LUXEMBOURG INSTITUTE OF HEALTH
RESEARCH DEDICATED TO LIFE

Occupational Health Meeting, 29.11.2024

Balanced Diet for a Disease-Free Life – How to Eat Healthy at Home & at Work ?

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Overview of Course (45')

I: Short Warm-up Quiz

II: Importance of Healthy Diet – Situation in LU?

III: A Deeper Look Into Diet & Disease

IV: Practical Aspects Regarding Diet – at Home & at Work

V: Dietary Supplements – do I Need those ?

VI: Short Summary

I - Warm-up Quiz

How many adult persons in LU are having obesity (BMI>30 kg/m^2) ?

a) 10%
b) 23%
c) 16%
d) 28%

What is the contribution of diet to healthy living (long lifespan) ?

a) ~10%
b) ~25%
c) ~50%

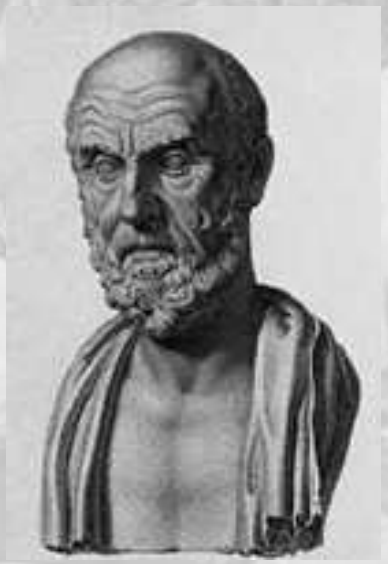
How many fruits & vegetables should you eat ?

a) one apple a day
b) 2 portions/d
c) 3 portions/d
d) 5 portions/d

Vegetarians…

a) less often die of cardiovascular disease
b) have lower BMI (vs. omnivores)
c) have nevertheless same all-cause mortality than omnivores

II – Importance of Healthy Diet

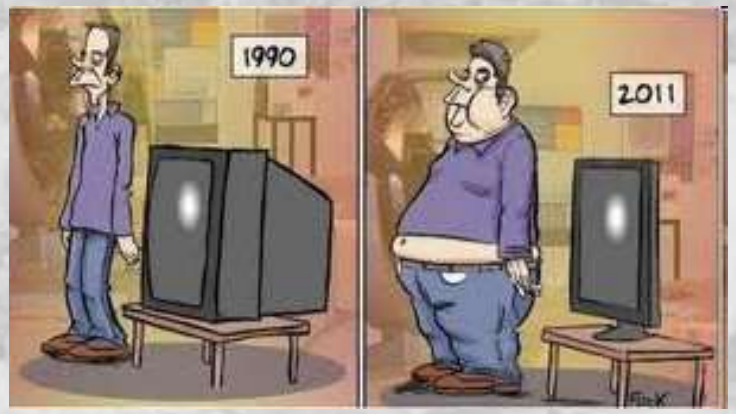


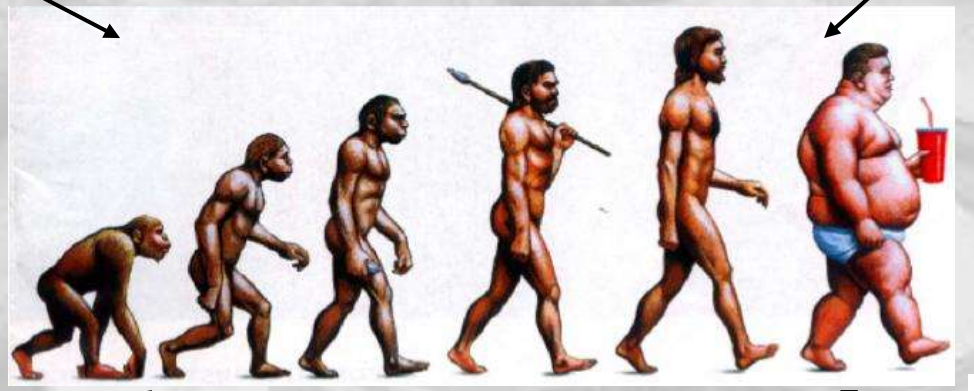
“Let Food be thy Medicine and Medicine be thy Food”

Hippocrates, 400 BC

II – Importance of Healthy Diet

Development toward Couch-Potato Existance ?





Genetic changes ?

0.3% per mio. y

Are we doomed ???

II – Importance of Healthy Diet

WHO & other Expert Commissions

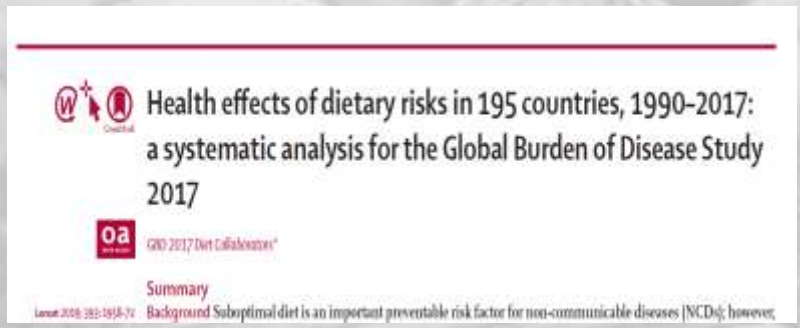
WHO: insufficient fruit/vegetable consumption:

31% ischemic heart disease
19% gastro-intestinal cancer
11% stroke

Globally:

- **Na**: 3 mio. deaths, 70 mio. DALYs,
- **Wholegrain**: 3 mio. deaths 82 mio. DALYs
- **Fruit**: 2 mio. deaths, 65 mio. DALYs

(IHD: 180 mio. DALYs,WHO)



Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017

oa

GBD 2017 Diet Collaborators*

Summary

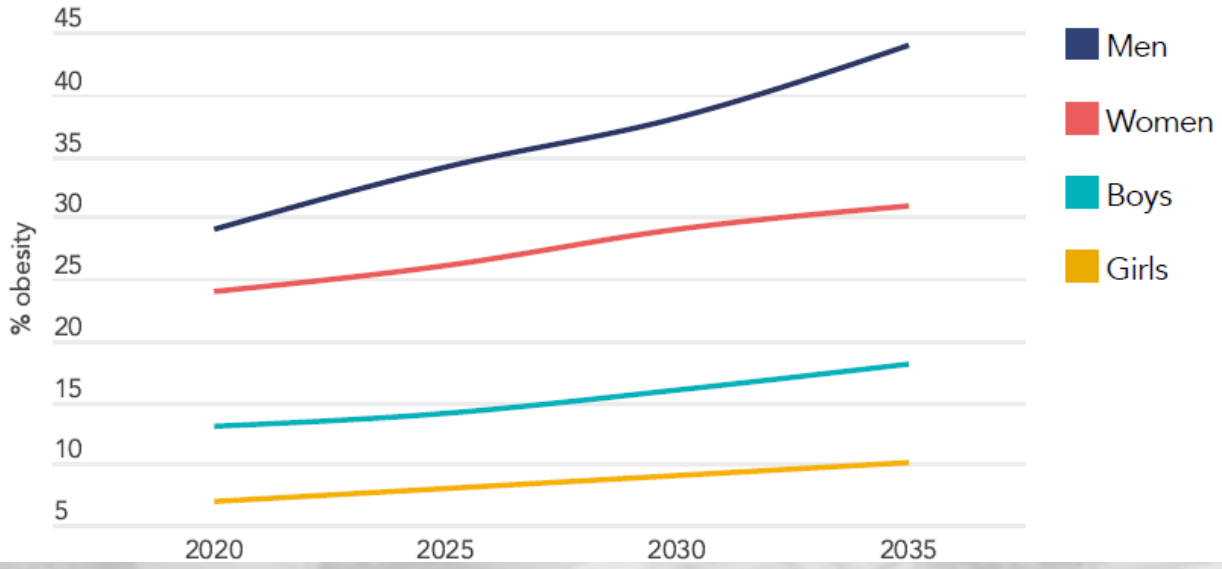
Background Suboptimal diet is an important preventable risk factor for non-communicable diseases (NCDs); however,

II – Importance of Healthy Diet

Overweight & Obesity

Luxembourg

PROJECTED TRENDS IN THE PREVALENCE OF OBESITY (BMI ≥30kg/m²)



ADULTS WITH OBESITY 2035

37%

VERY HIGH

ANNUAL INCREASE IN ADULT OBESITY 2020–2035

2.3%

HIGH

OVERWEIGHT IMPACT ON NATIONAL GDP 2035

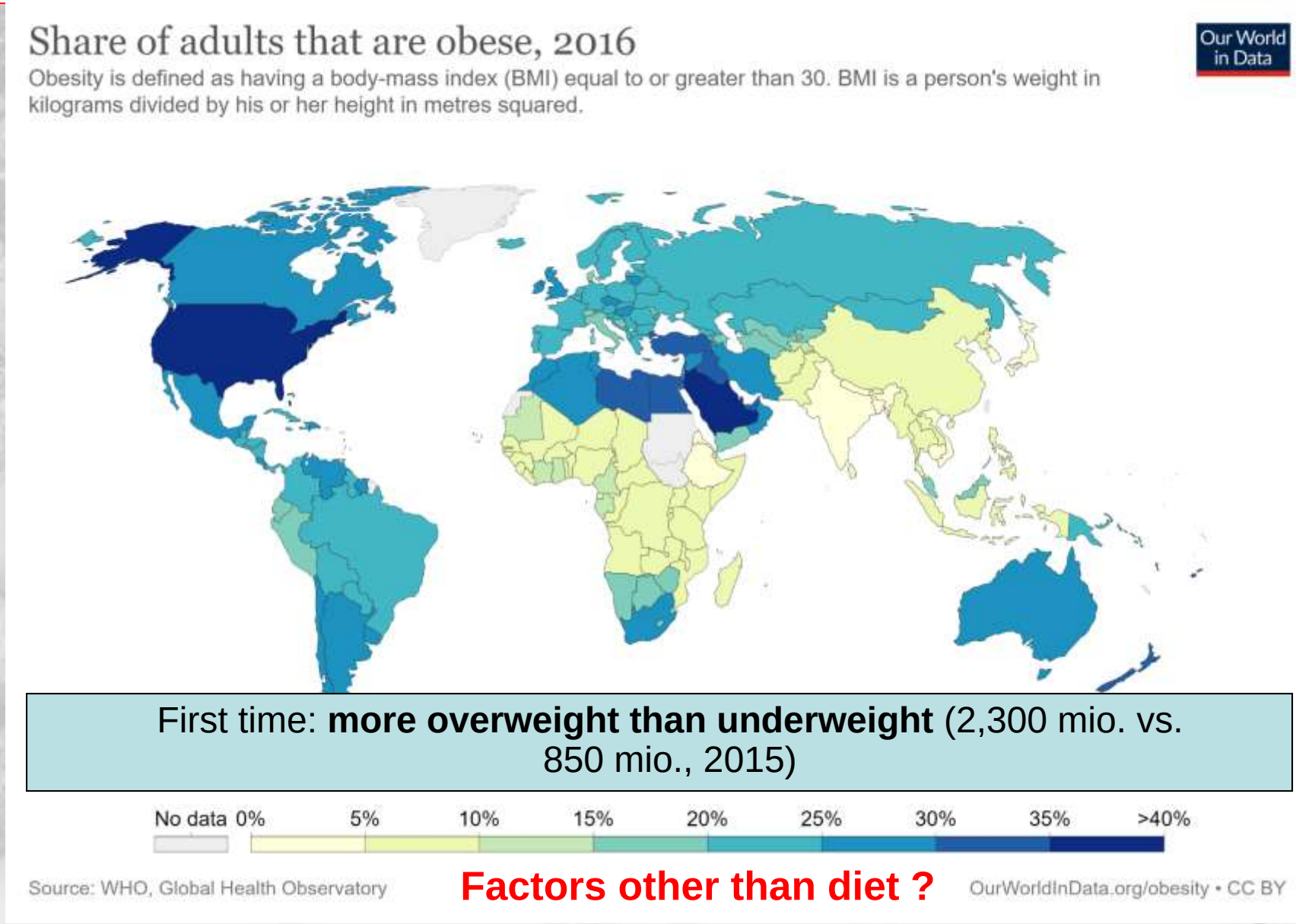
1.5%

HIGH

OECD, World Obesity Atlas 2023 & 2024

II – Importance of Healthy Diet

Not only a problem of Developed Countries:



First time: **more overweight than underweight** (2,300 mio. vs. 850 mio., 2015)

Factors other than diet ?

Never too late to change life-style !

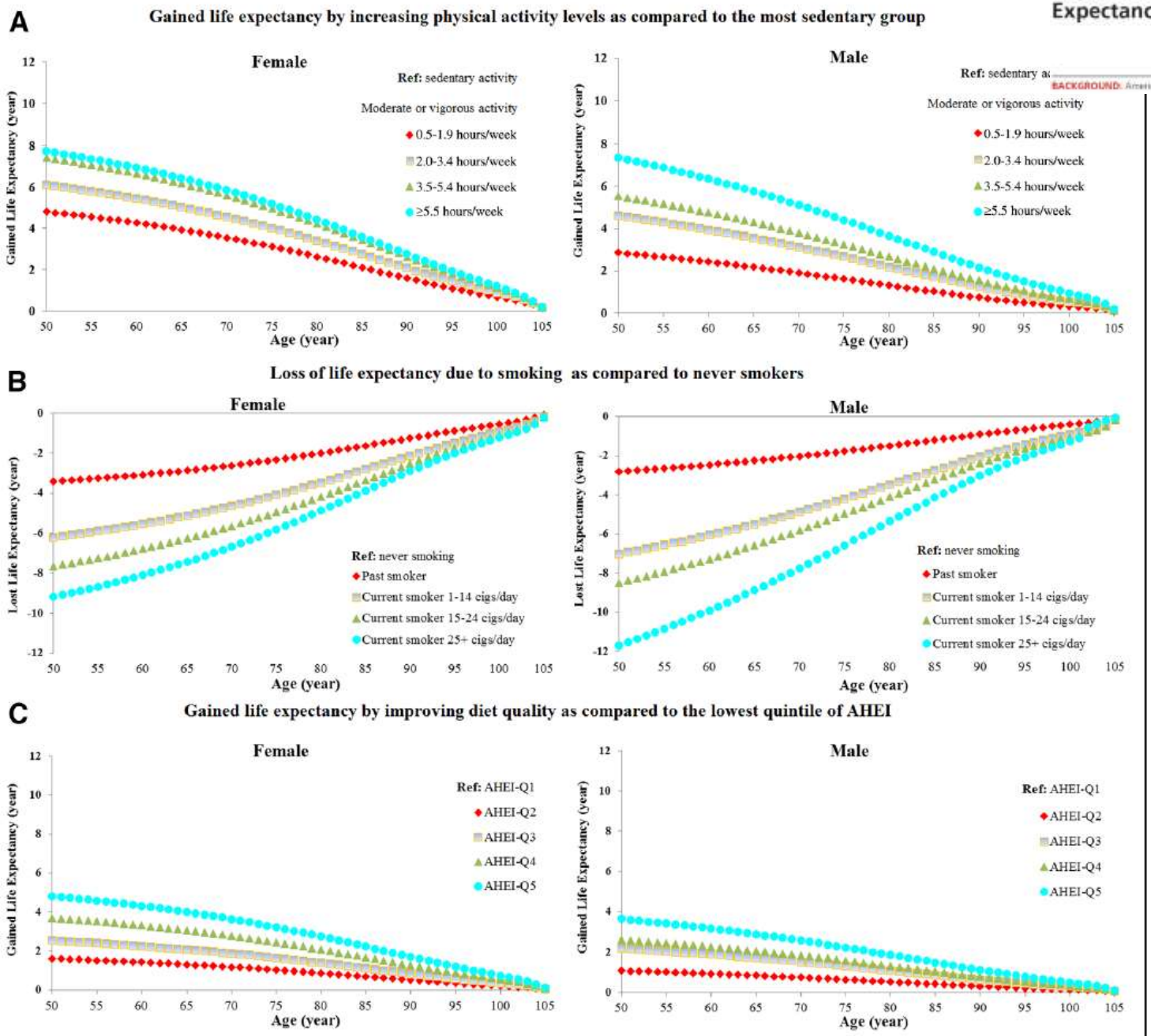
Circulation

ORIGINAL RESEARCH ARTICLE

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

BACKGROUND: Americans have a shorter life expectancy compared with

Yanping Li, MD, PhD*



Max. gain/losses:

+ 7-8 y with PA

- 9 - 12 y if you smoke

+ 4-5 y with healthy diet !

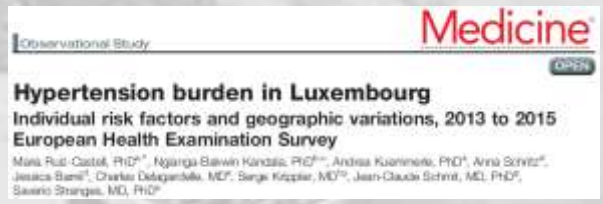
II – Importance of Healthy Diet

Some findings from the Oriscav Lux Studies

In Luxembourg:

- Prediabetes (26%)
- Overweight (37%)
- Obesity (21%)
- Hypertension (31%)
- Dyslipidaemia (>2/3)
- MetS: ~25%

- Highest meat consumers ww. (2007) – 137 kg/y !
- Ca. 60%: fiber intake <25/38 g/d
- Salt: >85%: >2 g/d Na
- 40%: < 5/d fruits/vegetables
- Simple sugars: >97% over 10% energy intake

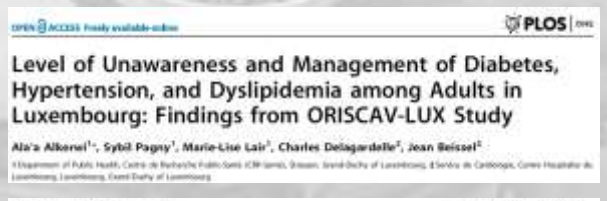

Observational Study

Medicine

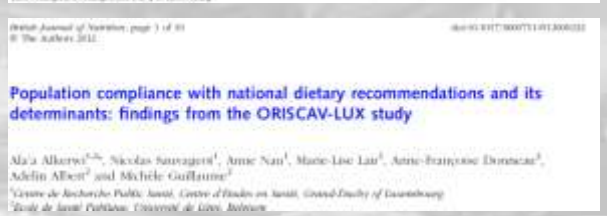
OPEN

Hypertension burden in Luxembourg

Individual risk factors and geographic variations, 2013 to 2015 European Health Examination Survey


PLOS One

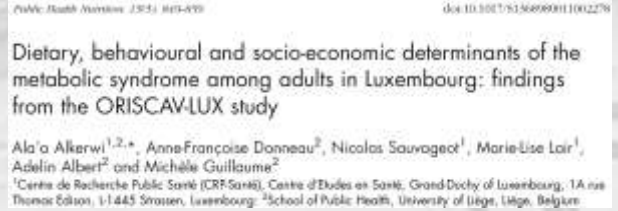
Level of Unawareness and Management of Diabetes, Hypertension, and Dyslipidemia among Adults in Luxembourg: Findings from ORISCAV-LUX Study


Population compliance with national dietary recommendations and its determinants: findings from the ORISCAV-LUX study


The Economist

Graphic detail

Kings of the carnivores


Public Health Nutrition

Dietary, behavioural and socio-economic determinants of the metabolic syndrome among adults in Luxembourg: findings from the ORISCAV-LUX study

Ala'a Alkerwi[1,2,*], Anne-Françoise Donneau[2], Nicolas Sauvageot[1], Marie-Lise Lair[1], Adelin Albert[2] and Michèle Guillaume[2]

[1]Centre de Recherche Public Santé (CRP-Santé), Centre d'Etudes en Santé, Grand-Duchy of Luxembourg, 1A rue Thomas Edison, L-1445 Strassen, Luxembourg; [2]School of Public Health, University of Liège, Liège, Belgium

II – Importance of Healthy Diet

What we are doing:

III – A Deeper Look into Diet & Disease

Which Macronutrients ?

Trend in the 1990' s: Low fat foods

"The Paradiso factory produces light mineral water and soft drinks "

Trend at ca. >2000: Low carb. foods

Tomorrows trend: Low protein ?

Eat nothing (but pills) ??

Which dietary recommendations to trust ?

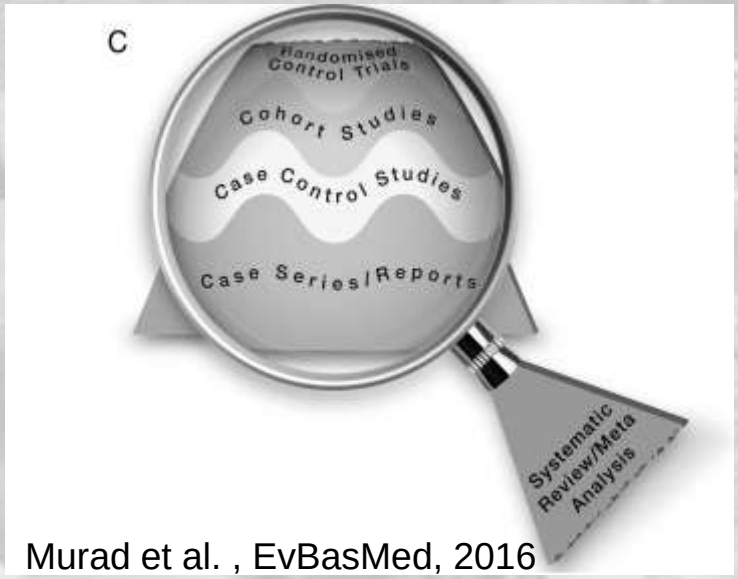
III – A Deeper Look into Diet & Disease

Which dietary recommendations to trust ?

1 swallow = summer ??

Be careful !

New evidence-pyramide:



Murad et al. , EvBasMed, 2016

World Health Organization

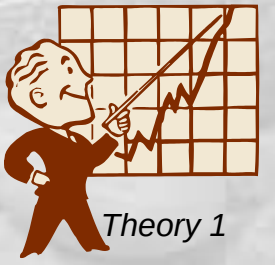
efsa
European Food Safety Authority

DGE

Industry-independent competent organizations & national guidelines

III – A Deeper Look into Diet & Disease

The search for the scapegoat…



Theory 1

“It is the fats” !!

- High caloric value : 9.3 kcal/g vs. 4.1 kcal/g (CH, proteins).
- Saturated fats (animal) in tendency unhealthier as unsaturated.
- Many saturated fats also contain cholesterol.

III – A Deeper Look into Diet & Disease

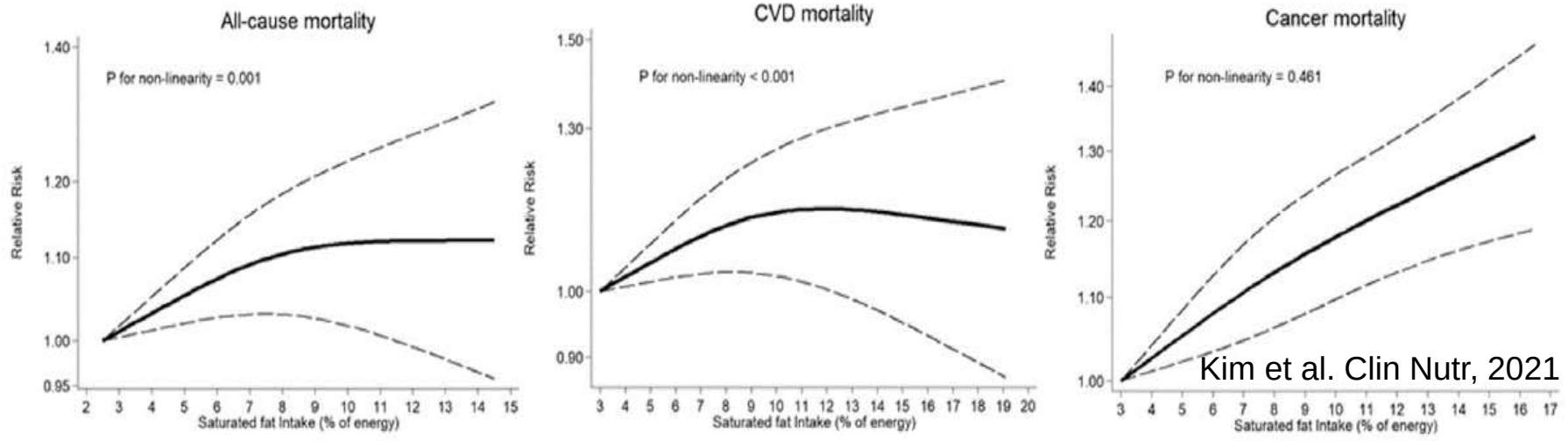
Saturated Fats & Health

19 prospective cohort - studies, n= 1,013,273 participants195,515 deaths

	Highest *versus* lowest		% of energy increment from fat		
	No. of studies	RR (95% CI)	% of energy	No. of studies	RR (95% CI)
All-cause mortality					
Total fat	8	0.89 (0.81–0.99)	5	6	0.99 (0.98–1.00)
Saturated fat	11	1.03 (0.94–1.13)	5	10	1.02 (1.00–1.05)

No sign. neg. effects : high vs. low intakes

→ But: high vs. low fraction of energy intake % (dietary patterns).



Kim et al. Clin Nutr, 2021

Inverse Relation: total mortality, CVD, cancer: borderline for mortality

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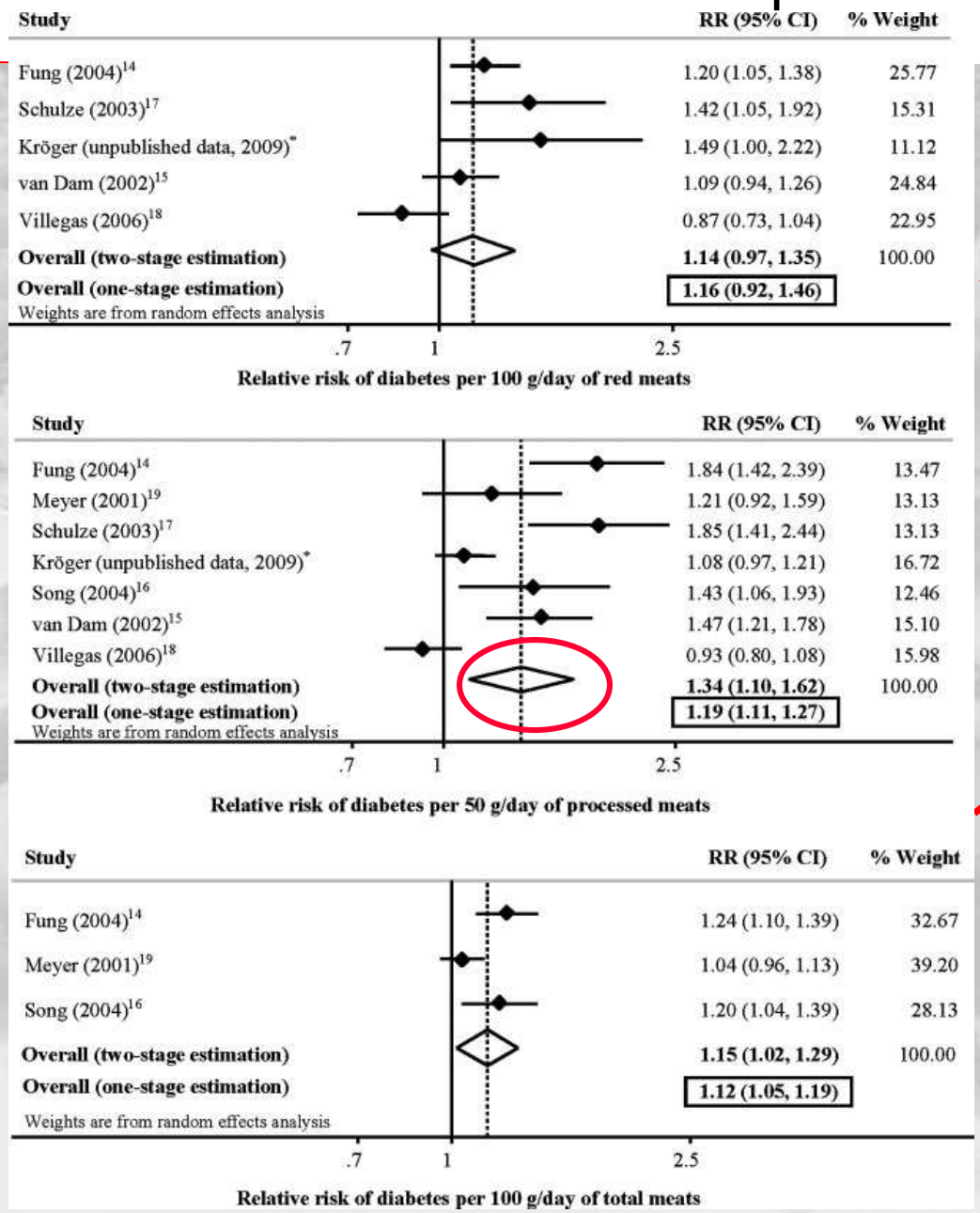
Meat products ?



Meta-analysis: consumption of processed meat (sausage, ham...) & red meat (unprocessed)

Micha, Circulation. 2010 1;121(21):2271-83

III – A Deeper Look into Diet & Disease

And “healthy fats” ?

RCT meta-Analysis & CVD mortalityt, 38 studies, n=150.000

Group by Subgroup within study	Trial/Author, Year	Statistics for each study: Rate ratio	Lower limit	Upper limit	p-Value	Relative weight
EPA	JELIS, 2007	0.93	0.56	1.55	0.79	13.43
	Nosaka et al., 2014	0.20	0.02	1.71	0.14	0.75
	REDUCE-IT, 2018	0.82	0.67	1.00	0.05	85.83
		0.82	0.68	0.99	0.04	
EPA + DHA	HARP, 1995	0.32	0.01	7.78	0.48	0.03
	SHOT, 1996	1.62	0.47	5.53	0.44	0.20
	GISSI-P, 1999	0.84	0.72	0.98	0.02	12.48
	SCIMO, 1999	0.34	0.01	8.26	0.50	0.03
	OFAMI, 2001	1.00	0.38	2.66	1.00	0.31
	Brox et al., 2001	0.17	0.01	4.09	0.27	0.03
	FAAT, 2005	1.01	0.40	2.54	0.98	0.35
	Raitt et al., 2005	0.40	0.08	2.06	0.27	0.11
	SOFA, 2006	0.46	0.18	1.21	0.12	0.32
	GISSI-HF, 2008	0.93	0.84	1.03	0.15	29.03
	OMEGA, 2009	0.95	0.56	1.59	0.84	1.12
	AlphaOmega, 2010	0.99	0.73	1.34	0.94	3.19
	DO IT, 2010	0.63	0.25	1.64	0.35	0.34
	SU.FOL.OM3, 2010	0.82	0.47	1.42	0.48	0.99
	ORIGIN, 2012	0.98	0.88	1.10	0.78	22.73
	Risk & Prevention, 2013	1.04	0.82	1.32	0.74	5.49
	Shinto et al., 2014	3.00	0.12	73.64	0.50	0.03
	AREDS2, 2014	0.96	0.38	2.41	0.93	0.35
	Derosa et al., 2016	0.34	0.01	8.31	0.51	0.03
	ASCEND, 2018	0.82	0.68	0.99	0.04	8.49
	VITAL, 2018	0.96	0.76	1.21	0.73	5.71
	STRENGTH, 2020	1.08	0.90	1.31	0.40	8.63
		0.94	0.89	0.99	0.02	
Overall		0.93	0.88	0.98	0.01	

Rate ratio and 95% CI

I² = 0%
P for interaction = 0.

Favors Omega-3 FA Favors Control

7% reduced risk

Conclusion: Light reduction of risk for **ω-3 FS & CVD & total mortality**

Strong convincing effects ??

If it is not the fat, what then ?

III – A Deeper Look into Diet & Disease

Dietary Intake Trends (71-2011)

Calorie consumption

- 1972 kcal → 2173 kcal (ca. 10%)

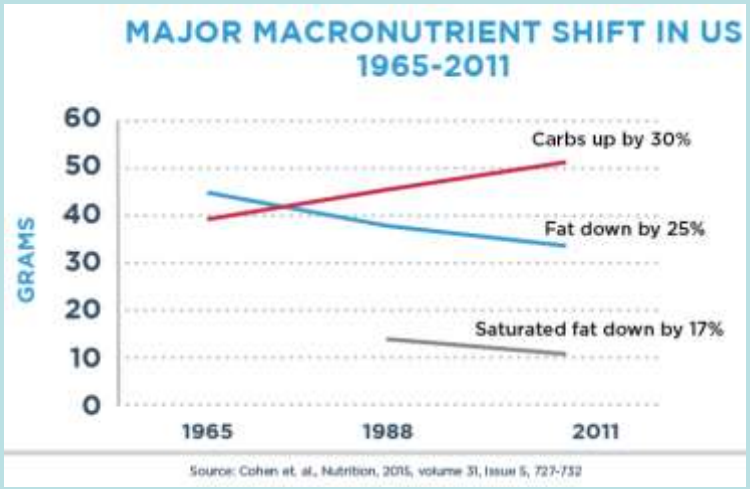
National Health and Nutrition Examination Surveys (NHANES)

Fat Intake

- 45% → 34% (p<0.01)

CH Intake

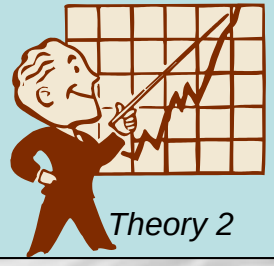
- 39% → 51% (p<0.01)



Proteins and dietary fiber

- No major change

Sugar consumption !



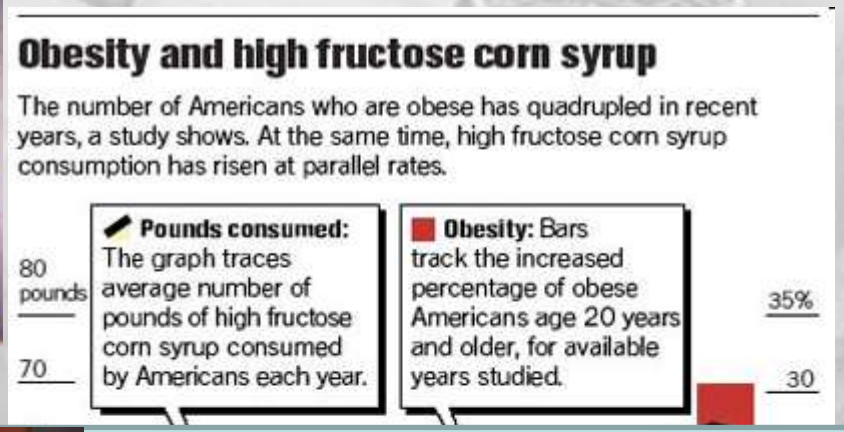
However, CH/sugar consumption has stagnated somewhat since 2000…

III – A Deeper Look into Diet & Disease

(Table)sugar causing obesity ?

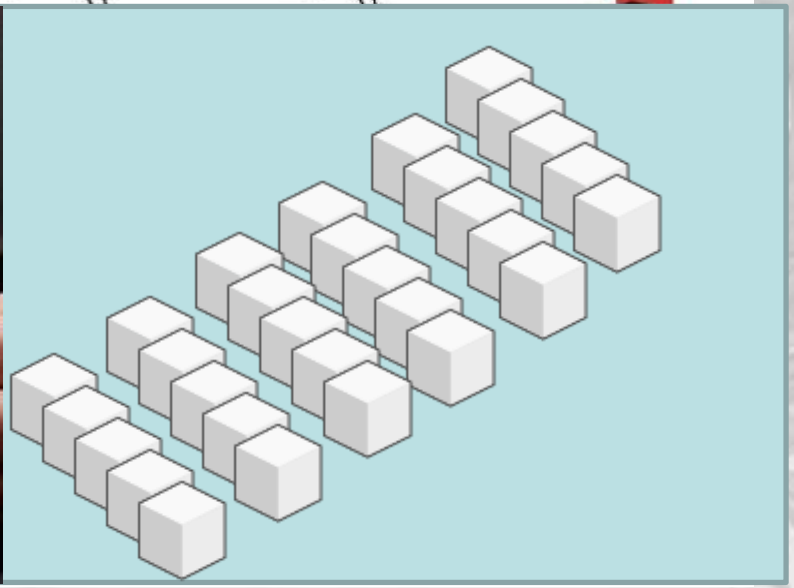
Consumption of sweetened beverages: +135% ↑ (1977 - 2001)

Nielsen SJ, Popkin BM. Am J Prev Med 2004



Fructose especially critical :

- Blood lipids ↑ (via
- Inflammation ↑
- Satiety ↓
- (V)LDL ↑



Sugar intake (DE): 88

Correlation between
type II diabetes incre

III – A Deeper Look into Diet & Disease

GI & GL – "Umbrella Meta-Analysis"

18 MA: prospective cohort-studies: GI &GL: Blood-sugar increase

- Pos. association between GI & T2D risk, CVD, some types of cancer (colorectal, breast, bladder), & GL risk CVD, T2D & stroke.

Outcome	Number of primary studies	Number of cases	Comparison	Summary relative risk (95%CI)	Quality of evidence (GRADE)
Gallbladder disease	2	7581	High vs low	1.26 (1.11, 1.40)	Low
Bladder cancer	2	1315	High vs low	1.26 (1.08, 1.46)	Low
Type 2 diabetes	15	34,841	Per 10-unit	1.18 (1.07, 1.29)	Low
Coronary heart disease	10	7137	High vs low	1.14 (1.05, 1.24)	Low
Colorectal cancer	12	14,108	High vs low	1.08 (1.01, 1.16)	Low
Breast cancer	11	25,917	High vs low	1.06 (1.01, 1.11)	Low
Stroke	7	3046	High vs low	1.07 (0.97, 1.19)	Low
Prostate cancer	5	15,949	High vs low	0.98 (0.94, 1.03)	Low
Endometrial cancer	7	4011	High vs low	1.00 (0.91, 1.10)	Low
Pancreatic cancer	8	3097	High vs low	1.02 (0.90, 1.16)	Low
Gastric cancer	3	869	High vs low	0.92 (0.57, 1.50)	Very low
Liver cancer	4	984	High vs low	1.04 (0.83, 1.32)	Very low
Renal cell carcinoma	2	1315	High vs low	0.99 (0.81, 1.17)	Very low
All-cause mortality	5	10,768	High vs low	1.10 (0.94, 1.30)	Very low

Individual diseases: up to 25% risk reduction

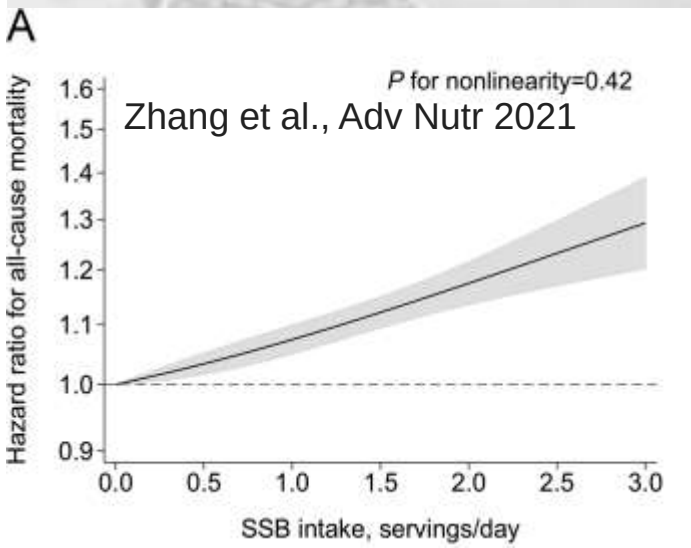
Jayedi, CrReFdSciNutr, 2021

III – A Deeper Look into Diet & Disease

"Sugar source – sweetened beverages"

MA: 15 studies: 11 cohorts, n=965,851 participants: total mortality

Cohort	Participants	Deaths	HR (95% CI)	Weight, %
All-cause mortality				
Cancer and Leukemia Group B 89803	1011	305	1.15 (0.95, 1.40)	3.47
European Prospective Investigation into Cancer and Nutrition	451,743	41,963	1.06 (1.02, 1.09)	16.88
Health Professionals Follow-Up Study	37,716	13,004	1.07 (1.03, 1.10)	17.05
Leisure World Cohort Study	13,624	11,386	1.00 (0.81, 1.23)	3.09
Northern Swedish Health and Disease Study	24,475	2881	1.06 (0.95, 1.19)	7.67
Nurses' Health Study	80,647	23,432	1.08 (1.05, 1.10)	18.09
Reasons for Geographic and Racial Differences in Stroke study	13,440	1000	1.06 (0.96, 1.16)	9.29
Singapore Chinese Health Study	52,584	10,029	0.91 (0.80, 1.03)	6.48
UK Biobank	161,415	2311	1.34 (1.20, 1.50)	7.61
Vitamins and Lifestyle study	69,582	4187	1.33 (1.13, 1.56)	4.85
Women's Health Initiative Study	59,614	4437	0.95 (0.82, 1.09)	5.53
Total (I^2=70.5%, P=0.002)	965,851	114,935	1.08 (1.04, 1.12)	100.00



Per extra beverage (355 mL): mortality↑ (HR: 1.08; 95% CI: 1.04, 1.12)

Steady increase from small amounts onward !

→No safe dose !

EFSA Opinion:

could not be compared. A level of sugars intake at which the risk of dental caries/chronic metabolic diseases is not increased could not be identified over the range of observed intakes, and thus, a UL or a safe level of intake could not be set. Based on available data and related uncertainties, the intake of added and free sugars should be as low as possible in the context of a nutritionally adequate diet. Decreasing the intake of added and free sugars would decrease the intake of total sugars to a similar extent. This opinion can assist EU Member States in setting national goals/recommendations.

III – A Deeper Look into Diet & Disease

Non-caloric sweeteners instead of sugars ?

A sweet tasting, food approved compound, that does not contain significant calories:

Aspartam (Phenylalanin)
Acesulfam K
Cyclamat
Saccharin
Stevia…

Do they reduce calories ?
Healthier ??

Increased ingestion of sweeteners: Does it increase appetite ?

Rats: yoghurt with sugar or acesulfamK/saccharin Swithers et al. 2009

After 2 Weeks: Significant weight increase !

- Disturbance of glucose metabolism ?
- Altered gut microbiota ?
- Stimulation of appetite via unknown mechanisms ?

Humans: Long term consequences uncertain, benefit questionable, energy balance: +/-
Meta-analyses: no clear direction


ORIGINAL PAPER
Sugar and artificially sweetened beverages linked to obesity: a systematic review and meta-analysis

IV – Practical Tips & Tricks Regarding Diet

How to make it healthy through a day – at home & work ?

- CAREER COLUMN Nature
- 16 March 2022

→ **Nine 'brain food' tips for "researchers"**

1. Find time to snack healthily

Short food breaks:

keep your blood-sugar level reasonably high without surging

→prevents hunger & over-consumption

→reduce SB !

IV – Practical Tips & Tricks Regarding Diet

1. Find time to snack healthily

Fruits for the office – negotiate !
Replace vending machines
Form a food – council !

Even better: Filtered tap water !

IV – Practical tips & tricks regarding Diet

2. Drink enough

Air (AC, heater) can be very dry !

→at least 1.5 (2) L per day !

- **Blood volume ↑**
- **Circulation & mental concentration ↑**
- **Tolerance against heat & cold ↑**
- **Energy expenditure ↑**
- **Satiety ↑**

→ also stimulates appetite

?

Not health beneficial as thought earlier.

Overall not health detrimental in moderation ? Risk for cancer!

IV – Practical Tips & Tricks Regarding Diet

3. Put food on your agenda & enjoy

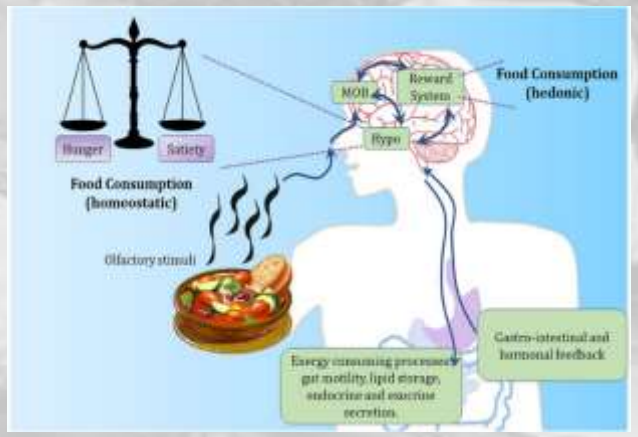
- Schedule regular mealtime in your diary
- Go with your biorythm ! Follow your gut !
- Avoid eating too late (in afternoon/evening)
- Eat consciously, take time

Timeslice	Start	End	Length	Session Name
1	8:30 AM	8:50 AM	20	Welcome break
2	8:50 AM	10:00 AM	70	Speaker 1
3	10:00 AM	10:20 AM	20	AM Break
4	10:20 AM	11:10 AM	50	Speaker 2
5	11:10 AM	12:05 PM	55	Panel
6	12:05 PM	1:05 PM	60	Lunch
7	1:05 PM	2:25 PM	80	Speaker 3
8	2:25 PM	2:45 PM	20	PM Break
9	2:45 PM	3:35 PM	50	Speaker 4
10	3:35 PM	4:20 PM	45	Speaker 5
11	4:20 PM	4:30 PM	10	Closing Remarks
Total			8:00	Total Time

Eat slowly to allow body feedback:

IV – Practical Tips & Tricks Regarding Diet

4. Plan your meals – think about it

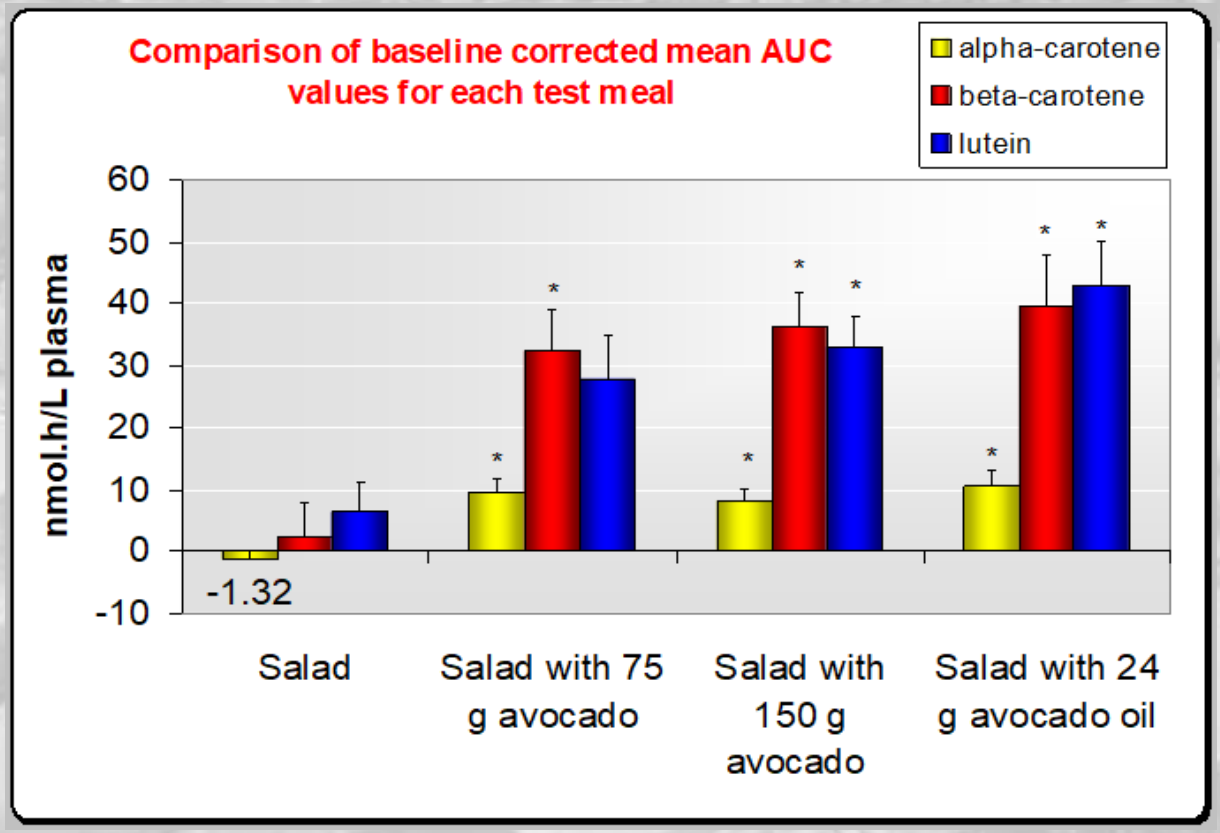


Increase your intake of: low-calorie items, e.g., but diversify:

High satiety
High nutrient density

IV – Practical Tips & Tricks Regarding Diet

Fat free dressing or not ?



Carotenoid Absorption from Salad and Salsa by Humans Is Enhanced by the Addition of Avocado or Avocado Oil[1,2]

Nuray Z. Unlu, Torsten Bohn, Steven K. Clinton,* and Steven J. Schwartz[3]

Department of Food Science and Technology and [3]Internal Medicine, The Ohio State University, Columbus, OH 43210

→A few g fat (5-10 g) needed/meal
→Improved micellization & chylomicron response

IV – Practical Tips & Tricks Regarding Diet

5. Avoid the insulin rollercoaster

<u>(Ultra-)Processed foods</u>:
- too salty
- too much sugar
- few nutrients
- too many additives

- contributing to chronic disease
- cognitive performance↓
- low satiety value
- insulin secretion↑ → soon hungry again

- Anti-inflammatory (SCFA↑)
- Cholesterol-lowering
- Slow increase blood-sugar
- Microbiome

IV – Practical Tips & Tricks Regarding Diet

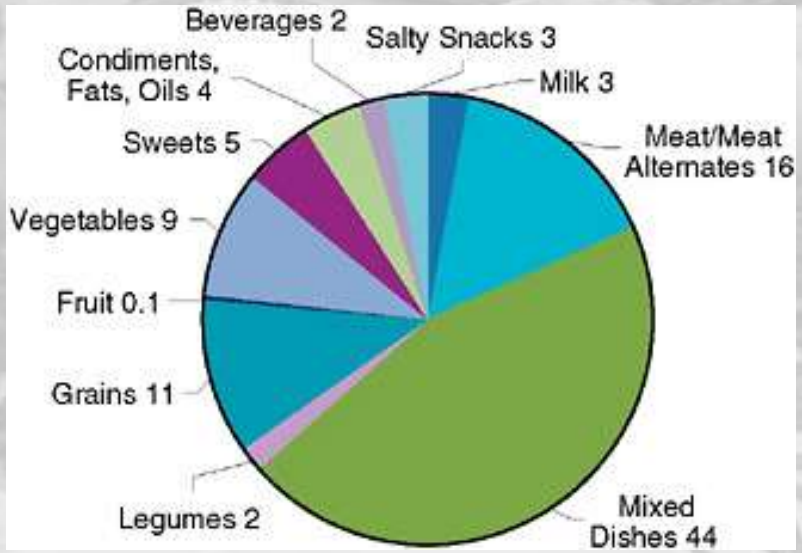
6. Scrap the salt

- major killer worldwide
- blood pressure, stroke and other cardiovascular diseases.

→ try pepper, curcuma, nutmeg or other spices to add flavour. Some health beneficial (curcuma…)

Blood pressure, CVD

According to most studies (Intersalt…): Intake twice of what is recommended



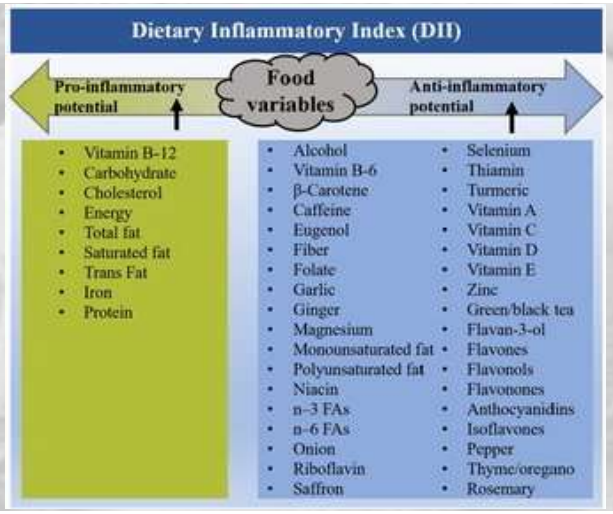
IOM: Strategies to Reduce Sodium Intake in the United States, 2010

IV – Practical Tips & Tricks Regarding Diet

6. Scrap the salt

IV – Practical Tips & Tricks Regarding Diet

Other aspects – joints, atrthitis – dietary indices



ORIGINAL PAPER
Rheumatology

CLINICAL PRACTICE WILEY

Association of Dietary Inflammatory Index (DII) with disease activity and inflammatory cytokines in the patients with rheumatoid arthritis

Arash Tandorost[1] | Sorayya Kheirouri[1] | Jalal Moludi[2] | Seyedmostafa Seyedmardani[3]

Mean DII score: higher in RA patients vs. controls (0.66 ± 0.23 vs. −0.58 ± 0.19). Patients with highest DII: sign. higher hs-CRP & TNF & clinical markers, disease activity score (DAS-28) & tender joints.

nutrients

MDPI

Systematic Review

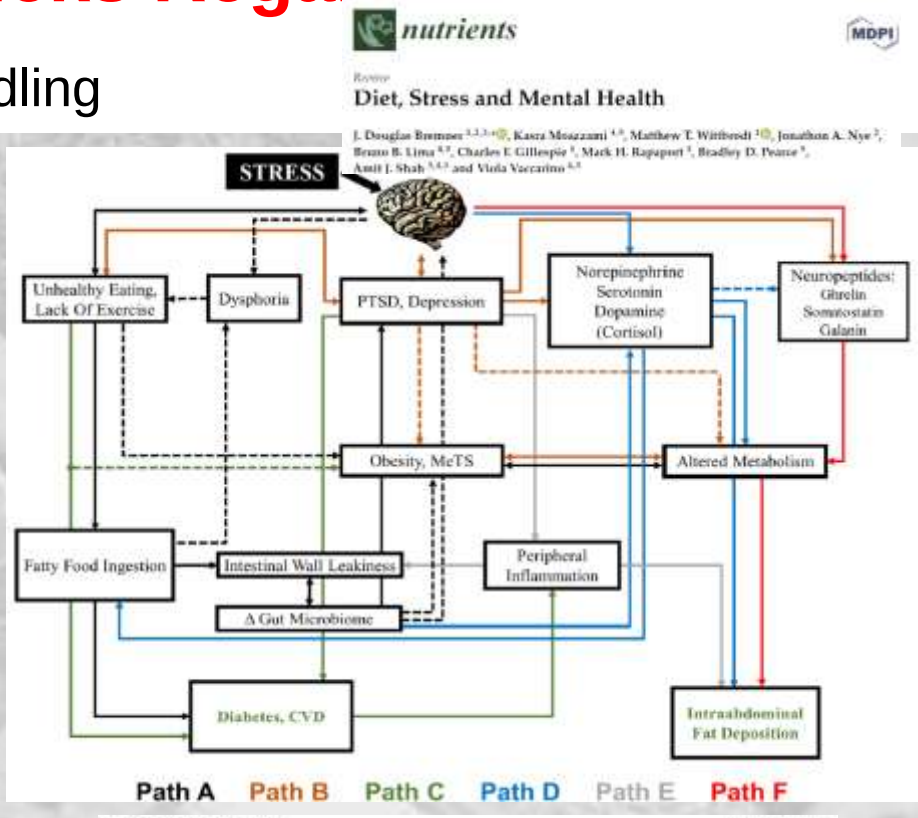
Effect of Anti-Inflammatory Diets on Pain in Rheumatoid Arthritis: A Systematic Review and Meta-Analysis

Katja A. Schönenberger [1,2,*], Anne-Catherine Schüpfer [1], Viktoria L. Gloy [3], Paul Hasler [4], Zeno Stanga [1], Nina Kaegi-Braun [5] and Emilie Reber [1]

7 RCTs, 326 participants.
Anti-inflammatory diets:
significantly lower pain than ordinary diets (-9.22 mm; 95% CI -14.15;-4.29)

IV – Practical Tips & Tricks Regarding Diet

Other aspects – stress handling



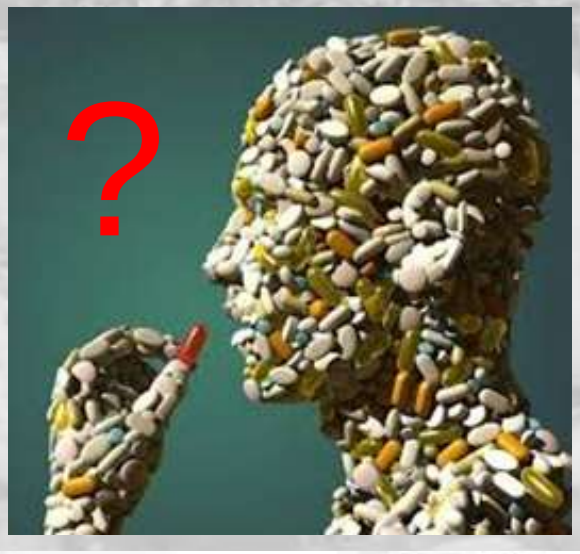
- PUFAS – anti-inflammatory
- Healthy gut microbiota (diversity): fiber
- Antioxidants
- Satiety, balanced diet

Inverse: depression incidence:
healthy diet (RR): 0.74 (0.48–0.99)
fish (RR: 0.88 (0.79–0.97)
coffee (RR: 0.89 (0.84–0.94)
dietary zinc (RR: 0.66 (0.50–0.82),
light-mod. alcohol (<40 g/d, RR: 0.77 (0.74–0.83)

Positive association:
SSB (RR: 1.05 (1.01–1.09)
For depression treatment:
probiotics (SMD): −0.31 (−0.56;−0.07)
omega-3 PUFA (SMD: −0.28 (−0.47;−0.09)
acetyl-L-carnitine (SMD: −1.10 (−1.65;−0.56)

V – Food Suppelements – Helpful or Harmful

Do I need those ?



Source: Spektrum der Wissenschaft spezial - Uebergewicht

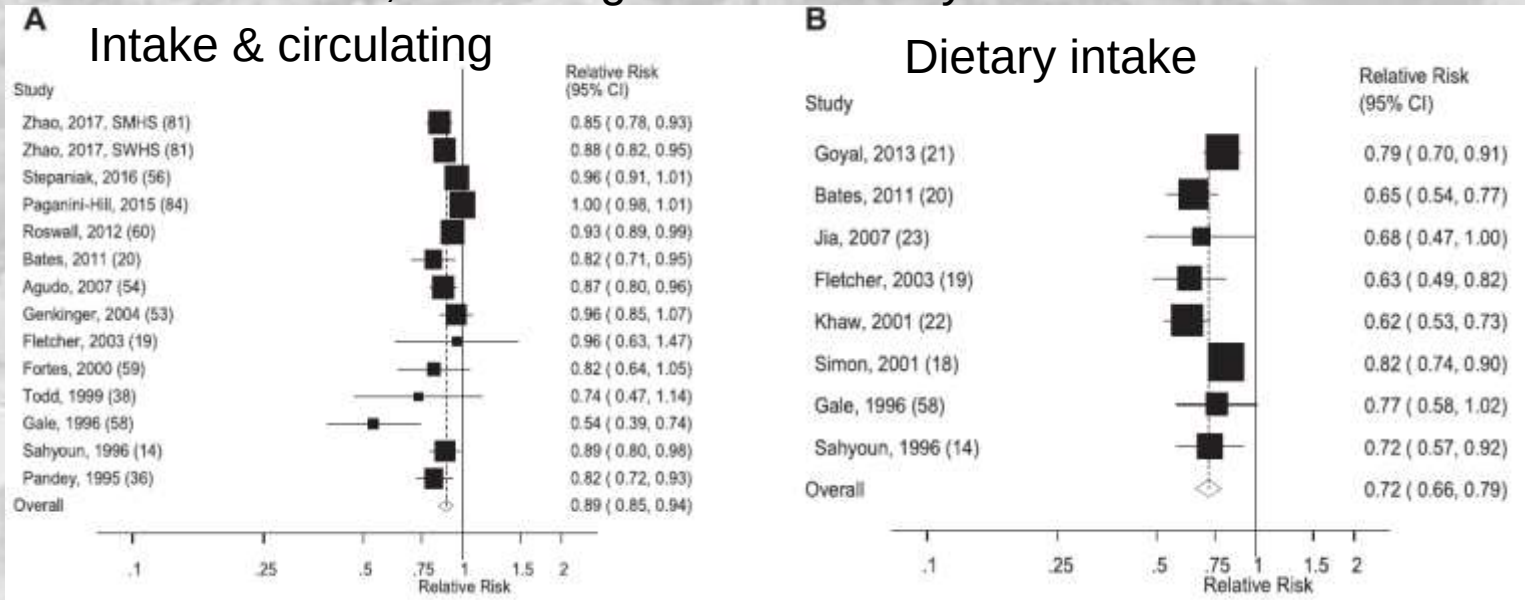
Harvard School of Public Health: 1 multivitamin tablet/d

DGE: Iodine (salt) & folic acid (pregnant women)

V – Food Suppelements – Helpful or Harmful

Meta-Analysis: Individual antioxidants & total mortality

69 Cohort studies, circulating levels & dietary intake of antioxidants & total mortality:



Vit. C

Beta-Car.

Intake of antioxidants from diet: clearly related to lower mortality

V – Food Suppelements – Helpful or Harmful

Meta-Analysis: Individual antioxidants and total mortality

Beta-carotene Clinical Intervention Trials (Supplements): n=232.000.

Table 5. Intervention Effects of Different Antioxidant Supplements vs Placebo or No Intervention on Mortality

Experimental Antioxidant Supplements	References	No. of Trials	No. of Participants	Random-Effects Model Meta-analysis: Relative Risk (95% Confidence Interval)	Heterogeneity I^2, %
Beta carotene given singly	37, 44, 50, 60, 62, 83	6	40977	1.06 (1.01-1.11)	5.4
Beta carotene given in combination with other antioxidant supplements	39, 41-44, 54, 59, 62-65, 68, 71-73, 79, 81, 83, 85, 86, 91, 94	22	139572	1.01 (0.94-1.08)	55.6
Beta carotene given singly or in combination with other antioxidant supplements	37, 39, 41-44, 50, 54, 59, 60, 62-65, 68, 71-73, 79, 81, 83, 85, 86, 91, 94	25	172811	1.01 (0.96-1.08)	52.2
Beta carotene given singly or in combination with other antioxidant supplements after exclusion of high-bias risk and selenium trials	37, 44, 50, 60, 62-64, 71, 73, 83, 85, 94	12	132610	1.07 (1.02-1.11)	36.8

Bjelakovic, 2007, JAMA 297, 842-57
Schwingshackl. AdNutr, 2018, 27ff.

What do you see ?

No effect of beta-carotene !

On the contrary: increased risk ?!

Similar : Finnish smoking study !

Similar: vitamin C, vitaminE

Problem:

All due to the 2 large smoking studies:
If removed, no negative effect.

V – Food Suppelements – Helpful or Harmful

Any guidance – EFSA Health-Claims !

Which health claims have been accepted - examples

“ Water-soluble tomato concentrate and platelet aggregation ”

“ Calcium and Vitamin D and Bone Density for Women ”

“ Vitamin C increases non-her

“ EPA and DHA – positive relatio

As claims are often barely understandable, an additional explanation may be added.

Which health claims have been rejected - examples

Not a single one on probiotics (LC1…- only B12 related)

Taurin and performance (red bull…)

Black Tea and mental

Glucosamin and reduction of carti

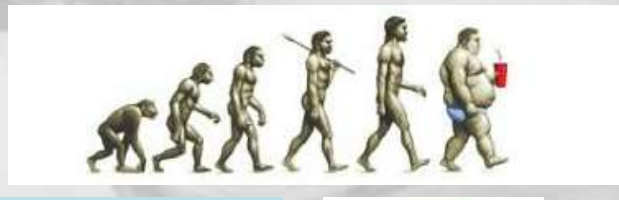
Soy and reduced risk

-Lack of evidence/negative evidence
-Wrong or absurd concentrations
-No food but medication
-Unmeasurable outcome (gut health ?)

https://www.efsa.europa.eu/sites/default/files/event/190118-ax.pdf

VI - Overall Summary &

Increase in chronic (civilization) diseases: CVD, T2D, often related to obesity ↔ diet, lifestyle



Macronutrients: too many simple sugars + low dietary fiber
Micronutrients: too much salt !

Processed foods: low satiety, low nutrient density

Avoid: too much, too late: Chrononutrition !

Enough: water, fresh food items, healthy fats, well distributed over the day, snacks can be ok,

Individual doses of vitamins, phytochemicals (supplements): no proven health benefit

No replacement for a healthy, balanced diet

Food with most severe side effect ?

Merci!!

III –Ernährungsformen/Diäten

Und Bio-Produkte/"organic foods" ?

Wie viele von Ihnen konsumieren Bio-Produkte ??

\+
- Weniger Pestizid-Zufuhr
- Einige Studien: mehr Mineralstoffe
- Einige Studien: Mehr sekundäre Pflanzenstoffe, ungesattigte Fettsäuren

\-
- Risiko: mehr Mykotoxine: gering (Kontrollen)
- Risiko: Umweltkontaminanten aus Boden (Hennen, Luft)
- Teils falsche Etikettierung
- Höherer Preis

Systamatic Review:


nutrients

MDPI

Review

A Systematic Review of Organic Versus Conventional Food Consumption: Is There a Measurable Benefit on Human Health?

Vanessa Vigar [1,2,3,4], Stephen Myers [1,3,4,*], Christopher Oliver [1,3,4,5], Jacinta Arellano [3], Shelley Robinson [1,3,4] and Carlo Leifert [4]

"The current evidence base does not allow a definitive statement on the health benefits of organic dietary intake. However, a growing number of important findings are being reported from observational research linking demonstrable health benefits with organic food consumption.."

Kein direkt nachweisbarer Effekt !!

II – Importance of Healthy Diet

Some consequences

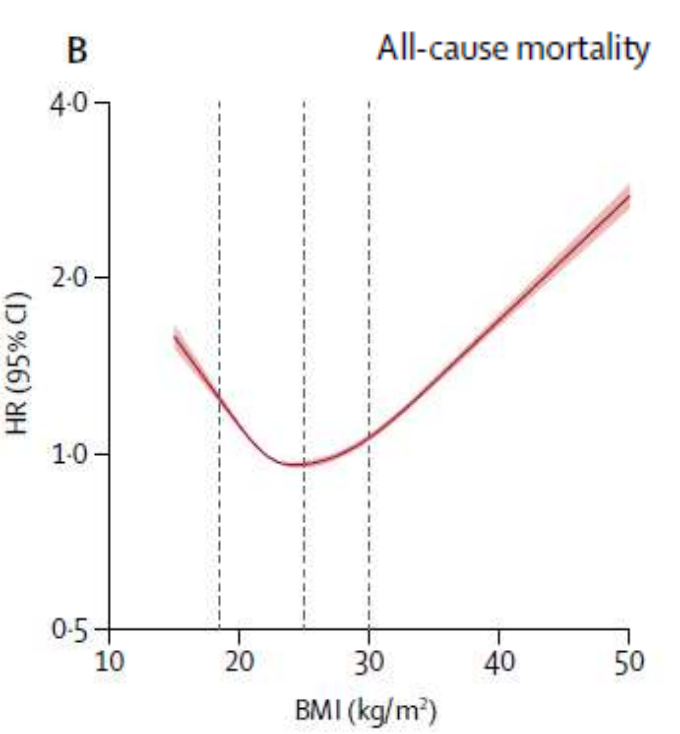
Association of BMI with overall and cause-specific mortality: a population-based cohort study of 3-6 million adults in the UK

oa

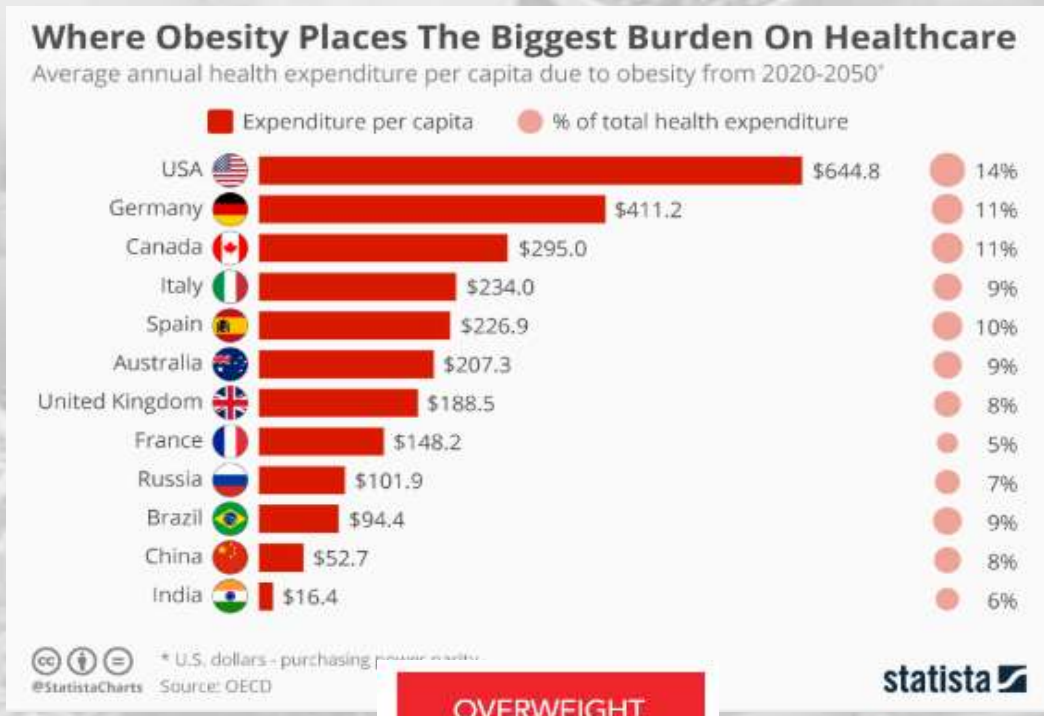
Summary

Background BMI is known to be strongly associated with all-cause mortality, but few studies have been large enough to reliably examine associations between BMI and a comprehensive range of cause-specific mortality outcomes.

Shortened life-expectancy



USA: excess weight $1.72 trillion (2016): 9.3% nationwide GDP *(Milken Institute Study)*.
OECD: 4.4 %



Co-morbidities:

- Type 2 diabetes
- Metabolic syndrome
- Cardiovascular disease
- Cancer…

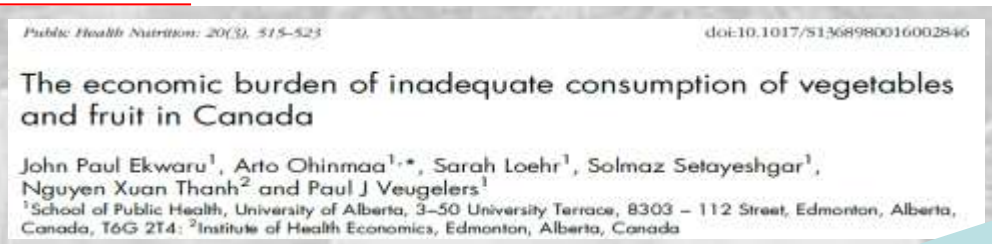
At present: 1.4%

A word on myself…

+EFSA
+Nutri-Score
+University LU
+Editor IJVNR

II – Importance of Healthy Diet

Some consequences



Public Health Nutrition: 20(5), 515–523 doi:10.1017/S1368980016002846

The economic burden of inadequate consumption of vegetables and fruit in Canada

John Paul Ekwaru[1], Arto Ohinmaa[1,*], Sarah Loehr[1], Solmaz Setayeshgar[1], Nguyen Xuan Thanh[2] and Paul J Veugelers[1]
[1]School of Public Health, University of Alberta, 3–50 University Terrace, 8303 – 112 Street, Edmonton, Alberta, Canada, T6G 2T4; [2]Institute of Health Economics, Edmonton, Alberta, Canada

PLOS ONE

RESEARCH

meeting food

Canada: The cost of

ing

essica R. L. Lieffers[¤], John Paul Ekwaru, Arto Ohinmaa, Paul J. Veugelers*

Population Health Intervention Research Unit, School of Public Health, University of Alberta, Edmonton, Alberta, Canada

¤ Current address: College of Pharmacy and Nutrition, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
* paul.veugelers@ualberta.ca

But what about physical activity, non-smoking etc….?

Costs of low fruit/vegetable consumption in Canada: 3.3 billion Can $/y
Luxembourg: 60 million Euro (*Ekwaru et al. Publ Health Nutr 2016*)

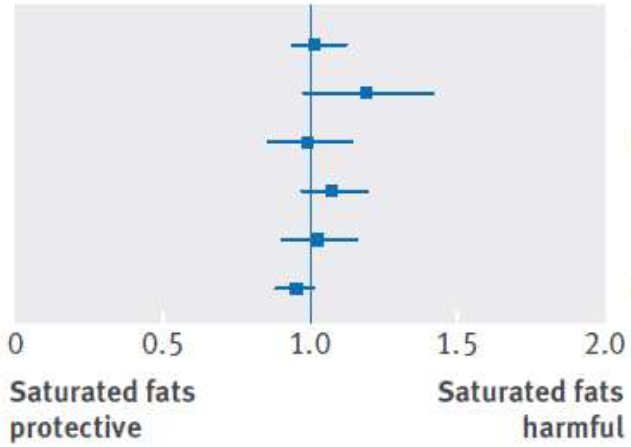
Costs of not following recommendations for 8 major food groups in Canada: 13.8 billion Can $/y
Luxembourg: 250 million Euro (Lieffers, PlosOne, *2018*)

III – A Deeper Look into Diet & Disease

Saturated Fats & Health

Former meta-analysis: 1–32 y prospective studies, follow-up:

Outcome	No of studies /comparisons	No of events /participants	Relative risk (95% CI)	P	P_{het}	I^2 (%)
All cause mortality	5/7	14 090/99 906	0.99 (0.91 to 1.09)	0.91	0.17	33
CHD mortality	11/15	2970/101 712	1.15 (0.97 to 1.36)	0.10	<0.001	70
CVD mortality	3/5	3792/90 501	0.97 (0.84 to 1.12)	0.69	0.29	19
CHD total	12/17	6383/267 416	1.06 (0.95 to 1.17)	0.29	0.02	47
Ischemic stroke	12/15	6226/339 090	1.02 (0.90 to 1.15)	0.79	0.002	59
Type 2 diabetes	8/8	8739/237 454	0.95 (0.88 to 1.03)	0.20	0.61	0



De Souza, BMJ 2015

No sign. effects !!

Similar to other studies

III – A Deeper Look into Diet & Disease

Sugar & Diabetes

Glycemic Index, Glycemic Load ↔ Diabetes:

A measure of blood sugar increase after a meal

Meta-Study, observational, 37 prospective cohort studies, n= 40129

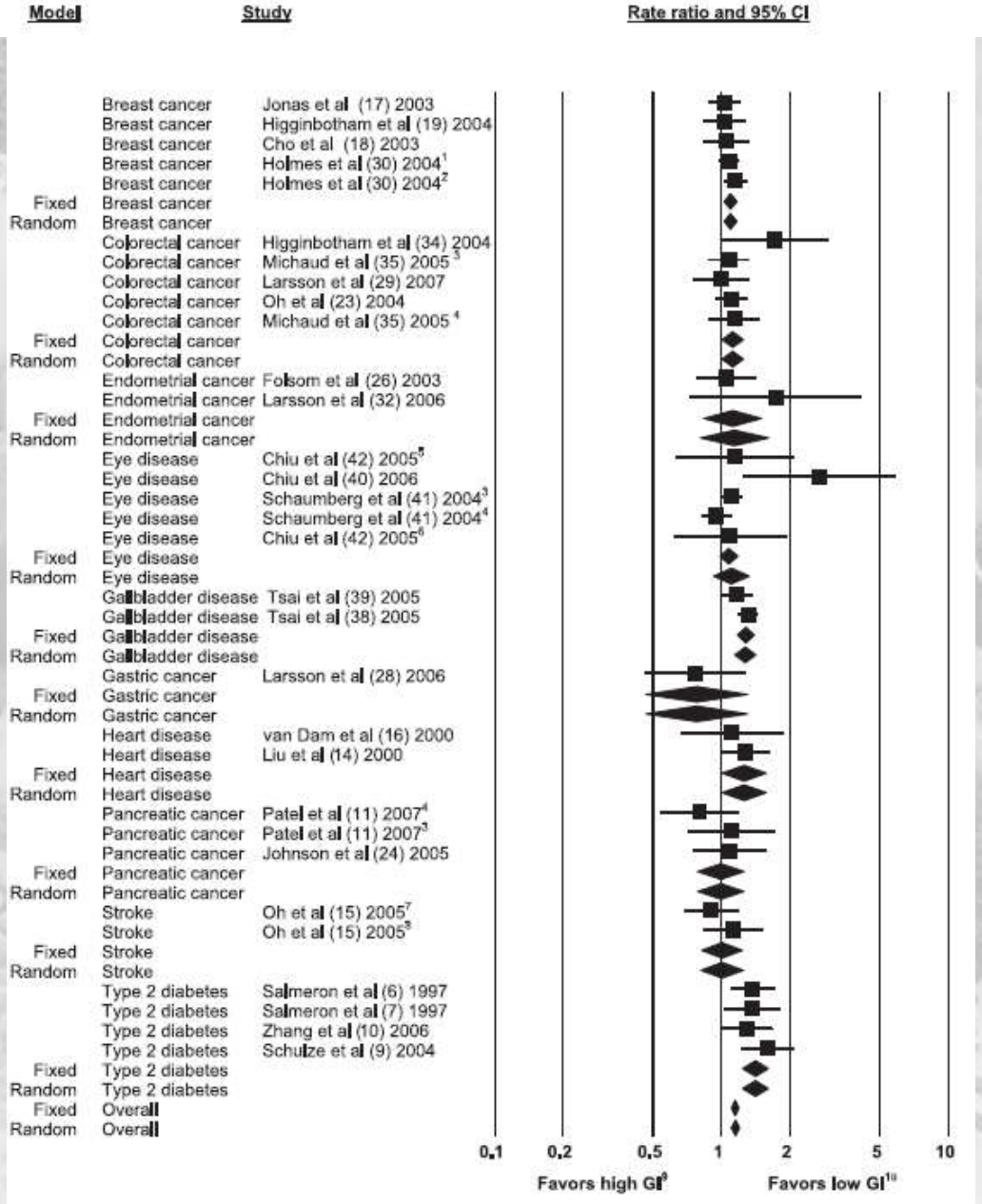
GI RR: 1.40 (1.23, 1.59)
GL RR: 1.27 (1.12, 1.45)

More diabetes due to consumption of sugar-containing products ?

Or do people consuming more sugar have unhealthy diets ?

Barclay et al. 2008, AJCN, 87, 627-33

Even for cancer: Long, EJCN, 2021



III – A Deeper Look into Diet & Disease

Sals – CVD – prospective studies

Study	Sample size	Events	Follow-up (years)	Relative risk (95% CI)	Sodium difference (mmol/day)	Relative risk (95% CI)
Alderman 1995[6]						
Men	1900	96	3.5		150	0.37 (0.18 to 0.75)
Women	1037	21			120	2.29 (0.44 to 11.9)
Tunstall-Pedoe 1997[12]						
Men	5754	404	7.6		72	1.05 (0.97 to 1.14)
Women	5875	177			55	1.16 (1.01 to 1.33)
He 1999[9]						
Men						(1.27 to 2.19)
Wom						1.12 to 2.10)
Tuomilehto 2001[						
Men	1173	72	13		100	1.38 (1.05 to 1.81)
Women	1263	15			100	1.43 (0.74 to 2.79)
Cohen 2006[15]	7154	541	13.7		92	0.88 (0.74 to 1.05)
Geleijnse 2007[16]	1448	217	5		69	0.77 (0.60 to 0.99)
Cook (I) 2007[17]	542	49	15		40	2.53 (1.30 to 4.94)
Cook (II) 2007[17]	1873	151	10		44	1.12 (0.78 to 1.59)
Umesawa 2008[19]	58 730	2087	12.7		85	1.42 (1.19 to 1.69)
Cohen 2008[20]	8699	436	8.7		44	0.88 (0.77 to 1.01)
Combined effect: P=0.07	104 933	5161				1.14 (0.99 to 1.31)
Combined effect (without Alderman): P=0.02						1.17 (1.02 to 1.32)

Heterogeneity: P<0.01, Egger's test: P=0.39

0.1 1 10

Favourable Adverse

Higher salt intake

(Δ of 5 g/d NaCl) : associated with 17% CVD increase

Fig 2| Risk of incident cardiovascular disease associated with higher compared with lower salt intake in 14 population cohorts from nine published prospective studies including 104 132 participants and 5161 events. Pooled analysis after the exclusion of the study by Alderman et al[6] (men and women), including 102 086 participants and 5044 events

Strazullo, BMJ, 2009

IV – Practical tips & tricks regarding Diet

Main meals – skipping breakfast ?? → Chrononutrition

1. The time that you eat (early, late)

Morning better than eating too much too late!

2. The time period that you eat (or rather not)

«Intermittent fasting»

«Time restricted eating»

«Eating window»

Some breaks without food may be good, but not if you eat too late !

3. The frequency of your meals (main meals vs. snacking)

Less clear
→ more important what vs. when you eat !

II – Importance of Healthy Diet

Contribution of Diet to Health (Lifespan) ? – how to measure ?

Ca. 25% of the variation in lifespan (identical) twins: attributable to genetic factors. 3/4 due to non-shared environmental factors !

And the remaining 75% ?

Moderate physical activity: **+ 1.4 y** to life-expectancy
High levels of physical activity: + **3.6 y** to life-expectancy

Even if you start at age 50…

Archives of Internal Medicine 2005;165:2355-2360

Diet: Studies suggest that:

Through healthy diet max. of **3-10 y** additional lifetime may be gained

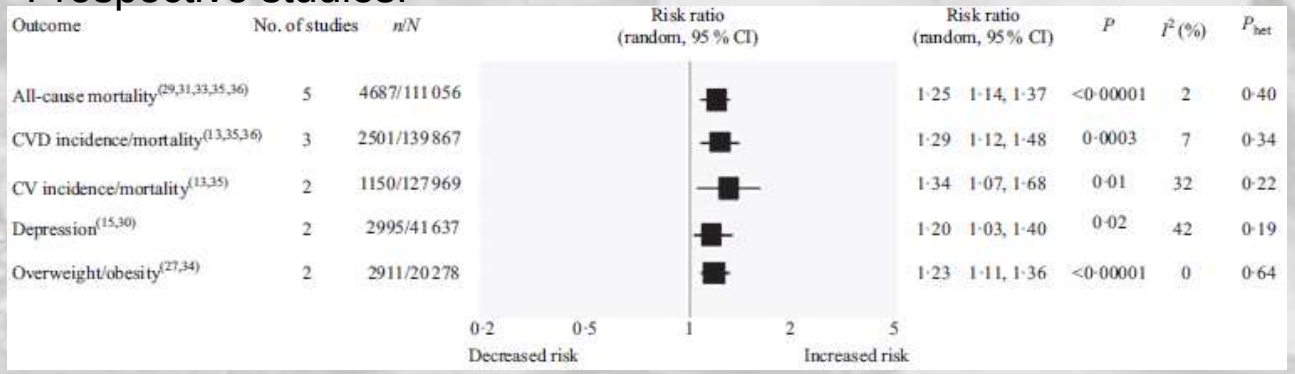
Of the lifestyle factors, the following are important:
Non-smoking>nutrition=exercise
Or: ca. 25% of lifespan variation explained by nutrition ?

III – A Deeper Look into Diet & Disease

And (ultra-)processed foods ?

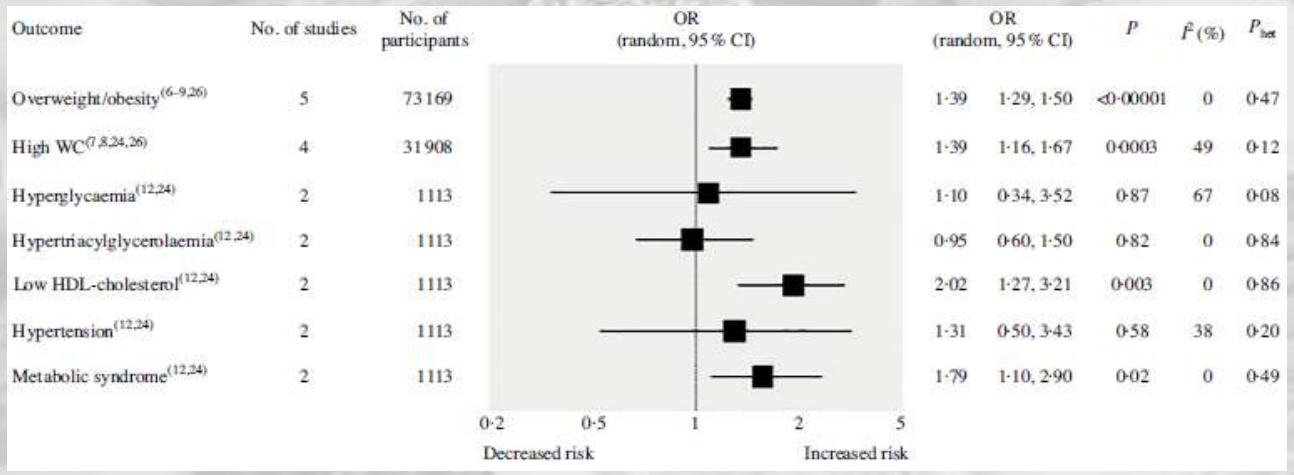
MA: 23 studies (10 cross-sectional, 13 prospective cohort-studies, 3.5-15 y follow-up, Pagali et al. BJN, 2021)

Prospective studies:



Outcome	No. of studies	n/N	Risk ratio (random, 95 % CI)		P	I^2 (%)	P_{het}
All-cause mortality[29,31,33,35,36]	5	4687/111 056	1·25	1·14, 1·37	<0·00001	2	0·40
CVD incidence/mortality[13,35,36]	3	2501/139 867	1·29	1·12, 1·48	0·0003	7	0·34
CV incidence/mortality[13,35]	2	1150/127 969	1·34	1·07, 1·68	0·01	32	0·22
Depression[15,30]	2	2995/41 637	1·20	1·03, 1·40	0·02	42	0·19
Overweight/obesity[27,34]	2	2911/20 278	1·23	1·11, 1·36	<0·00001	0	0·64

Cross-secional studies:



Outcome	No. of studies	No. of participants	OR (random, 95 % CI)		P	I^2 (%)	P_{het}
Overweight/obesity[6–9,26]	5	73 169	1·39	1·29, 1·50	<0·00001	0	0·47
High WC[7,8,24,26]	4	31 908	1·39	1·16, 1·67	0·0003	49	0·12
Hyperglycaemia[12,24]	2	1113	1·10	0·34, 3·52	0·87	67	0·08
Hypertriacylglycerolaemia[12,24]	2	1113	0·95	0·60, 1·50	0·82	0	0·84
Low HDL-cholesterol[12,24]	2	1113	2·02	1·27, 3·21	0·003	0	0·86
Hypertension[12,24]	2	1113	1·31	0·50, 3·43	0·58	38	0·20
Metabolic syndrome[12,24]	2	1113	1·79	1·10, 2·90	0·02	0	0·49

Higher total mortality & CVD

Salt ?
Calories ?
Dieter fiber ?
Structure, satiety ?
Vitamins, minerals?

III – A Deeper Look into Diet & Disease

Also carbohydrates: dietary fiber (pectins, inulin, res. starch…)

- Anti-inflammatory (SCFA↑)
- Cholesterol-lowering
- Slow increase blood-sugar
- Microbiome

Umbrella-review of MA (Veronese, AJCN, 2018):
18 MA, 298 prospective observational studies:

Outcome (reference)	Population	Study design included in MA	Level of comparison	Studies, *n*	Participants, *n*	Cases, *n*	Type of effect size metric	Effect size (95% CI)
Prospective studies								
CVD mortality (40)	General	Prospective	Highest vs. lowest category	10	806,561	52,582	RR	0.818 (0.778, 0.861)
All-cause mortality (38)	Mixed	Prospective	Highest vs. lowest category	19	982,393	67,019	RR	0.835 (0.797, 0.875)
CVD (41)	Mixed	Prospective	Continuous (increase of 7 g/d)	22	2,165,830	25,461	RR	0.913 (0.893, 0.932)
Type 2 diabetes (35)	Not reported	Prospective	Highest vs. lowest category	12	359,167	14,065	RR	0.812 (0.730, 0.903)
Stroke (33)	Not reported	Prospective	Highest vs. lowest category	14	325,707	9676	RR	0.828 (0.740, 0.926)
Coronary artery disease (31)	Not reported	Prospective	Highest vs. lowest category	25	461,187	8591	RR	0.932 (0.906, 0.958)
Cancer mortality (45)	General	Prospective	Highest vs. lowest	3	920,055	22,954	RR	0.867 (0.770, 0.981)

Similar to other studies: strong pos. effects of dietery fiber !
(despite some diverging effects of various dietary fibers)

V – Food Suppelements – Helpful or Harmful

Example - Polyphenols, Antioxidants

Polyphenols: strong antioxidants in vitro. Should act as antioxidants in vivo.

Or not …???

1. Before bioactivity, there must be bioavailability…

Many polyphenols are:
- poorly absorbed
- heavily metabolise
- rapidly excreted

In short: **low bioavailability !!**

2. The entire picture is imporants. There are other "players" determining antioxidant capacity in the body:

Enzymes:	SOD, GPX, catalase…
Endogenous antioxidants:	Glutathion, uric acid, albumin…
Other exogenous antioxidants:	Vit. C, Vit. E, Carotenoids…

Some are even health deterimental: carotenoids, smokers !

V – Food Suppelements – Helpful or Harmful

Meta-Analysis: Individual antioxidants & total mortality

Vit. C: Clinical intervention trials – pure vitamin C (n=170,000)

Vitamin C given singly	48, 62, 80	3	826	0.88 (0.32-2.42)	0
Vitamin C given in combination with other antioxidant supplements	36, 38, 39, 41-45, 51, 52, 54, 57, 59, 62-65, 68, 71-73, 75, 76, 79-81, 84, 86, 91, 92, 98, 100, 101	33	69 997	0.97 (0.88-1.07)	22.1
Vitamin C given singly or in combination with other antioxidant supplements	36, 38, 39, 41-45, 48, 51, 52, 54, 57, 59, 62-65, 68, 71-73, 75, 76, 79-81, 84, 86, 91, 92, 98, 100, 101	34	70 456	0.97 (0.88-1.06)	19.4
Vitamin C given singly or in combination with other antioxidant supplements after exclusion of high-bias risk and selenium trials	44, 45, 62-64, 71, 73, 75, 76, 80, 92, 98, 100	13	29 275	1.06 (0.94-1.20)	10.3

Bjelakovic, 2007, JAMA 297, 842-57
Schwingshackl. AdNutr, 2018, 27ff.

What do you see ?

No effect of vitamin C

Similar effects of many other individual compounds:

- No or very limited effects,

- Or only in certain risk-groups or those with a poor nutritional status.