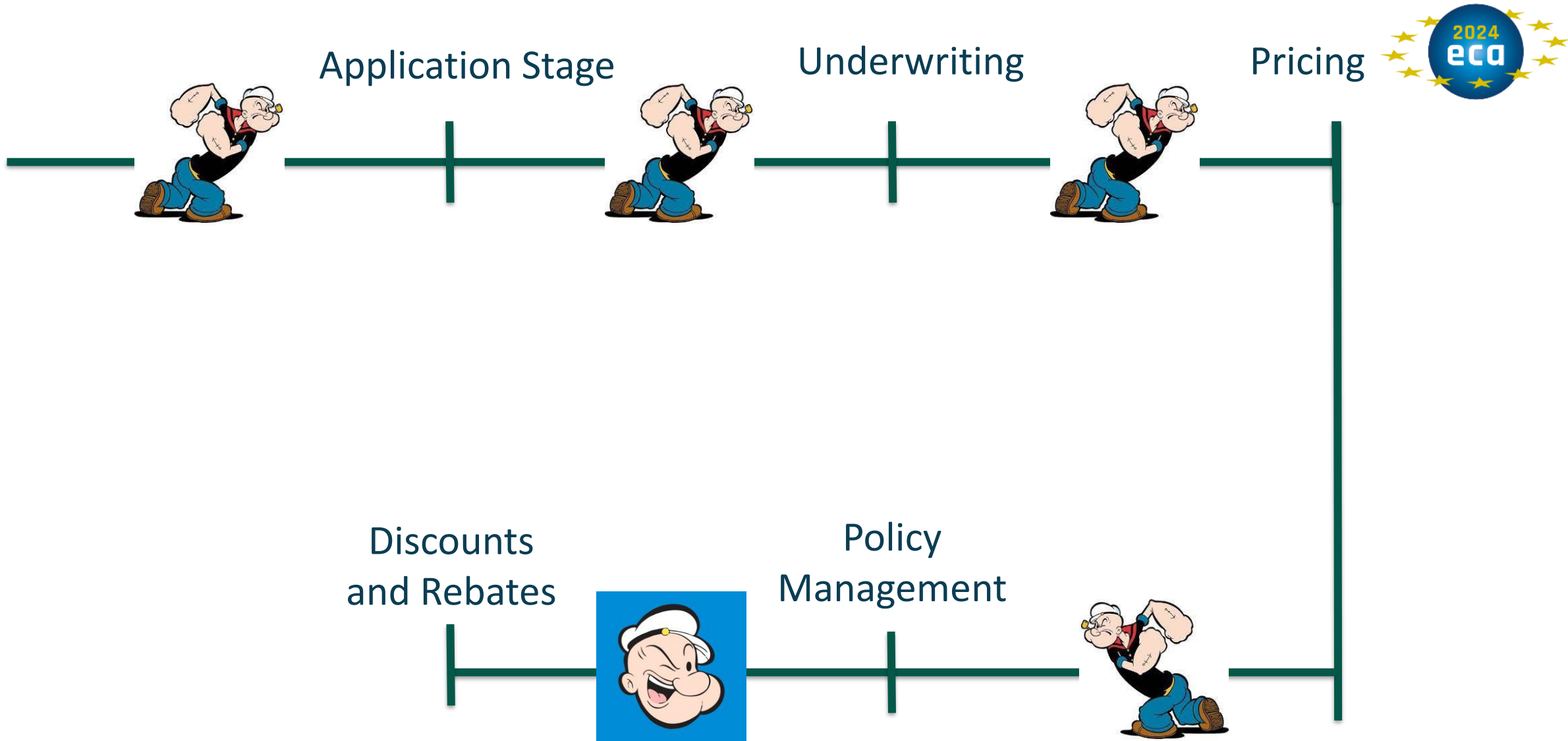
Reduce

Environmental Toxins  
Tobacco  
Alcohol consumption  
Chronic Stress

Improve

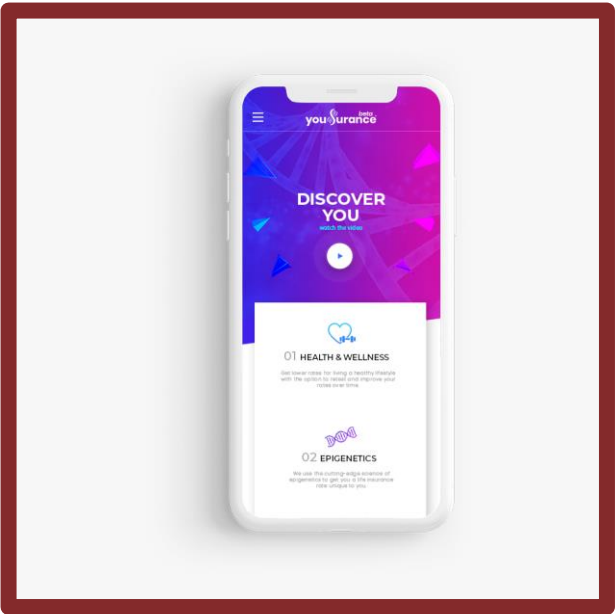
Physical activity  
Adequate Sleep  
Healthy Food

# LIFE INSURANCE CYCLE

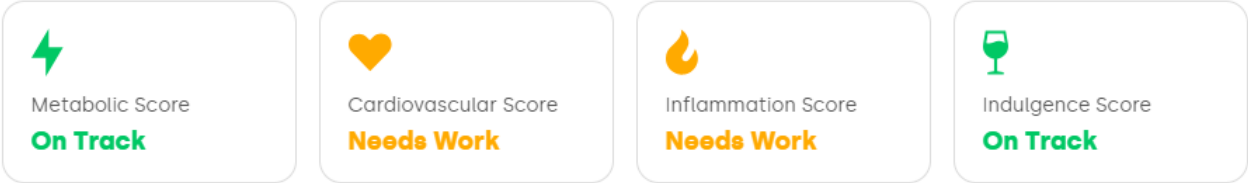




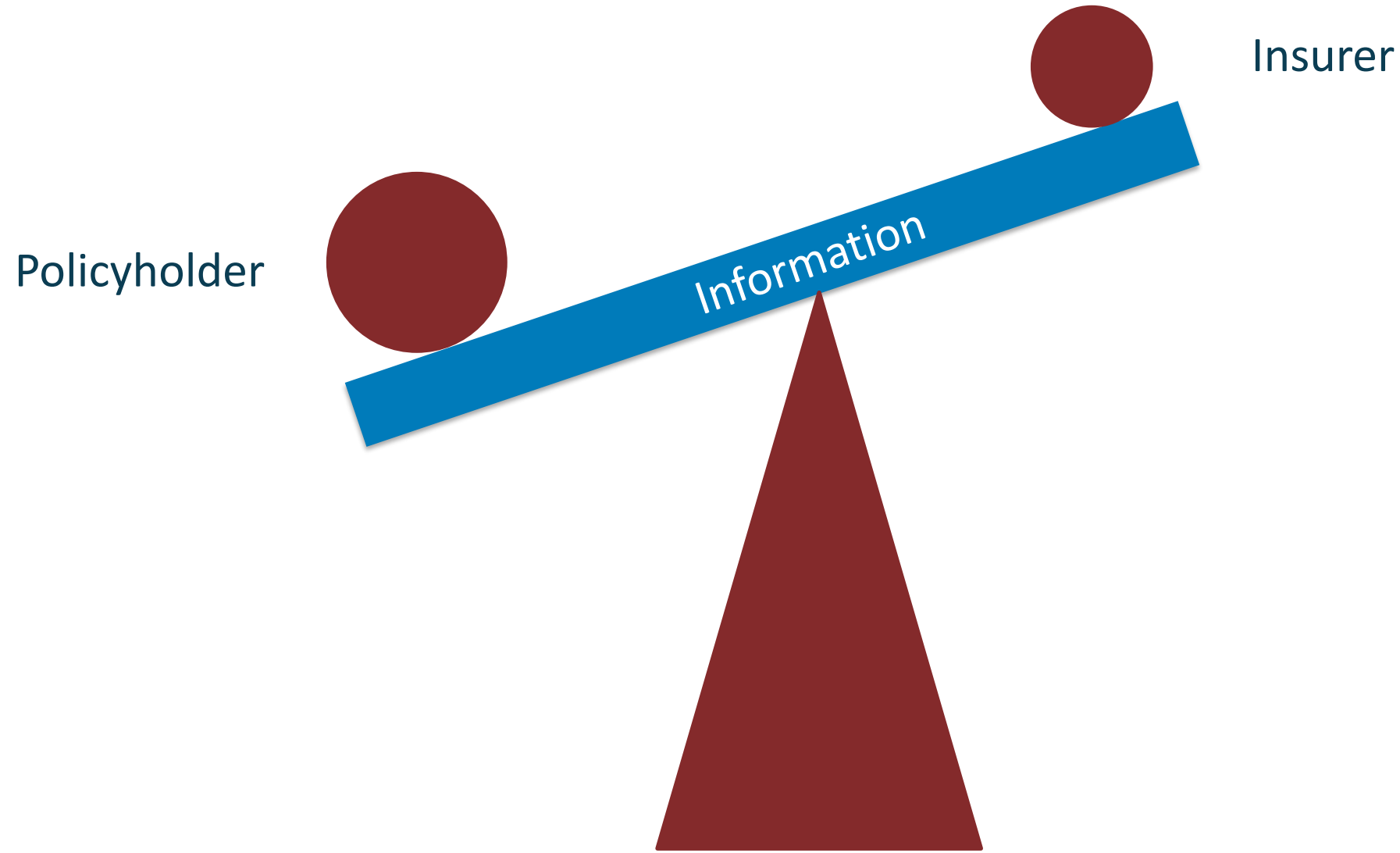
# EPIGENETICS IN INSURANCE



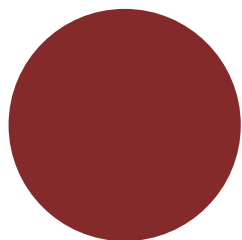
Discover your epigenetic wellness status across four key categories.



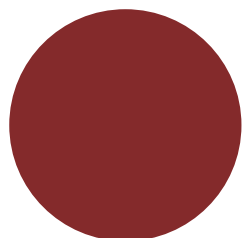
# REDUCE INFORMATION ASSYMETRY



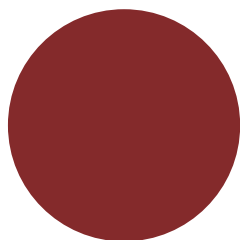
# EVALUATE EPIGENETIC TESTS



Analytical Validity



Clinical Validity



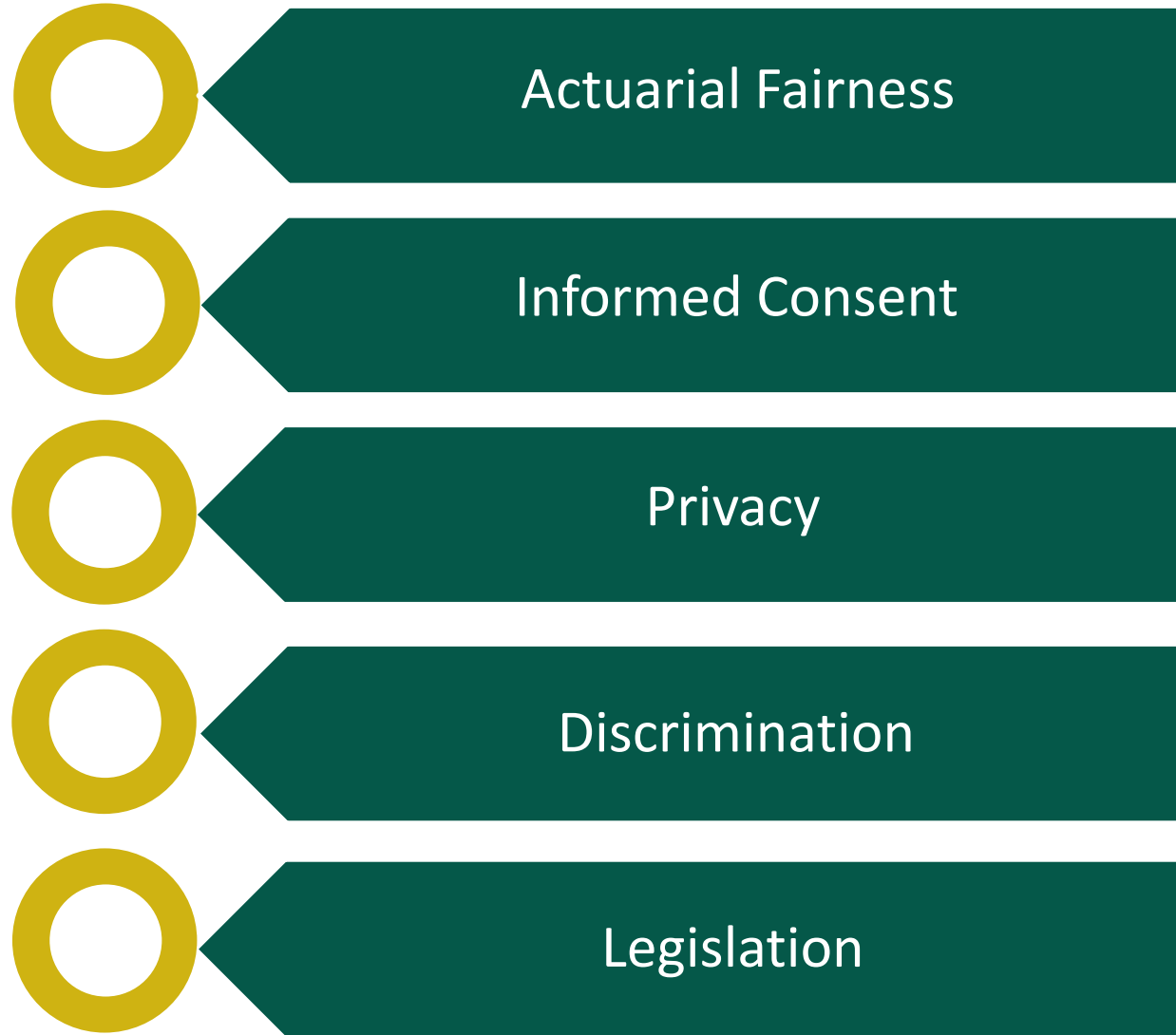
Clinical Utility



# ETHICAL, LEGAL AND SOCIAL IMPLICATIONS (ELSI)

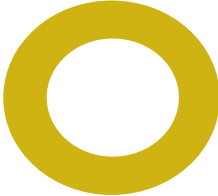
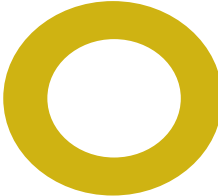
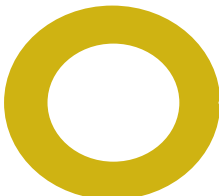
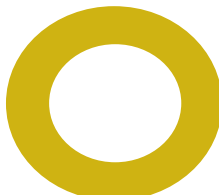
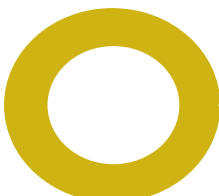


# ETHICAL, LEGAL AND SOCIAL IMPLICATIONS



# LEGISLATION / LEGAL IMPLICATIONS



-  German Genetic Diagnostic Act
-  Portugal Personal Genetic Information and Health Information Act
-  Austrian Gene Technology Act
-  Association for Savings and Investments South Africa (ASISA)
-  Australia moratorium

# CONSTRAINTS



Investment in research,  
infrastructure and expertise

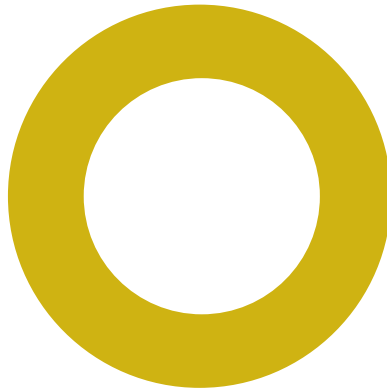


Costs (€200) – sample processing  
& laboratory analysis

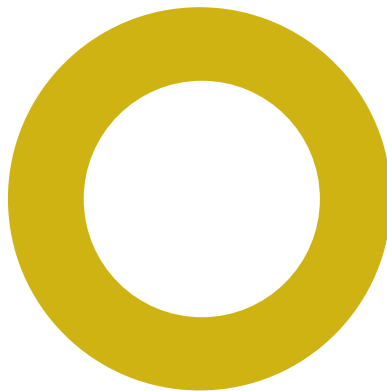


Accurate interpretation of  
epigenetic tests

# MORE INFO



Read Epigenetics: A White Paper on Technology and Innovation, by the Society of Actuaries



Watch “Be Kind to Your Genes: An Insurance Perspective on the Fast-Growing Field of Epigenetics”.

<https://www.soa.org/globalassets/assets/files/resources/research-report/2020/epigenetics-underwriting-report.pdf>

<https://www.rgare.com/knowledge-center/article/be-kind-to-your-genes-an-insurance-perspective-on-the-fast-growing-field-of-epigenetics>



# Thank you!

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