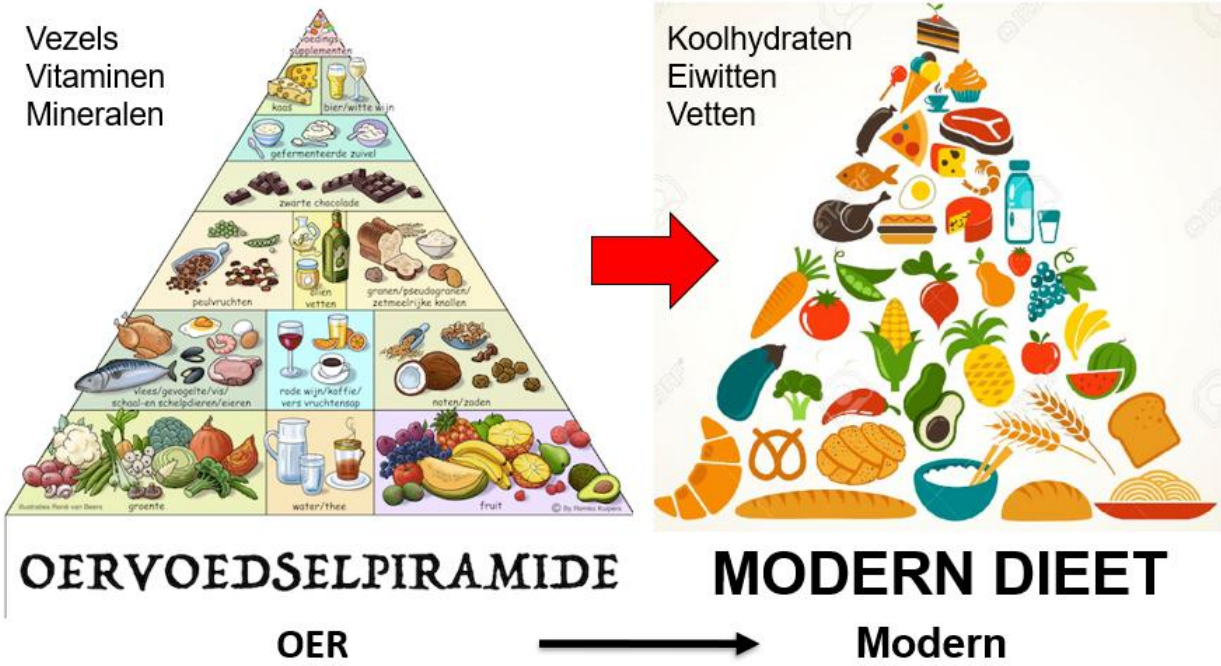
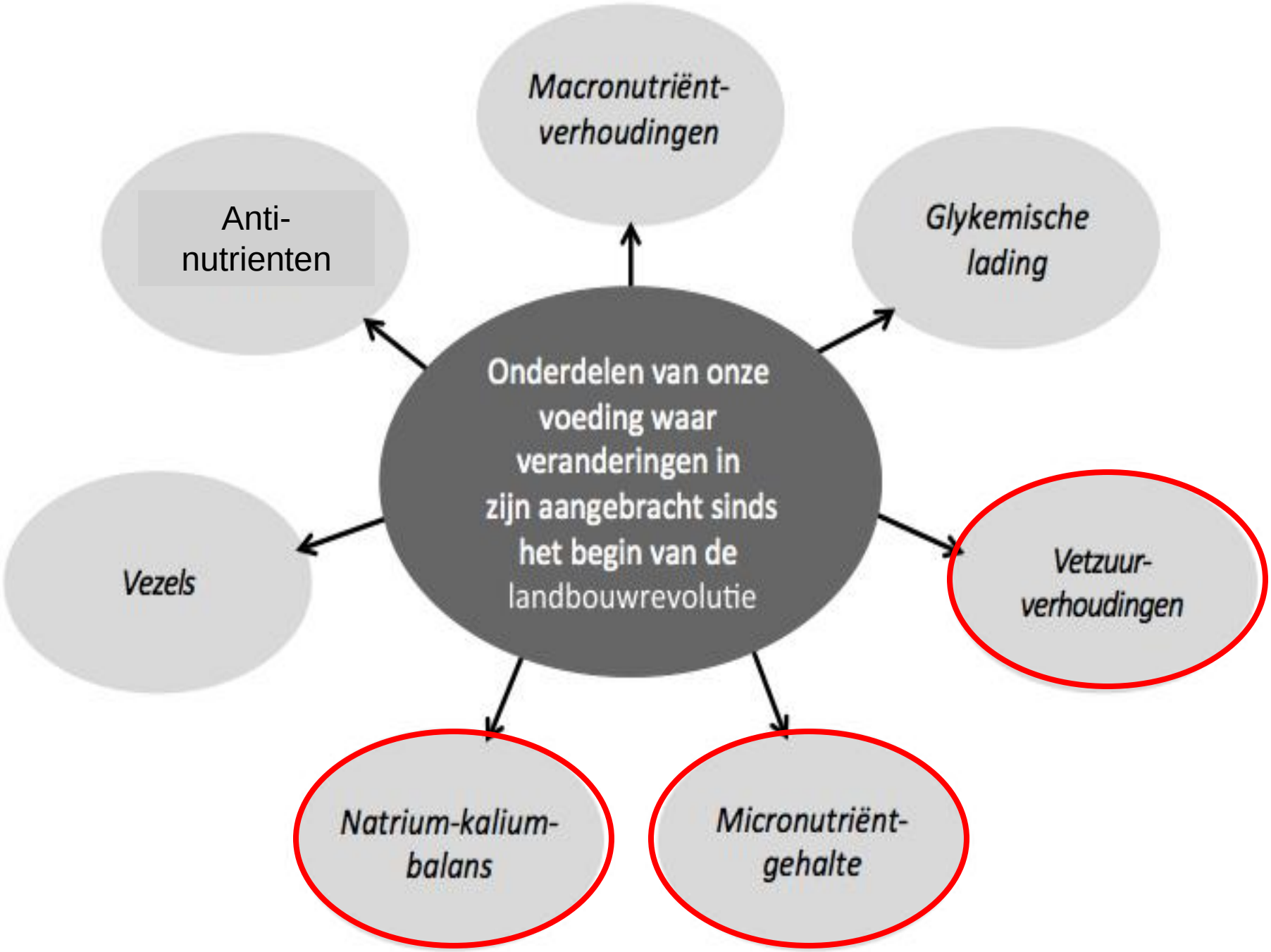
Charles Darwin: Survival of the Fittest

Law 1. Conditions of existence
Law 2. Natural selection

Verlies van variatie en kwaliteit

Micronutriënten = voeden → **Energie = vullen**



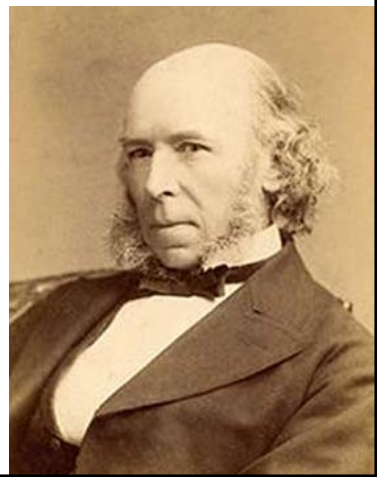

Macronutriënt-verhoudingen
Anti-nutrienten
Glykemische lading
Onderdelen van onze voeding waar veranderingen in zijn aangebracht sinds het begin van de landbouwrevolutie
Vezels
Vetzuur-verhoudingen
Natrium-kalium-balans
Micronutriënt-gehalte

Vet vs LDL, HDL, en TC/HDL-C

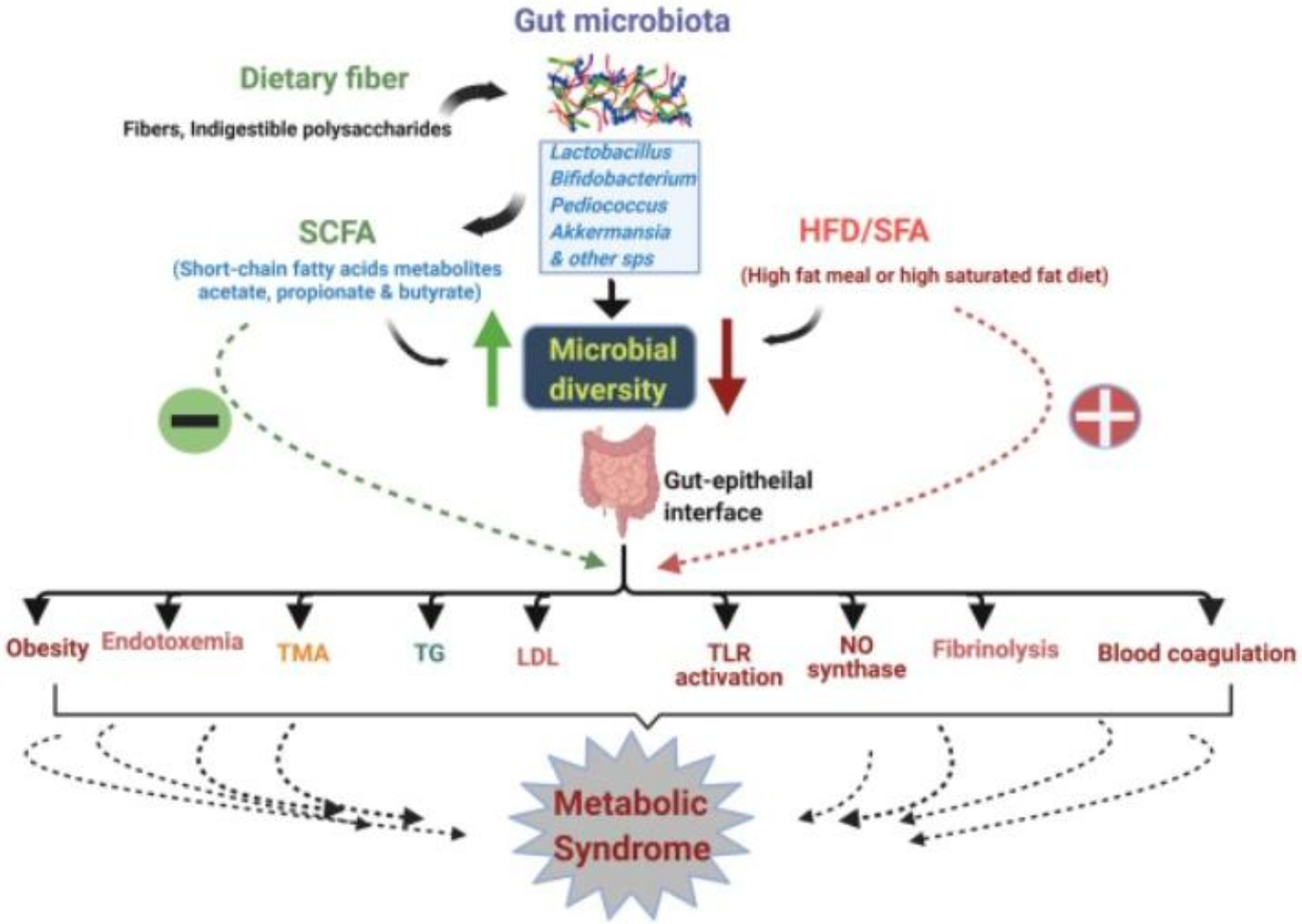
Take home message No. 1:

Kokosolie verhoogt het LDL, heeft weliswaar een gunstig effect op de TC/HDL-ratio maar met ongewist effect.

Beperk liever de inname van verzadigd vet



Zijn MCT relevant?

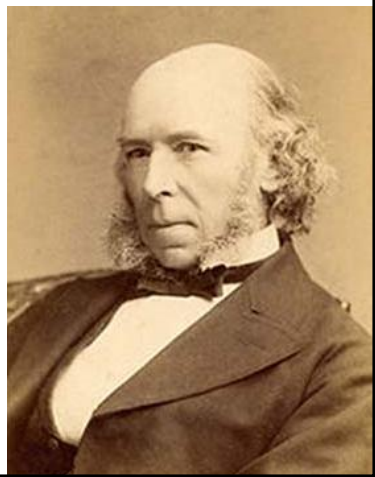


SCFA produced by the gut microbiome from notably fiber increase intestinal integrity and systemic inflammation.

Take home message No. 2:

MCT olie

ondersteunt mogelijk het microbioom,
het darmepitheel en biedt daarmee bescherming
tegen systemische lage-graad ontstekingen



The NEW ENGLAND JOURNAL of MEDICINE

This article was published on June 13, 2018,

ORIGINAL ARTICLE

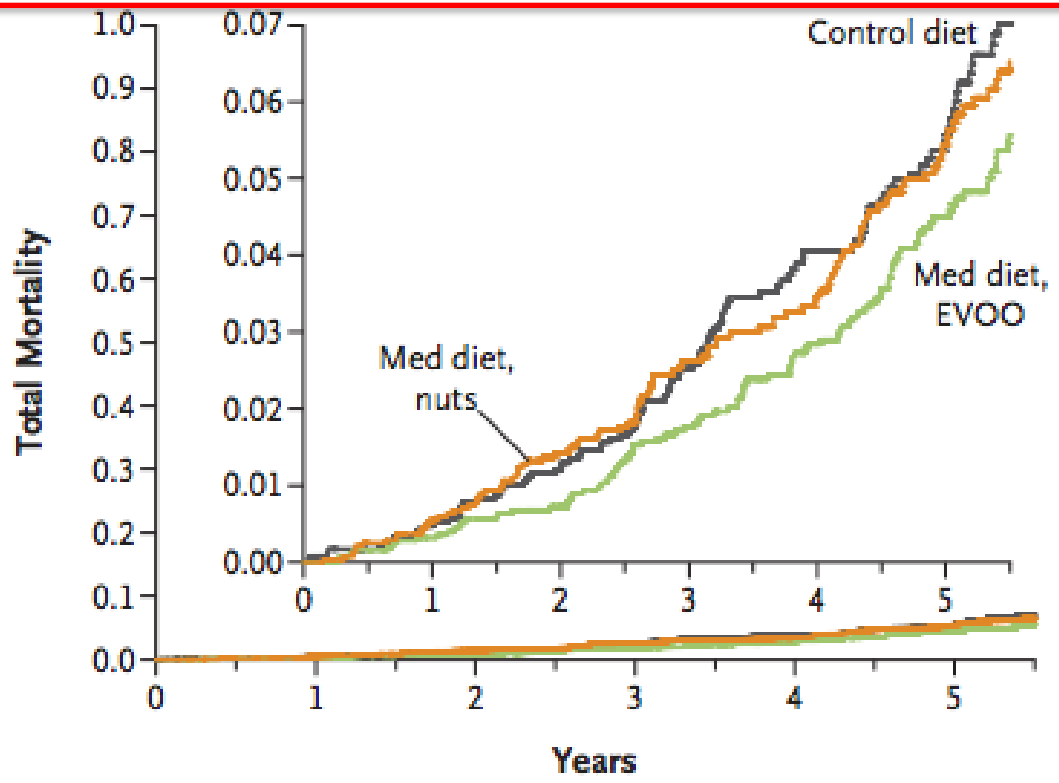
Primary Preve
Disease with

Ramón Estruch, M.D., Ph.D., Em
Maria-Isabel Covas, D.Pha
Fernando Arós, M.D., F
Valentina Ruiz-Gutiérrez, Ph.D.,
Rosa Maria Lamuela-Raventos,
Xavier Pintó, M.D., Ph.D., Josep B
José V. Sorlí, M.D., Ph.D., Jo
Miguel Angel Martínez-González

Food
Mediterranean diet
Recommended
Olive oil*
Tree nuts and peanuts†
Fresh fruits
Vegetables
Fish (especially fatty fish), s
Legumes
Sofrito‡
White meat
Wine with meals (optionally,

B Total Mortality

Med diet, EVOO: hazard ratio, 0.90 (95% CI, 0.69–1.18)
Med diet, nuts: hazard ratio, 1.12 (95% CI, 0.86–1.47)



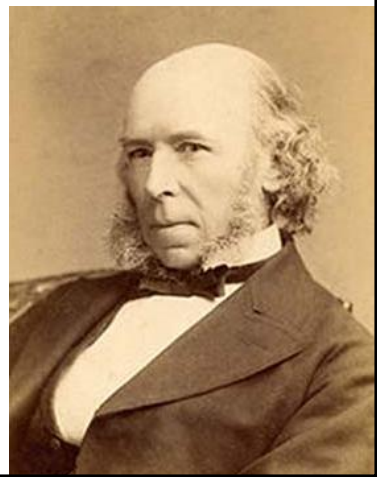
No. at Risk

Control diet	2450	2270	2027	1586	1272	949
Med diet, EVOO	2543	2486	2324	1991	1691	1310
Med diet, nuts	2454	2345	2097	1662	1395	1037

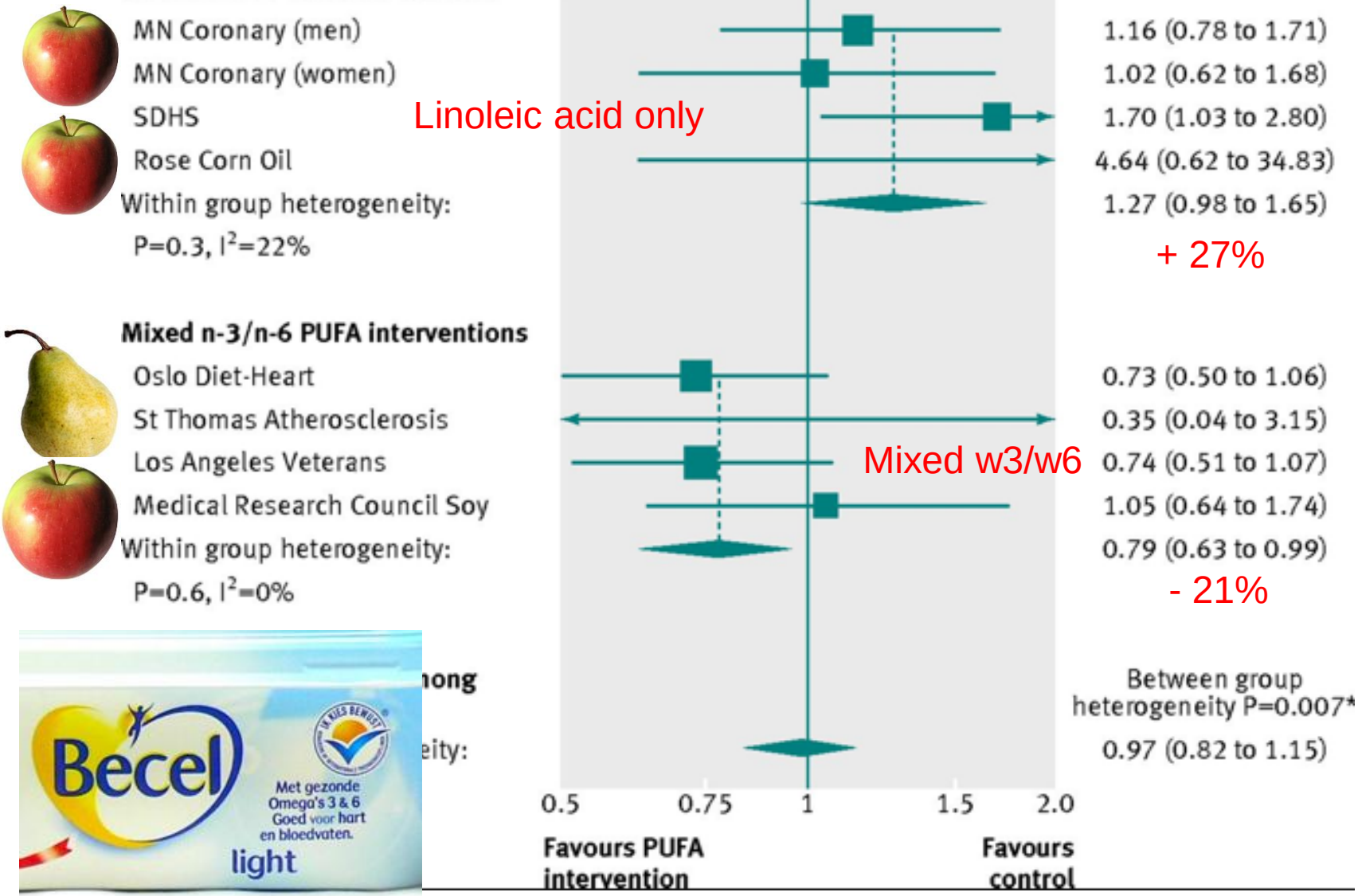
Take home message No. 3:

Oliezuur / olijfolie:

waarschijnlijk de gezondste keuze om te gebruiken als olie, zowel in koude als warme gerechten



Liever appels of peren?



Ramsden, BJN, 2010, Ramsden BMJ 2014

Randomized Control Trial	Population	Omega-3 Dose	Placebo	Outcomes	
JELIS (2007)[3]	• n = 18,645 • total cholesterol > 6.5 mmol/L • on statins	EPA 1800 mg/day	Statin only	Significant reduction in MACE in patients with history of CAD	
ORIGIN (2012)[4]	• n = 12,536 • impaired fasting glucose or diabetes • high risk CV events	EPA + DHA 840 mg/day	Olive oil	No significant difference in rate of CV events	
ASCEND (2018)[5]	• n = 15,480 • with diabetes • no atherosclerotic CV disease	EPA + DHA 840 mg/day	Olive oil	No significant difference in risk of serious CV events	
VITAL (2019)[6]	• n = 25,871 • ♂ > 50 yo, ♀ > 55 yo	EPA + DHA 840 mg/day	Olive oil	No significant difference in incidence of MACE or cancer	
REDUCE-IT (2019)[7]	• n = 8,179 • with CV disease or with diabetes and other risk factors • on statins • fasting TG of 41-100 mg/dL	EPA 2 g twice daily (total 4 g/day)	Light paraffin oil	Significantly lower risk of ischemic events, including CV death	

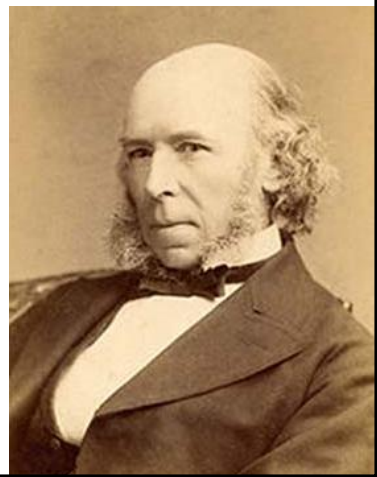
STRENGTH TRIAL RELEVANT LITERATURE

Source: https://www.cardionerds.com/cardsjc-strength-trial/

Take home message No. 4:

Vervang
omega-6 vetten (zonnebloemolie)
door omega-3 vet (vis)

en/of koop supplemenen van kwaliteit



Vitamin D in traditional people

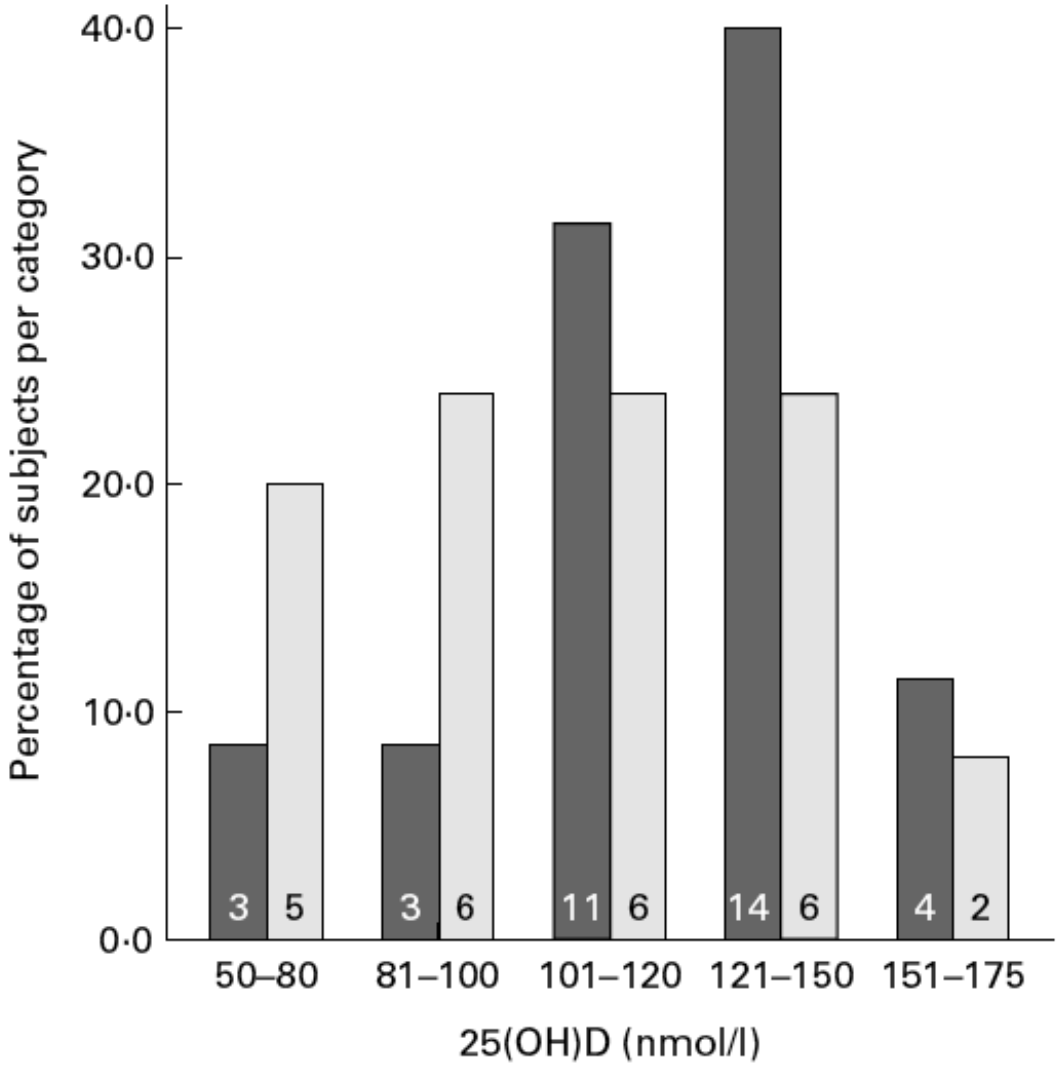
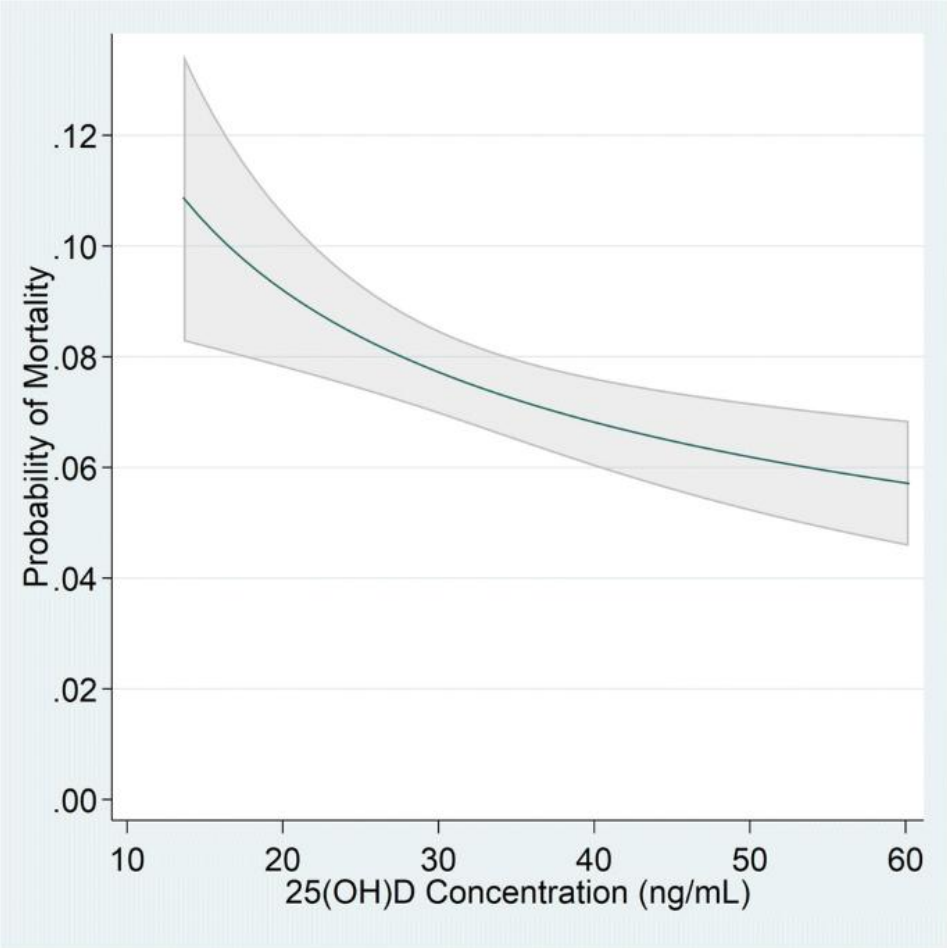


Fig. 1. Serum 25-hydroxyvitamin D (25(OH)D) frequency distributions for Maasai (■) and Hadzabe (□). The numbers in the bars refer to the absolute number of subjects.

- Mean serum 25(OH)D
  - Maasai 119 nmol/l
  - Hadzabe 109 nmol/l
  - Zero subjects under 50 nmol/l

Luxwolda et al, Brit J Nutr 2012

Vitamin D *status* and COVID mortality

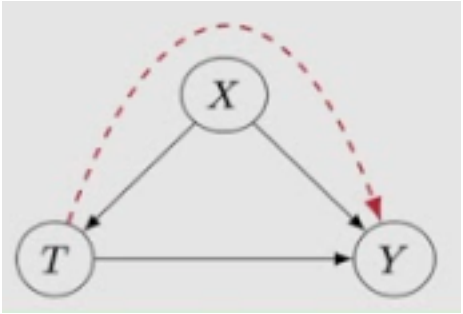


Association is not causation

Sleeping with shoes on is strongly correlated with waking up with a headache

Common cause: drinking the night before

1. Confounding

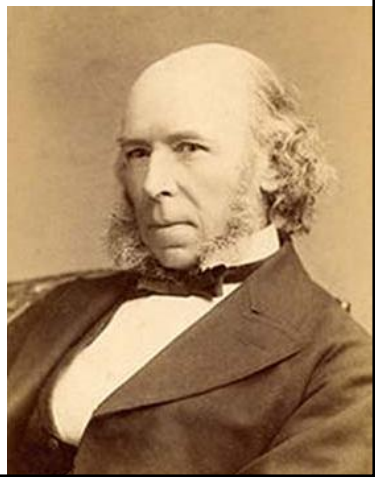


Take home message No. 5:

Vitamine D *suppletie*

beschermt niet tegen hart- en vaatziekten

maar vermindert wel de ernst van infectieziekten



Calcium

J Intern Med. 2023 Jul;294(1):83-95. doi: 10.1111/joim.13643. Epub 2023 Apr 24.

All-cause and cause-specific mortality risks associated with calcium supplementation with or without vitamin D: A nationwide population-based study

calcium supplementation only [CaO], n = 6256; calcium supplementation in combination with vitamin D [CaD], n = 21,590)

Kyoung Jin Kim [1], Jimi Choi [1], Kyeong Jin Kim [1], Nam Hoon Kim [1], Sin Gon Kim [1]

Results: No difference in all-cause mortality risk was found between the Ca-Only and control groups: (adjusted hazard ratio [HR] = 1.00; 95% confidence interval [CI]: 0.92-1.10). However, **all-cause mortality was lower in the CaD group (HR = 0.85**; 95% CI: 0.80-0.89) compared with that in the control group.

Calcium sources

1 cup cooked leafy greens = 200-350mg

1 cup beans = 120-180mg

1 tbs sesame seeds = 90mg

20 almonds = 60mg

1 orange = 70mg

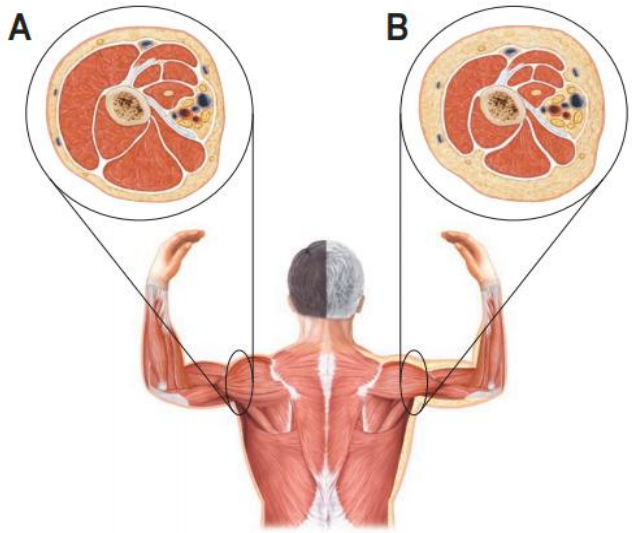
2 tbsp chia seeds = 200mg.

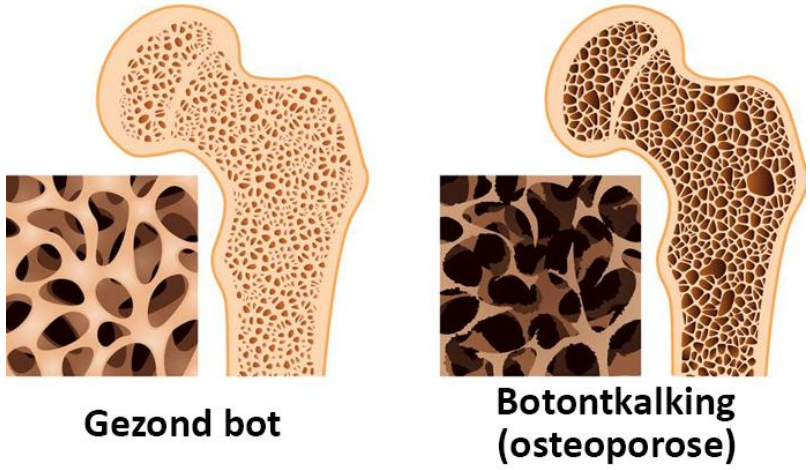
8 sardines = 370mg

6 brazil nuts = 40mg

Use it or lose it!

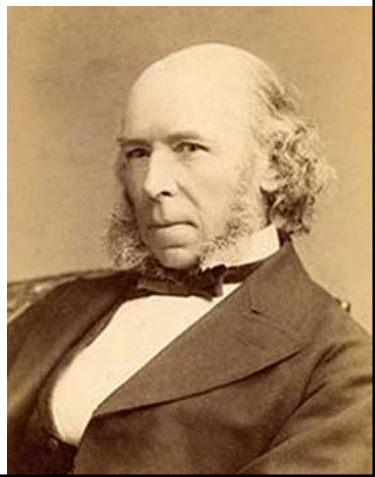
(osteoporose)





Take home message No. 6:

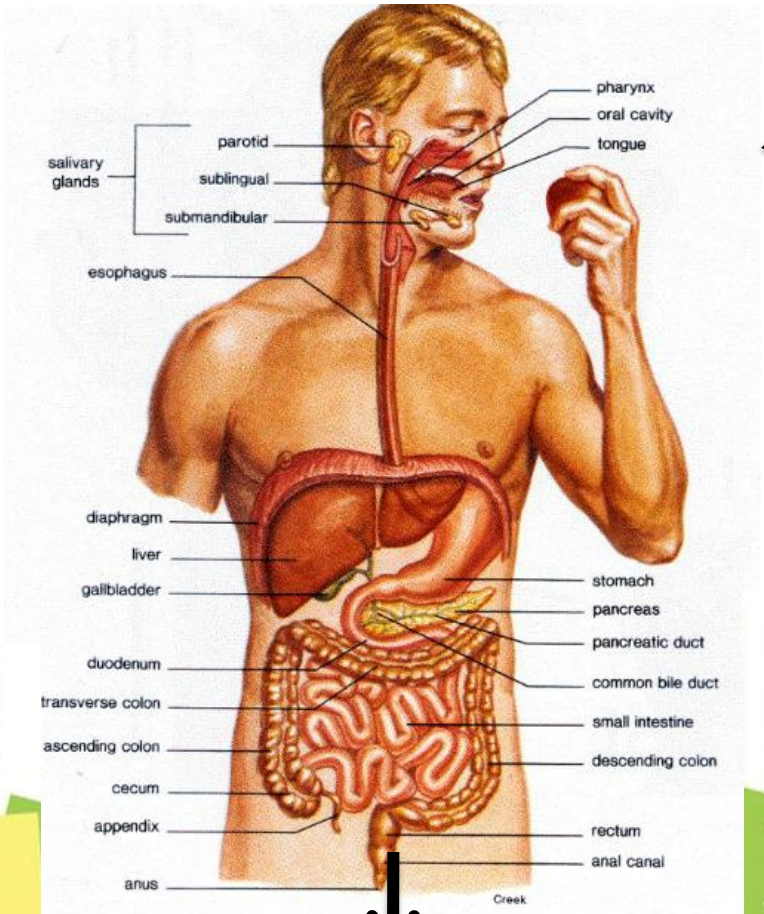
Haal calcium bij voorkeur uit je voeding
en combineer in geval van suppletie met vitamine D



Calcium

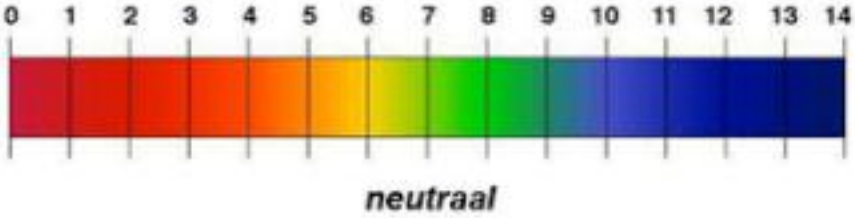
Magnesium

Carbonate



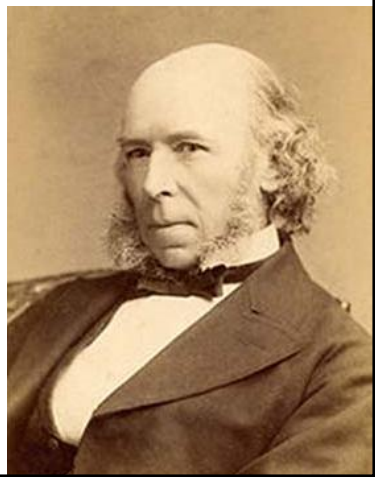
pH schaal

zuur **basisch**



Take home message No. 7:

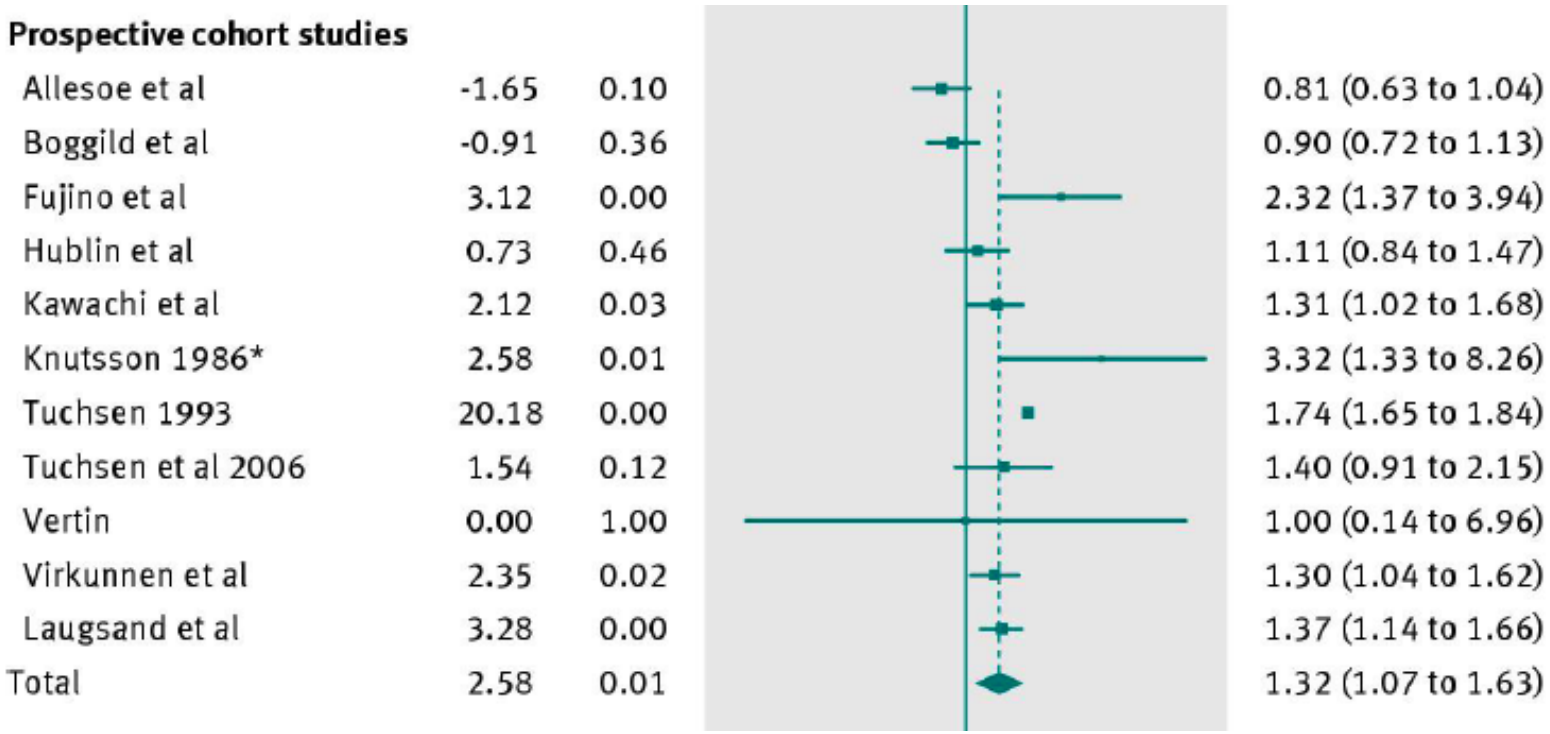
Haal mineralen bij voorkeur uit je voeding
en houd ze vast (in je nieren) door de juiste zuurgraad



Observational data

Shift work and vascular events: systematic review and meta-analysis

BMJ 2012;345:e4800 doi: 10.1136/bmj.e4800 (Published 26 July 2012)



Prospective cohort studies			
Allesoe et al	-1.65	0.10	0.81 (0.63 to 1.04)
Boggild et al	-0.91	0.36	0.90 (0.72 to 1.13)
Fujino et al	3.12	0.00	2.32 (1.37 to 3.94)
Hublin et al	0.73	0.46	1.11 (0.84 to 1.47)
Kawachi et al	2.12	0.03	1.31 (1.02 to 1.68)
Knutsson 1986*	2.58	0.01	3.32 (1.33 to 8.26)
Tuchsen 1993	20.18	0.00	1.74 (1.65 to 1.84)
Tuchsen et al 2006	1.54	0.12	1.40 (0.91 to 2.15)
Vertin	0.00	1.00	1.00 (0.14 to 6.96)
Virkunnen et al	2.35	0.02	1.30 (1.04 to 1.62)
Laugsand et al	3.28	0.00	1.37 (1.14 to 1.66)
Total	2.58	0.01	1.32 (1.07 to 1.63)

Melatonin supplementation improves N-terminal pro-B-type natriuretic peptide levels and quality of life in patients with heart failure with reduced ejection fraction: Results from MeHR trial, a randomized clinical trial

Clin Cardiol. 2022;45:417–426.

Results: Overall, 92 patients were recruited, and 85 completed the study (melatonin: 42, placebo: 43). Serum NT-Pro BNP decreased significantly in the melatonin compared with the placebo group (estimated marginal means for difference [95% confidence interval]: 111.0 [6.2–215.7], $p = .044$). Moreover, the melatonin group had a significantly better clinical outcome (0.93 [0.18–1.69], $p = .017$), quality of life (5.8 [0.9–12.5], $p = .037$), and New York Heart Association class (odds ratio: 12.9 [1.6–102.4]; $p = .015$) at the end of the trial. Other studied outcomes were not significantly different between groups.

Haemodynamic-guided management of heart failure (GUIDE-HF): a randomised controlled trial

Lancet 2021; 398: 991–1001

Interpretation Haemodynamic-guided management of heart failure did not result in a lower composite endpoint rate of mortality and total heart failure events compared with the control group in the overall study analysis. However, a

Remote haemodynamic monitoring of pulmonary artery pressures in patients with chronic heart failure (MONITOR-HF): a randomised clinical trial

Jasper J Brugts, MD [a,*] · Sumant P Radhoe, MD [a,*] · Pascal R D Clephas, MSc [a,†] · Dilan Aydin, MD [a,†] · Marco W F van Gent, MD [b] · Mariusz K Szymanski, MD [c] · et al. Show more

The Lancet, ISSN: 0140-6736, Vol: 401, Issue: 10394, Page: 2113-2123

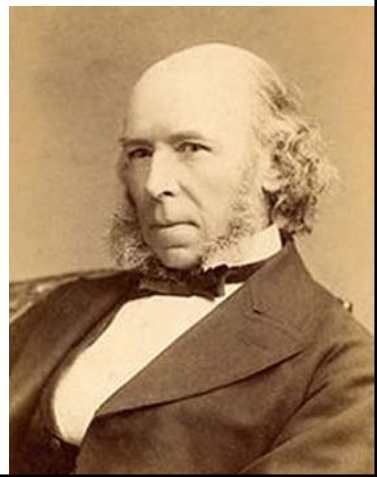
The difference in mean change in KCCQ overall summary score at 12 months was 7·13 (95% CI 1·51–12·75; p=0·013) between groups (+7·05 in the CardioMEMS group, p=0·0014, and –0·08 in the standard care group, p=0·97).

Brugts et al, Lancet, 2023

Take home message No. 8:

Prioriteer slaap,

maar mogelijk is (phyto)melatonine in suprafysiologische doseringen anti-inflammatoir…



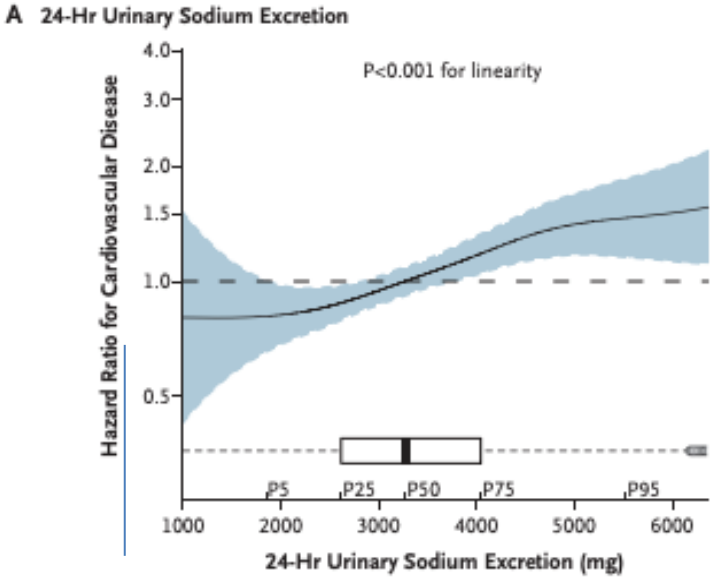
Tabel 6: Micronutriënten in het oerdieet en onze huidige voeding.

Vitaminen	Oerdieet	Huidige voeding	ADH	UL
Energie (kcal)	2.500			
Vitamine A (RAE)	2400	770	700-1000	3000
Beta-caroteen (µg)	3583	99		
Vit. B1, thiamine (mg)	1,9	1,3	1.1-1.5	ND
Vit. B2; riboflavine (mg)	2,7	1,7	1.5-1.7	ND
Vit. B3,; nicotinezuur (mg)	56,2	13	17-20	35
Vit. B5; panthotheenzuur (mg)	11,5	2,0	5-10	ND
Vit. B6; pyridoxine (mg)	5,9	2,2	1.5-2.0	100
Vit. B8; biotine (µg)	113	13	30-50	ND
Vit. B9 of B11; folaat (µg)	911	272	300-400	1000
Vit. B12; cobalamine (µg)	10,3	4,8	6.0	ND
Vitamine C (mg)	559	96	60-90	2000
Vitamine D (µg, per os)	-	3,5	2.5-15	100
Vitamine D (IU, cutaan)	4000	-	400	4000
Vitamine E (mg)	22,6	15,1	11.8-15	300
Vitamine K (µg)	945	59	90-120	ND
Mineralen				
Natrium (mg)	546	2943	1500-2400	2400
Kalium (mg)	6333	3676	4700	ND
Calcium (mg)	972	1080	1000-1300	2000
Fosfor (mg)	2289	1735	700-1400	4000
Magnesium (mg)	742	371	300-400	ND
IJzer (mg)	33,1	11,4	9-18	45
Zink (mg)	14,2	11,7	10-15	40
Koper (mg)	6	1,3	1.5-3.5	10
Mangaan (mg)	7,3	0,9	2	11
Selenium (µg)	147	51	50-150	400
Vezels (g)	47	8	25-38	ND

ADH: aanbevolen dagelijkse hoeveelheid;

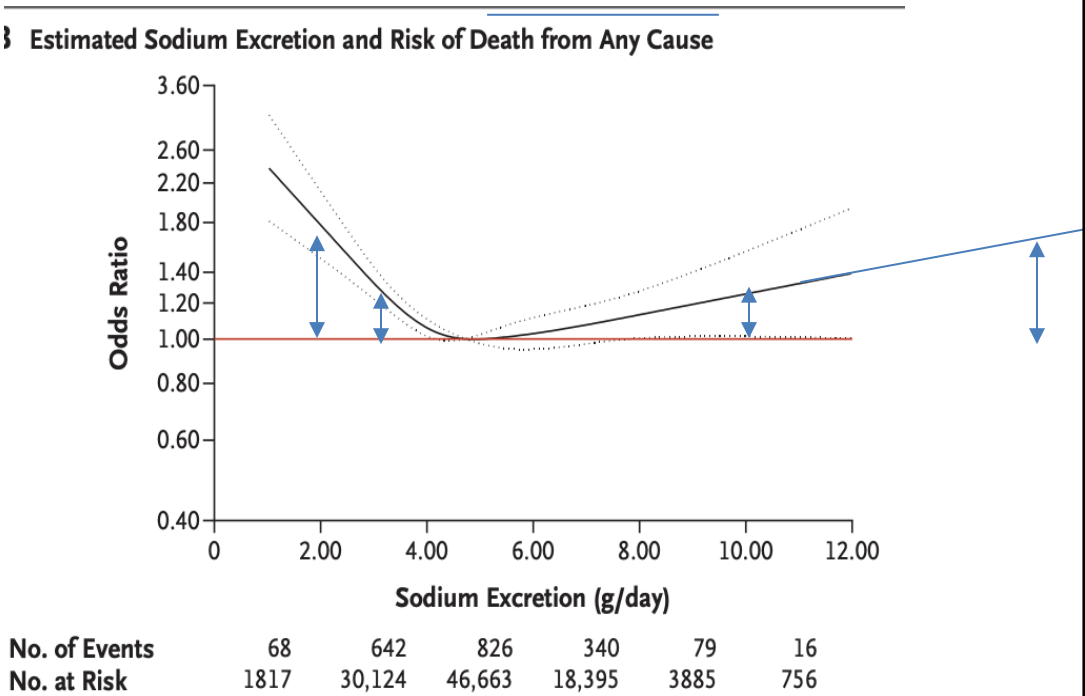
Bron: Kuipers, Oerdieet

Beter iets te veel dan te weinig…



Minder cardiovasculaire dood

Maar: Hogere sterfte,
- door vallen bij *hypo*tensie?



in a large, international, prospective cohort study. An estimated sodium intake between 3 g per day and 6 g per day was associated with a lower risk of death and cardiovascular events than either a higher or lower estimated level of sodium intake. As compared with an estimated potassium

Ma et al, NEJM, 2022

O'Donnell NEJM 2014

ESC European Society of Cardiology

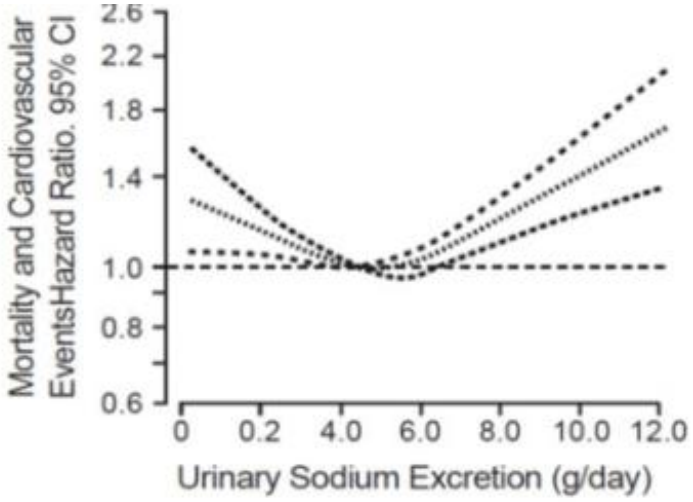
European Heart Journal (2020) **41**, 3363–3373
doi:10.1093/eurheartj/ehaa586

CLINICAL REVIEW
Prevention

Salt and cardiovascular disease: insufficient evidence to recommend low sodium intake

Table 1 **Categories of sodium (salt) intake**

Sodium intake categories	Sodium (salt) g/day	Sodium (mmol/day)	~Teaspoons of salt
Low sodium intake	Sodium <2.3 g/day (salt <5.75 g/day)	Sodium <100 mmol	<1 teaspoon of salt
Moderate sodium intake	Sodium 2.3–4.6 g/day (salt 5.75–11.5 g/day)	Sodium 100–200 mmol/day	1–2 teaspoons of salt
High sodium intake	Sodium >4.6 g/day (Salt 11.5 g/day)	Sodium >200 mmol/day	>2 teaspoons of salt



Effect of Salt Substitution on Cardiovascular Events and Death

Neal B et al. DOI: 10.1056/NEJMoa2105675

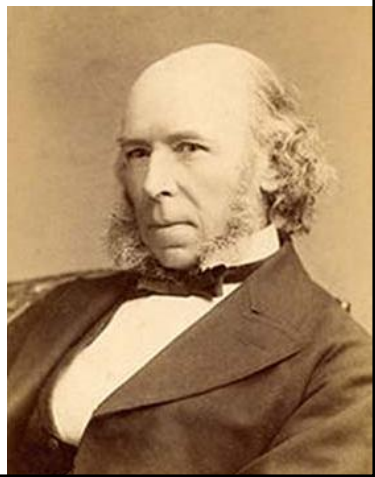
Outcomes	Salt Substitute	Regular Salt	Rate Ratio (95% CI)	P Value
	no. of events per 1000 person-yr			
Stroke	29.14	33.65	0.86 (0.77–0.96)	P=0.006
Major Adverse CV Events	49.09	56.29	0.87 (0.80–0.94)	P<0.001
Death from Any Cause	39.28	44.61	0.88 (0.82–0.95)	P<0.001
Hyperkalemia	3.35	3.30	1.04 (0.80–1.37)	P=0.76

September 16, 2021

N Engl J Med 2021; 385:1067-1077

Take home message No. 9:

Haal kalium bij voorkeur uit je voeding en gebruik, in geval van tafelzout, zout met kalium en jodium



Rijksinstituut voor Volksgezondheid en Milieu
Ministerie van Volksgezondheid, Welzijn en Sport

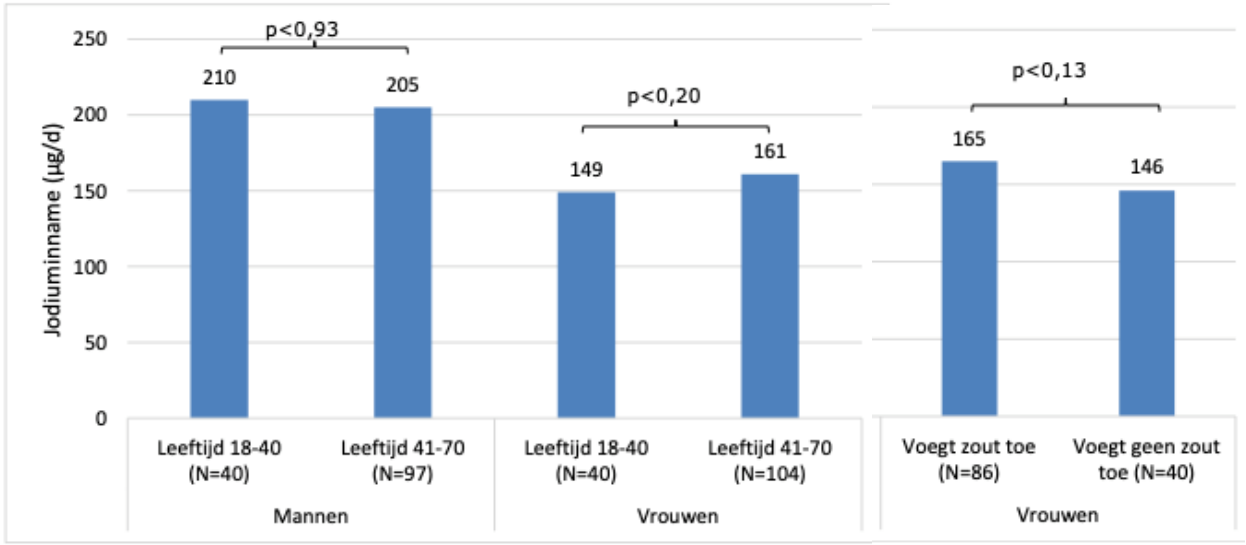
https://www.rivm.nl/bibliotheek/rapporten/2022-0066.pdf

Volwassenen krijgen dagelijks voldoende jodium binnen

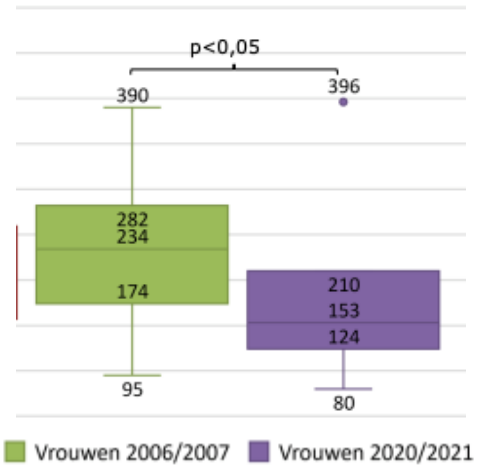
Publicatiedatum 01-07-2022 | 09:00

The WHO recommends iodine fortification to achieve sufficient iodine intake (150 µg/d in non-pregnant adults)

Zwangere en borstvoedende vrouw: behoefte: 175 en 200 mcg **jodium** per dag



Figuur 3 Mediane jodiuminname (in µg/d) in 2020/2021 in het Lifelines cohort, opgesplitst voor geslacht en leeftijd (geselecteerd op leeftijd, BMI categorie en opleidingsniveau).

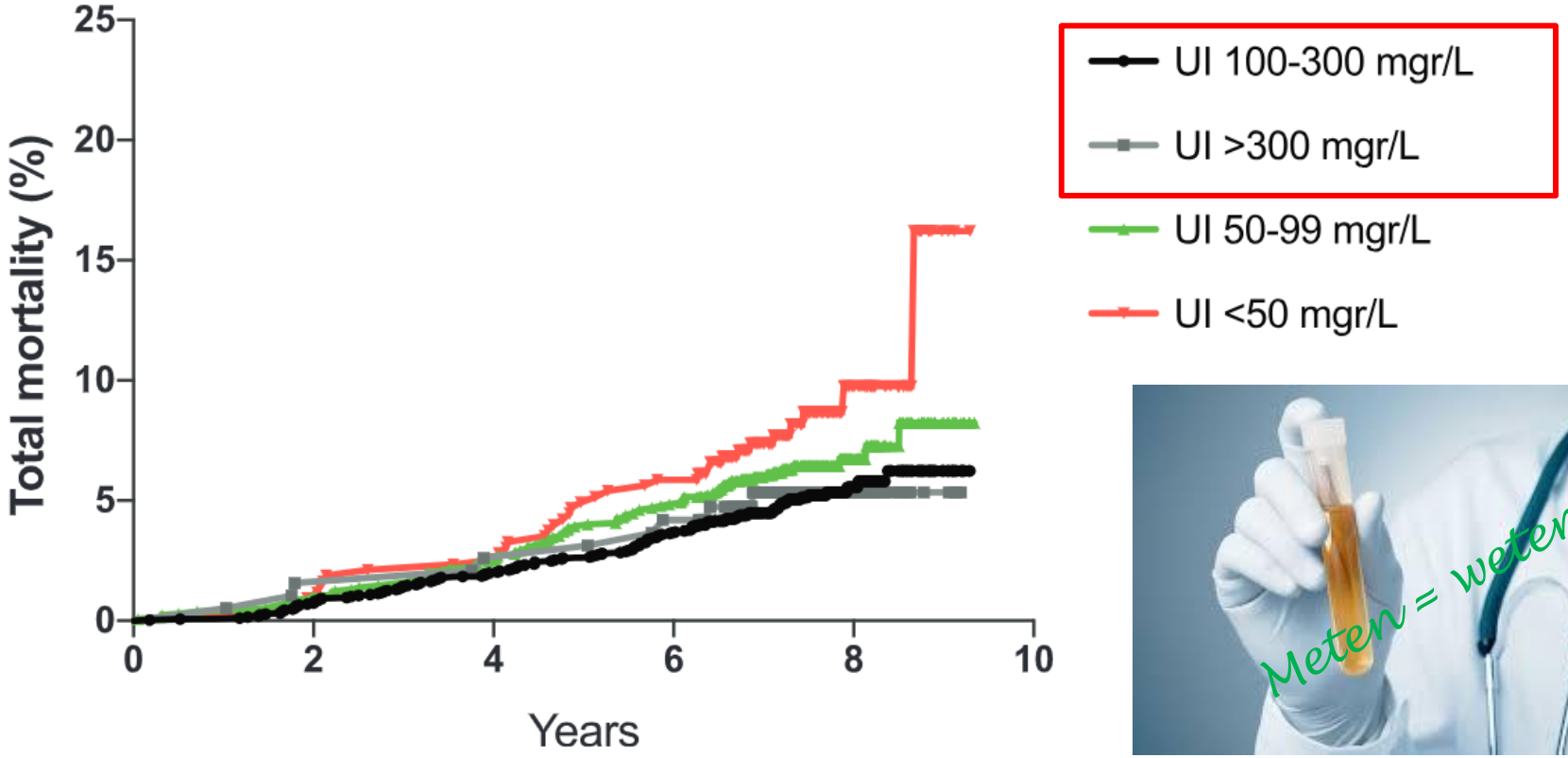


World Health Organization/International Council for the Control of the Iodine Deficiency Disorders/United Nations Childrens Fund (WHO/ICCIDD/UNICEF) (2007) Assessment of Iodine Deficiency Disorders and Monitoring Their Elimination, 3rd ed. Geneva: WHO.

Iodine Deficiency and Mortality in Spanish Adults: Di@bet.es Study

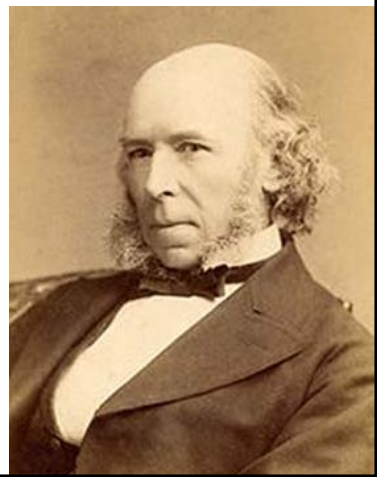
THYROID
Volume 31, Number 1, 2021

Cristina Maldonado-Araque,[1,2] Sergio Valdés,[1,2] Rocío Badía-Guillén,[1] Ana Lago-Sampedro,[1,2] Natalia Colomo,[1,2] Eduardo Garcia-Fuentes,[3] Carolina Gutierrez-Repiso,[4,5] Albert Goday,[6] Alfonso Calle-Pascual,[2,7] Luis Castaño,[2,8,9] Conxa Castell,[10] Elías Delgado,[9,11] Edelmiro Menendez,[9,11] Josep Franch-Nadal,[2,12] Sonia Gaztambide,[2,9,13] Joan Girbés,[14] Francisco Javier Chaves,[2,15] Federico Soriguer,[1,2] and Gemma Rojo-Martínez[1,2]



Take home message No. 10:

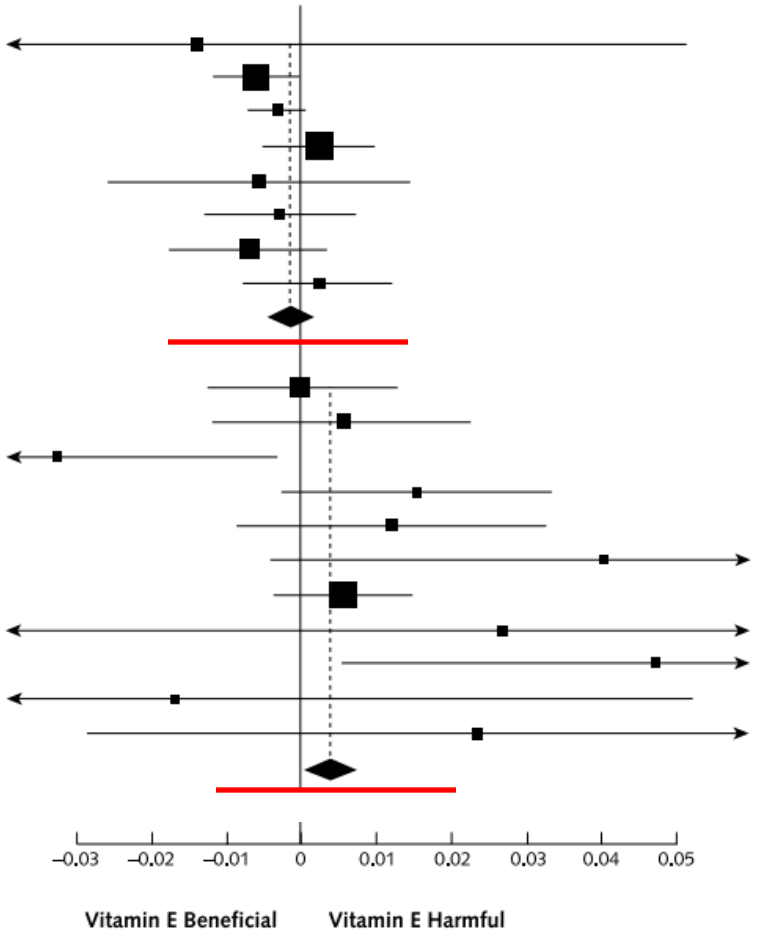
Haal jodium bij voorkeur uit je voeding
en overweeg je eigen ‘status’ te bepalen
- streef 100-300 mg/L -



Meta-Analysis: High-Dosage Vitamin E Supplementation May Increase All-Cause Mortality

Edgar R. Miller III, MD, PhD; Roberto Pastor-Barriuso, PhD; Darshan Dalal, MD, MPH; Rudolph A. Riemersma, PhD, FRCPE; Lawrence J. Appel, MD, MPH; and Eliseo Guallar, MD, DrPH

Study, Year (Reference)	Vitamin E Dosage, *IU/d*	Deaths/Participants, *n/n* Vitamin E	Deaths/Participants, *n/n* Control
Low-dosage vitamin E			
MIN.VIT.AOX, 1999 (35)	16.5	100/361	106/364
Linxian A, 1993 (36)	33	1018/14 792	1109/14 792
SU.VI.MAX, 2004 (37)	33	76/6481	98/6536
ATBC, 1994 (38, 39)	50	1800/14 564	1770/14 569
Linxian B, 1993 (40)	60	157/1657	167/1661
Linqu, 2001 (41)	200	38/1706	43/1705
GISSI, 1999 (42)	330	488/5666	529/5668
PPP, 2001 (43)	330	72/2231	68/2264
Total (low dosage)			
High-dosage vitamin E			
HOPE, 2000 (44)	400	535/4761	537/4780
AREDS, 2001 (45)	400	251/2370	240/2387
PPS, 1994 (46)	440	15/433	29/431
VECAT, 2004 (47)	500	20/595	11/598
CHAOS, 1996 (8, 9)	600	68/1035	52/967
REACT, 2002 (48)	660	9/149	3/148
MRC/BHF HPS, 2002 (49)	660	1446/10 269	1389/10 267
SPACE, 2000 (50)	800	31/97	29/99
WAVE, 2002 (51)	800	16/212	6/211
ADCS, 1997 (52)	2000	19/170	22/171
DATATOP, 1998 (53)	2000	73/399	64/401
Total (high dosage)			



Use of antioxidant vitamins for the prevention of cardiovascular disease: meta-analysis of randomised trials

Deepak P Vivekananthan, Marc S Penn, Shelly K Sapp, Amy Hsu, Eric J Topol

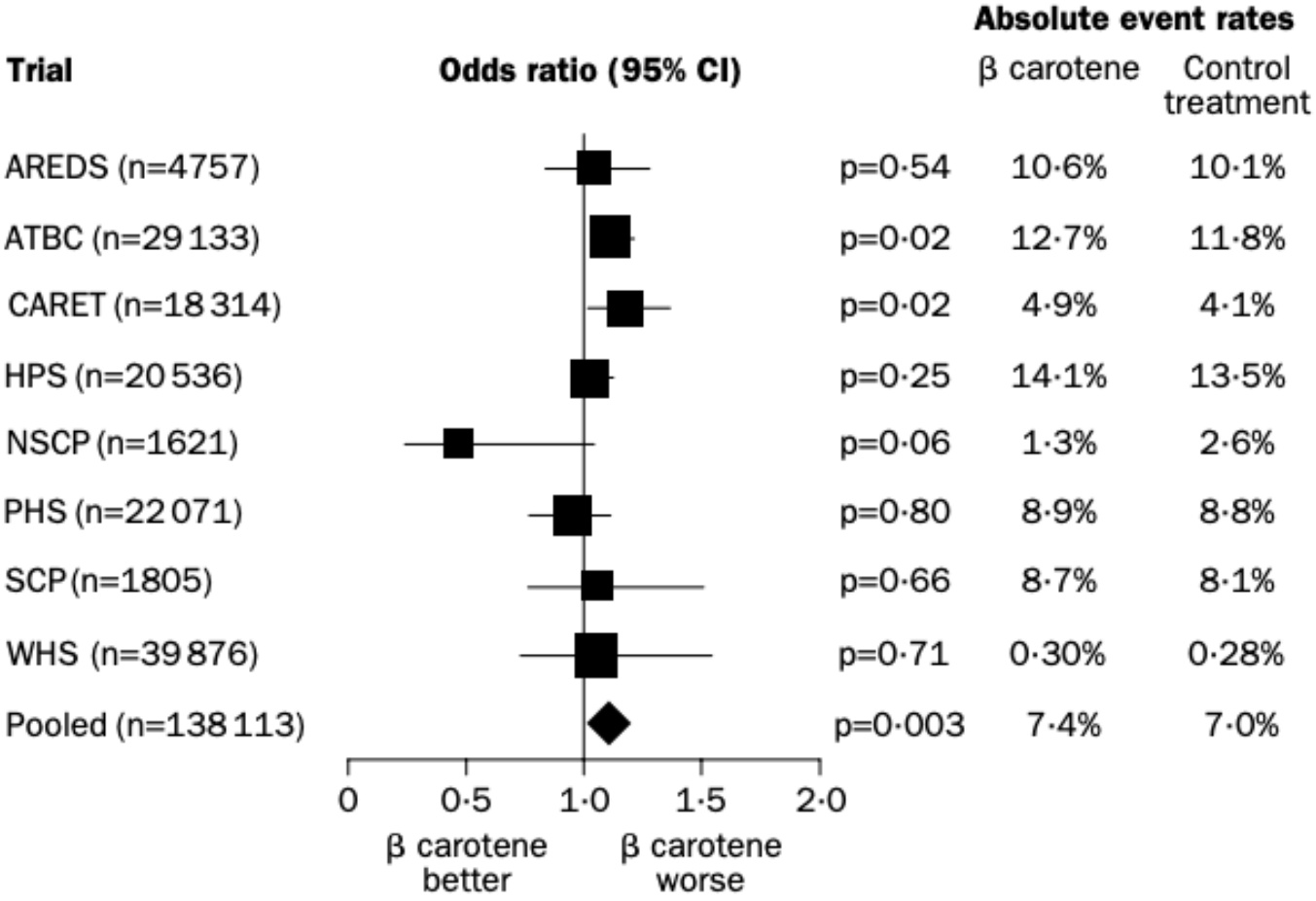
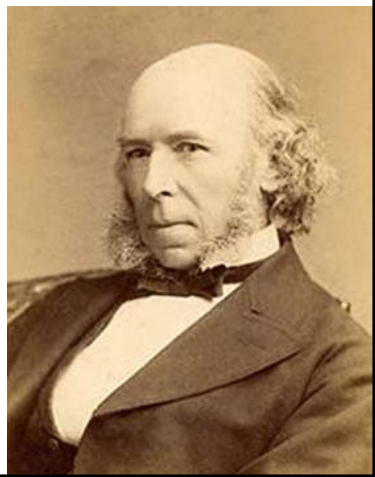


Figure 1: **Odds ratios (95% CI) of all-cause mortality for individuals treated with β carotene or control therapy**

Lancet 2003; **361:** 2017–23

Take home message No. 11:

Er is wetenschappelijk bewijs tegen het gebruik van vitamine A en vitamine E suppletie



National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

The habitual micronutrient intake of Dutch adults (VCP 2007-2010) compared with dietary reference values set by the Health Council of the Netherlands (2014) and EFSA (2010-2017)

3.15 Magnesium

Table 34. The distribution (95%-CI) of habitual magnesium intake in Dutch adults aged 19-50 years (DNFCS 2007-2010).

	Habitual intake distribution magnesium (mg/d)					
	mean	**P5**	**P25**	**P50**	**P75**	**P95**
men	396 (390-406)	268 (259-278)	337 (330-346)	391 (384-400)	450 (442-461)	545 (532-562)
women	308 (301-314)	214 (207-221)	265 (258-271)	304 (297-310)	347 (338-354)	415 (402-426)

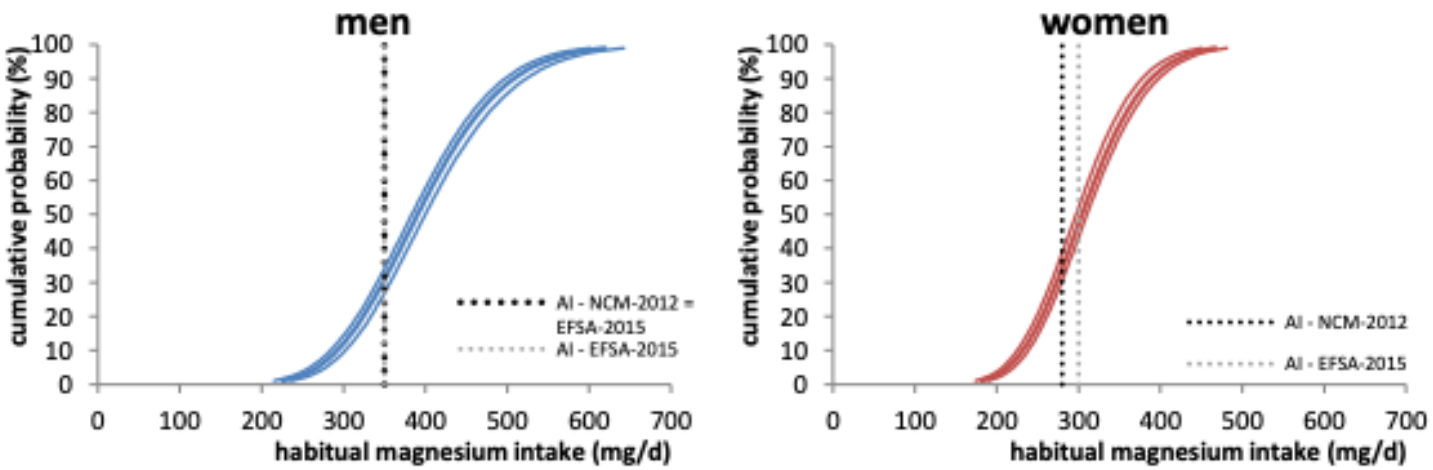


Figure 15. Habitual magnesium intake distribution for Dutch adult men (blue) and women (red) aged 19-50 years (DNFCS 2007-2010) in comparison with the ad interim Dutch or EFSA DRV.

Maximum RDA = 350 mg voor vrouwen en 420 mg voor mannen

Referentiewaarde Mg volwassenen: **0.7-1.0 mmol/l.**

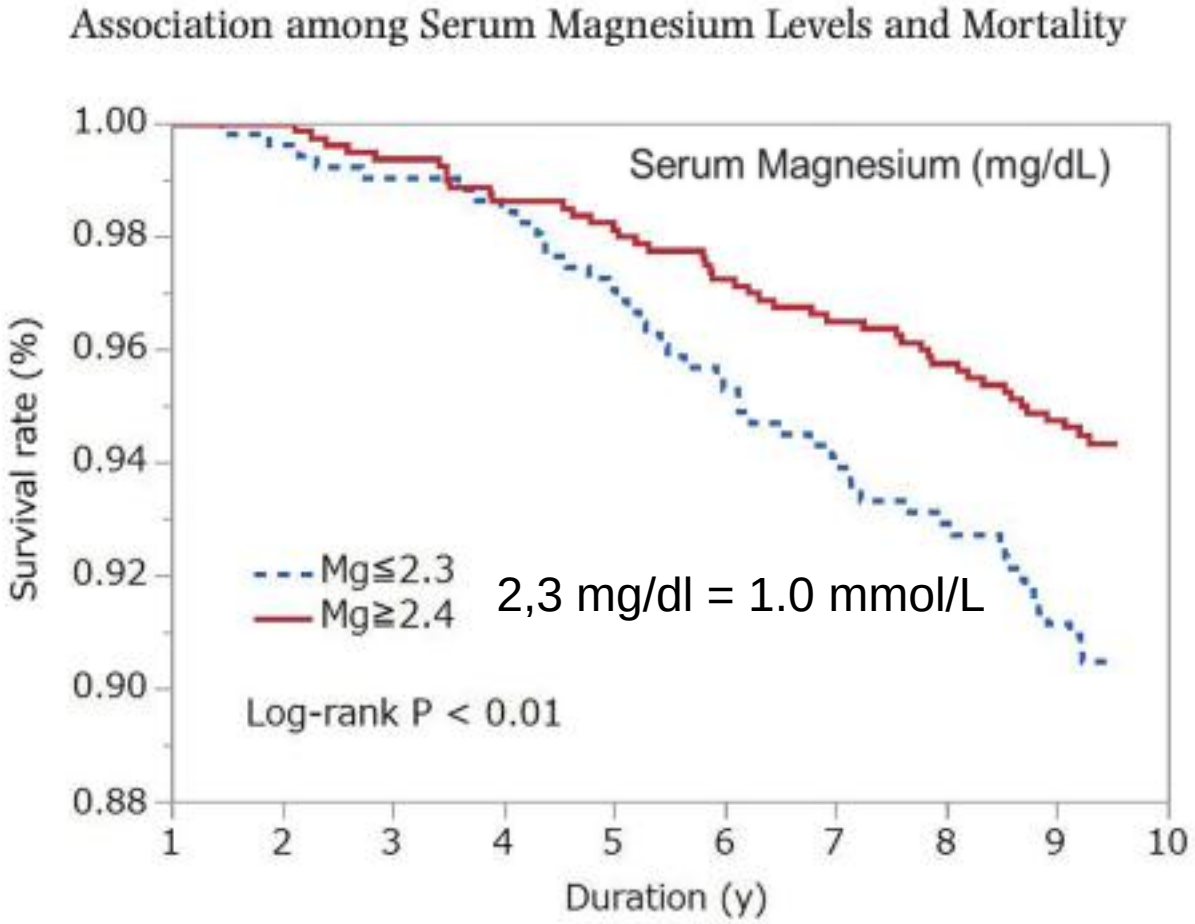


Fig. 2. Ten-year all-cause mortality rates according to serum magnesium levels.

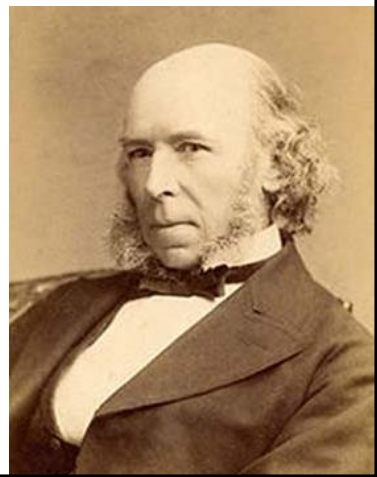
J Nutr Sci Vitaminol, **68**, 270–275, 2022

Take home message No. 12:

Magnesium lijkt een bewezen effectief supplement t.a.v. bloeddruk, insulinegevoeligheid, CV-risico en mortaliteit

referentiewaarde mogelijk te ‘laag’

-streef > 0.85-

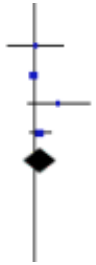


Systematic Review

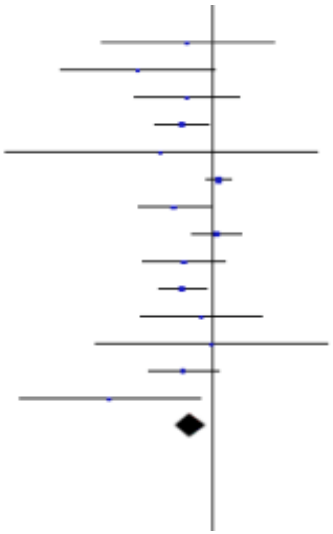
Association of Oral or Intravenous Vitamin C Supplementation with Mortality: A Systematic Review and Meta-Analysis

Chongxi Xu [1], Tong Yi [2], Siwen Tan [3], Hui Xu [4], Yu Hu [1], Junpeng Ma [1,†] and Jianguo Xu [1,*,†]

1.1.5 Cancer mortality						
C G Moertel [1985]	24	49	24	51	4.4%	1.04 [0.69, 1.57]
Creagan ET [1979]	60	60	62	63	13.6%	1.02 [0.97, 1.06]
Gaziano JM [2009]	45	7329	31	7312	3.8%	1.45 [0.92, 2.29]
Lin J [2009]	329	3824	295	3803	10.8%	1.11 [0.95, 1.29]
Subtotal (95% CI)		**11262**		**11229**	**32.6%**	**1.11 [0.87, 1.41]**
Total events	458		412			
Heterogeneity: Tau² = 0.04; Chi² = 19.09, df = 3 (P = 0.0003); I² = 84%						
Test for overall effect: Z = 0.84 (P = 0.40)						

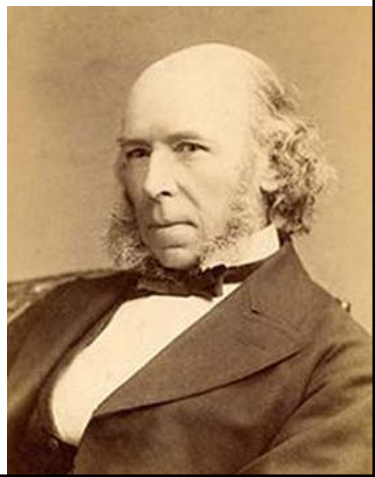


1.1.1 Sepsis mortality						
Aisa-Alvarez A [2020]	3	18	5	21	0.6%	0.70 [0.19, 2.53]
El Driny WA [2022]	3	20	9	20	0.8%	0.33 [0.11, 1.05]
Fowler AA 3rd [2014]	7	16	5	8	1.6%	0.70 [0.32, 1.52]
Fowler AA 3rd [2019]	25	84	38	82	4.5%	0.64 [0.43, 0.96]
Gayathri Ranie Ap [2022]	1	19	2	18	0.2%	0.47 [0.05, 4.78]
Lamontagne F [2022]	152	429	137	434	9.6%	1.12 [0.93, 1.36]
Lv SJ [2021]	15	61	24	56	3.0%	0.57 [0.34, 0.98]
Mohamed ZU [2020]	26	45	23	43	5.0%	1.08 [0.74, 1.57]
Nabil Habib T [2017]	12	50	18	50	2.4%	0.67 [0.36, 1.23]
Niu JJ [2019]	34	122	48	112	5.3%	0.65 [0.46, 0.93]
P Rosengrave [2022]	6	20	7	20	1.2%	0.86 [0.35, 2.10]
Reddy [2020]	2	9	2	9	0.4%	1.00 [0.18, 5.63]
Wacker DA [2022]	16	60	26	64	3.2%	0.66 [0.39, 1.10]
Zabet MH [2016]	2	14	9	14	0.6%	0.22 [0.06, 0.85]
Subtotal (95% CI)		**967**		**951**	**38.3%**	**0.74 [0.59, 0.91]**
Total events	304		353			
Heterogeneity: Tau² = 0.06; Chi² = 24.70, df = 13 (P = 0.03); I² = 47%						
Test for overall effect: Z = 2.78 (P = 0.005)						



Take home message No. 13:

Vitamine C suppletie heeft een bewezen effect t.a.v. mortaliteit door infecties



Zinc Supplementation in Individuals with Prediabetes and type 2 Diabetes: a GRADE-Assessed Systematic Review and Dose-Response Meta-analysis

Review > Biol Trace Elem Res. 2024 Jul;202(7):2966-2990.

Of the 4004 initial records, 23 studies that met inclusion criteria were analyzed in this meta-analysis. The pooled findings indicated the significant lowering effects of zinc supplementation on triglycerides (TG), total cholesterol (TC), fasting blood glucose (FBG), hemoglobin A1C (HbA1C), and C-reactive protein (CRP), while high-density cholesterol (HDL) concentrations showed an elevation after zinc supplementation.

Our study demonstrated that zinc supplementation has beneficial effects on glycemic control markers, lipid profile, and CRP levels as a classic marker of inflammation in T2DM.

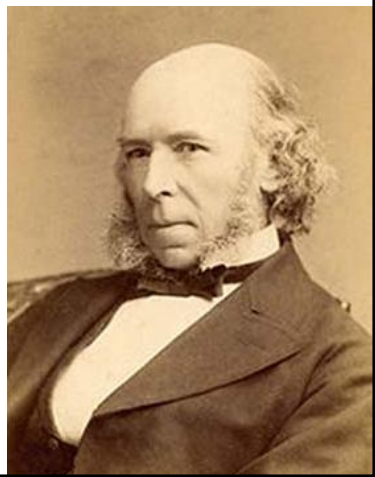
Review > Eur J Med Res. 2022 May 23;27(1):70. doi: 10.1186/s40001-022-00694-z.

Zinc supplementation and COVID-19 mortality: a meta-analysis

The meta-analysis showed that zinc supplementation in cases led to a significant lower risk of mortality when it was compared with the control group; pooled OR (95% CI) was 0.57 [0.43, 0.77] ($P < 0.001$).

Take home message No. 14:

Zink suppletie heeft een bewezen effect t.a.v. insulinegevoeligheid en mortaliteit door infecties

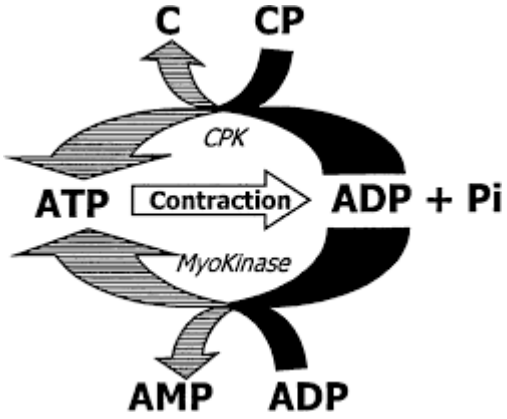


Waar komt energie vandaan?

Back to Basics – Understanding Energie

De mens kent **verschillende** manieren voor energievoorziening

- **Het ATP-CP systeem: Ultra kort/direct (10-30 seconden)**
  - Energie leverancier: ATP opgeslagen in spierweefsel
    - ATP -> ADP + P
  - Regeneratie optie 1 van ATP: Creatininephosphaat (CP)
    - CP (oiv creatine kinase) -> creatine + Pi (=energie)
  - Regeneratie optie 2 van ATP: ADP
    - ADP (oiv myoninase) -> AMP + Pi
  - Energie + ADP + P -> ATP
    - ATP -> ADP + P, etc

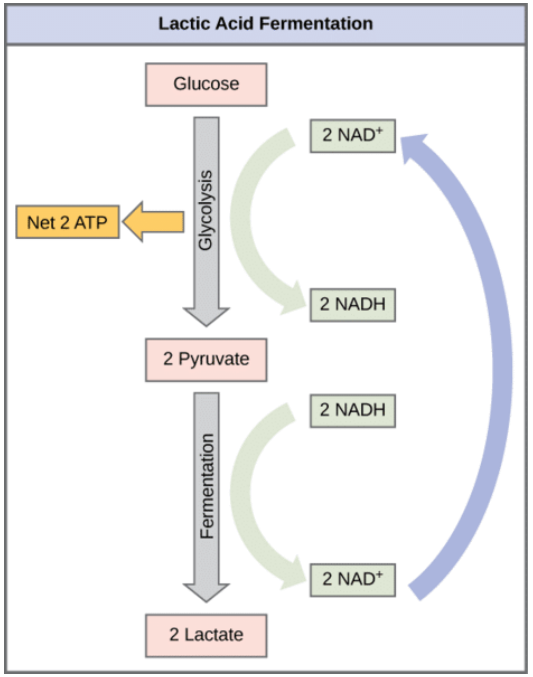


  - Bovenstaande processen lopen tot alle CP ‘op’ is
    - na ongeveer 10-30 seconden
    - Recovery van het ATP-CP is zeer snel (in 3-5 minuten)

Back to Basics – Understanding Energie

De mens kent **verschillende** manieren voor energievoorziening

- **Anaerobe respiratie: Kort (1-3 minuten):**
  - Anaerobe (zonder zuurstof) respiratie
  - Glycolyse
    - Glucose afgebroken tot 2 pyruvaat
    - Generatie van 2 ATP (en 2 NADH)
    - Verbruik 2 NAD+
  - Fermentatie
    - Pyruvaat afgebroken tot lactaat (melkzuur)
    - NADH gerecycled tot NAD+ voor behoud glycolyse

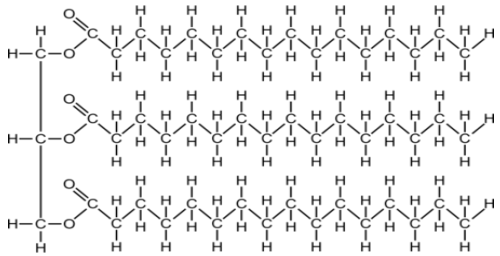


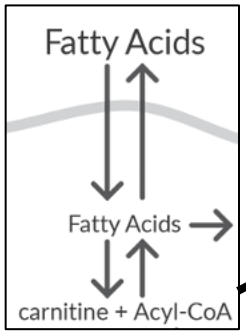
  - Reactie beperkt door stapeling van lactaat / verzuring

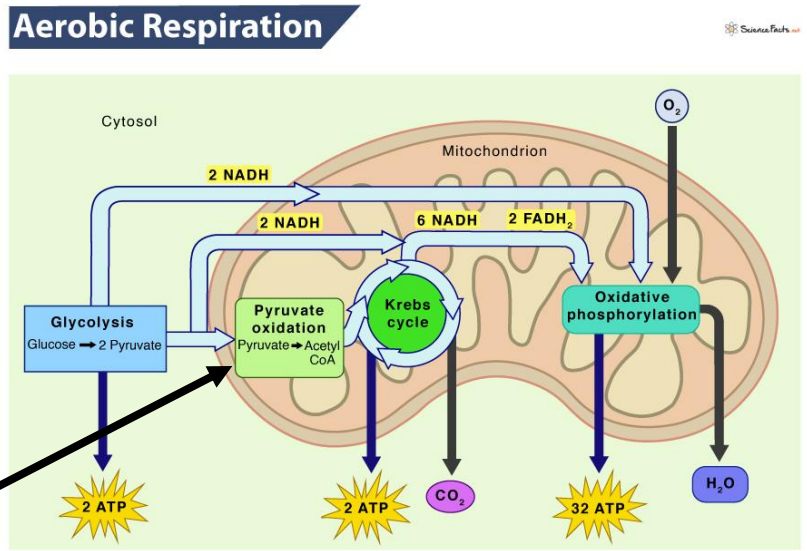
Back to Basics – Understanding Energie

De mens kent **verschillende** manieren voor energievoorziening

- **Aerobe respiratie: langdurig (uren tot dagen)**
  - Zowel mogelijk met **koolhydraten, vetten** en eiwit (en zelfs alcohol)
    - 1 molecuul glucose levert 2 Acetyl CoA
      - » 36 ATP
    - 1 molecuul vet levert
      - » 1 triglyceride = 1 Acetyl CoA
      - » 3 vetzuren (van gemiddeld 18 C-atomen)
        - 3 x 18/3 = 18 Acetyl CoA
      - » 19 (18+1) x 34 = 646 ATP…

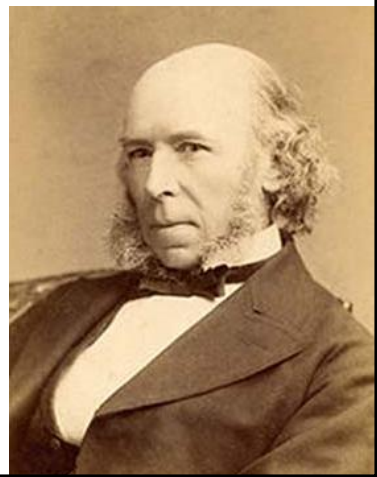




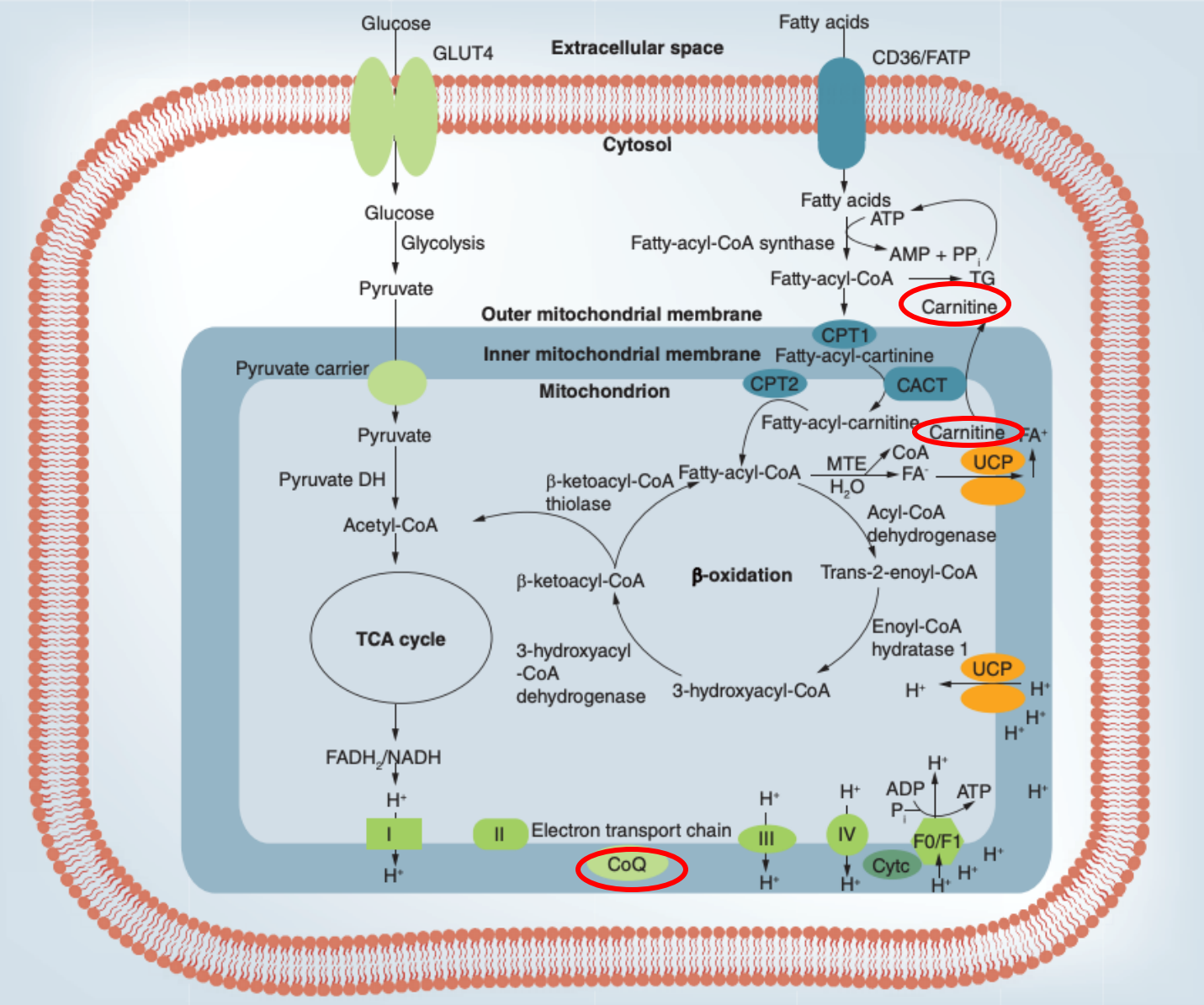


Take home message No. 15:

Energie generatie vindt vnl plaats in de mitochondria en levert onder aerobe omstandigheden 36 ATP, onder anaerobe omstandigheden 2 ATP, en vaak iets daartussen



Mitochondrial Energy Problems



Muthuramu et al. Clinical lipidology 2015

Grünert et al. Orphanet Journal of Rare Diseases (2020) 15:87
https://doi.org/10.1186/s13023-020-01371-2

Carnitine deficiency

Orphanet Journal of Rare Diseases

RESEARCH Open Access

Primary carnitine deficiency – diagnosis after heart transplantation: better late than never!

1:100.000

Sarah C. Grünert[1*], Sara Tucci[1], Anke Schumann[1], Meike Schwendt[2], Gwendolyn Gramer[3], Georg F. Hoffmann[3], Michelle Erbel[4], Brigitte Stiller[2] and Ute Spiekerkoetter[1]

Myocardial Function, Energy Provision, and Carnitine Deficiency in Experimental Uremia

J Am Soc Nephrol 18: 84–92, 2007. doi: 10.1681/ASN.2005080876

Veena Reddy,* Sunil Bhandari,† and Anne-Marie L. Seymour*

**Department of Biological Sciences, University of Hull, Hull, and †Department of Renal Medicine, Hull and East Yorkshire Hospital NHS Trust, Kingston-upon-Hull, United Kingdom*

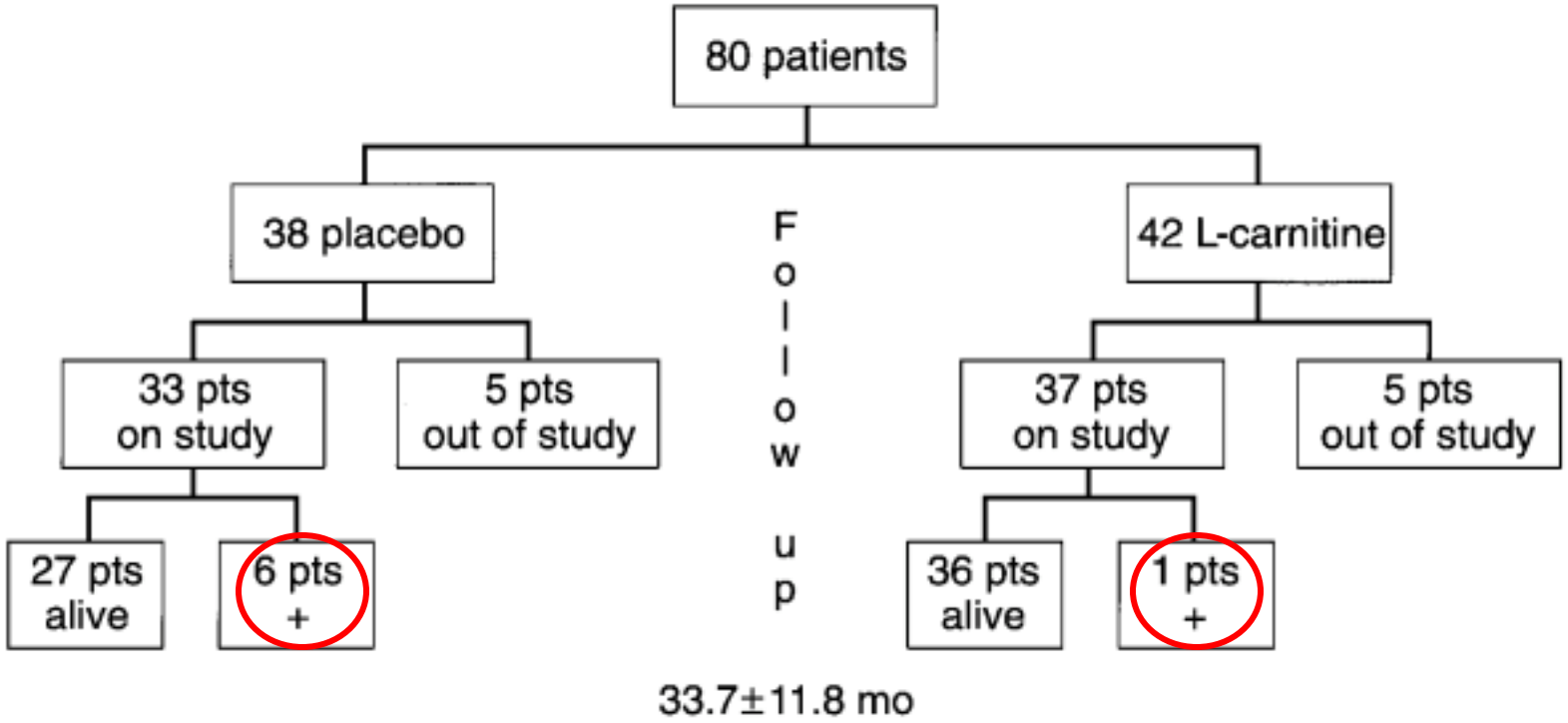
Secondary carnitine deficiency frequently is seen in uremic patients, particularly in those who are on maintenance hemodialysis therapy

Three-year survival of patients with heart failure caused by dilated cardiomyopathy and L-carnitine administration

Ioannis Rizos, MD *Athens, Greece*

. (Am Heart J 2000;139:S120-S123.)

Figure 2



Disposition of patients at 3-year follow-up; +, death.

Lei and Liu *BMC Cardiovascular Disorders*
DOI 10.1186/s12872-017-0628-9

RESEARCH ARTICLE

Efficacy of coe cardiac failure trials

Li Lei[1] and Yan Liu[2*]

Table. Demonstrated Benefits of Evidence-Based Therapies for Patients With Heart Failure and Reduced Ejection Fraction

Evidence-Based Therapy	Relative Risk Reduction in All-Cause Mortality in Pivotal Randomized Clinical Trial(s), %	NNT to Prevent All-Cause Mortality Over Time	NNT for All-Cause Mortality[a]
ACEI/ARB	17	22 over 42 mo	77
ARNI[b]	16	36 over 27 mo	80
β-Blocker	34	28 over 12 mo	28
Aldosterone antagonist	30	9 over 24 mo	18
Hydralazine/ nitrate	43	25 over 10 mo	21
CRT	36	12 over 24 mo	24
ICD	23	14 over 60 mo	70

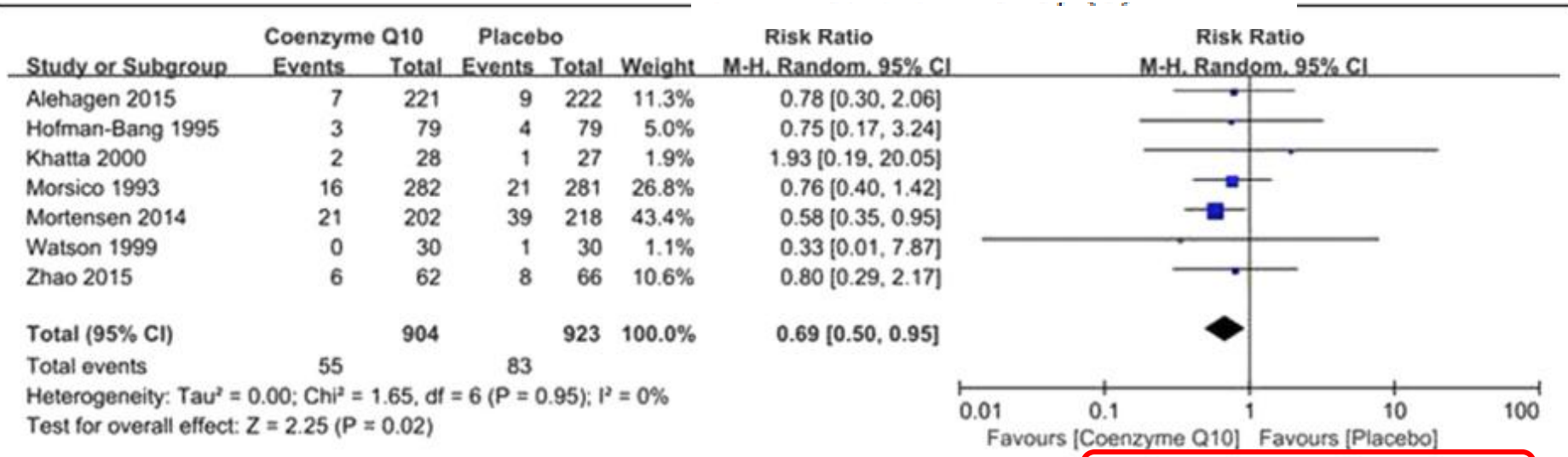


Fig. 2 Forest plot of mortality

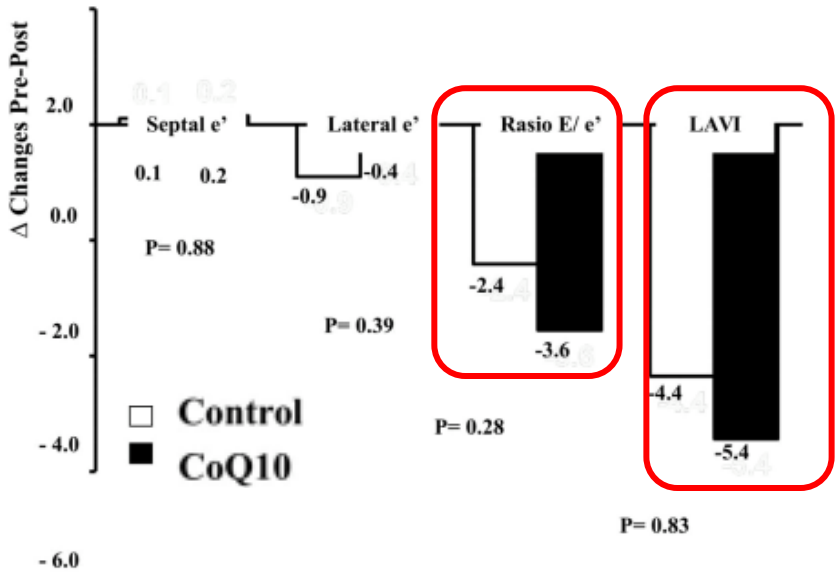
RRR 31%; NNT = 34

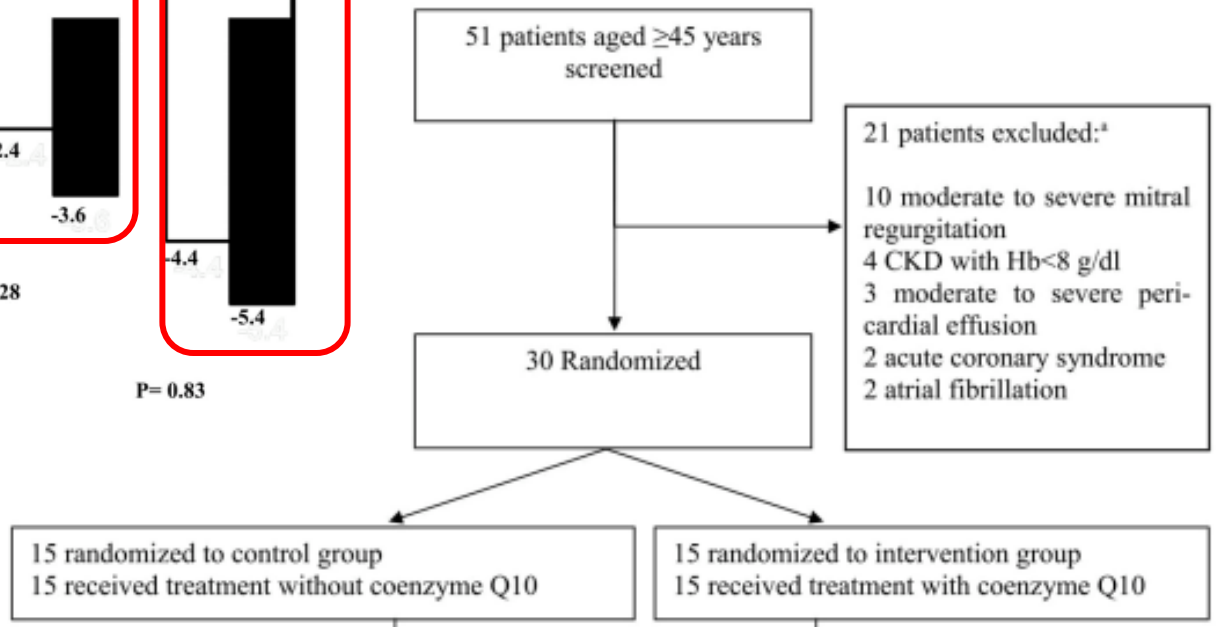
Original Article

DOI: 10.5582/ddt.2019.01004

Effects of coenzyme Q10 supplementation on diastolic function in patients with heart failure with preserved ejection fraction

Mochamad Ali Sobirin[1,2,*], Yan Herry[1], Sefri Noventi Sofia[1], Ilham Uddin[1], Sodiqur Rifqi[1], Hiroyuki Tsutsui[3]





Wat eten mensen gemiddeld?

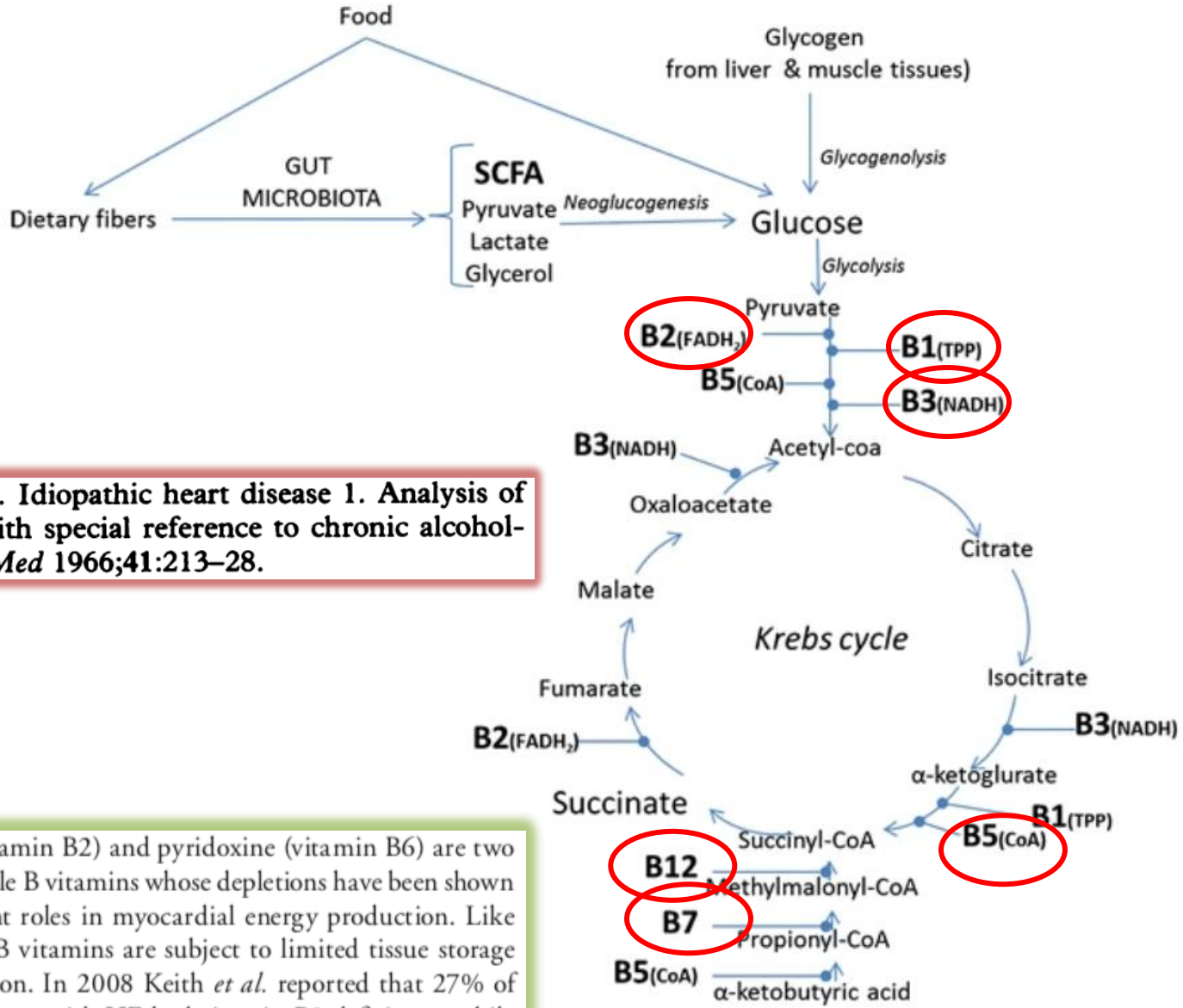
Tabel 18: Percentage Westerlingen dat aan ADH voldoet

Nutriënt	Aanbeveling	Percentage
Natrium	2400 mg	100
Selenium	70 ug	91
Riboflavine / B2	1.7 mg	89
IJzer	18 mg	89
Niacine / B3	20 mg	87
Fosfor	1000 mg	87
Koper	2 mg	84
Thiamine / B1	1.5 mg	82
Vitamine B12	6 ug	80
Pyridoxine / B6	2 mg	74
Zink	15 mg	71
Foliumzuur	400 ug	60
Vitamine C	60 mg	51
Vitamine A	900 ug	46
Magnesium	400 mg	43
Vitamine E	30 IU	14
Jodium	150 ug	<10*
Kalium	4700 mg	8

* Indien het gebruik van gejodeerd zout (o.a. in brood) niet wordt meegerekend

Bron: Kuipers, Oerdieet

The citric acid / tricarboxylic / Krebs Cycle

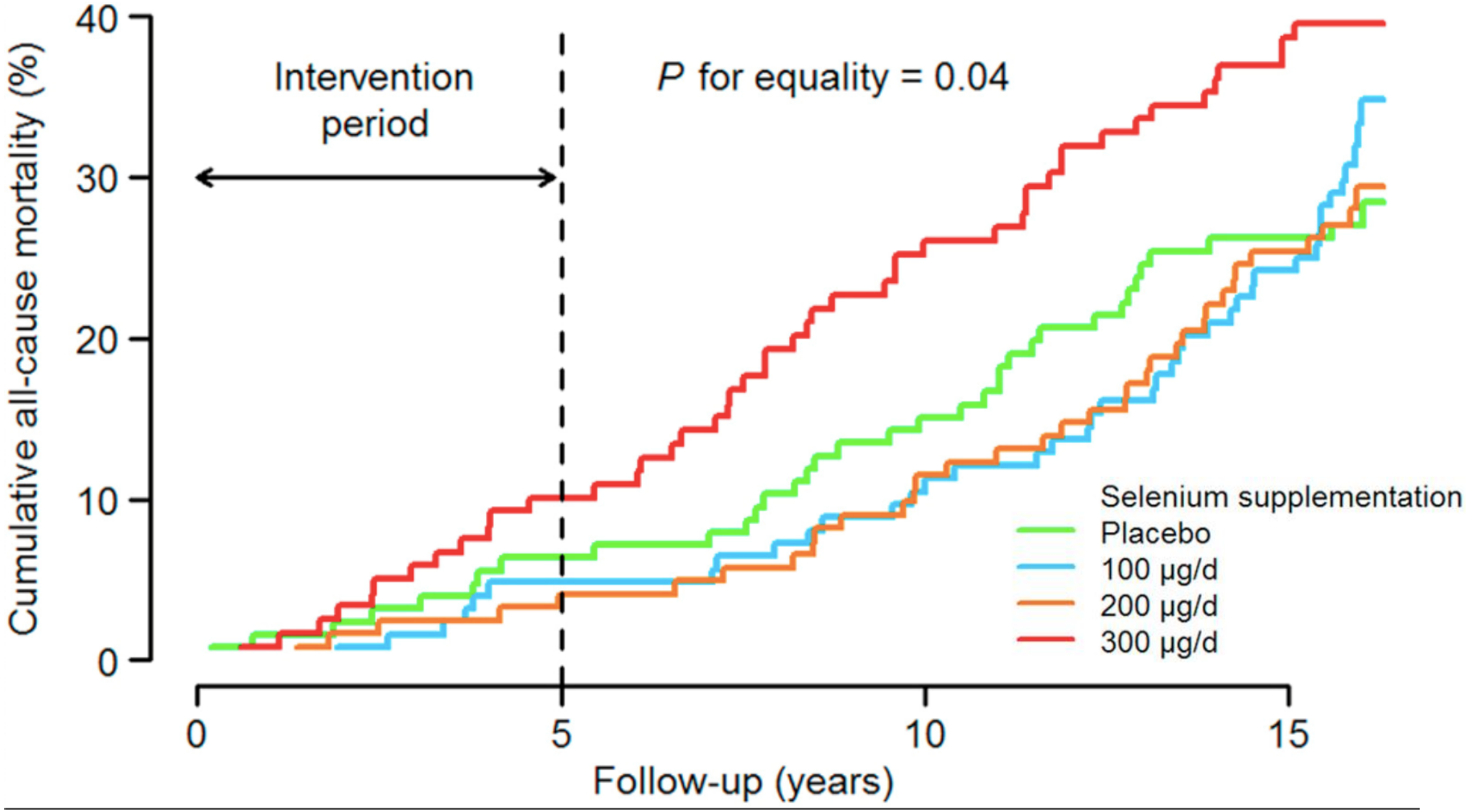


Alexander CS. Idiopathic heart disease 1. Analysis of 100 cases with special reference to chronic alcoholism. *Am J Med* 1966;41:213–28.

Riboflavin (vitamin B2) and pyridoxine (vitamin B6) are two other water-soluble B vitamins whose depletions have been shown to play important roles in myocardial energy production. Like thiamine, these B vitamins are subject to limited tissue storage and renal excretion. In 2008 Keith *et al.* reported that 27% of hospitalized patients with HF had vitamin B2 deficiency, while 38% had vitamin B6 deficiency [26]. In the same study, the use

Expert Rev. Cardiovasc. Ther. 9(9), 1161–1170 (2011)

Maar: it's the dose that makes…



Rayman et al FRBM 2018

European Heart Journal (2005) **26**, 2238–2244
doi:10.1093/eurheartj/ehi442

EUROPEAN SOCIETY OF CARDIOLOGY®

Proof of principle

Clinical research

The effect of micronutrient supplementation on quality-of-life and left ventricular function in elderly patients with chronic heart failure

Klaus K.A. Witte[1*], Nikolay P. Nikitin[1], Anita C. Parker[1], Stephan von Haehling[2], Hans-Dieter Volk[3], Stefan D. Anker[4], Andrew L. Clark[1], and John G.F. Cleland[1]

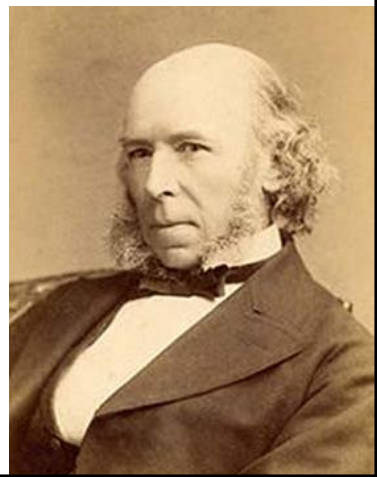
Methods and results Thirty CHF patients [age 75.4 (0.7), mean (SEM), LV ejection fraction (LVEF) $\leq$35%] were randomized to receive capsules containing a combination of high-dose micronutrients (calcium, magnesium, zinc, copper, selenium, vitamin A, thiamine, riboflavin, vitamin B_6, folate, vitamin B_{12}, vitamin C, vitamin E, vitamin D, and Coenzyme Q10) or placebo for 9 months in a double-blind fashion. All subjects were on stable optimal medical therapy for at least 3 months before enrolment.

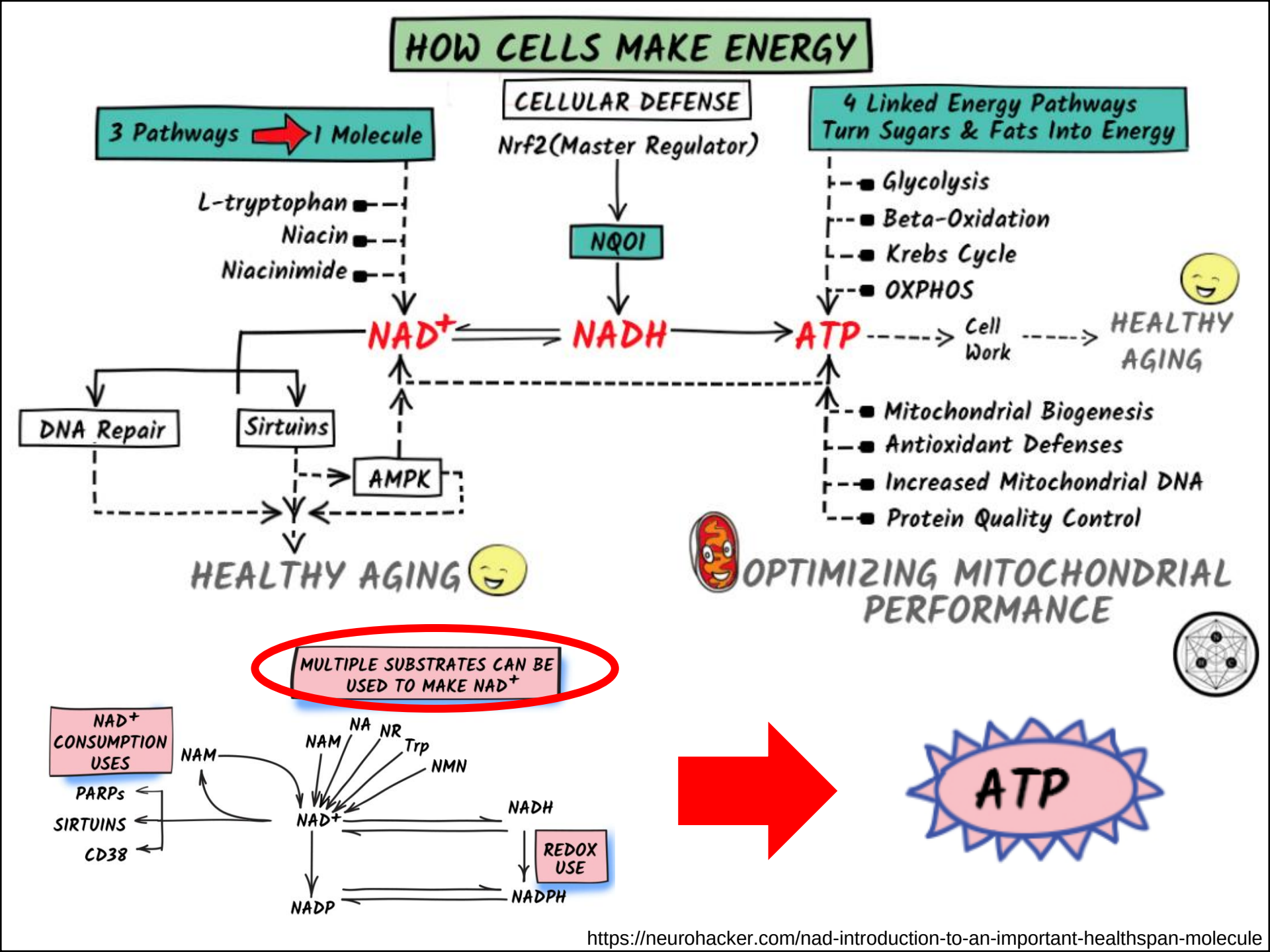
Conclusion Long-term multiple micronutrient supplementation can improve LV volumes and LVEF and QoL scores in elderly patients with heart failure due to LV systolic dysfunction.

Take home message No. 16:

Multi-vitamine suppletie (als mitochondriale booster) bij hartfalen wordt ondersteund door wetenschappelijke studies.

Bij chronische vermoeidheidssyndromen (oa fibromyalgie) remains to be elucidated





https://neurohacker.com/nad-introduction-to-an-important-healthspan-molecule

Nicotinamide

Nicotinamide for the treatment of heart failure with preserved ejection fraction*

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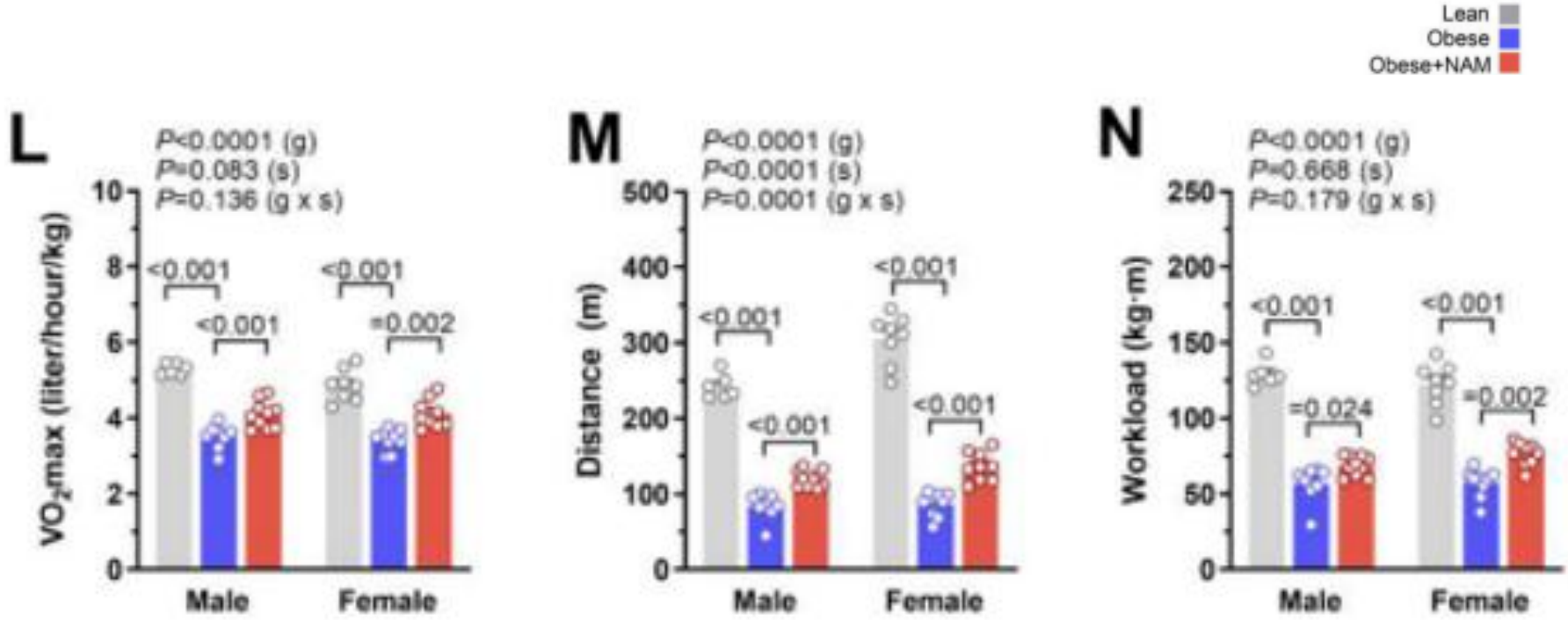

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Take home message No. 17:

Mitochondriale ondersteuning vanuit NAD plus invloed NAD op herstel onderwerp van actuele studies.