

Medizin von Morgen: für den älteren Menschen

Heike A. Bischoff-Ferrari, Prof. Dr. med. DrPH



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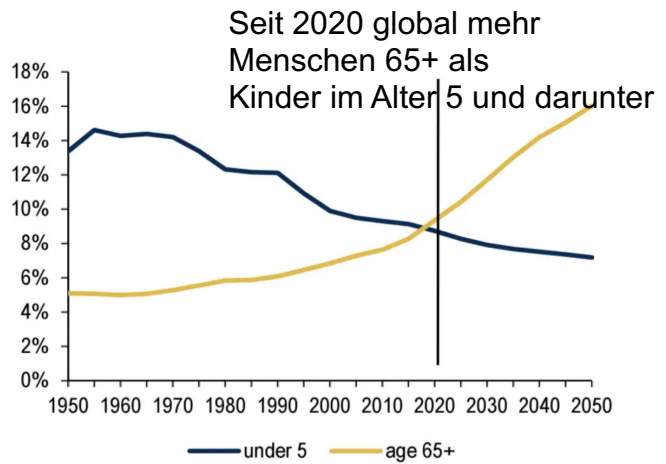
Hintergrund

2

Unsere Welt wird in einem hohen Tempo älter

Seit 1900 hat sich die globale Lebenserwartung verdoppelt.

Von im Schnitt 35 Jahre auf jetzt über 70 Jahre



Source: UN

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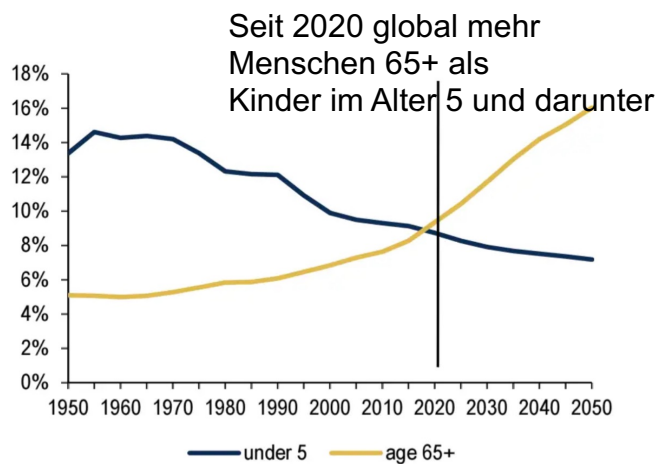
Unsere Welt wird in einem hohen Tempo älter

Seit 1900
die gl
ver

V
a

Ursachen:

- 1) Abnehmende Fertilität
- 2) Zunahme Lebenserwartung



Source: UN

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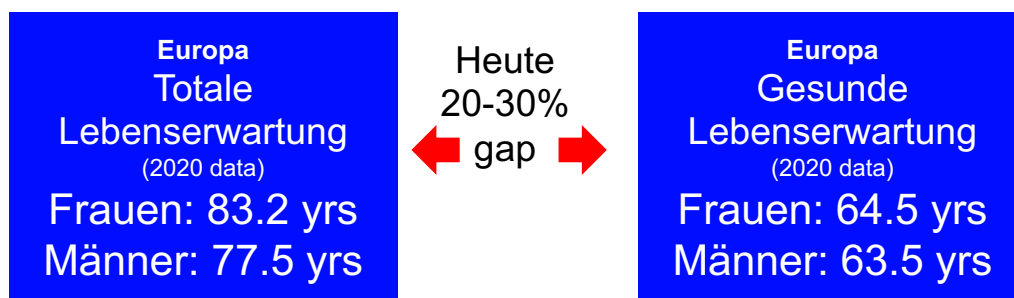
Zukunft Demographie

- Von jetzt bis 2050 wird sich die Population 65+ in Europa und USA verdoppeln.
- Bis 2050 ist jeder 3te Mensch in Europa und jeder 5te Mensch in USA 65-Jährig und älter.
- Bis 2050 ist global ein mittleres Pensionsalter von 73 Jahren notwendig um die Finanzierung der Pensionskassen sicherzustellen.

UN Population Division

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Gesunde Lebenserwartung hält nicht Schritt mit totaler Lebenserwartung



ec.europa.eu/eurostat

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Ziel für Population 65+

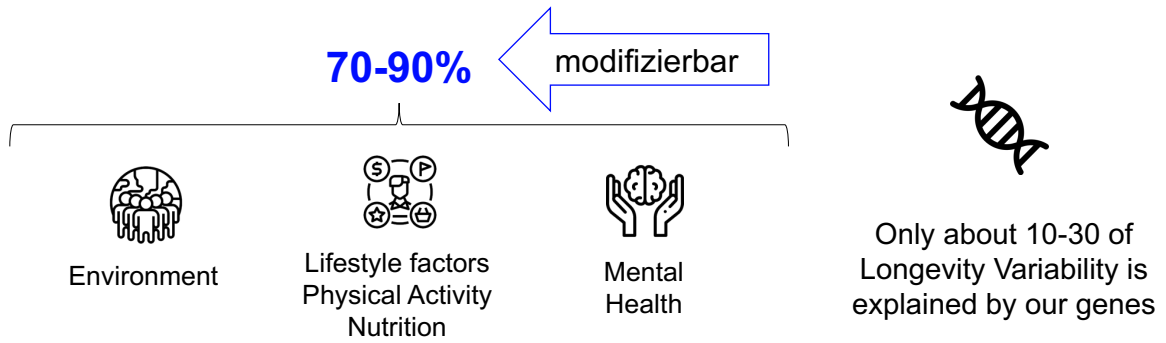
Erhöhung der **gesunden** Lebenserwartung
und Reduktion von Funktionseinbußen

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**Was sind die Hebel für eine
Verlängerung der gesunden
Lebenserwartung?**

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Lebensstil

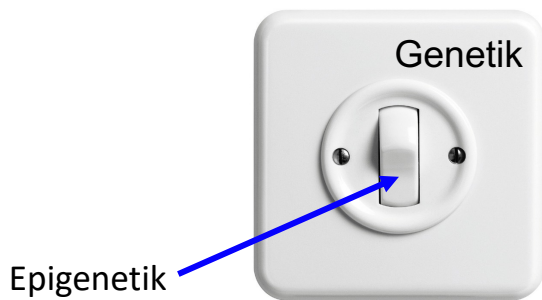


Epi-genetische Faktoren haben ein enormes Potential

*Lopez-Otin C, Cell 2013
Passarino G et al.;
Immun Ageing 2016*

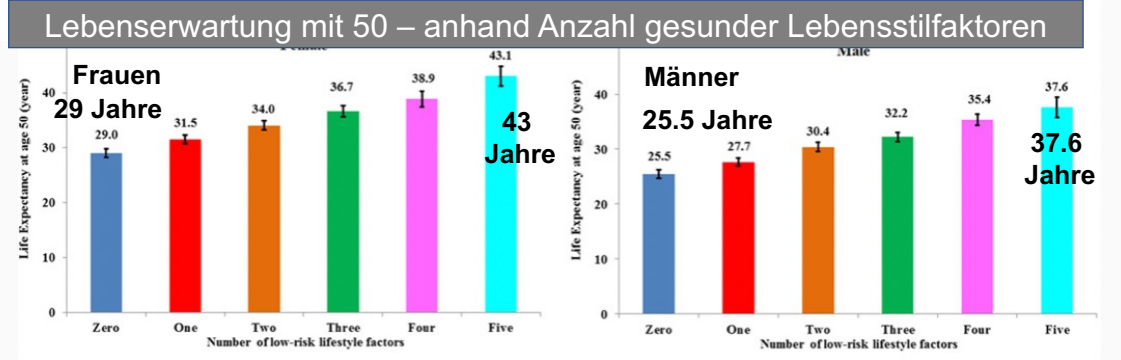
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Epigenetik erklärt



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Additiver Nutzen gesunder Lebensstilfaktoren für die Langlebigkeit



Nurses' Health Study (1980–2014; n=78865) and the Health Professionals Follow-up Study (1986–2014, n=44354)

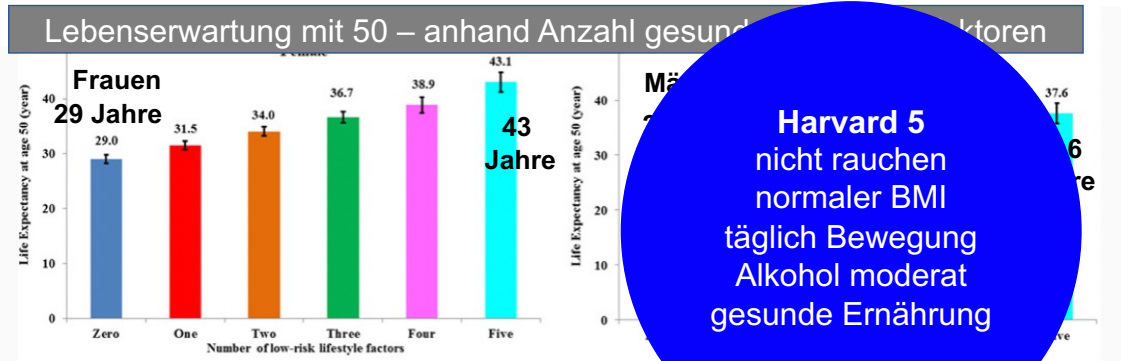
5 low-risk lifestyle factors as never smoking, body mass index of 18.5 to 24.9 kg/m², ≥30 min/d of moderate to vigorous physical activity, moderate alcohol intake, and a high diet quality score (upper 40%)

Impact of Healthy Lifestyle Factors on Life Expectancies in the US Population

Yanping Li, An Pan, Dong D. Wang, Xiaoran Liu, Klodian Dhana, Oscar H. Franco, Stephen Kaptoge, Emanuele Di Angelantonio, Meir Stampfer, Walter C. Willett and Frank B. Hu
 Originally published 30 Apr 2018 | <https://doi.org/10.1161/CIRCULATIONAHA.117.032047> | Circulation, 2018;138:345–355

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Additiver Nutzen gesunder Lebensstilfaktoren für die Langlebigkeit



Harvard 5
 nicht rauchen
 normaler BMI
 täglich Bewegung
 Alkohol moderat
 gesunde Ernährung

Nurses' Health Study (1980–2014; n=78865) and the Health Professionals Follow-up Study (1986–2014, n=44354)

5 low-risk lifestyle factors as never smoking, body mass index of 18.5 to 24.9 kg/m², ≥30 min/d of moderate to vigorous physical activity, moderate alcohol intake, and a high diet quality score (upper 40%)

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European Healthy Longevity Trial




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Tested 3 life-style factors

- Vitamin D (2000 IU/day)
- Omega-3 (1g/day)
- Home exercise program (3x30 min per week / strength or flexibility)


In a 2x2x2 factorial design trial

in 2157
Generally healthy and active adults
age 70 years and older
3 years of follow-up

Original Investigation
November 10, 2020

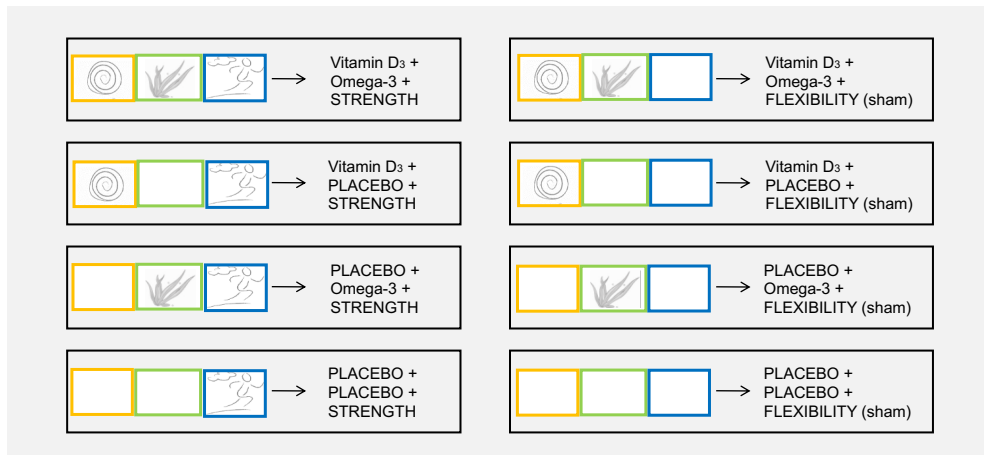
Effect of Vitamin D Supplementation, Omega-3 Fatty Acid Supplementation, or a Strength-Training Exercise Program on Clinical Outcomes in Older Adults
 The DO-HEALTH Randomized Clinical Trial

Heike A. Bischoff-Ferrari, MD, DrPH^{1,2,3}; Bruno Vellas, MD, PhD^{4,5}; René Rizzoli, MD⁶; et al
> Author Affiliations
JAMA. 2020;324(18):1855-1868. doi:10.1001/jama.2020.16909



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DO-HEALTH – 2x2x2 factorial design



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Original Investigation

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JAMA. 2020;324(18):1855-1868. doi:10.1001/jama.2020.16909

- N = 2157: 42 % Healthy Agers, 60% ohne Vitamin D Mangel, 83 % mäßig bis stark körperlich aktiv - alle Teilnehmer durften die aktuelle Empfehlung für Vitamin D (800 IE) einnehmen
- Bei gesunden, aktiven und ohne Vitamin D Mangel - kein zusätzlicher Nutzen dieser 3 Interventionen in Bezug auf Knochenbrüche, kognitive Funktionen, Beinfunktion, Infektionsrate und Blutdruck



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Zwei “DO-HEALTH Resultate” die einen beschleunigten Alterungsprozess abbilden zeigen additiven Benefit der 3 Interventionen

- Invasive Krebserkrankungen
- Frühzeitige Gebrechlichkeit



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frontiers | Frontiers in Aging

ORIGINAL RESEARCH
published: 25 April 2022
doi: 10.3389/fragi.2022.852643

2157 participants (mean age 74.9 years; 61.7% women;
40.7% with 25-OH vitamin D below 20 /ml, 83% at least moderately physically active.
Follow-up of 3 years, **81 invasive cancer cases were diagnosed and verified.**



Combined Vitamin D, Omega-3 Fatty Acids, and a Simple Home Exercise Program May Reduce Cancer Risk Among Active Adults Aged 70 and Older: A Randomized Clinical Trial

Heike A. Bischoff-Ferrari^{1,2,3*}, Walter C. Willett⁴, JoAnn E. Manson⁵, Bess Dawson-Hughes⁶, Markus G. Manz⁷, Robert Theiler^{1,2}, Kilian Braendle^{1,2}, Bruno Vellas⁸, René Rizzoli⁹, Reto W. Kressig¹⁰, Hannes B. Staehelin¹⁰, José A. P. Da Silva¹¹, Gabriele Ambrecht¹², Andreas Egli^{1,2}, John A. Kanis^{13,14}, Endel J. Orav¹⁵ and Stephanie Gaengler^{1,2} DO-HEALTH Research Group

OPEN ACCESS

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Unterschiedliche Schutz - Mechanismen Krebsentstehung

Vitamin D, Omega-3 und Bewegung beeinflussen verschiedene Mechanismen der Krebsentstehung:

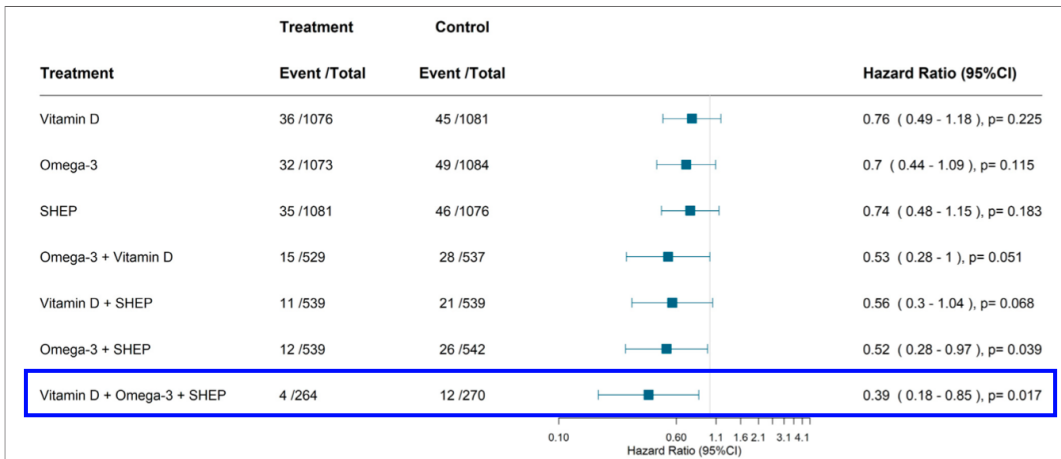
- Vitamin D unterdrückt unkontrolliertes Zellwachstum
- Omega-3 hat entzündungshemmende Wirkungen
- Bewegung löst die Apoptose von Krebszellen aus

Bischoff-Ferrari HA et al. *Frontiers of Ageing* 2022



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In Kombination 61% Verminderung invasiver Krebserkrankungen in 3 Jahren



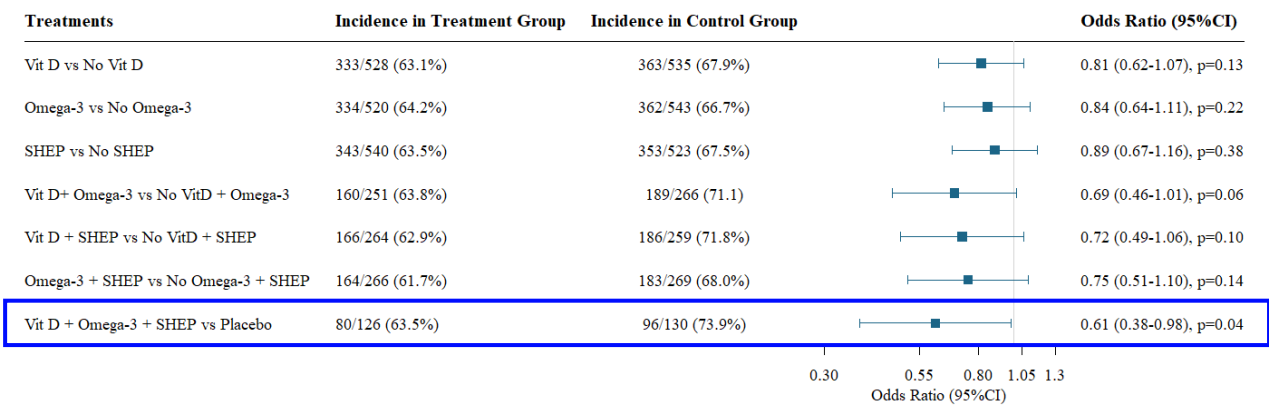
SHEP =
Simple
Home
Exercise
Program

FIGURE 2 | Primary endpoint—effect of treatments on the prevention of any invasive cancer. Cox-proportional hazard model adjusted for history of cancer, sex, BMI, prior fall, age, and study center. The comparison group is always the group that does not have the respective treatment(s) of interest. For all three treatments, it is the group who received only the placebo. All verified new invasive cancer cases (n = 81) among all 2,157 participants. Abbreviation: SHEP, Simple home exercise program.

Bischoff-Ferrari HA et al. *Frontiers of Ageing* 2022

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In Kombination 39% Verminderung frühzeitiger Gebrechlichkeit in 3 Jahren

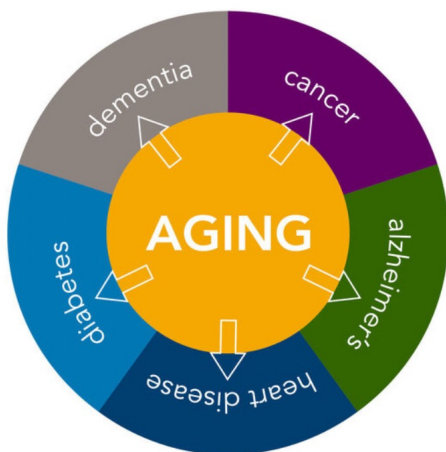


Gagesch M, Bischoff-Ferrari HA et al. J Frailty Aging. 2023;12(1):71-77.

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Geroscience

Medizin von Morgen setzt am Alterungsprozess an



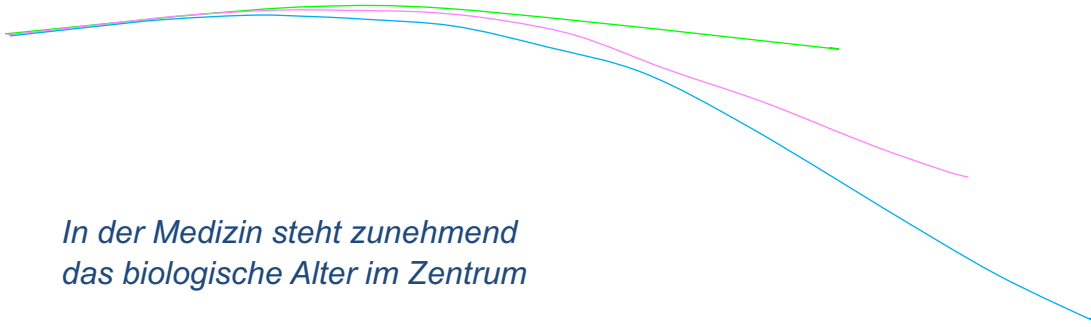
Die biologischen Prozesse des Alterns sind die der gemeinsame Risikofaktor chronischer Krankheiten und Funktionsverluste.

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

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Das Alter hat ein Spektrum

Drei Männer – gleiches chronologisches Alter 80



In der Medizin steht zunehmend das biologische Alter im Zentrum

Quelle: printertest

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Biomarkers of Aging



Lopez-Otin C, Cell 2013

Jain P et al.; JAMA 2023

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Original Investigation | Public Health
 July 27, 2022

Analysis of Epigenetic Age Acceleration and Healthy Longevity Among Older US Women

Purva Jain, PhD, MPH¹; Alexandra M. Binder, ScD, ScM^{2,3}; Brian Chen, PhD¹; et al
 > Author Affiliations | Article Information
 JAMA Netw Open. 2022;5(7):e2223285. doi:10.1001/jamanetworkopen.2022.23285

EAA – Epigenetic Age Acceleration
 is a measure of whether individuals are aging faster or slower than their chronological age

- **Women’s Health Initiative study:**
 1813 women eligible to survive to age 90 years by end of study period
- Epigenetic age acceleration was measured by 4 epigenetic clocks
 Horvath, Hannum, Pheno, and Grim
- **Estimated for 3 healthy longevity outcomes for each clock:**
 survival to age 90 years with intact mobility
 survival to age 90 years without intact mobility
 and no survival to age 90 years

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- EAA predicted longevity
- EAA discriminated healthy from total longevity
- **Future studies to focus on the potential for public health interventions to reduce EAA**

Odds of surviving to age 90 years by 1 SD increase in EAA compared with those who did not survive to age 90 years

A Age 90 y with intact mobility

EAA measure

EAA measure	OR (95% CI)
AgeAccelHorvath	~0.85 (0.75, 0.95)
AgeAccelHannum	~0.65 (0.55, 0.75)
AgeAccelPheno	~0.65 (0.55, 0.75)
AgeAccelGrim	~0.75 (0.65, 0.85)





B Age 90 y without intact mobility

EAA measure

EAA measure	OR (95% CI)
AgeAccelHorvath	~0.95 (0.85, 1.05)
AgeAccelHannum	~0.95 (0.85, 1.05)
AgeAccelPheno	~0.75 (0.65, 0.85)
AgeAccelGrim	~0.85 (0.75, 0.95)

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EAA Pilotstudien Lebensstilfaktoren

Randomized-Controlled Trials	Intervention	Main findings
Gensous et al., 2020 n=120 older adults; 12 months	Mediterranean diet 	Reduction of 0.84 years in EAA
Chen et al., 2019 n=51 young adults; RCT; 4 month	Vitamin D, 2000 IU 	Reduction in 1.90 years in EAA
Chaix et al., 2017 n=38, 13 long-term meditators, 20 control	Meditation 	Reduction of 0.24 years in EAA for each year of meditation practice
Fitzgerald et al., 2021 n=43 healthy adult male RCT 8 weeks	Combined lifestyle 	Reduction of 3.23 years in EAA

EAA: Epigenetic Age Acceleration measured by epigenetic clocks
(most promising biology of aging biomarker to reflect lifestyle changes)

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Next Step -- Precision Age

Personalisierte Prävention

Make Prevention a Treatment

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Forschung Geroscience Universitäre Altersmedizin ZH

DO-HEALTH  - BioAge

DO-HEALTH Bio-Age zielt darauf ab den Einfluss der DO-HEALTH Interventionen und Lebensstilfaktoren auf den Biologischen Alterungsprozess (EAA) zu untersuchen (SNF)

Grösste Healthy Aging Studie Europas und Biobank

N = 2157, davon N = 1000 Schweiz

Gesunde Menschen 70+

Schweiz, Deutschland, Österreich
Frankreich, Portugal

(Bischoff-Ferrari HA et al. JAMA 2020)

PRECISION-Age

Precision-Age zielt darauf ab, Methoden der Präzisions-Medizin für die Prävention von Menschen ab 45 Jahren zu nutzen.



**Precision Age: langsamer altern
und länger gesund bleiben**

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Limitation Precision-Age

Nicht zugänglich für Alle

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ICOPE

WHO Integrated Care for Older People

ICOPE offers to monitor and support function at the public health level

ICOPE captures six integrated domains of function that people value most

<https://www.who.int/teams/maternal-newborn-child-adolescent-health-and-ageing/ageing-and-health/integrated-care-for-older-people-icope>






Mobility



Nutrition
Vitality



Vision



Mental Health



Cognitive
Function





Hearing

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ICOPE

WHO Integrated Care for Older People

Why build on ICOPE function?

- 1) Feasibility of implementation shown in a large-scale global study**

(Tavassoli N et al. Lancet Healthy Longevity 2022;3(6):e394-404)
- 2) Relevant to overall health:** predicts current and future health state, and future care needs

(Beard JR et al. J Gerontol A Biol Sci Med Sci 2022;77(1):94-100)

ICOPE offers a concept to address **Aging** based on six functional domains

Low-cost monitoring accessible for all

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Step 1 ICOPE

WHO ICOPE SCREENING TOOL

Priority conditions associated with declines in intrinsic capacity	Tests	Assess fully any domain with a checked circle
COGNITIVE DECLINE (Chapter 4)	1. Remember three words: flower, door, rice (for example)	<input type="radio"/> Wrong to either question or does not know
	2. Orientation in time and space: What is the full date today? Where are you now (home, clinic, etc)?	<input type="radio"/> Cannot recall all three words
	3. Recalls the three words?	
LIMITED MOBILITY (Chapter 5)	Chair rise test: Rise from chair five times without using arms. Did the person complete five chair rises within 14 seconds?	<input checked="" type="radio"/> No
MALNUTRITION (Chapter 6)	1. Weight loss: Have you unintentionally lost more than 3 kg over the last three months?	<input checked="" type="radio"/> Yes
	2. Appetite loss: Have you experienced loss of appetite?	<input checked="" type="radio"/> Yes
VISUAL IMPAIRMENT (Chapter 7)	Do you have any problems with your eyes: difficulties in seeing far, reading, eye diseases or currently under medical treatment (e.g. diabetes, high blood pressure)?	<input type="radio"/> Yes
HEARING LOSS (Chapter 8)	Hears whispers (whisper test) or	<input type="radio"/> Fail
	Screening audiometry result is 35 dB or less or	
	Passes automated app-based digits-in-noise test	
DEPRESSIVE SYMPTOMS (Chapter 9)	Over the past two weeks, have you been bothered by	<input type="radio"/> Yes
	- feeling down, depressed or hopeless? - little interest or pleasure in doing things?	<input type="radio"/> Yes

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Beispiel Mobilität

Step 1: Scening

LIMITED MOBILITY
(Chapter 5) Chair rise test: Rise from chair five times without using arms. Did the person complete five chair rises within 14 seconds?

Eingeschränkt

Step 2: Test

Verminderte Ganggeschwindigkeit

Step 3: WHO Handbuch



Integrierte Prävention

Limited mobility

Limited mobility is found in 39% of people over 65 years of age (2014).



What can health and social care workers do?

- Assess mobility**
- Promote a combination of exercise** (strength/resistance, aerobic, balance, flexibility training)
- Improve nutrition**
- Review and eliminate unnecessary medication**
- Assess and manage pain**
- Adapt home to provide safe spaces and ensure accessibility**
- Provide assistive devices** such as canes, crutches and walkers

ICOPE

Integrated Care for Older People (ICOPE) is a community-based approach to prevent health and social services towards more person-centred and coordinated model of care. Look for WHO ICOPE handbook app for iOS & Android devices.
www.who.int/news-room/feature-stories/child-adolescent-health-and-ageing-and-health/integrated-care-for-older-people-icope



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Chance ICOPE



**Neues Präventionsmodell
für die 2te Lebenshälfte**

zur Reduktion
Funktionsverluste
und Verlängerung der
gesunden Lebenserwartung

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ICOPE Umsetzung: Auf was können wir aufbauen?

ICOPE Frankreich

**ICOPE
digitale
Tools
entwickelt**



WHO Toulouse

**ICOPE
Machbarkeit
etabliert**

> 40'000
TeilnehmerInnen
Alter 60+
eingeschrieben

> 6000 ICOPE
Ärzte und Nurses
ausgebildet

*(Tavassoli N et al.
Lancet Healthy Longev.
2022)*

**ICOPE
Engagement
French
Ministry of
Health and
Prevention**

Frankreich prüft
derzeit die
Vergütung der
ICOPE Leistungen
in 8 Regionen von
Frankreich

(Art 51)

ICOPE Schweiz Ausblick

**Umsetzung
ICOPE**



UZH-Lehrstuhl
Geriatric &
Altersforschung

&

**PRO
SENECTUTE**
Kanton ZH

**ICOPE
RCT**
mit 1000
Menschen 70+



Schweiz-
Frankreich

Beleg
Wirksamkeit
Wirtschaftlichkeit

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Zusammenfassung

- Medizin von Morgen für den älteren Menschen hat zum Ziel die gesunde Lebenserwartung zu verlängern
- ist Funktions-zentriert
- Kombination gesunder Lebensstilfaktoren hat hohes Potential für eine Verlängerung der gesunden Lebenserwartung
- ICOPE – Volksgesundheit
- PrecisionAge – Präzisionsmedizin Biologisches Alter

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Ausblick HealthAge



- Präsident Emmanuel Macron hat am 16. Mai 2023 das 10-Jahres Forschungsprogramm HealthAge bewilligt, um neue Biomarker und Therapien zur Verlangsamung des Alterungsprozesses zu erforschen und zur klinischen Anwendung zu bringen.
- Ziel ist die Verlängerung der gesunden Lebenserwartung und Innovation Medizin von Morgen die am Alterungsprozess ansetzt.
- 15 Forschungsteams & internationales Netzwerk mit Open Science Hub.

HealthAge vereint 3 Programme:

- INSPIRE Geroscience Program Toulouse
- WHO ICOPE Toulouse
- DO-HEALTH



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Vielen Dank