



Evolutionair Denken

wat is het & wat kun je er mee?

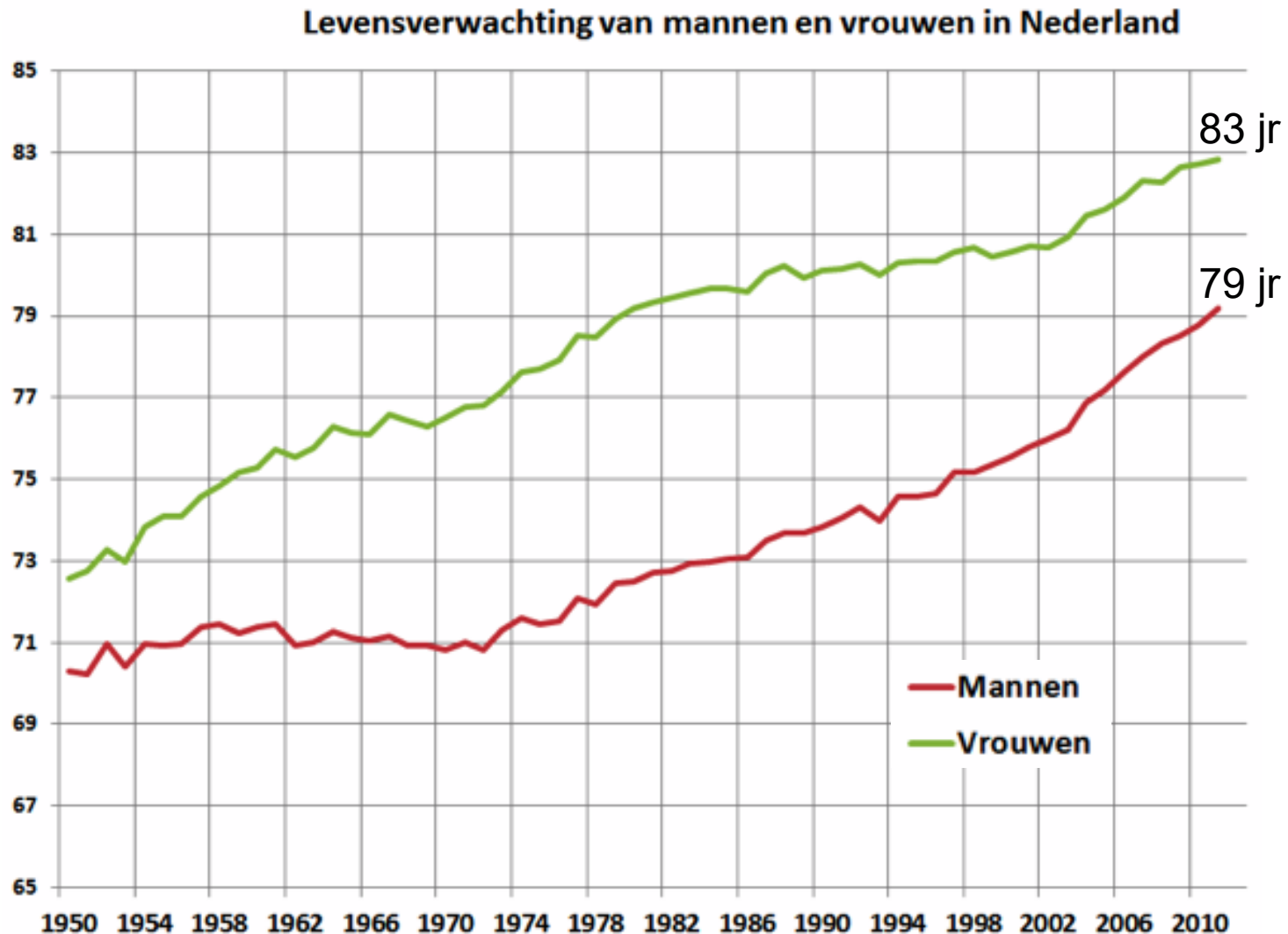
Disclosure belangen spreker

(potentiële) belangenverstrengeling	Zie hieronder
Voor bijeenkomst mogelijk relevante relaties met bedrijven Honorarium of andere (financiële) vergoeding	<i>Speakers honoraria from:</i> ABN-Amro, Academy of Integrative Medicine, Bonusan, Care by Nature, Folia Orthica, Health Benefits 08, Hogeschool NHLStenden, Hormoonfactor, Hormooncommunity, ING, Nationale Nederlanden, Nutriphyt, Facebook, Natura Foundation, Otro Elements, Pro-Osteo, SCEM (Seinen Congres & Events Management), Stichting Education Atrium Innovations
• Sponsoring of onderzoeksgeld • Aandeelhouder • Andere relatie, namelijk ...	- Friesland-Campina - Eigenaar www.remkokuipers.com - Auteur: <i>Oerdieet</i> - Auteur: <i>Oergezond</i> Supporter and practitioner of a healthy lifestyle

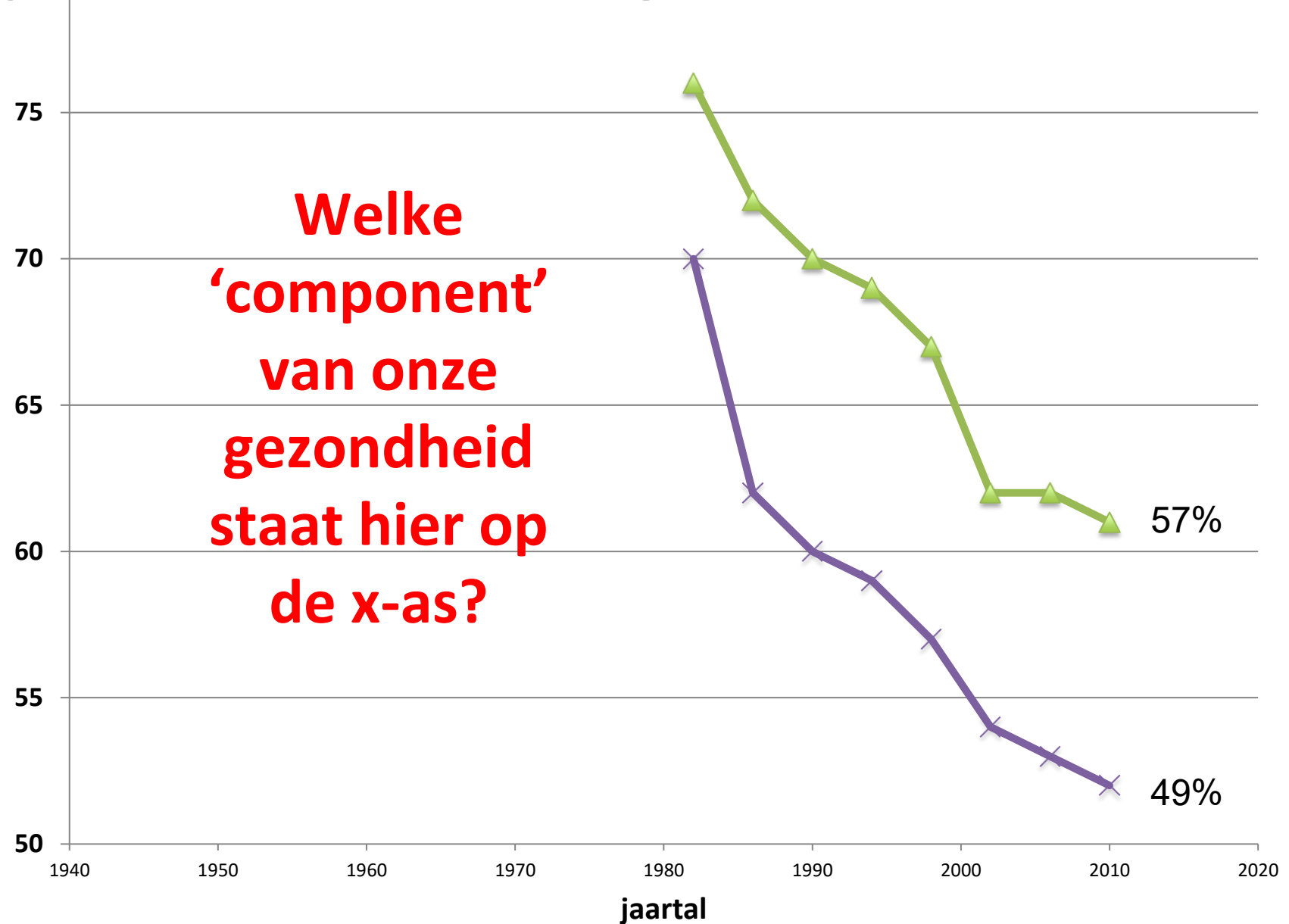
Evolutionair Denken

Introductie

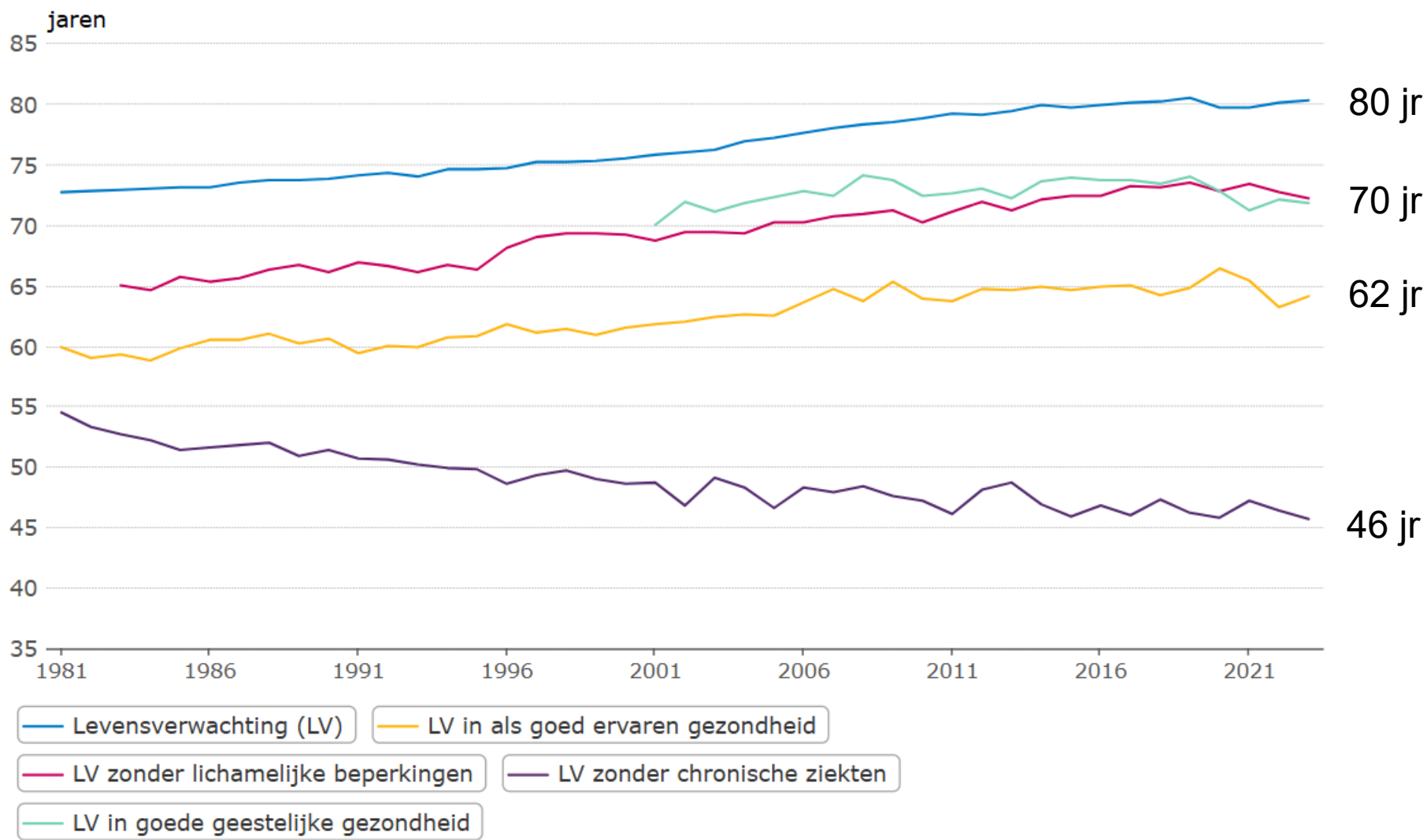
Lang leve onze gezondheid!



Of is het niet alles goud wat er blinkt?

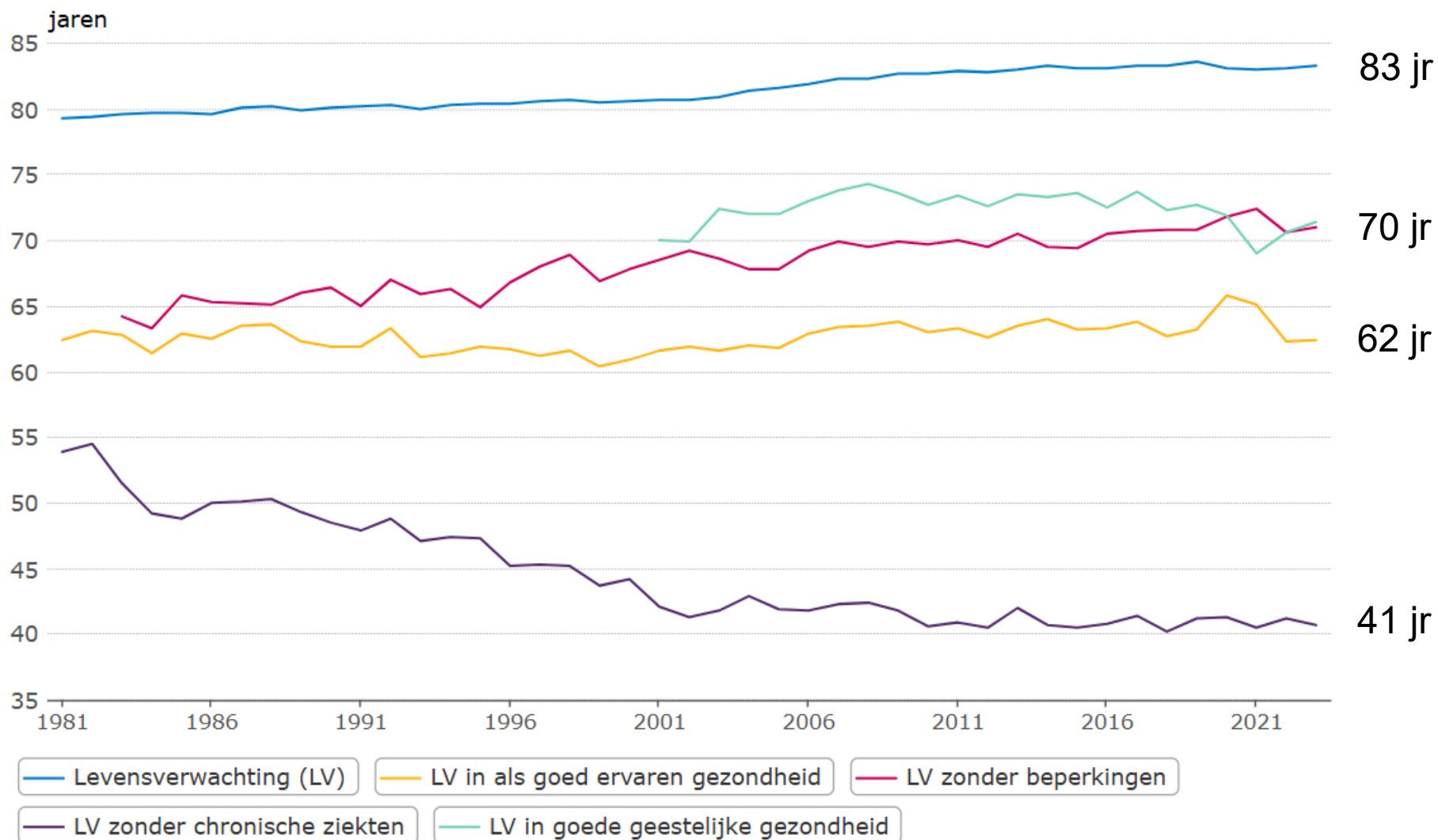


(Gezonde) levensverwachting mannen 1981-2023

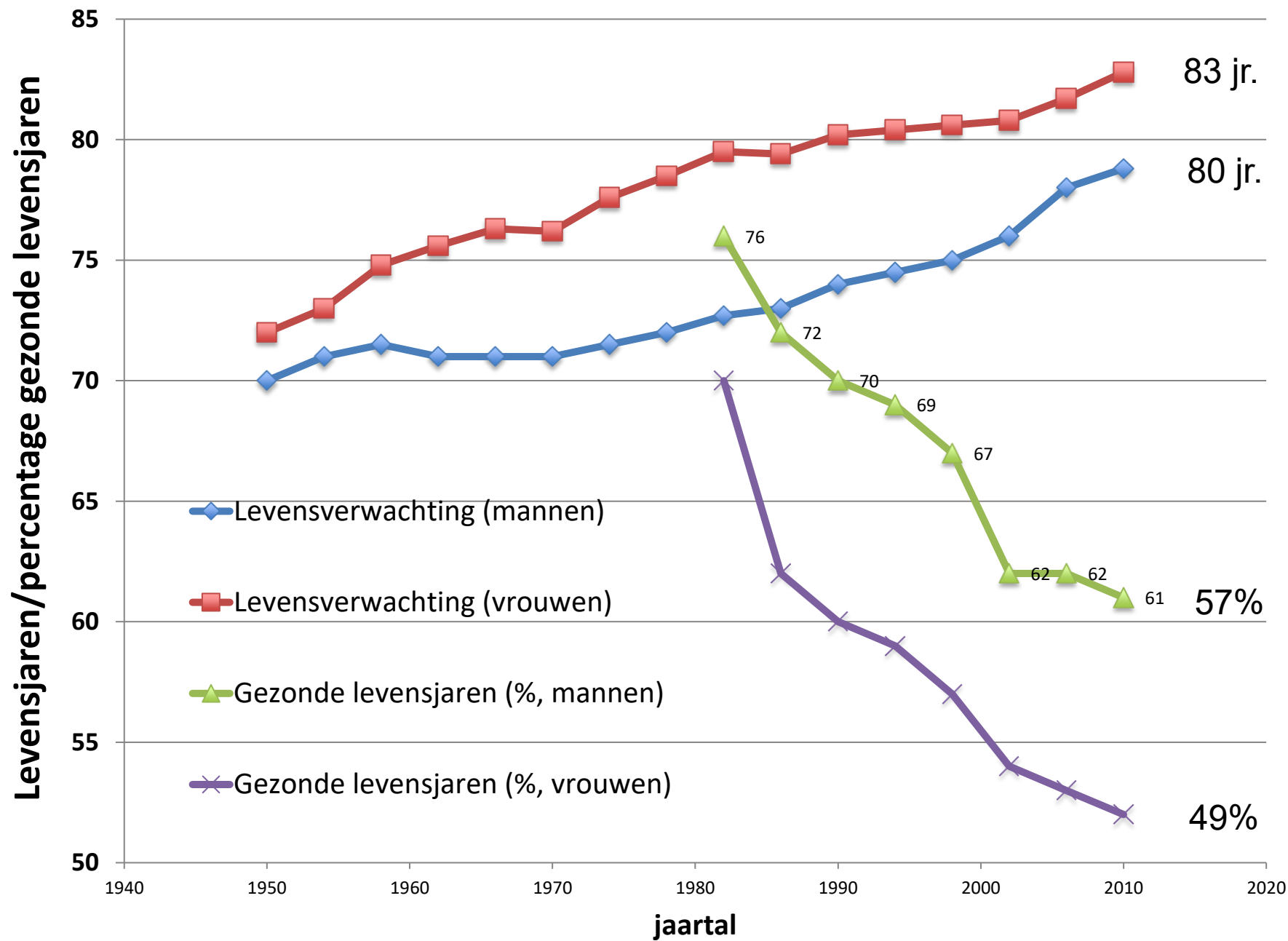


Bron: <https://www.vzinfo.nl/gezonde-levensverwachting/leeftijd-en-geslacht>

(Gezonde) levensverwachting vrouwen 1981-2023



Bron: <https://www.vzinfo.nl/gezonde-levensverwachting/leeftijd-en-geslacht>

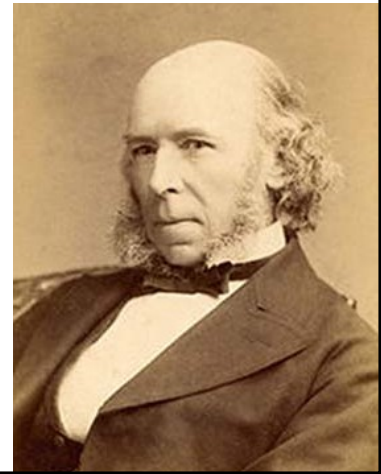


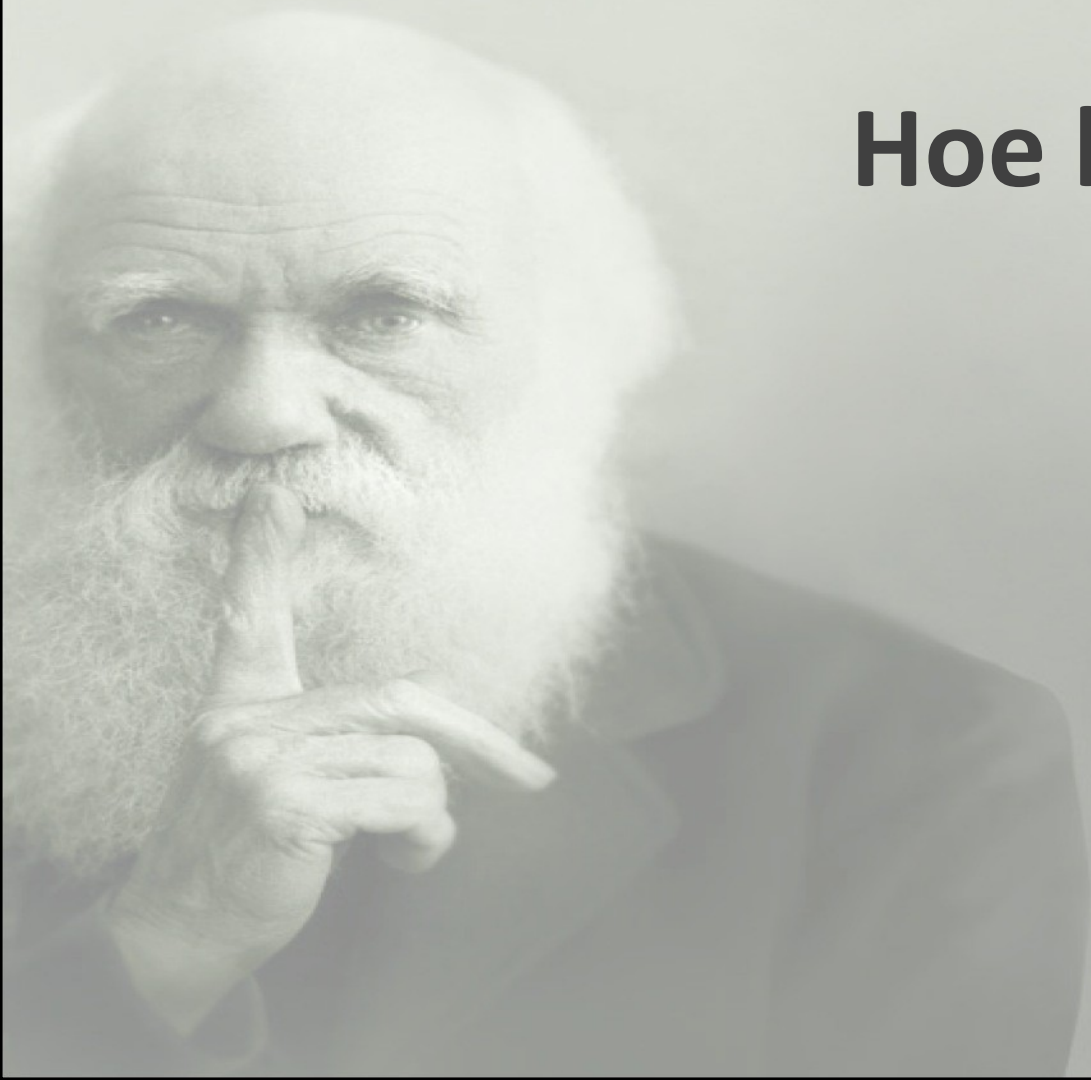


Take home message No. 1:



We worden *steeds ouder*
maar ook
steeds *jonger ziek*:
dubbel zo lang chronisch ziek





Hoe kan dit nou?

The problem starts... at (before?) birth

The epidemiological burden of obesity in childhood: a worldwide epidemic requiring urgent action

Table 3 Estimates of the proportion of obese children aged 2–4 years, by region

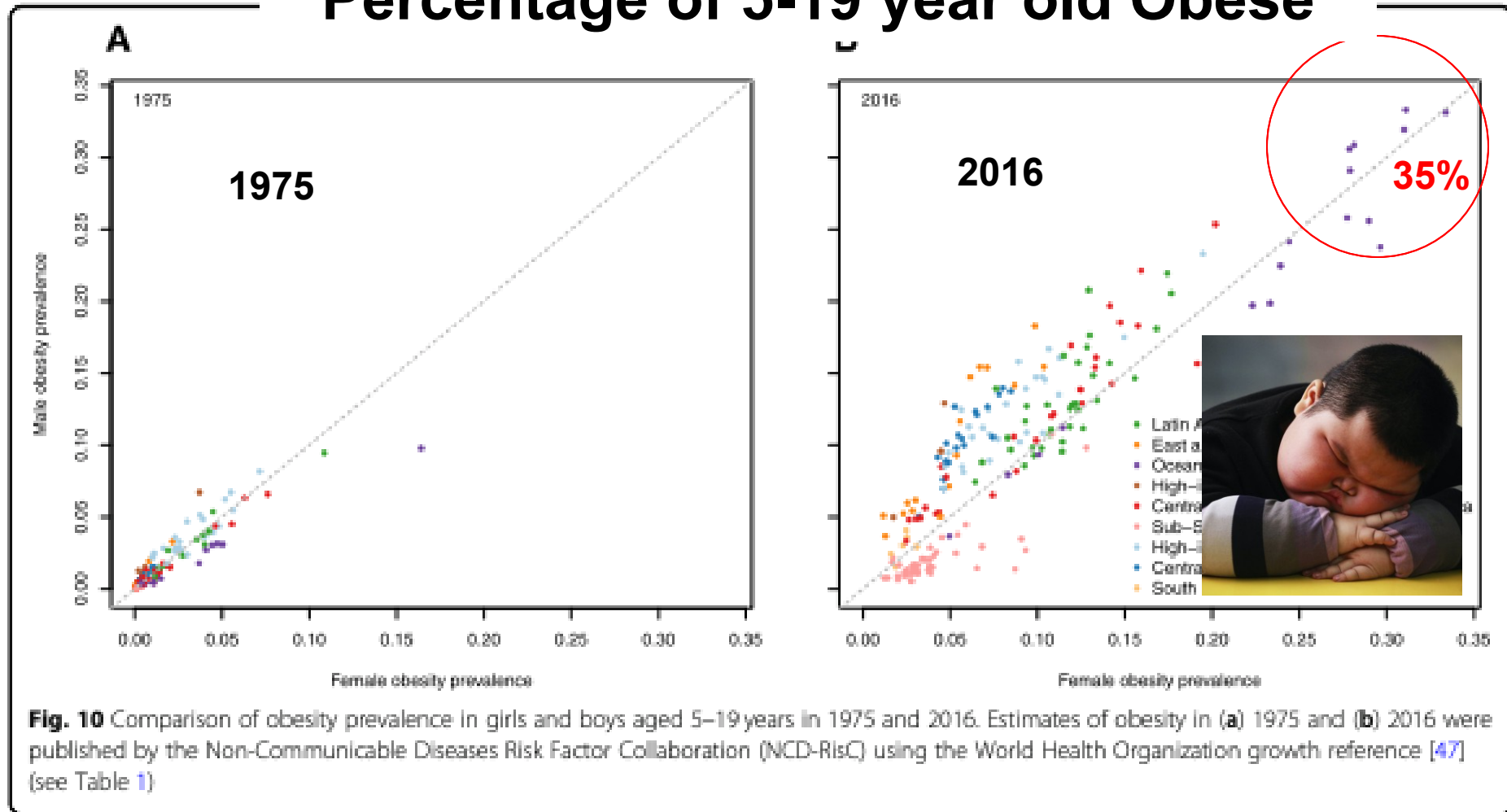
Region	Sex	1980 (% obese)	2015
Sub-Saharan Africa	Female	3.7 (3.1–4.4)	5.4 (4.5–6.5)
	Male	4.3 (3.4–5.5)	5.8 (4.7–7.1)
South Asia	Female	2.8 (1.5–4.9)	4.0 (2.1–7.1)
	Male	2.4 (1.3–4.2)	4.5 (2.3–8.1)
East and Southeast Asia and Oceania	Female	2.3 (1.4–3.8)	6.8 (4.2–10.8)
	Male	2.3 (1.4–3.7)	8.1 (4.8–12.5)
High-income countries	Female	6.0 (4.9–7.2)	8.9 (7.2–10.9)
	Male	6.1 (4.9–7.6)	10.0 (8.0–12.4)
Latin America and the Caribbean	Female	3.9 (2.7–5.7)	8.7 (6.0–12.4)
	Male	5.0 (3.2–8.0)	9.8 (6.4–14.1)
Middle East and North Africa	Female	4.3 (3.7–5.1)	9.2 (7.6–10.9)
	Male	3.5 (2.9–4.3)	8.8 (7.3–10.7)
Central and Eastern Europe and Central Asia	Female	9.0 (7.3–11.1)	9.3 (7.7–11.3)
	Male	11.5 (9.4–14.1)	12.6 (10.4–15.0)



Estimates were published by the Institute for Health Metrics and Evaluation (see Table 1)

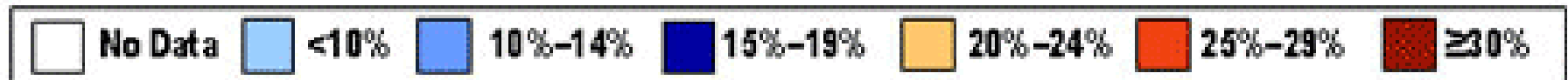
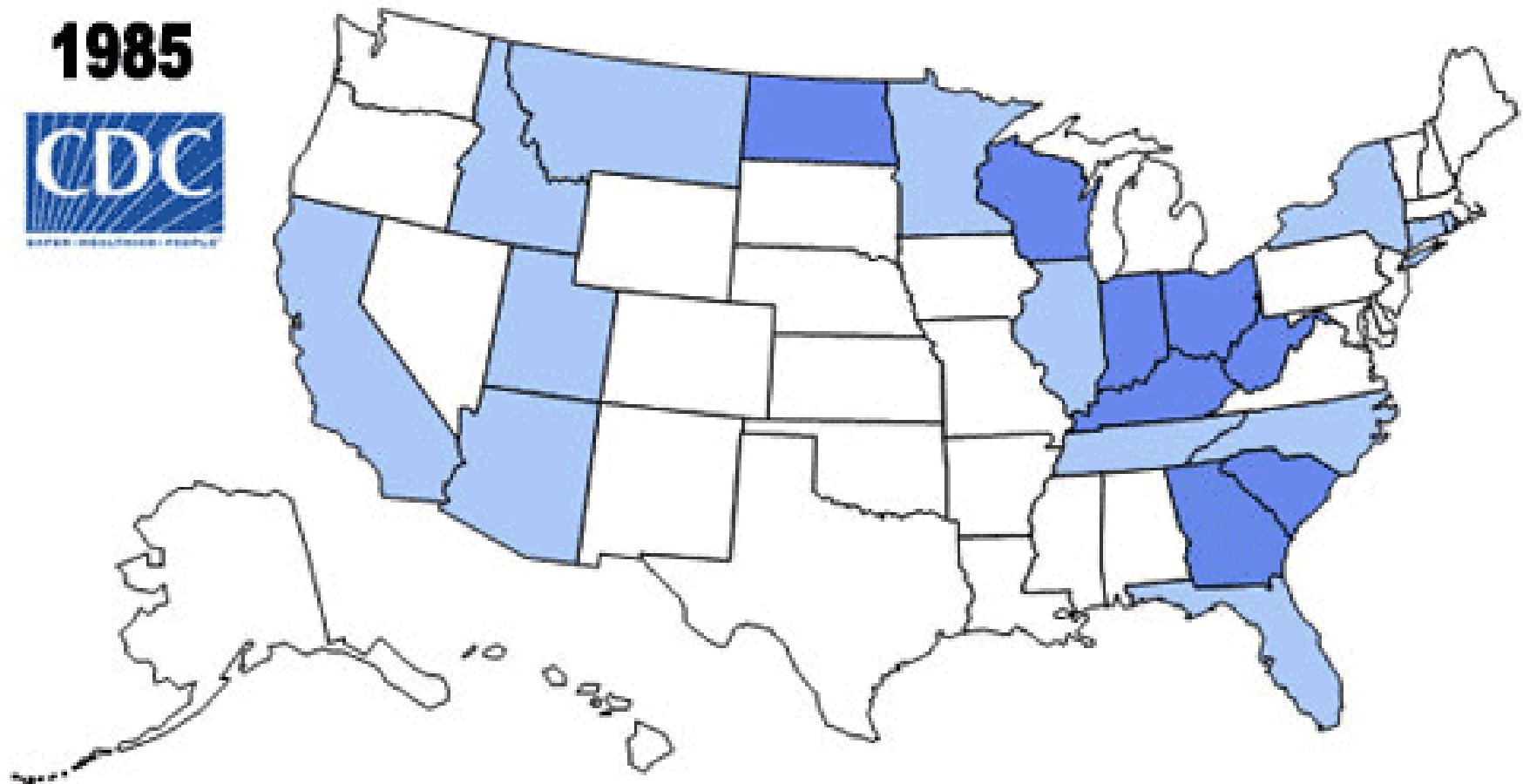
The problem continues at school(?)

Percentage of 5-19 year old Obese

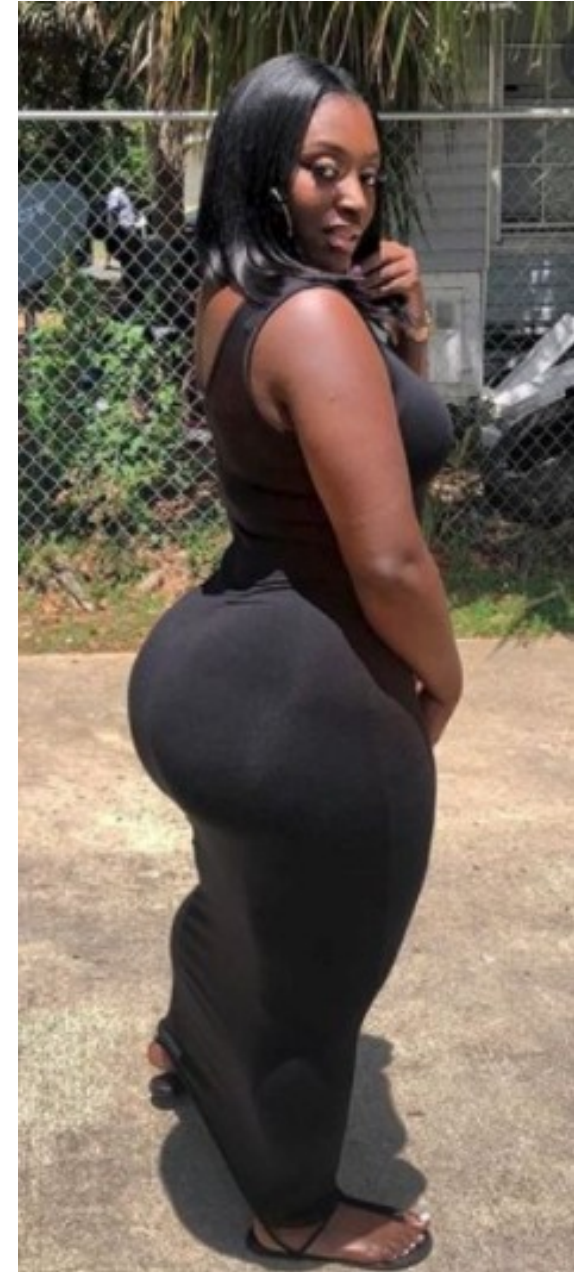
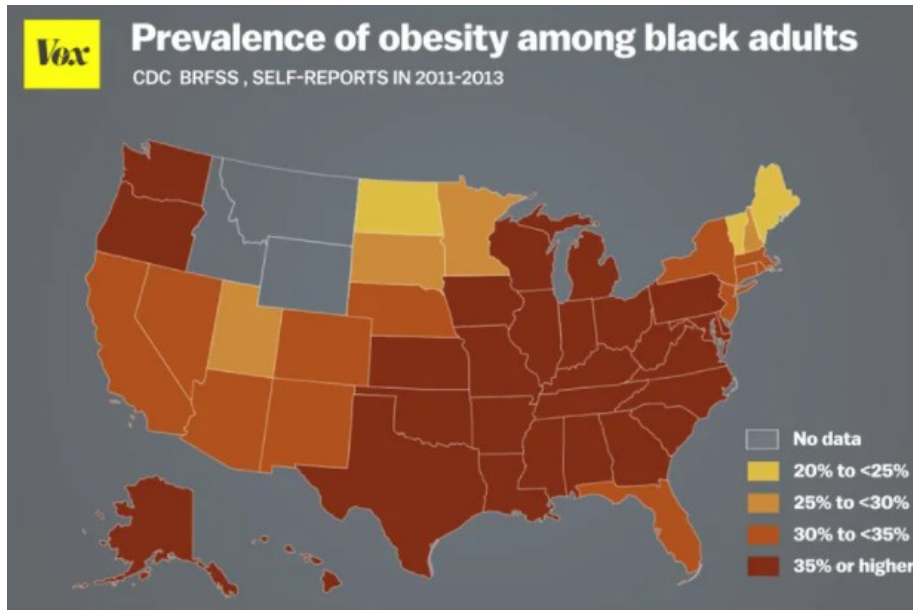
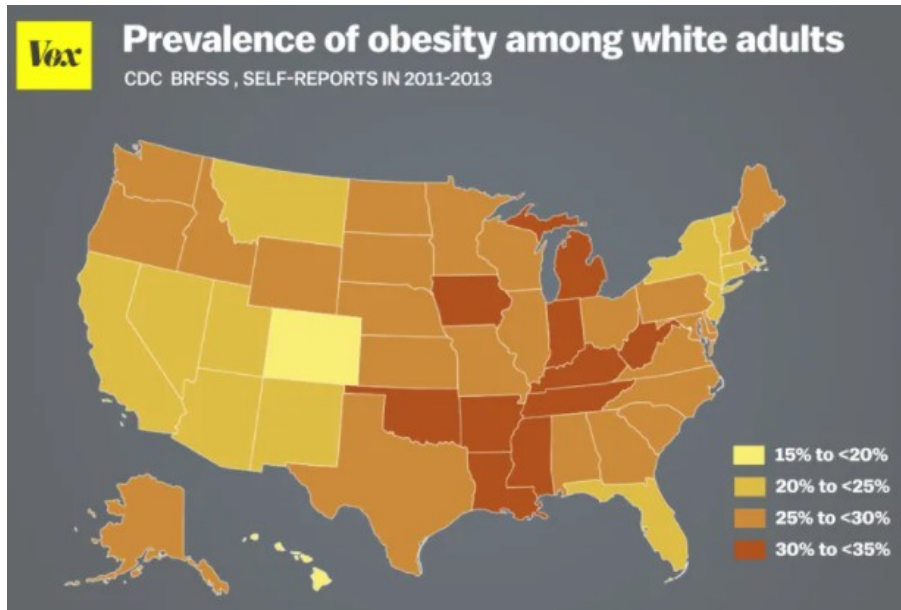


Obesity rates in the US

1985

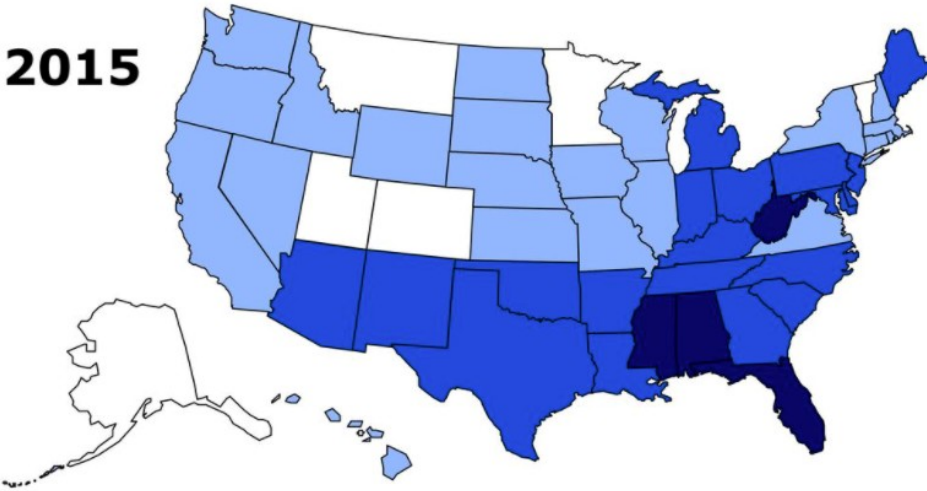


Culturalisme ≠ Racisme (Yuval Harari)

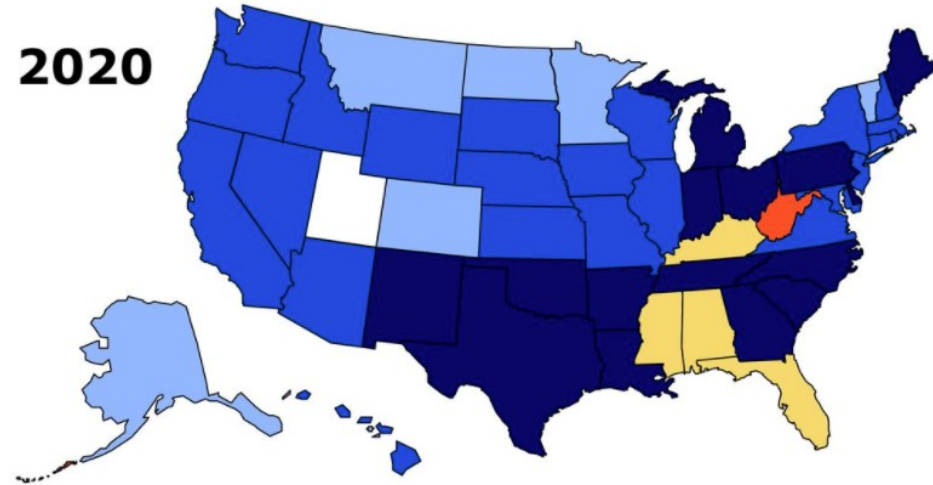


Obesity -> Diabetes: rates in the US

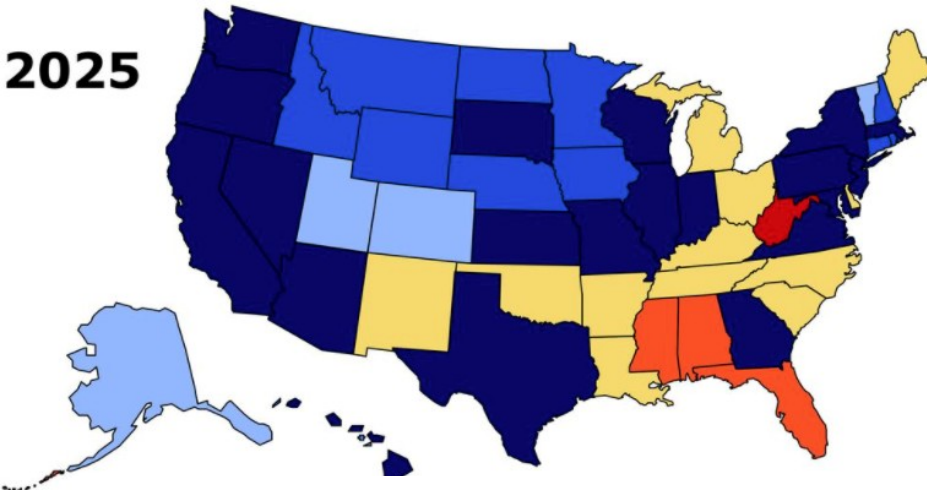
2015



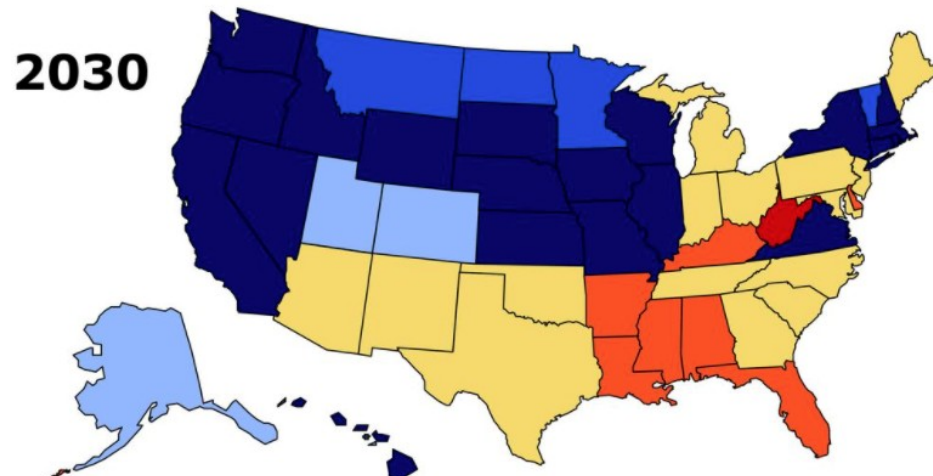
2020



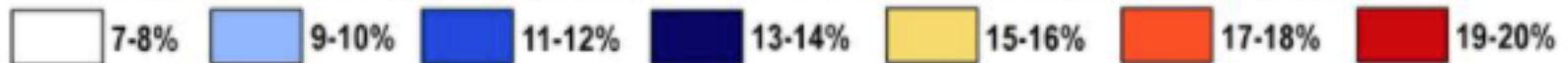
2025



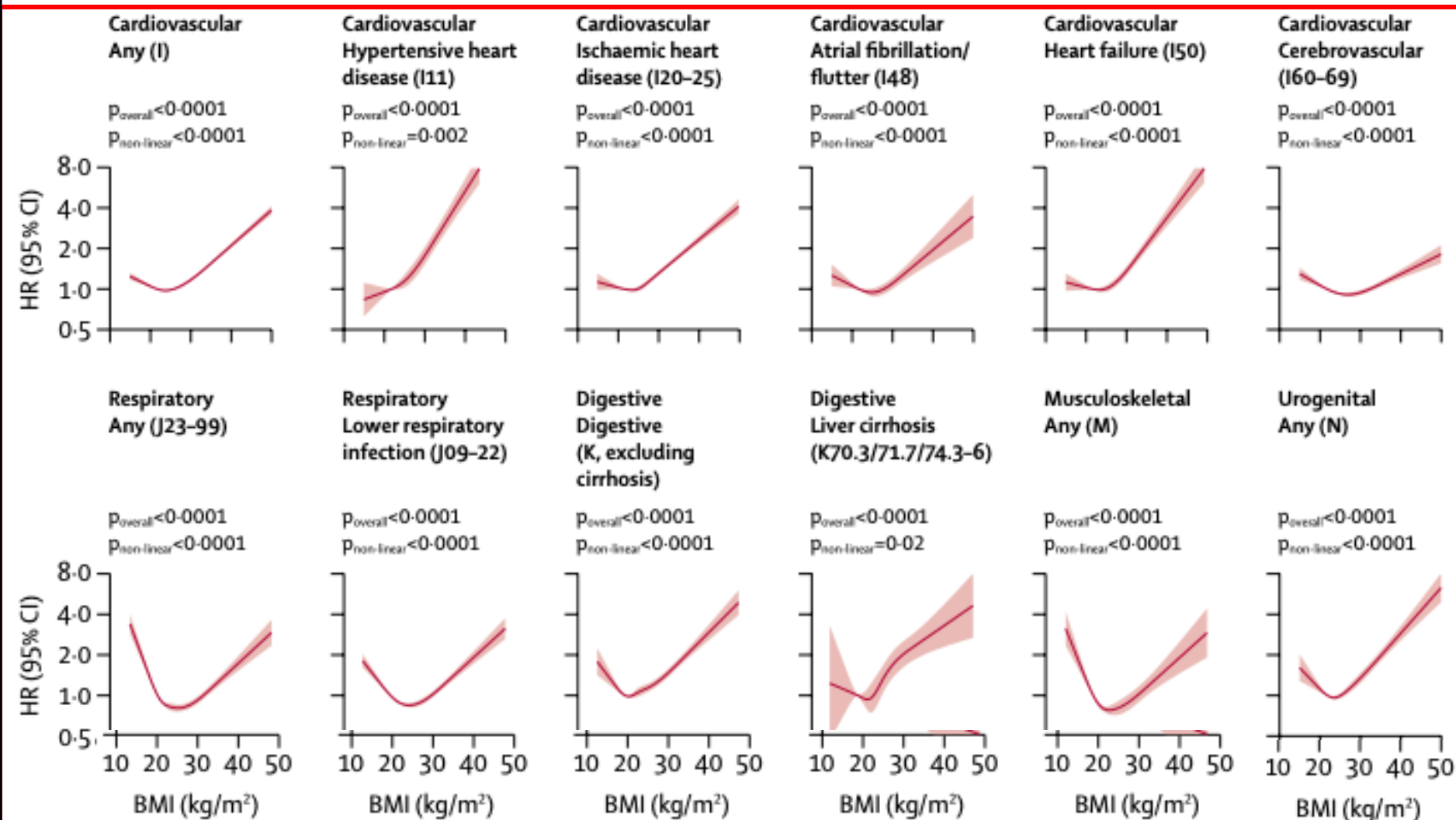
2030



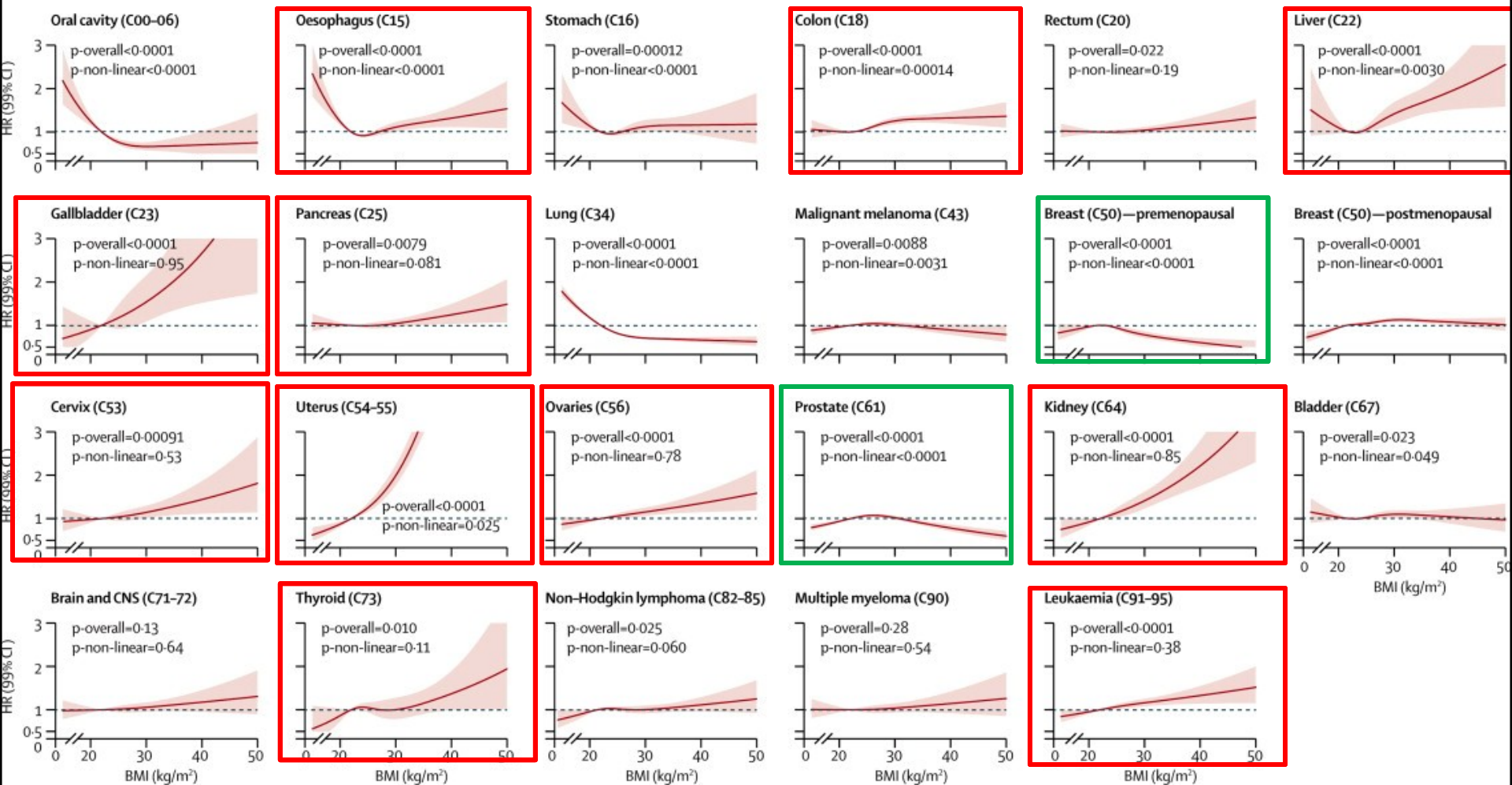
Percent of Total Population with Diabetes (Diagnosed and Undiagnosed)



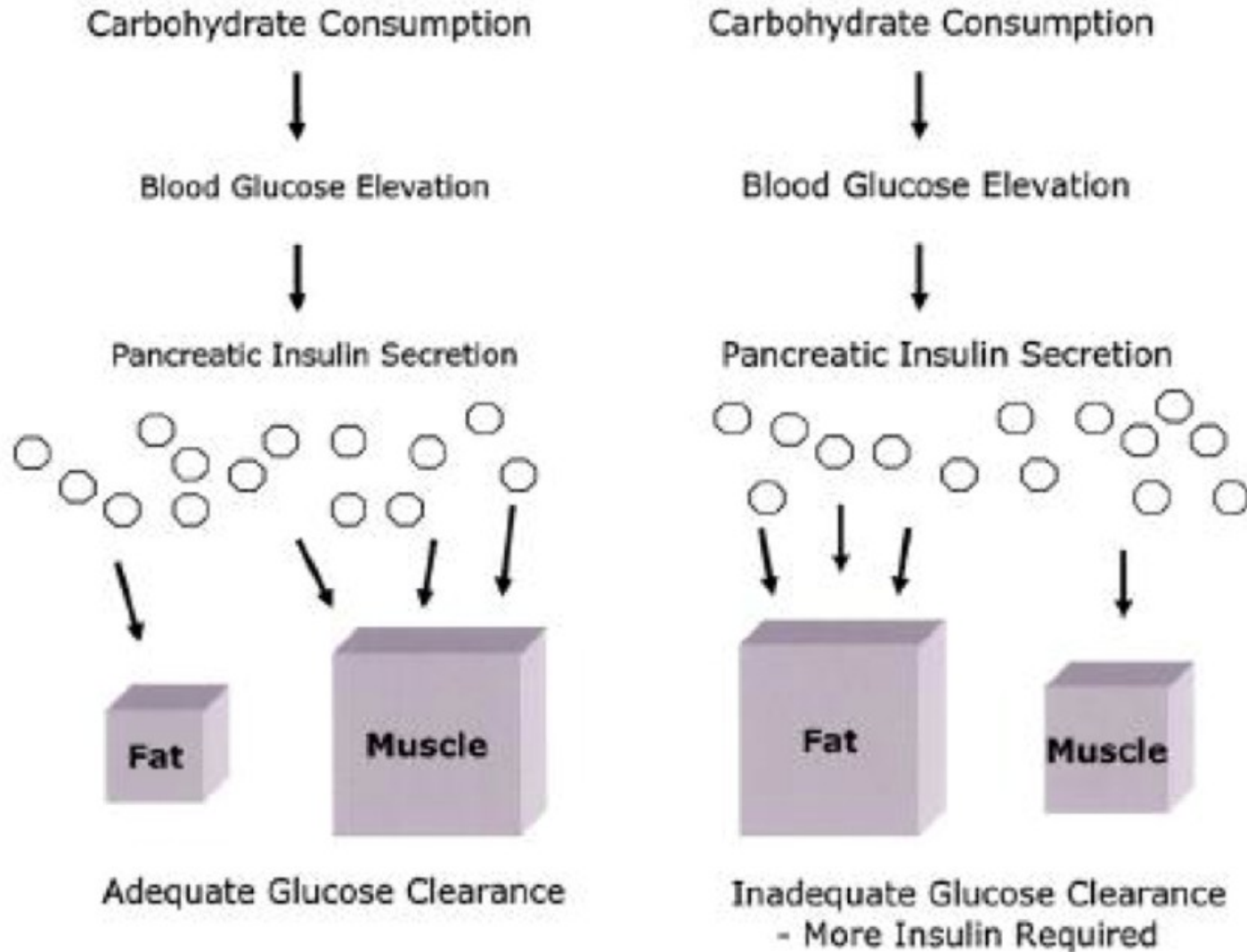
Obesity and CVD / other



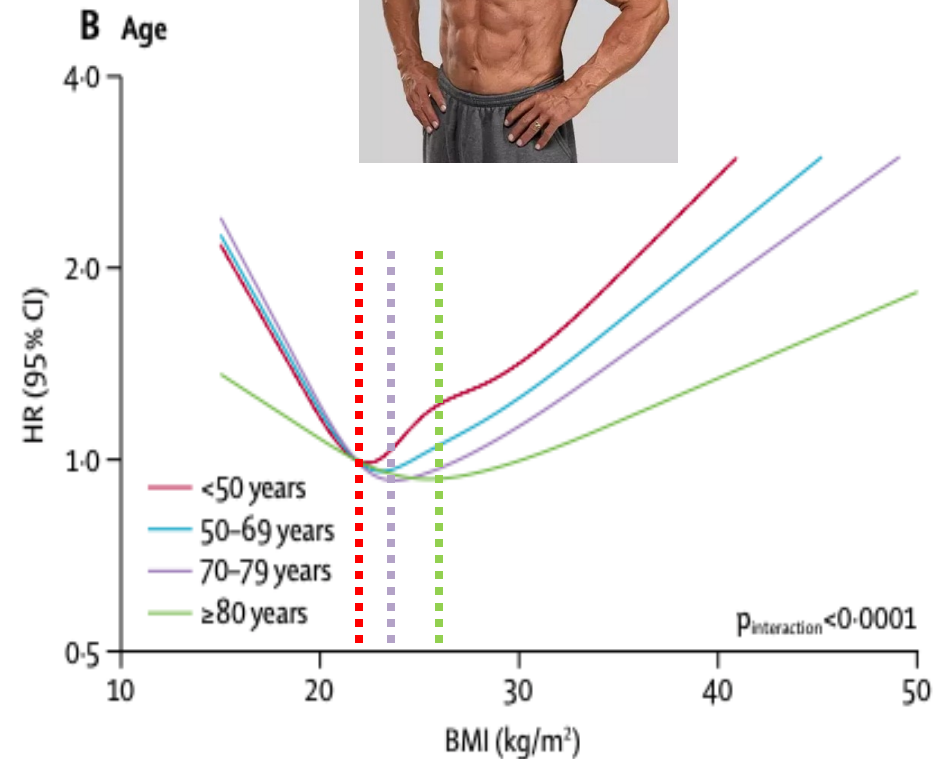
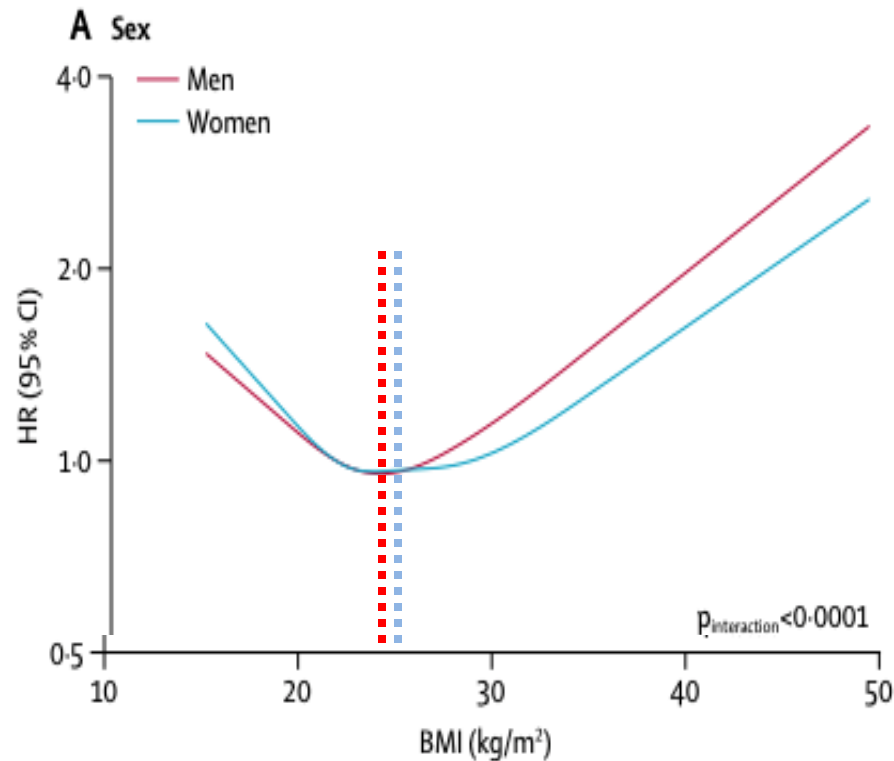
Obesity and Cancer



Sarcopenie & diabetes



Obesity and all-cause mortality



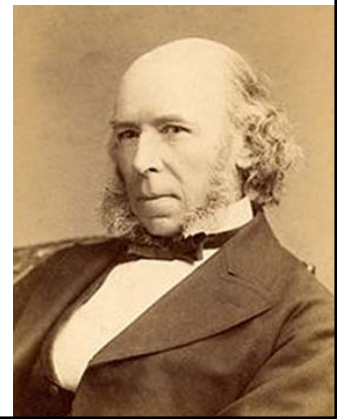
Bhaskaran et al, BMI and overall and cause specific mortality in 2.6 million UK adults, 2018



Take home message No. 3:



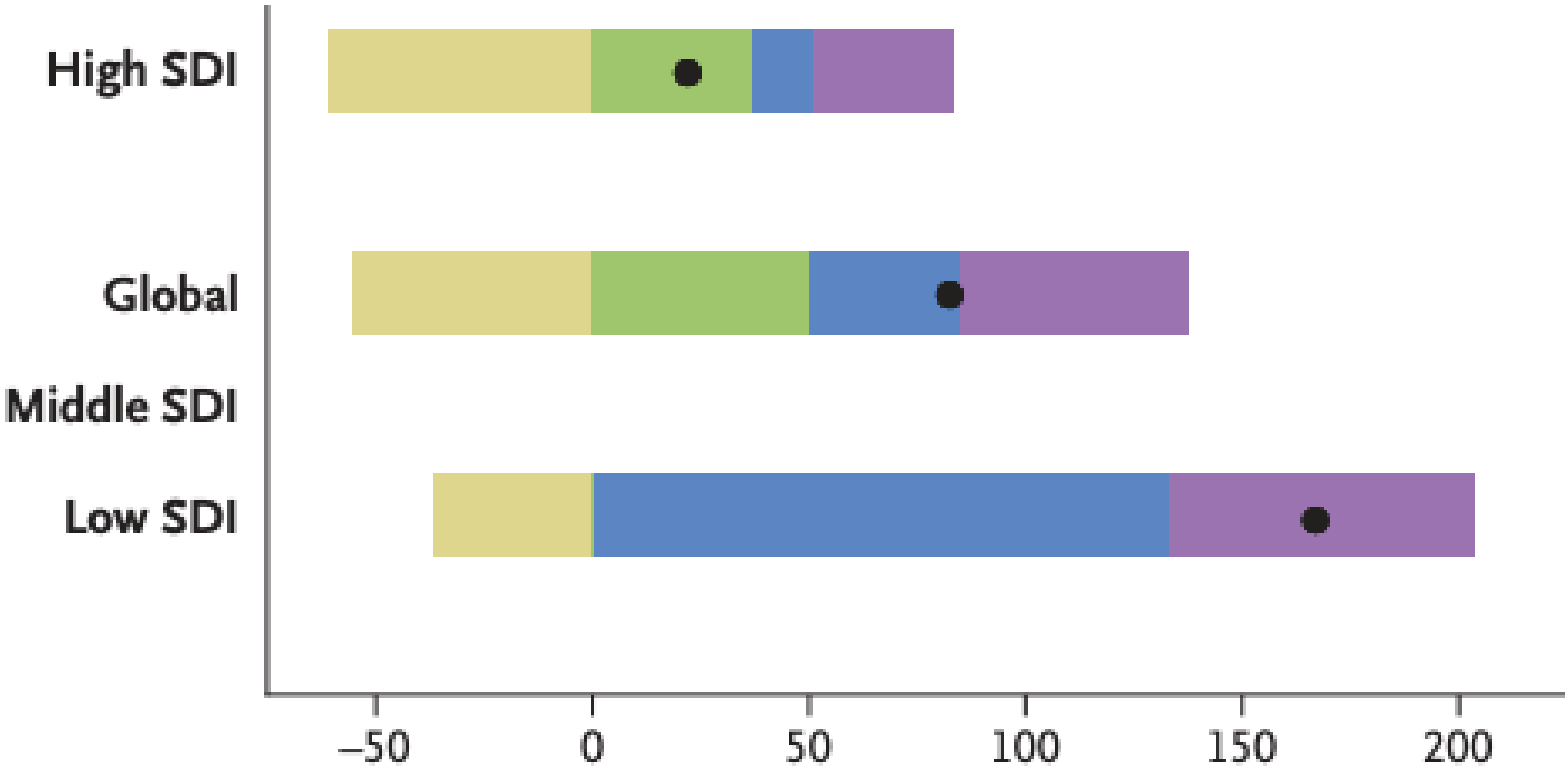
Obesitas is een wereldwijd probleem,
dat **gerelateerd is aan vrijwel ALLE welvaartsziekten**
en aan **vroegtijdige sterfte**



Health Effects of Overweight and Obesity in 195 Countries over 25 Years

B Deaths

- Change due to risk-deleted death rate
- Change due to population aging
- Change due to population growth
- exposure to high BMI
- Total percent change





Take home message No. 4:

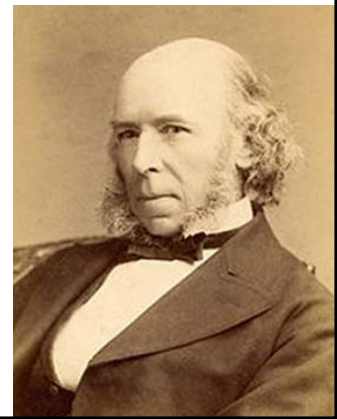


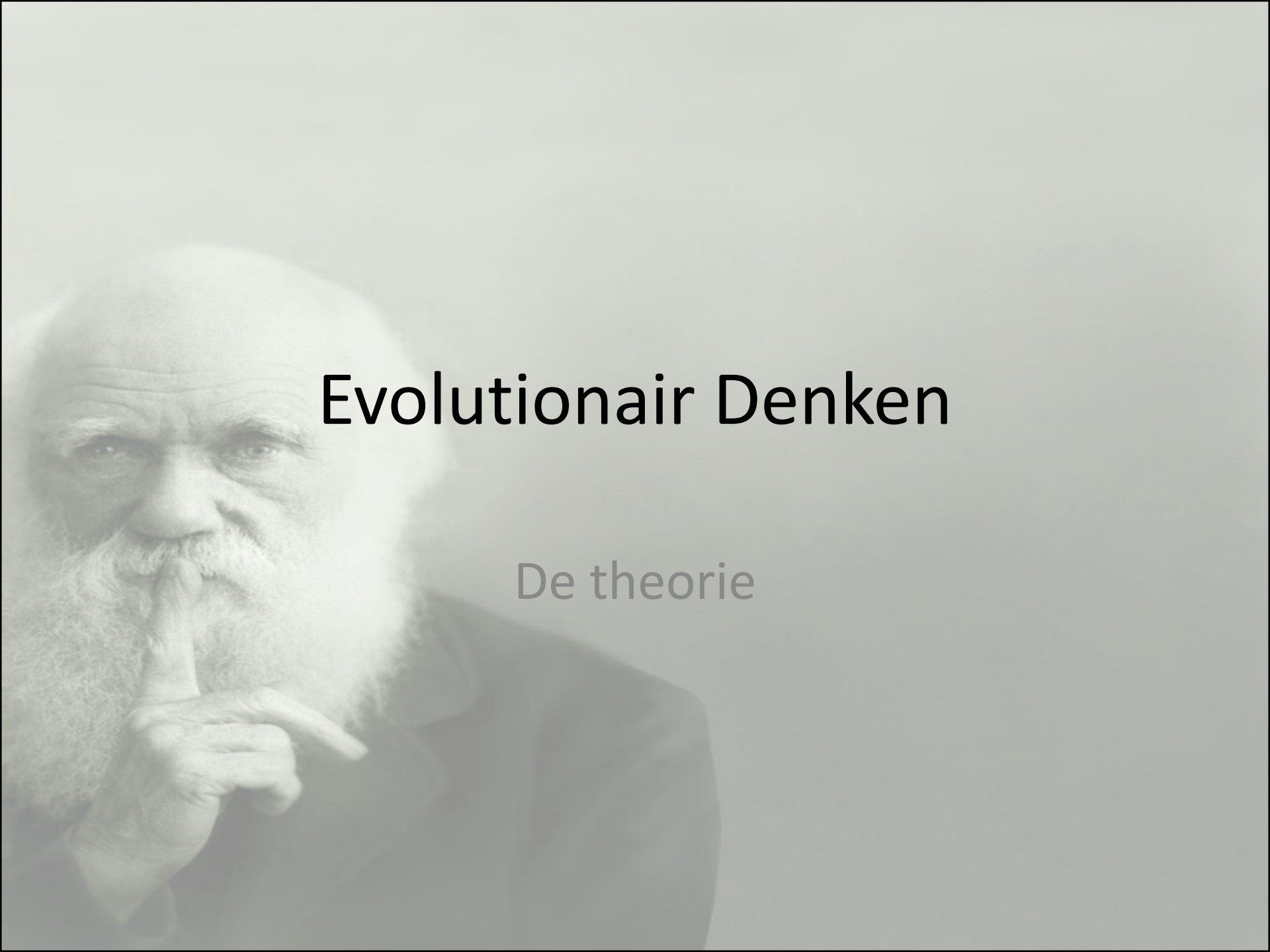
Oorzaken obesitas pandemie:

1. Globale toename welvaart / ongezonde leefomgeving

2. Mondiale vergrijzing (toename levensverwachting)

3. Krimpende hoog / (nog) groeiende laag-sociaal economische klasse

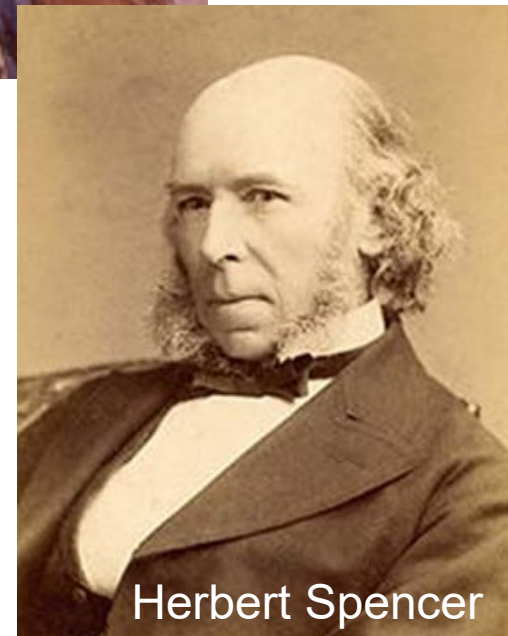
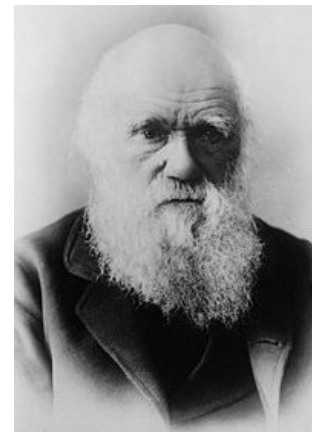
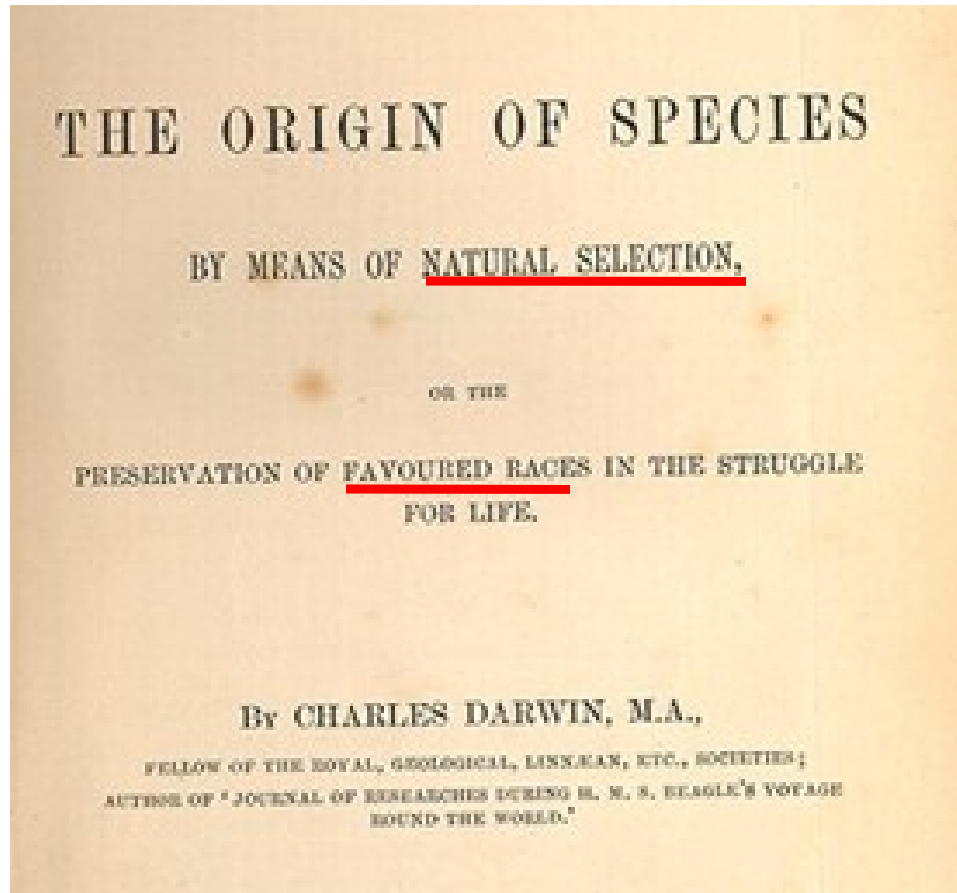




Evolutionair Denken

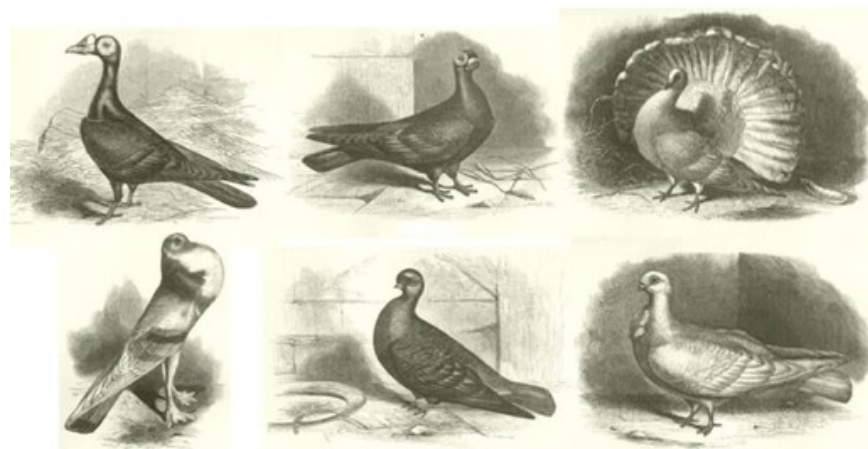
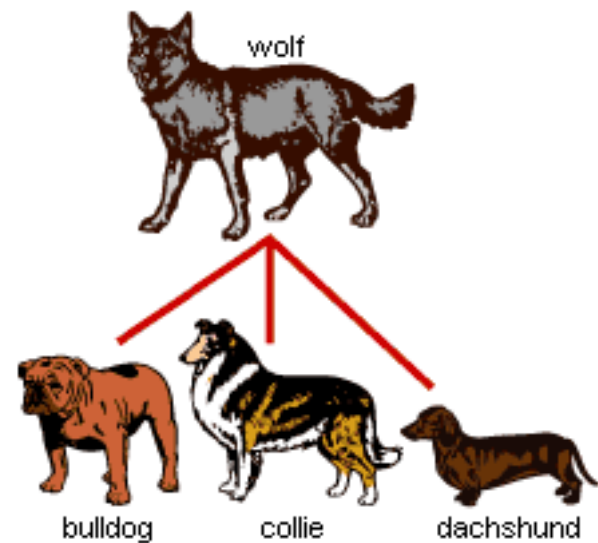
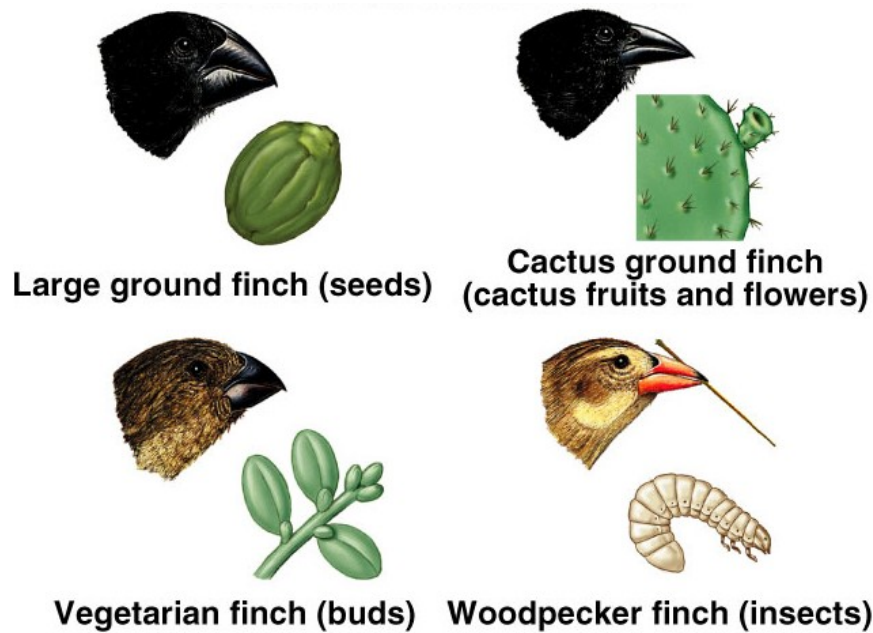
De theorie

Charles Darwin: Survival of the Fittest

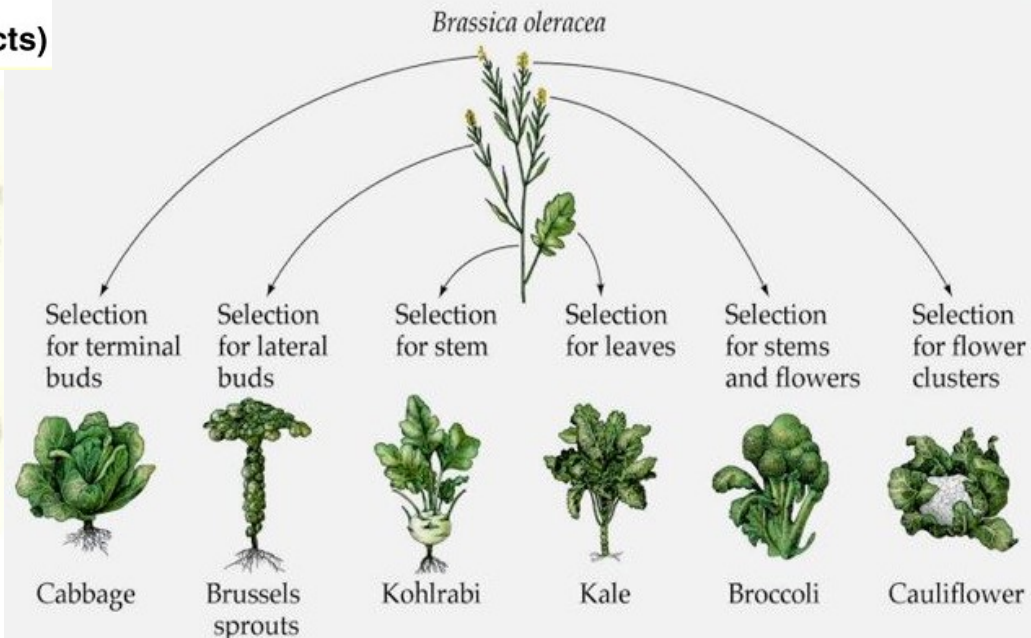


Herbert Spencer

(Un)natural selection - veredeling



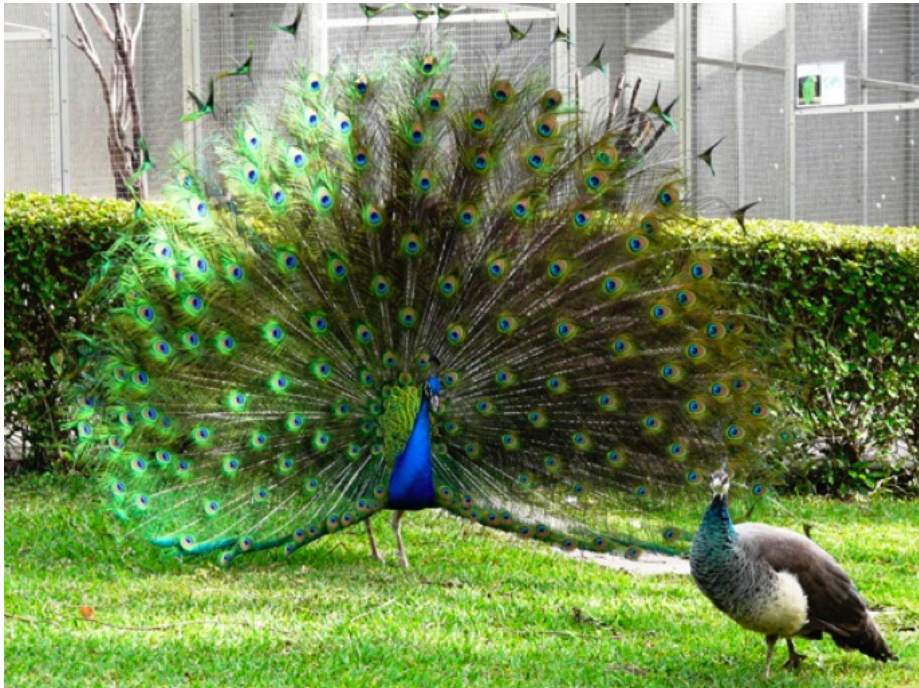
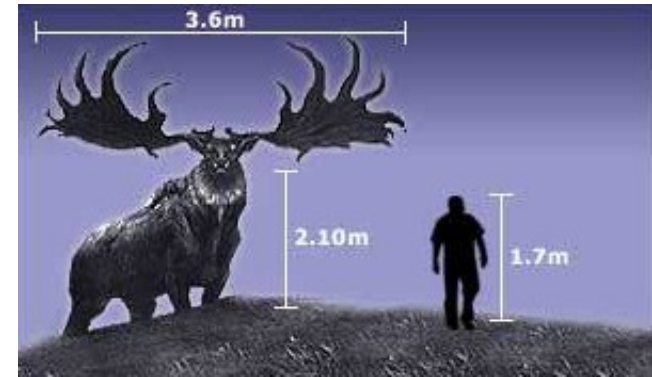
A selection of fancy pigeon breeds that Darwin studied



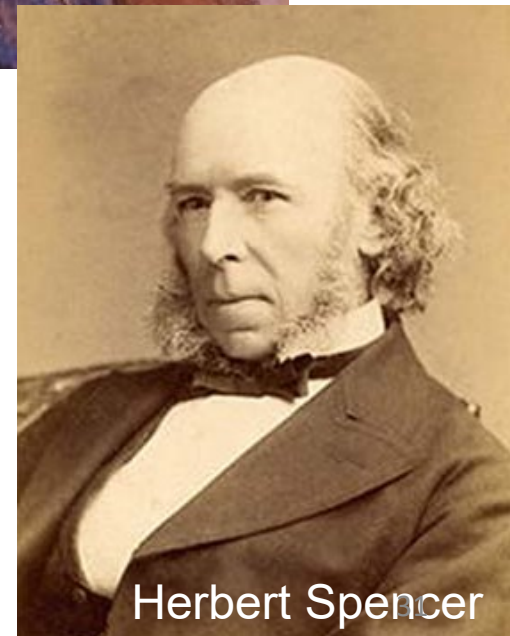
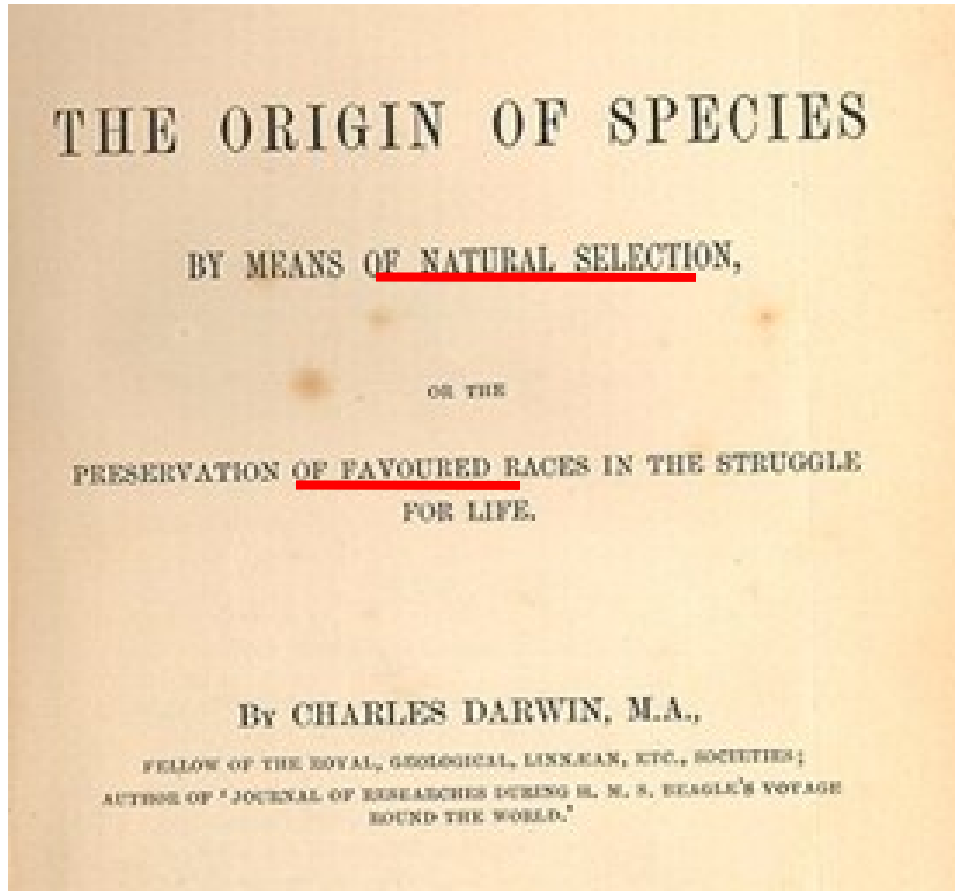
Sexual Selection

<https://www.youtube.com/watch?v=YTR21os8gTA>

https://www.youtube.com/watch?v=el_quJRRGxk



Charles Darwin: Survival of the Fittest



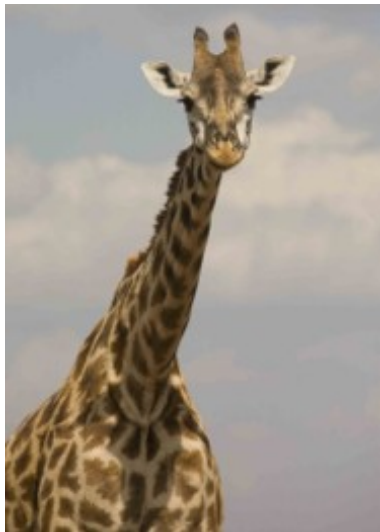
Law 1. Conditions of existence

Law 2. Natural selection

Herbert Spencer

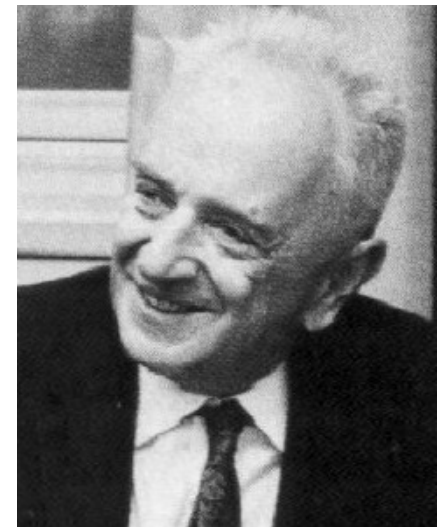
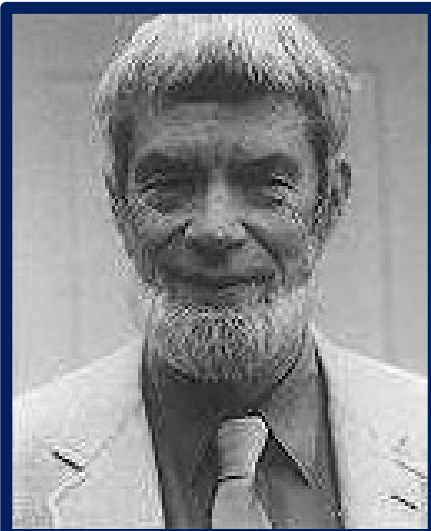
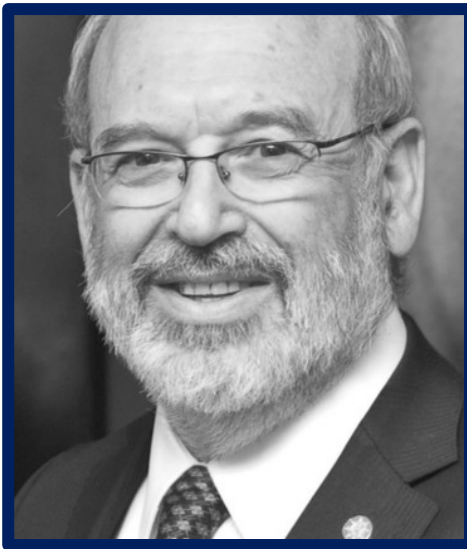
Theodosius Dobzhansky

- Nothing in biology makes sense except in the light of evolution



Evolutionary Medicine

- Nothing in human (patho) physiology makes sense except in the light of evolution

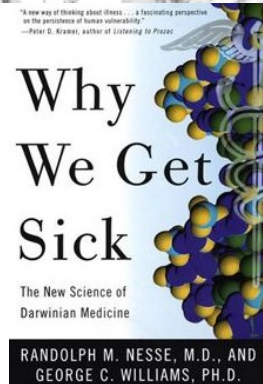


Waarom we ziek worden?

- Proximale versus Evolutionaire verklaringen voor ziekte

» Why we get sick, Nesse & Williams, 1994

- Proximale oorzaak = hoe
 - Oorzaak op moleculair niveau
 - Behandelen = pappen en nat houden
- Evolutionaire of ultieme oorzaak = waarom
 - Oorzaak op evolutionair niveau
 - Wegnemen oorzaak – wegnemen ziekte





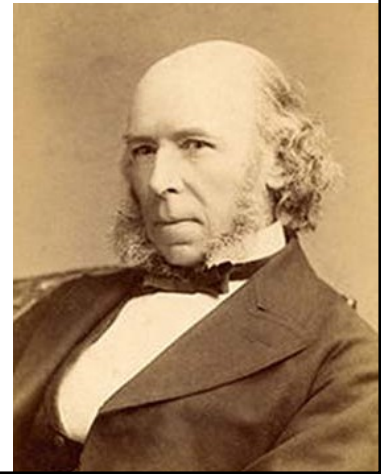
Take home message No. 5:



Gezondheidszorg 1.0

=

symptoombehandeling



VOLUME 66, No. 1

MARCH 1991

THE QUARTERLY REVIEW *of* BIOLOGY

THE DAWN OF DARWINIAN MEDICINE

GEORGE C. WILLIAMS RANDOLPH M. NESSE

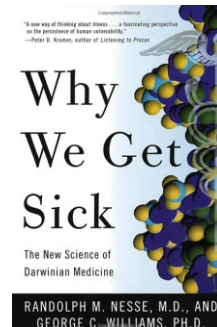


Randolph M. Nesse



**George C. Williams
1926-2010**

- Defense-mechanism
- Trade-offs/Conflicts
- Constraints
- Mismatches
- Genetics



Kuipers, Luxwolda, Muskiet. Medisch Contact 2010

Voorbeeld 1: Koorts



Proximaal: Hoe *genees* ik koorts met *medicijnen*?

Oorzaak?



Gevolg

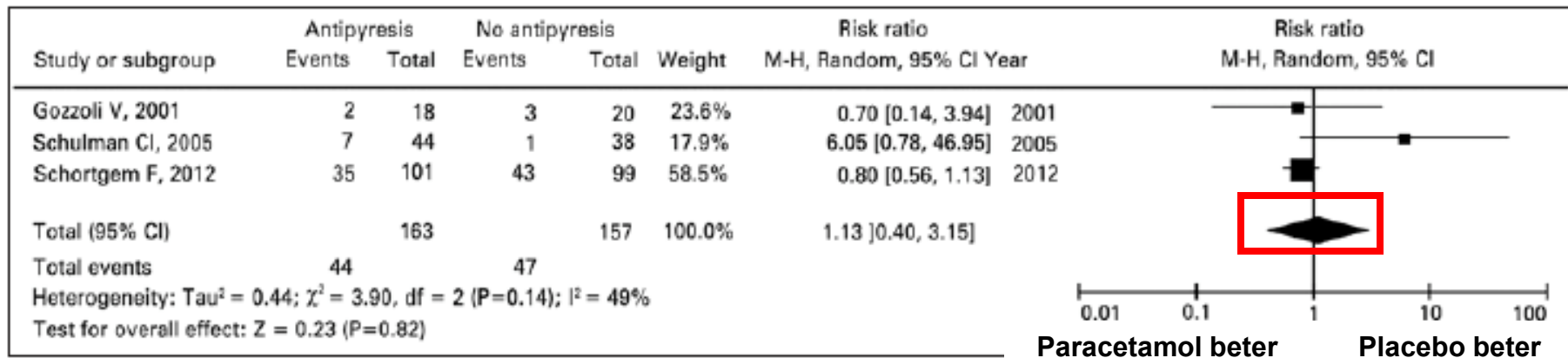


Oplossing

Evidence Based Medicine?

Should we treat fever in critically ill patients? A summary of the current evidence from three randomized controlled trials

Ary Serpa Neto¹, Victor Galvão Moura Pereira¹, Giancarlo Colombo², Farah Christina de la Cruz Scarin², Camila Menezes Souza Pessoa², Leonardo Lima Rocha²
einstein. 2014;12(4):518-23



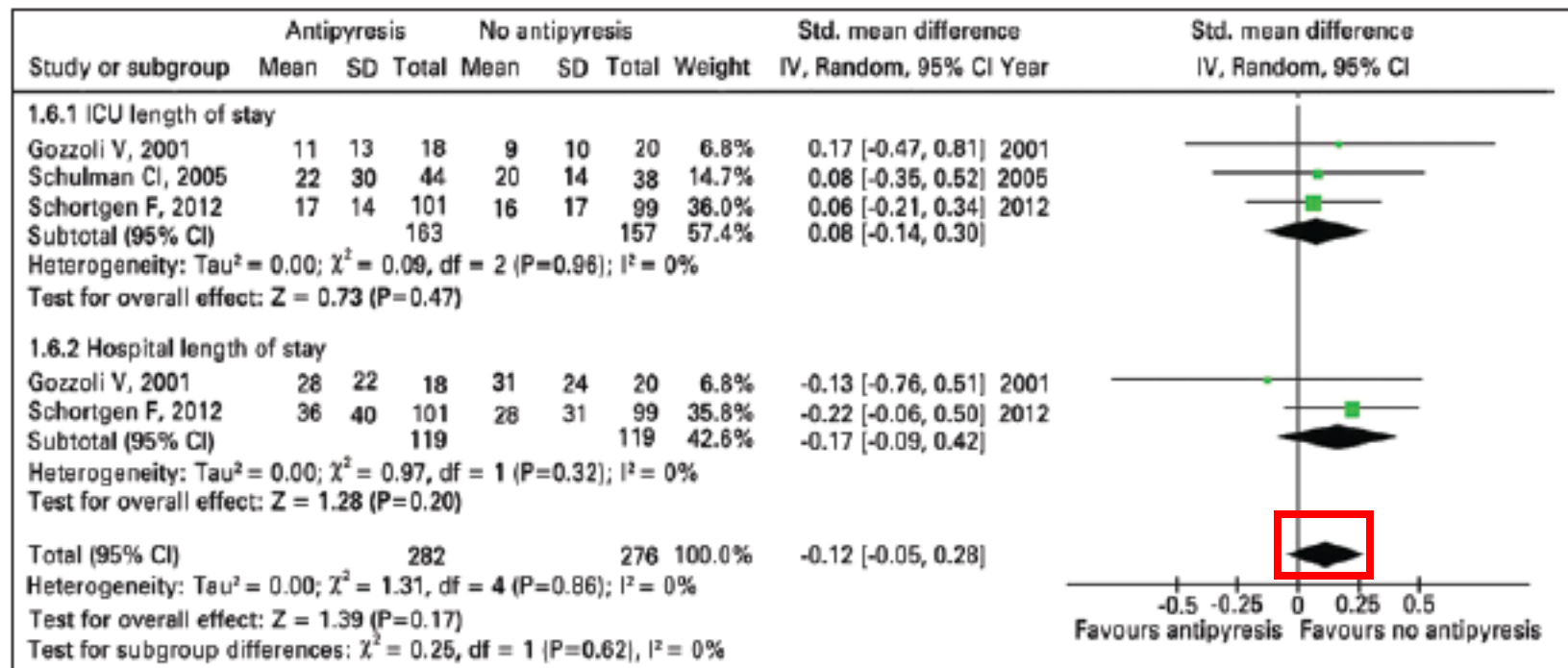
95% CI: 95% of confidence interval.

Figure 2. Meta-analysis of overall survival for antipyresis or no antipyresis in critically ill patients

**Paracetamol geven aan IC patienten met koorts:
géén verschil in mortaliteit**

Should we treat fever in critically ill patients? A summary of the current evidence from three randomized controlled trials

Ary Serpa Neto¹, Victor Galvão Moura Pereira¹, Giancarlo Colombo², Farah Christina de la Cruz Scarin², Camila Menezes Souza Pessoa², Leonardo Lima Rocha² *einstein. 2014;12(4):518-23*



95% CI: 95% of confidence interval; SD: standard deviation; ICU: intensive care unit.

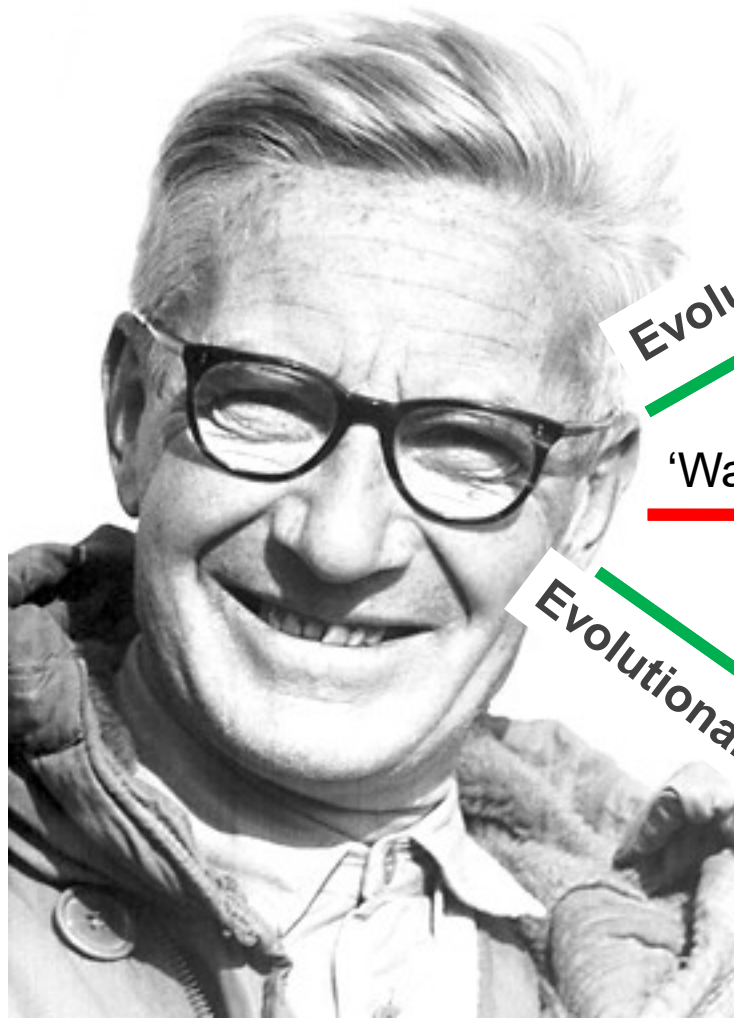
Figure 3. Meta-analysis of intensive care unit and hospital length of stay for antipyresis or no antipyresis in critically ill patients

Paracetamol beter

Placebo beter

**Paracetamol geven aan IC patienten met koorts:
Geeft, if anything, een LANGERE opnameduur**

Voorbeeld 1: Koorts

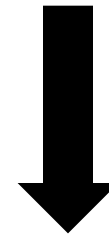


Evolutionaire benadering

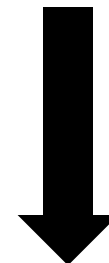
'Waarom' gebeurt het ?

Evolutionaire benadering

Oorzaak



Gevolg

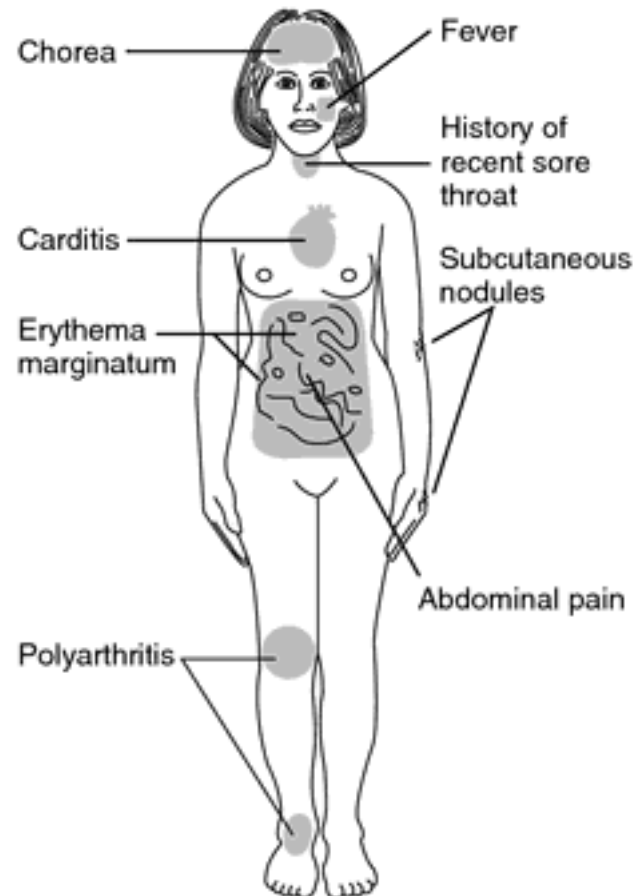


Oplossing
= koorts!

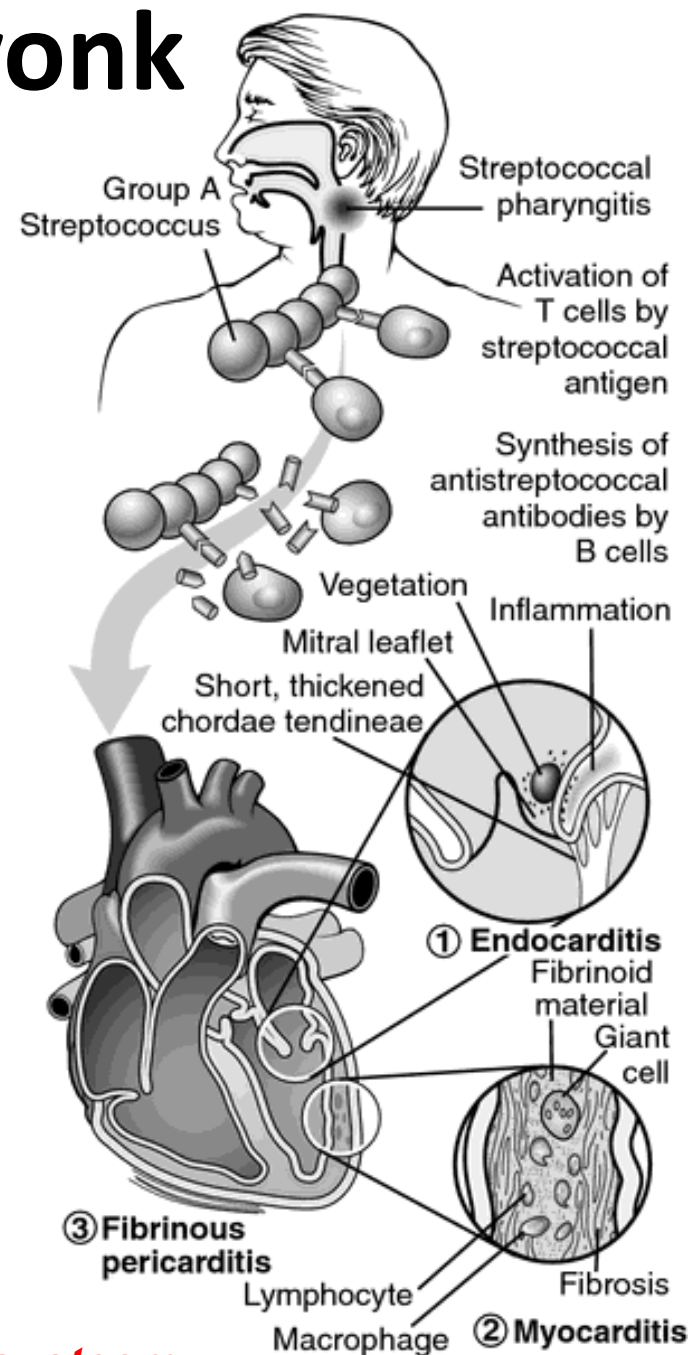
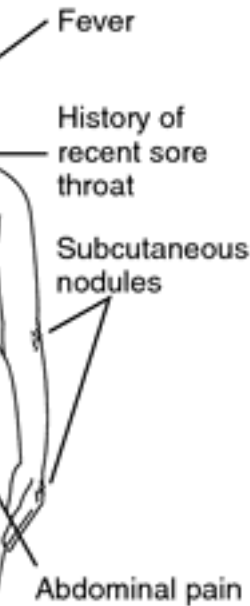
Voorbeeld 2. Roodvonk

Bèta-hemolytische streptokok

Major manifestations



Minor manifestations and later findings



Collateral damage van het ijverige immuunsysteem

Voorbeeld 3: IJzergebreksanemie

- Afrikaanse kinderen krijgen een onderzoek naar hun gezondheid
- Ze blijken voor een groot deel slecht gevoed
- Veelal is er ijzergebreksanemie
- De tropenarts schrijft ijzersupplementen voor
- Wel of geen goed idee?

Proximate vs Evolutionary

Iron Supplementation in HIV-Infected Malawian Children With Anemia: A Double-Blind, Randomized, Controlled Trial

Michael O. Esan,^{1,3} Michael Boele van Hensbroek,¹ Ernest Nkhoma,³ Crispin Musicha,³ Sarah A. White,³ Feiko O. ter Kuile,^{2,4} and Kamiia S. Phiri^{2,4}

Table 3. Morbidity Outcomes, by Study Arm and Period

Outcome	Iron		Placebo		Unadjusted IRR (95% CI)	P	Adjusted IRR ^b (95% CI)	P
	Events, No. (%)	Incidence ^a	Events, No. (%)	Incidence ^a				
All-cause outpatient sick visits								
All events over 6 mo follow-up	133 (58)	350.0	135 (67)	383.0	0.95 (.68–1.33)	.76	0.98 (.67–1.43)	.91
Intervention period (0–3 mo)	63 (27)	275.4	47 (26)	206.6	1.35 (.83–2.19)	.22	1.48 (.81–2.68)	.20
Postintervention period (>3–6 mo)	70 (31)	323.7	88 (41)	460.1	0.79 (.50–1.26)	.32	0.83 (.51–1.35)	.45
All-cause hospital admissions								
All events over 6 mo follow-up	14 (14)	28.6	20 (19)	42.3	0.61 (.31–1.20)	.15	0.62 (.27–1.42)	.26
Intervention period (0–3 mo)	8 (8)	31.6	6 (6)	23.8	1.43 (.54–3.78)	.47	1.56 (.48–5.09)	.46
Postintervention period (>3–6 mo)	6 (6)	24.2	14 (13)	61.9	0.40 (.16–1.00)	.05	0.35 (.11–1.14)	.08
Malawi								
All events over 6 mo follow-up	52 (37)	120.2	33 (24)	71.7	1.73 (1.04–2.85)	.03	1.81 (1.04–3.16)	.04
Intervention period (0–3 mo)	20 (15)	78.1	9 (8)	36.0	2.39 (1.08–5.28)	.03	2.68 (1.08–6.63)	.03
Postintervention period (>3–6 mo)	32 (22)	140.7	24 (16)	107.9	1.25 (.68–2.31)	.47	1.44 (.73–2.84)	.29
Respiratory infections								
All events over 6 mo follow-up	21 (17)	43.5	36 (26)	79.1	0.59 (.32–1.09)	.09	0.59 (.29–1.22)	.16
Intervention period (0–3 mo)	14 (12)	56.6	13 (11)	52.8	1.16 (.55–2.44)	.70	1.42 (.56–3.63)	.46

Het middel is erger dan de kwaal...

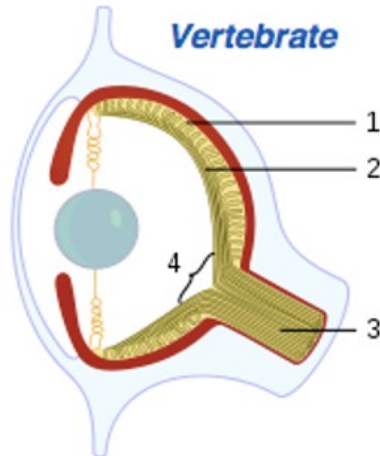


Voorbeelden

Evolutionair denken

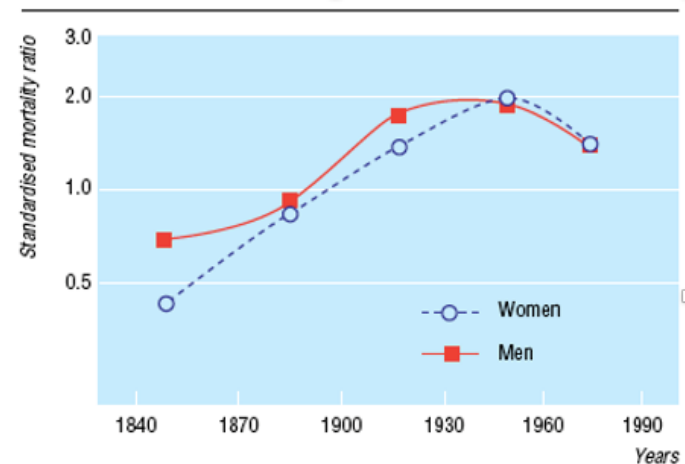
Het dierenrijk

- De grijze haren van de silverback gorilla
- Het oog van de octopus



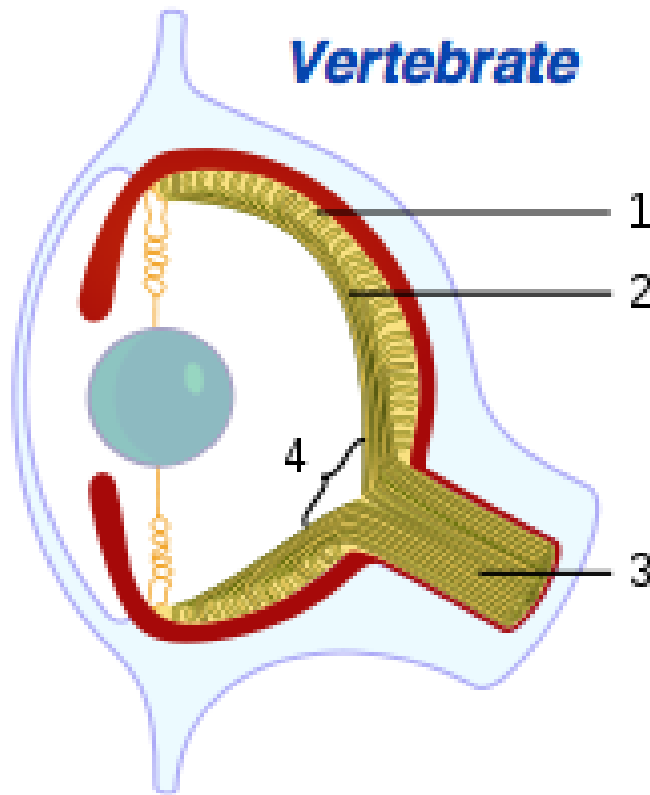
De mens

- Bipedalisme
- Menopauze
- Bilirubine
- FH

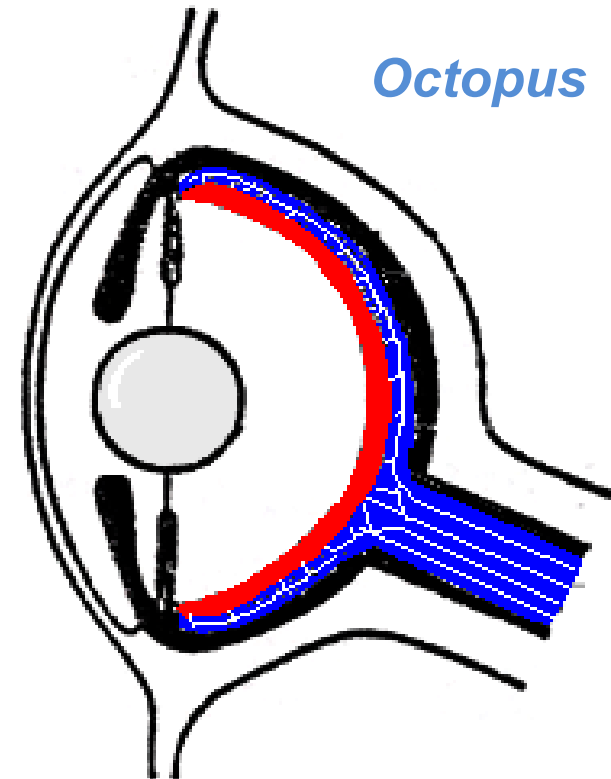


Evolution has no way back

<https://www.youtube.com/watch?v=cO1a1Ek-HD0>



1. Retina
3. Nervus opticus



2. Zenuwuiteinden
4. Blinde vlek

Bipedalism & Body hair

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Chimpanzee

- Skull attaches posteriorly
- Spine slightly curved
- Arms longer than legs and also used for walking
- Long, narrow pelvis
- Femur angled out

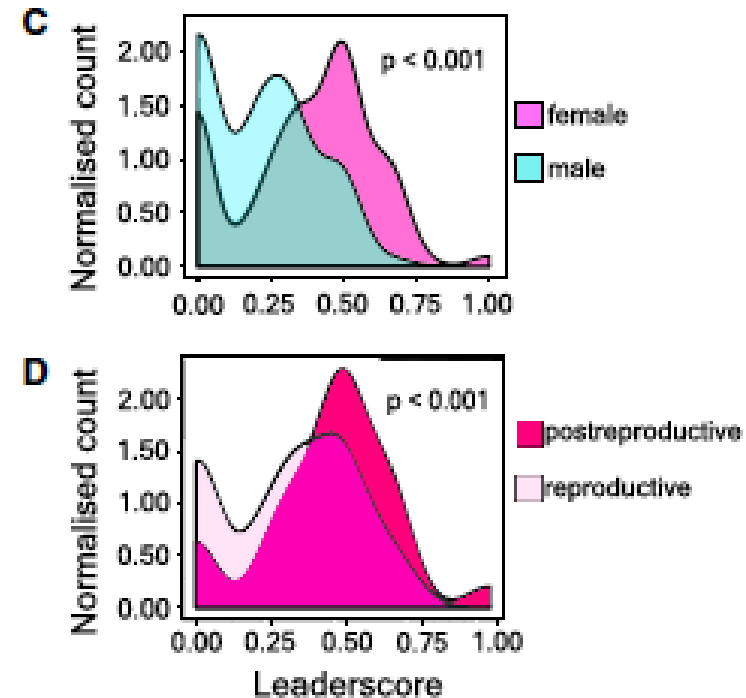
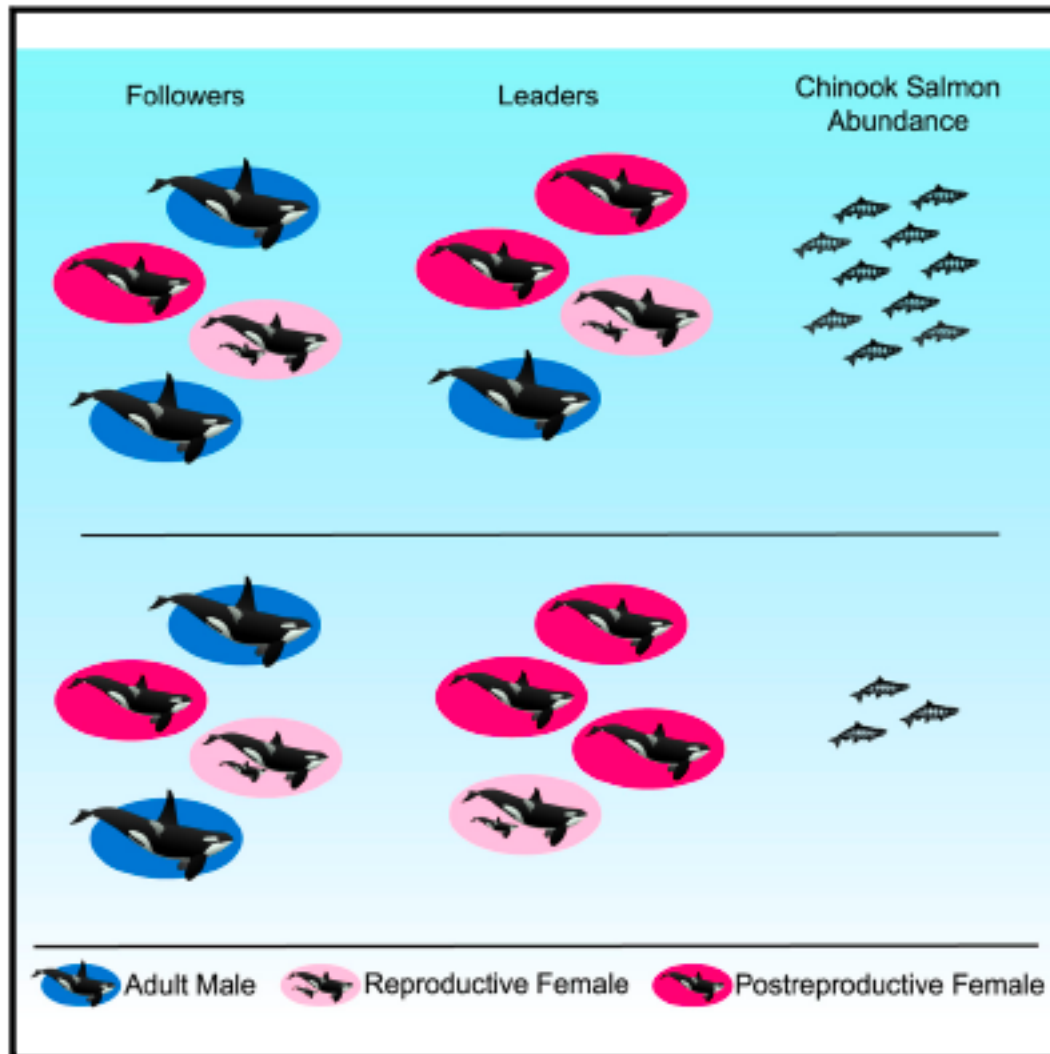


Australopithecine

- Skull attaches inferiorly
- Spine S-shaped
- Arms shorter than legs and not used for walking
- Bowl-shaped pelvis
- Femur angled in

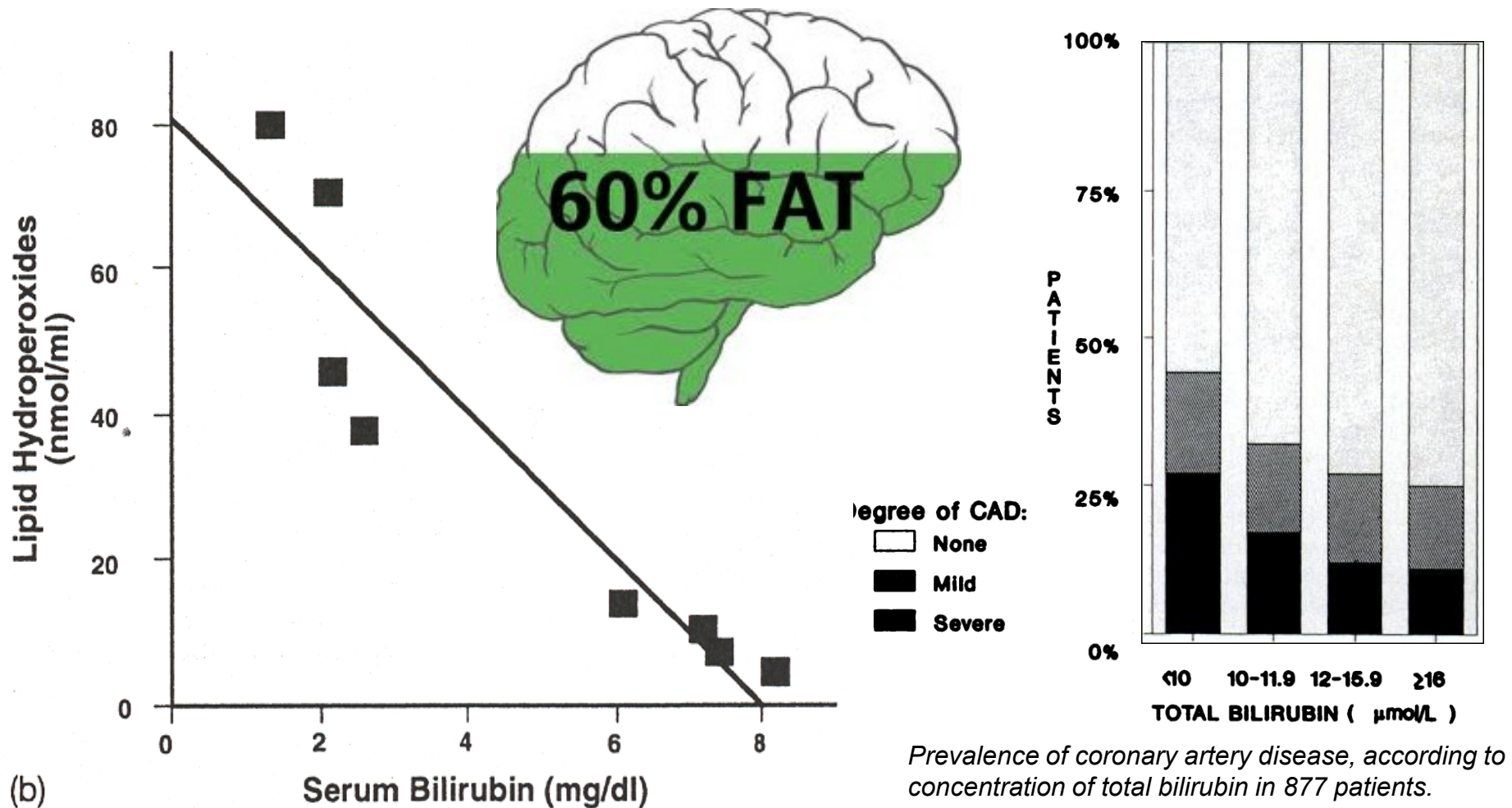


Kin selection



**Menopauze is een
aanpassing aan een
meer succesvolle
overleving van het
nageslacht**

Bilirubine en atherosclerose



Dennery PA, McDonagh AF, Spitz DR, Rodgers PA, & Stevenson DK. (1995). Hyperbilirubinemia results in reduced oxidative injury in neonatal Gunn rats exposed to hyperoxia. *Free Radic Biol Med.*, **19**: 395-404.

48

Schwertner HA, Jackson WG, & Tolan G. (1994). Association of low serum concentration of bilirubin with increased risk of coronary artery disease. *Clinical Chemistry*, **40**(1): 18-23.

Familiale Hypercholesterolemie

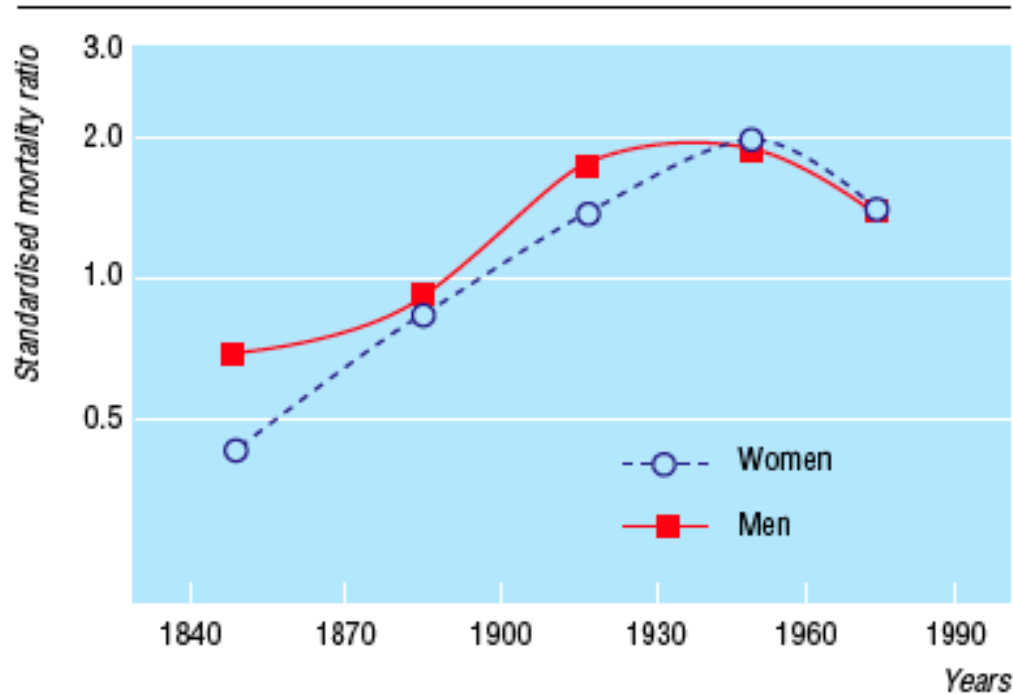
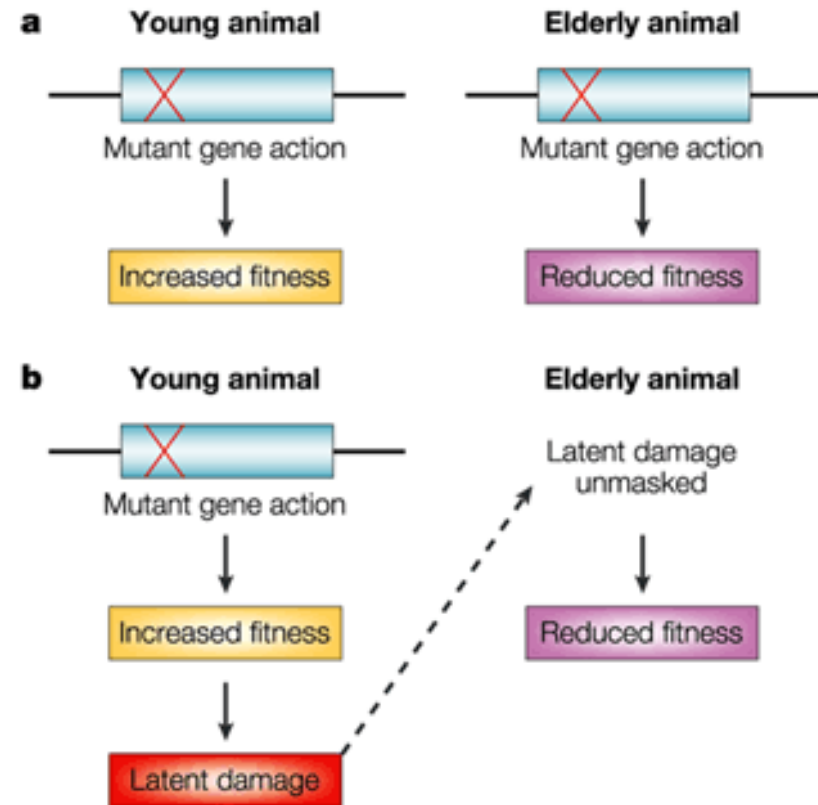


Fig 2 Mortality from familial hypercholesterolaemia according to sex and time. Mortality was estimated among 250 persons with 0.5 probability of carrying the V408M. Probands and the first 20 years of life were ignored



Nature Reviews | Genetics

VOLUME 66, No. 1

MARCH 1991

THE QUARTERLY REVIEW *of* BIOLOGY

THE DAWN OF DARWINIAN MEDICINE

GEORGE C. WILLIAMS RANDOLPH M. NESSE

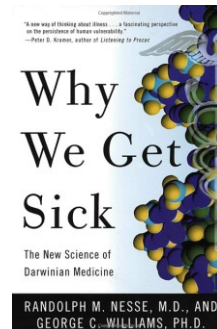


Randolph M. Nesse



George C. William
1926-2010

- Defense-mechanism
- Trade-offs/Conflicts
- Constraints
- **Mismatch**
- Genetics





Evolutionary Mismatch



Waarom is dit grappig?

En dit niet?



Evolutionair onweerstaanbaar

the thrifty-gene hypothesis – hongerwinter epigenetics

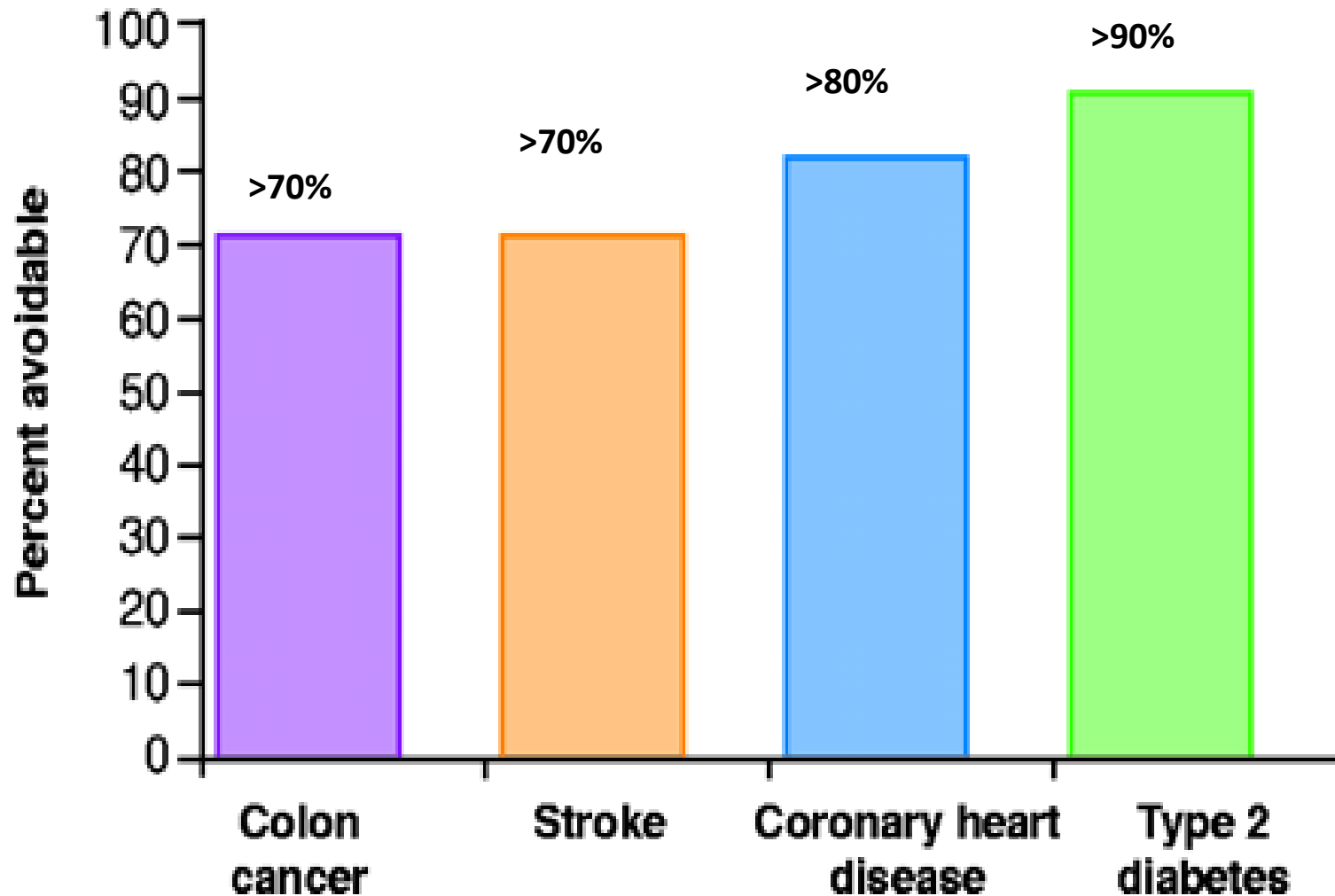
- Zoet ->
- Vet ->
- Zout ->
- Vers ->



SUPERSTIMULI



Welvaartsziekten: Meer “Nurture” dan “Nature”



Marktwerving in de zorg...

(wie verdient er niet aan?)



Big Pharma



Politiek



Gevolgen Gezondheidszorg 1.0

Wat er ook gebeurt, de uitgaven aan zorg stijgen

Uitgaven aan zorg als percentage van het bbp



NRC 250812 / BG / Bron: Ministerie van VWS

Wie verdient er niet aan?





Take home message No. 3:



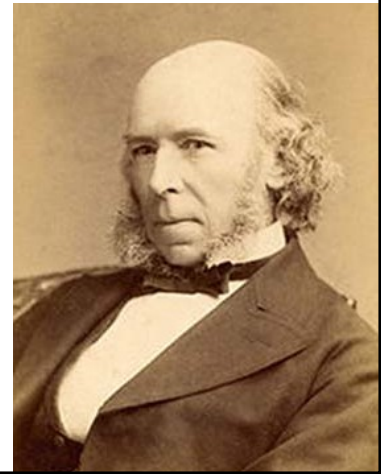
Gezondheidszorg 2.0

=

preventie

=

jouw eigen
verantwoordelijkheid



Wat is ONgezond?



Wat is Ongezond?

Tabel 21: De impact van ziekten op de levensverwachting

Ziekte	Aantal verloren levensjaren	
	Mannen	Vrouwen
Roken	-12	-7
Suikerziekte	-10	-8
Inactiviteit	-6	-8
Chronische stress	-6	-6
Hoge bloeddruk	-5	-6
Overgewicht	-4	-4
Teveel alcohol	-4	X
Groente/fruit tekort	-3	-2
Hoog cholesterol	-3	-2
Slaaptekort/teveel	-2	-2

Maar wat komt het meeste voor?

Tabel 21: De impact van ziekten op de levensverwachting

Ziekte

Roken

Suikerziekte

Inactiviteit

Chronische stress

Hoge bloeddruk

Overgewicht

Teveel alcohol

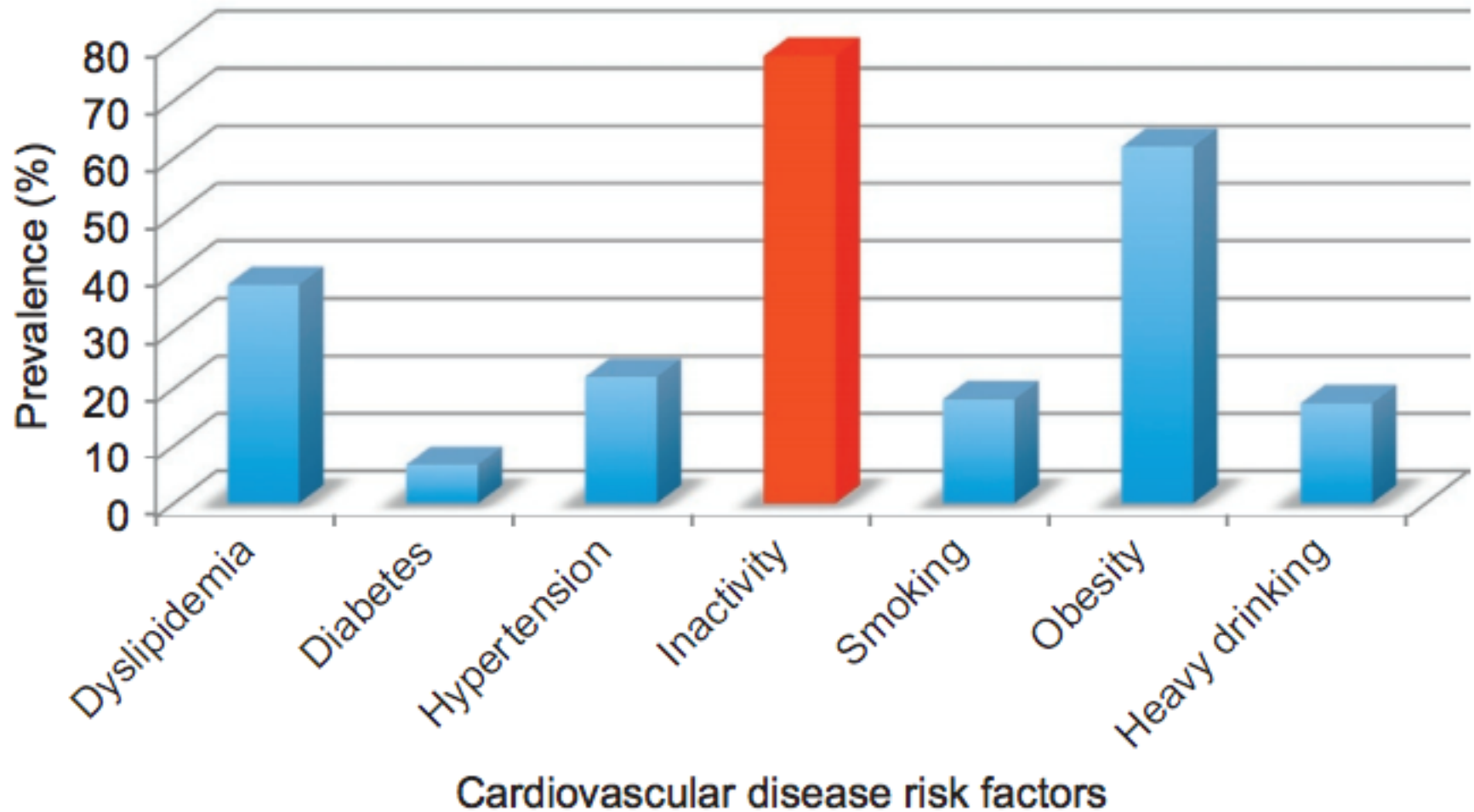
Groente/fruit tekort

Hoog cholesterol

Slaaptekort/teveel

Maar wat komt het meeste voor?

Maar wat komt het meeste voor?



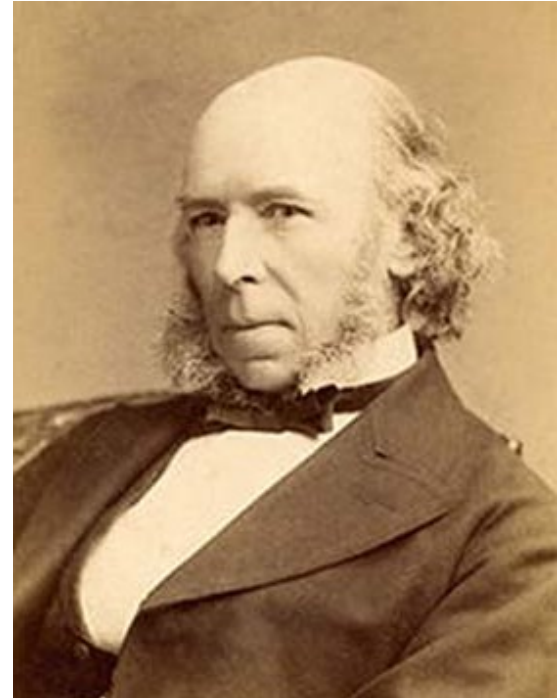
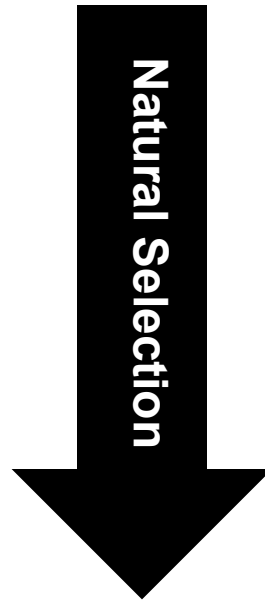


Preventie?

Maar hoe dan?

Conditions of existence

(= oorzaak)



Survival of the Fittest

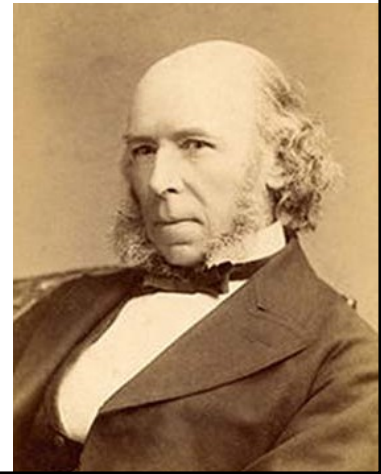
(= gevolg)

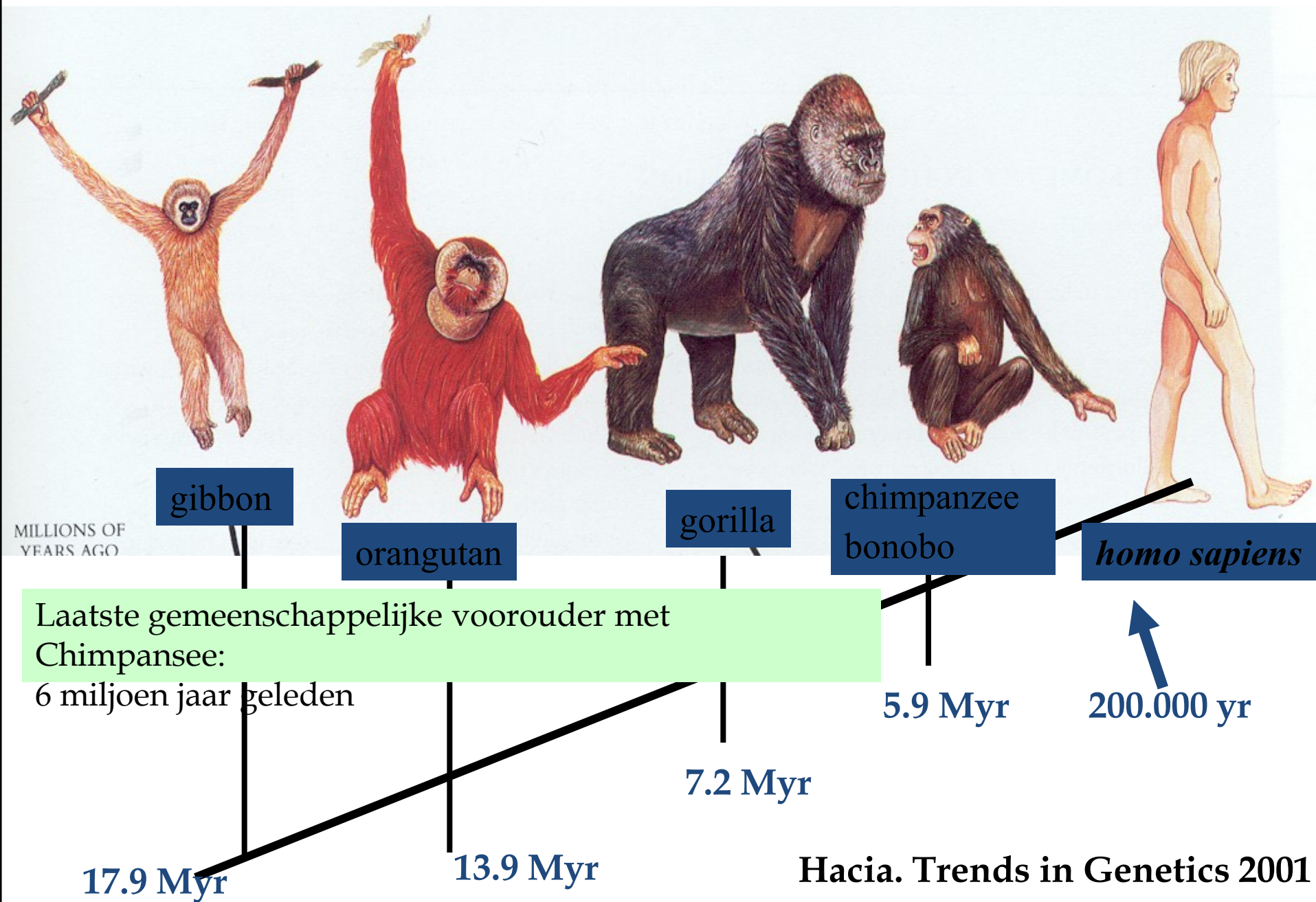


Take home message No. 4:



Om gezond te blijven
moeten we onze
'conditions of existence'
of OER-omgeving
(onder)kennen





Onze 'Conditions of Existence'

- Laaste gemeenschappelijke voorouder met de chimpanzee: 6 miljoen jaar geleden
- 3rd Out of Africa Diaspora: 100.000 jaar geleden
- $100.000 / 6.000.000 \Rightarrow 0.02 = 2\% \Rightarrow 98\%$ van de menselijke evolutie vond plaats in Oost Afrika

**Cradle of Mankind:
Africa**





















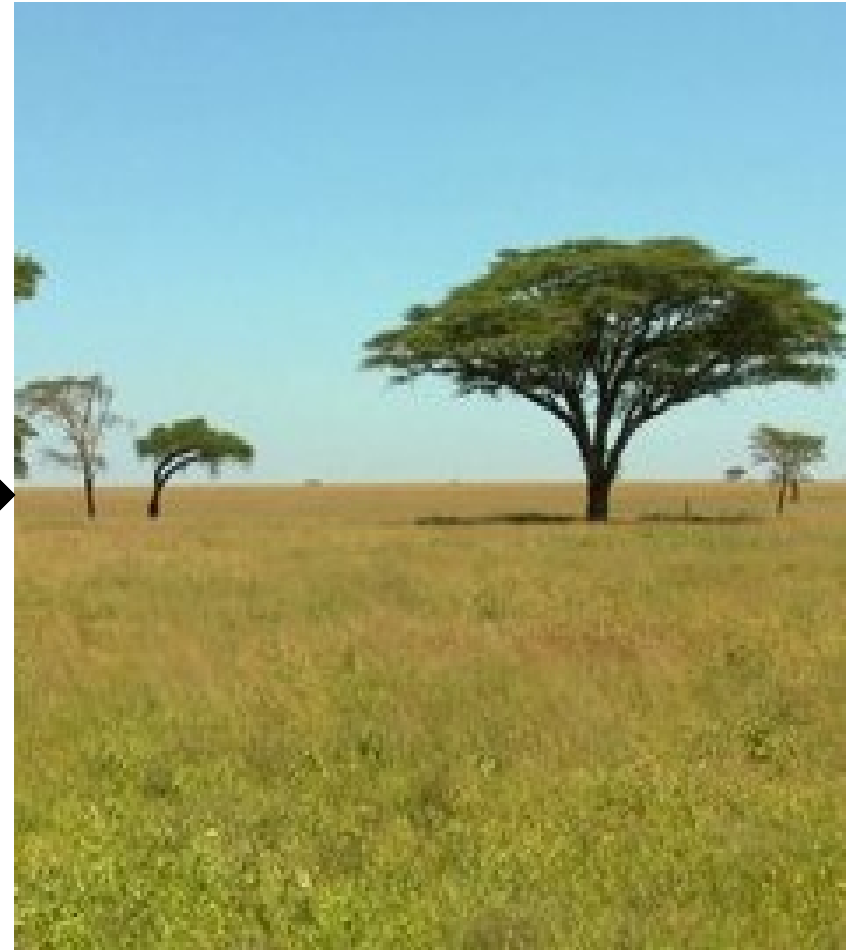
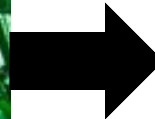


Klimaatverandering

6-7 mya



Oerwoud

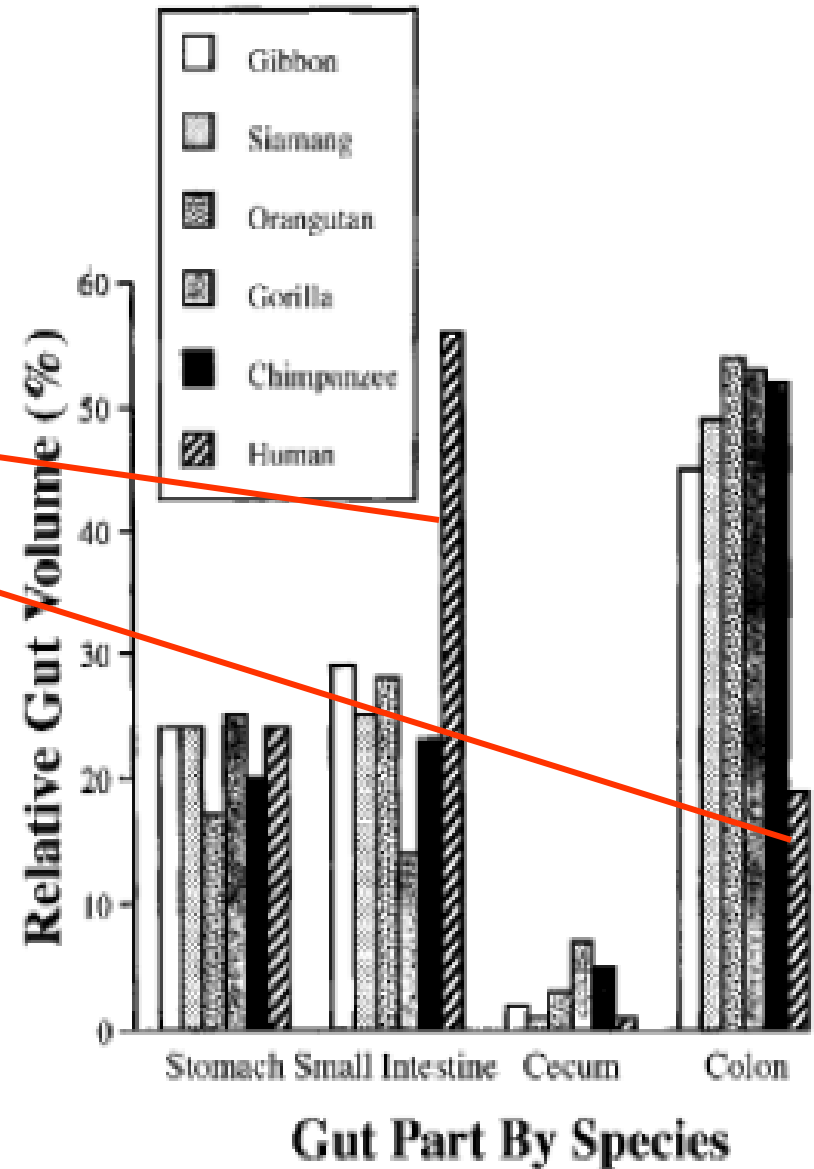
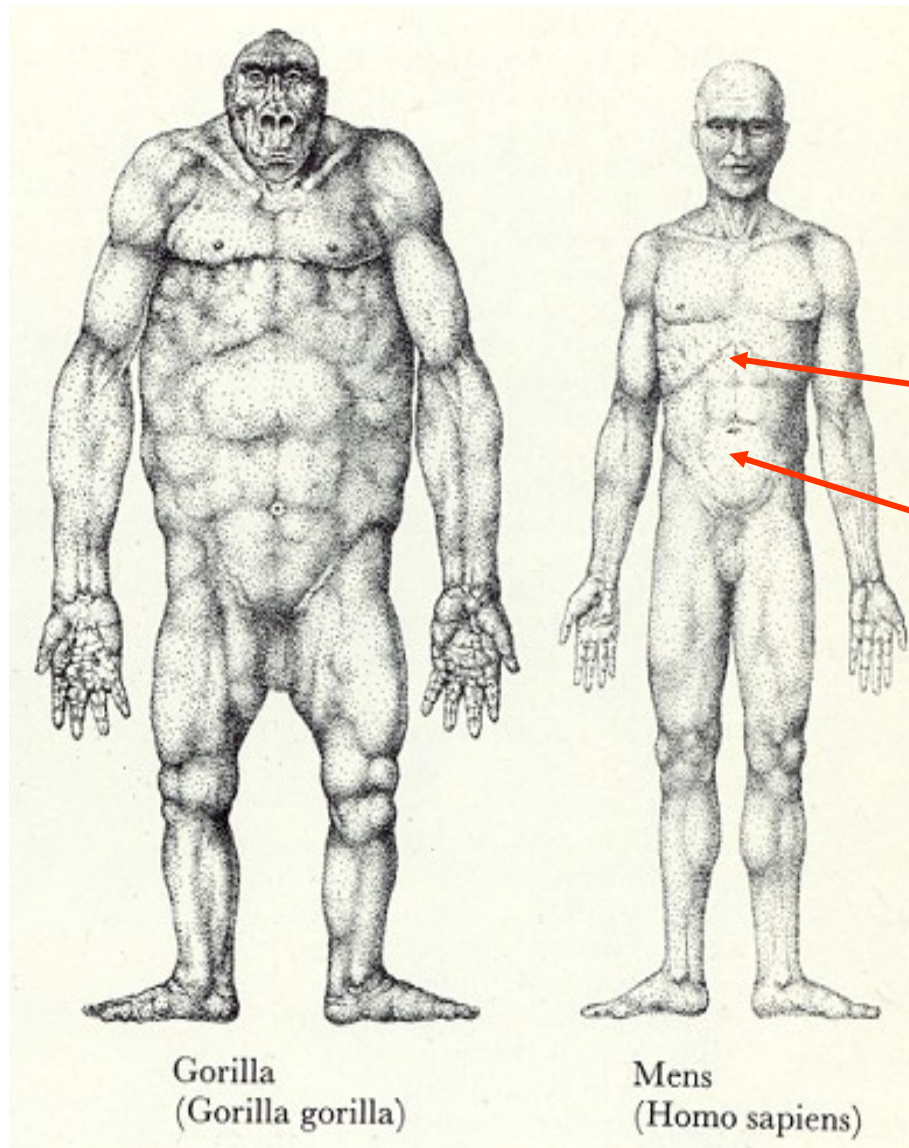


Savanne/steppe

Vegetariër -> Omnivoor



Waarom wij **GEEN** vegetariërs zijn



Man the Hunter...

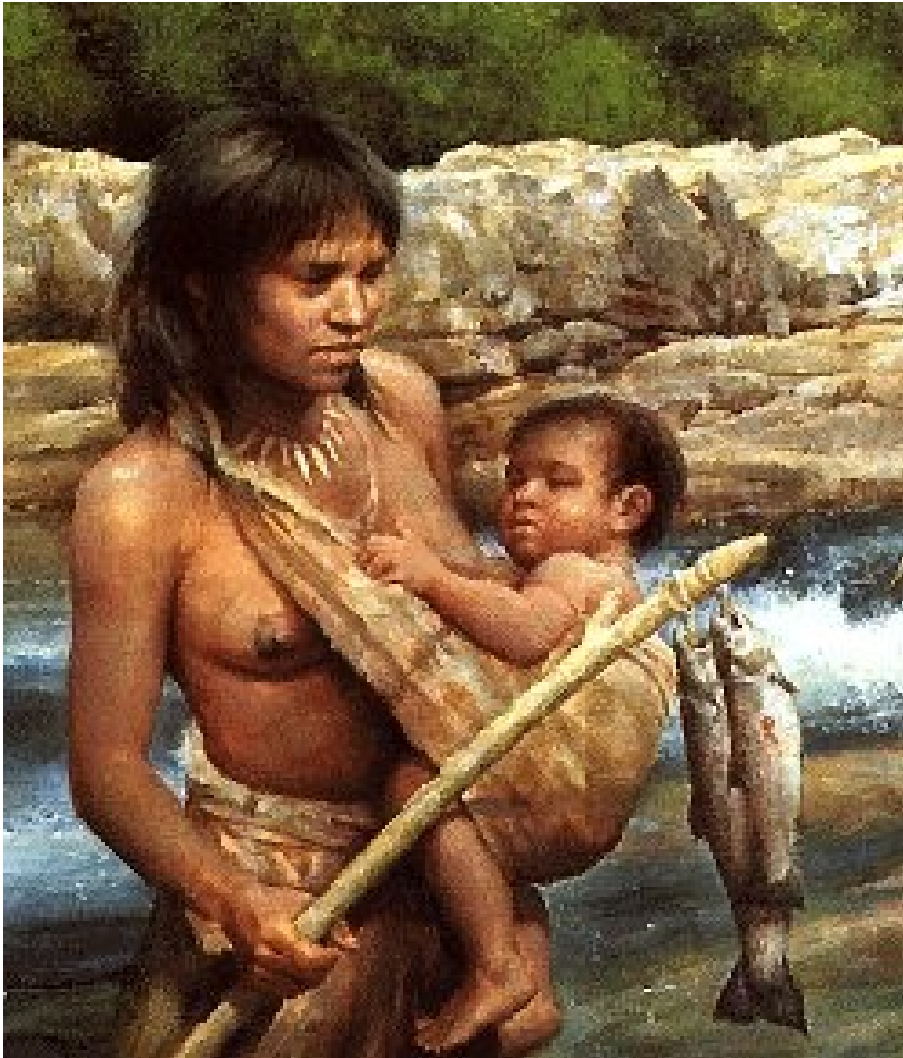


Het succespercentage
van jagers = $< 35\%$

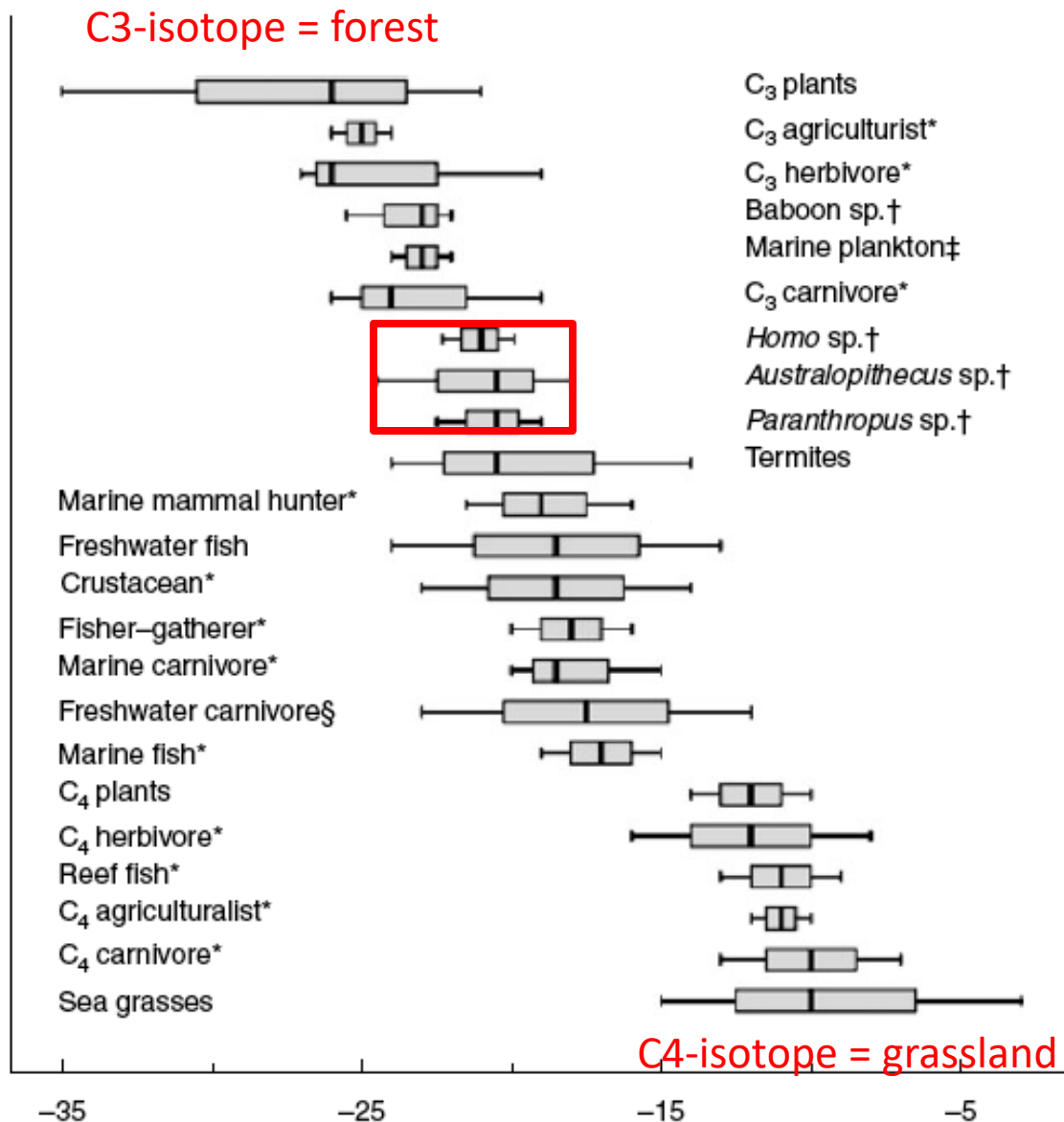
Maar ondertussen aan het kampvuur...



Of 'Woman the Gatherer'



What do the isotopes tell us?



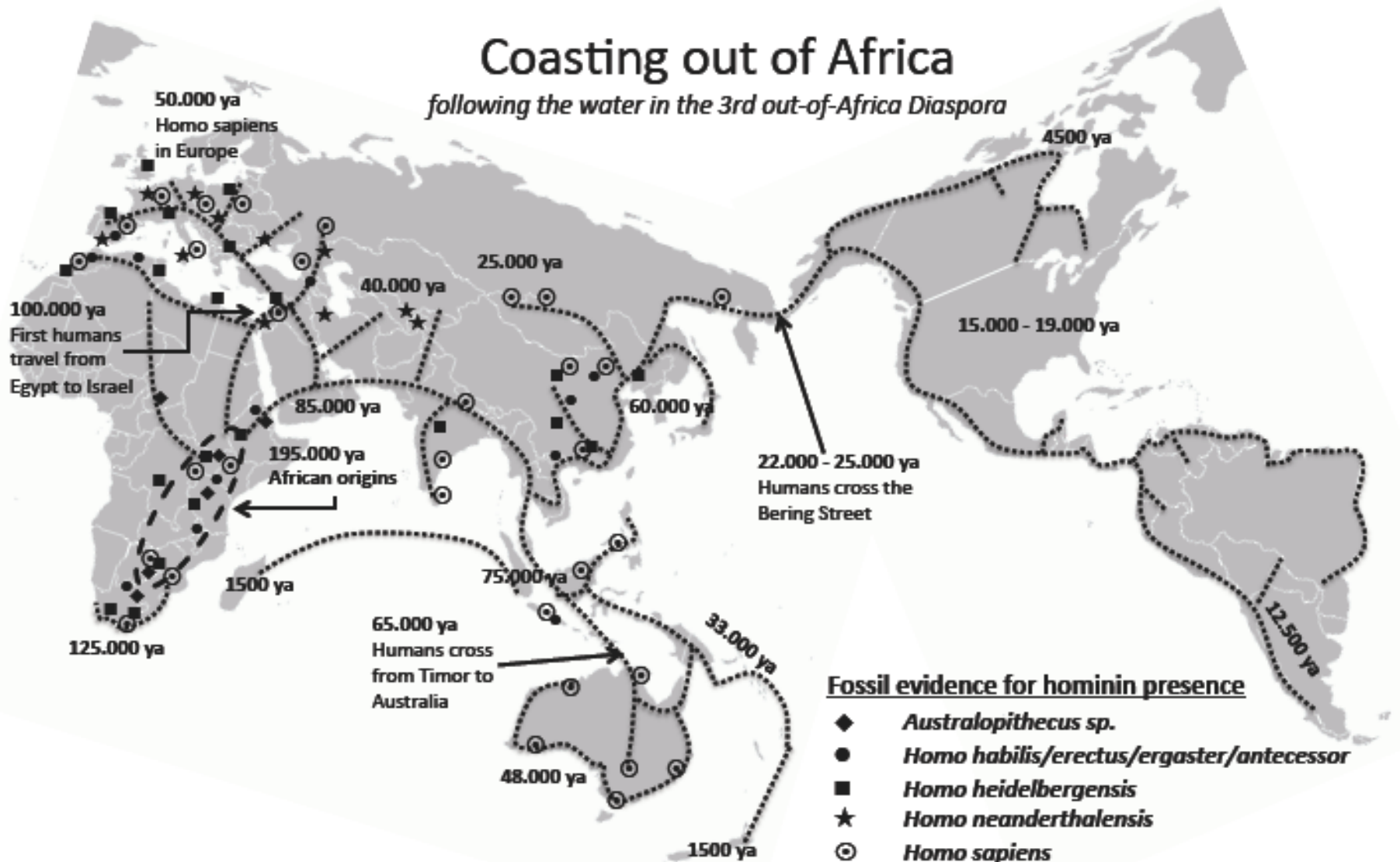
- Onze isotope-signatures lijken op:

- Termites
- Marine mammal hunter
- C₃-carnivore
- Freshwater fish
- Crustaceans
- Fisher-gatherer
- Freshwater carnivore

- Our isotopic signature does NOT resemble

- C₄-agriculturalist
- C₄-carnivore

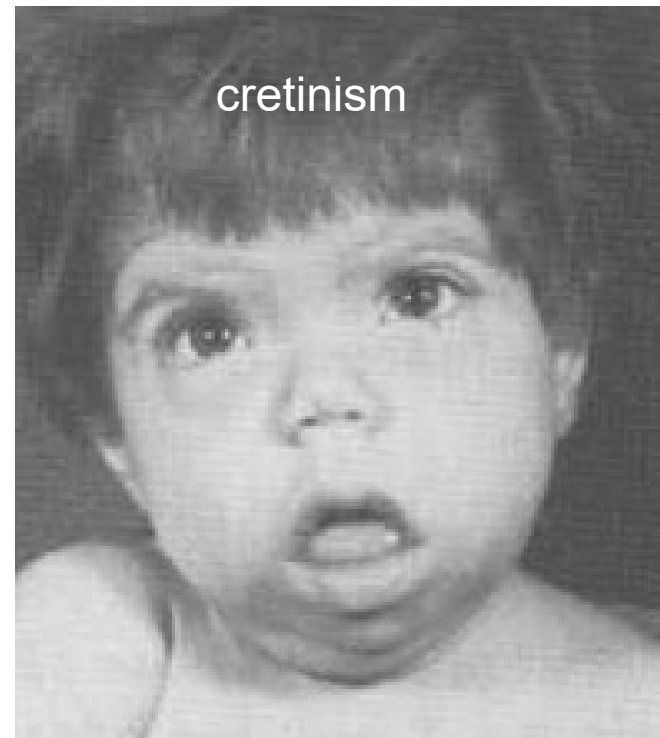
Archeologische opgravingen



Het water-land ecosysteem:

– Een rijke bron van

- Jodium
- Chroom
- IJzer
- Zink
- Vitamine A and D
- ω 3-visvetzuren
 - DHA en EPA

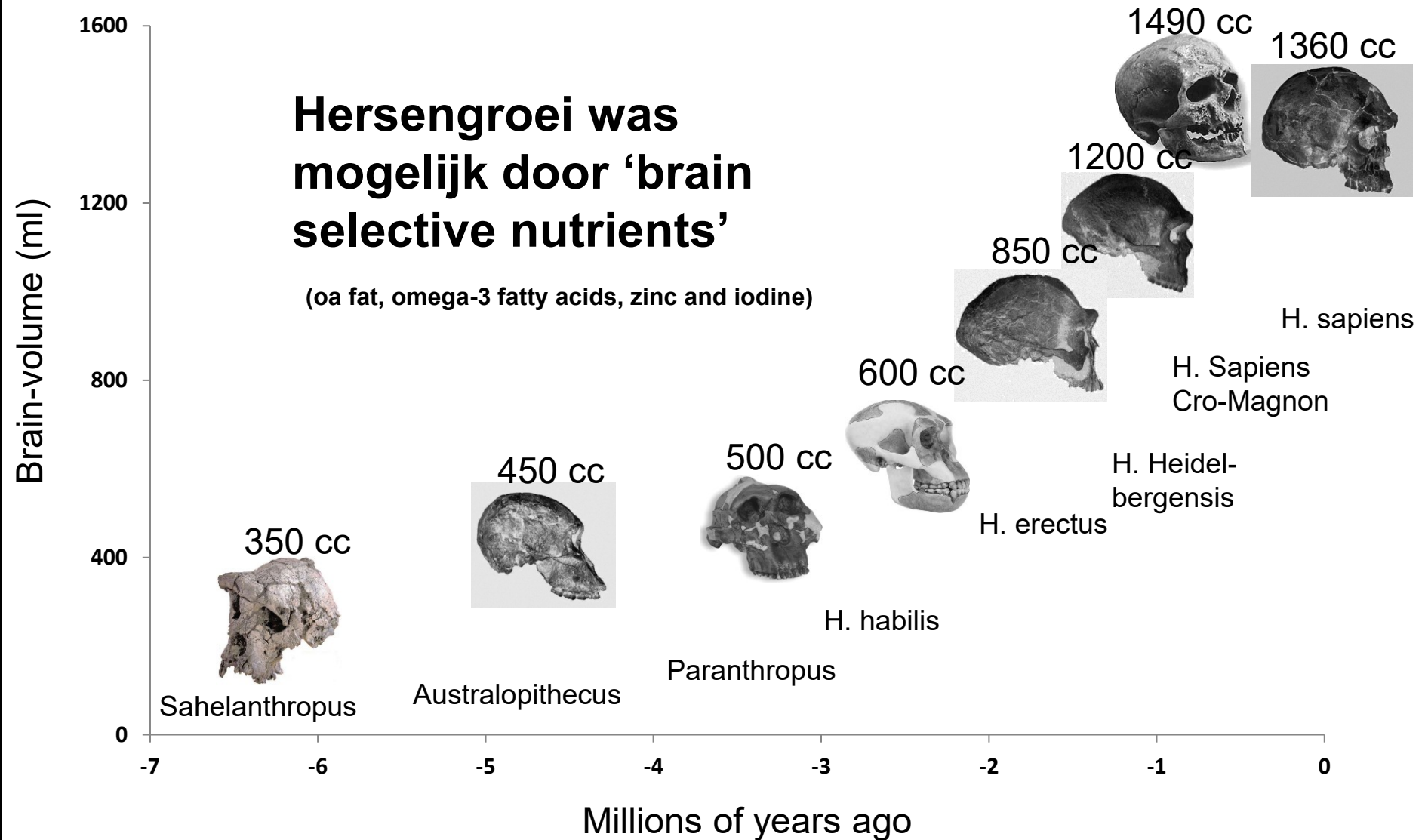


hersenvouwstenen

Van aap naar mens

**Hersengroei was
mogelijk door 'brain
selective nutrients'**

(oa fat, omega-3 fatty acids, zinc and iodine)



Onze Conditions of Existence

The African Land-Water ecosystem:

Tattersal, Nature: Once we were not alone

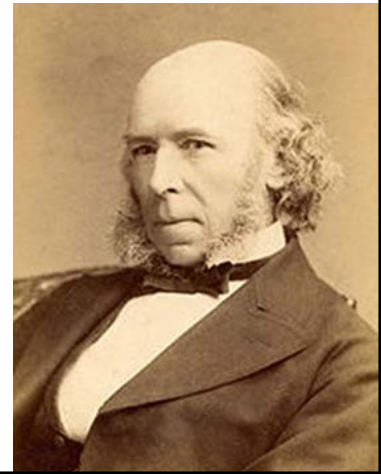


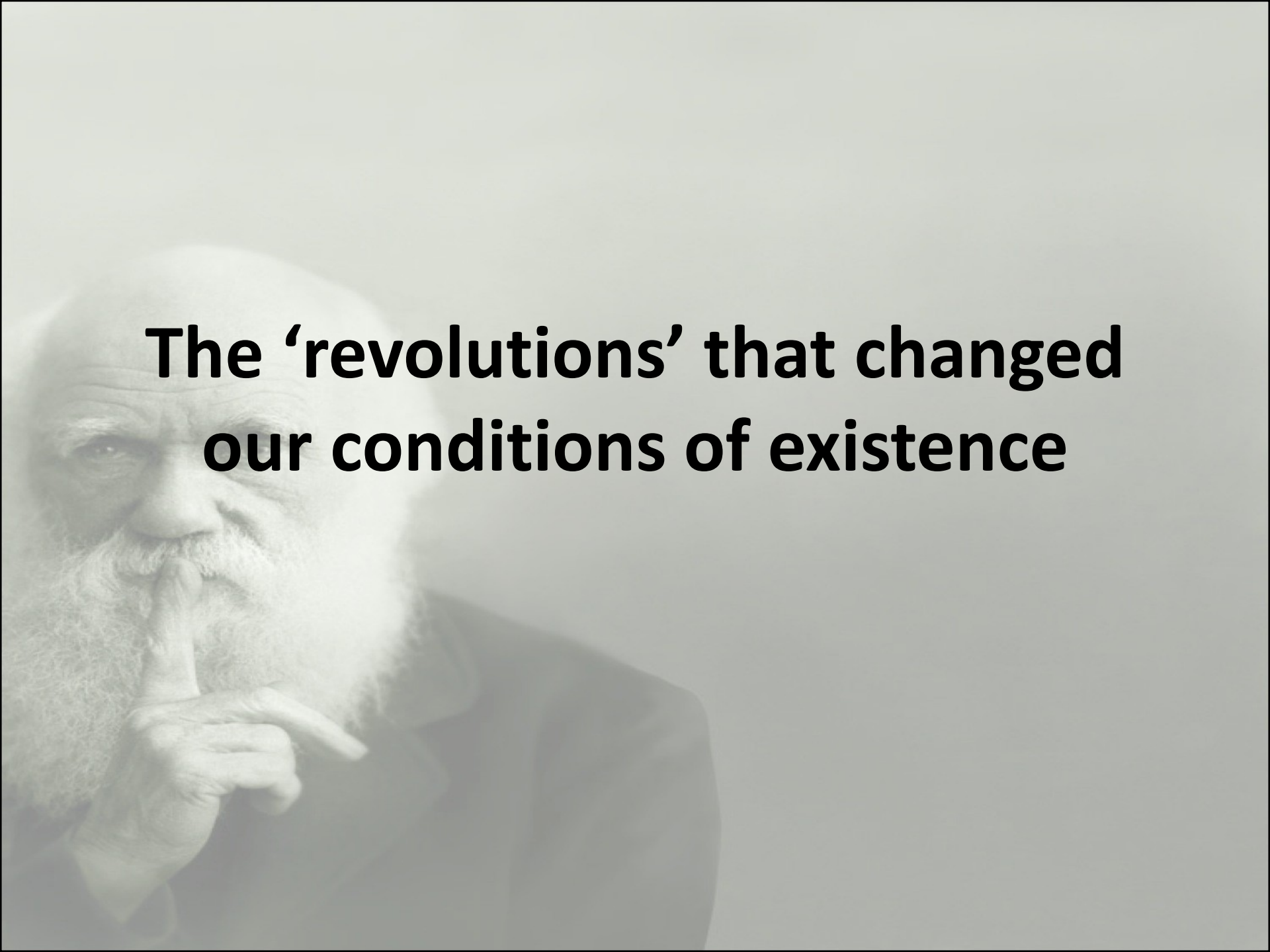


Take home message No. 5:



Onze
'conditions of existence'
=
land-water ecosystem





**The 'revolutions' that changed
our conditions of existence**

10.000 jaar geleden



200 jaar geleden

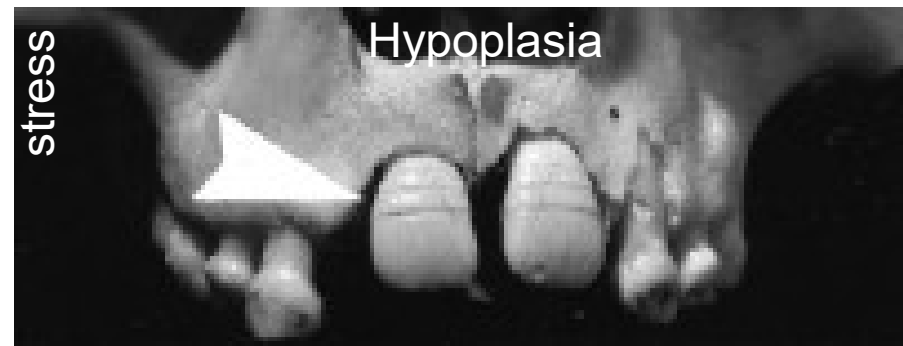
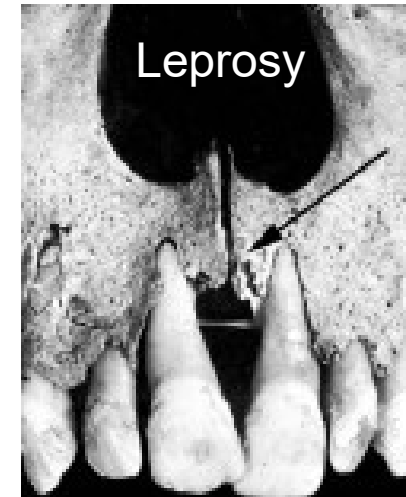
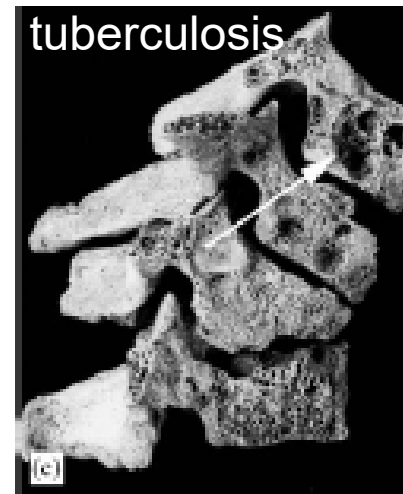
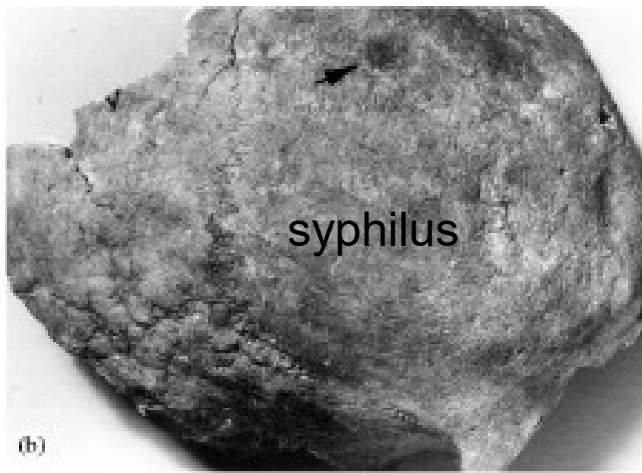


50 jaar
geleden

The Creation of a Mismatch

The agricultural revolution as environmental catastrophe:
Implications for health and lifestyle in the Holocene

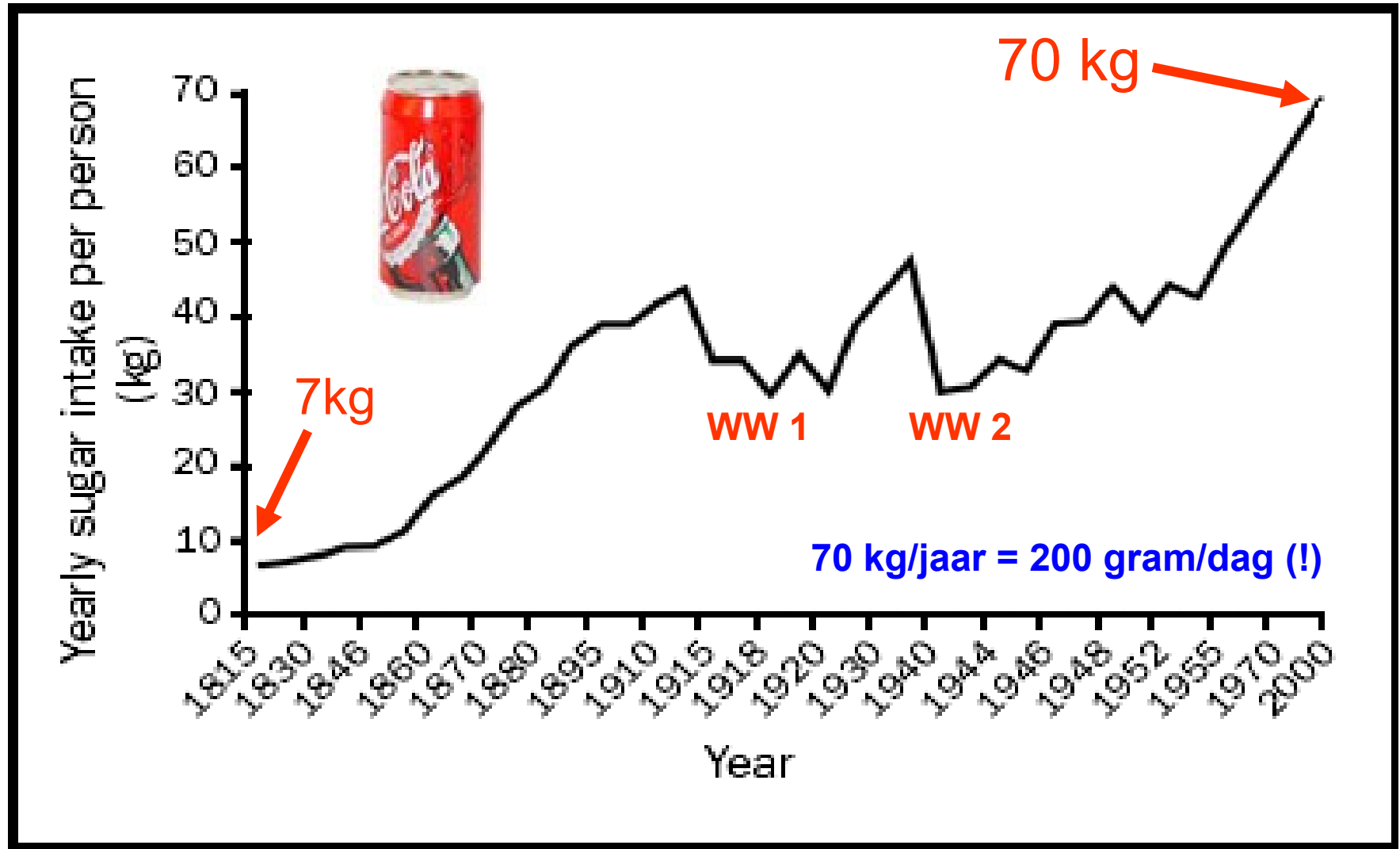
Clark Spencer Larsen*



Industriële revolutie



Jaarlijkse Suikerinname 1815-2000



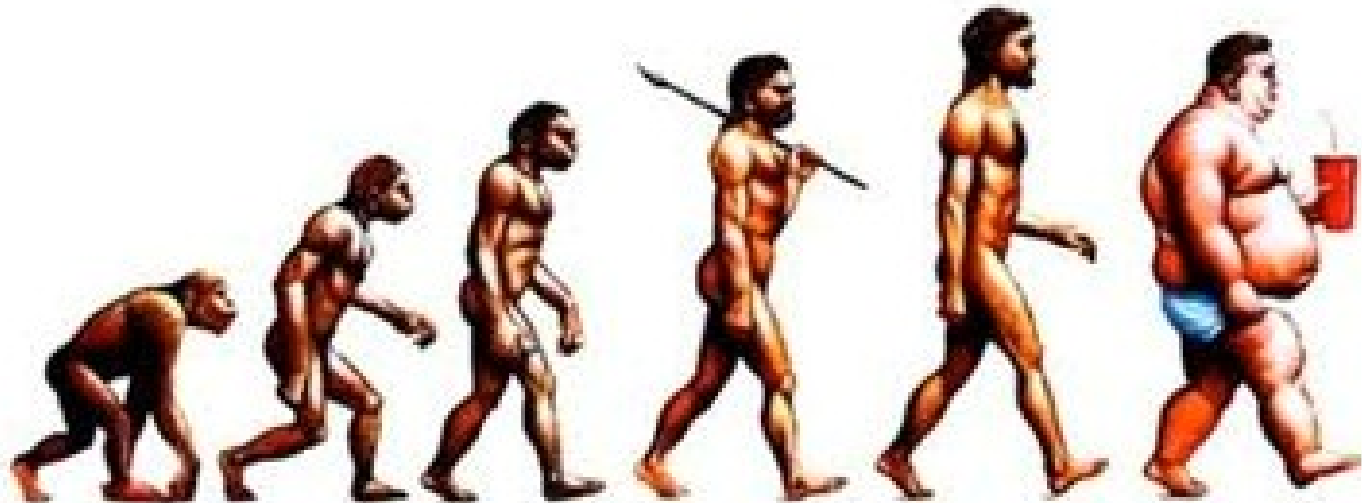
What went Wrong?

Increasing loss of physical activity, loss of realistic reference



Digital Revolution: 10 years ago

De MISMATCH

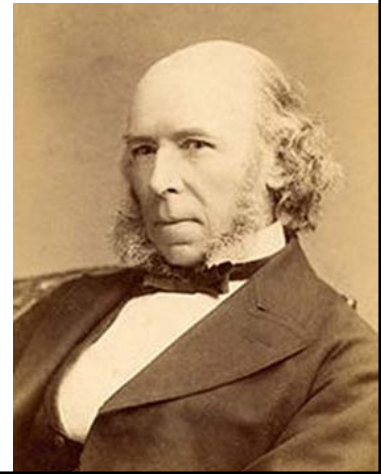




Take home message No. 6:



Onze **genen** leven nog in de **Steentijd**



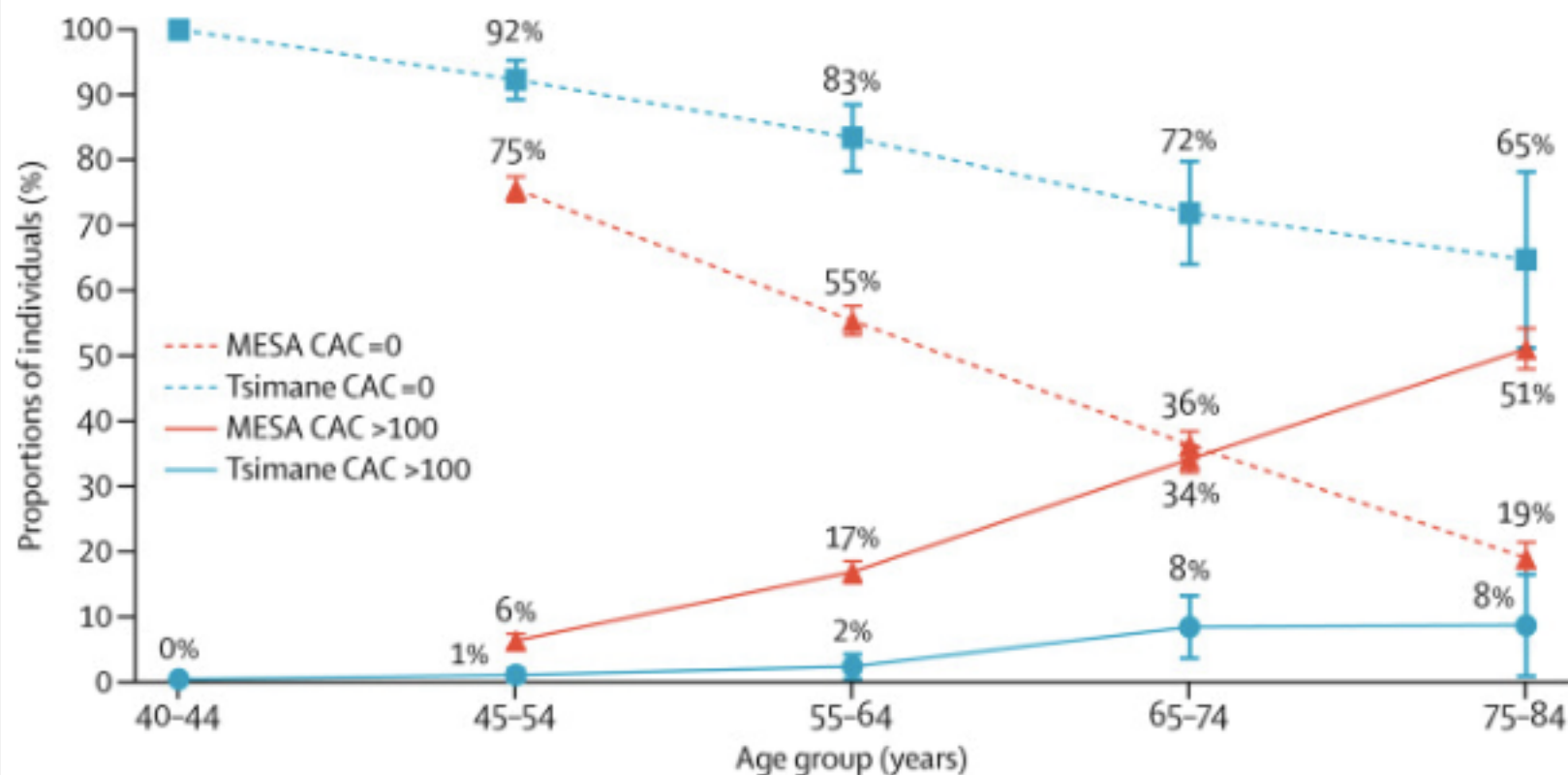


Figure 2.

CAC scores by age for US MESA, and Tsimane samples

Tsimane have significantly lower CAC for each age category (all $p \leq 0.0001$). Raw data and t tests for differences between Tsimane and MESA²³ are given in the [appendix](#). Error bars show 95% CI.

CAC=coronary artery calcium.

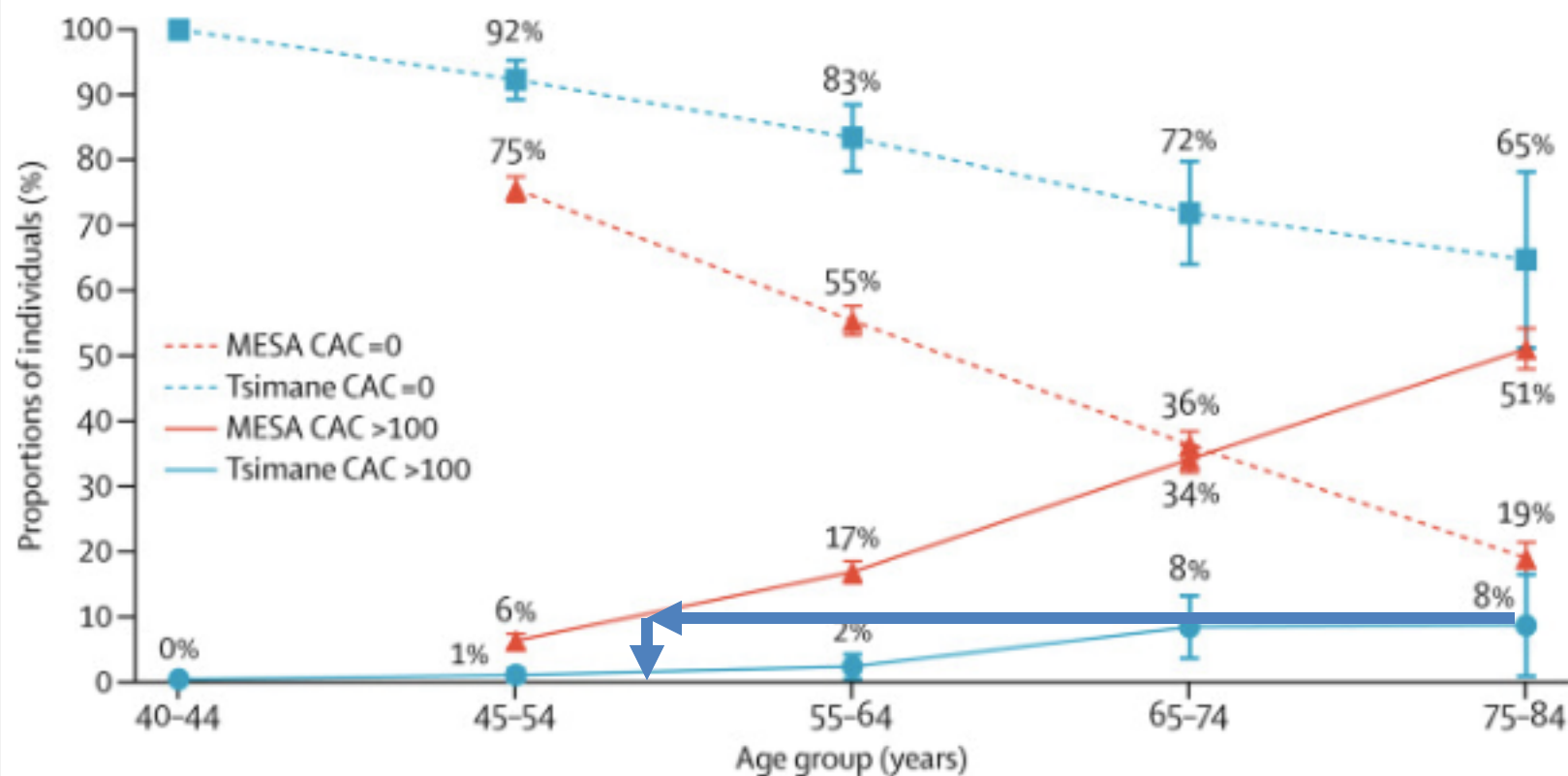


Figure 2.

CAC scores by age for US MESA, and Tsimane samples

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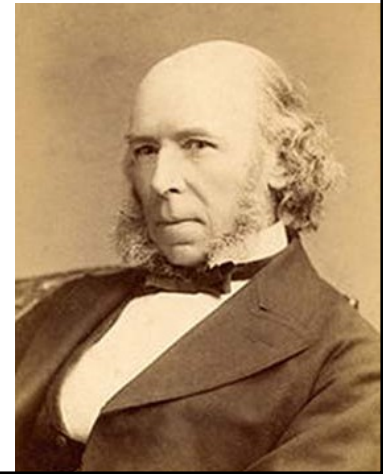
CAC=coronary artery calcium.



Take home message No. 7:



Welvaartsziekten
zijn op steeds jongere leeftijd optredende
ouderdomsziekten
veroorzaakt door langdurige blootstelling aan
risicofactoren en daarmee
lage graad ontsteking

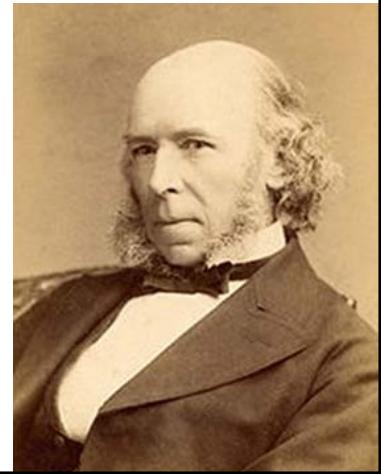




Take home message No. 8:



Om gezond te blijven
moeten we terug naar onze
'conditions of existence'
of OER-omgeving

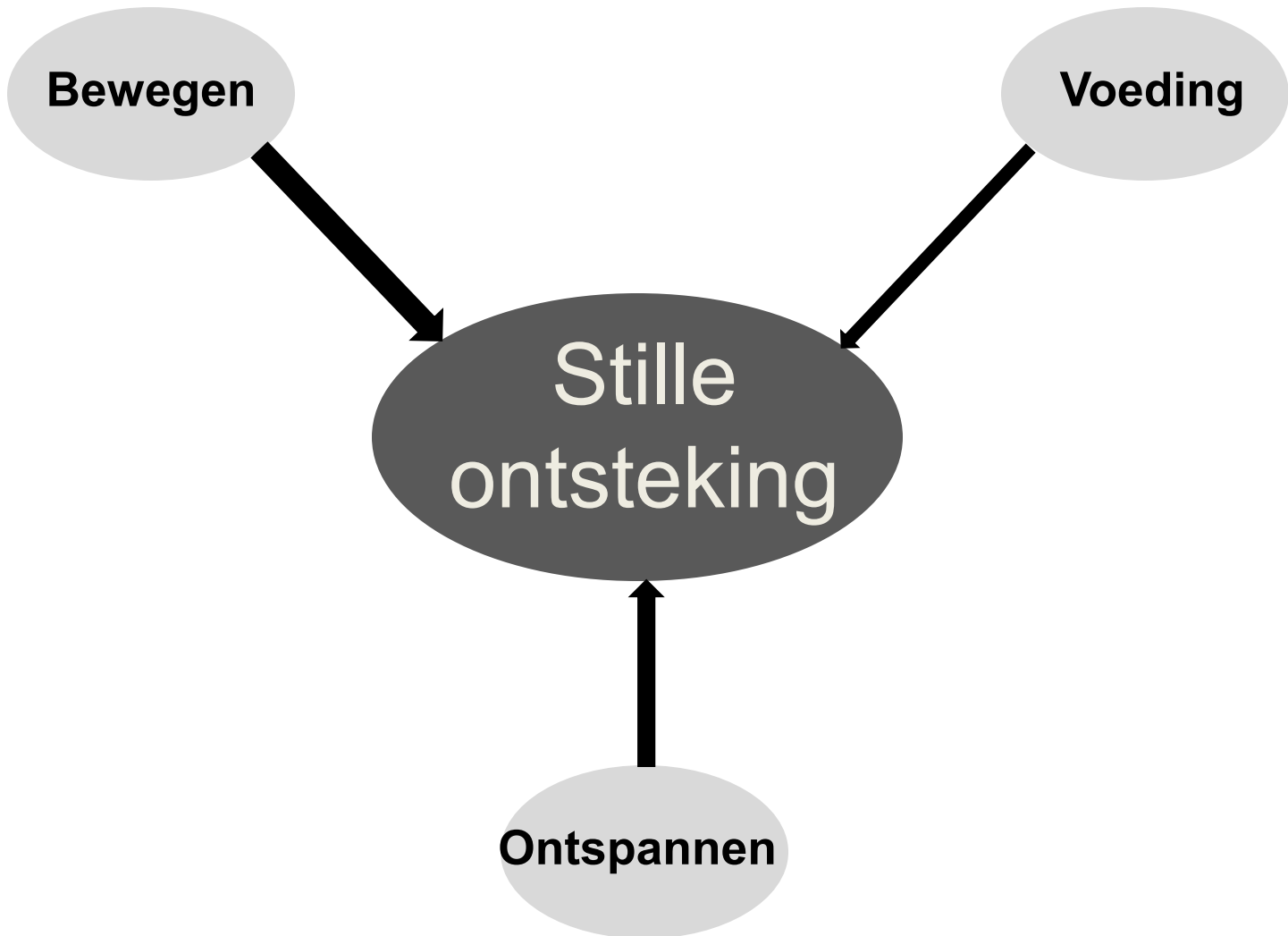




Evolutionair Denken

Lage graad ontsteking
en
een oerleefstijl

Een verbindende 'risico-factor'





Lage graad ontsteking

Low-grade inflammation (LGI)

- **Hoe moet ik me dit voorstellen?**



LGI in de praktijk

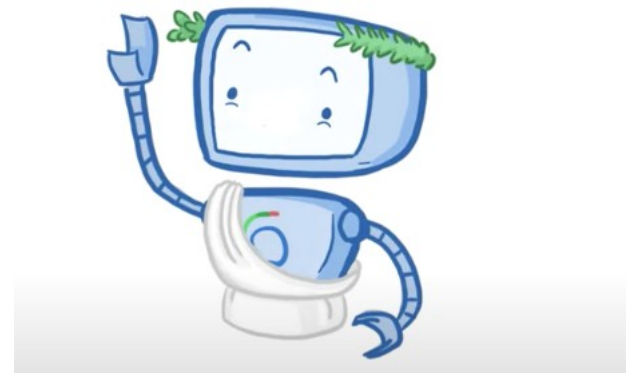
Point measures

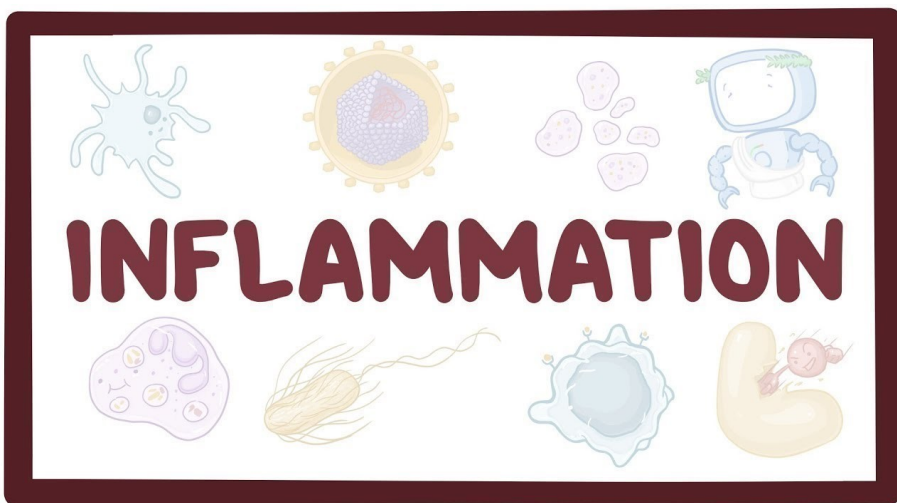
- Age
- Sexe
- Education
- Location of living (Urban/n)
- Smoking
- Waist-to-hip ratio
- Leasure Time
- Hypertension
- High TG/HDL ratio
- Glucose-intolerance
- Vegetable/fruit intake

Only in sequence

- hsCRP
- Leukocytes
- Trombocytes
- Ferritine

INFLAMMATION



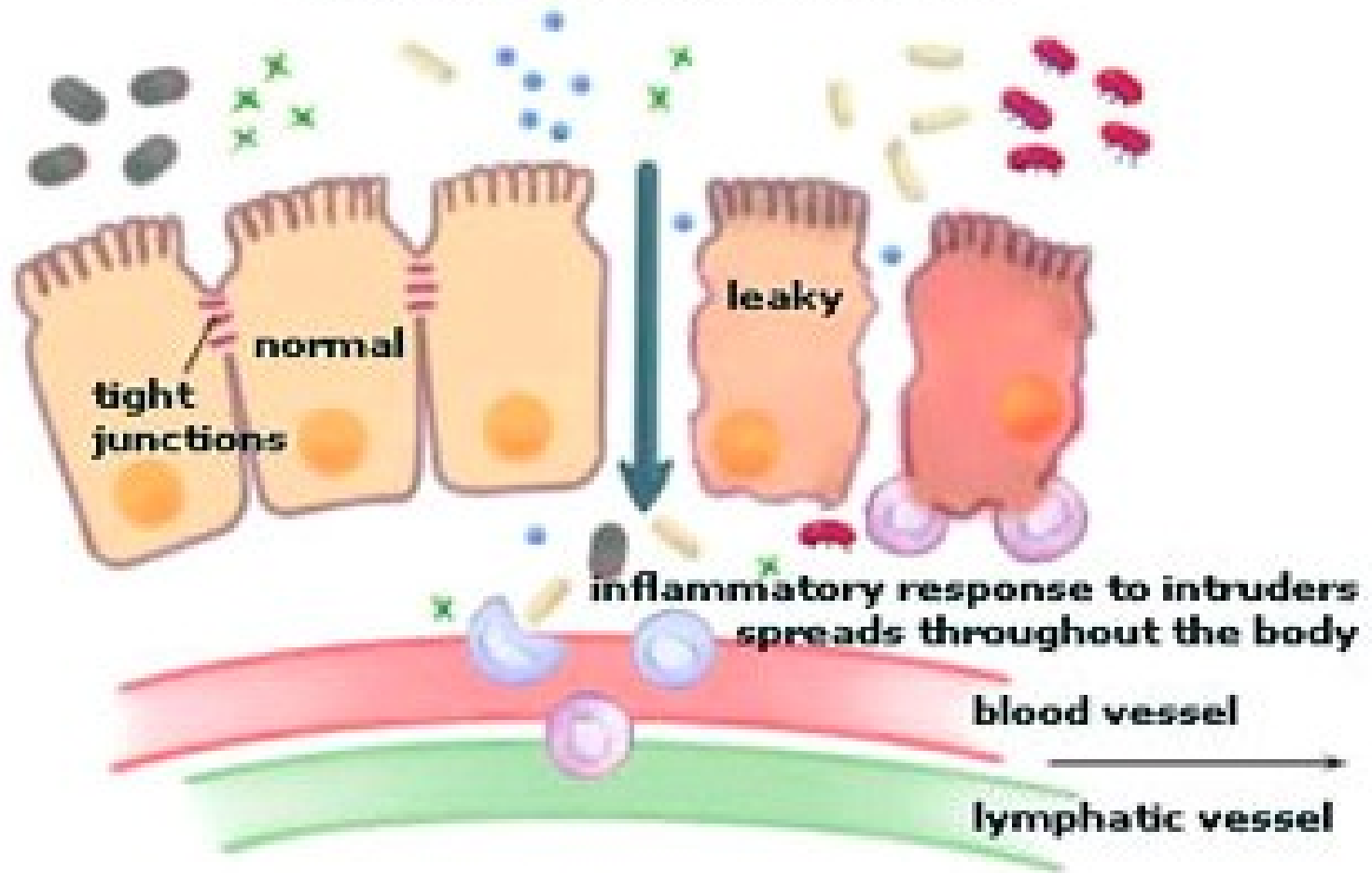


It's all about 'barrières'

- Oral Cavity and skin
 - Microbial translocation
- Lungs
 - Inflammatory particles (rook, fijnstof)
- **Digestive system**
 - Translocation of microbes and pro-inflam particles
- **Blood vessels**
 - Disruption of the endothelial barrier / glycocalyx

LEAKY GUT

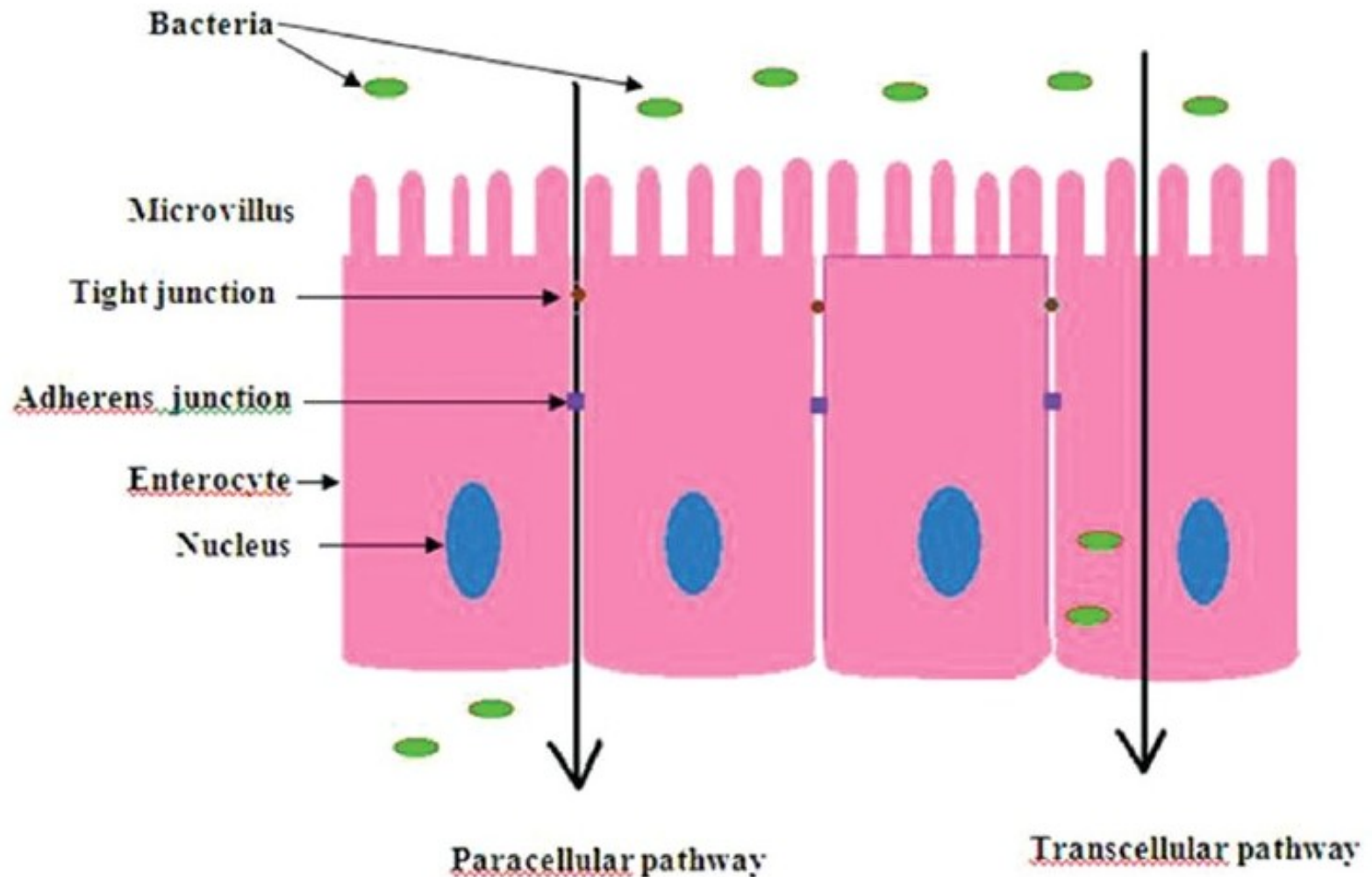
undigested food particles / toxins



Digestive system – Evolutionaire stress

Ongewenste gevolgen

- Bacterial translocation / Sepsis

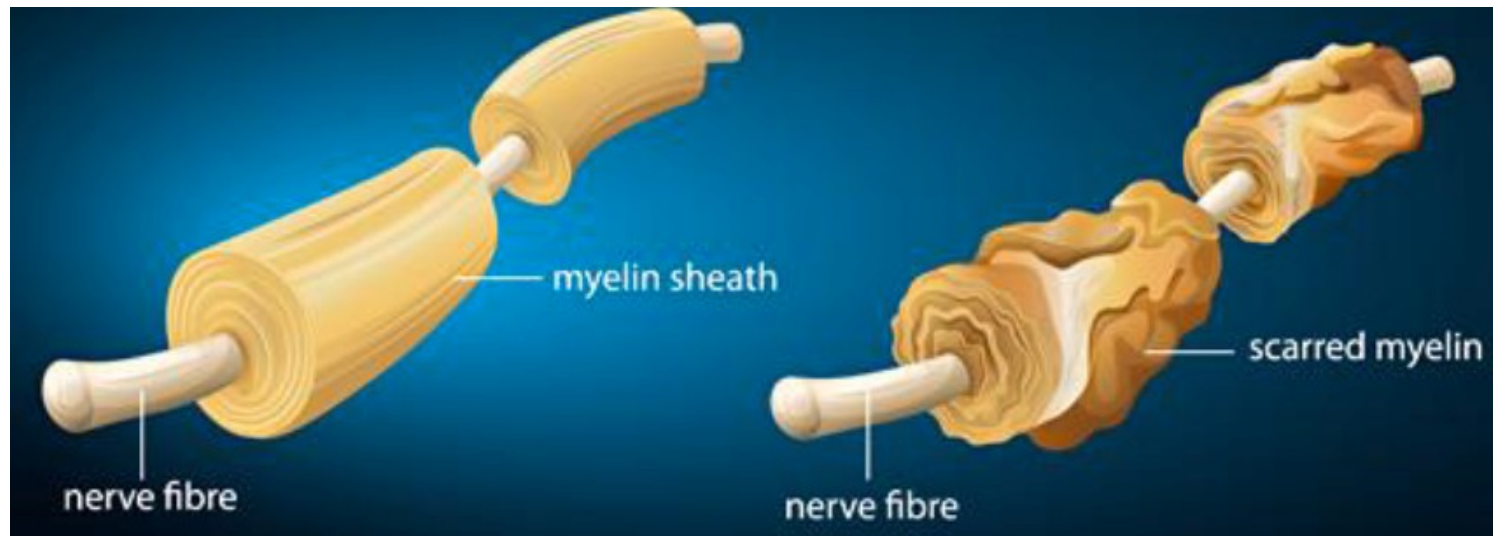
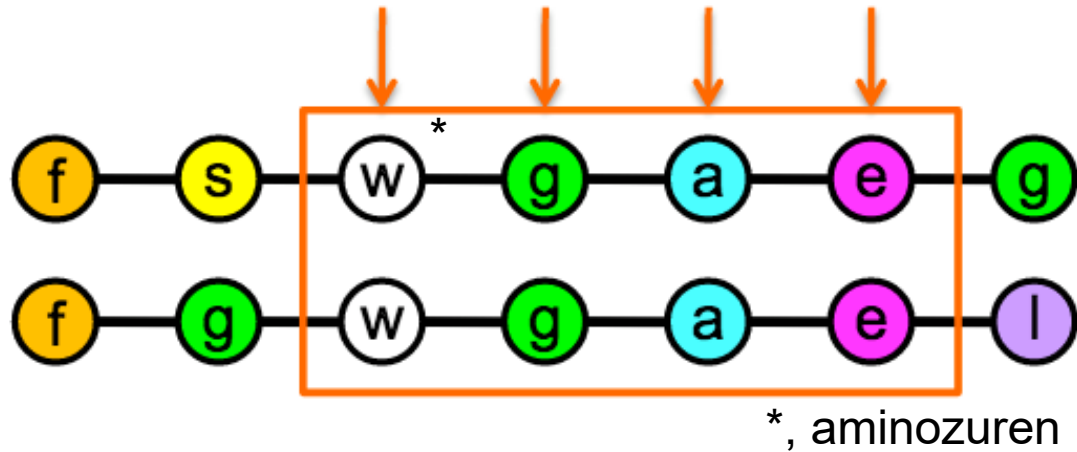


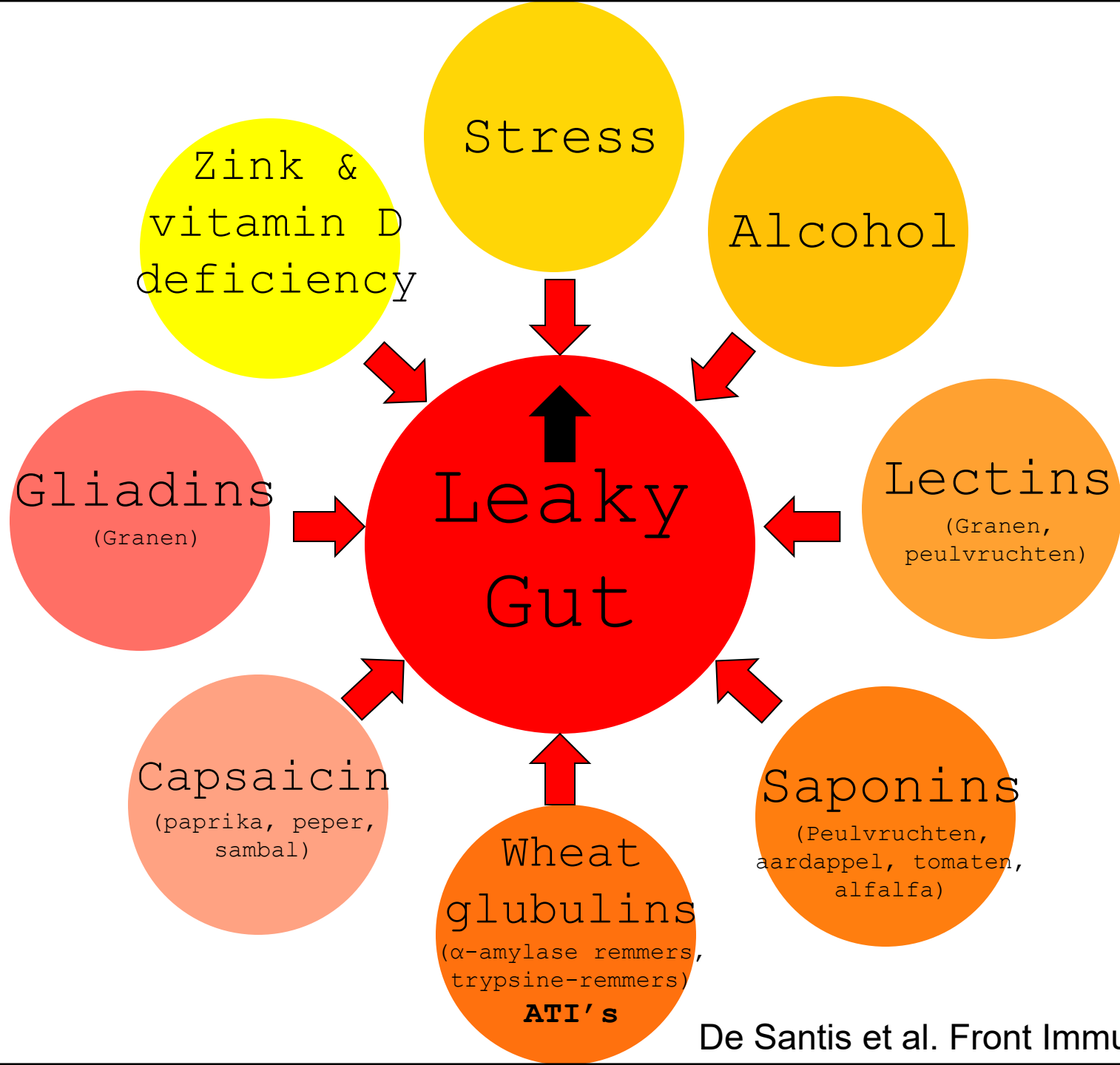
Multiple Sclerosis

Structural Homology

Myelin Basic protein

Escherichia coli





Barrierefunctie related disease

Disease

Reference

Ankylosing spondilitis

Vaile JH et al. J Rheumatol 1999;26:128-35

Autoimmune gastritis

Greenwood DL et al. Eur J Pediatr 2008;167:917-25

Autoimmune hepatitis

Terjung B Clin Rev Allergy Immunol 2009;36:40-51

Behcet's syndrome

Fresko I et al. Ann Rheum Dis 2001;60:65-6

Celiac disease

Schulzke JD et al. Pediatric Res 1998;43:435-41

Crohn's disease

Caradonna L et al. J Endotoxin Res 2000;6:205-14

Dermatitis herpetiformis

Kieffer M et al. Br J Dermatol 1983;108:673-8

Diabetes type 1

Sapone A et al. Diabetes 2006;55:1443-49

Hashimoto Thyroiditis

Sasso FC et al. Gut 2004;53:1878-80

Juvenil Arthritis

Picco P et al. Clin Exp Rheumatol 2000;18:773-8

Lupus

Apperloo HZ et al. Epidemiol Infect 1994;112:367-73

Multiple Sclerosis

Yacyshyn B et al. Dig Dis Sci 1996;41:2493-98

Psoriasis

Hamilton et al. Q J Med 1985;56:559-67

Rheumatoid Arthritis

Smith MD et al. J Rheumatol 1985;12:299-305

Ulcerative Colitis

Caradonna L et al. J Endotoxin Res 2000;6:205-14

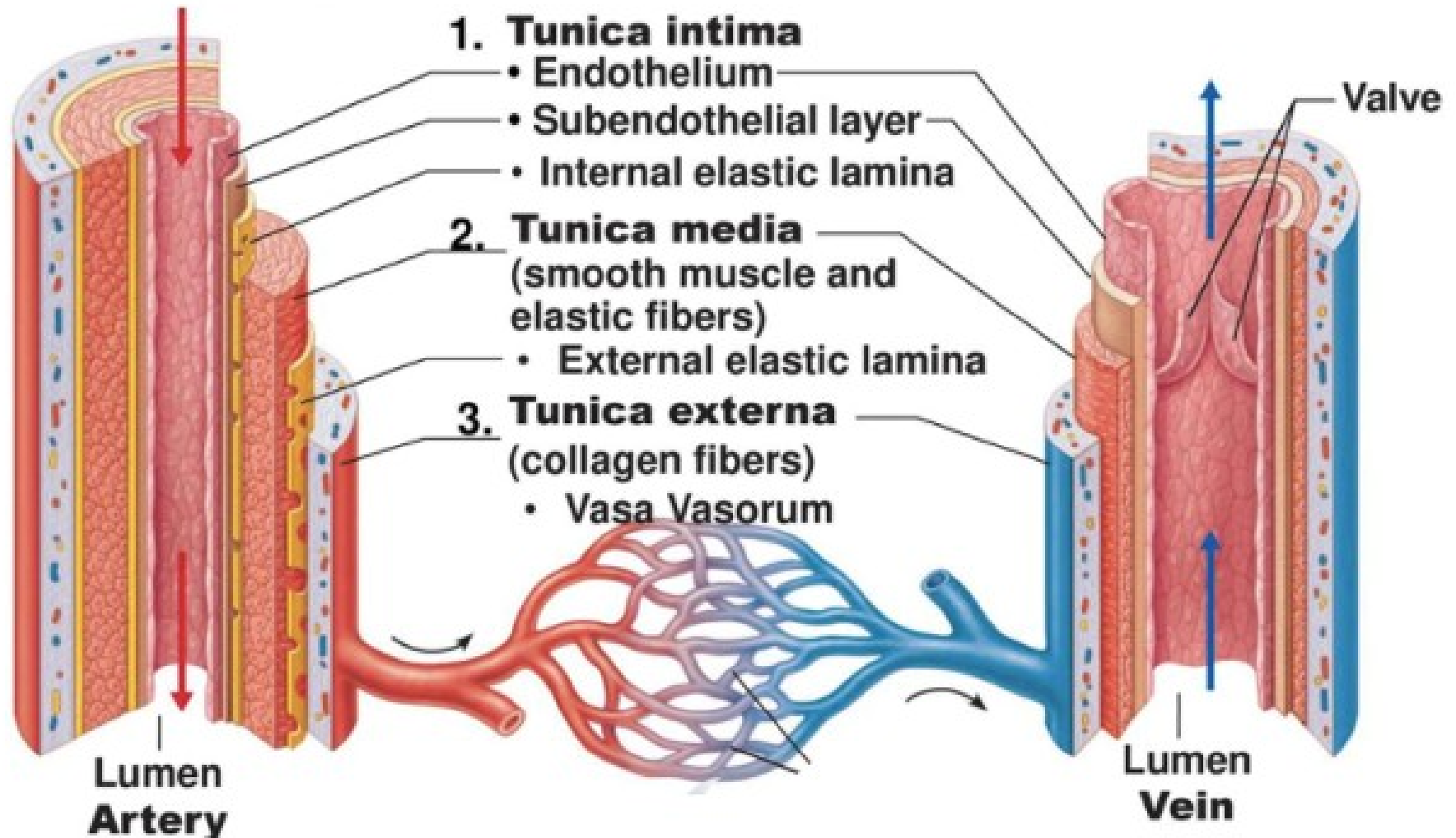
Uveitis

Benitez JM et al. Eye 2000 14(pt 3A):340-3

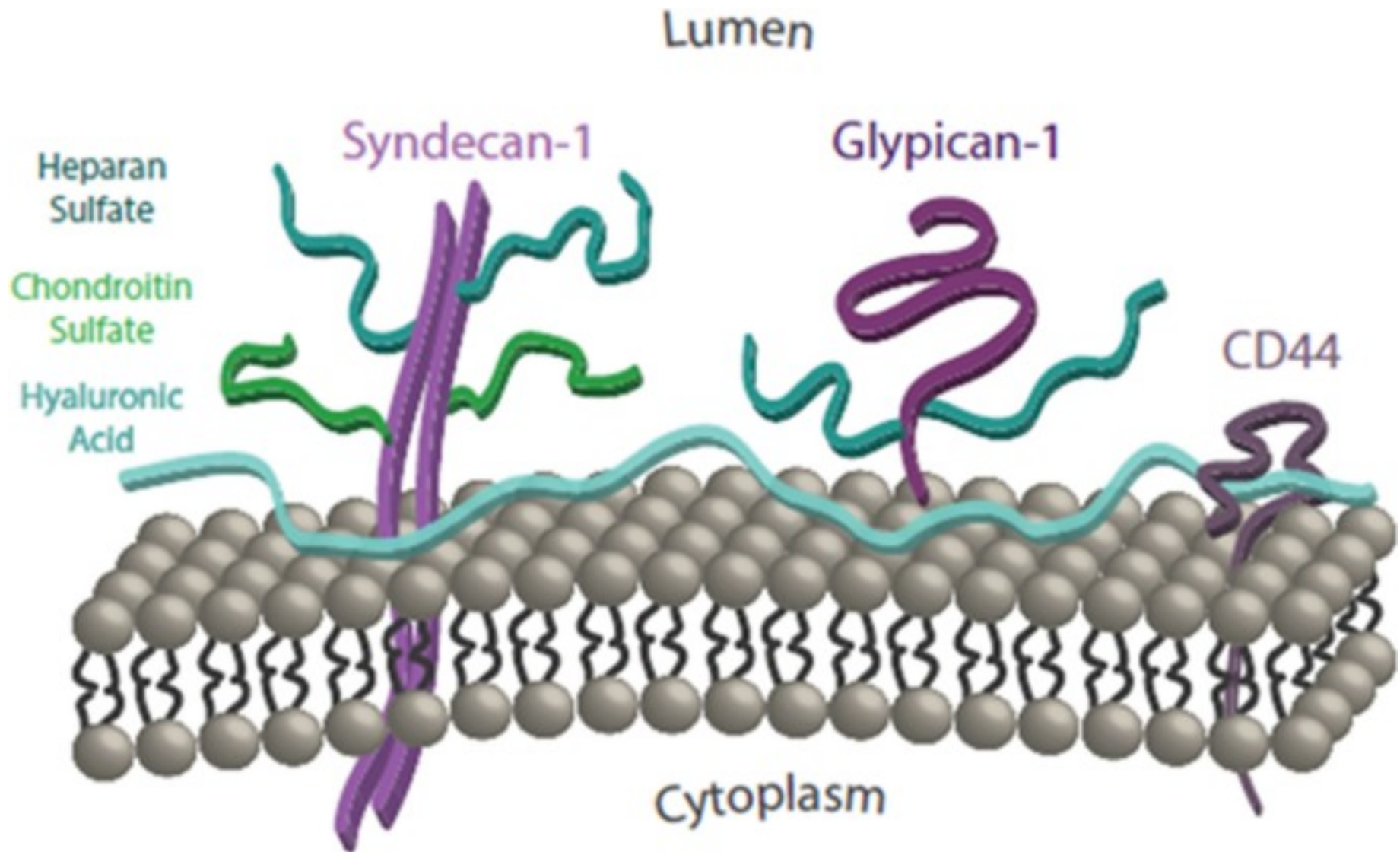
It's all about 'barrières'

- Oral Cavity and skin
 - Microbial translocation
- Lungs
 - Inflammatory particles (rook, fijnstof)
- **Digestive system**
 - Translocation of microbes and pro-inflam particles
- **Blood vessels**
 - Disruption of the endothelial barrier / glycocalyx

The blood vessel wall

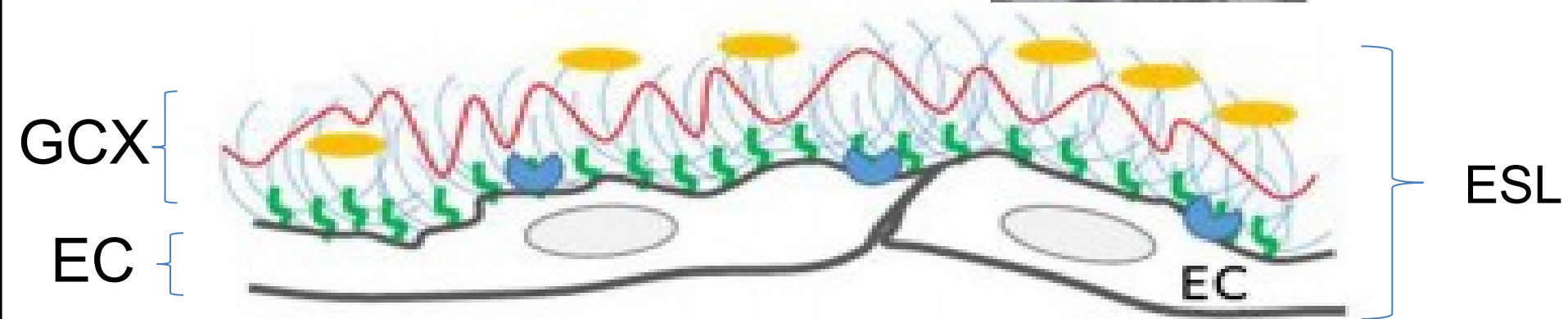
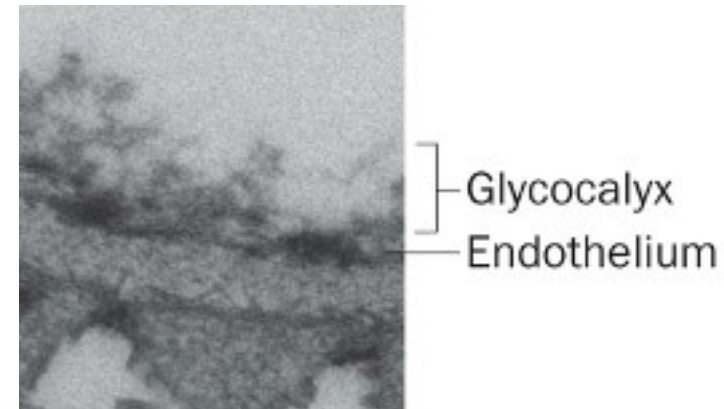


Glycocalyx: the forgotten layer.....



Biology of the glycocalyx

- Barriere tussen bloed en endotheel
- Transmissie van shear-stress
- Afstoten RBC, WBC, platelets
- Remming van de Stolling



GCX = glycocalyx; EC = endothelial cell; ESL = endothelial surface layer

Een verbindende 'risico-factor'

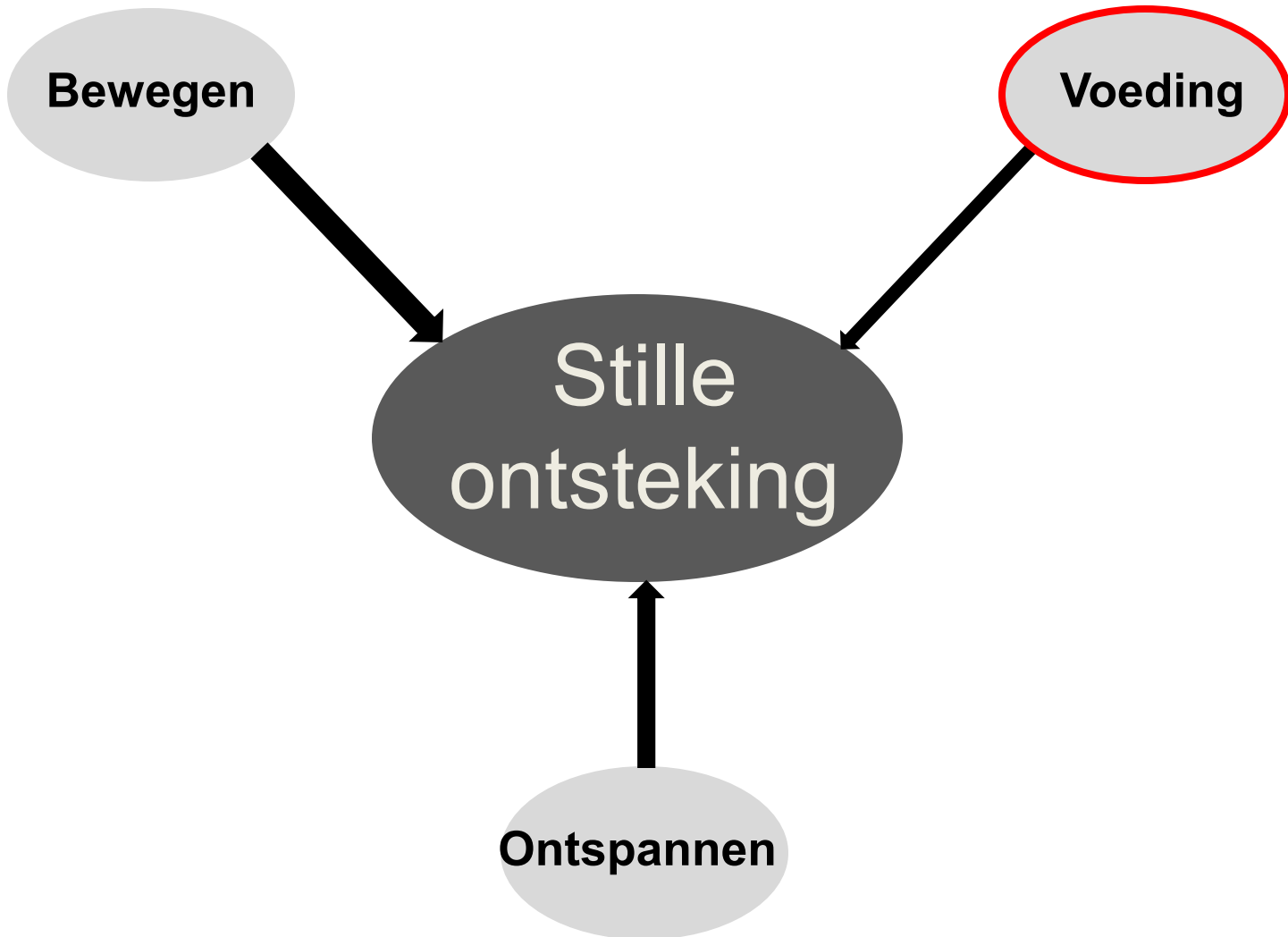


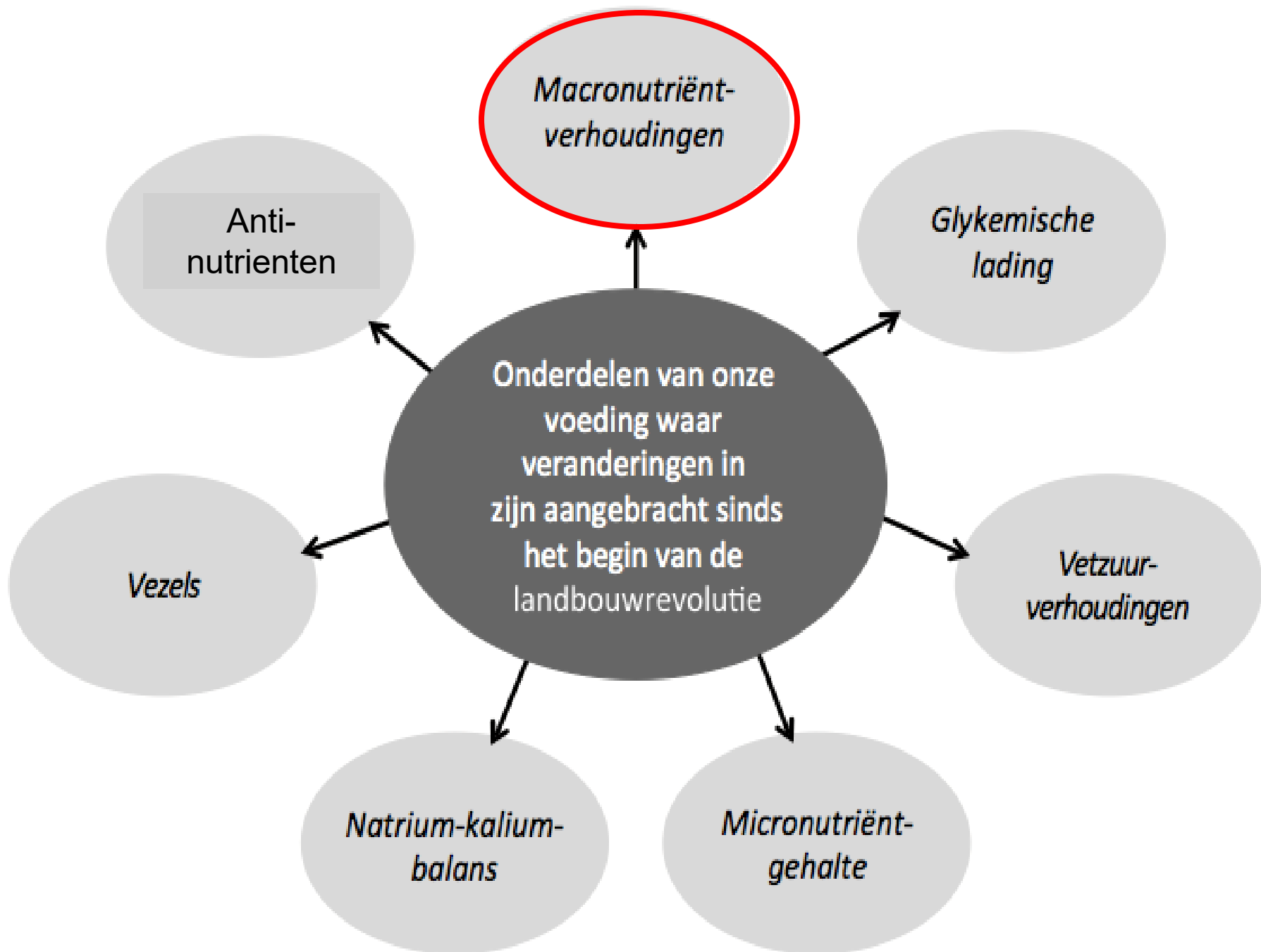
TABLE 1

Food and food types found in Western diets generally unavailable to preagricultural hominins¹

Food or food group	Value
<u>Dairy products</u>	<i>% of energy²</i>
Whole milk	1.6
Low-fat milk	2.1
Cheese	3.2
Butter	1.1
Other	2.6
Total	<u>10.6</u>
<u>Cereal grains</u>	
Whole grains	3.5
Refined grains	20.4
Total	<u>23.9</u>
<u>Refined sugars</u>	
Sucrose	8.0
High-fructose corn syrup	7.8
Glucose	2.6
Syrups	0.1
Other	0.1
Total	<u>18.6</u>
<u>Refined vegetable oils</u>	
Salad, cooking oils	8.8
Shortening	6.6
Margarine	2.2
Total	<u>17.6</u>
Alcohol	1.4
Total energy	<u>72.1</u>
Added salt, as sodium chloride	9.6 ³

Zuivel**Graan****Suiker****Olie**

**Onze huidige
voeding
bestaat voor
72% uit
'onbekend'
voedsel**



Macro-nutriënten

Koolhydraten

Eiwitten
(proteïne)

Vetten

Snelle
Koolhydraten

Langzame
Koolhydraten



Verzadigd vet

Onverzadigd vet

Enkelvoudig
onverzadigd vet

Meervoudig
onverzadigd vet

Gezonde eiwitten (vnl plant)



- Eiwitrijke diëten zijn gezond omdat
 - Verzadigend, ondanks negatieve energiebalans
 - Persisterend energiek, ondanks gewichtsverlies
 - Behouden van spiermassa bij afvallen

Vetten

Verzadigde vetten

- cocosboter
- roomboter

Onverzadigde vetten

Enkelvoudig onverzadigde vetten

- Olijfolie
- Avocado
- Macadamia
- Hazelnoten
- Pecannoten

Meervoudig onverzadigde vetten

Omega-6 vetten

- Zonnebloemolie
- Maïsolie
- Sojaboonolie
- Sesamzaadolie
- Pinda(olie)
- Hennepzaadolie

Omega-3 vetten

- Vette vis
- Perillaolie
- Lijnzaad(olie)
- Koolzaadolie
- Walnoot(olie)

Trans- vetten

- Koek en gebak
- Zuivel
- Margarine/halvarine
- Frituurvet

Why are we so afraid of fat?

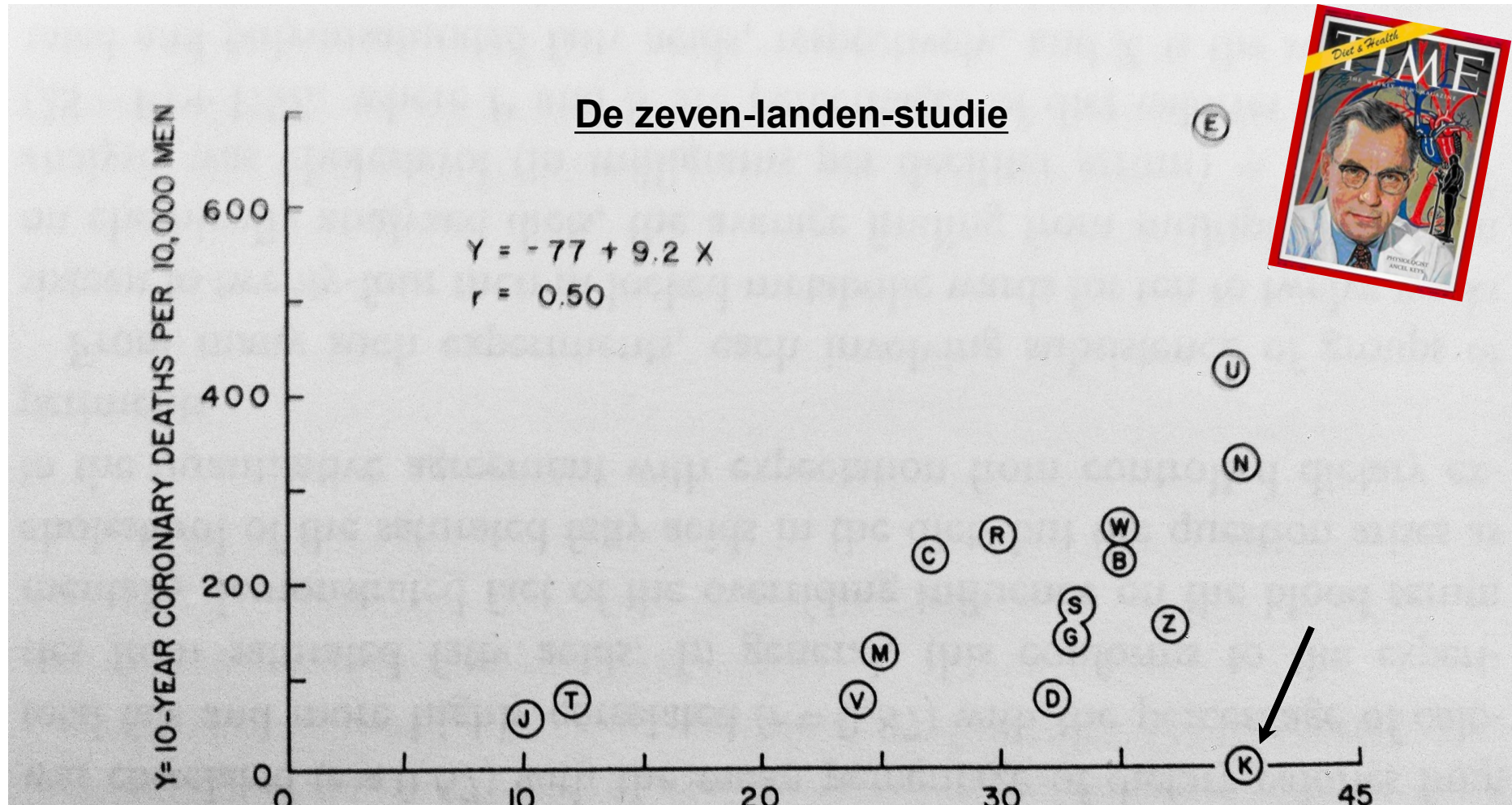


Meer eiwit, meer vet?



- Eet minder vet:
- LET op VET
- Verzadigd = Verkeerd
- Tussen 1987 en 1997 zijn Nederlanders minder vet en verzadigd vet gaan eten

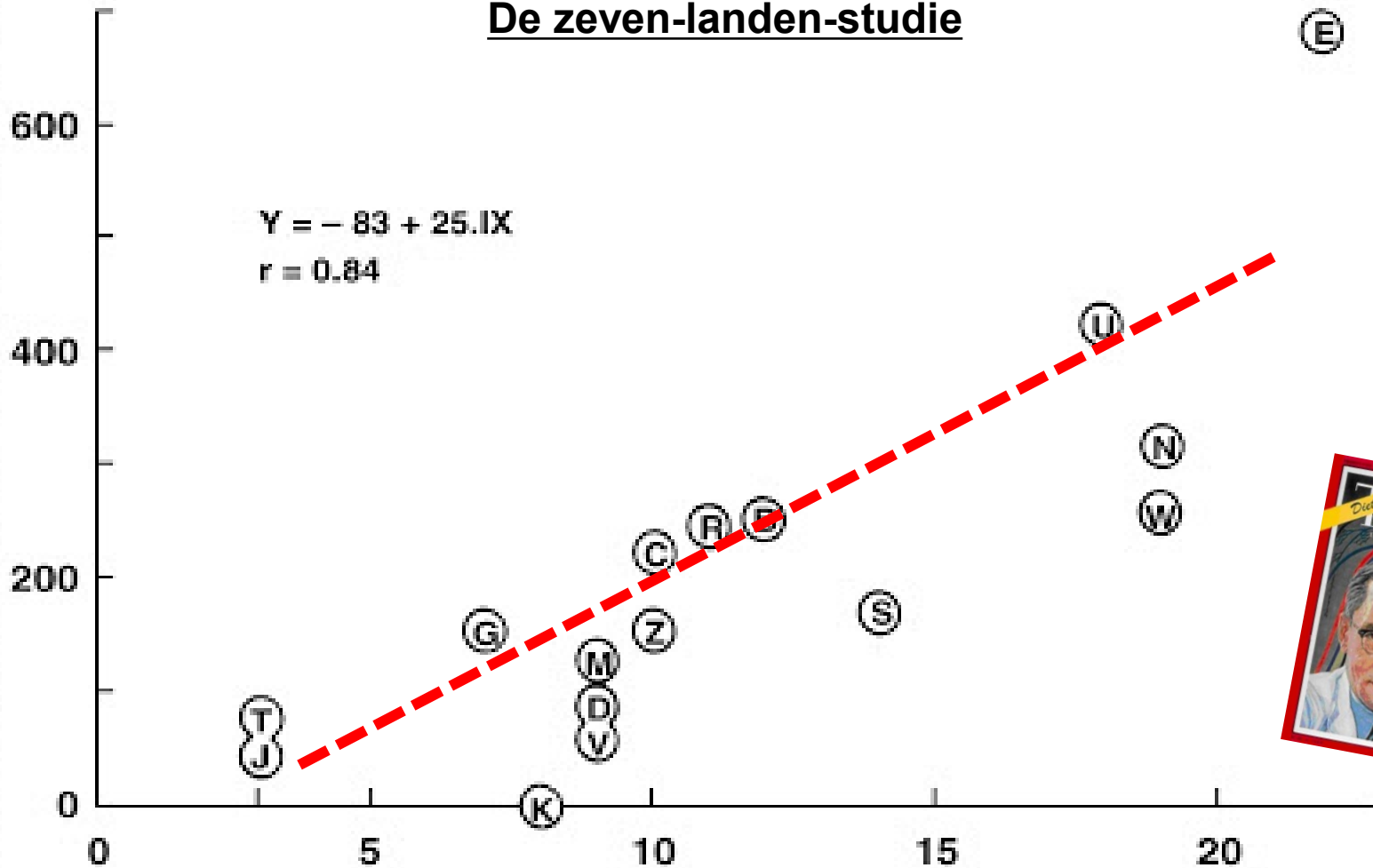
Vet ongezond?



Figuur: De hoeveel dodelijke hartaanvallen als functie van de inname van vet

Y = 10-YEAR CORONARY DEATHS PER 10,000 MEN

De zeven-landen-studie



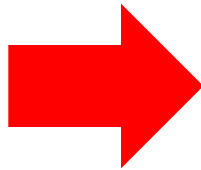
Figuur: De hoeveel dodelijke hartaanvallen als functie van de inname van VERZADIGD vet

Verzadigd vet vervangen door koolhydraten

Major types of dietary fat and risk of coronary heart disease: a pooled analysis of 11 cohort studies¹⁻³

Marianne U Jakobsen, Eilis J O'Reilly, Berit L Heitmann, Mark A Pereira, Katarina Bälter, Gary E Fraser, Uri Goldbourt, Göran Hallmans, Paul Knekt, Simin Liu, Pirjo Pietinen, Donna Spiegelman, June Stevens, Jarmo Virtamo, Walter C Willett, and Alberto Ascherio

During 4-10 y of follow-up, 5249 coronary events and 2155 coronary deaths occurred among 344,696 persons



Vervangen van verzadigd vet door koolhydraten geeft een

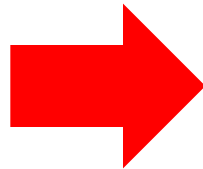
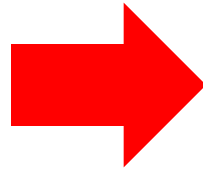
7% **hogere** kans op HVZ

Type koolhydraten?

Intake of carbohydrates compared with intake of saturated fatty acids and risk of myocardial infarction: importance of the glycemic index¹⁻³

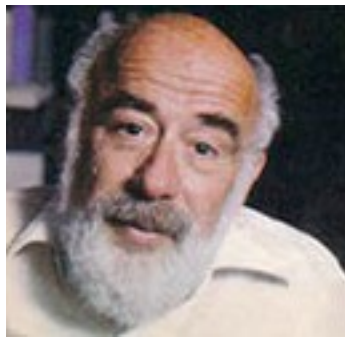
Marianne U Jakobsen, Claus Dethlefsen, Albert M Joensen, Jakob Stegger, Anne Tjønneland, Erik B Schmidt, and Kim Overvad

prospective cohort study included 53,644 women and men



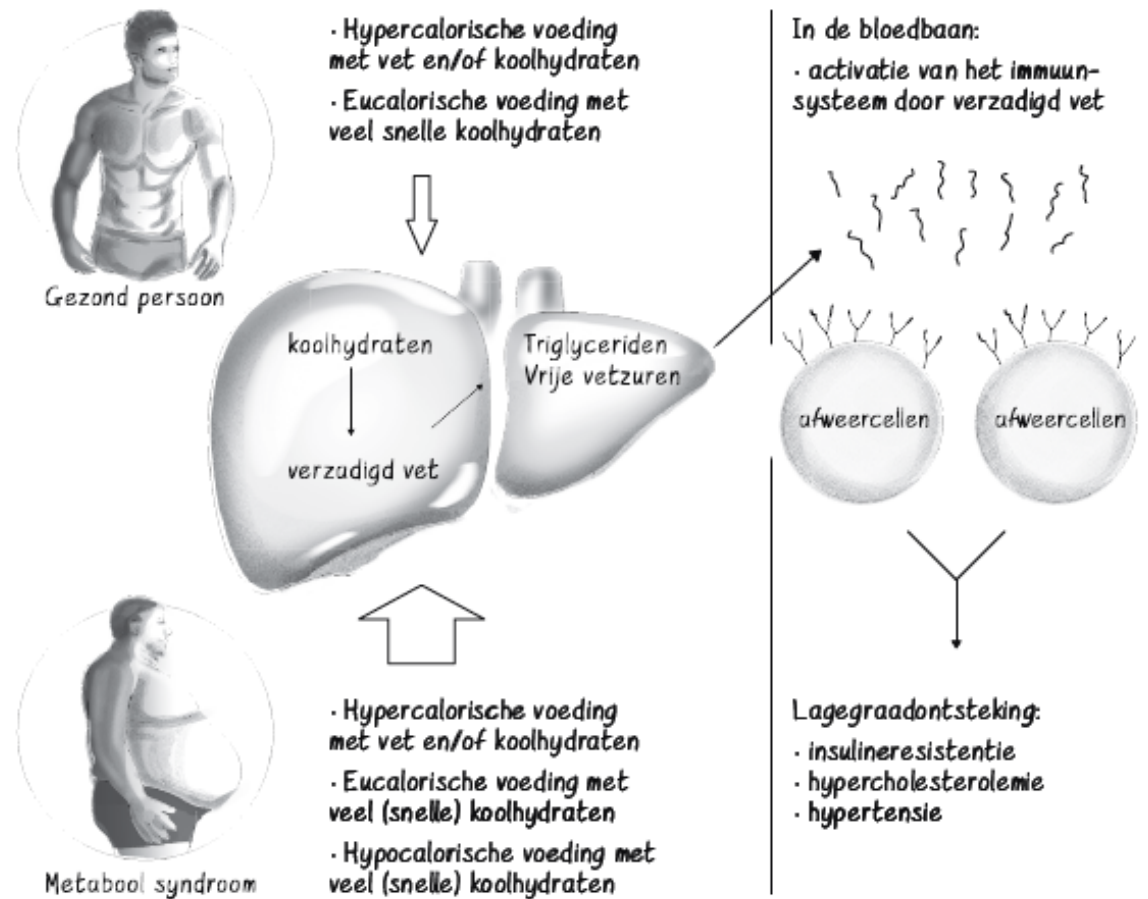
- Lage glycemische index: **niet sign. 12% verlaagd** HVZ risico
- Hoge glycemische index: **33% verhoogd** HVZ risico

De link tussen koolhydraten en inflammatie



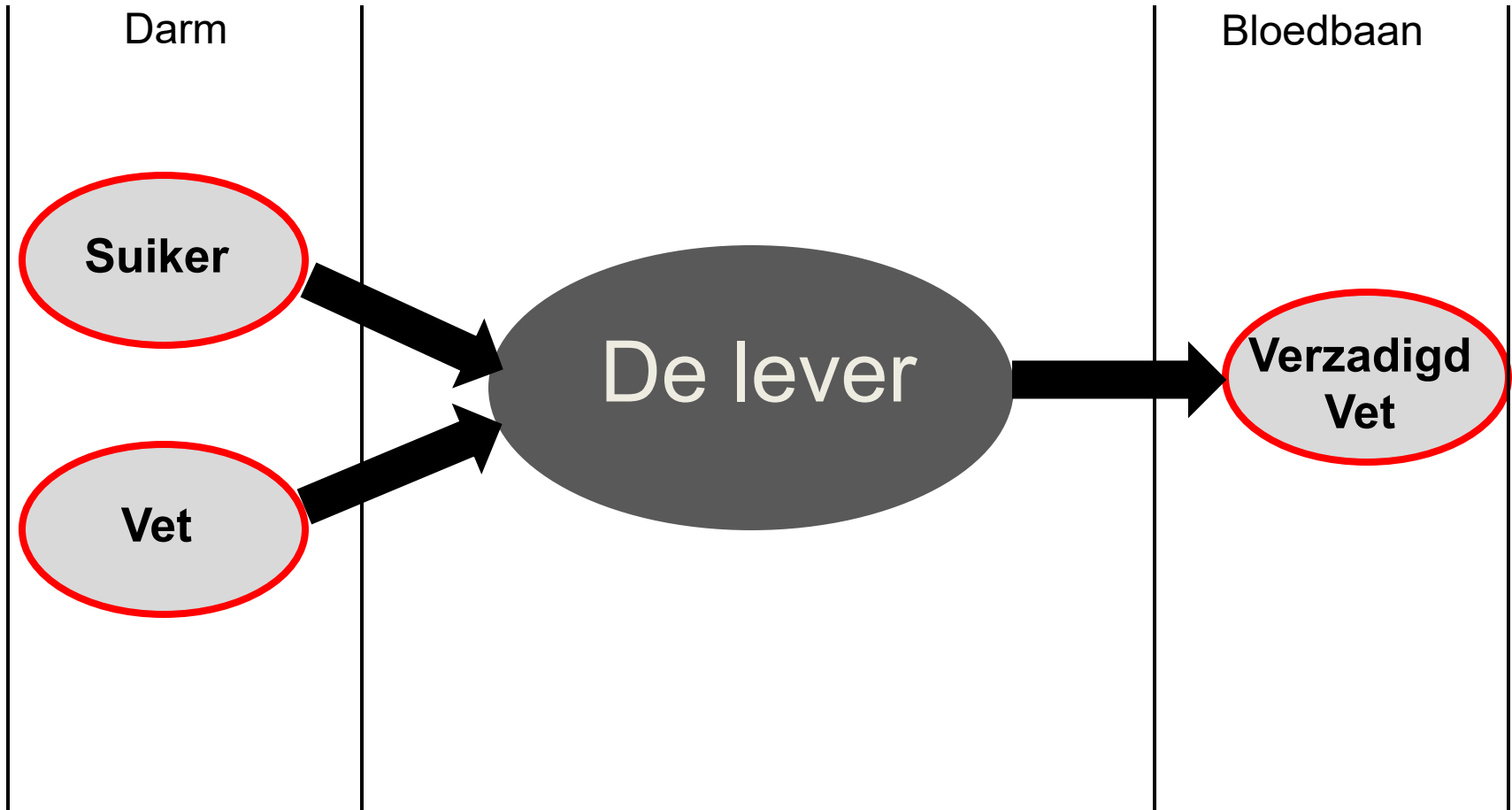
John Gofman

**Carbohydrate
induced
hyper-TG**

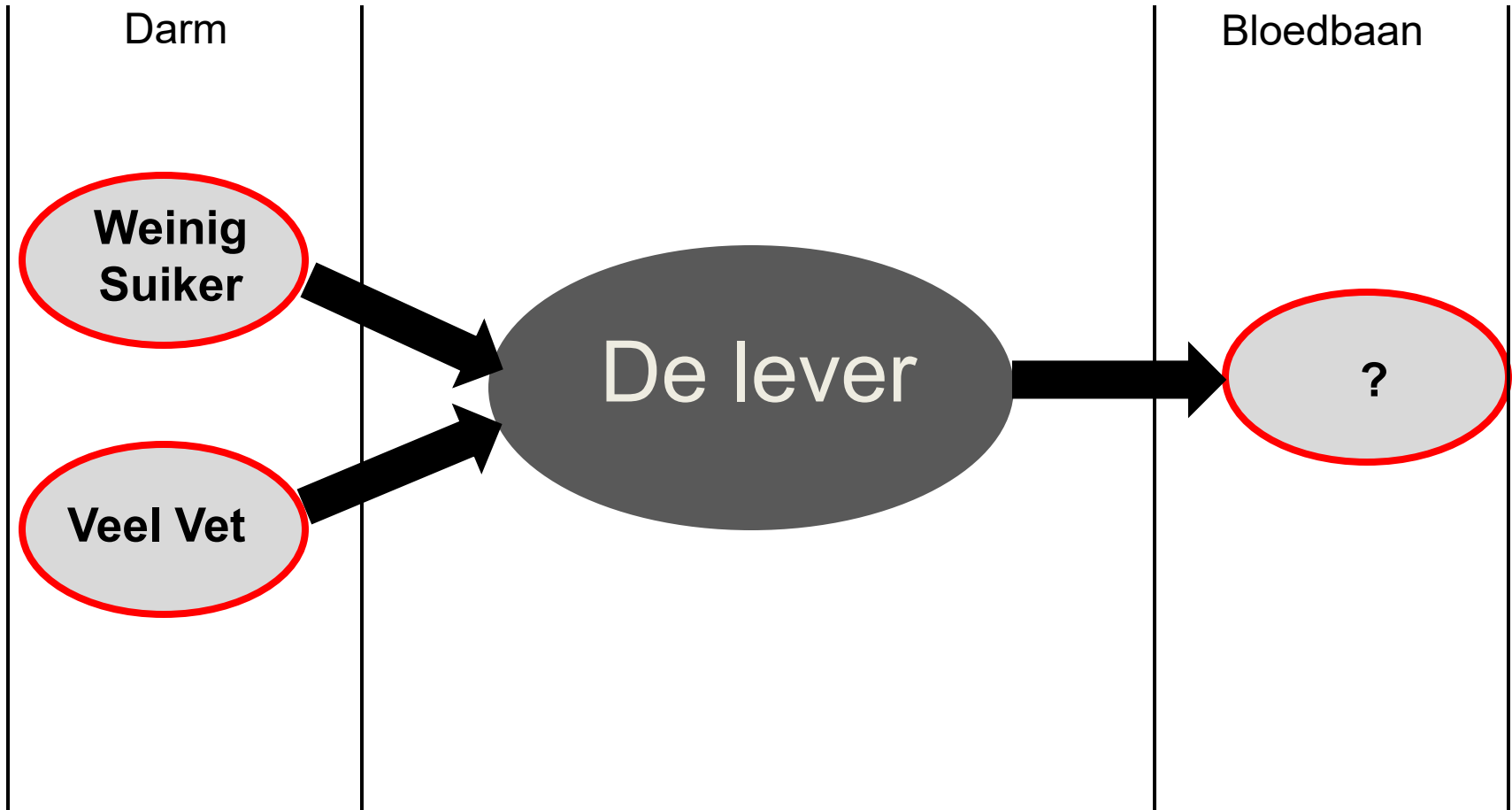


Figuur 21. De gevolgen van de inname van verschillende soorten voeding op de triglyceriden, het cholesterol, op insulineresistentie, overgewicht (obesitas) en hoge bloeddruk (hypertensie) via lagegraadontsteking in gezonde personen en personen met het metabool syndroom.⁴⁸⁹

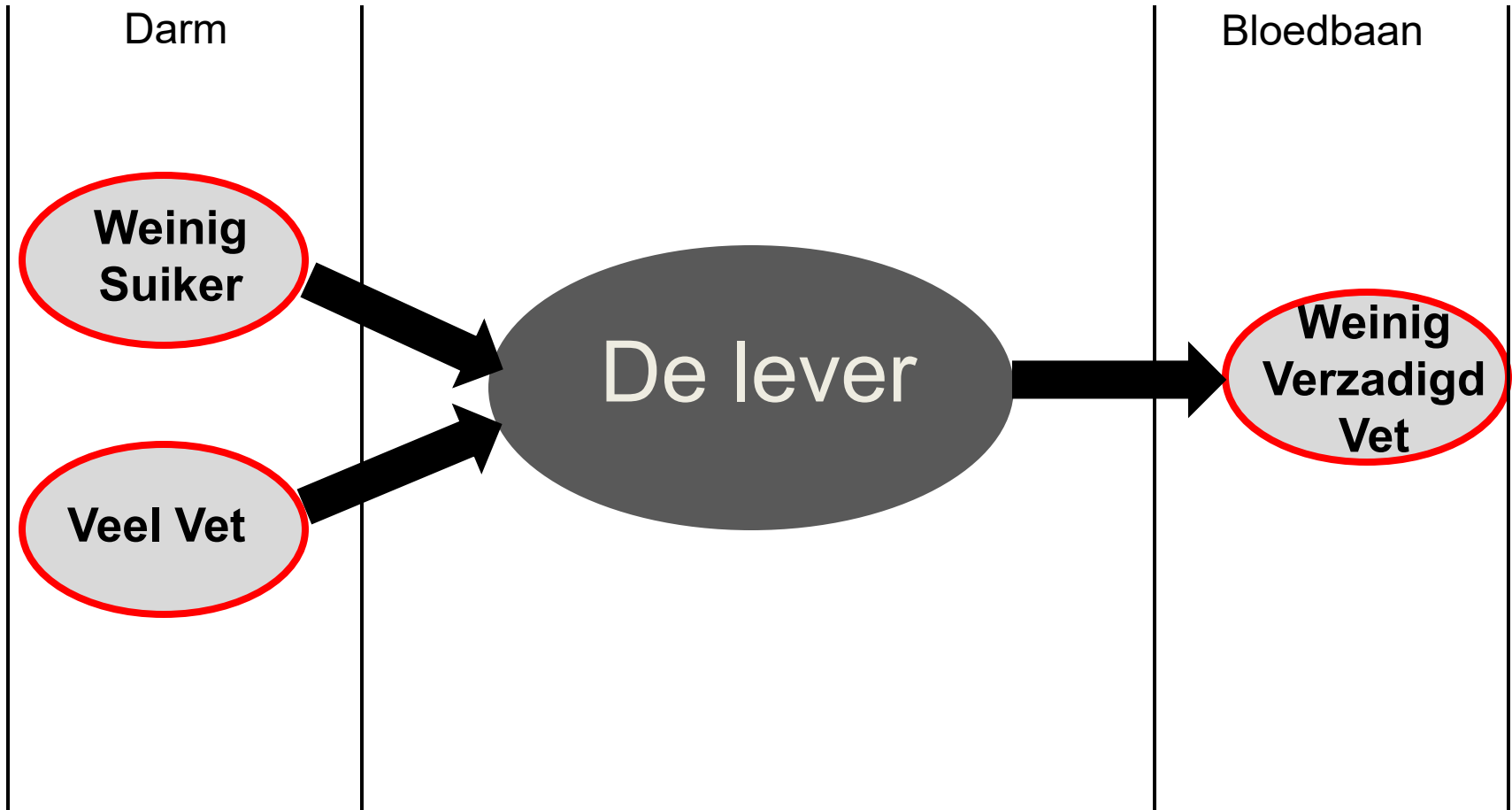
Verzadigd vet en aderverkalking



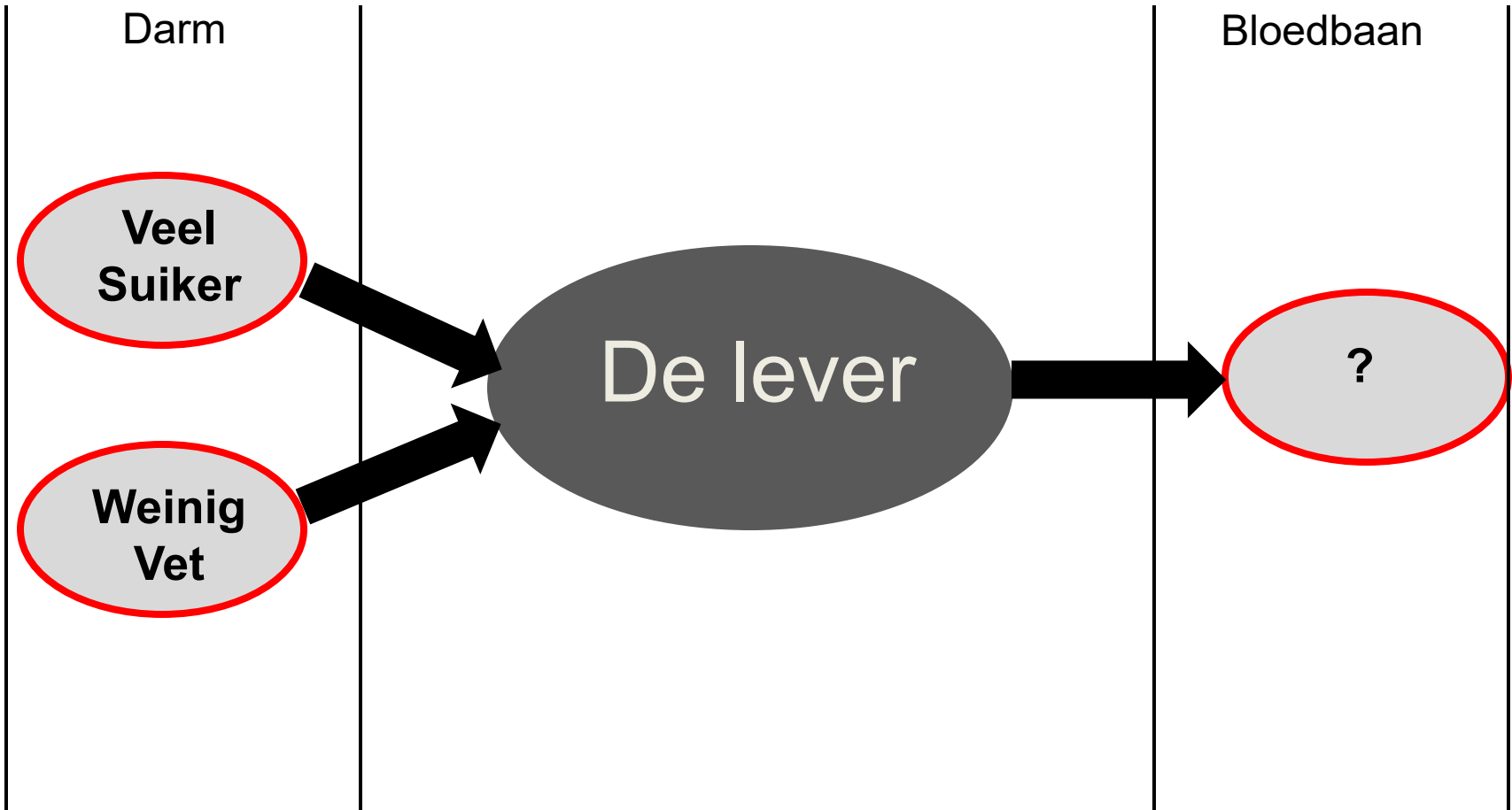
Verzadigd vet en aderverkalking



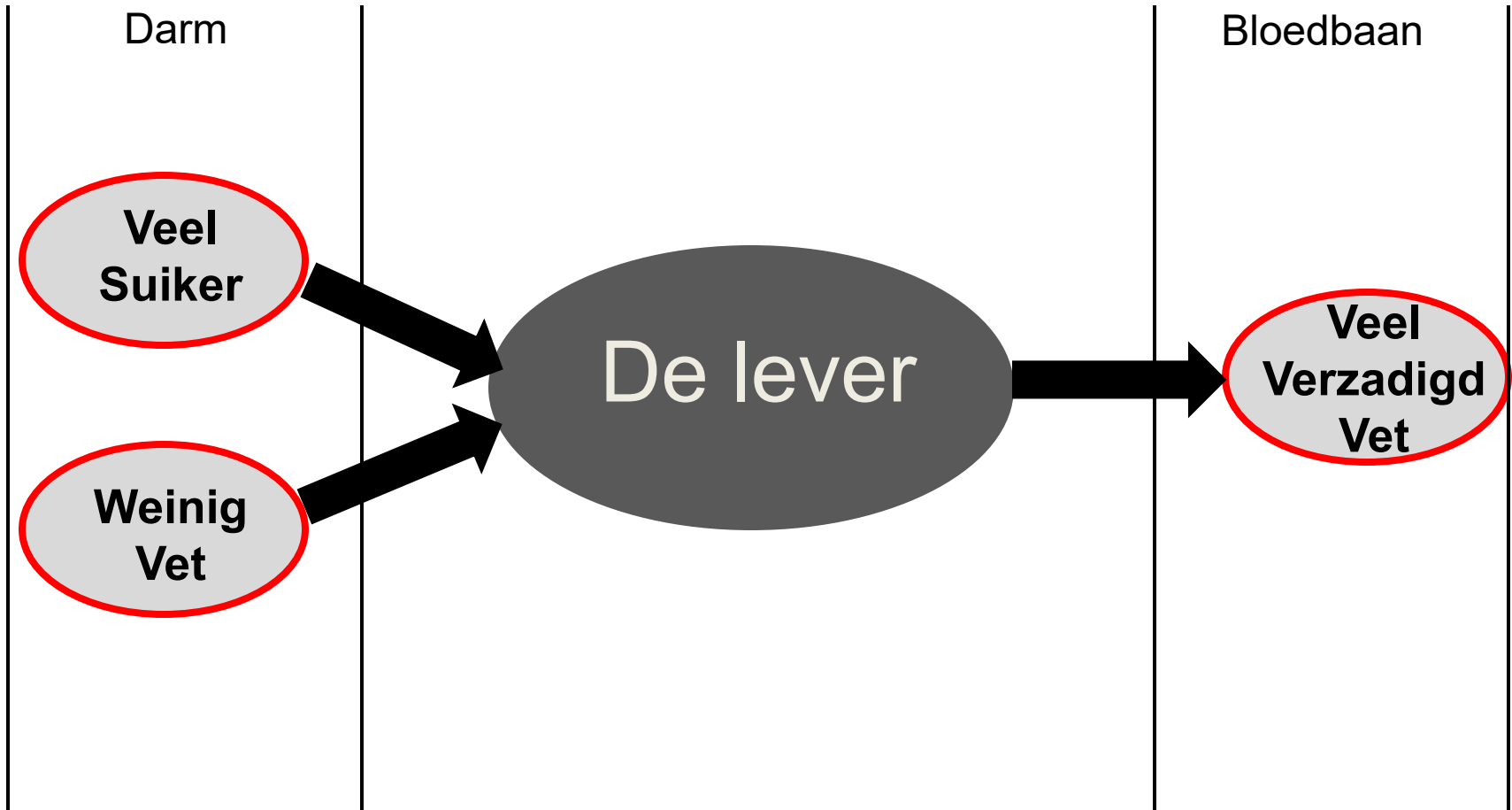
Verzadigd vet en aderverkalking



Verzadigd vet en aderverkalking



Verzadigd vet en aderverkalking





Take home message No. 11:

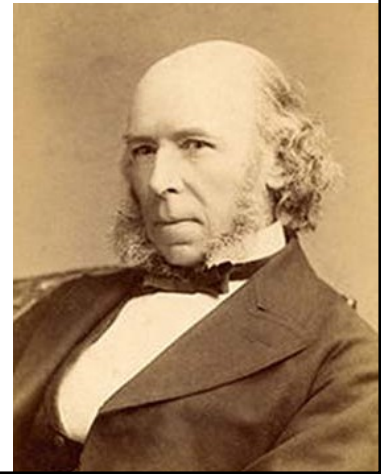


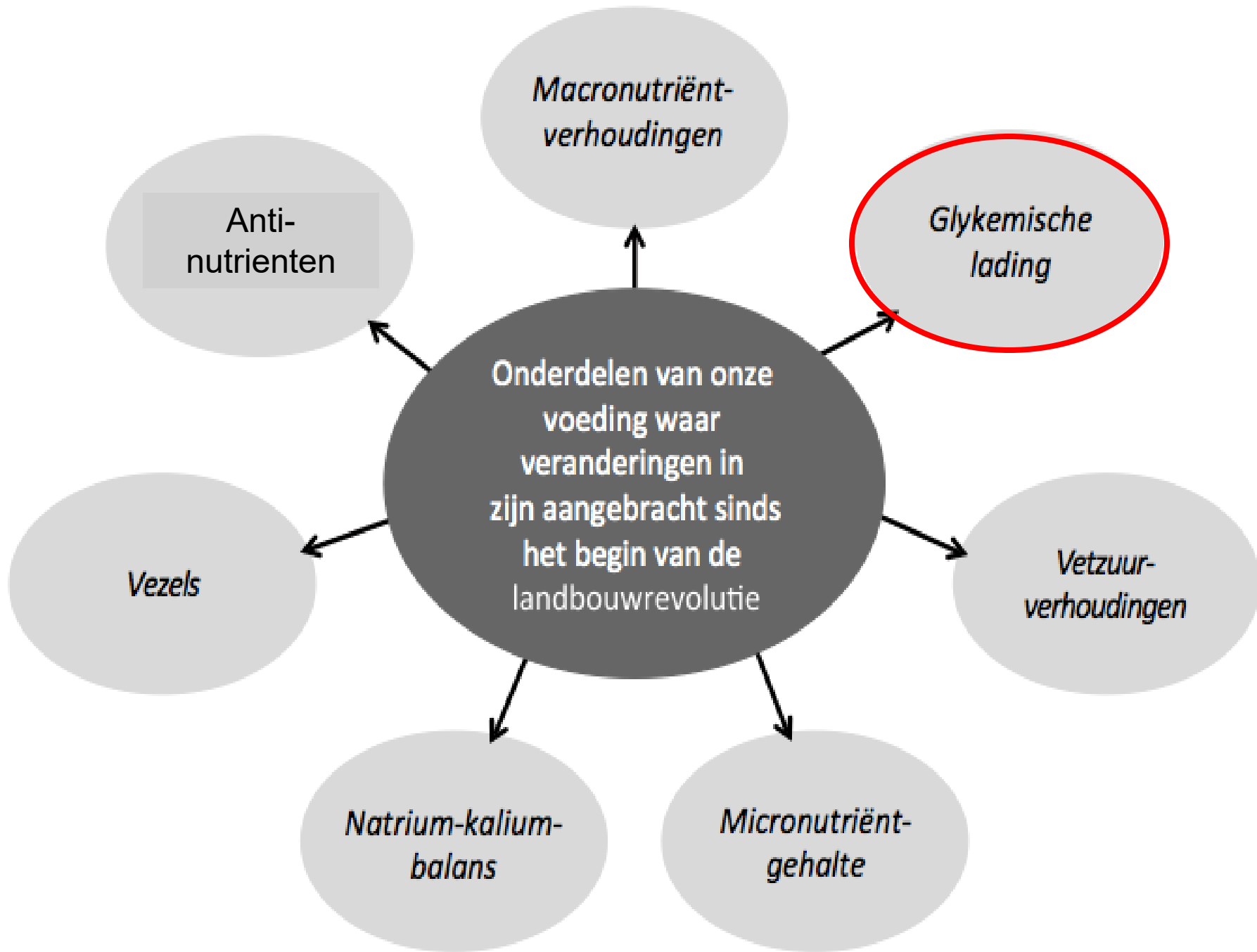
Vervang

ongezonde (snelle) koolhydraten (fastfood en frisdrank) en verzadigd vet (rood vlees)

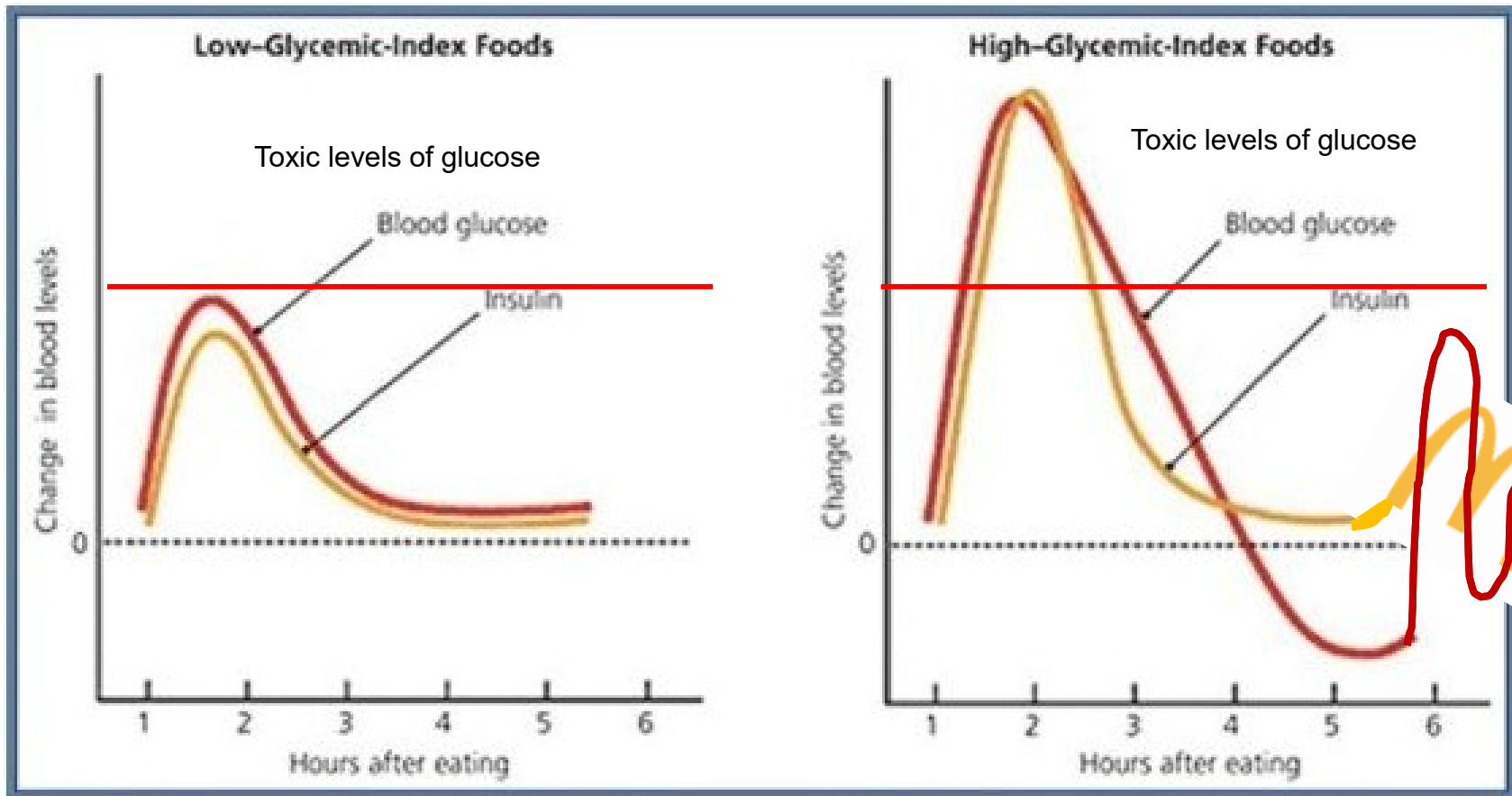
door

door langzame koolhydraten (groente en fruit) en noten, peulvruchten, gevogelte en vis





Insuline/glucose respons

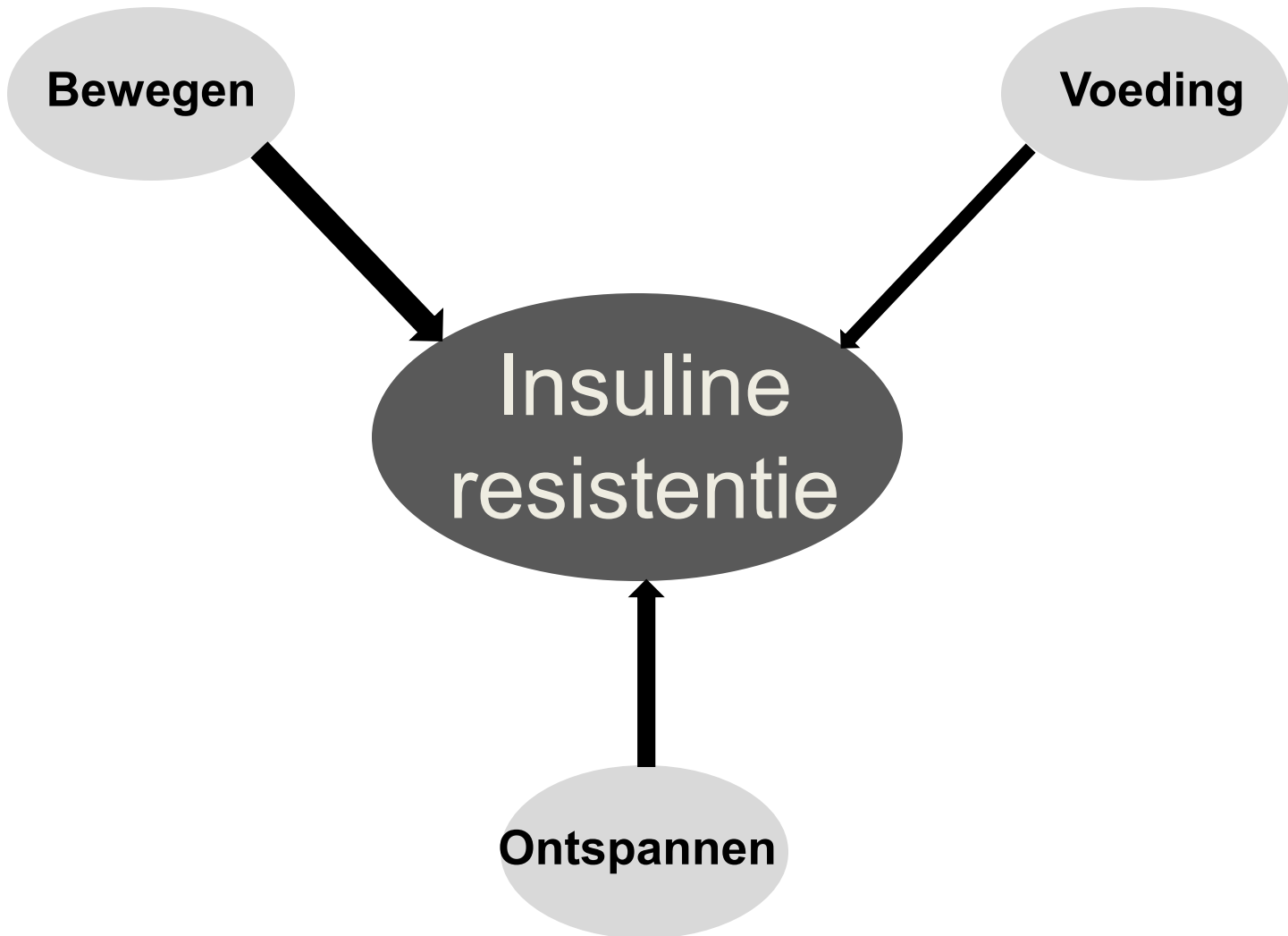


Food Values: Glycemic Index/Glycemic Load

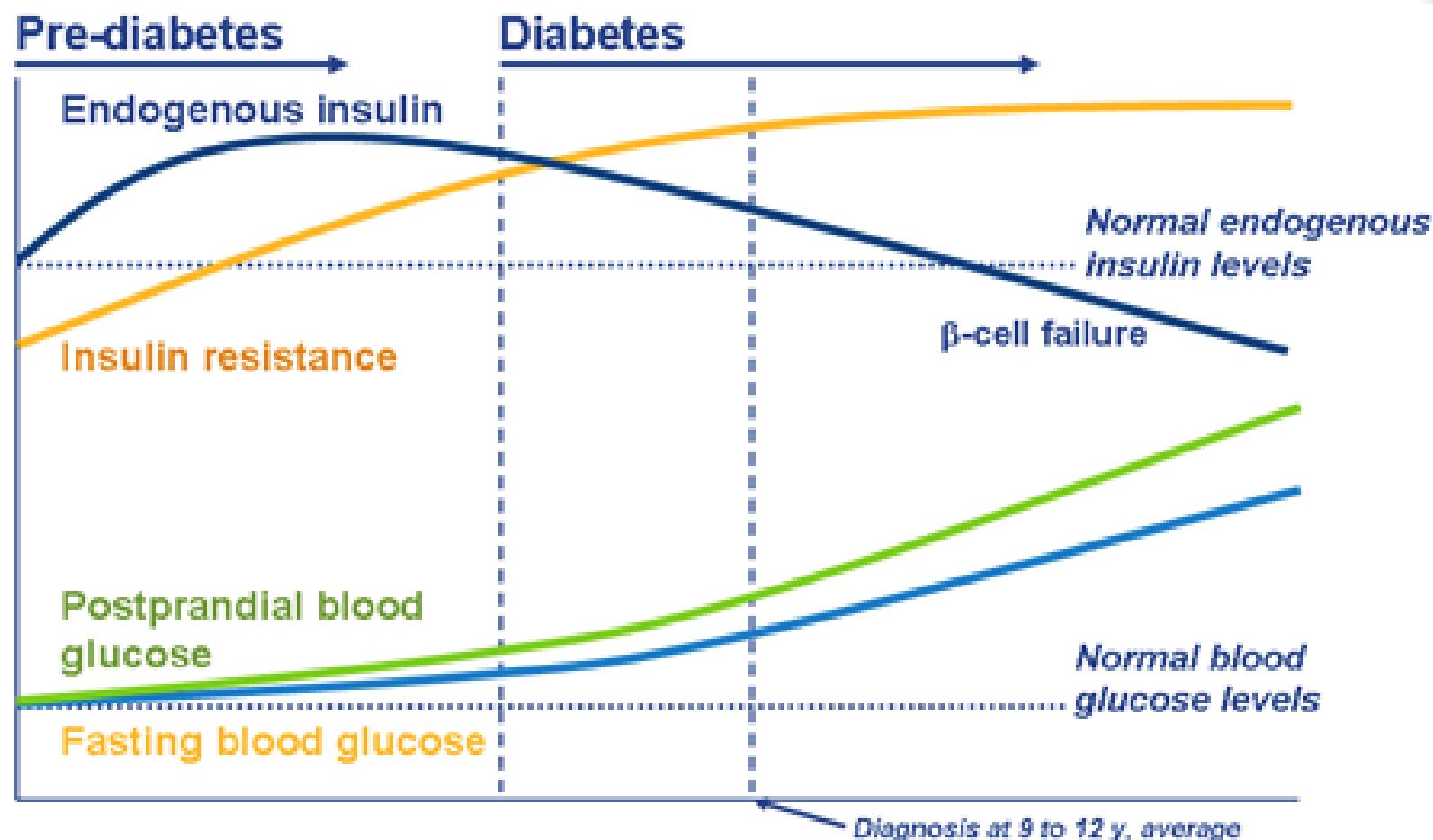
	Low GI	Med GI	High GI
Low GL	All-bran cereal (8,42) Apples (6,38) Carrots (3,47) Peanuts (1,14) Strawberries (1,40) Sweet Corn (1,54)	Beets (5,64) Cantaloupe (4,65) Pineapple (7,59) Sucrose, i.e. table sugar (7,68)	Popcorn (8,72) Watermelon (4,72) Whole wheat flour bread (17,70)
Med GL	Apple juice (11,40) Bananas (12,52) Fettucine (18,40) Orange juice (12,50) Sourdough wheat bread (15,54)	Life Cereal (16,66) New potatoes (12,47) Wild rice (18,51)	Cheerios (15,74) Shredded wheat (15,75)
High GL	Linguine (23,52) Macaroni (23,47) Spaghetti (23,42)	Couscous (23,65) White rice (23,64)	Baked Russet potatoes (26,85) Cornflakes (21,81)

Source: Revised International Table of Glycemic Index (GI) and Glycemic Load (GL), *The American Journal of Clinical Nutrition*, July 2002

Risico-factoren



Progression to Type 2 Diabetes

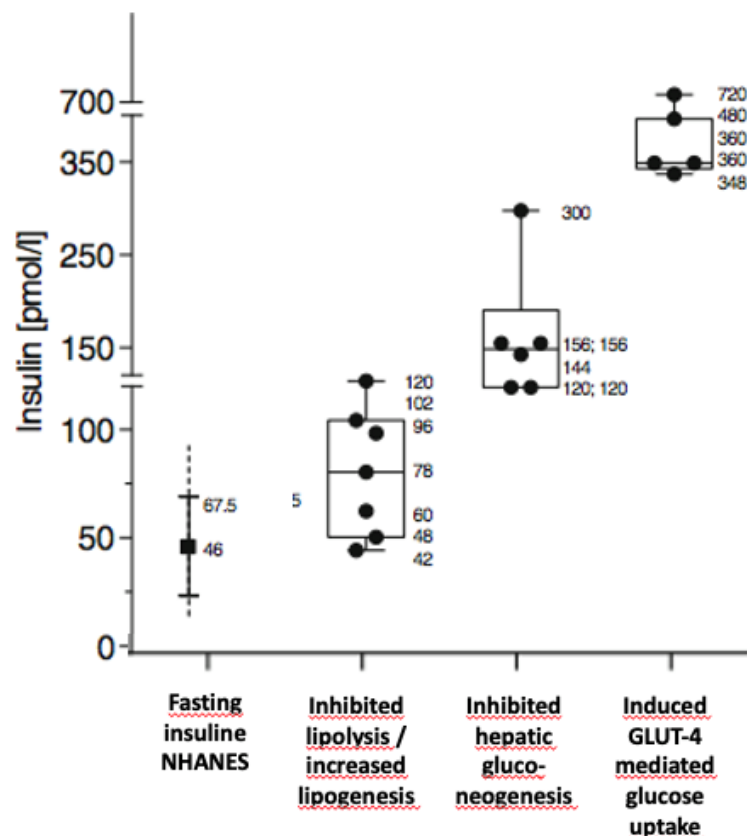


The carbohydrate-insulin model: a physiological perspective on the obesity pandemic

David S Ludwig,^{1,2,3} Louis J Aronne,⁴ Arne Astrup,⁵ Rafael de Cabo,⁶ Lewis C Cantley,⁷ Mark I Friedman,^{8,9} Steven B Heymsfield,¹⁰ James D Johnson,^{11,12} Janet C King,¹³ Ronald M Krauss,^{14,15} Daniel E Lieberman,¹⁶ Gary Taubes,⁹ Jeff S Volek,¹⁷ Eric C Westman,¹⁸ Walter C Willett,^{3,19} William S Yancy, Jr,¹⁸ and Cara B Ebbeling^{1,2}

ABSTRACT

According to a commonly held view, the obesity pandemic is caused by overconsumption of modern, highly palatable, energy-dense processed foods, exacerbated by a sedentary lifestyle. However, obesity rates remain at historic highs, despite a persistent focus on eating less and moving more, as guided by the energy balance model (EBM). This public health failure may arise from a fundamental limitation of the EBM itself. Conceptualizing obesity as a disorder of energy balance restates a principle of physics without considering the biological mechanisms that promote weight gain. An alternative paradigm, the carbohydrate-insulin model (CIM), proposes a reversal of causal direction. According to the CIM, increasing fat deposition in the body—resulting from the hormonal responses to a high-glycemic-load diet—drives positive energy balance. The CIM provides a conceptual framework with testable hypotheses for how various modifiable factors influence energy balance and fat storage. Rigorous research is needed to compare the validity of these 2 models, which have substantially different implications for obesity management, and to generate new models that best encompass the evidence. *Am J Clin Nutr* 2021;00:1–13.



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