



Dietary patterns, and health outcomes

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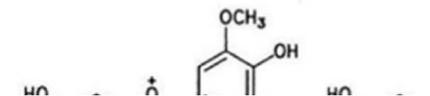
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How to live long and well?

- Diet patterns and impact on
 - Cardiovascular health
 - Cancer
 - Longevity
- Diet patterns and impact on
 - Weight and diabetes
- Putting it all together



Cranberries Blackberries Blueberries Bla





For numbered affiliations see end of article.

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Whole grain consumption and risk of cardiovascular disease, cancer, and all cause and cause specific mortality: systematic review and dose-response meta-analysis of prospective studies

Dagfinn Aune,^{1,2} NaNa Keum,³ Edward Giovannucci,^{3,4,5} Lars T Fadnes,⁶ Paolo Boffetta,⁷ Darren C Greenwood,⁸ Serena Tonstad,⁹ Lars J Vatten,¹ Elio Riboli,² Teresa Norat¹⁰

ABSTRACT

OBJECTIVE To quantify the dose-response relation between consumption of whole grain and specific types of grains and the risk of cardiovascular disease, total cancer, and all cause and cause specific mortality.

DATA SOURCES

PubMed and Embase searched up to 3 April 2016.

STUDY SELECTION

Prospective studies reporting adjusted relative risk estimates for the association between intake of whole grains or specific types of grains and cardiovascular disease, total cancer, all cause or cause specific mortality.

DATA SYNTHESIS

Summary relative risks and 95% confidence intervals calculated with a random effects model.

RESULTS

45 studies (64 publications) were included. The summary relative risks per 90 g/day increase in whole grain intake (90 g is equivalent to three servings—for example, two slices of bread and one bowl of cereal or one and a half pieces of pita bread made from whole grains) was 0.81 (95% confidence interval 0.75 to 0.87; $P=9%$, $n=7$ studies) for coronary heart disease, 0.88 (0.75 to 1.03; $P=5.6%$, $n=6$) for stroke, and 0.78 (0.73 to 0.85; $P=0.0%$, $n=10$) for cardiovascular disease, with similar results when studies were stratified by whether the outcome was incidence or mortality. The relative risks for mortality were 0.85 (0.80 to 0.91; $P=37%$, $n=6$)

WHAT IS ALREADY KNOWN ON THIS TOPIC

A high intake of whole grains has been associated with a lower risk of type 2 diabetes, cardiovascular disease, and weight gain. Recommendations for whole grain intake have often been unclear or inconsistent with regard to the amount and types of whole grain foods that should be consumed to reduce chronic disease and risk of mortality.

WHAT THIS STUDY ADDS

A high intake of whole grains was associated with reduced risk of coronary heart disease, cardiovascular disease, total cancer, and all cause mortality, as well as mortality from respiratory disease, infectious disease, diabetes, and all non-cardiovascular, non-cancer causes.

Reductions in risk were observed up to an intake of 210–225 g/day (seven to eight and a half servings/day) and for whole grain bread, whole grain breakfast cereals, and added bran.

The results strongly support dietary recommendations to increase intake of whole grain foods in the general population to reduce risk of chronic diseases and premature mortality.

thebmj | *BMJ* 2016;353:e2716 | doi:10.1136/bmj.e2716

- Assessec
- > 2 million
- Most stuc
- activity, E
- beverages, red meat etc)

Methods



International Journal of Epidemiology, 2017, 1–28

doi: 10.1093/ije/dyw019

Original article



Original article

Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality—a systematic review and dose-response meta-analysis of prospective studies

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Accepted 13 October 2016

Abstract

Background: Questions remain about the strength and shape of the dose-response relationship between fruit and vegetable intake and risk of cardiovascular disease, cancer and mortality, and the effects of specific types of fruit and vegetables. We conducted a systematic review and meta-analysis to clarify these associations.

Methods: PubMed and Embase were searched up to 29 September 2016. Prospective studies of fruit and vegetable intake and cardiovascular disease, total cancer and all-cause mortality were included. Summary relative risks (RRs) were calculated using a random effects model, and the mortality burden globally was estimated; 95 studies (142 publications) were included.

Results: For fruits and vegetables combined, the summary RR per 200 g/day was 0.92 [95% confidence interval (CI): 0.90–0.94, $I^2=0%$, $n=15$] for coronary heart disease, 0.84 (95% CI: 0.76–0.92, $I^2=73%$, $n=10$) for stroke, 0.92 (95% CI: 0.90–0.95, $I^2=31%$, $n=13$) for cardiovascular disease, 0.97 (95% CI: 0.95–0.99, $I^2=49%$, $n=12$) for total cancer and 0.90 (95% CI: 0.87–0.93, $I^2=83%$, $n=15$) for all-cause mortality. Similar associations were observed for fruits and vegetables separately. Reductions in risk were observed up to 800 g/day for all outcomes except cancer (600 g/day). Inverse associations were observed between the intake

Aune et al. *BMC Medicine* (2016) 14:207

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BMC Medicine

RESEARCH ARTICLE

Open Access



Nut consumption and risk of cardiovascular disease, total cancer, all-cause and cause-specific mortality: a systematic review and dose-response meta-analysis of prospective studies

Dagfinn Aune^{1,2*}, NaNa Keum³, Edward Giovannucci^{3,4,5}, Lars T. Fadnes⁶, Paolo Boffetta⁷, Darren C. Greenwood⁸, Serena Tonstad⁹, Lars J. Vatten¹, Elio Riboli² and Teresa Norat¹⁰

Abstract

Background: Although nut consumption has been associated with a reduced risk of cardiovascular disease and all-cause mortality, data on less common causes of death has not been systematically assessed. Previous reviews missed several studies and additional studies have since been published. We therefore conducted a systematic review and meta-analysis of nut consumption and risk of cardiovascular disease, total cancer, and all-cause and cause-specific mortality.

Methods: PubMed and Embase were searched for prospective studies of nut consumption and risk of cardiovascular disease, total cancer, and all-cause and cause-specific mortality in adult populations published up to July 19, 2016. Summary relative risks (RRs) and 95% confidence intervals (CIs) were calculated using random-effects models. The burden of mortality attributable to low nut consumption was calculated for selected regions.

Results: Twenty studies (29 publications) were included in the meta-analysis. The summary RRs per 28 grams/day increase in nut intake was for coronary heart disease, 0.71 (95% CI: 0.63–0.80, $I^2=47%$, $n=11$), stroke, 0.93 (95% CI: 0.83–1.05, $I^2=14%$, $n=11$), cardiovascular disease, 0.79 (95% CI: 0.70–0.88, $I^2=60%$, $n=12$), total cancer, 0.85 (95% CI: 0.76–0.94, $I^2=42%$, $n=8$), all-cause mortality, 0.78 (95% CI: 0.72–0.84, $I^2=66%$, $n=15$), and for mortality from respiratory disease, 0.48 (95% CI: 0.26–0.89, $I^2=61%$, $n=3$), diabetes, 0.61 (95% CI: 0.43–0.88, $I^2=0%$, $n=4$), neurodegenerative disease, 0.65 (95% CI: 0.40–1.08, $I^2=5.9%$, $n=3$), infectious disease, 0.25 (95% CI: 0.07–0.85, $I^2=54%$, $n=2$), and kidney disease, 0.27 (95% CI: 0.04–1.91, $I^2=61%$, $n=2$). The results were similar for tree nuts and peanuts. If the associations are causal, an estimated 4.4 million premature deaths in the America, Europe, Southeast Asia, and Western Pacific would be attributable to a nut intake below 20 grams per day in 2013.

Conclusions: Higher nut intake is associated with reduced risk of cardiovascular disease, total cancer and all-cause mortality, and mortality from respiratory disease, diabetes, and infections.

Keywords: Nuts, Peanuts, Cardiovascular disease, Cancer, All-cause mortality, Cause-specific mortality, Meta-analysis

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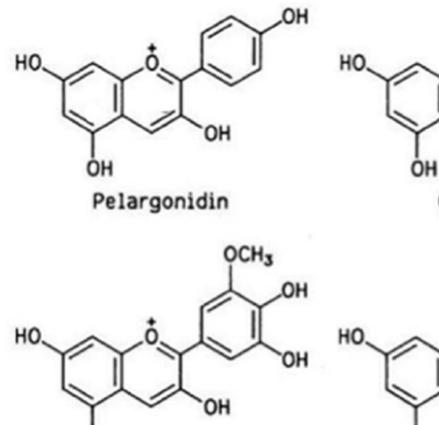
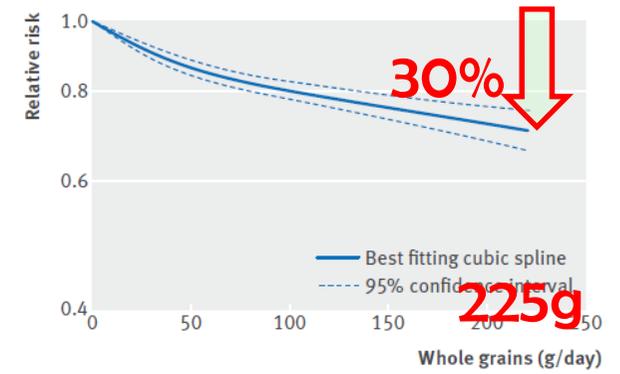
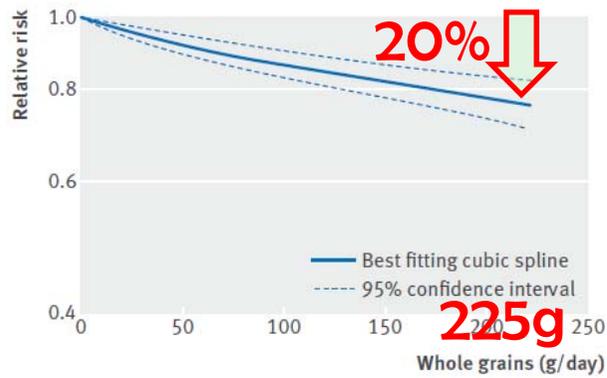
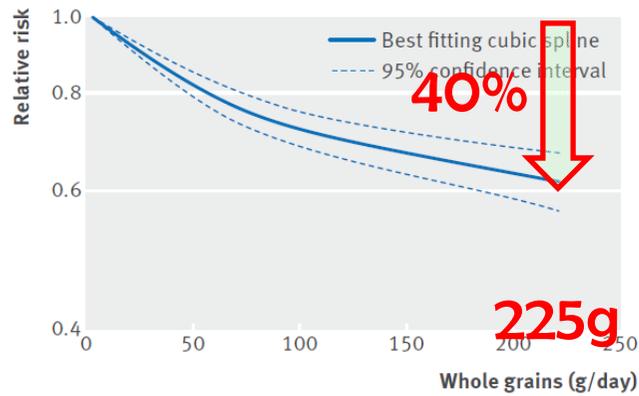
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Aune D, Keum N, Giovannucci E, Fadnes LT et al. Whole grain consumption and risk of cardiovascular disease, cancer, and all cause and cause specific mortality: systematic review and dose-response meta-analysis of prospective studies. *BMJ* 2016; **353**: i2716.



- How much?

- 225 g (wet weight) = 70 g dry weight

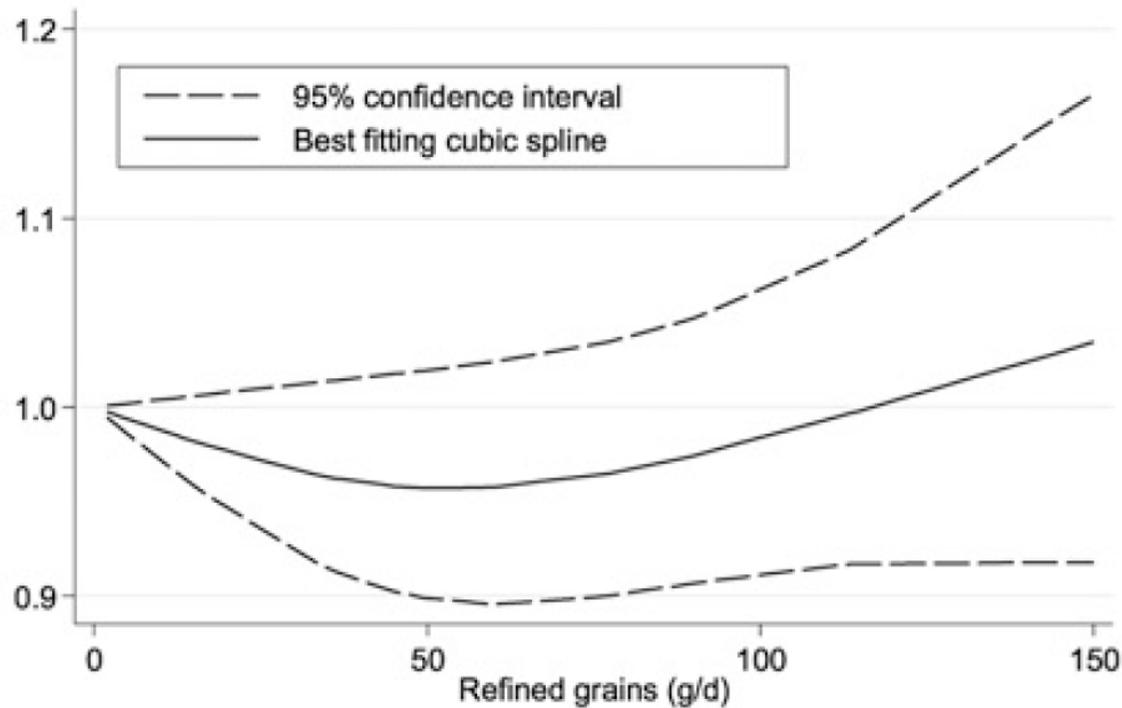
- = 2 dl oatmeal or

- = 1.5 dl whole grain flour (e.g. rye or wheat) or

- = 1 dl barley grains



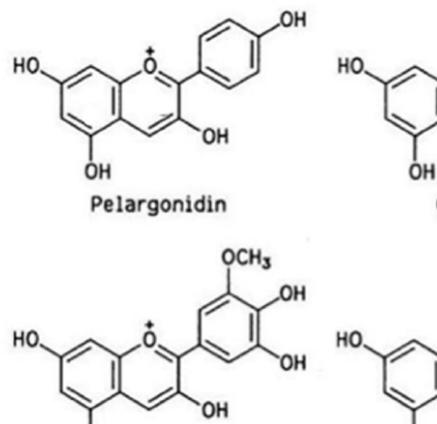
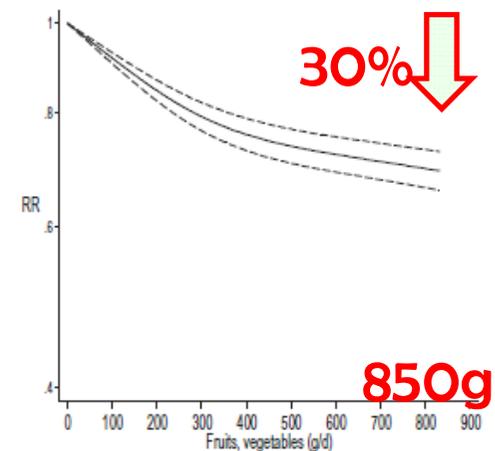
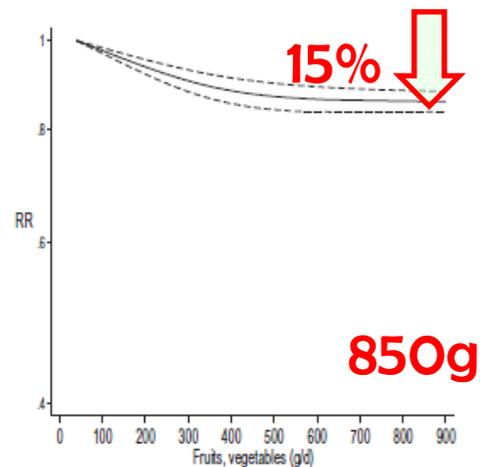
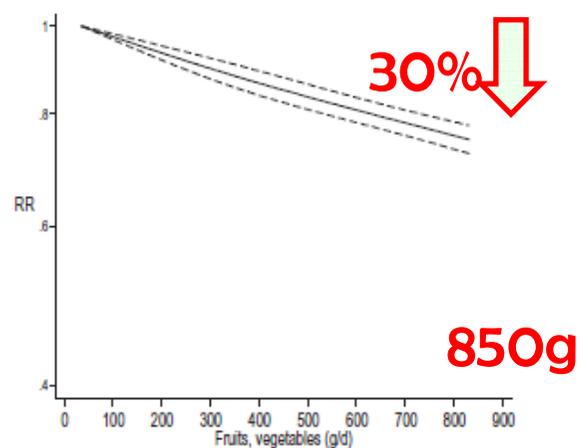
What about refined grains



0%



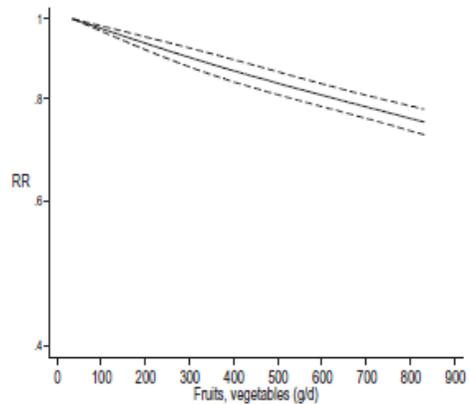
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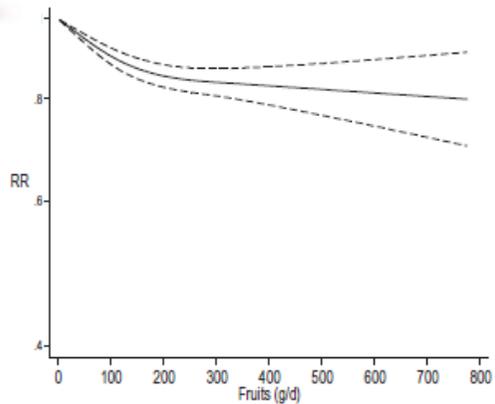
Aune D, Giovannucci E, Boffetta P, Fadnes LT et al. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality-a systematic review and dose-response meta-analysis of prospective studies. *Int J Epidemiol* 2017; **46**(3): 1029-56.



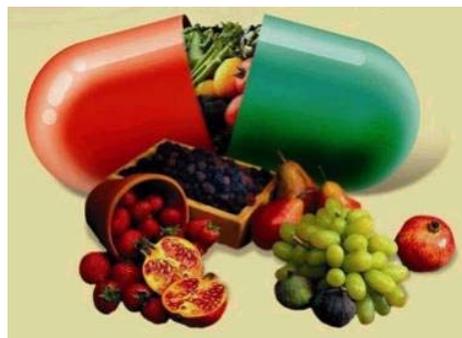
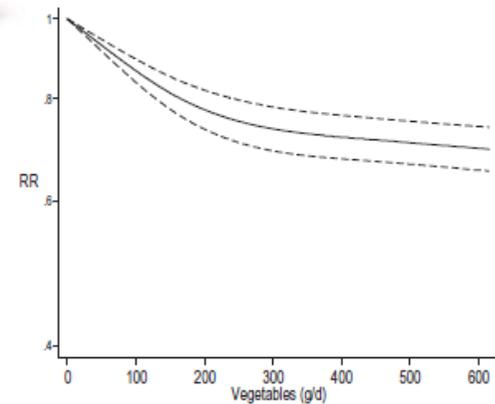
Fruits and vegetables and coronary heart disease, nonlinear dose-response

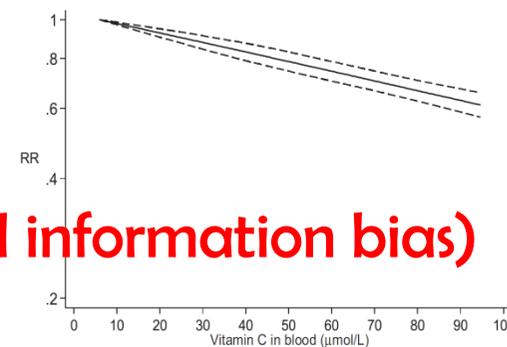
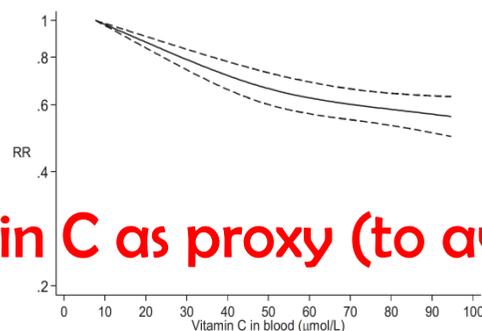
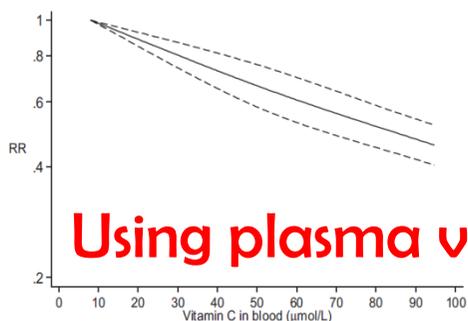


Fruits and coronary heart disease, nonlinear dose-response

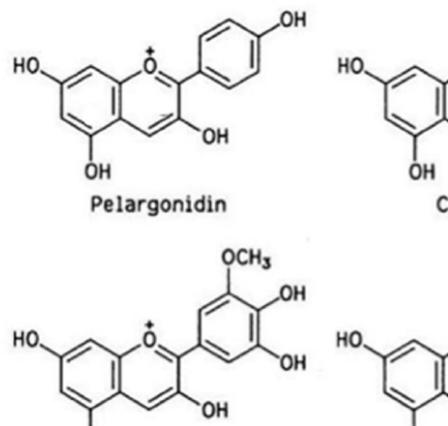


Vegetables and coronary heart disease, nonlinear dose-response





Using plasma vitamin C as proxy (to avoid information bias)



Aune D, Keum N, Giovannucci E, Fadnes LT et al. Dietary intake and blood concentrations of antioxidants and the risk of cardiovascular disease, total cancer, and all-cause mortality: a systematic review and dose-response meta-analysis of prospective studies. *Am J Clin Nutr* 2018; **108**(5): 1069-91.

Around 5.6-7.8 million premature deaths (worldwide 2013) may be prevented with increased fruit and vegetable intake to 500-800 g/day

Most groups of fruits and vegetables contributed strongly positive (including apples/pears, citrus fruits, green leafy vegetables/salads and cruciferous, green-yellow vegetables)



Small fruits

1 serving is

2 mandarin oranges, 2 kiwis,
2 plums or similar size fruit



Berries

1 serving is

6 strawberries, 10 grapes/cherries or
16 raspberries



Juices and smoothies

1 serving is

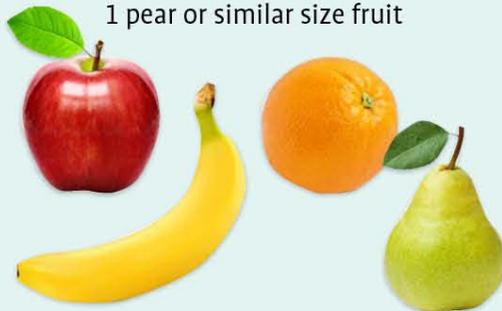
1 glass (150ml) of unsweetened 100% fruit
or vegetable juice can count as a portion.
But **only one glass** counts, further glasses of
juice don't count toward your total 5-A-DAY



Medium fruits

1 serving is

1 apple, 1 banana, 1 orange,
1 pear or similar size fruit



Dried fruit

1 serving is

1 heaped dessertspoon of raisins or
sultanas, 2 figs, 3 prunes or
1 handful of dried banana chips



Cooked vegetables

1 serving is

½ cup of cooked vegetables,
fresh, frozen or tinned



Large fruits

1 serving is

½ grapefruit, 1 slice of melon,
1 slice of pineapple, 2 slices of mango



Soup

1 serving is

1 bowl homemade vegetable soup

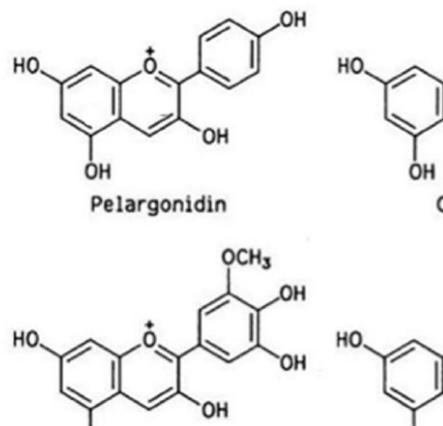
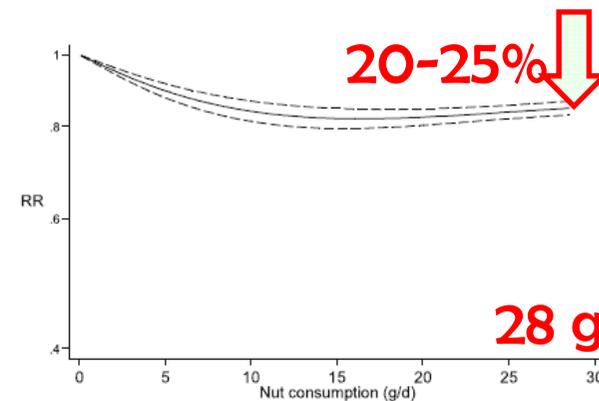
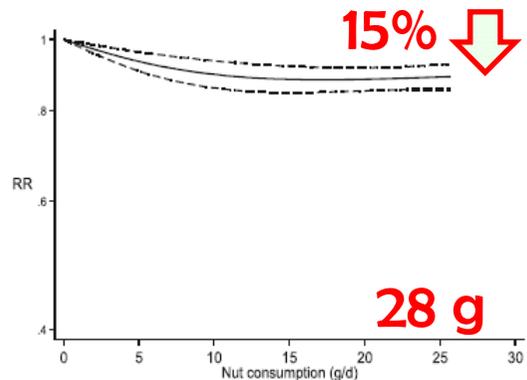
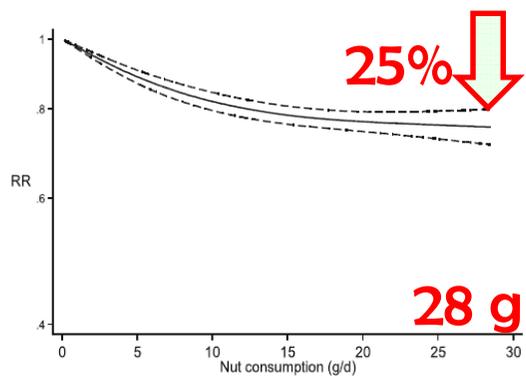


Salad vegetables

1 serving is

1 bowl of mixed salad, 1 medium
tomato or 5cm piece of cucumber



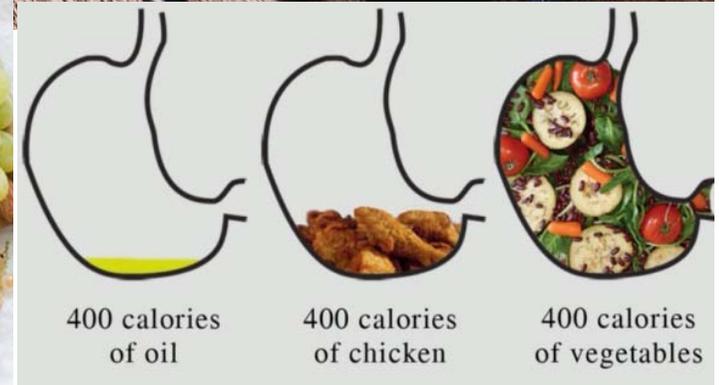
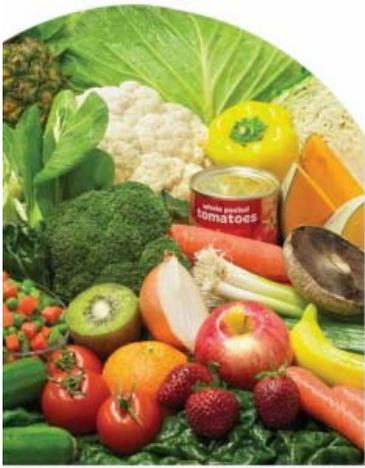


Aune D, Keum N, Giovannucci E, Fadnes LT et al. Nut consumption and risk of cardiovascular disease, total cancer, all-cause and cause-specific mortality: a systematic review and dose-response meta-analysis of prospective studies. *BMC Med* 2016; **14**(1): 207.

30 grams

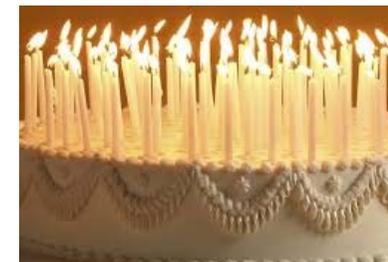
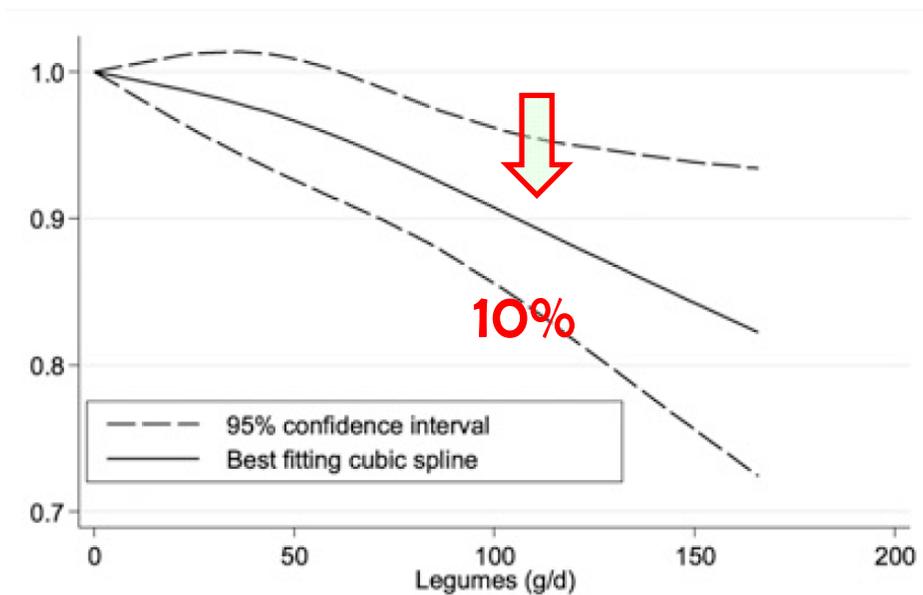


Replacing other foods and energy density

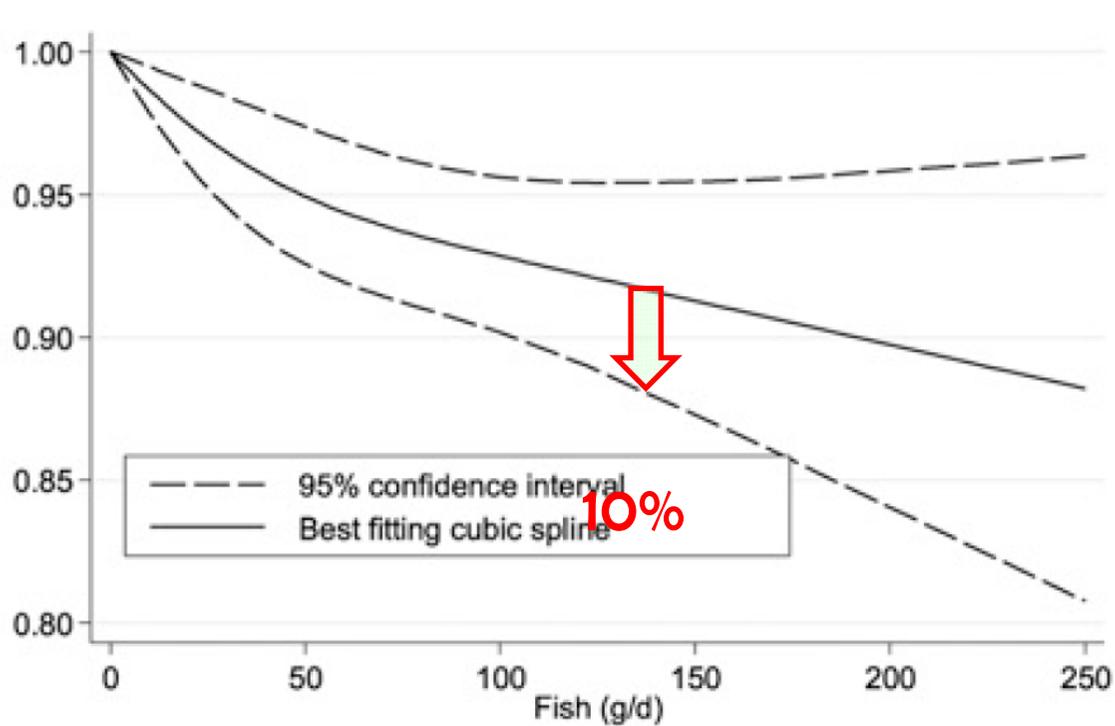


What about legumes?

> 100 g



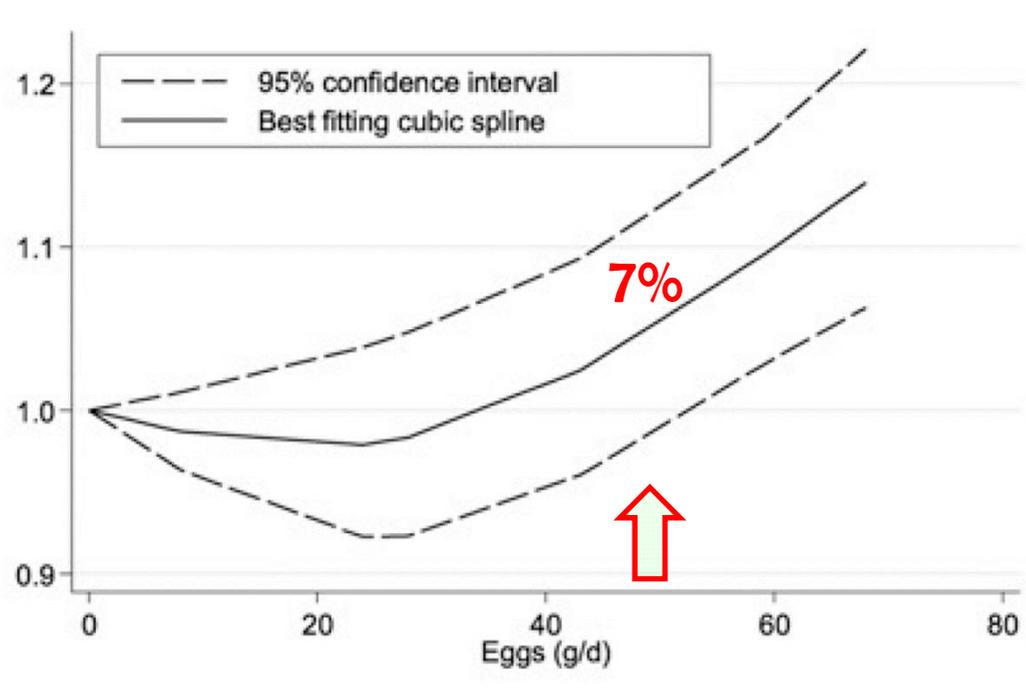
What about fish?



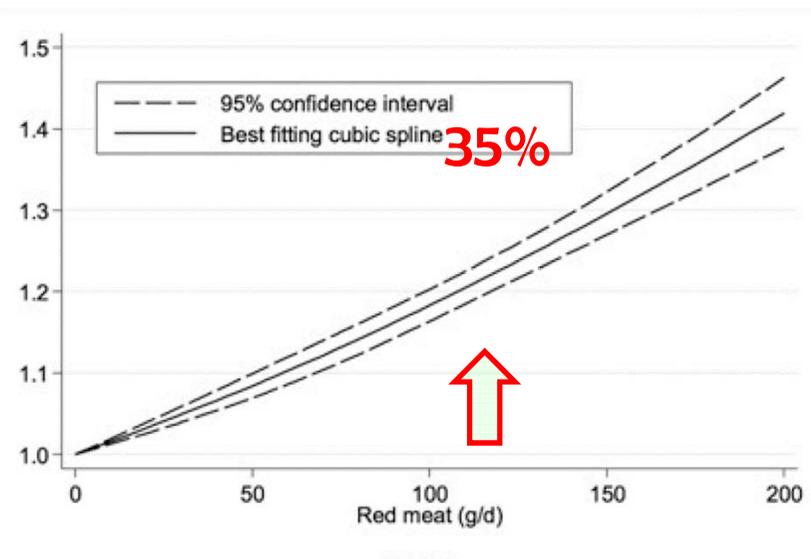
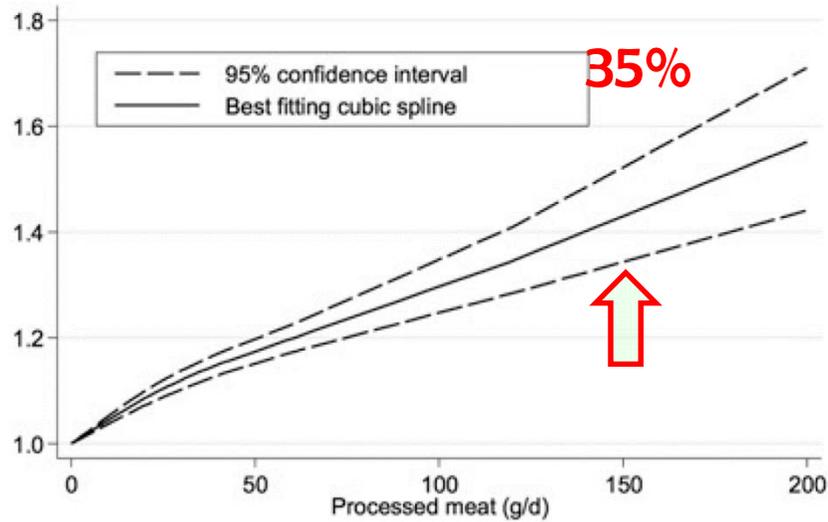
200 g



What about eggs?



What about meat?



0-28 g

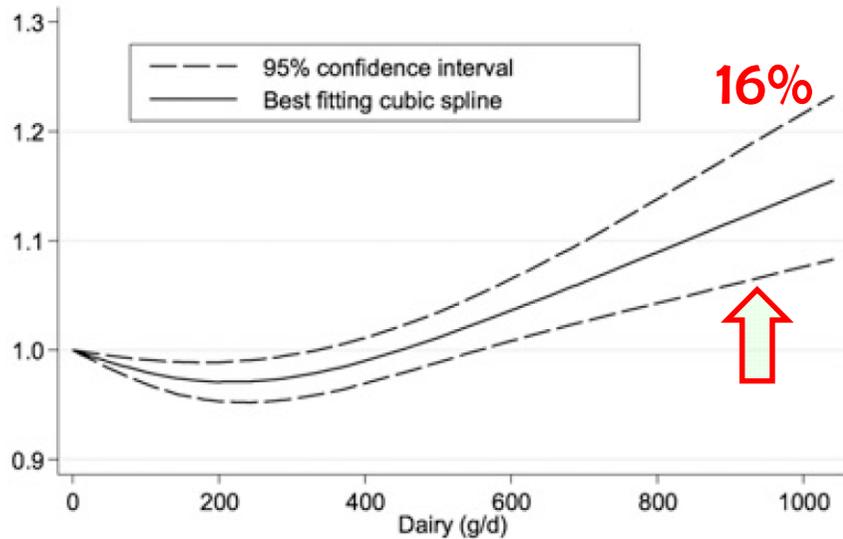


Schwingshackl et al. **Food groups and risk of all-cause mortality: a systematic review and meta-analysis of prospective studies.** *The American journal of clinical nutrition* 2017

What about dairy?

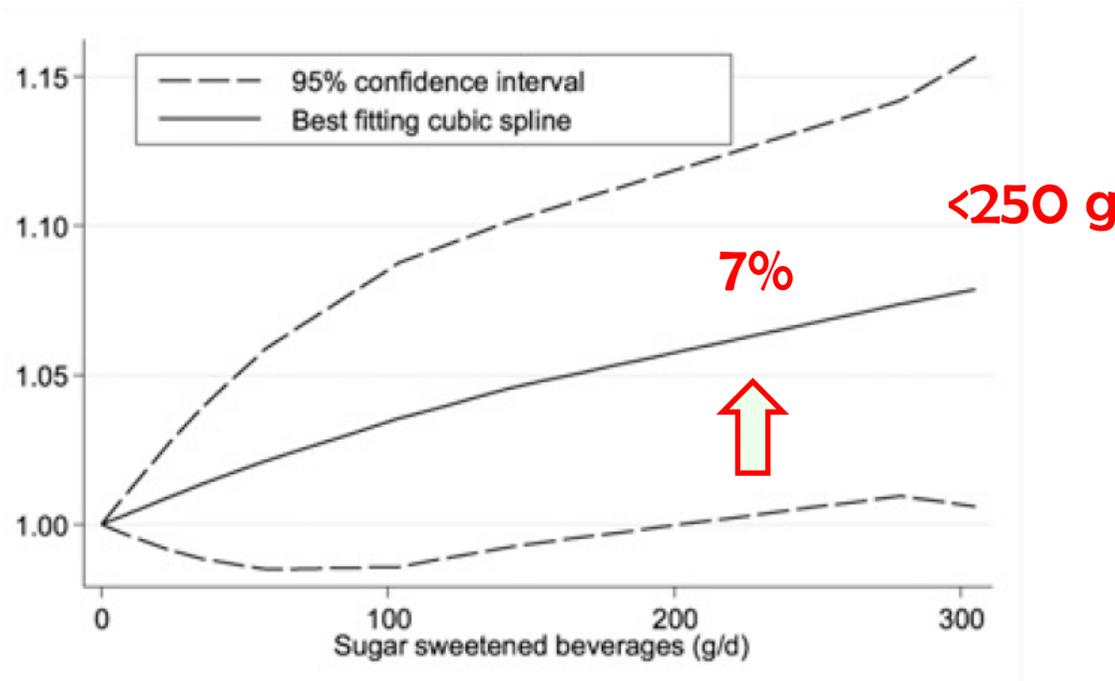


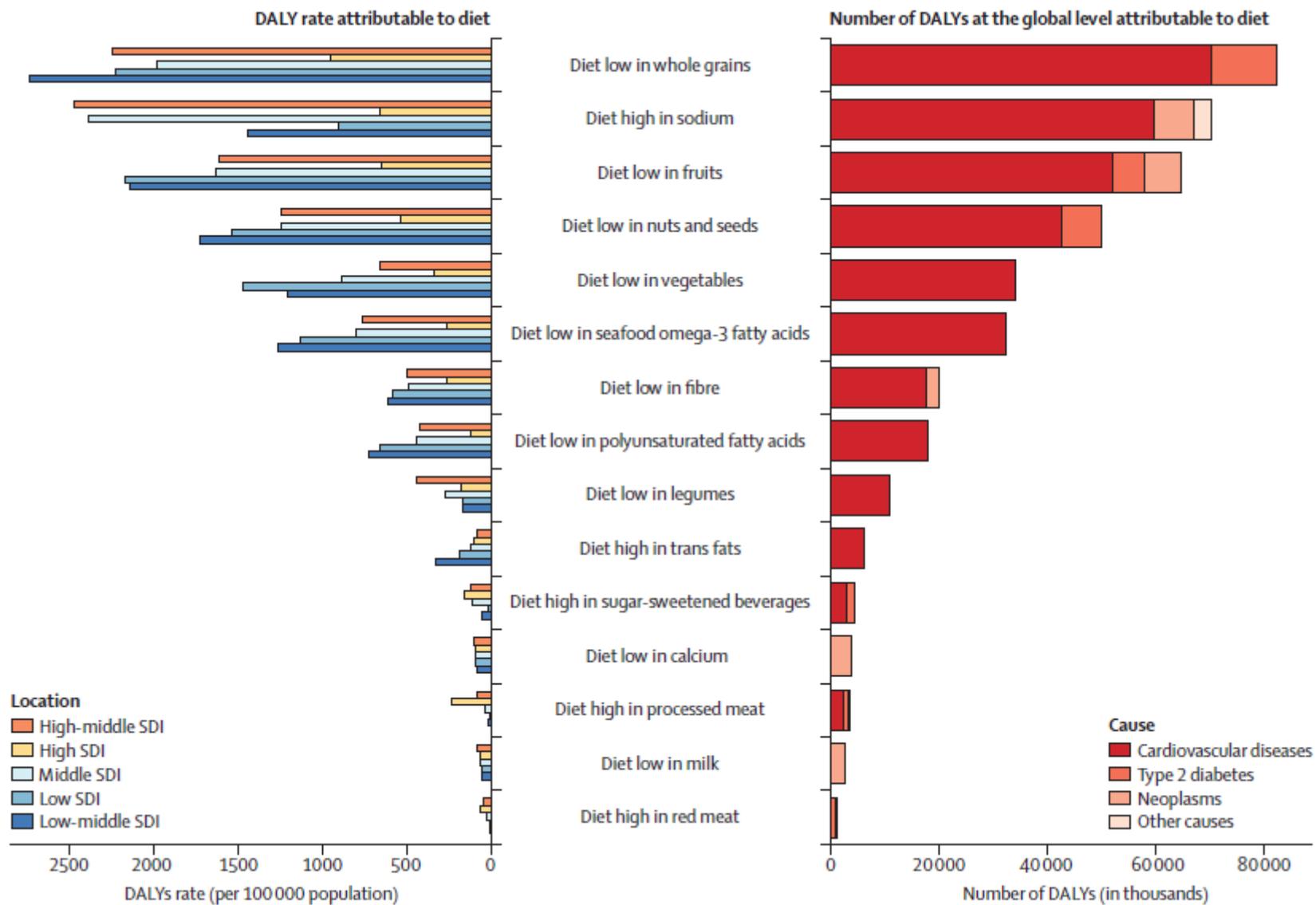
< 5 dl



Schwingshackl et al. **Food groups and risk of all-cause mortality: a systematic review and meta-analysis of prospective studies.** *The American journal of clinical nutrition* 2017

What about sweetened beverages?





Collaborators GBD: Health effects of dietary risks in 195 countries, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2019

What do trials say: LDL?

- The winners: nuts, legumes, grains, fruits and vegetables

Nuts									
-0.04	Legumes								
(-0.23, 0.14)									
-0.12	-0.08	Whole grains							
(-0.24, 0.01)	(-0.24, 0.09)								
-0.24	-0.19	-0.12	Refined grains						
(-0.35, -0.13)	(-0.36, -0.03)	(-0.18, -0.06)							
-0.15	-0.10	-0.03	0.09	Fruits and vegetables					
(-0.36, 0.07)	(-0.31, 0.11)	(-0.23, 0.18)	(-0.11, 0.29)						
-0.25	-0.21	-0.13	-0.02	-0.11	Eggs				
(-0.45, -0.06)	(-0.45, 0.04)	(-0.33, 0.06)	(-0.21, 0.18)	(-0.38, 0.17)					
-0.32	-0.28	-0.20	-0.08	-0.18	-0.07	Dairy			
(-0.76, 0.12)	(-0.72, 0.16)	(-0.64, 0.24)	(-0.52, 0.35)	(-0.65, 0.29)	(-0.54, 0.40)				
-0.34	-0.29	-0.22	-0.10	-0.19	-0.08	-0.01	Fish		
(-0.54, -0.14)	(-0.50, -0.08)	(-0.42, -0.02)	(-0.29, 0.10)	(-0.45, 0.07)	(-0.35, 0.18)	(-0.45, 0.42)			
-0.34	-0.30	-0.22	-0.10	-0.20	-0.09	-0.02	-0.01	Red meat	
(-0.50, -0.18)	(-0.46, -0.13)	(-0.38, -0.06)	(-0.26, 0.05)	(-0.43, 0.03)	(-0.32, 0.15)	(-0.43, 0.39)	(-0.14, 0.13)		
-0.35	-0.31	-0.24	-0.12	-0.21	-0.10	-0.03	-0.02	-0.01	SSBs
(-0.91, 0.20)	(-0.87, 0.25)	(-0.79, 0.32)	(-0.67, 0.44)	(-0.79, 0.37)	(-0.68, 0.48)	(-0.37, 0.31)	(-0.57, 0.53)	(-0.55, 0.52)	

¹The value below the food groups corresponds to the difference in mean (95% CI) in LDL cholesterol (mmol/L) between the column and the row (e.g. the mean difference in average LDL-cholesterol between nuts and red meat is -0.34 mmol/L). SSB, sugar-sweetened beverage.

What do trials say: all outcomes

- The winners: **nuts, legumes, whole grains, fish, fruits and vegetables**

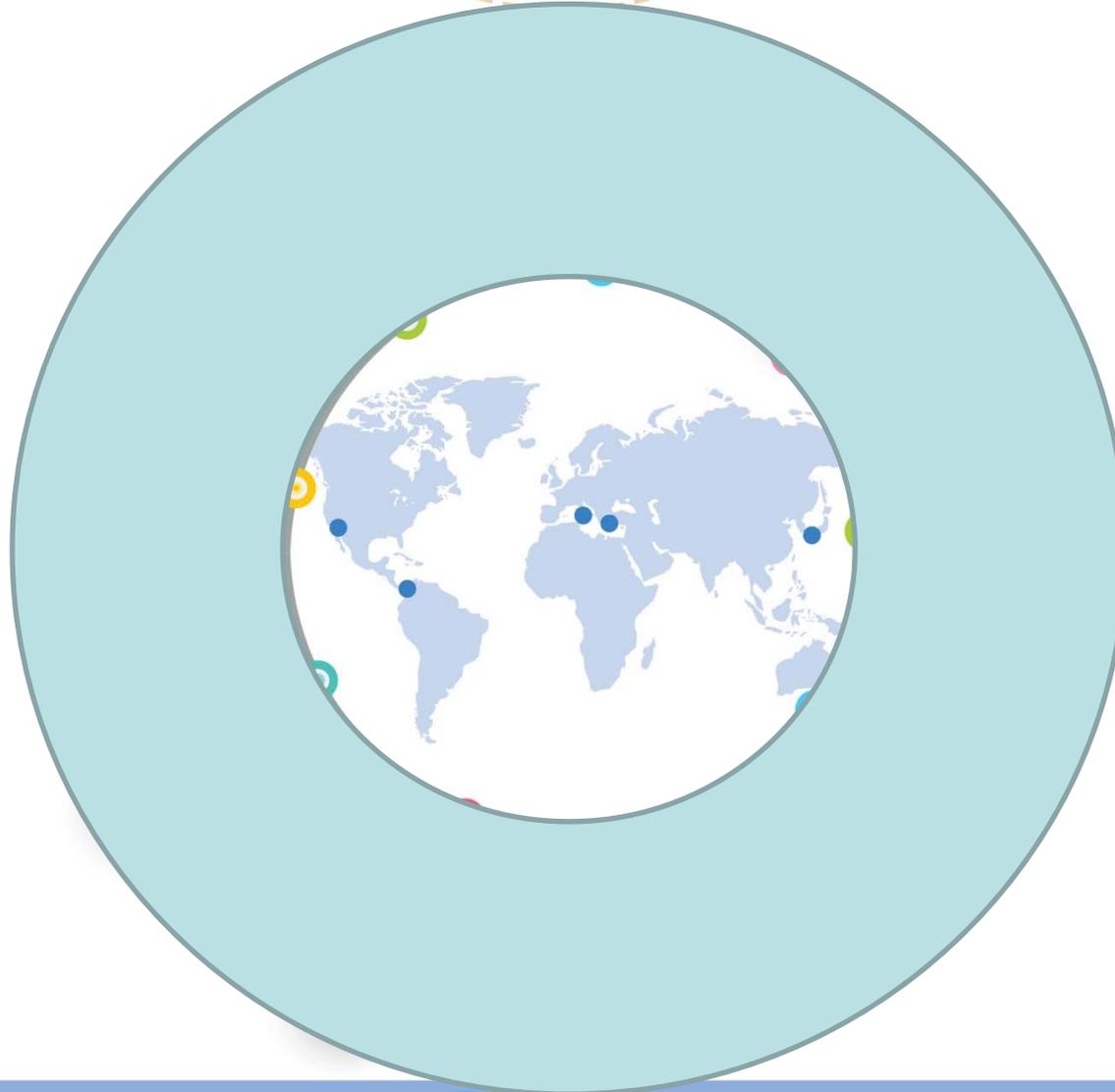
Food group relativ ranking for each individual primary and secondary outcome and summary ranking across outcomes¹

Food group	Primary outcomes				Secondary outcomes						Summary ranking
	LDL-C	TG	TC	HDL-C	FG	HbA1c	HOMA-IR	SBP	DBP	CRP	All outcomes combined
Nuts	93	78	92	62	84	37	67	32	42	76	66
Legumes	85	58	91	12	51	61	76	69	70	45	62
Whole grains	70	53	71	44	57	76	86	44	57	61	62
Refined grains	42	25	42	49	74	70	56	14	30	36	44
Fruits and vegetables	63	35	58	49	20	52	43	91	54	26	49
Eggs	40	16	30	58	NA	NA	6	41	41	80	39
Dairy	33	44	33	49	32	NA	21	NA	NA	48	37
Fish	23	97	23	91	NA	NA	47	62	33	32	51
Red meat	20	72	28	57	24	5	NA	48	74	46	42
SSBs	30	23	32	30	28	NA	NA	NA	NA	NA	29

¹The values represent the SUCRA for all outcomes (e.g. nuts were ranked as the best food group for reducing LDL cholesterol, SUCRA: 93%; fish was ranked as the best food group for reducing triacylglycerol, SUCRA: 97%). CRP, C-reactive protein; DBP, diastolic blood pressure; FG, fasting glucose; HbA1c, glycated hemoglobin; HDL-C, HDL cholesterol; LDL-C, LDL cholesterol NA, not applicable; SBP, systolic blood pressure; SSB, sugar-sweetened beverage; SUCRA, surface under the cumulative ranking curves; TC, total cholesterol; TG, triacylglycerols.

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9 lessons on health and longevity from the world's Blue Zones

These habits are typical in these zones

- 1) **Move naturally.** People in blue zones build physical activity into their daily lives naturally by walking, gardening and doing physical tasks throughout the day.
- 2) **Live with purpose.** Volunteering offers vital help to people in need and provides a sense of purpose that can improve your health and happiness.
- 3) Relax. Stress is part of life. People who live to 100, however, build **stress-relieving rituals into their daily routines.**
- 4) Apply the 80% rule. **Don't overindulge in food.** Stop eating when your stomach is 80% full. To cut 20% of your calories, eat from a smaller plate.
- 5) **Put plants first in your diet.** Sardinians enjoy a variation of the Mediterranean Diet, which includes lots of fruits, vegetables, whole grains, goat's milk, and olive oils. Meat is consumed on special occasions.



9 lessons on health and longevity from the world's Blue Zones

These habits are typical in these zones

6) **Drink water**, sip wine. Long-lived people drink plenty of water and enjoy a glass of wine with a light dinner.

7) Nurture your spirit. Most centenarians that researchers talked to belonged to a faith-based community. Practicing meditation or yoga is another way to shut down mind chatter and get in touch with your spiritual side.

8) Lean on loved ones. Close family ties across generations leads to children, grandchildren and extended family honouring and supporting older adults throughout their lives.

9) Build strong social networks. Keep old friends and make new ones. Participating regularly in social activities protects against the harmful physical and emotional consequences of social isolation.

How to make use of this?

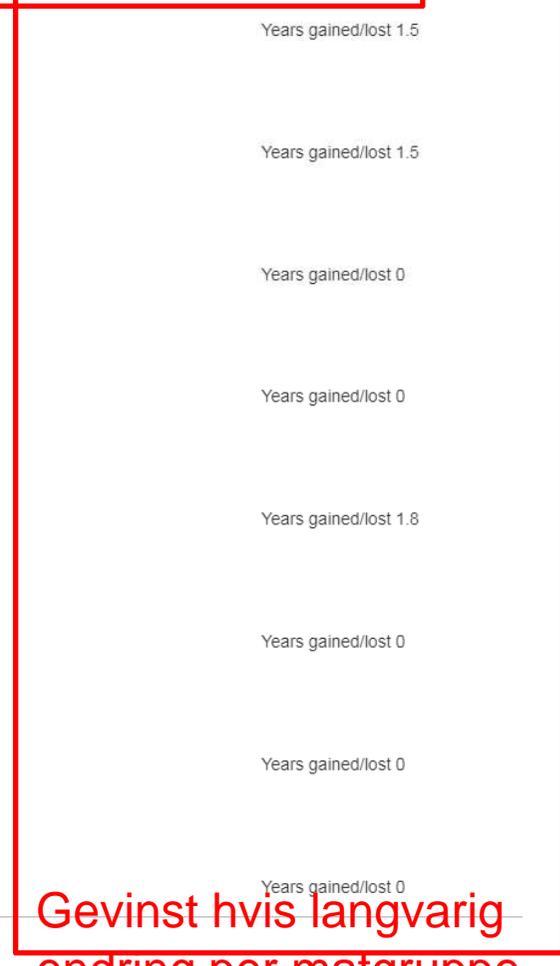
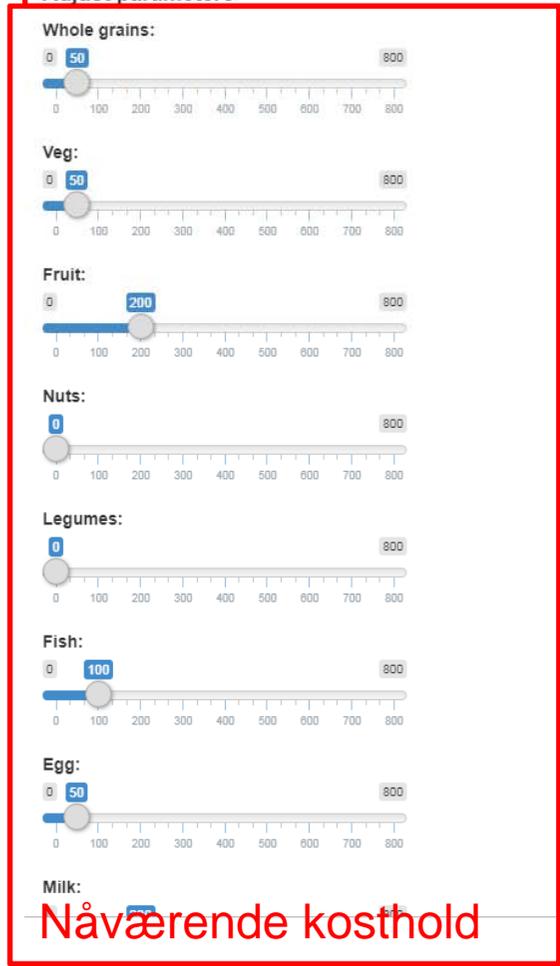
<http://calc.food4healthylife.org>

Dine bakgrunnsdata

Country: Norway | Age: 45 | Gender: Both

Expected years left: 40.6 Total: 85.6 Reference from both: 85.6
Expected years left: 40.6 Total: 85.6 Reference from both: 85.6
Expected years left: 40.6 Total: 85.6 Reference from both: 85.6
Years gained/lost: 6.7

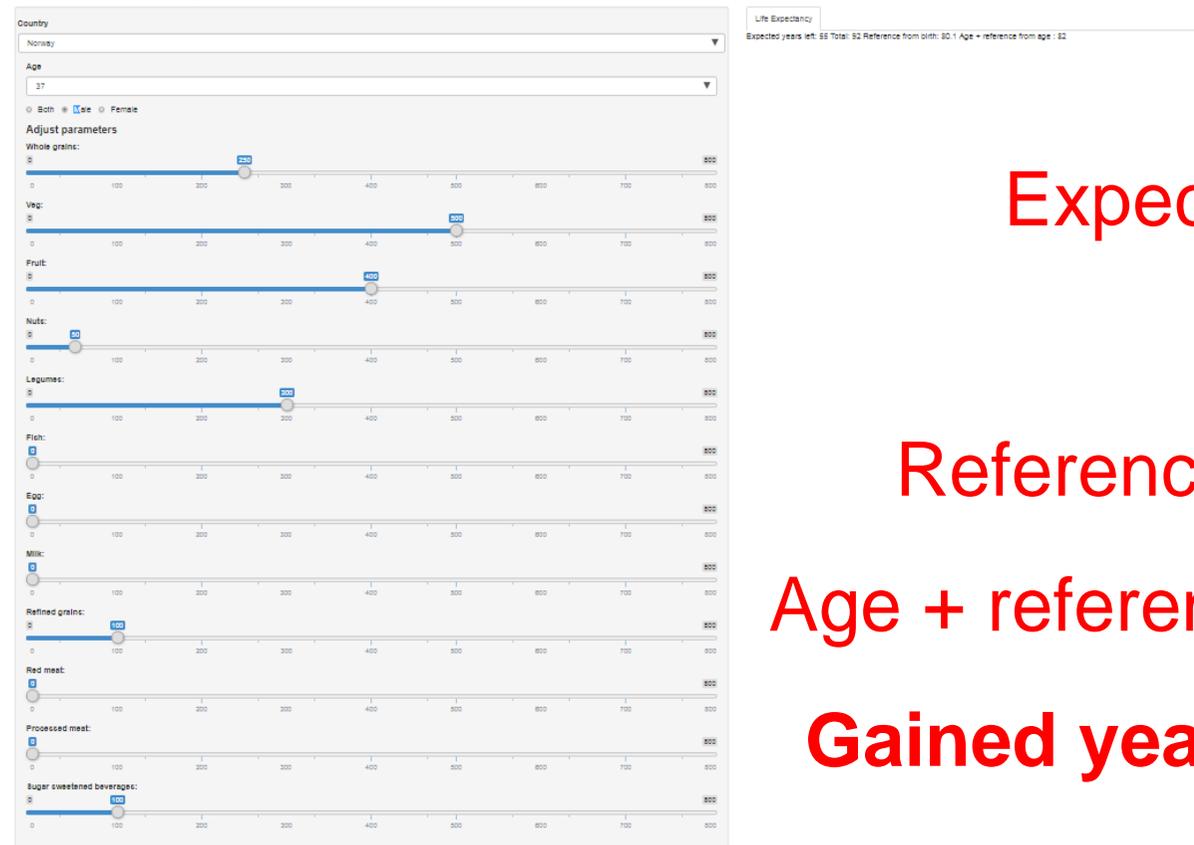
Effekt av hvert av kostholdene og totalgevinst av endring



Food4HealthyLife.org

Food app

Created by Lars Thore Fadnes and Jan-Magnus Økland



Expected years left: 55

Total: 92

Reference from birth: 80.1

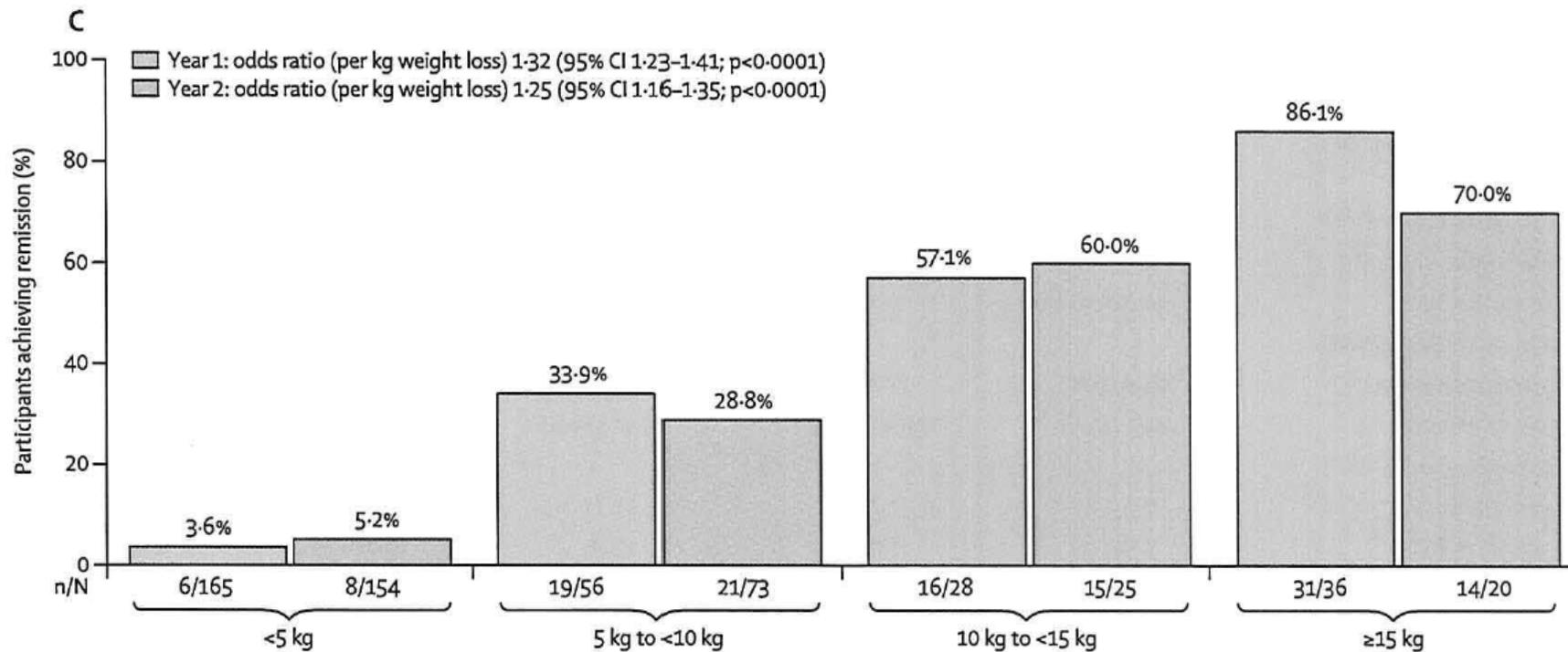
Age + reference from age : 82

Gained years, from diet: 10

<http://food4healthylife.org>

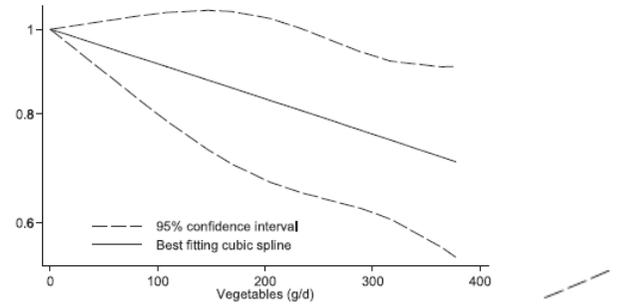
Diabetes vs. weight

DM2 diagnosis → HbA1c < 6.5%/48mmol/mol without antidiabetics

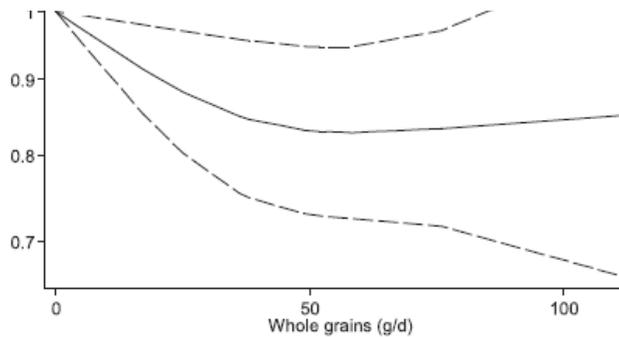


Lean, M.E.J., et al., *Durability of a primary care-led weight-management intervention for remission of type 2 diabetes: 2-year results of the DiRECT open-label, cluster-randomised trial*. *Lancet Diabetes Endocrinol*, 2019

Food and weight: the positives



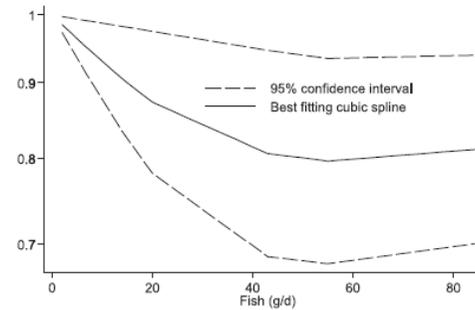
>300g
30% ↓



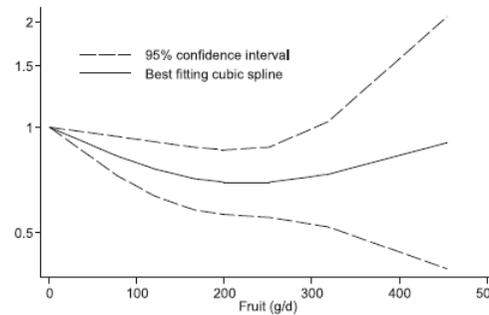
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20% ↓



Food and weight: the positives



>40g
20% ↓

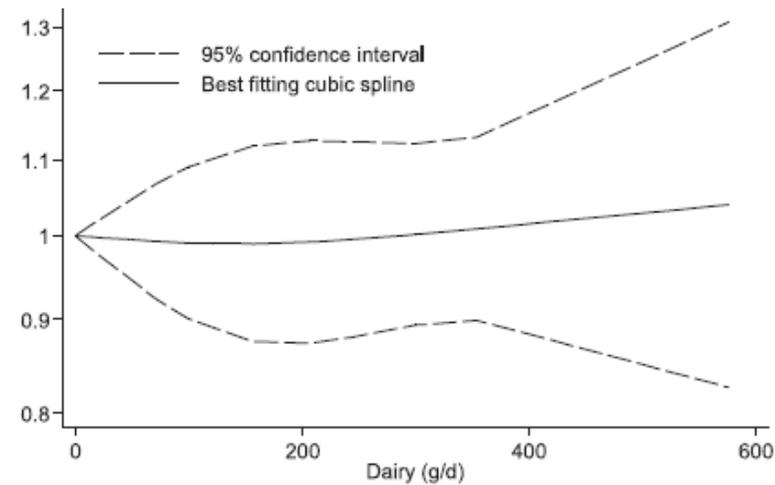


>240g
15% ↓



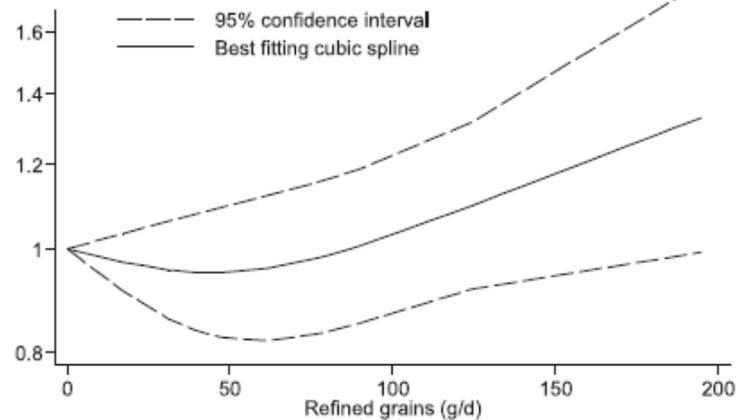
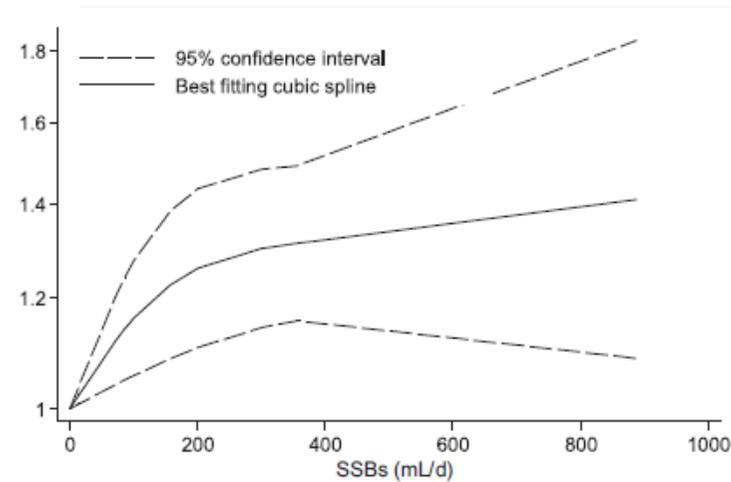
20%

Food and weight: the neutrals

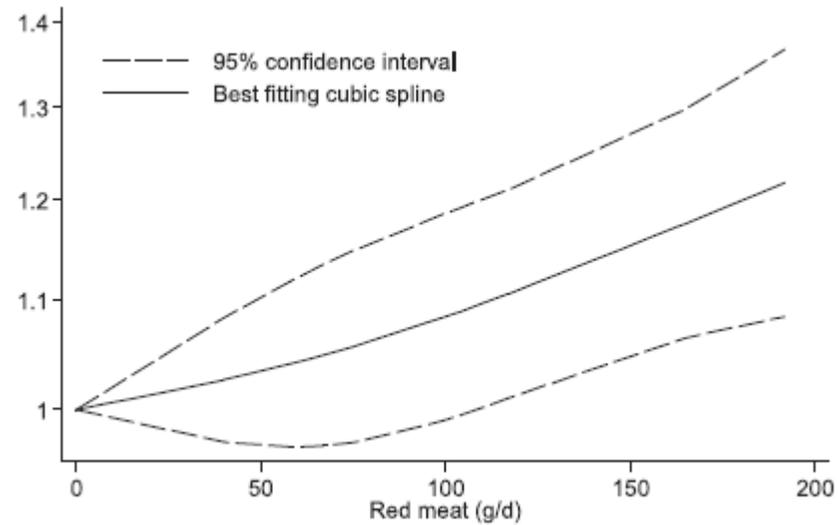


Schlesinger S et al.: Food Groups and Risk of Overweight, Obesity, and Weight Gain: A Systematic Review and Dose-Response Meta-Analysis of Prospective Studies. *Advances in nutrition* 2019

Food and weight: the negatives



Food and weight: the negatives



Diets on LDL among DM2: ranked by effectiveness from trials

Table 1 League table showing the results of the network meta-analysis comparing the effects (mean difference: MD) of all dietary approaches and 95% confidence intervals (95% CI) on LDL (mmol/L) in individuals with T2D (n= 44)

Vegetarian								
-0.08 (-0.28, 0.13)	Low GI/GL							
-0.14 (-0.44, 0.15)	-0.07 (-0.33, 0.20)	Mediterranean						
-0.13 (-0.97, 0.71)	-0.05 (-0.88, 0.78)	0.02 (-0.84, 0.87)	Palaeolithic					
-0.12 (-0.33, 0.08)	-0.05 (-0.19, 0.10)	0.02 (-0.25, 0.29)	0.01 (-0.83, 0.84)	Moderate carbohydrate				
-0.23 (-0.40, -0.06)	-0.15 (-0.26, -0.04)	-0.08 (-0.33, 0.16)	-0.10 (-0.92, 0.72)	-0.11 (-0.22, 0.01)	Low fat			
-0.31 (-0.53, -0.09)	-0.23 (-0.41, -0.05)	-0.17 (-0.45, 0.12)	-0.18 (-1.02, 0.65)	-0.19 (-0.37, 0.00)	-0.08 (-0.22, 0.06)	High protein		
-0.29 (-0.52, -0.06)	-0.21 (-0.40, -0.02)	-0.15 (-0.44, 0.15)	-0.16 (-1.00, 0.68)	-0.17 (-0.36, 0.02)	-0.06 (-0.22, 0.10)	0.02 (-0.19, 0.23)	Low carbohydrate	
-0.33 (-0.55, -0.12)	-0.26 (-0.43, -0.09)	-0.19 (-0.47, 0.08)	-0.21 (-1.04, 0.63)	-0.21 (-0.38, -0.05)	-0.11 (-0.24, 0.02)	-0.03 (-0.22, 0.17)	-0.05 (-0.25, 0.16)	Control

Food and diabetes

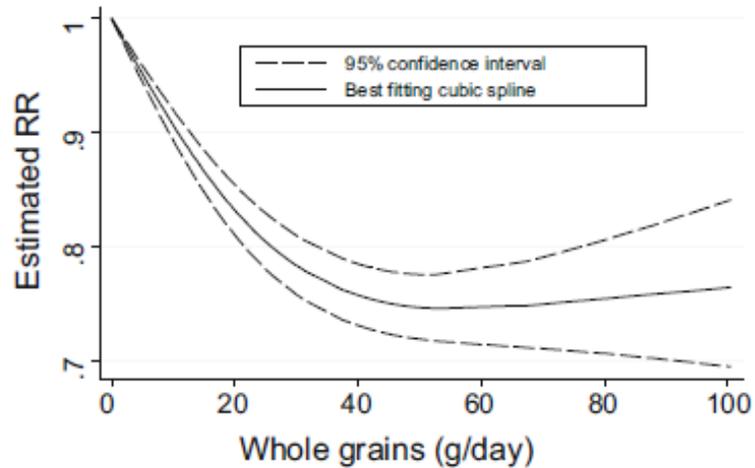
- Diet interventions can be very effective (DiRECT)
 - Mean weight reduction 9 kg
 - HbA1c reduction 9 mmol/mol (60→51/7.7→6.8)
 - Diabetes remission in 46% in intervention group and 4% in the control group
- Less diabetes in vegetarians and vegans vs. non-vegetarians
 - Vegetarian OR 0.7, vegan 0.6, flexi 0.8)

Lean ME, Leslie WS, Barnes AC, Brosnahan N, Thom G, McCombie L, Peters C, Zhyzhneuskaya S, Al-Mrabeh A, Hollingsworth KG *et al*: **Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial.** *Lancet* 2018, **391**(10120):541-551.

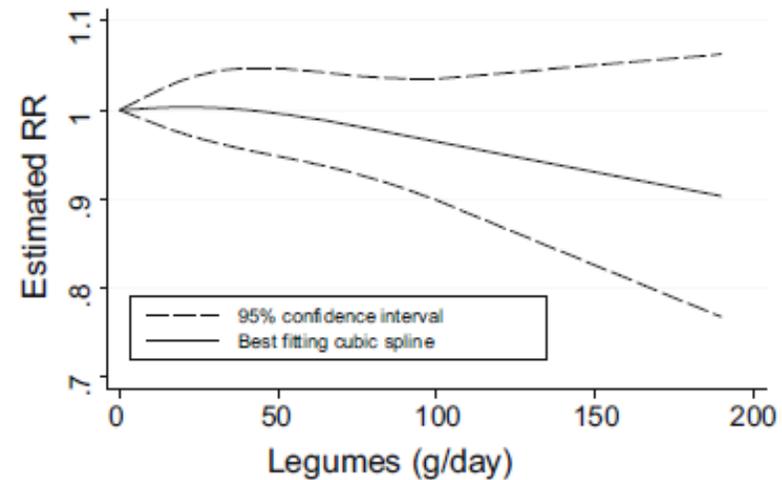
Lee Y, Park K: **Adherence to a Vegetarian Diet and Diabetes Risk: A Systematic Review and Meta-Analysis of Observational Studies.** *Nutrients* 2017, **9**(6).

Food and diabetes: the good (1)

Whole grains



Legumes

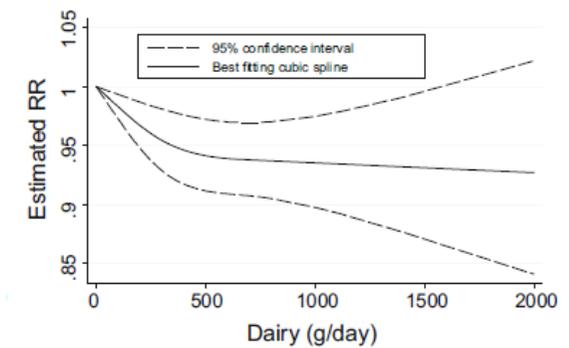
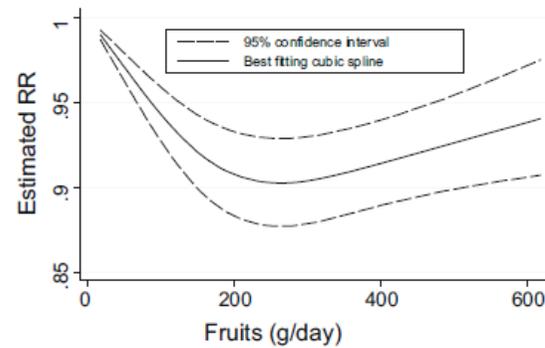
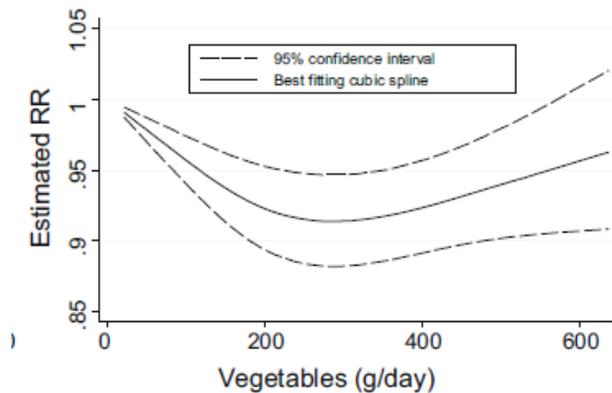


Food and diabetes: the good (2)

Fruits and vegetables

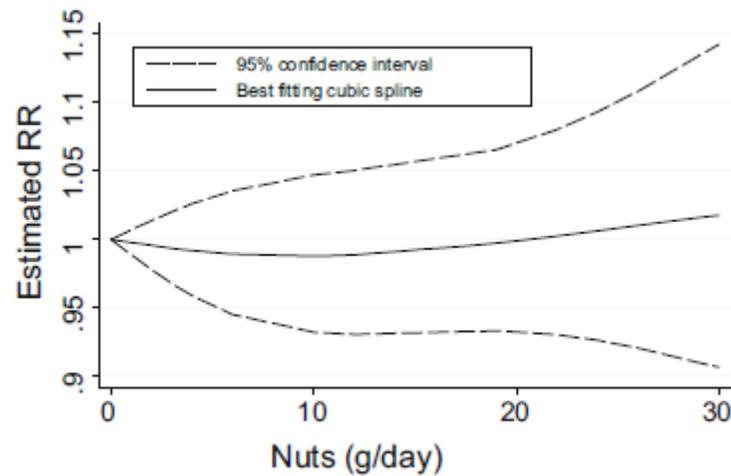


Dairy

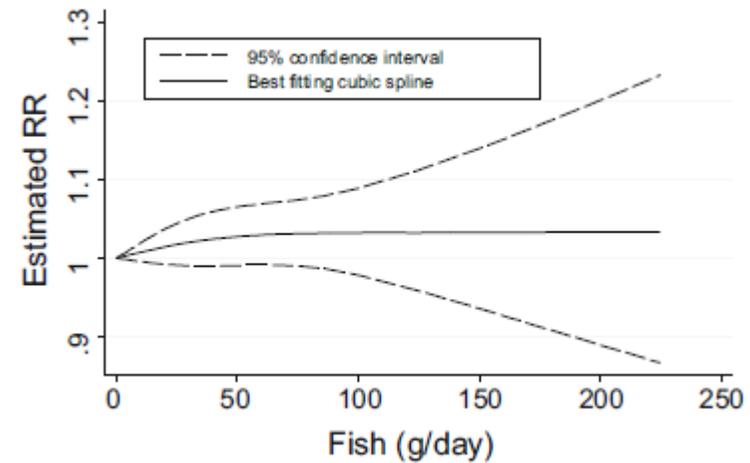


Food and diabetes: the neutrals

Nuts

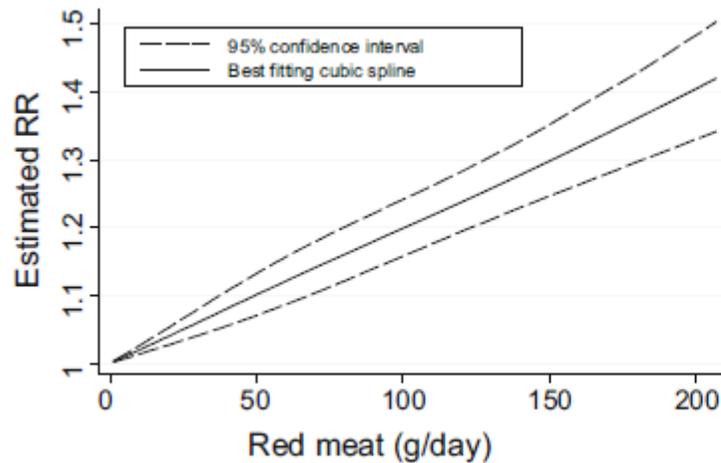


Fish

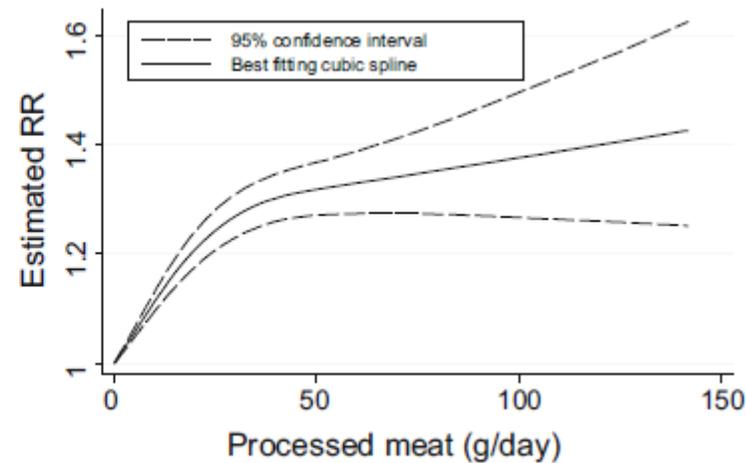


Food and diabetes: the bad (1)

Red meat

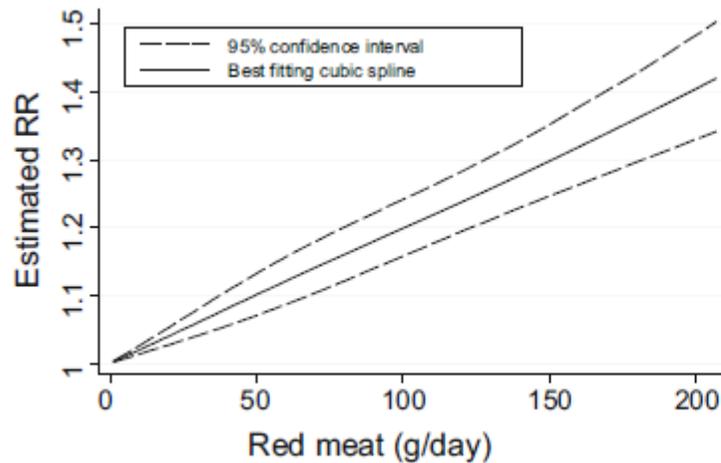


Processed meat

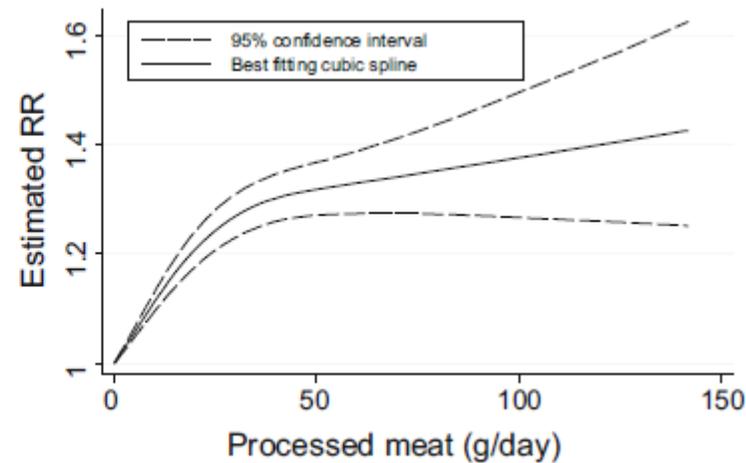


Food and diabetes: the bad (1)

Red meat



Processed meat



Food and diabetes: the bad (2)

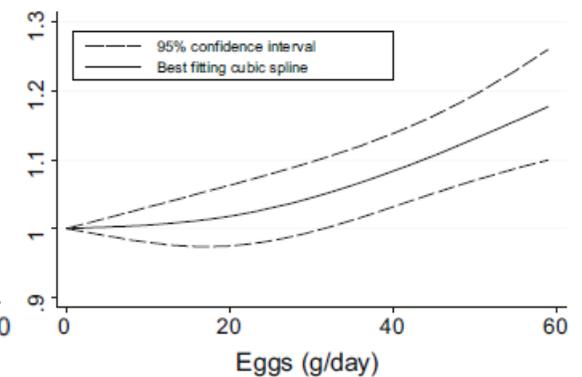
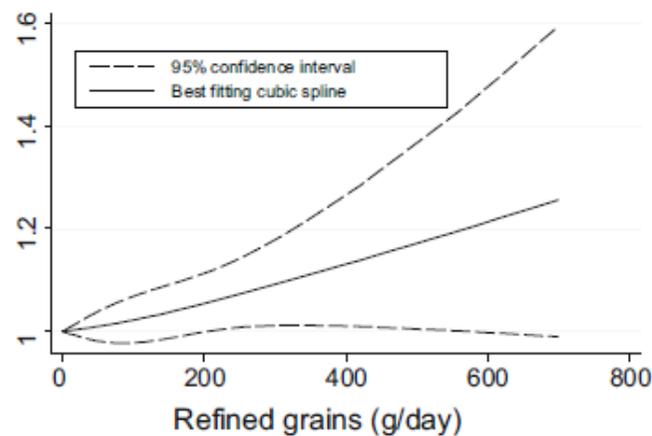
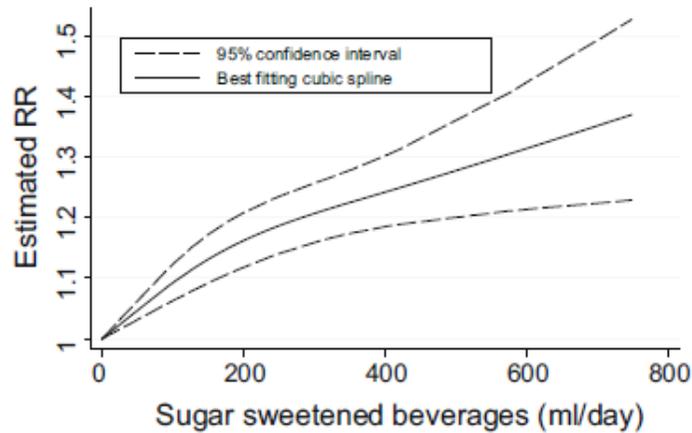
Sugar sweetened beverages



Refined grains



Eggs



American Diabetes Association on eating patterns

- **Mediterranean**
- **Vegetarian or vegan**
- **Low fat**
- **Low carbohydrate**
 - Mixed results – generally negative for cardiovascular
- **DASH (Dietary Approaches to Stop Hypertension)**
 - Similar to Norwegian recommendations
 - Nordic diet seems to be less effective than the first mentioned

Ajala O, English P, Pinkney J: **Systematic review and meta-analysis of different dietary approaches to the management of type 2 diabetes.** *The American journal of clinical nutrition* 2013

Zimorovat A, Mohammadi M, Ramezani-Jolfaie N, Salehi-Abargouei A: **The healthy Nordic diet for blood glucose control: a systematic review and meta-analysis of randomized controlled clinical trials.** *Acta Diabetol* 2019

American diabetes association: <http://www.diabetes.org/food-and-fitness/food/planning-meals/diabetes-meal-plans-and-a-healthy-diet.html>

Diabetes and diet

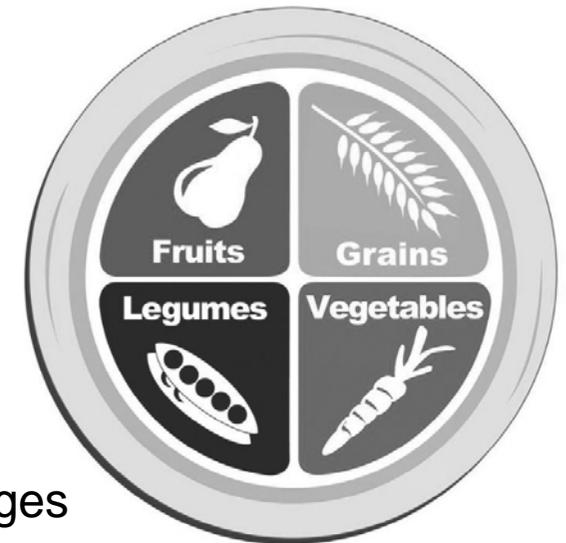
1. Eat plenty of whole grains and legumes, moderate amounts of fruits and vegetables

2. Limit meats and eggs

3. Favor food with low glycemic load/index

1. Limit refined grains and sugar sweetened beverages

4. Be careful with use of vegetable oils (olive oil mostly regarded acceptable)



Schwingshackl L et al: **Food groups and risk of type 2 diabetes mellitus: a systematic review and meta-analysis of prospective studies.** *Eur J Epidemiol* 2017

Livesey et al: **Dietary Glycemic Index and Load and the Risk of Type 2 Diabetes: A Systematic Review and Updated Meta-Analyses of Prospective Cohort Studies.** *Nutrients* 2019

Schwingshackl L, Hoffmann G: **Long-term effects of low glycemic index/load vs. high glycemic index/load diets on parameters of obesity and obesity-associated risks: a systematic review and meta-analysis.** *Nutrition, metabolism, and cardiovascular diseases : NMCD* 2013

Barnard N: **Dr. Neal Barnard's Program for Reversing Diabetes: The Scientifically Proven System for Reversing Diabetes without Drugs.** Rodale Books: 2018

Glycemic index and load

- Glycemic index (GI): measure on how individual foods are expected to impact blood sugar levels (glucose defined value of 100)
 - Liquids digest quickly and raise blood sugar levels faster than solids
 - Highly cooked or mashed → generally increases GI
- The glycemic load (GL) is an equation that takes into account the planned portion size of a food as well as the glycemic index of that food ($GL = GI/100 * \text{net grams of planned carbohydrate (excluding fiber)}$)
 - In theory, a large amount of a low GI food may increase your blood sugar as much as a small amount of a high GI food

Glycemic index and load

Food	GI	Serving Size	Glycemic Load	Other benefits
Peanuts	14	30 g	1	+++
Grapefruit	25	½ large	1	+++
Tomato juice	30	2 dl	2	+++
Milk	32	2 dl	4	++/-
Watermelon	72	300 g	4	++
Orange, fresh	48	large size	4	+++
Cheese	30	2 slices	5	+/-
Popcorn	72	4 dl	6	+/-
Apple, raw	38	medium size	6	+++
Pineapple, raw	66	120 g	6	+++
Kidney beans	28	2 dl	7	+++
High-fiber cereal	52	30 g	9	+++
Orange juice	46	2 dl	10	+++
Yoghurt	33	2 dl	10	++
Oatmeal (cooked)	58	2 dl	12	+++
Banana, fresh	52	medium size	12	++
Wholemeal barley flour (80%) bread	67	1 piece	13	+++
Milk chocolate	50	50 g	14	+/-
Carrots, boiled	92	100 gram	16	++
Spaghetti	40	200 g	16	+/-
Baked potato	69	150 g	19	++/-
Boiled potatoes	50-100	150 g	10-25	++/-
Brown rice	46	2 dl	19	++
Corn flakes	81	2 dl	21	+/-
Snickers candy bar	55	50 g	22	-/--
White rice (boiled)	64	2 dl	23	-
Raisins	64	20 g	27	++
French baguette with chocolate spread	72	70 g	27	--

Glycemic index and load: good

Peanuts	14	30 g	1	+++
Grapefruit	25	½ large	1	+++
Tomato juice	30	2 dl	2	+++
Milk	32	2 dl	4	++/-
Watermelon	72	300 g	4	++
Orange, fresh	48	large size	4	+++
Cheese	30	2 slices	5	+/-
Popcorn	72	4 dl	6	+/-
Apple, raw	38	medium size	6	+++
Pineapple, raw	66	120 g	6	+++
Kidney beans	28	2 dl	7	+++
High-fiber cereal	52	30 g	9	+++



Glycemic index and load: medium

Orange juice	46	2 dl	10	+++
Yoghurt	33	2 dl	10	++
Oatmeal (cooked)	58	2 dl	12	+++
Banana, fresh	52	medium size	12	++
Wholemeal barley flour (80%) bread	67	1 piece	13	+++
Milk chocolate	50	50 g	14	+/-
Carrots, boiled	92	100 gram	16	++
Spaghetti	40	200 g	16	+/-
Baked potato	69	150 g	19	++/-
Boiled potatoes	50-100	150 g	10-25	++/-
Brown rice	46	2 dl	19	++



Glycemic index and load: worst

Corn flakes	81	2 dl	21	+/-
Snickers candy bar	55	50 g	22	-/--
White rice (boiled)	64	2 dl	23	-
Raisins	64	20 g	27	++
French baguette with chocolate spread	72	70 g	27	--



- MUFAs have been shown to reduce TGs and increase HDL levels in patients with and without T2D, but had no significant effect on LDL levels

Caloric restriction and fasting

- Calorie restriction
 - Continuous reduction in caloric intake without malnutrition
- Intermittent fasting
 - Fasting for varying periods of time, typically for 12 h or longer
 - Time-restricted feeding: restricting food intake to specific time periods of the day, typically between 8 and 12 h each day
 - Alternate-day fasting: consuming no calories on fasting days and alternating fasting days with a day of unrestricted food intake, or a “feast” day
 - Modified: consuming <25% of baseline energy needs on “fasting” days
 - Periodic fasting (e.g. 5:2): fasting 1-2 d/week and consuming food ad libitum on 5-6 d/week

Caloric restriction and fasting

- Both are effective in
 - Reducing weight/BMI
 - Improve insulin sensitivity and less often diabetes
 - Reduce dyslipidemia
 - Reduce inflammation cytokines
 - Improved cognitive function
 - Possibly increased life-span
- ‘Flipping’ the metabolic switch:
 - Lipogenesis to lipolysis

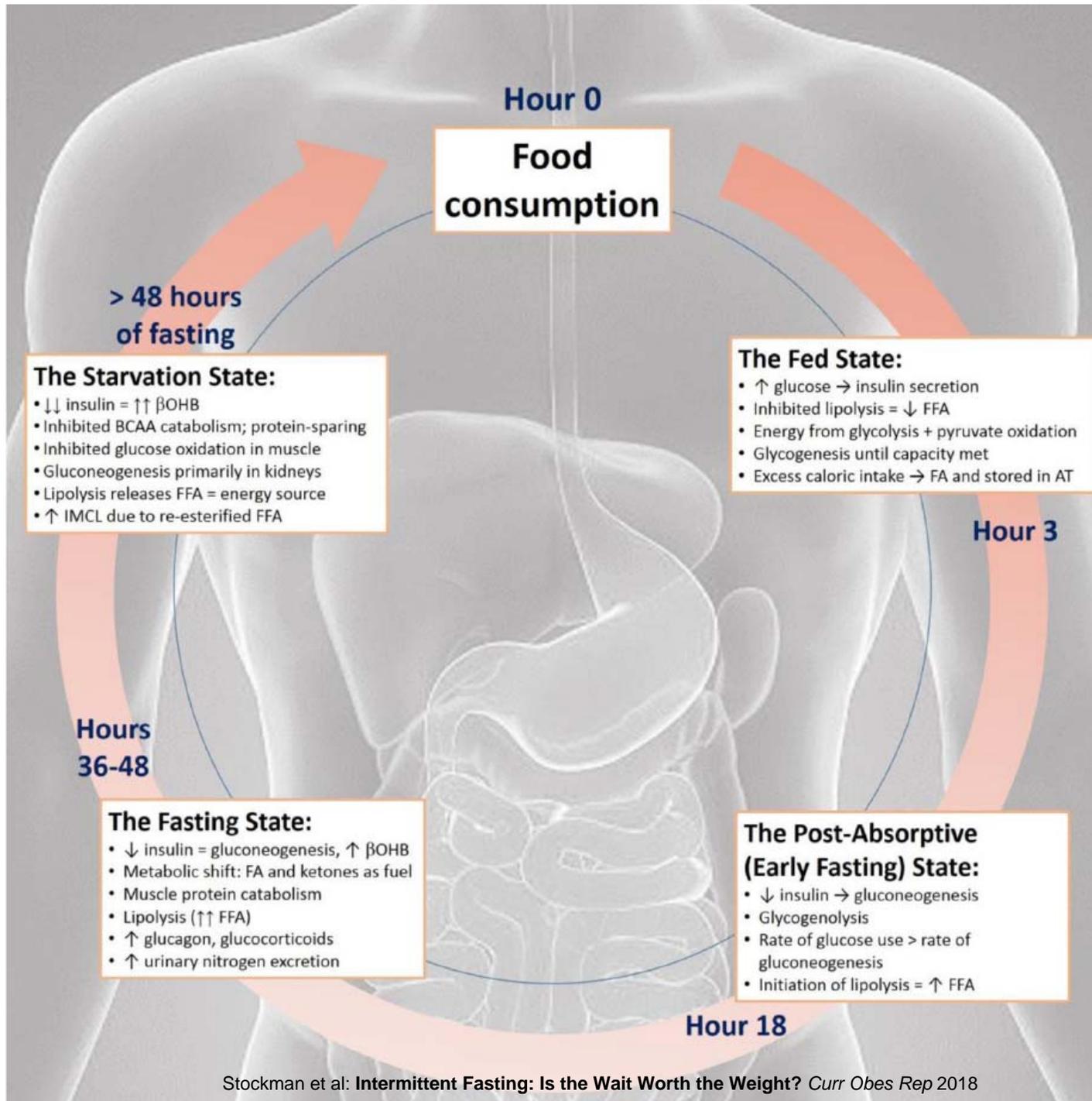
Anton et al: **Flipping the Metabolic Switch: Understanding and Applying the Health Benefits of Fasting.** *Obesity (Silver Spring)* 2018

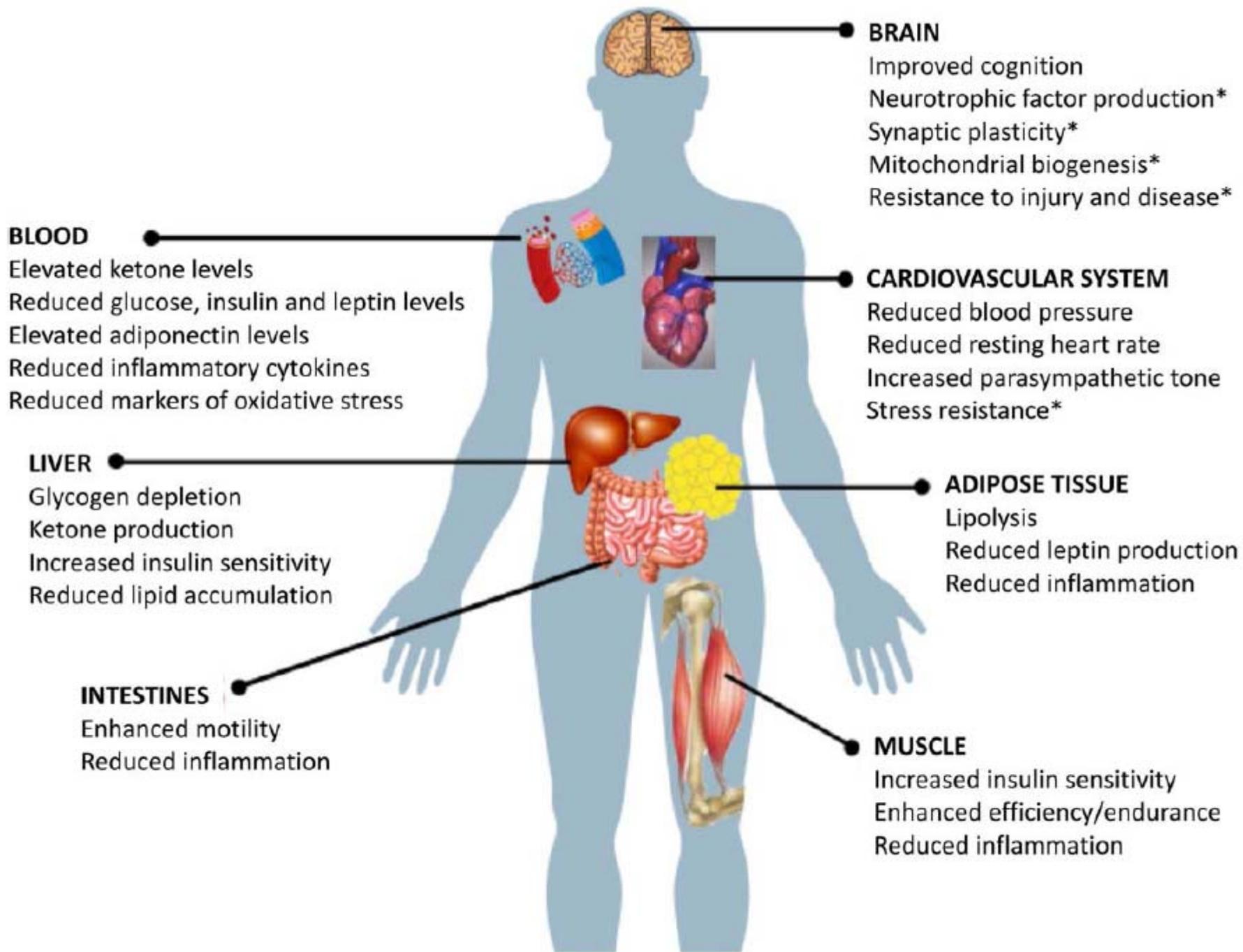
Golbidi et al: **Health Benefits of Fasting and Caloric Restriction.** *Curr Diab Rep* 2017

Zubrzycki et al: **The role of low-calorie diets and intermittent fasting in the treatment of obesity and type-2 diabetes.** *J Physiol Pharmacol* 2018

Fasting and risks

- Long episodes of fasting may lead to large portions of unhealthy foods at the end of the fast, leading to loss of benefits (binge eating disorder is especially prevalent among individuals with obesity seeking weight loss, with loss of control over eating, often also linked with depression)
 - Fasting might benefit most for motivated individuals who are able to avoid overeating following fasting periods
- Except this and prolonged fasting (e.g. >1 week), few known negative health consequences





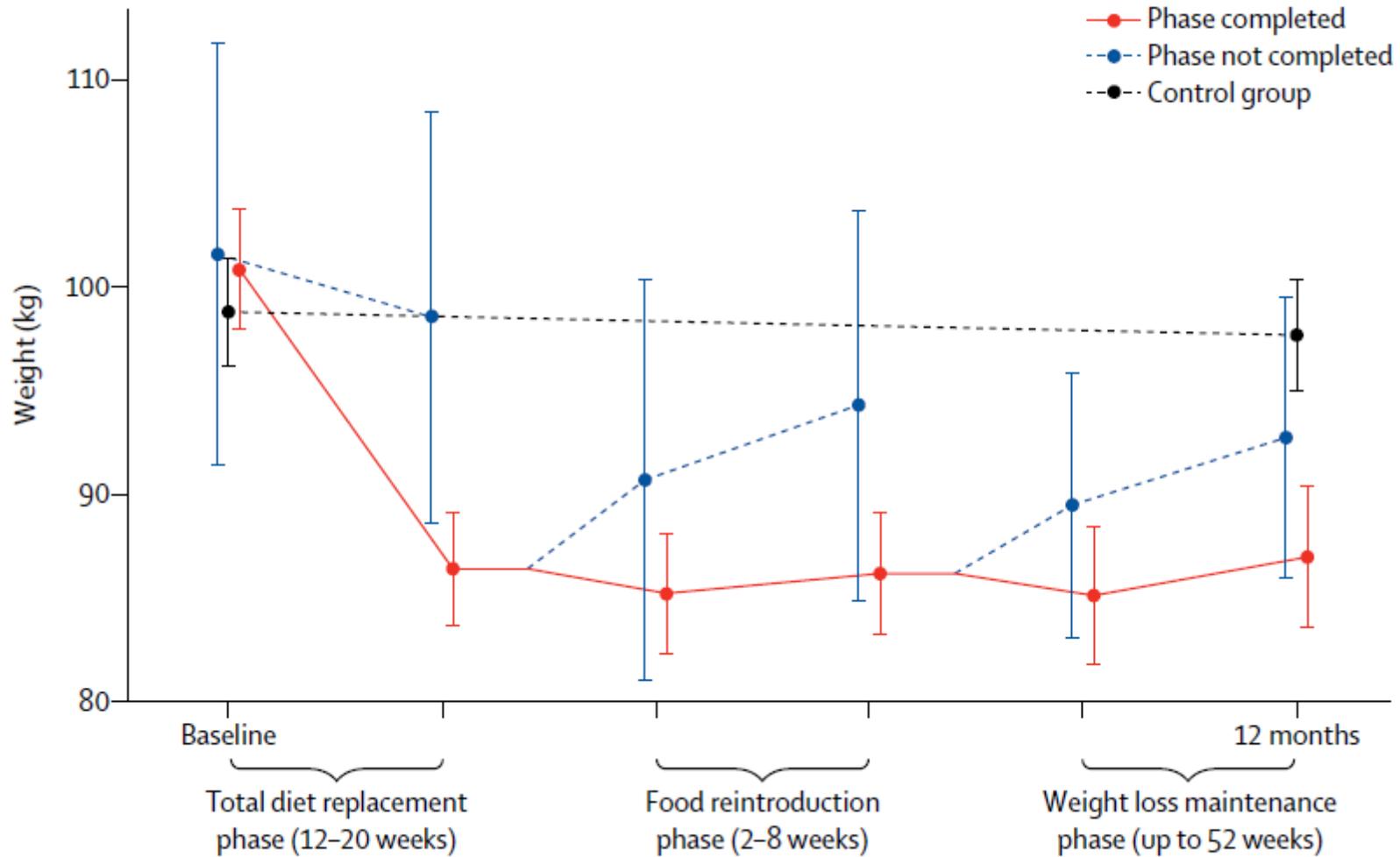
Stable weight loss & regulation

- Long term caloric reduction
 - Hunger and appetite increased still 12 months after initial weight loss despite weight stability or even some weight regain
 - Higher fiber intake and lower energy density plus increased polyunsaturated fat intake have been associated with better weight maintenance
 - Higher satiety value of protein than sugars
 - Carbohydrate is more thermogenic than fat (and energy expenditure higher when consuming more carbohydrates compared to fat)

Stable weight loss & regulation

- Long term weight maintenance after large weight losses is associated with
 - Frequent self-monitoring of body weight and food intake
 - Consistency of food intake
 - Limit high-density foods (preferring low fat and avoiding fast food)
 - E.g. Mediterranean
 - Most individuals eat a fixed volume of food
 - High levels of regular physical activity

DiRECT trial



Lean ME, Leslie WS, Barnes AC, Brosnahan N, Thom G, McCombie L, Peters C, Zhyzhneuskaya S, Al-Mrabeh A, Hollingsworth KG *et al*: **Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial.** *Lancet* 2018, **391**(10120):541-551.

The Lean Team “No Doubts Diet”

- Breakfast
 - 40g (half cup) porridge oats, made with water (1 cup)
 - 1 portion fruit (e.g. small banana, chopped).
 - Preparation: heat for 2 minutes, eat with a splash of cold milk
- Lunch
 - Bowl of lentil soup, and 1 slice of wholemeal/wholegrain bread
- Dinner
 - Bowl of lentil soup, and 1 slice of wholemeal/wholegrain bread
- Evening Snack
 - 1 portion fruit
- Fluids
 - Aim for 3 litres (zero calorie) fluids per day
 - Avoid sweetened ‘diet’ drinks



University
of Glasgow

School of Medicine,
Dentistry & Nursing

Lentil soup

This recipe makes 4 servings, each 160 calories, so enough for 2 days. You can save yourself time by doubling all the quantities to make enough for 4 days.

Ingredients:

5 large carrots

2 onions

3 sticks of celery

125g lentils

750 mls water

“1-cal” spray oil (or a small amount of olive oil)

Spicy tomato bean soup

This recipe makes 4 servings, each 220 calories, so enough for 2 days. You can save yourself time by doubling all the quantities to make enough for 4 days.

Ingredients:

1 medium sized onion

1 tablespoon mild or medium spiced curry powder

200 mls water

1x400g tin of chopped tomatoes

1x410g tin of black eyed beans

1x700g jar of Italian smooth passata

100g plain soft cheese (Philadelphia or shops own brand)

“1 calorie” spray oil

Tomato & lentil soup

This recipe makes 4 servings, each 200 calories, so enough for 2 days. You can save yourself time by doubling all the quantities to make enough for 4 days.

Ingredients:

6 medium (peeled) carrots

1 medium onion

700 mls water

1 large potato (peeled)

1 can chopped tomatoes

150g (dry weight) red split lentils

"1-calorie" spray oil

10 tips for success (from DiRECT)

1. Planning is essential for success

- Cook in advance, and keep soups in the fridge and freezer which can be easily heated.

2. Keep it simple and be consistent. Too many meal options is likely to increase confusion, temptation and appetite. Reducing the thinking around food choice, helped participants in the DiRECT study a lot.

3. Be Mindful. Make sure you take the time sit down, and enjoy the meals you have planned. Lay the table at home, put on some nice music. At work, get away from your desk.

10 tips for success (from DiRECT)

4. The first few days will be the most difficult. Get through those and you're on your way. If you experience a headache, it will pass as your body adjusts to the lower calorie intake. Keep your fluid intake high.

5. Find pleasure and joy in things other than food. Do not focus on what you are giving up by eating less of some of the foods you enjoy, but focus on what you will gain in return from weight loss and diabetes remission

6. Don't give in to hunger. The first few days will likely be hard. Dealing with hunger, or a desire to eat, is key to success. Keep yourself busy at these times and remind yourself why you are doing this. Your appetite will adjust after a few days, and most of the time you will not be hungry.

10 tips for success (from DiRECT)

7. Check your weight at the same time each week, and keep a record. If you can, enlist support from someone who can weigh you and discuss your progress every week. Some people find keeping a journal is also helpful. This is somewhere to record your daily progress, your motivations, goals, thoughts, and what you eat.

8. Get active! Don't suddenly try a half marathon - but be as physically active as you can be. Walking for 30 minutes every day is a good start.

9. Beat stress - find ways to effectively deal with stress, without turning to food. This could be through meditation, exercise or talking with someone you trust. Eating will only double your problems.

10. Don't be disheartened if you lapse from your plan. A slip up here and there will not matter. The important thing is getting back on track quickly and keeping going!

Weight loss maintenance

- Self-monitoring of weight: keep a record of your weight and weigh at least weekly
- Self-monitoring of intake: this does not mean writing things down every day but always being aware of habits is helpful
- Keeping to a lower calorie diet than you were accustomed to prior to losing weight
- Keeping to a lower calorie diet than you were accustomed to prior to losing weight
- Social support: people do better when they have a supportive partner, friend or family member
- Act quickly if you notice any increase in your weight

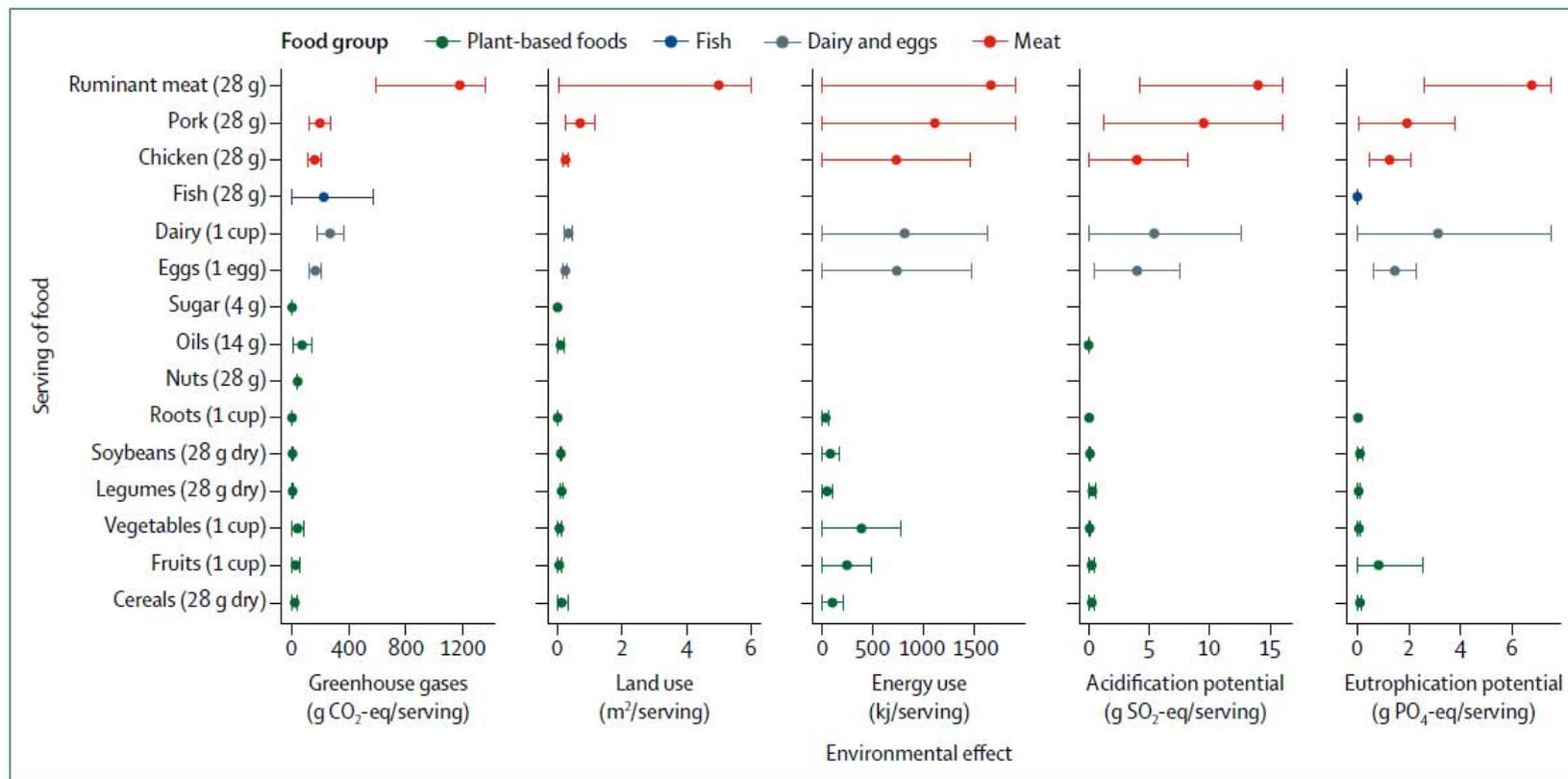


Figure 4: Environmental effects per serving of food produced
 Bars are mean (SD).^{5,216} Some results are missing for fish due to lack of data for some impact categories (eg, land use stemming from plant-based feeds in aquaculture). This was, however, accounted for in the global food systems modeling framework used in Section 3. CO₂=carbon dioxide. Eq=equivalent. PO₄=phosphate. SO₂=sulphur dioxide.

1 Goal - 2 Targets - 5 Strategies

To Achieve Planetary Health Diets for Nearly 10 Billion People by 2050



#foodcanfixit

Setting Scientific Targets for Healthy Diets and Sustainable Food Production

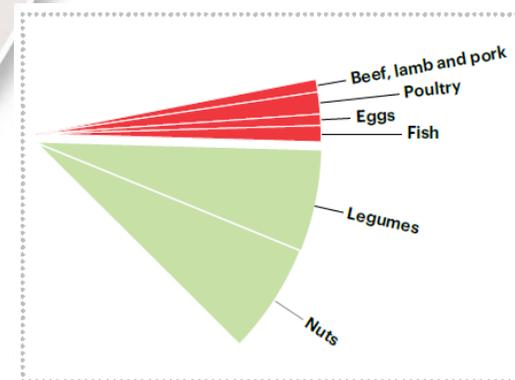


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A planetary health plate



adopting the diet could avoid about 11.1 million deaths per year and reduce premature mortality by 19% or 22 % of adult deaths.



Planetary healthy plates

	Macronutrient intake grams per day (possible range)	Caloric intake kcal per day
 Whole grains Rice, wheat, corn and other	232	811
 Tubers or starchy vegetables Potatoes and cassava	50 (0-100)	39
 Vegetables All vegetables	300 (200-600)	78
 Fruits All fruits	200 (100-300)	126
 Dairy foods Whole milk or equivalents	250 (0-500)	153
Protein sources		
 Beef, lamb and pork	14 (0-28)	30
 Chicken and other poultry	29 (0-58)	62
 Eggs	13 (0-25)	19
 Fish	28 (0-100)	40
 Legumes	75 (0-100)	284
 Nuts	50 (0-75)	291
Added fats		
 Unsaturated oils	40 (20-80)	354
 Saturated oils	11.8 (0-11.8)	96
Added sugars		
 All sugars	31 (0-31)	120

Willett et al. Food in the Anthropocene the EAT–Lancet Commission on healthy diets from sustainable food systems. Lancet 2019