Fler trick än bara en kopp kaffe för att hålla metabolismen uppe och vikten nere!

Fredrik Nyström
Professor och överläkare i internmedicin
Linköpings Universitet och Region Östergötland

Snabbmatsstudien:
en undersökning av vad som händer när man äter väldigt mycket och slutar motionera,

Studieupplägg enligt dokumentären ”Super size me” av Morgan Spurlock

Snabbmatsstudien

Design/upplägg:

Försökspersoner: 18 st (6♀, 12♂) relativt välträna de individer, ca 20-35 år gamla, parallell kontrollgrupp

Mål: fördubbling av kaloriintag på individbasis

viktuppgång 5-15% (avbrytande i förtid vid 15% viktuppgång)

Intervention: "snabbmat" definierat som kaloririka måltider från i första hand väletablerade snabbmatskedjor såsom MacDonald's, Burger King eller Sibylla, till lunch och middag i 4 veckor

Motion minimeras till maximalt 5000 steg/dag (busskort efter behov)

14 Bigmac = 7000 kcal

huvudresultat, vikt:

5 personer nådde 15% viktuppgång, 3 av dessa slutade i förtid

En person nådde 15% viktuppgång på 2v (från 80 till 92 kg, dvs 12 kg viktuppgång)

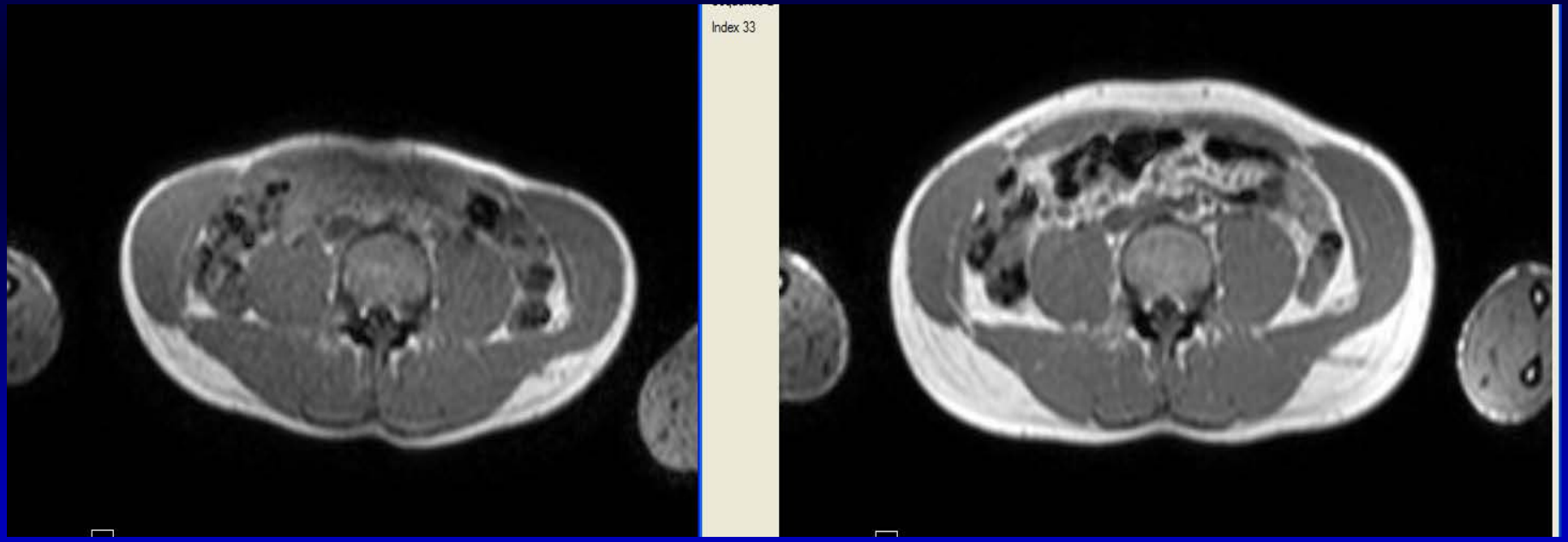
Genomsnittlig viktuppgång = 10% utan könsskillnad

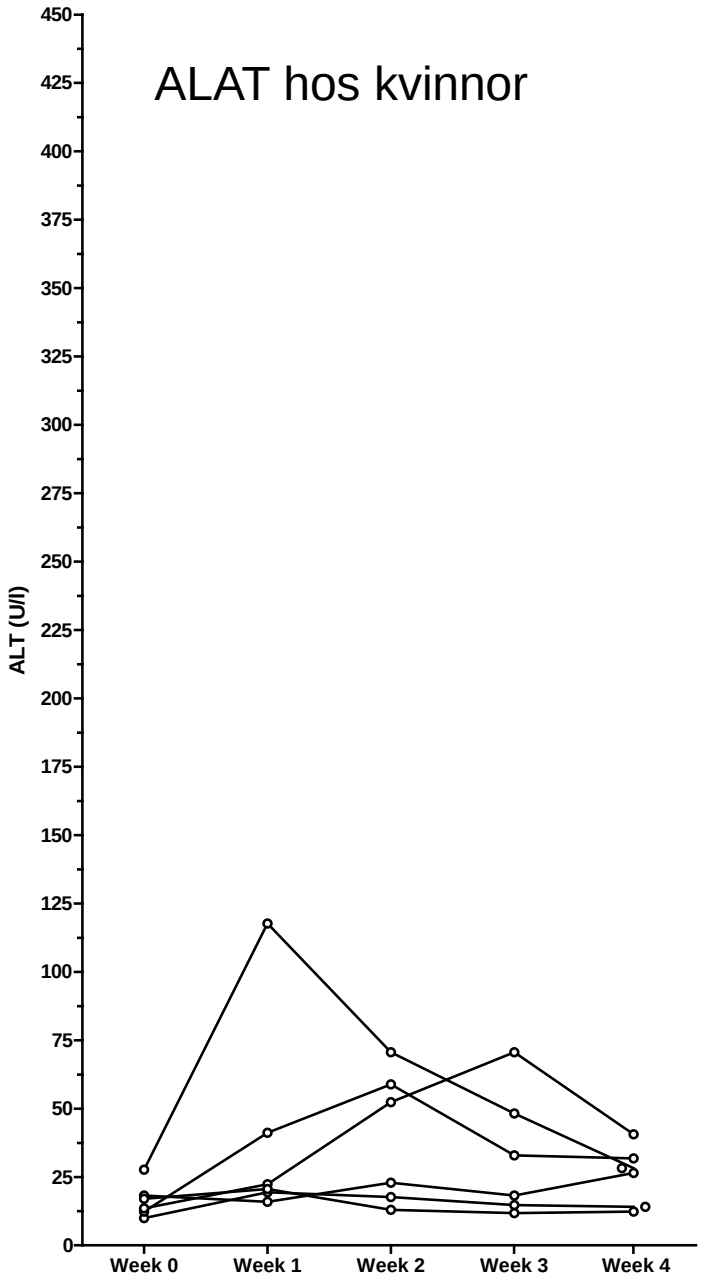
Man nådde i snitt en ökning på 70% av kaloriintag under de 4 veckorna

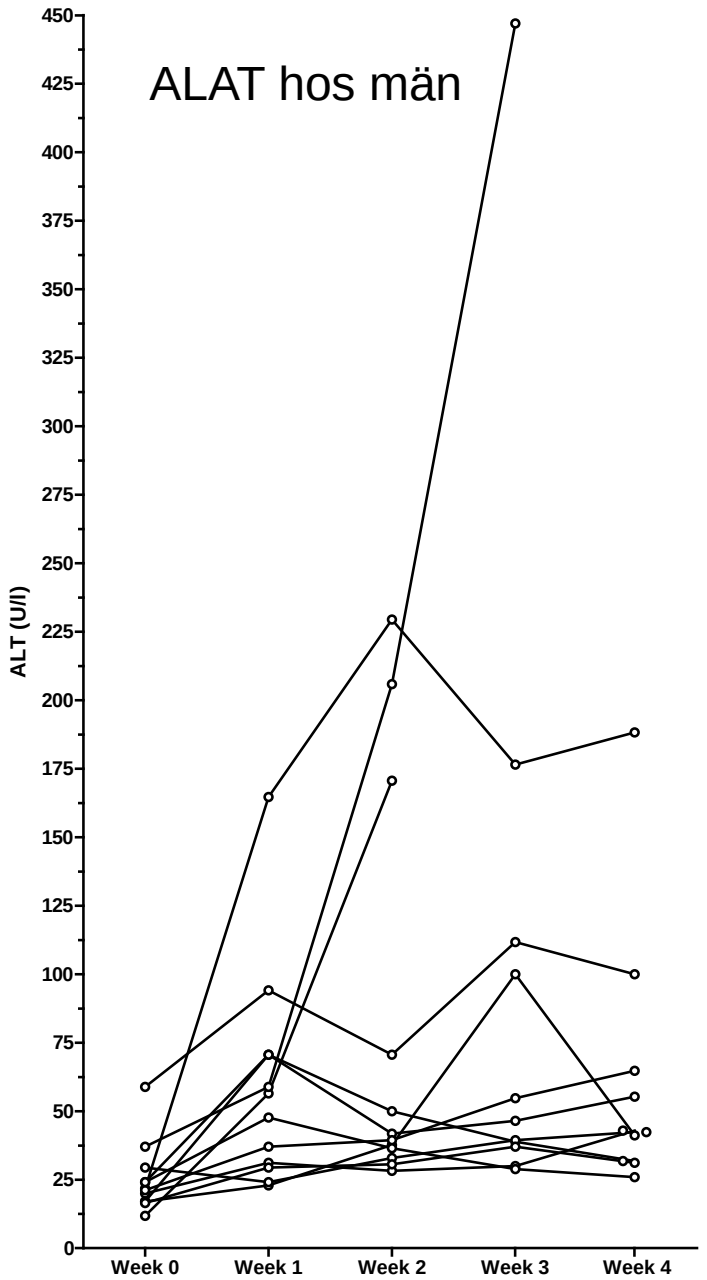
Magnetkameraundersökning av buken

(vitt = fett, snittet är taget strax över höftbenskammen)

Före **Efter**

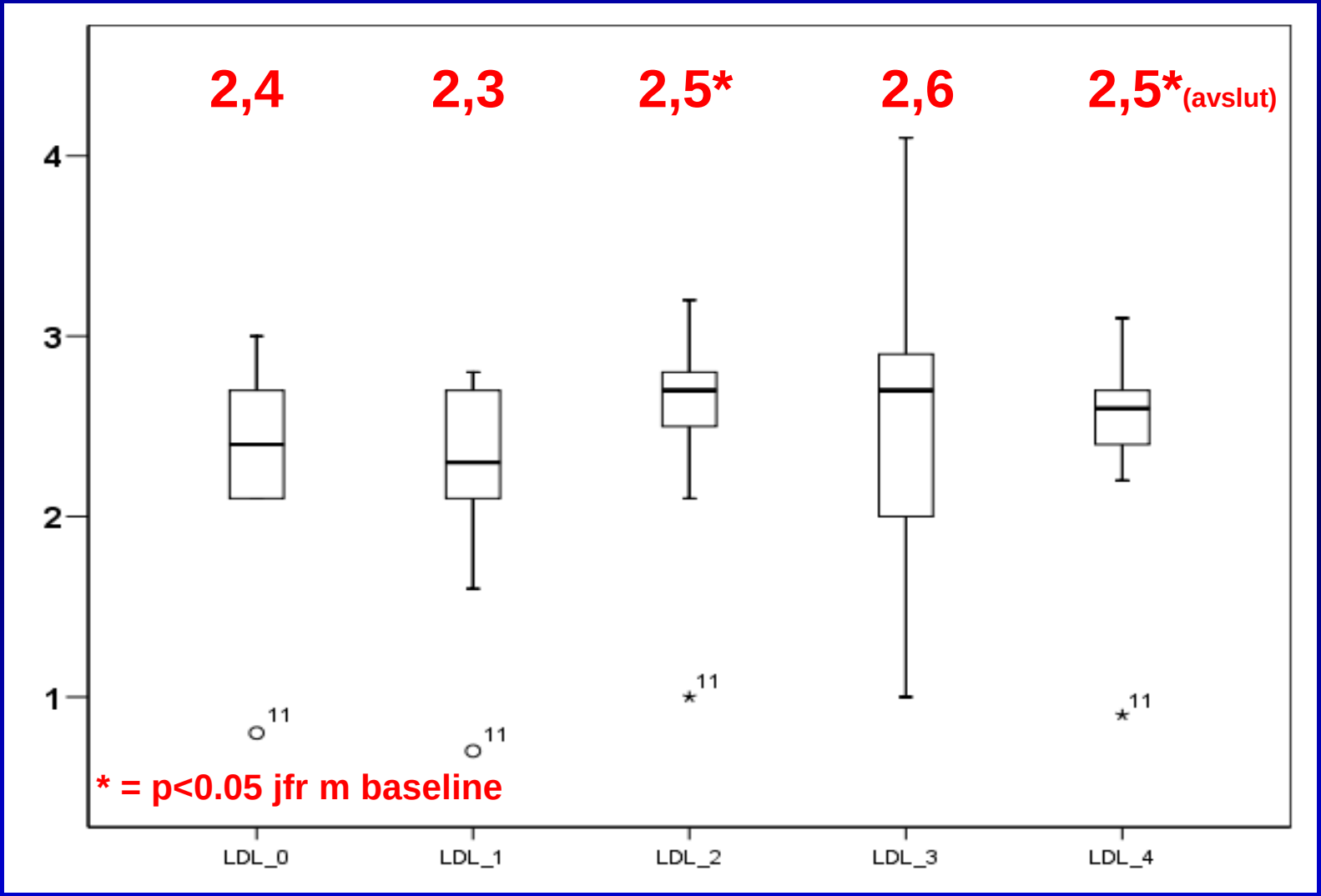




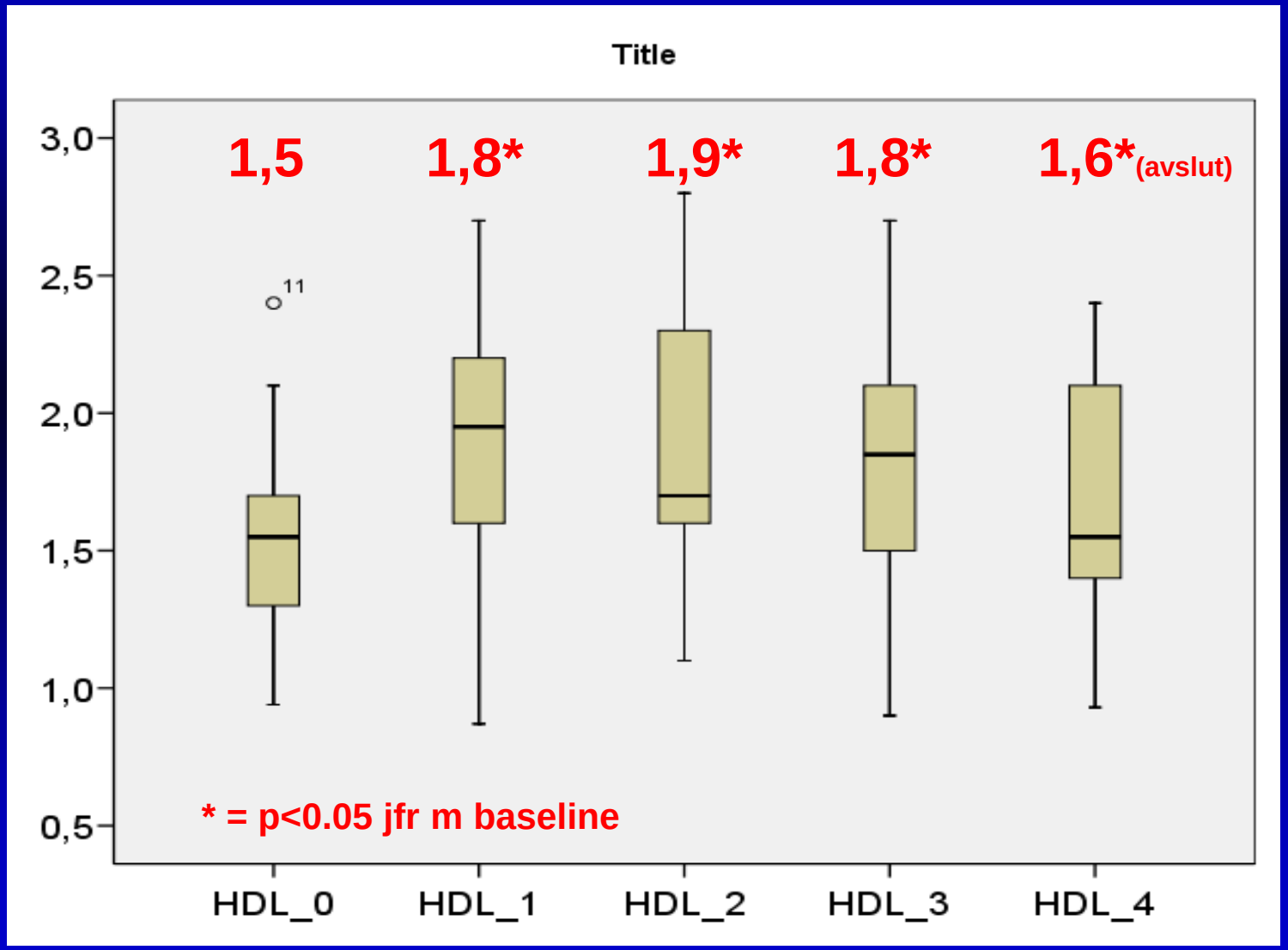


S. Kechagias et al., Gut, 2008

LDL nivåer vid snabbmatsinducerad viktökning
(mmol/l)



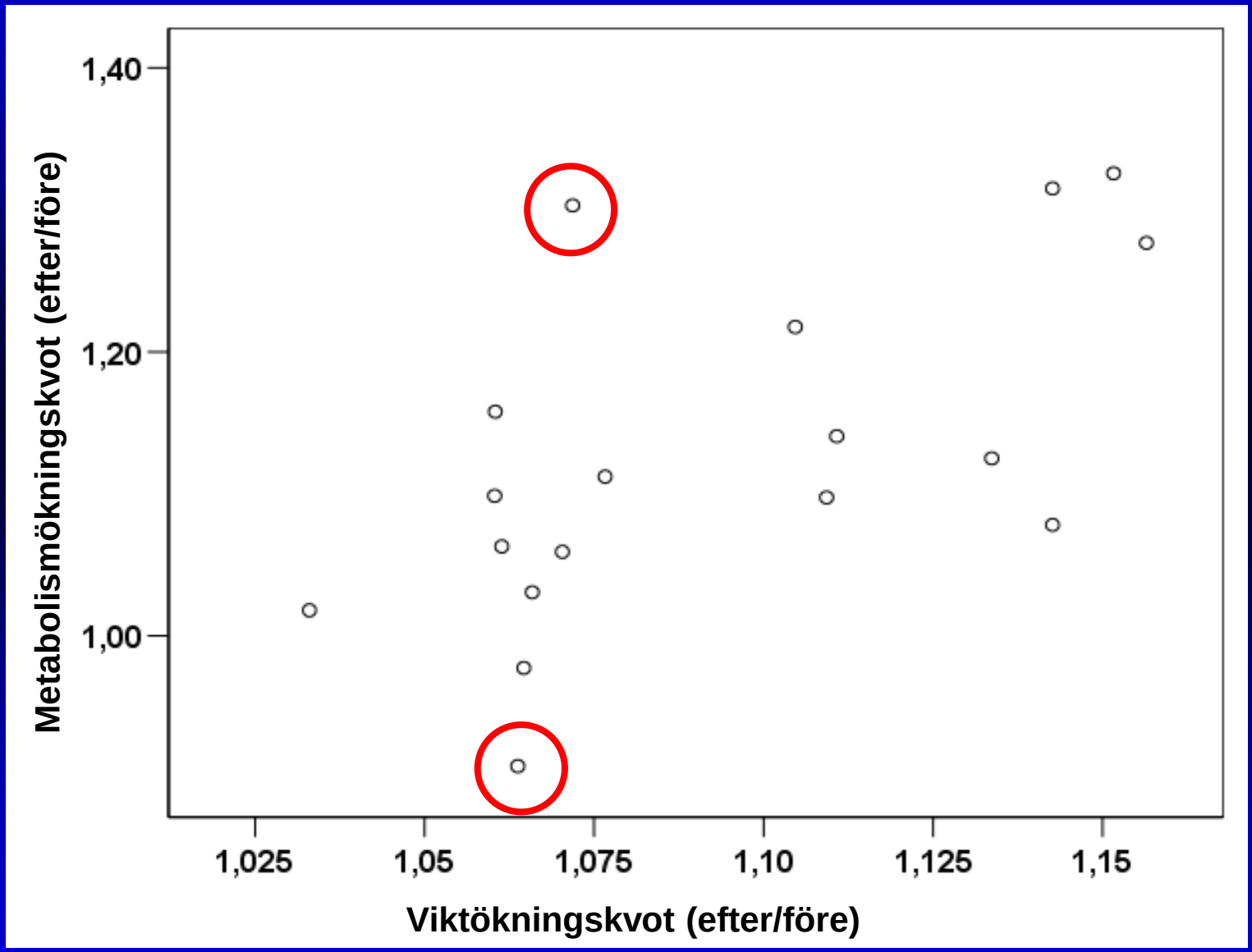
HDL stiger vid snabbmatsinducerad viktökning
(mmol/l)



Mätning av metabolismen (= produktion av koldioxid samt förbrukning av syre)

Viktökning och basalmetabolismökning är kopplade till varandra

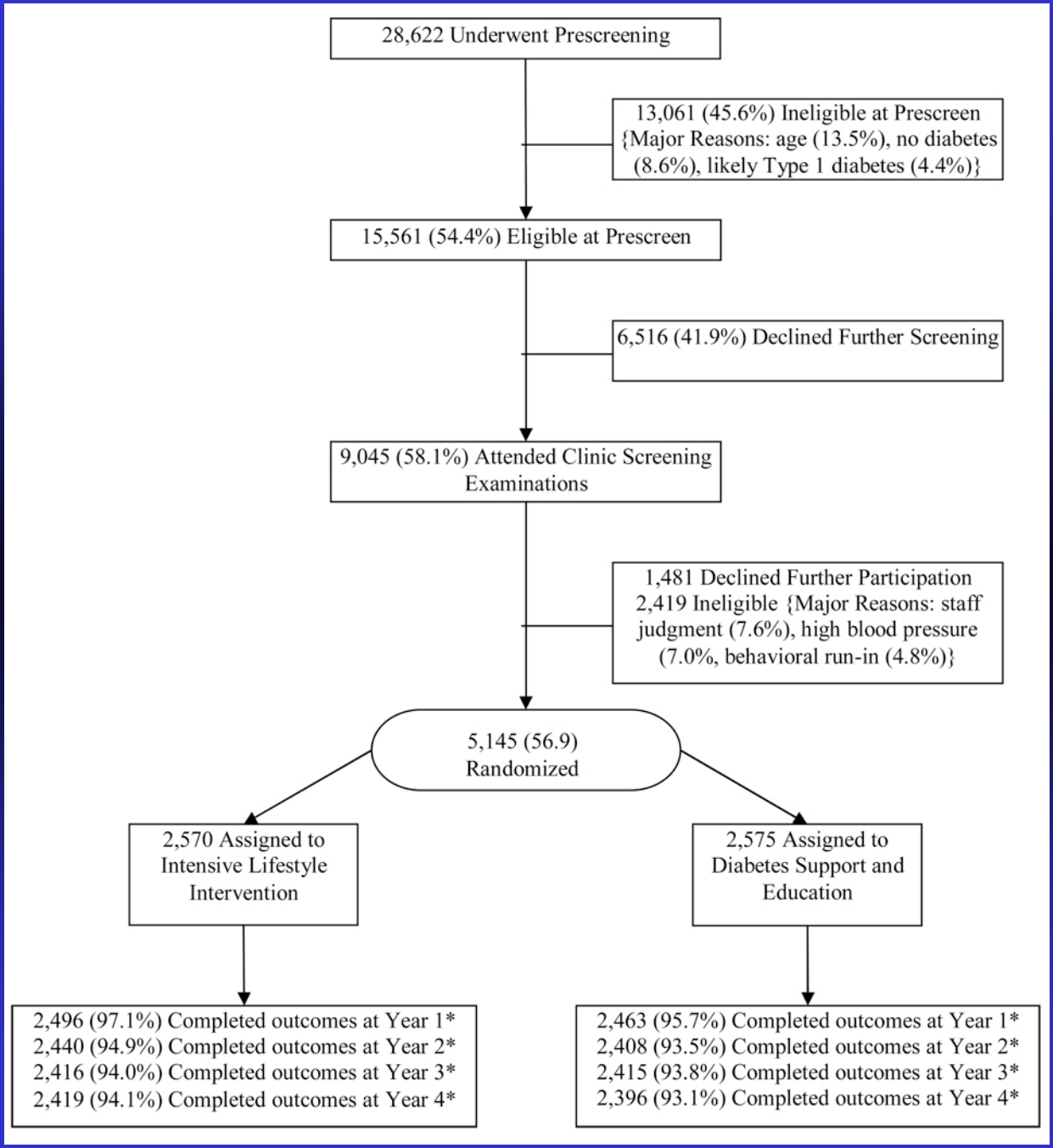
r= 0,62, p= 0,006



Den enda stora studien som testar effekt av livsstilsåtgärder på sjuklighet:

Look AHEAD Trial

Long Term Effects of a Lifestyle Intervention on Weight and Cardiovascular Risk Factors in Individuals with Type 2 Diabetes: Four Year Results of the Look AHEAD Trial
Arch Intern Med 2010 1701566-1575



Cardiovascular Effects of Intensive Lifestyle Intervention in Type 2 Diabetes

The Look AHEAD Research Group
NEJM 2013

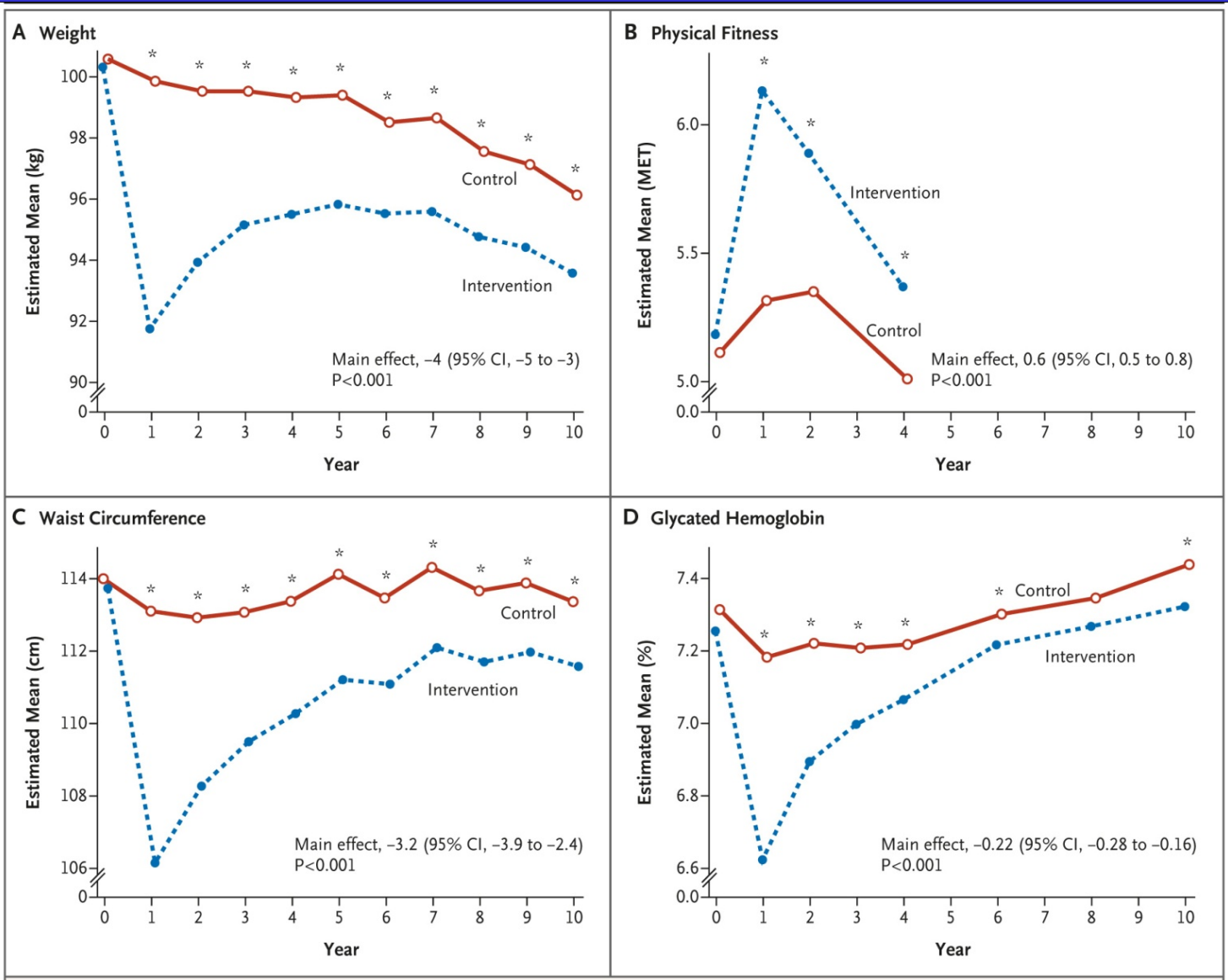
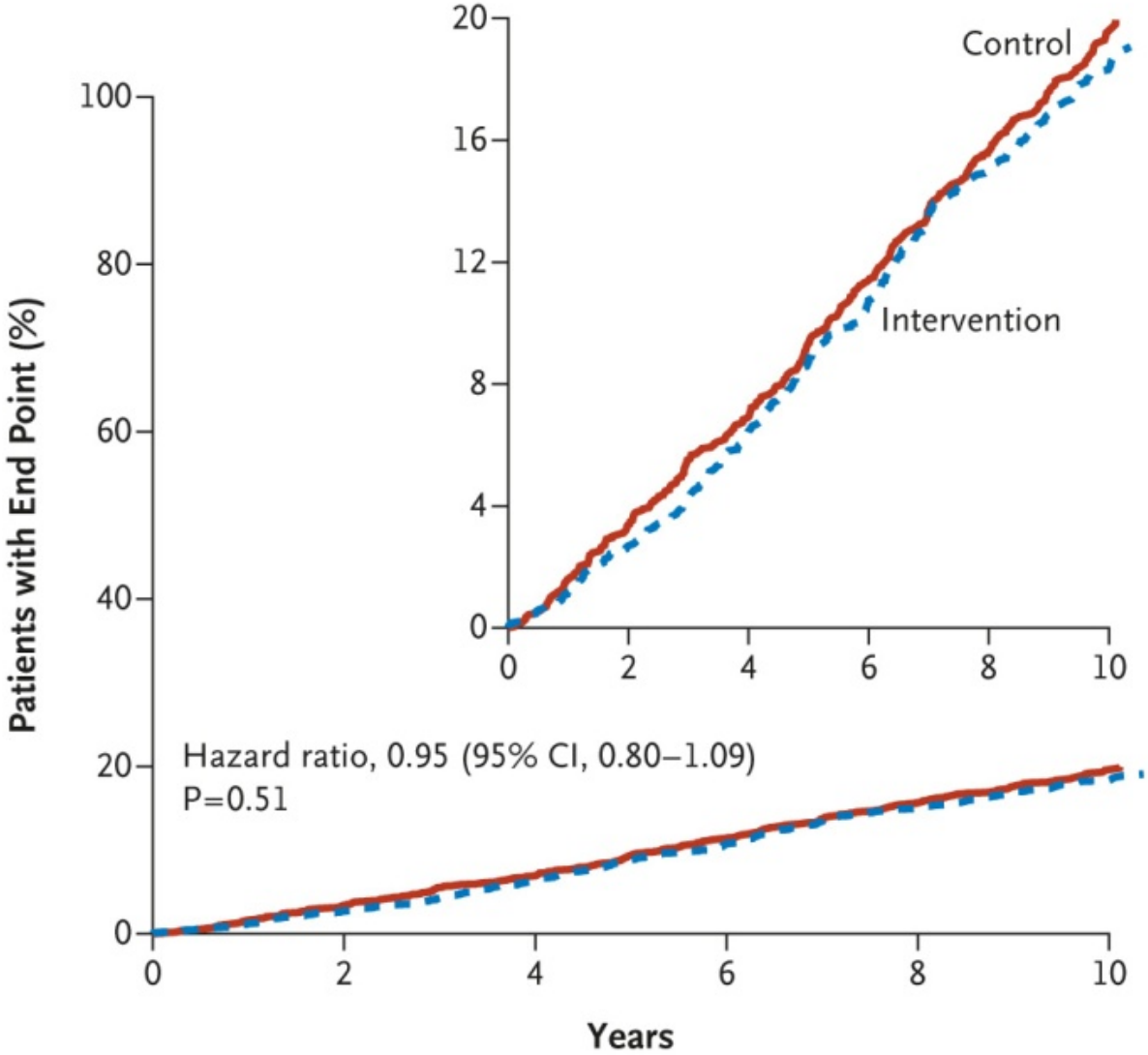


Figure 1. Changes in Weight, Physical Fitness, Waist Circumference, and Glycated Hemoglobin Levels during 10 Years of Follow-up.

Shown are the changes from baseline in overweight or obese patients with type 2 diabetes who participated in an intensive lifestyle intervention (intervention group) or who received diabetes support and education (control group). The reported main effect is the average of all between-group differences after baseline. Means were estimated with the use of generalized linear models for continuous measures. MET denotes metabolic equivalents; asterisks indicate P<0.05 for the between-group comparison. Data from 107 visits during year 11 were not included in the analyses.

Cardiovascular Effects of Intensive Lifestyle Intervention in Type 2 Diabetes

The Look AHEAD Research Group NEJM 2013



No. at Risk						
Control	2575	2425	2296	2156	2019	688
Intervention	2570	2447	2326	2192	2049	505

Figure 2. Cumulative Hazard Curves for the Primary Composite End Point.

Det finns ett riktigt randomiserat test av "nyttig" mat med mkt frukt, grönsaker, fibrer och lite fett:

Women's Health Initiative Study
Reducing Total Fat Intake for CVD prevention

Aim: To study the effect of low-fat, high fruit, vegetable, and grain diet on breast cancer, colorectal cancer and *heart disease* in postmenopausal women

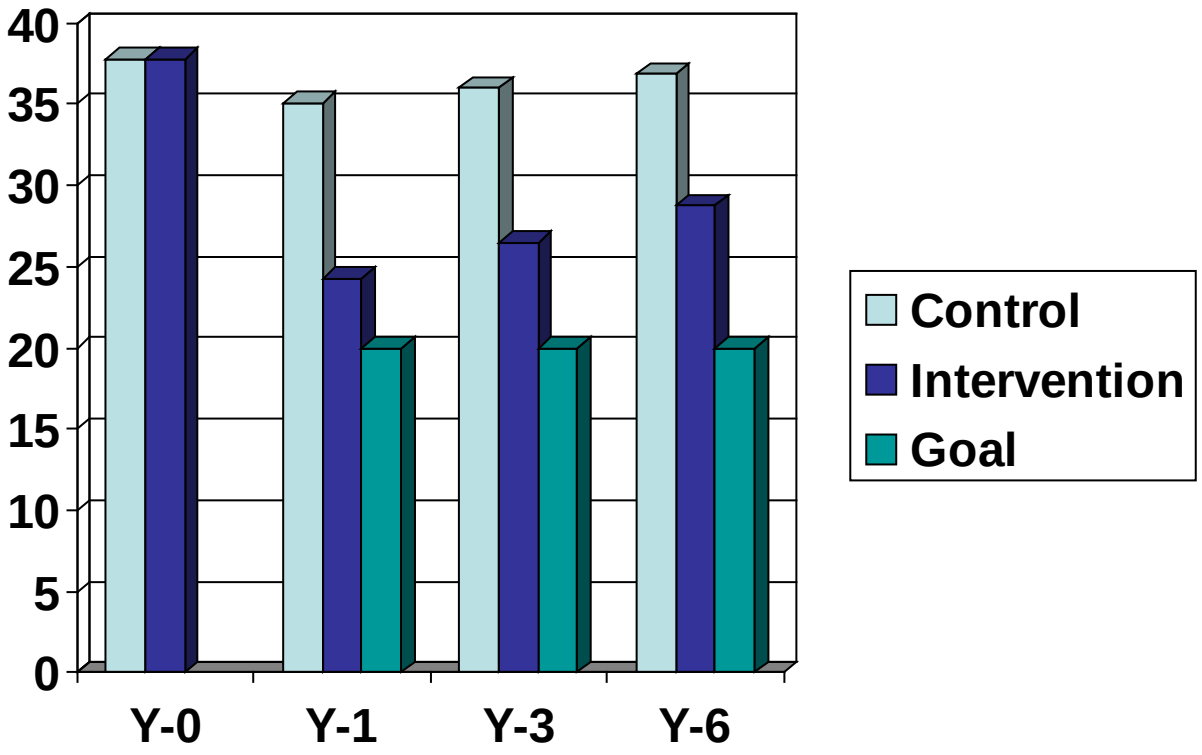
Diet NOT designed for weight loss

48,000 postmenopausal women followed 8 years

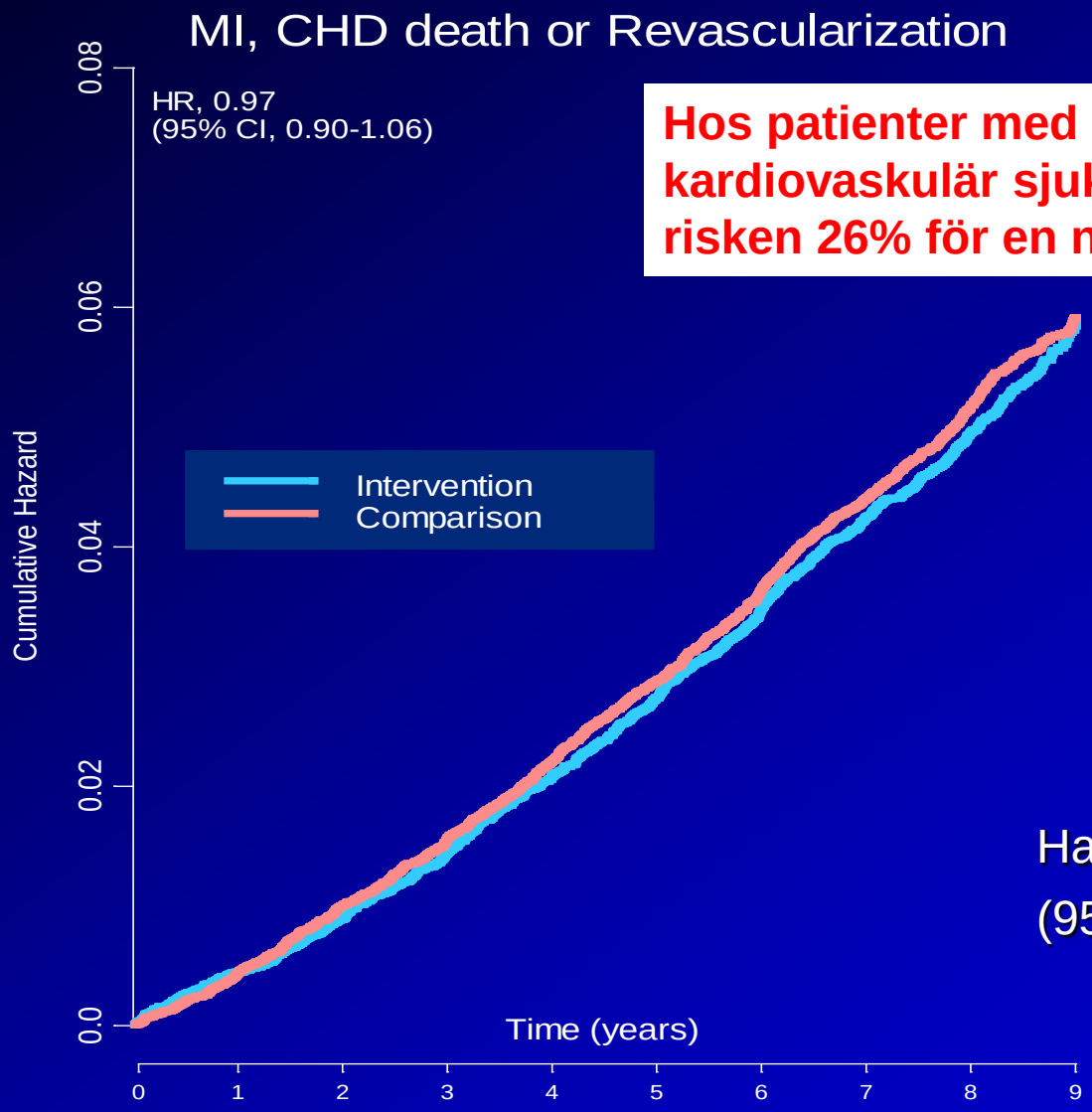
- No intervention – 60% of participants
- Intervention (dietary change) – 40% of participants

Change in Fat Calories Over Time

Women reported a significant decrease in fat-calories, but not to 20E%



Effekt av frukt, grönsaker, fiberrik kost i kombination med att undvika fett



Hos patienter med tidigare kardiovaskulär sjukdom ökade risken 26% för en ny händelse!

Hazard ratio = 0.97

(95% CI = 0.90-1.06)

Howard, B. V. et al. JAMA 2006;295:655-666.

Publicerad 2013-01-02 Dagens Medicin

"Överviktiga hade längre överlevnad

Risken att dö i förtid tycks vara mindre för dem med ett BMI mellan 25 och 30, jämfört med normalviktiga, enligt en ny metaanalys i tidskriften JAMA"

REVIEW

Association of All-Cause Mortality With Overweight and Obesity Using Standard Body Mass Index Categories

A Systematic Review and Meta-analysis

Katherine M. Flegal, PhD
Brian K. Kit, MD
Heather Orpana, PhD
Barry I. Graubard, PhD

Importance Estimates of the relative mortality risks associated with normal weight, overweight, and obesity may help to inform decision making in the clinical setting.

Objective To perform a systematic review of reported hazard ratios (HRs) of all-cause mortality for overweight and obesity relative to normal weight in the general population.

Data Sources PubMed and EMBASE electronic databases were searched through September 30, 2012, without language restrictions.

Study Selection Articles that reported HRs for all-cause mortality using standard body mass index (BMI) categories from prospective studies of general populations of adults were selected by consensus among multiple reviewers. Studies were excluded that used nonstandard categories or that were limited to adolescents or to those with specific medical conditions or to those undergoing specific procedures. PubMed searches yielded 7034 articles, of which 141 (2.0%) were eligible. An EMBASE search yielded 2 additional articles. After eliminating overlap, 97 studies were retained for analysis, providing a combined sample size of more than 2.88 million individuals and more than 270 000 deaths.

Data Extraction Data were extracted by 1 reviewer and then reviewed by 3 independent reviewers. We selected the most complex model available for the full sample and used a variety of sensitivity analyses to address issues of possible overadjustment

THE TOPIC OF THE MORTALITY differences between weight categories has sometimes been described as controversial.[1] The appearance of controversy may arise in part because studies of body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) and mortality have used a wide variety of BMI categories and varying reference categories, which can make findings

Heart, Lung, and Blood Institute's

tality. Grade 1 obesity overall was not associated with higher mortality, and overweight was associated with significantly lower all-cause mortality. The use of predefined standard BMI groupings can facilitate between-study comparisons.

JAMA. 2013;309(1):71-82 www.jama.com

For editorial comment see p 87.

CME available online at www.jamaarchivescme.com and questions on p 91.

Author Video Interview available at www.jama.com.

Author Affiliations: National Center for Health Statistics, Centers for Disease Control and Prevention, Hyattsville, Maryland (Drs Flegal and Kit); School of Psychology, University of Ottawa, Ottawa, Ontario, Canada (Dr Orpana); and Division of Cancer Epidemiology and Genetics, National Cancer Institute, Bethesda, Maryland (Dr Graubard).
Corresponding Author: Katherine M. Flegal, PhD, National Center for Health Statistics, Centers for Disease Control and Prevention, 3311 Toledo Rd, Room 4336, Hyattsville, MD 20782 (kmf2@cdc.gov).

"overweight was associated with significantly lower all-cause mortality" (-6%)

Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

R Estruch et al. NEJM 2013

Rekommendationer lågfettkost

drinkers)	
Discouraged	
Soda drinks	<1 drink/day
Commercial bakery goods, sweets, and pastries§	<3 servings/wk
Spread fats	<1 serving/day
Red and processed meats	<1 serving/day
Low-fat diet (control)	
Recommended	
Low-fat dairy products	≥3 servings/day
Bread, potatoes, pasta, rice	≥3 servings/day
Fresh fruits	≥3 servings/day
Vegetables	≥2 servings/wk
Lean fish and seafood	≥3 servings/wk
Discouraged	
Vegetable oils (including olive oil)	≤2 tbsp/day
Commercial bakery goods, sweets, and pastries§	≤1 serving/wk
Nuts and fried snacks	≤1 serving /wk
Red and processed fatty meats	≤1 serving/wk
Visible fat in meats and soups¶	Always remove
Fatty fish, seafood canned in oil	≤1 serving/wk
Spread fats	≤1 serving/wk
Sofrito‡	≤2 servings/wk

Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

R Estruch et al. NEJM 2013

Rekommendationer Medelhavskost

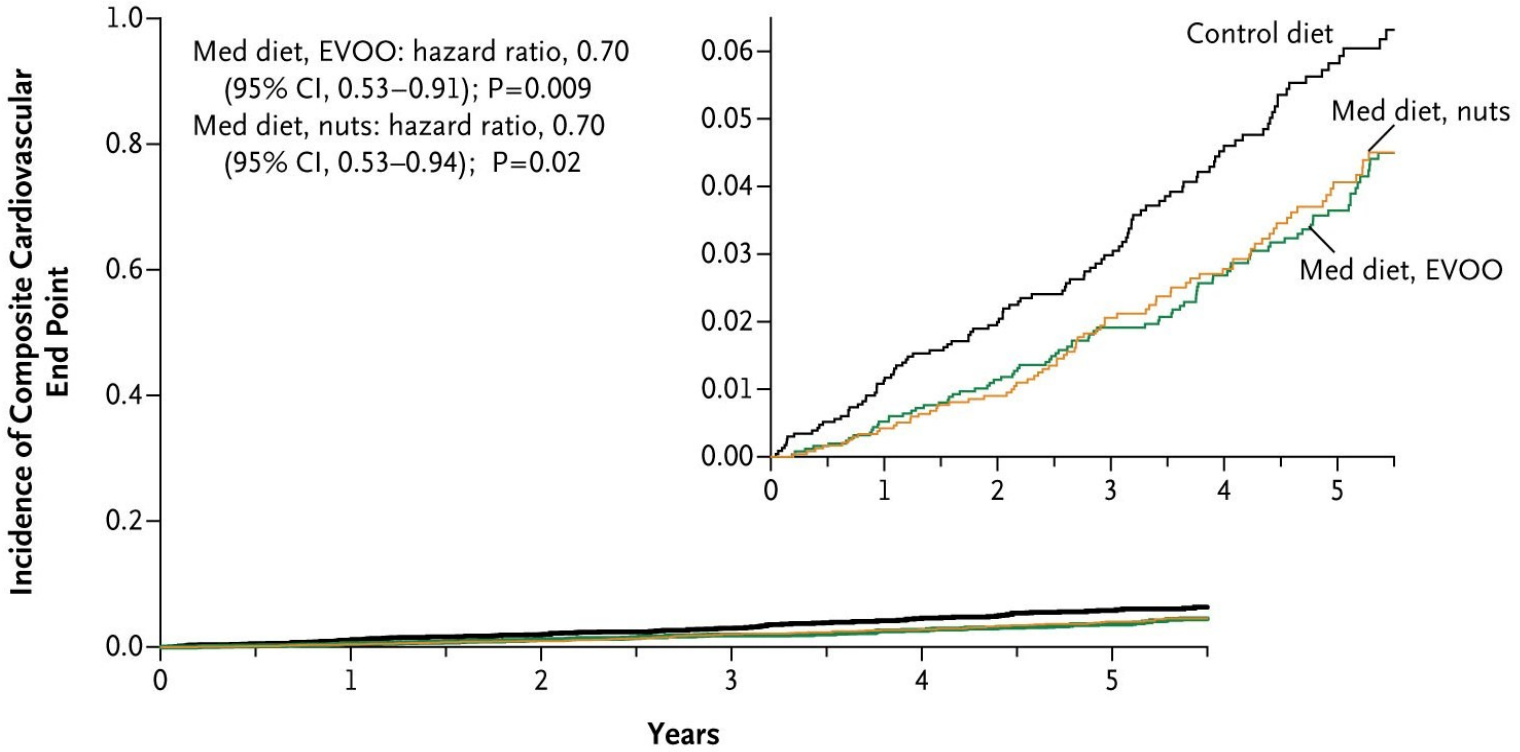
Table 1. Summary of Dietary Recommendations to Participants in the Mediterranean-Diet Groups and the Control-Diet Group.

Food	Goal
Mediterranean diet	
Recommended	
Olive oil*	≥4 tbsp/day
Tree nuts and peanuts†	≥3 servings/wk
Fresh fruits	≥3 servings/day
Vegetables	≥2 servings/day
Fish (especially fatty fish), seafood	≥3 servings/wk
Legumes	≥3 servings/wk
Sofrito‡	≥2 servings/wk
White meat	Instead of red meat
Wine with meals (optionally, only for habitual drinkers)	≥7 glasses/wk
Discouraged	
Soda drinks	<1 drink/day
Commercial bakery goods, sweets, and pastries§	<3 servings/wk
Spread fats	<1 serving/day
Red and processed meats	<1 serving/day
Low-fat diet (control)	
Recommended	
Low-fat dairy products	≥3 servings/day

Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

R Estruch et al. NEJM 2013

A Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)



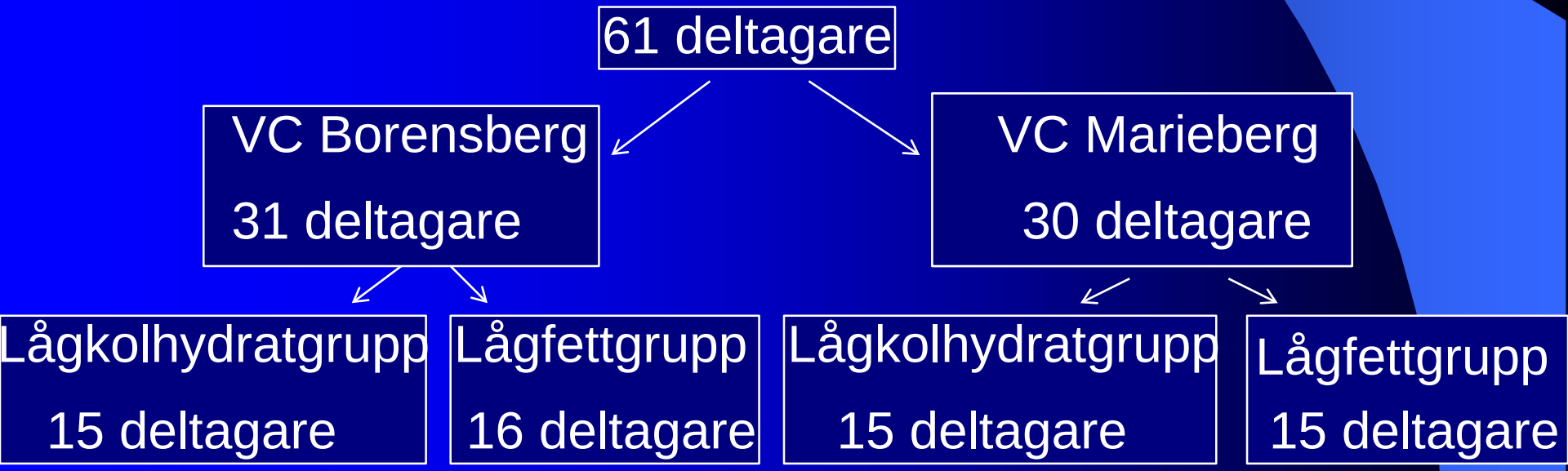
No. at Risk

Control diet	2450	2268	2020	1583	1268	946
Med diet, EVOO	2543	2486	2320	1987	1687	1310
Med diet, nuts	2454	2343	2093	1657	1389	1031

VÄSTKOST

Fett eller kolhydrater för patienter med diabetes?

- Hans Guldbrand distriktsläkare
- Sammanlagt 61 patienter med diabetes typ 2.
- 30 + 31 patienter på 2 vårdcentraler.

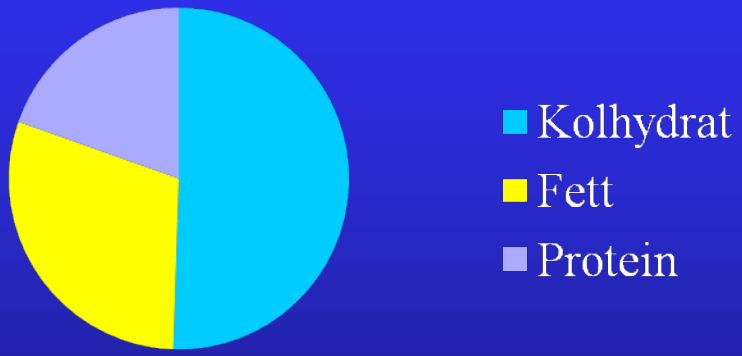


Guldbrand et al Diabetologia 2012

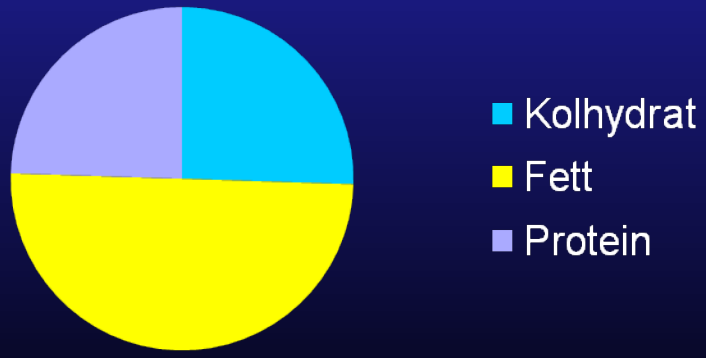
Kostregistrering

Guldbrand et al Diabetologia 2012

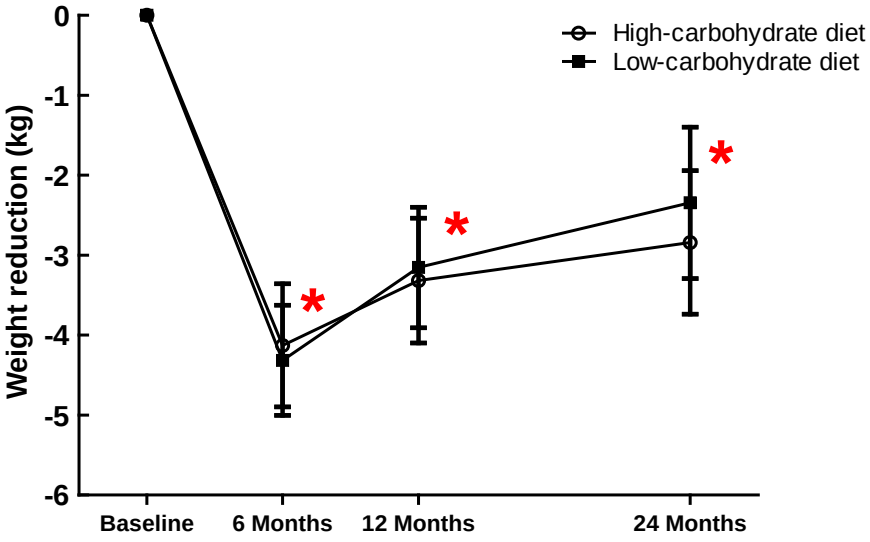
Lågfettgrupp vid 6 månader

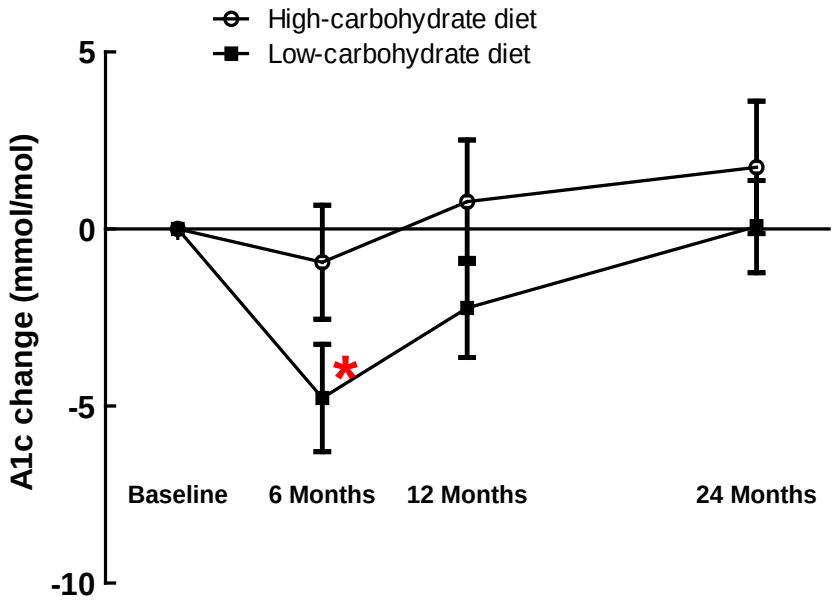


Högfettgrupp vid 6 månader



In type 2 diabetes, randomisation to advice to follow a low-carbohydrate diet transiently improves glycaemic control compared with advice to follow a low-fat diet producing a similar weight loss,





* **sign. jfr. med baseline inom gruppen**

Guldbrand et al. Diabetologia 2012

Inom grupperna vid 6 månader jämfört med start hade

Lågfettgruppen LDL kolesterol som gick från 2.36 ±0.65 **till 2.31** ±0.76 **mmol/l, p= 0.7**

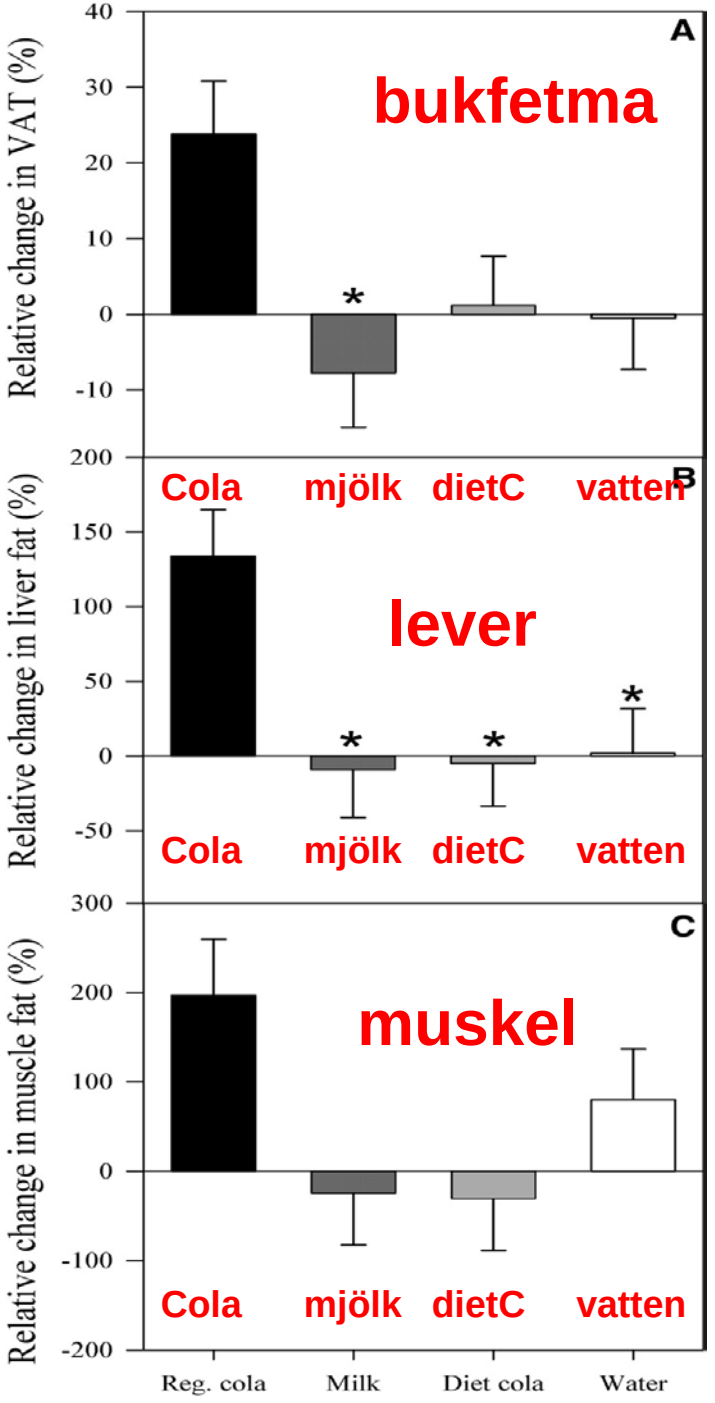
HDL kolesterol som gick från 1.08 ±0.29 **till 1.10** ±0.30 **mmol/l, p= 0.4**

Högfettgruppen LDL kolesterol som gick från 2.61 ± 0.84 till 2.49 ±0.75 **mmol/l, p= 0.4**

HDL kolesterol som gick från 1.13 ±0.33 **till 1.25** ±0.47 **mmol/l, p= 0.02**

Gulbrand et al Diabetologia 2012

Var hamnar det fett kroppen själv bildar (lagrar) om man konsumerar för mkt kalorier?



Sucrose-sweetened beverages increase fat storage in the liver, muscle, and visceral fat depot: a 6-mo randomized intervention study

Maersk M et al. Am J Clin Nutr 2011;95:283-289

Electronic supplementary material

Table 1

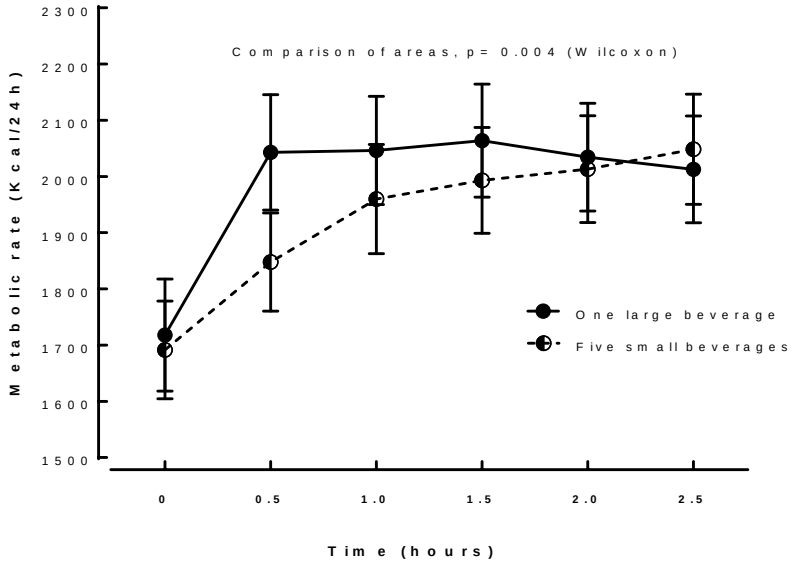
Anthropometrics, metabolic outcomes and medication at 0, 6, 12 and 24 months after the initiation in patients with type 2 diabetes randomised to a low-fat or low-carbohydrate diet and had followed the fat-restriction: ≤35 energy % for low-fat group (n= 20), ≥45 energy % for low-carbohydrate group (n= 12) at the 24 month registration.

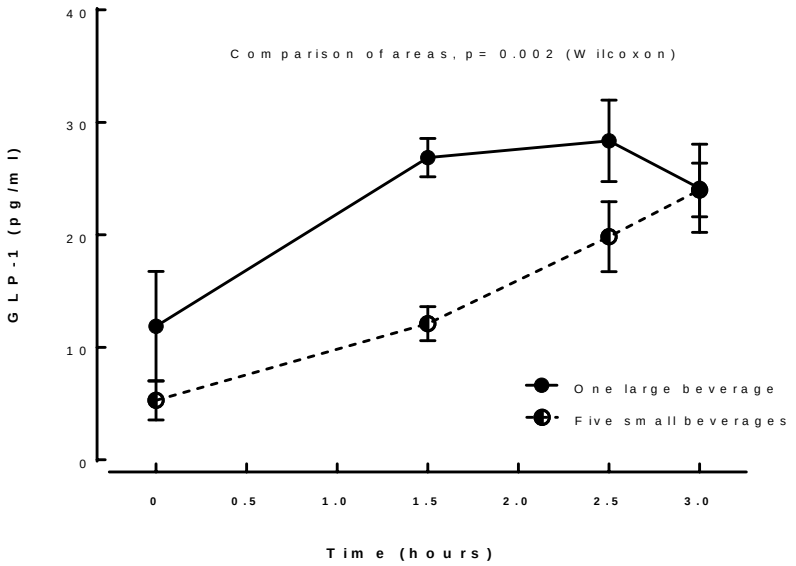
Variable	Diet	Time point									
		0 months		6 months		12 months		24 months			
			P value[a]		*P* value[b]		*P* value[b]		*P* value[b]	*P* value[c]	*P* value[d]
Weight (kg)	Low-fat	98.4±19	0.061	93.8±19	<0.001	94.5±18	0.002	94.9±19	0.001	<0.001	0.096
	Low-carb.	85.0±18		80.1±16	<0.001	82.8±17	0.001	82.0±18	0.018	<0.001	
BMI (kg/m^2)	Low-fat	34.8±5.6	0.040	33.1±5.2	<0.001	33.4±5.0	0.002	33.5±5.6	0.001	<0.001	0.053
	Low-carb.	30.4±5.4		28.7±4.9	<0.001	29.3±5.4	0.001	29.3±5.4	0.016	<0.001	
Waist (cm)	Low-fat	111±12	0.033	107±13	0.001	107±12	<0.001	108±14	0.011	<0.001	0.072
	Low-carb.	102±13		98±11	0.002	97±11	0.003	100±13	0.022	<0.001	
Sagittal abdominal diameter (cm)	Low-fat	27±5	0.11	27±4	0.24	27±4	0.27	27±4	0.98	0.40	0.010
	Low-carb.	25±4		23±3	0.008	23±3	0.006	23±4	0.013	0.003	
HbA1c (%) (mmol/mol)	Low-fat	7.1±2.9 54.5±8.0	0.28	7.0±3.0 52.9±9.7	0.35	6.9±3.0 52.3±9.1	0.16	7.4±3.2 56.9±11.1	0.22	0.021	0.77
	Low-carb.	7.4±2.7 57.5±6.4		6.9±3.1 51.6±10.0	0.034	7.1±3.2 54.5±11.3	0.16	7.3±2.8 56.5±7.4	0.65	0.14	
Systolic blood pressure (mmHg)	Low-fat	137±13	0.065	127±14	0.006	125±10	0.001	125±15	0.001	0.001	0.11
	Low-carb.	128±14		122±16	0.22	125±12[‡]	0.29	122±13	0.44	0.51	
Diastolic blood pressure (mmHg)	Low-fat	78±8	0.054	75±7	0.065	67±9	<0.001	72±11	0.014	<0.001	0.34
	Low-carb.	71±13		70±9	0.72	70±11[‡]	0.57	68±6	0.20	0.39	

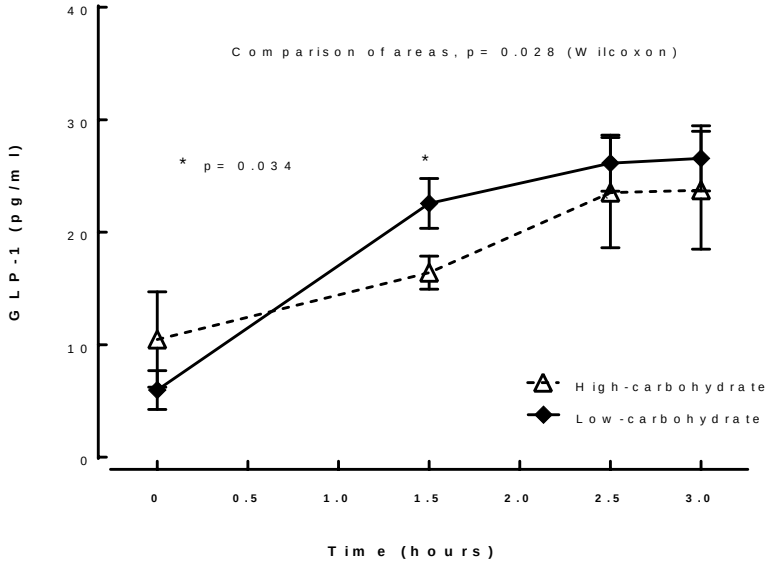
Guldbrand et al Diabetologia 2012

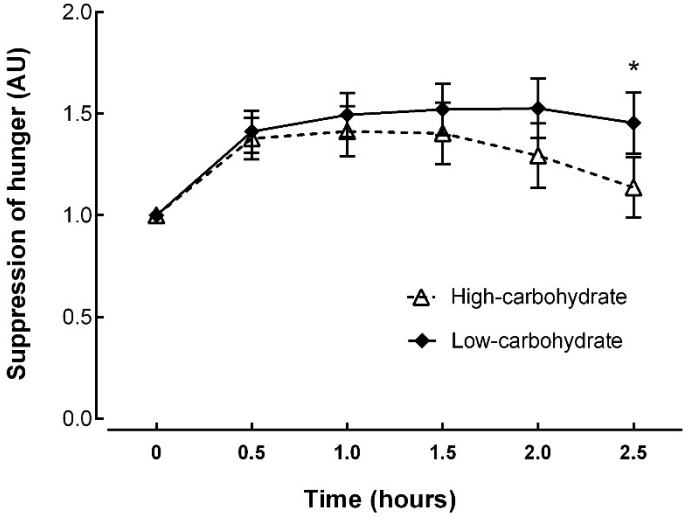
Två drinkar Low-carb. eller High-carb. som 1 stor eller 5 små portioner med totalt 750 kcal

Ingves et al. Peptides 2017

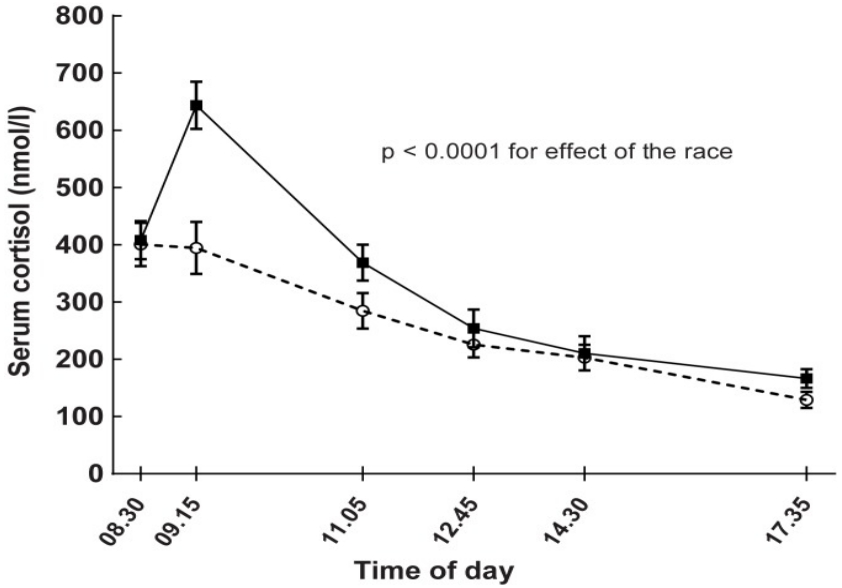


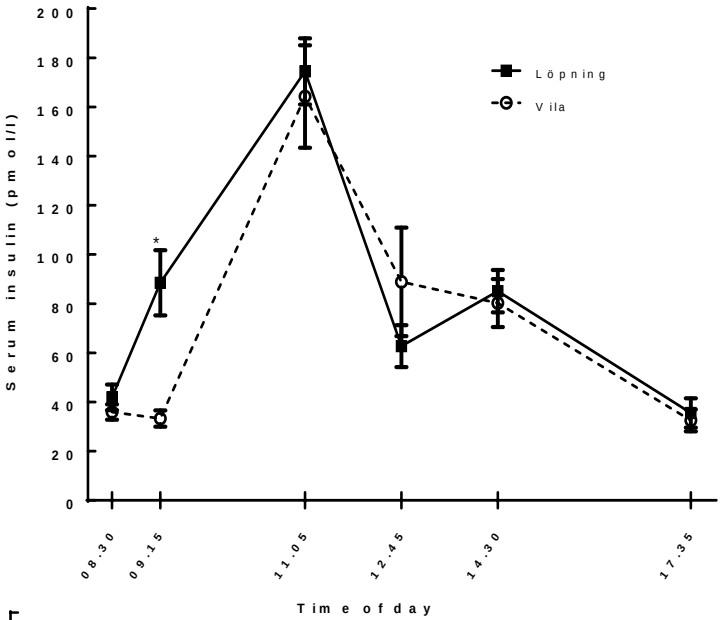


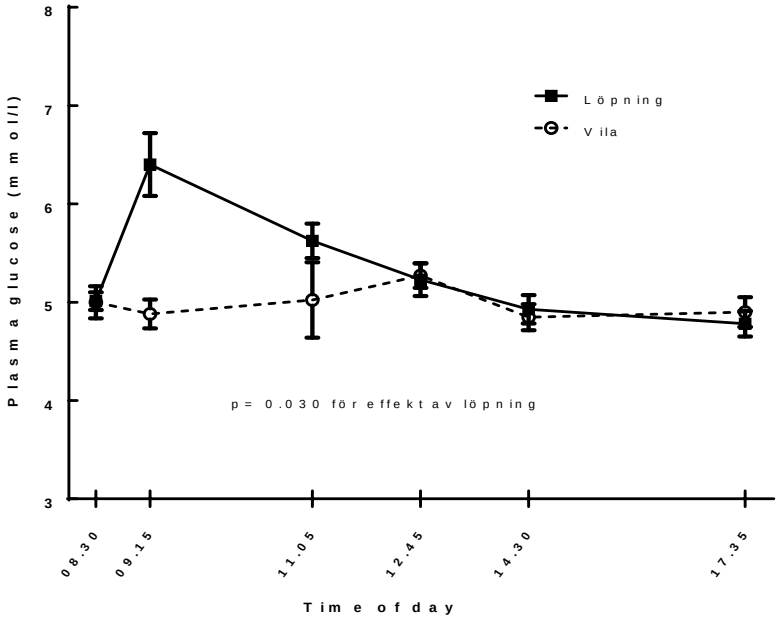


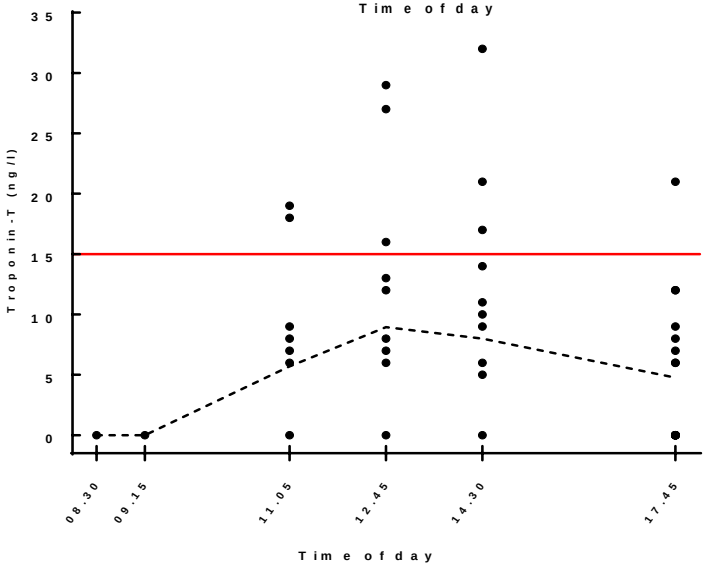


Metabola effekter av 5 km löpning







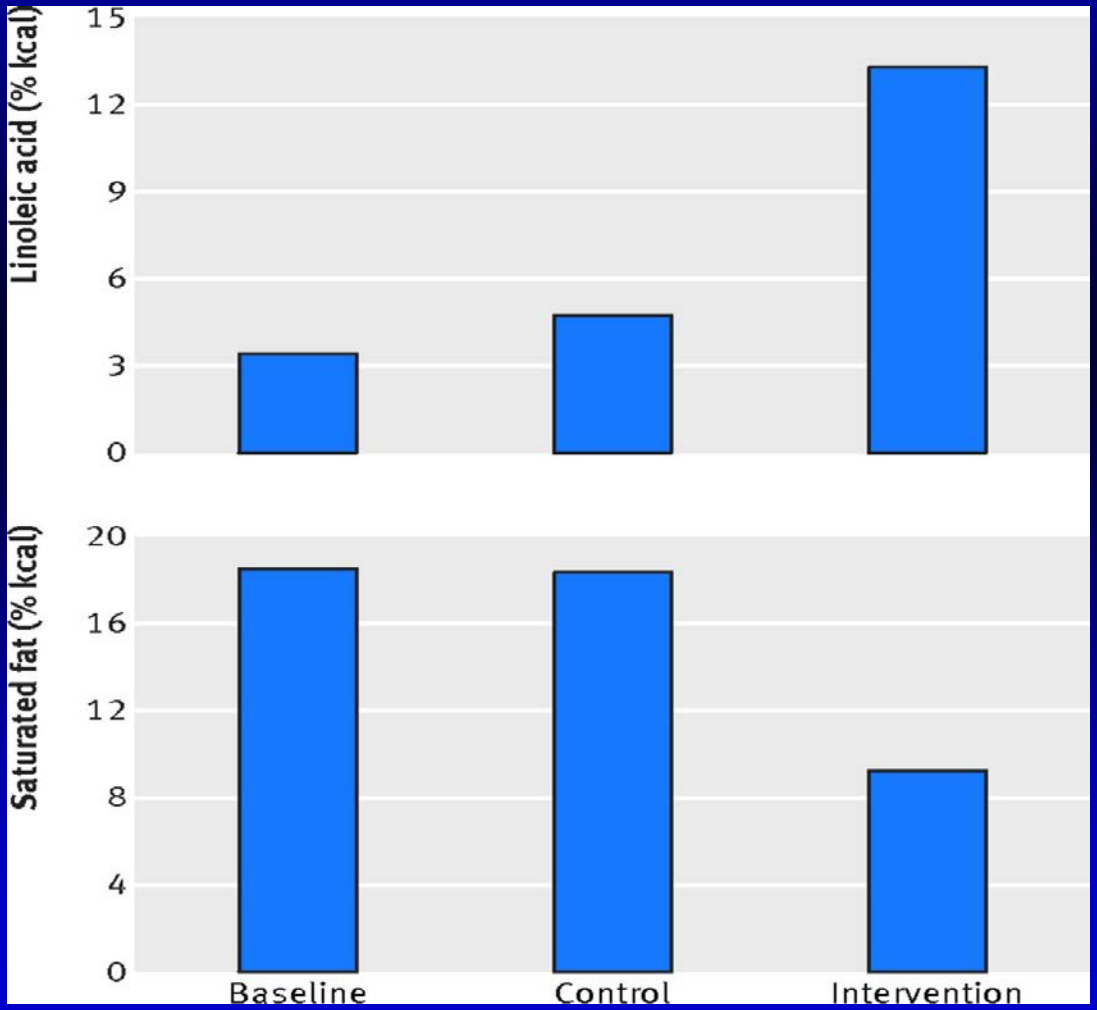


Keselman, Vergara Nystrom et al. PLOS ONE 2017

Re-evaluation of the traditional diet-heart hypothesis: analysis of recovered data from Minnesota Coronary Experiment (1968-73)

BMJ 2016;353:i1246 N= 9423.

“reduction in serum cholesterol −13.8% P<0.001”



Ancel Keys

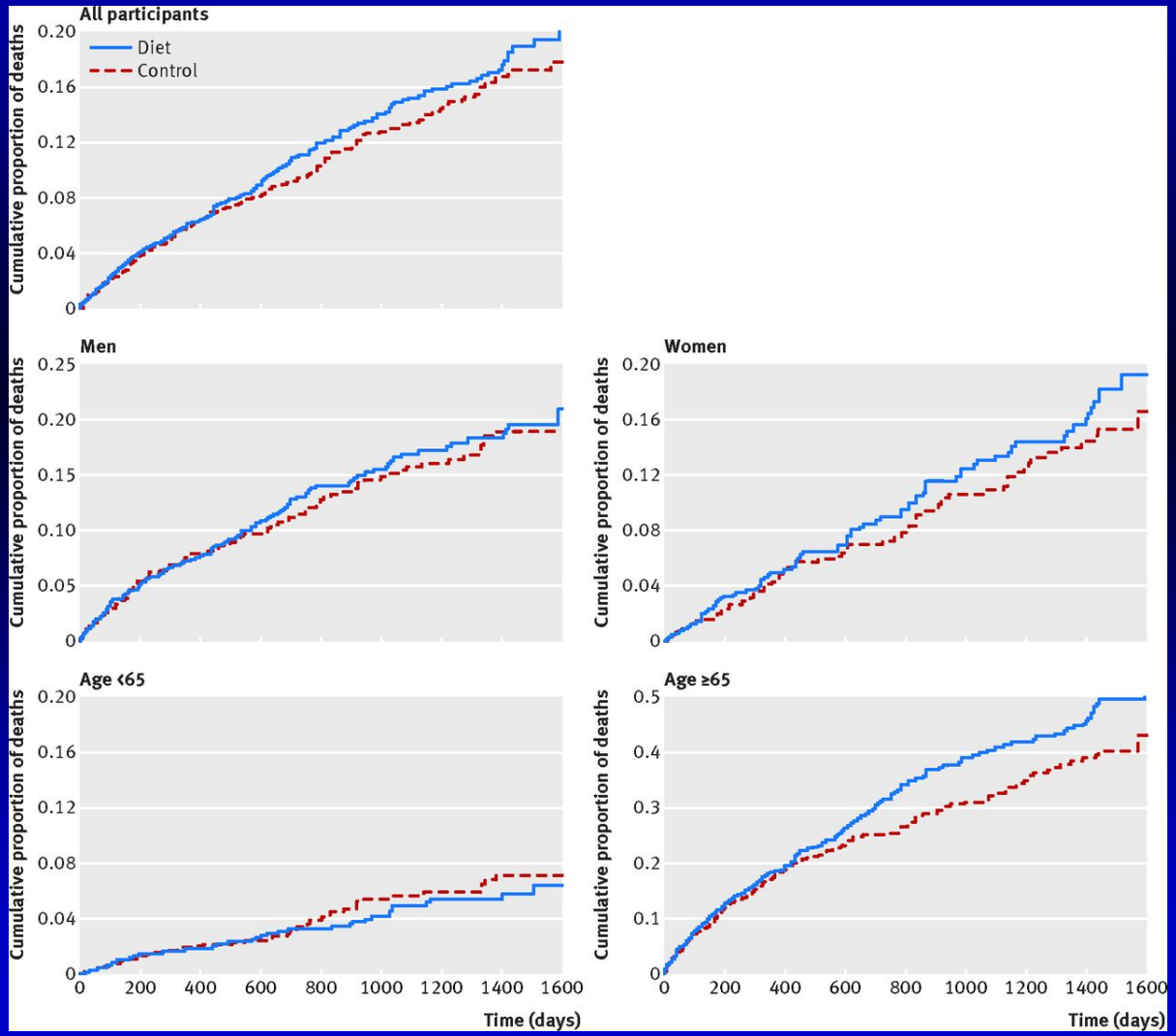
- ”*Mättat fett är farligt*”

Re-evaluation of the traditional diet-heart hypothesis: analysis of recovered data from Minnesota Coronary Experiment (1968-73)

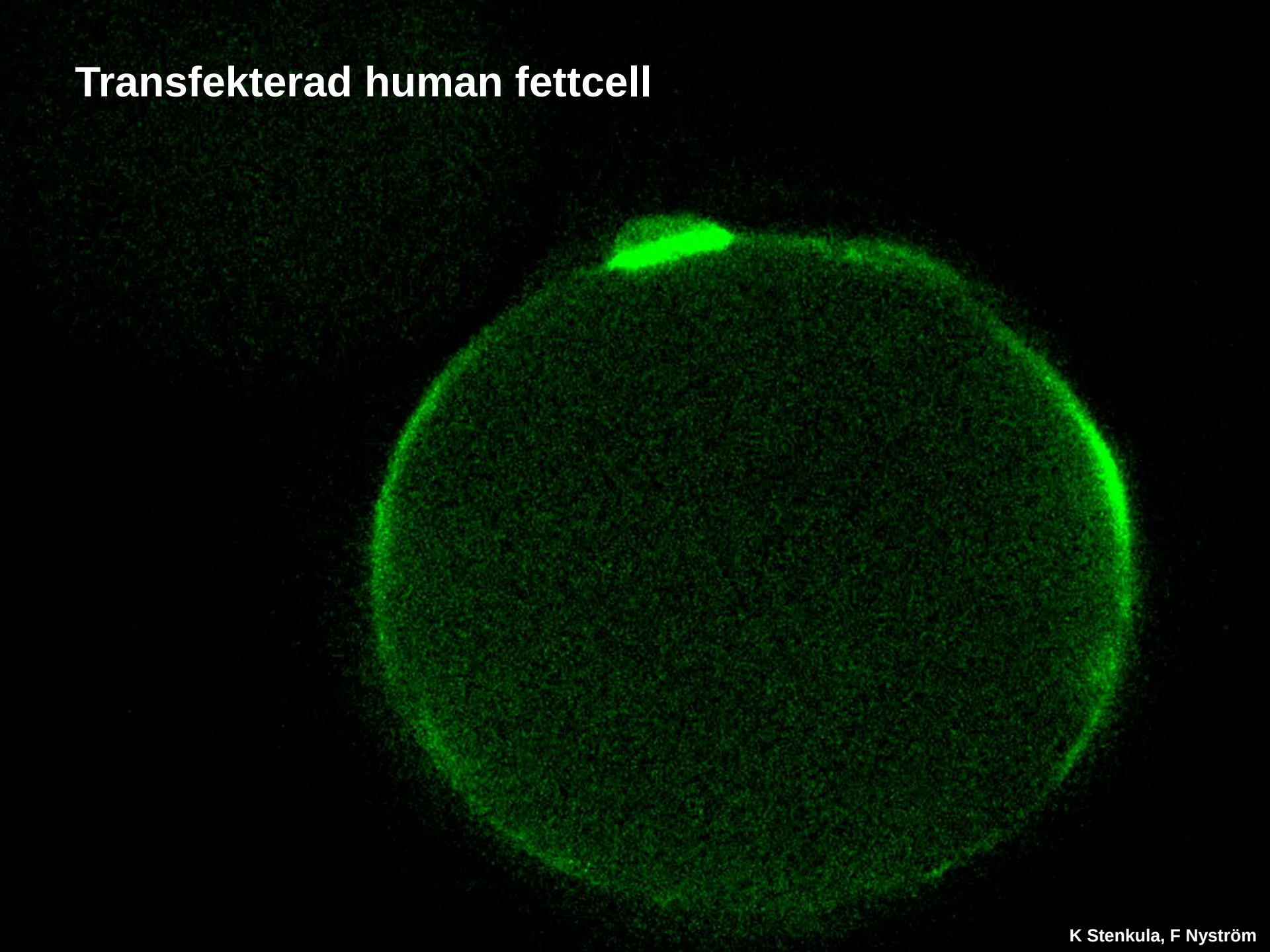
BMJ 2016;353:i1246 N= 9423. **There was a 22% higher risk of death for each 30 mg/dL (0.78 mmol/L) reduction in serum cholesterol in covariate adjusted Cox regression models (hazard ratio 1.22, 95% confidence interval 1.14 to 1.32; P<0.001).**

Kraftigt ökat intag av majsolja sänkte kolesterol men ökade samtidigt dödligheten

(+22% / 0.78 mmol/l sänkning)



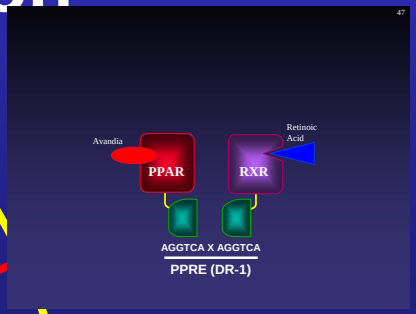
Transfekterad human fettcell

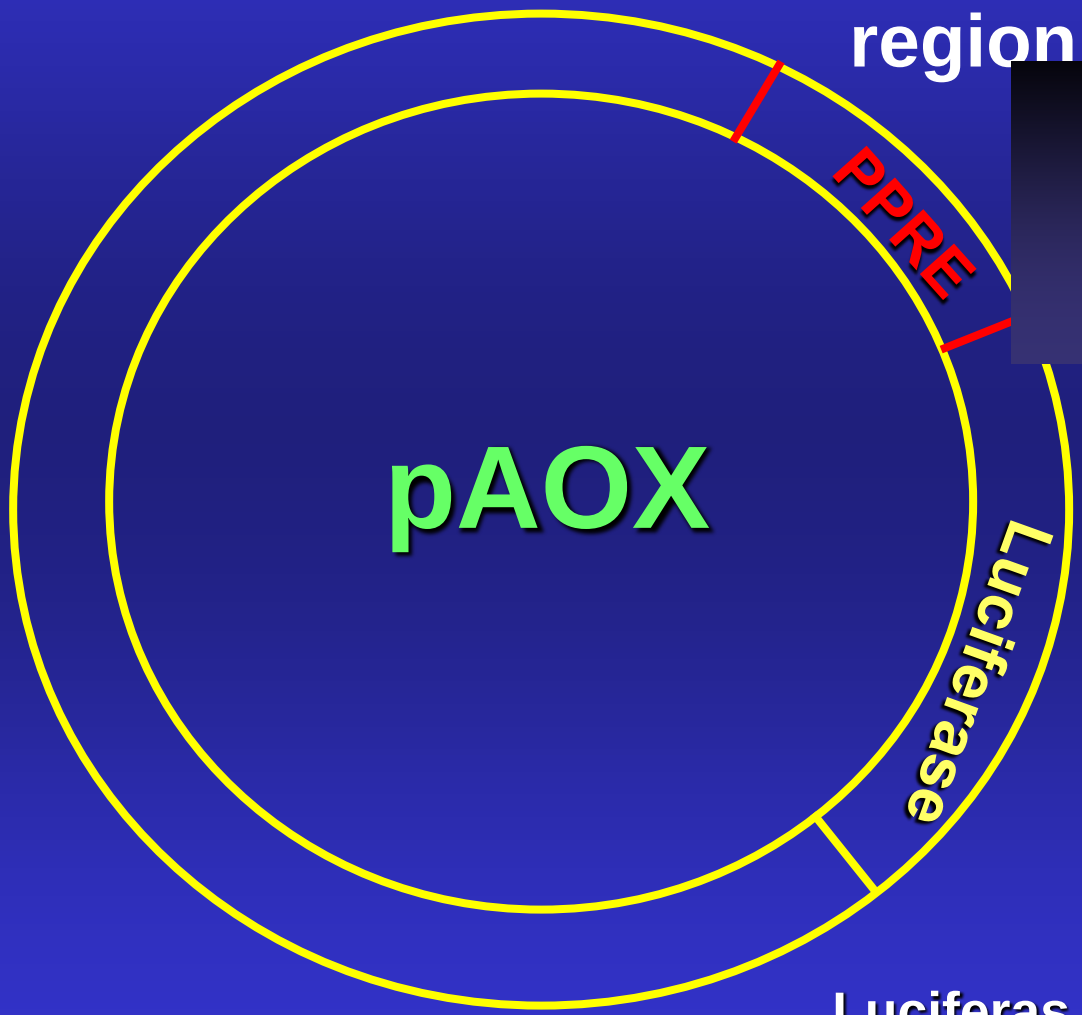


K Stenkula, F Nyström

Plasmid

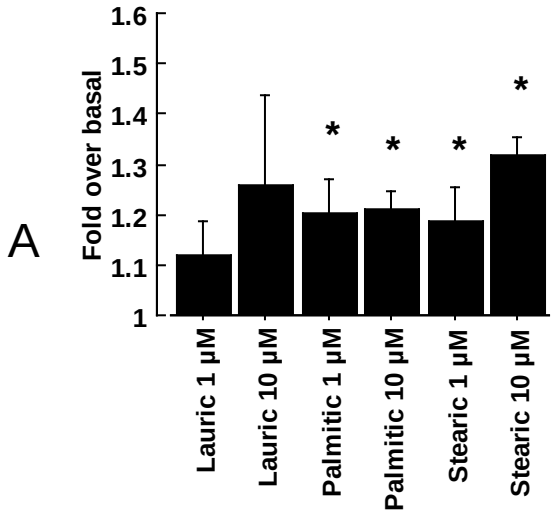
Promotor-region

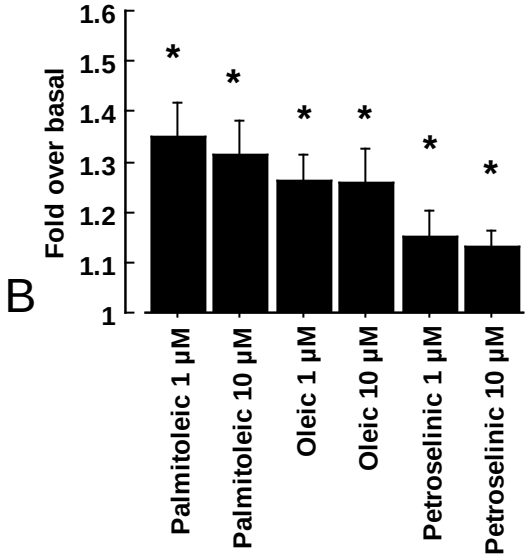


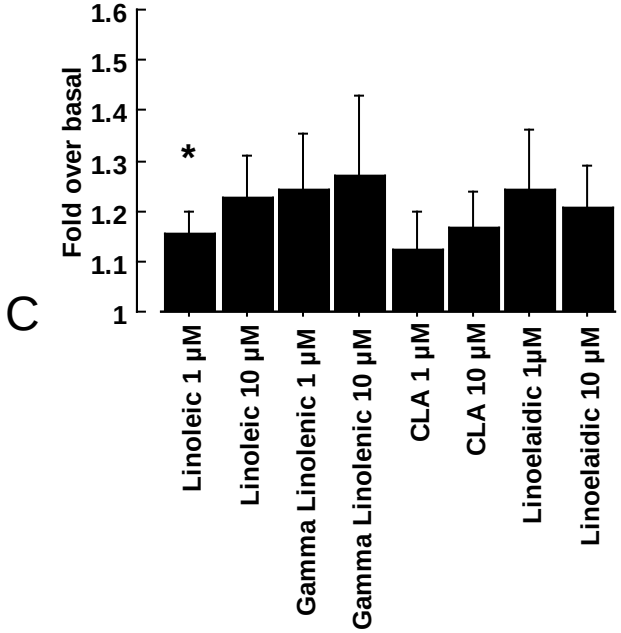


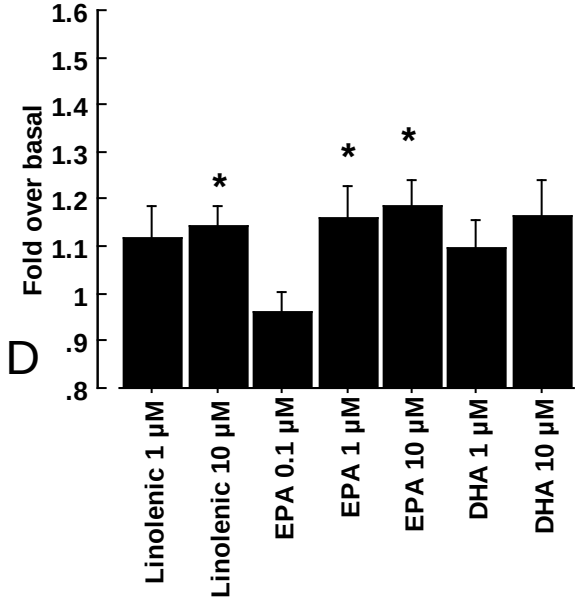
Luciferas (enzym) + luciferin (substrat) = ljus

Effekt av olika fettsyror på PPAR gamma aktivitet i mänskliga fettceller







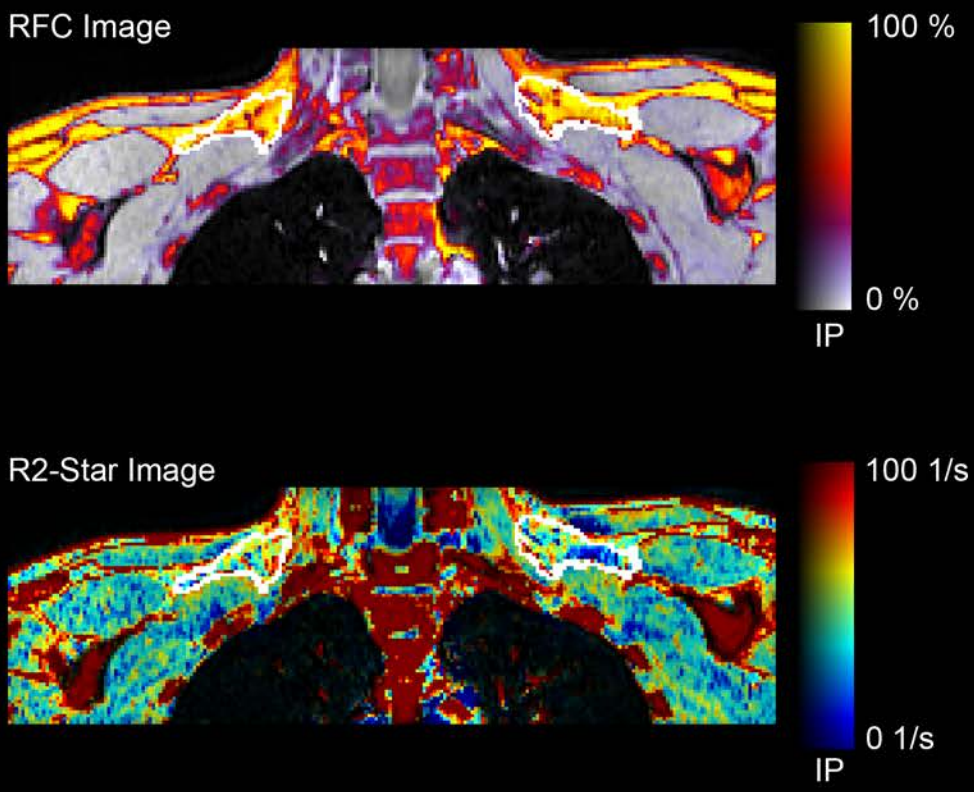


Sauma L, Nystrom F et al. Nutrition 2006

Köldstudien

Automatic Muscle and Visceral Fat Segmentation

Supraclavicular BAT Segmentation



Romu, Nystrom et al 2016, Metabolism

”Köldstudien”

En lottad studie under 6 veckor

26 friska frivilliga

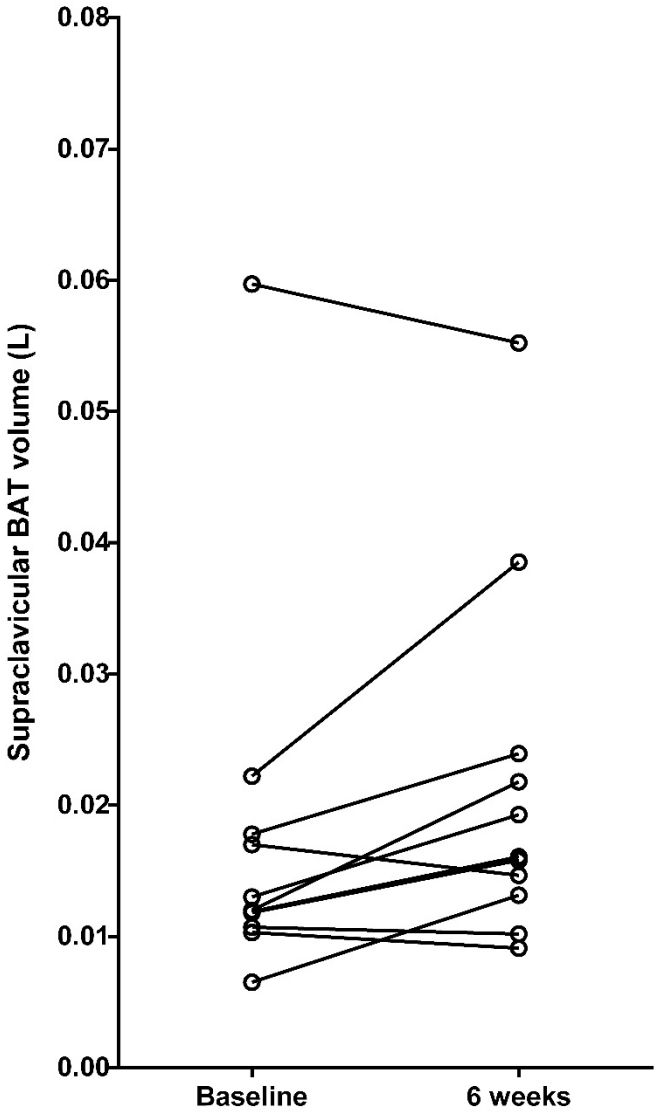
- **14 som skulle frysa under minst en timme/dag (men inte huttra)**
- **12 som skulle klä sig ordentligt och därmed undvika allt frysande**

Metoder: indirekt kalorimetri före och efter akut aktivering av brunt fett med en kombination av köldväst (från NASA) och kallvatten

Magnetresonanstomografi av brun fettvävsvolym

De 11 deltagare i frysgruppen som verkligen frös dagligen fick ökad volym av den bruna fettväven

Från 0.0175 ± 0.015 liter till 0.0216 ± 0.014 liter, p= 0.049



Romu, Nystrom et al 2016, Metabolism

Associations of fats and carbohydrate intake with cardiovascular disease and mortality in 18 countries from five continents (PURE): a prospective cohort study

The Lancet August 2017

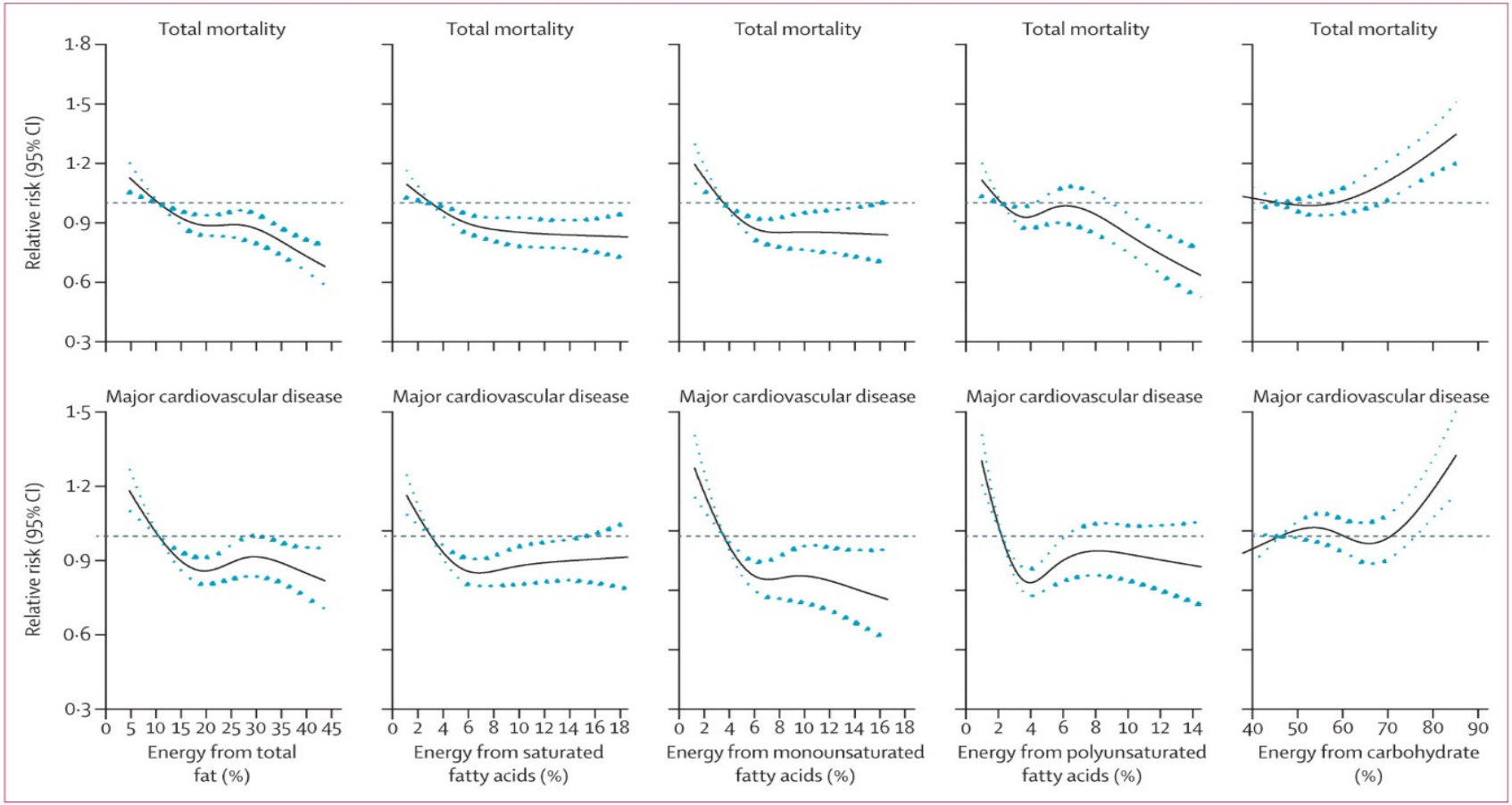


Figure 1: **Association between estimated percentage energy from nutrients and total mortality and major cardiovascular disease (n=135 335)**
Adjusted for age, sex, education, waist-to-hip ratio, smoking, physical activity, diabetes, urban or rural location, centre, geographical regions, and energy intake. Major cardiovascular disease=fatal cardiovascular disease+myocardial infarction+stroke+heart failure.

Slutord

Bestäm själv hur mycket du skall träna (men spring helst inte maraton)

Medelhavskost med vin till kvällsmaten ger en påtaglig reduktion av fr.a. hjärtsjukdomsrisken

Det är framför allt kolhydrater i överskott som ger ”ölmage”

Grädde mättar längre än socker, och ät allt på en gång för högsta metabolism (mycket muskler samt kyla håller också uppe metabolismen).

Ofta hör man att det är ”bättre att stå än att sitta”. Detta råd bygger på epidemiologi (inte på RCT). Men den senaste kanadensiska välgjorda studien på det temat visar tvärtom att stå mycket på jobet är lika farligt som att röka, det kopplar till dubbel risk för hjärtsjukdom jämfört med att sitta.

Table 2.

Hazard Ratios Over a 12-Year Period for Sitting and Standing Occupational Exposures and Incident Heart Disease Among Employed Canadian Workers Aged 35–74 Years (*n* = 7,320), Ontario, Canada, 2003–2015

Primary Type of Body Posture or Movement	Model 1[a]		Model 2[b]		Model 3[c]		Model 4[d]	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Sitting	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Standing	2.32[e]	1.16[e], 4.62[e]	2.28[e]	1.16[e], 4.45[e]	2.18[e]	1.11[e], 4.27[e]	1.97	0.99, 3.90
Sitting, standing, and walking	0.97	0.58, 1.61	0.93	0.56, 1.55	0.93	0.56, 1.54	0.97	0.58, 1.62
Other body positions	1.09	0.70, 1.69	1.04	0.66, 1.66	1.04	0.42, 2.57	1.07	0.43, 2.65

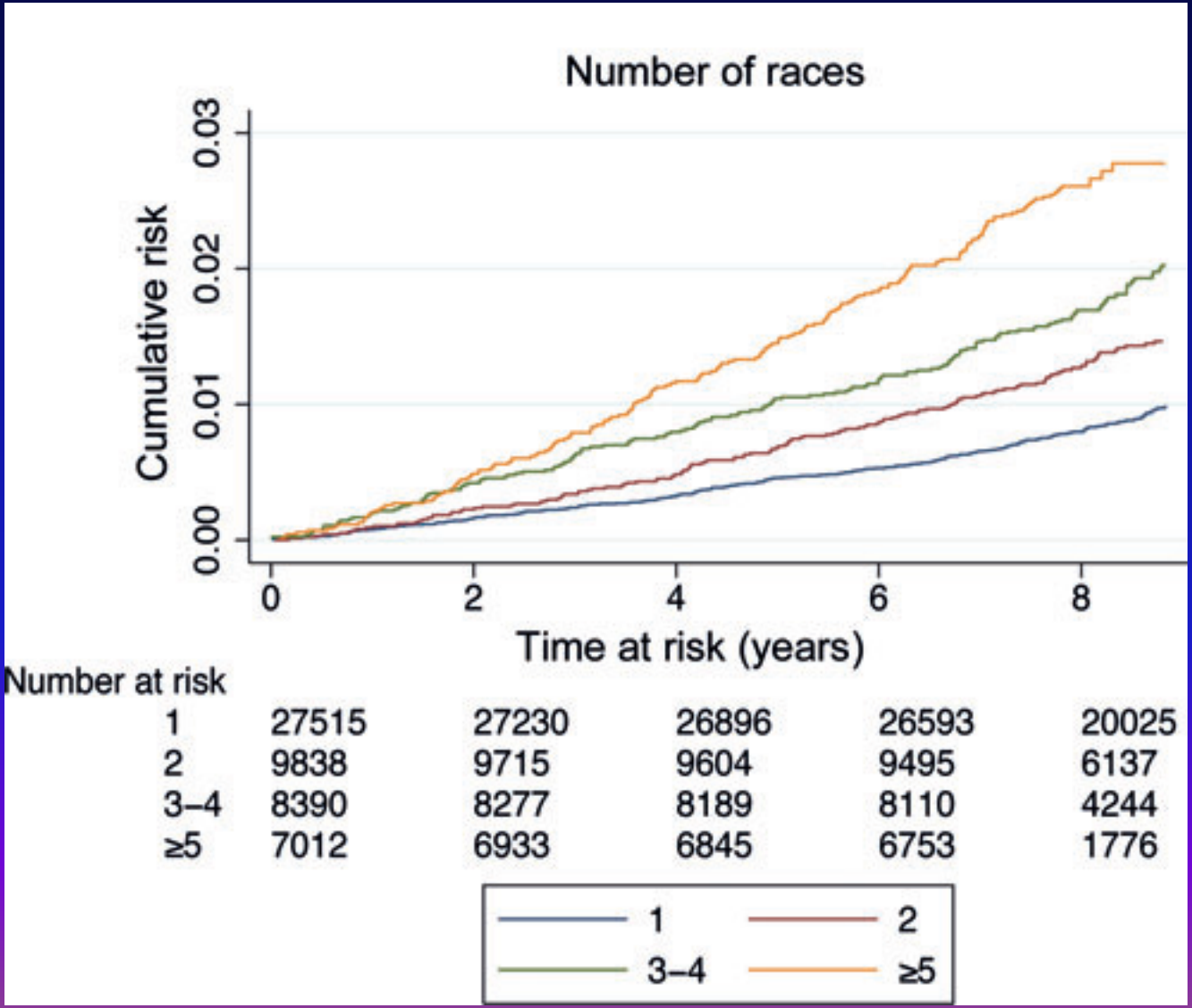
Abbreviations: CI, confidence intervals; HR, hazard ratio.

Am J Epidemiol. 2018 Jan 1;187(1):27-33

Kumulativ incidens av hjärtarytmi (mest förmaksflimmer) hos svenska Vasaloppsåkare utifrån antal genomförda lopp

53000 Vasalöpare, 919 med arytmi,

European Heart J 2013 34:3624-31



Kumulativ incidens av artros hos svenska Vasaloppsåkare utifrån antal genomförda lopp

Risk of Severe Knee and Hip Osteoarthritis in Relation to Level of Physical Exercise: A Prospective Cohort Study of Long-Distance Skiers in Sweden PLoS One. 2011; 6(3): e18339.