



## Altersaspekte bei der KHK

15.11.2023, Göttingen

**Univ.-Prof. Dr. Christian Schulze**

# Demographische Entwicklung in Deutschland

ZEIT  ONLINE

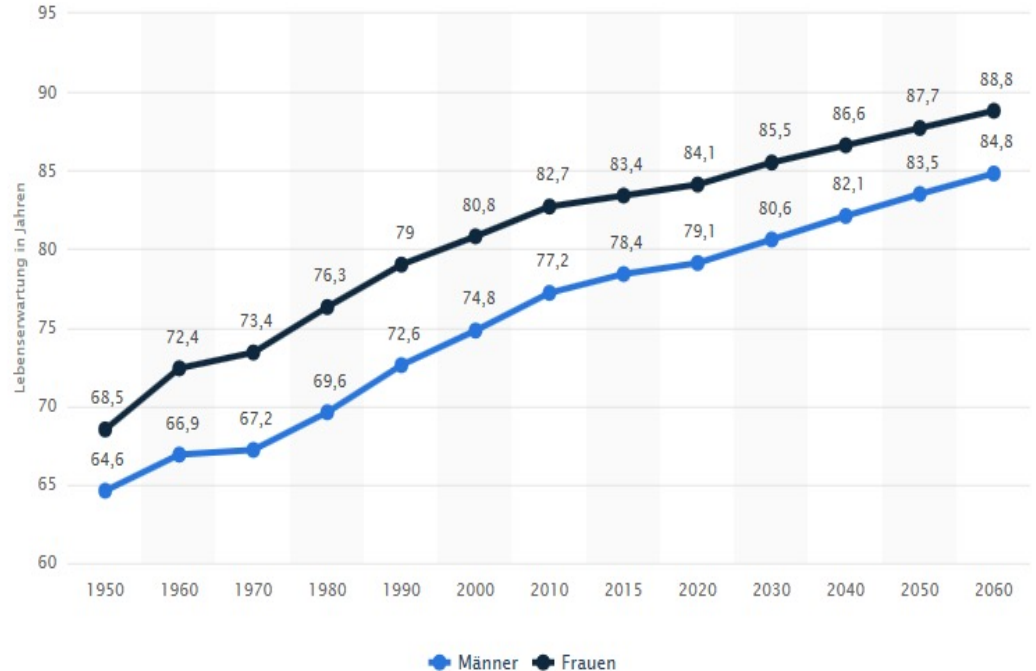
»Alter ist Leben für Fortgeschrittene«

**Franfurter Allgemeine**

DAS LEBEN DER SENIOREN

Die Alten drehen auf

**OSTTHÜRINGER  
Zeitung**



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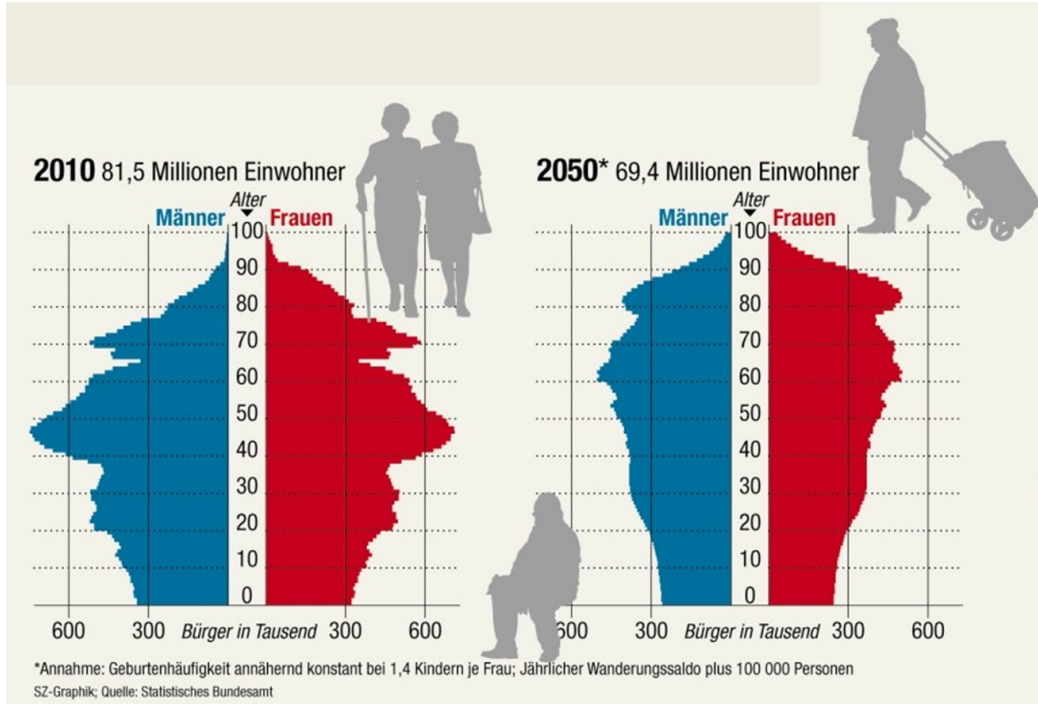
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# Demographische Entwicklung in Deutschland

2060 wird in Deutschland voraussichtlich jeder dritte über 65 Jahre alt sein und jeder siebte über 80 Jahre.



\*Annahme: Geburtenhäufigkeit annähernd konstant bei 1,4 Kindern je Frau; Jährlicher Wanderungssaldo plus 100 000 Personen  
SZ-Graphik; Quelle: Statistisches Bundesamt

"Age is something that  
doesn't matter unless  
you are a cheese"

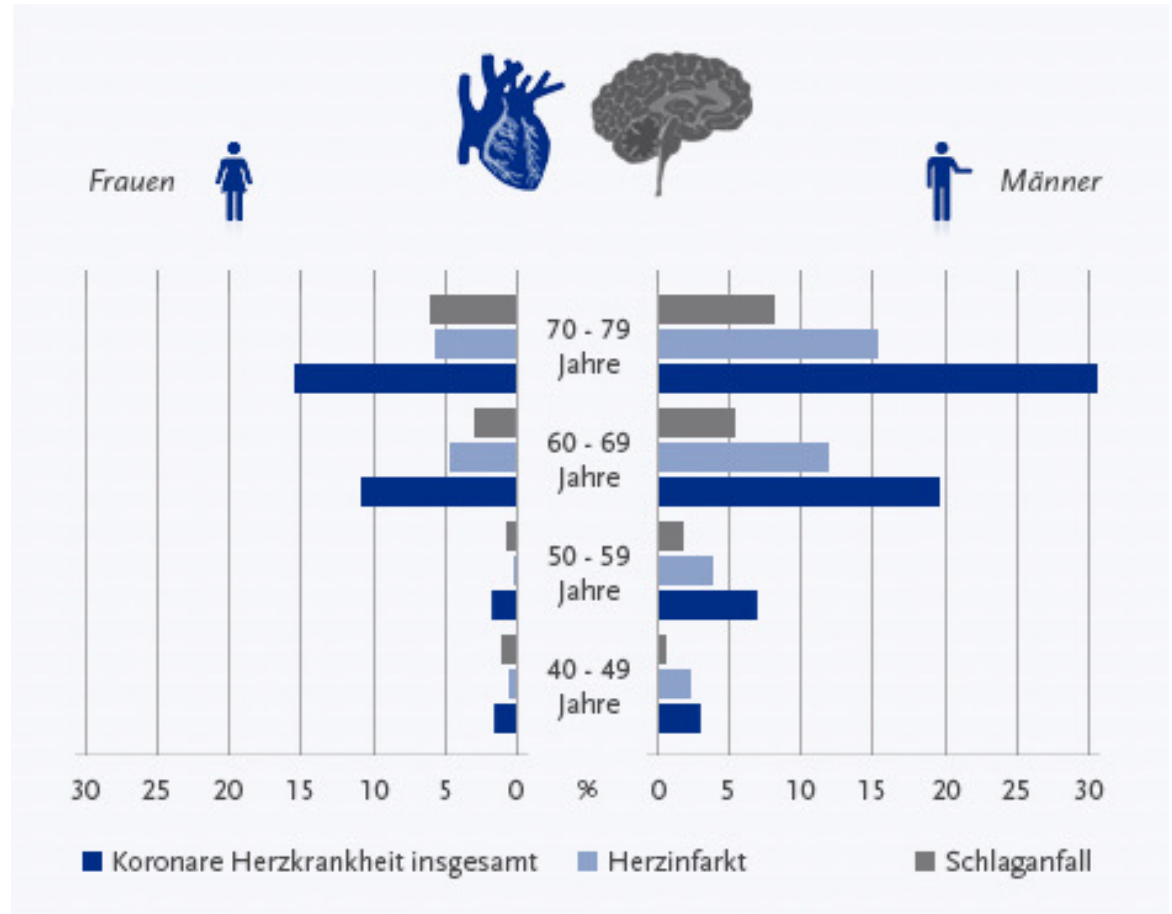


Billie Burke (american actress, 1884-1970)



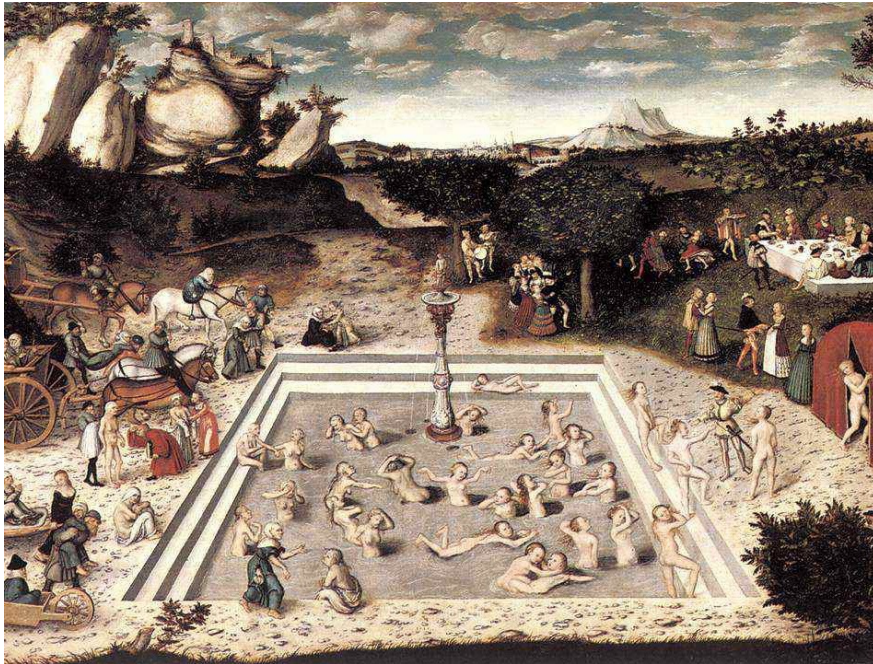
*Topper Returns (1941)*

# Altersabhängigkeit kardiovaskulärer Erkrankungen in Deutschland (2022)



# Was wollen wir?

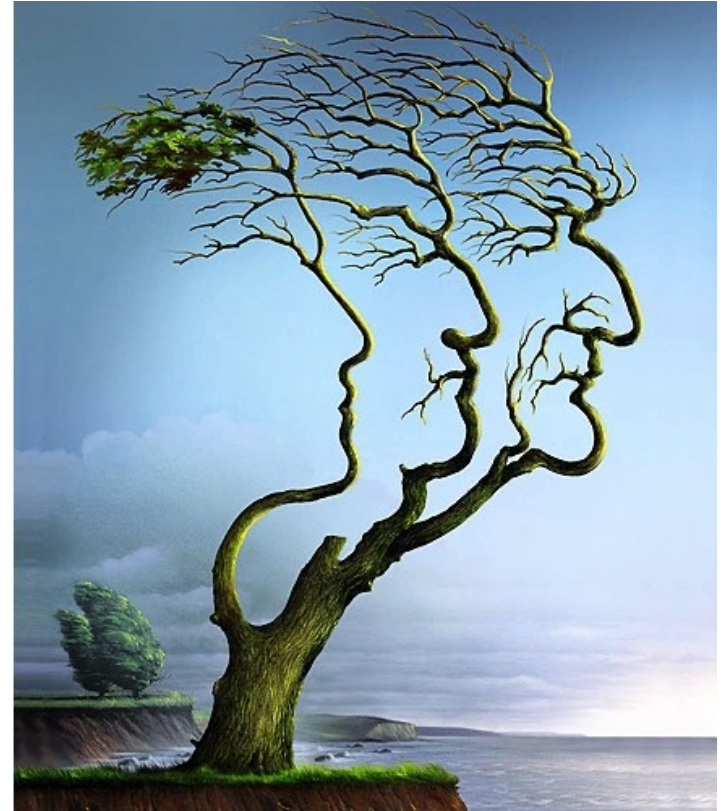
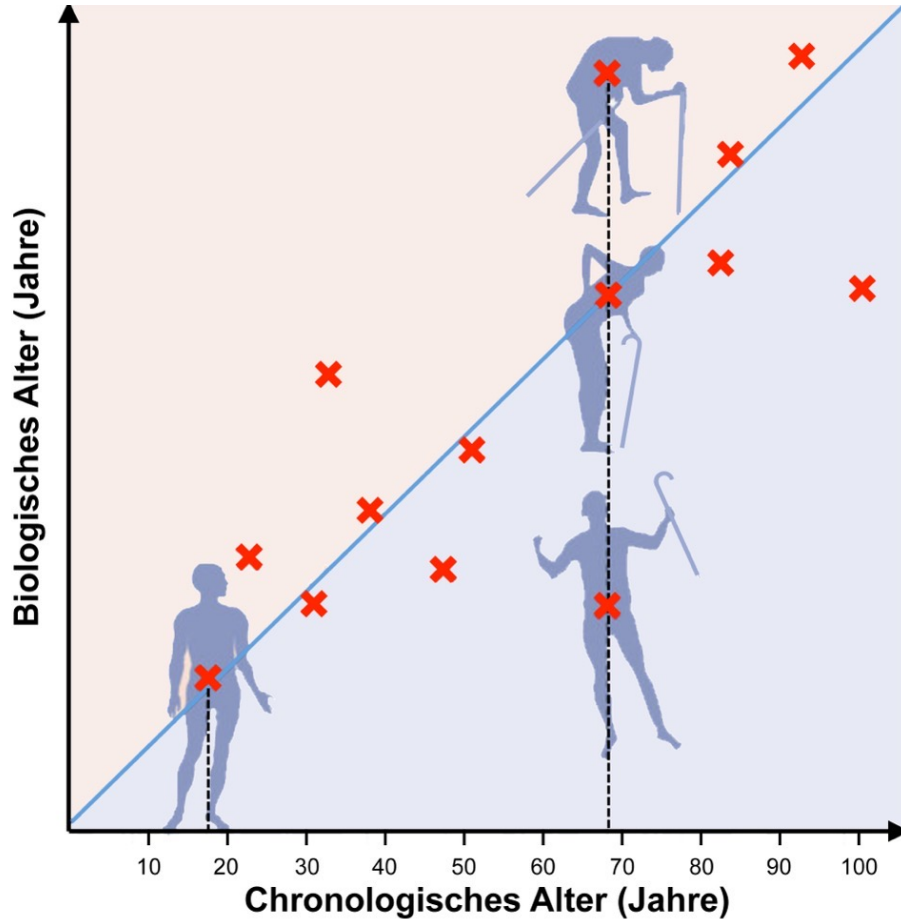
Gesund und glücklich altern und unabhängig leben!



Lucas Cranach der Ältere "Frauen im Jungbrunnen"



# What are the reasons for biological aging?

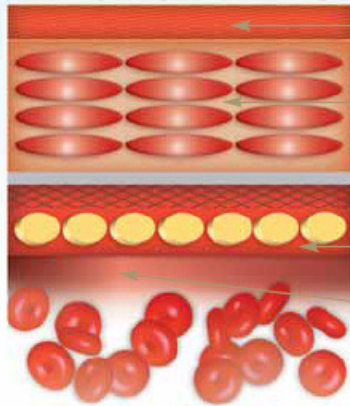




## Arteries: Young and Old

Biochemical changes can lead to structural breakdowns in the aging arterial wall

### Young Artery



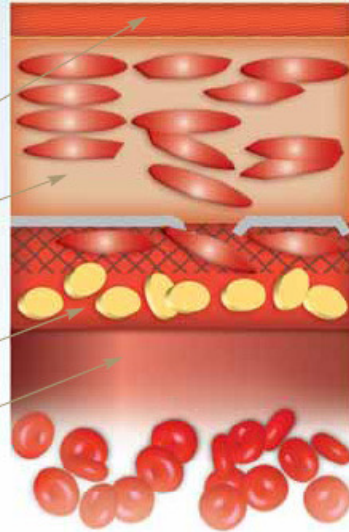
Adventitia

Media

Intima

Arterial Lumen

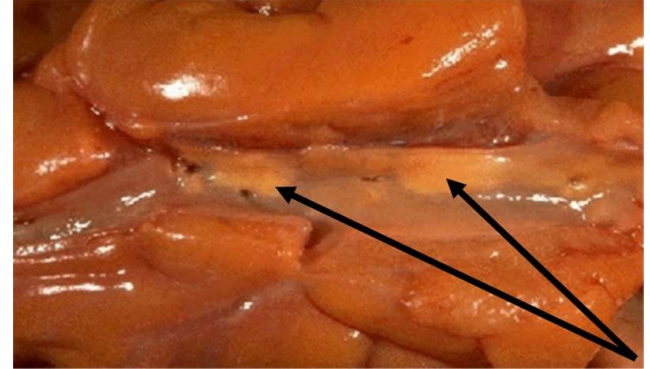
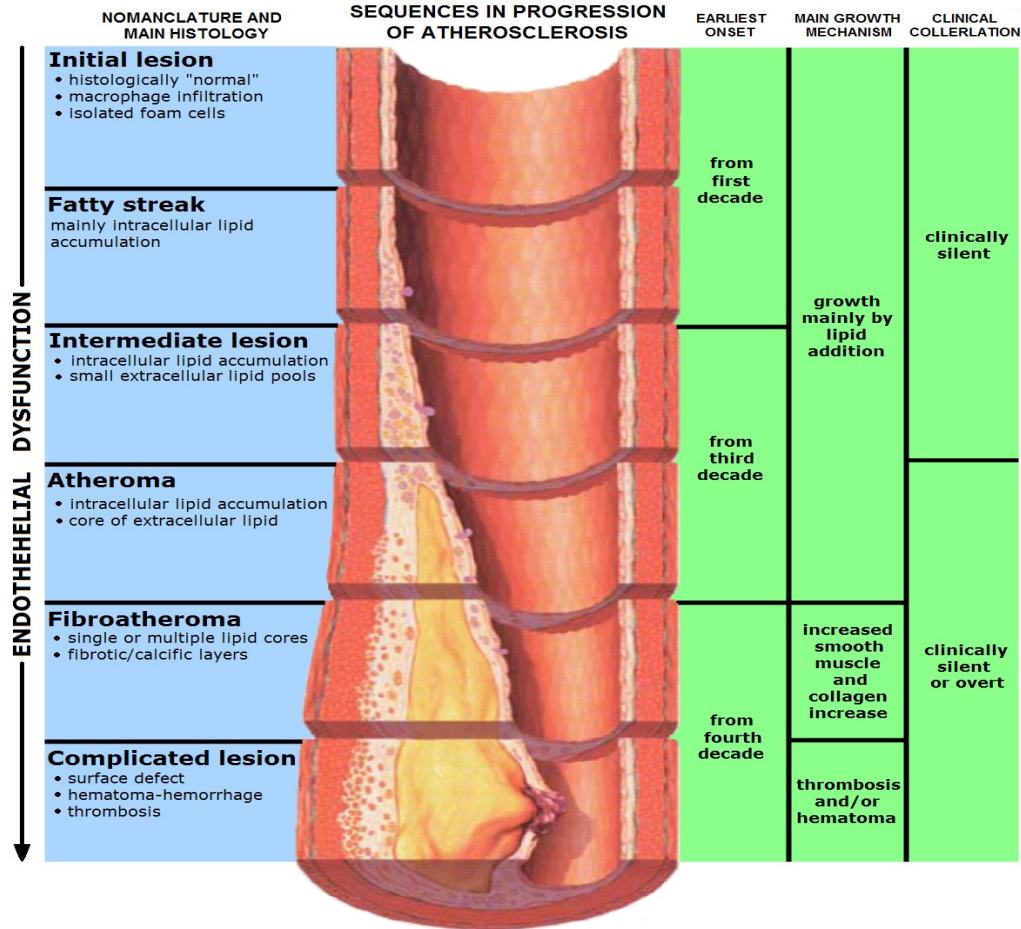
### Old Artery



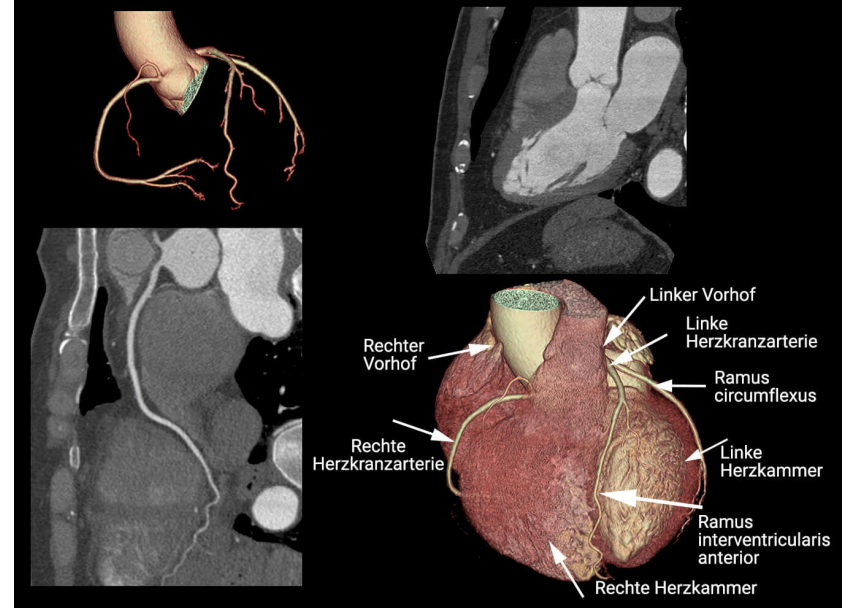
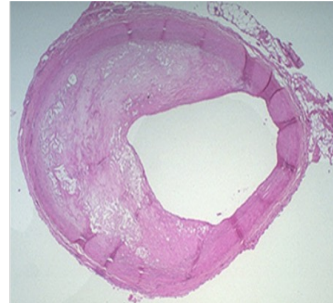
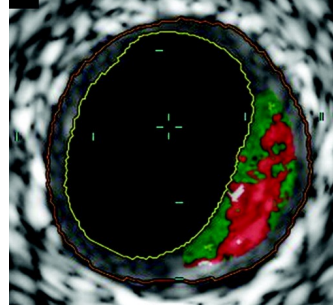
**Der Mensch ist so alt wie  
seine Arterien.**

**Thomas Sydenham, MD  
English Physician 1624-1689**

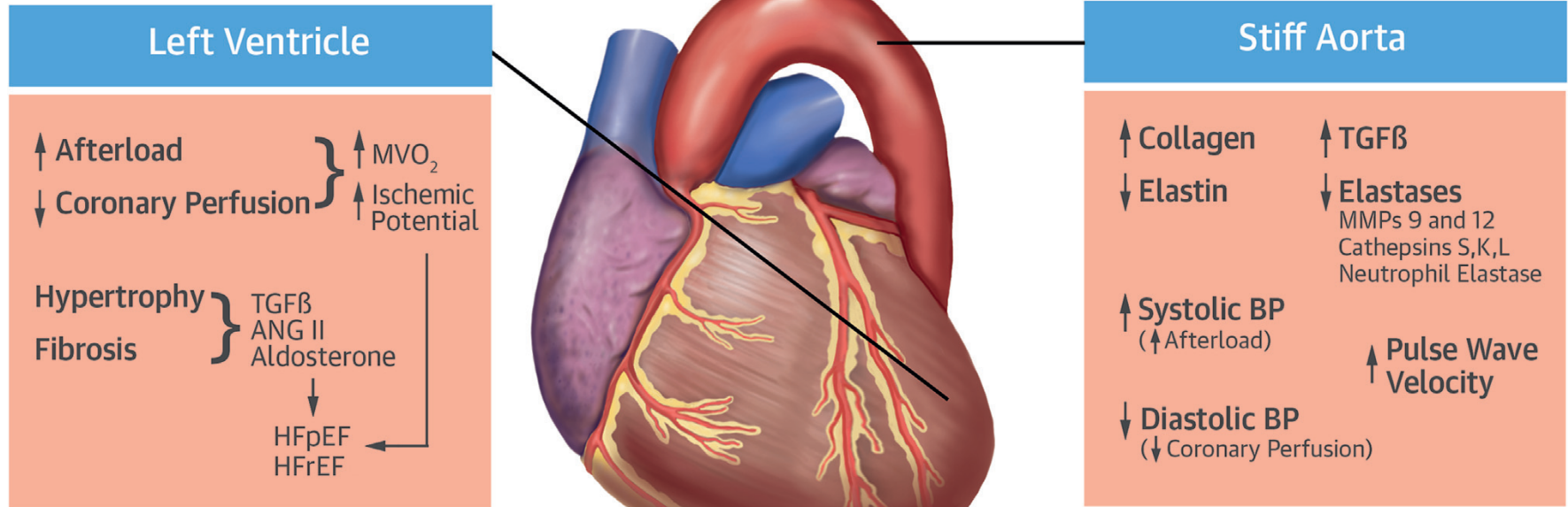




# Diagnostik der Atherosklerose



# Kardiovaskuläres Altern – Physiologische Faktoren

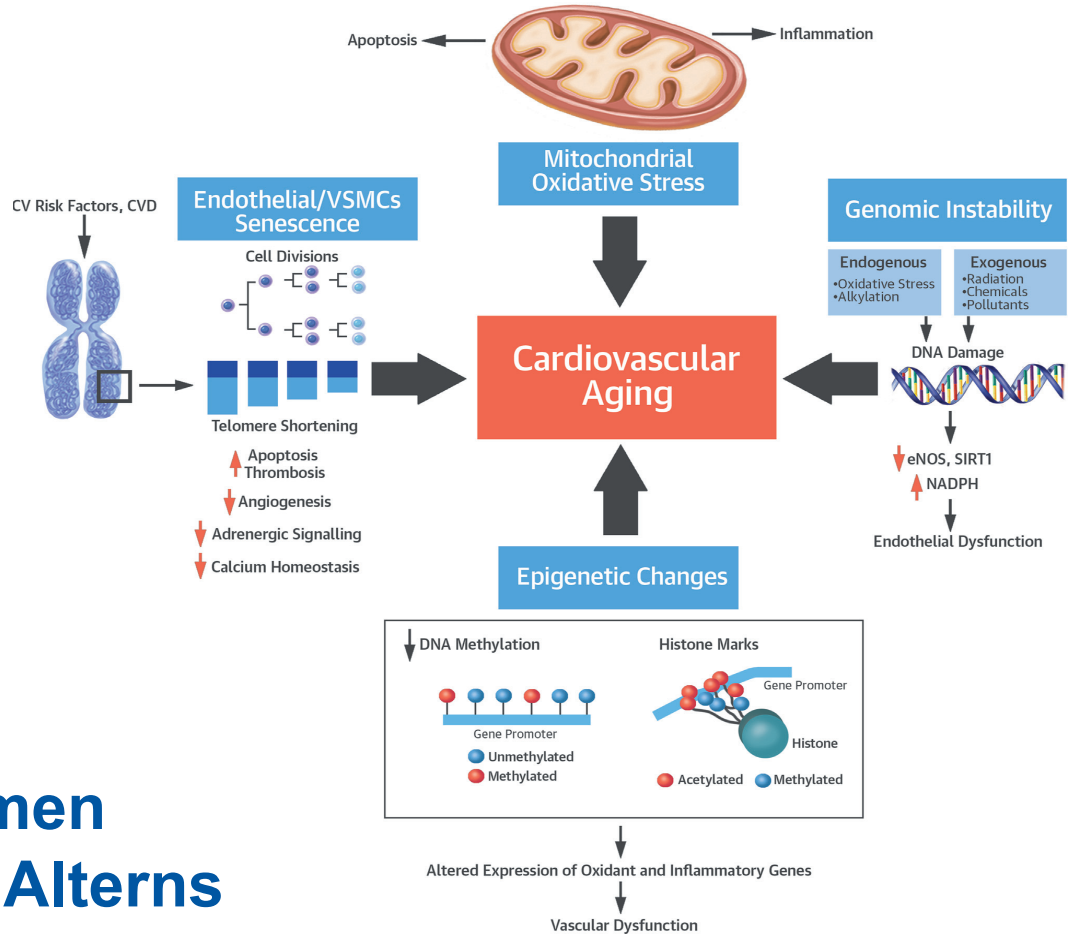


Does aging depend on one gene?

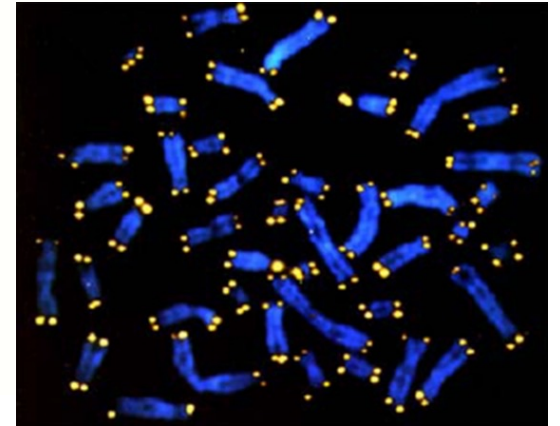
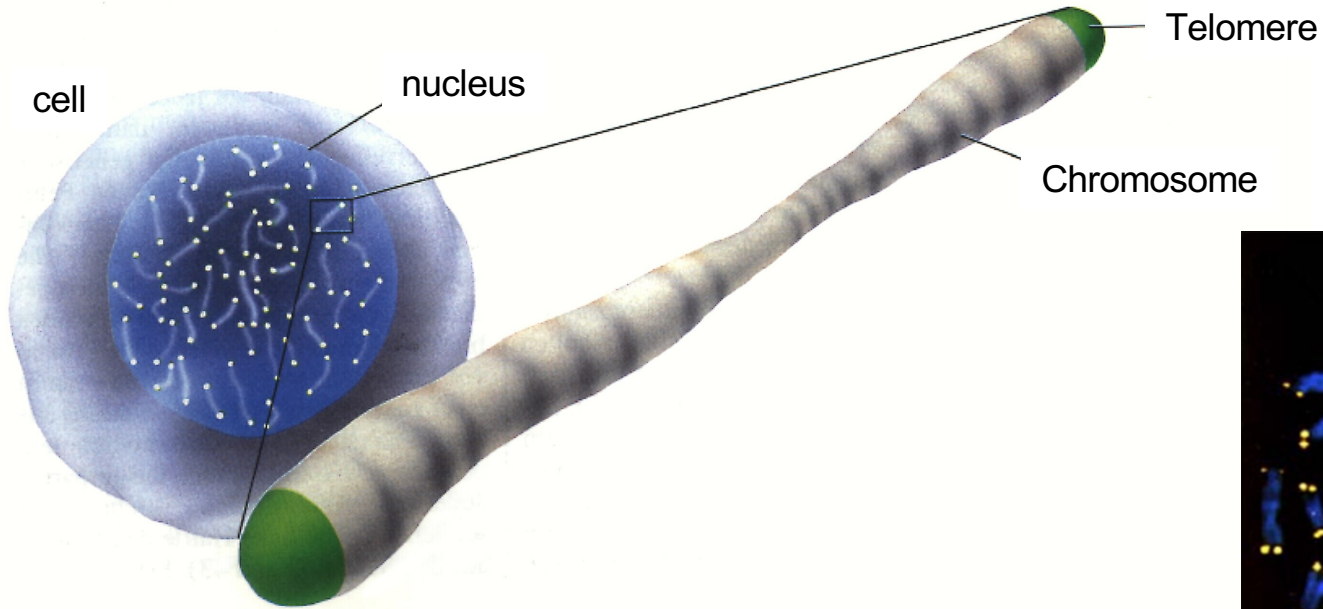


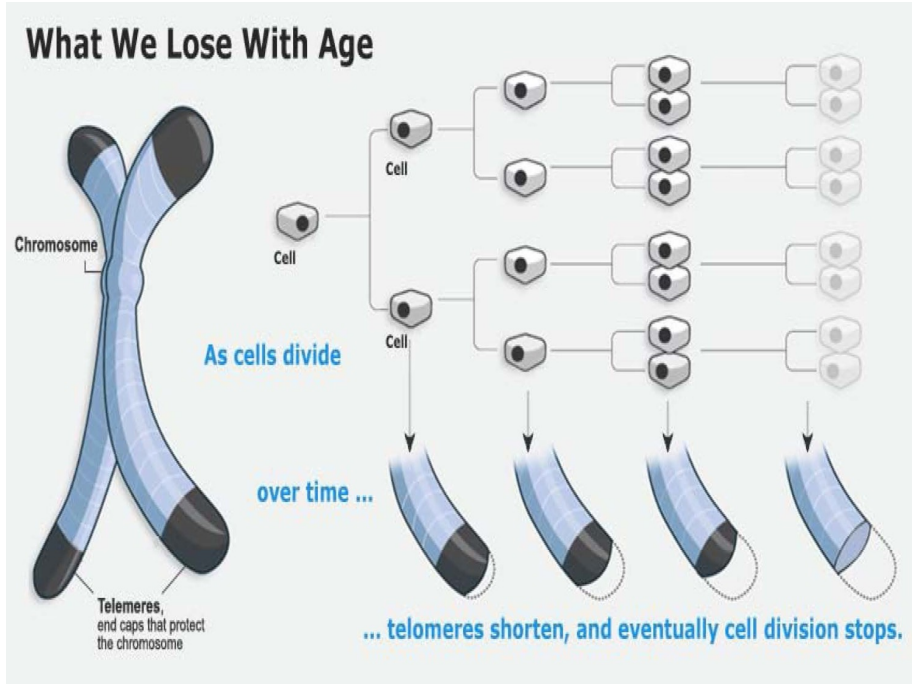
Okinawa Centenarian Study

# Molekulare Mechanismen des kardiovaskulären Alterns



# Telomeres





The Nobel Prize in Physiology or Medicine 2009



Elizabeth H. Blackburn



Carol W. Greider

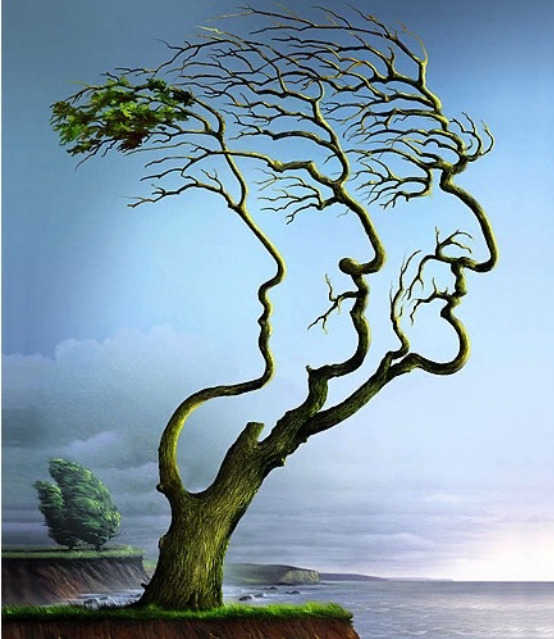
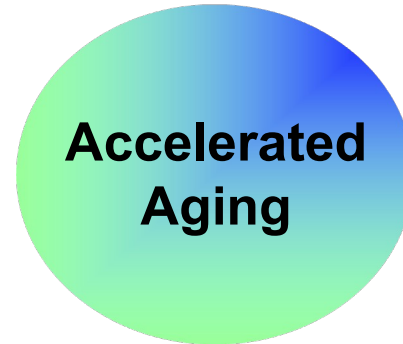
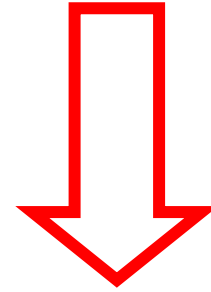
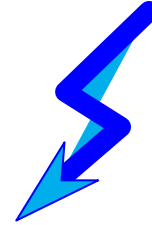


Jack W. Szostak

**”for the discovery of the telomeres and the enzyme telomerase”**

Diet

Environment







**CALORIE RESTRICTION DIET**

**Canto, 25**

Although a senior citizen — the average rhesus monkey lifespan in captivity is 27 — Canto, above, is aging fairly well. Outwardly, he has a nice coat, elastic skin, a smooth gait, upright posture and an energetic demeanor. His bloodwork shows he is as healthy as he looks.

**Human equivalent** Meals prepared by Mike Linksvayer, 36



**Breakfast** fermented soybeans and garlic



**Lunch** tofu, konyakku and carrots



**Dinner** vegan sausage, kale, tomato sauce and salad

**2000 kCal**

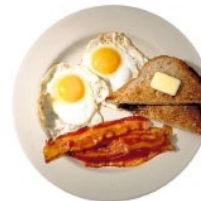


**NORMAL DIET**

**Owen, 26**

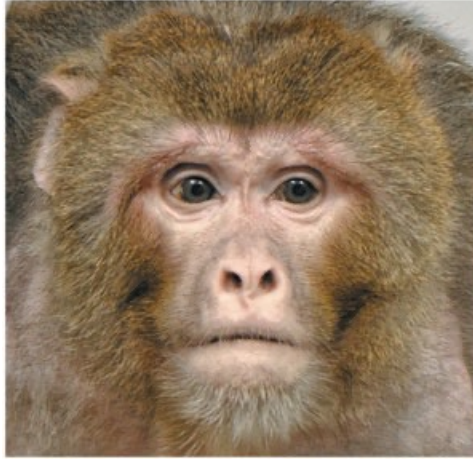
He gets more food, but Owen, above, isn't aging as well. His posture has been affected by arthritis. His skin is wrinkled and his hair is falling out. Owen is frail and moves slowly. His bloodwork shows unhealthy levels of glucose and triglycerides.

Diet of an average, active human male of 36



**3000 kCal**

Photos by Jim Wilson and Tony Cenicola/The New York Times and Lars Klove for The New York Times



"all you can eat"



"half"



**Hundert  
Jahre -  
aber  
immer  
hungrig?**



## Therapien der Atherosklerose und KHK

Allgemein:

ASS

Betablocker

ACEi/ARB

Statine



**Siehe Vorlesung „Sekundärprophylaxe KHK“**

## Zusammenfassung – Take home points

Kardiovaskuläres Altern wird durch oxidativen Stress, genomische Instabilität, epigenetische Faktoren und zelluläre Seneszenz beeinflusst.

Marker des kardiovaskulären Alterns sind die Erhöhung der myokardialen Fibrose und Hypertrophie mit gestörter Koronarfunktion sowie eine erhöhte vaskuläre Steifheit.

Biologisches Altern steht dem chronologischen Altern gegenüber und ist durch externe Faktoren (Diät) beeinflussbar.

## Weiterführende Literatur

Braunwald. Heart Disease. 12. Auflage. Elsevier. 2022

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Pietri et al. Cardiovascular Aging and Longevity. JACC 2021

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# Molekulare Regulation des kardiovaskulären Alterns

