

Biology of Aging

3. Studienjahr – 7.11.2024

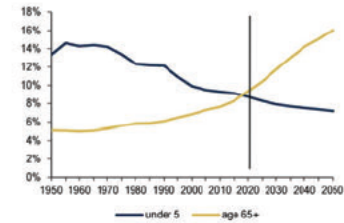
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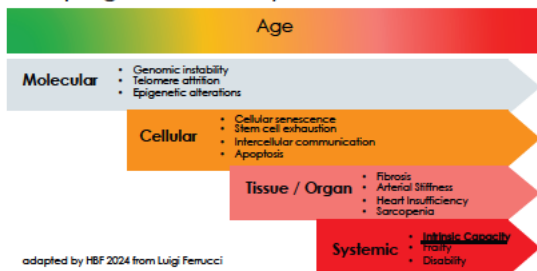
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Our world is aging rapidly



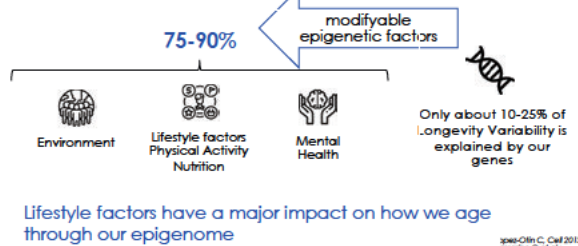
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Aging starts at the molecular level and progresses to the systemic functional level



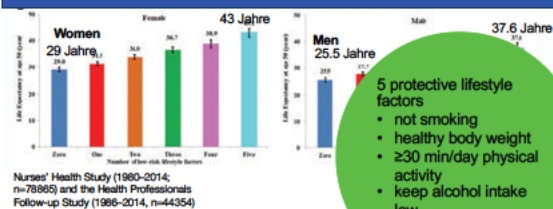
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Only 10-25% of Longevity Variability is due to our Genes



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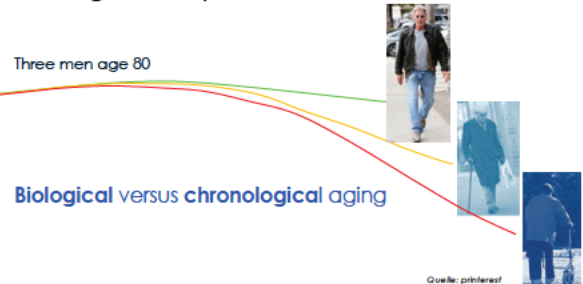
Life expectancy at age 50 according to number of protective lifestyle factors



- 5 protective lifestyle factors
- not smoking
 - healthy body weight
 - ≥30 min/day physical activity
 - keep alcohol intake low
 - healthy nutrition

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We age in a spectrum



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... think about it now

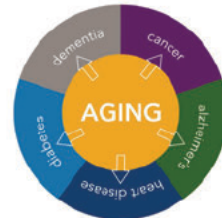


Donnelly et al. Quantification of biological aging in young adults. PNAS 2015

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What is Geroscience?

Medicine version 2



Connecting the Biology of Aging and the Biology of Disease

The biological processes of aging are the greatest risk factors for many chronic diseases and disabilities that affect us as we grow older.

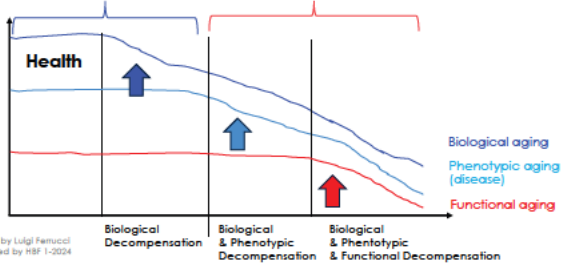
By treating aging—not just age related disease—we can stay healthier longer.

<https://www.afar.org/what-is-geroscience>

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Metrics of Aging

Geroscience Medicine Medicine today acts here



Graph by Luigi Ferrucci
adapted by HRF 1-2024

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Novel Biomarkers of Aging

Mitochondrial dysfunction
Cellular senescence
Stem cell exhaustion
Genomic instability
Telomere attrition
Altered intercellular communication
Loss of proteostasis
Dysregulation of nutrient sensing
Epigenetic alterations



Alzheimer's Disease
Cell. 2013;155(1):1194-1217

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Clocks measure Epigenetic Age Acceleration
Pan Tissue Biological Aging



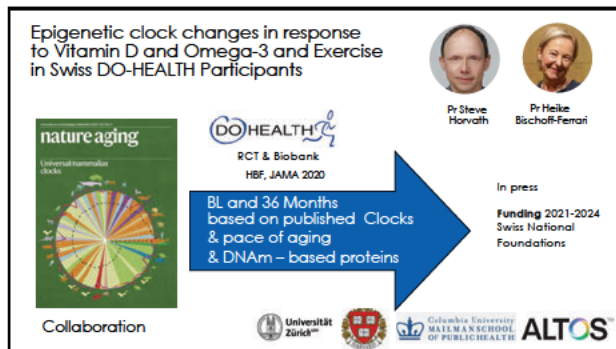
Prof. Steve Horvath

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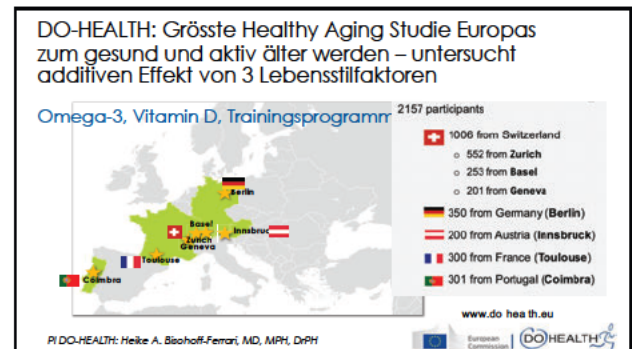
Small pilot trials suggest that clocks respond to prevention – large trial needed for confirmation

Randomized-Controlled Trials	Intervention	Main findings
Genous et al., 2020 n=120 older adults; RCT, 12 months	Mediterranean diet	Reduction of 0.84 years in EAA
Chen et al., 2019 n=51 young adults; RCT, 4 months	Vitamin D, 2000 IU/d	Reduction in 1.90 years in EAA
Chau et al., 2017 n=34, 18 long-term meditators, 20 control; 1-day intensive meditation	Meditation	Reduction of 0.24 years in EAA

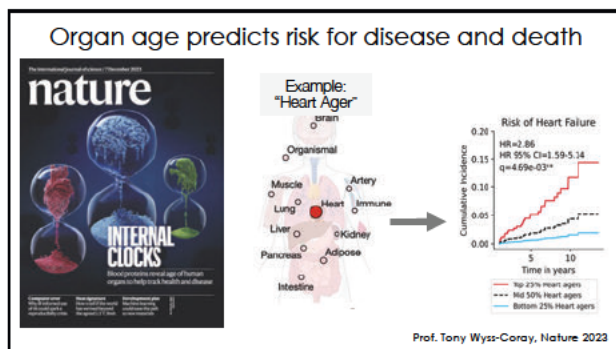
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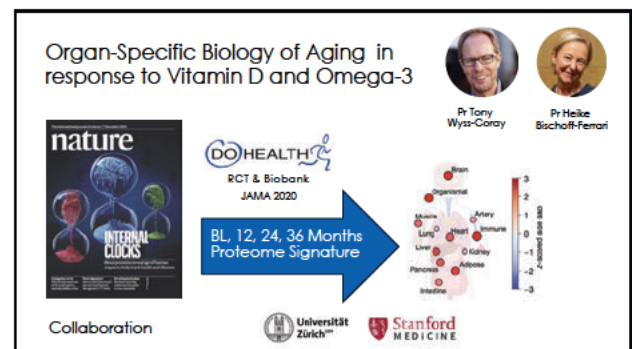
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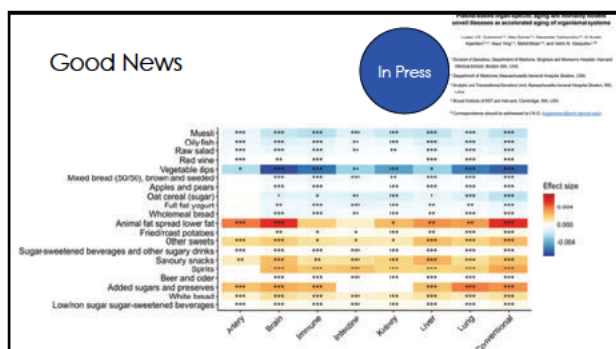
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GEROSCIENCE – drug development

1. Prävention: Riesiges Potential

Lebensstilfaktoren **Heute**

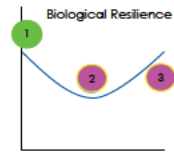
1. Booster Beispiele:

Metformin **Morgen**

Senolytics (z.B. Flavonol Fesitin)

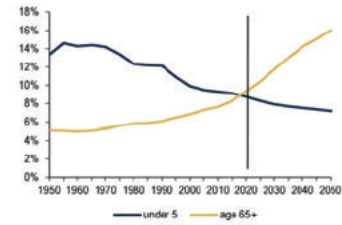
3. Recovery / Rejuvenation:

Stammzelltherapie **Morgen**



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Our world is aging rapidly



Thank you!

Source: UN

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