
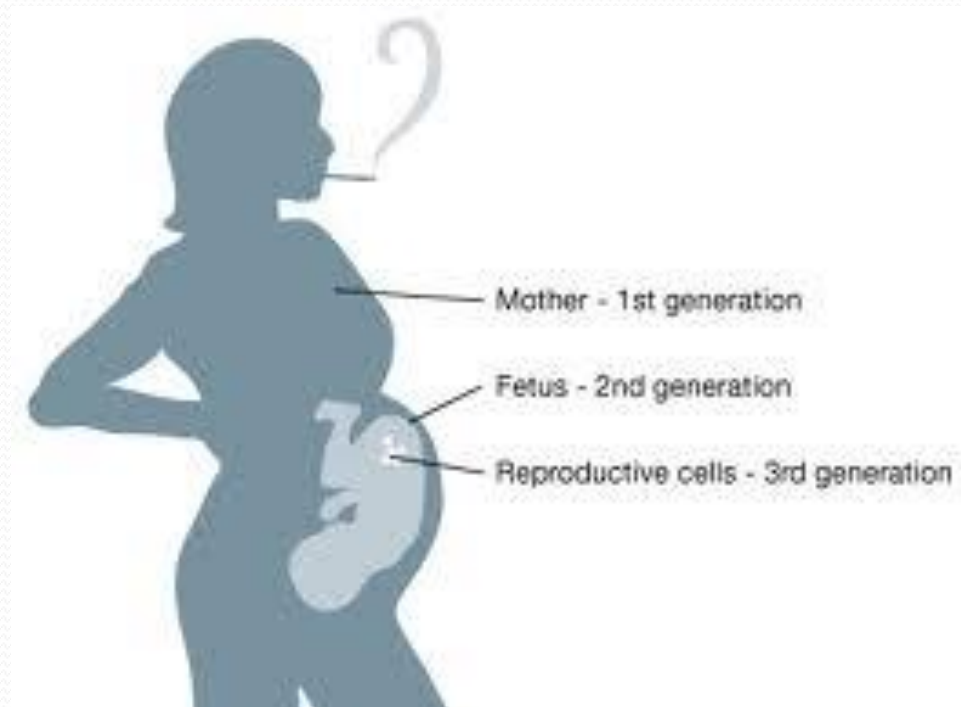


- 
- Some genes are dictators (brown eyes, etc.)
 - Others are Committees (genes for DM, etc.) – whose recommendations you can ignore
 - Genes for DM are like cactus seeds on the desert floor, waiting for a good rain to bloom

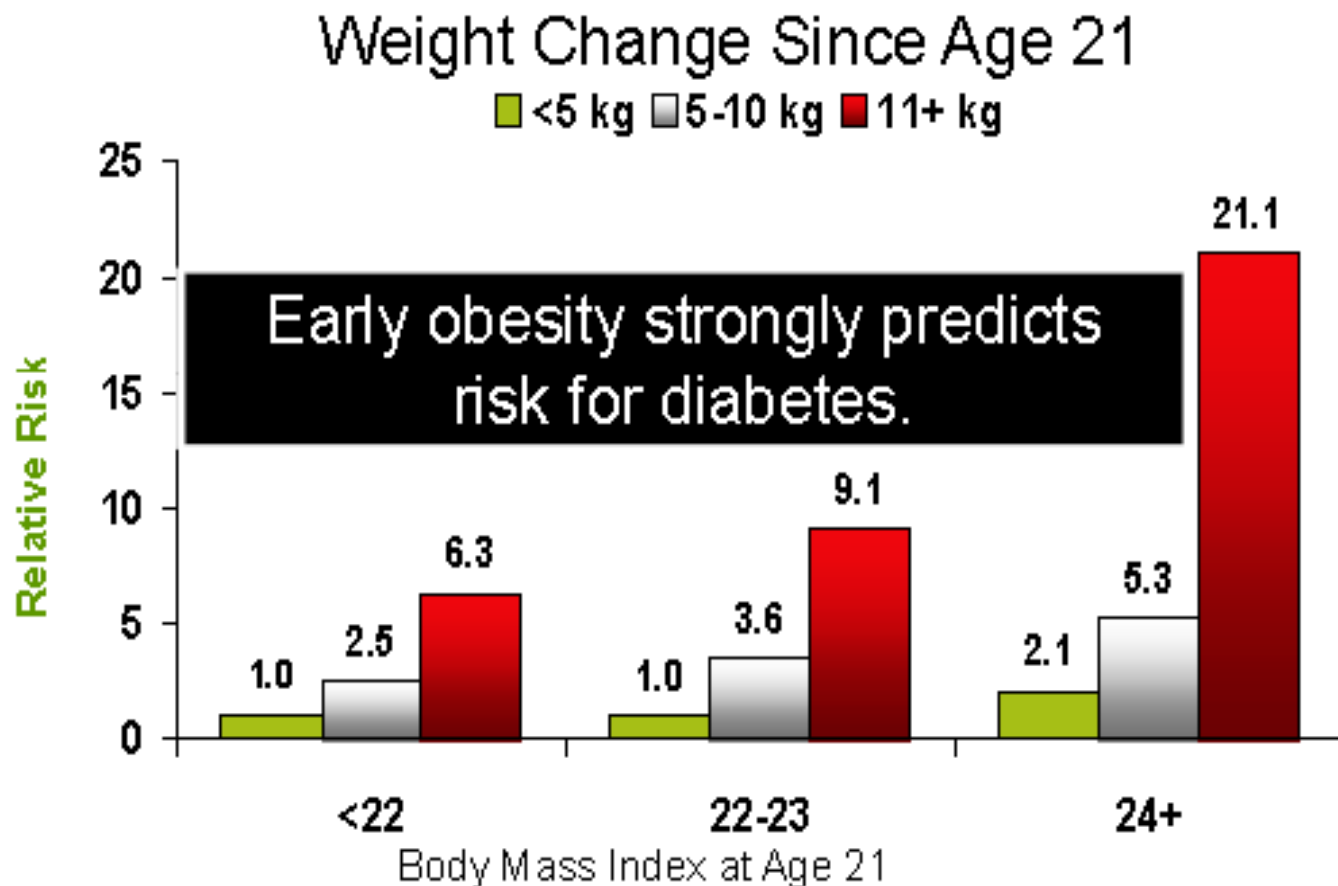
- Neal Barnard

Personal History

- Environment in the womb:
 - Famine
 - Maternal obesity/GDM /excessive weight gain
 - IUGR



Weight Gain and Diabetes Risk



Adapted from Chan JM, et al. *Diabetes Care* 1994;17:960-969.

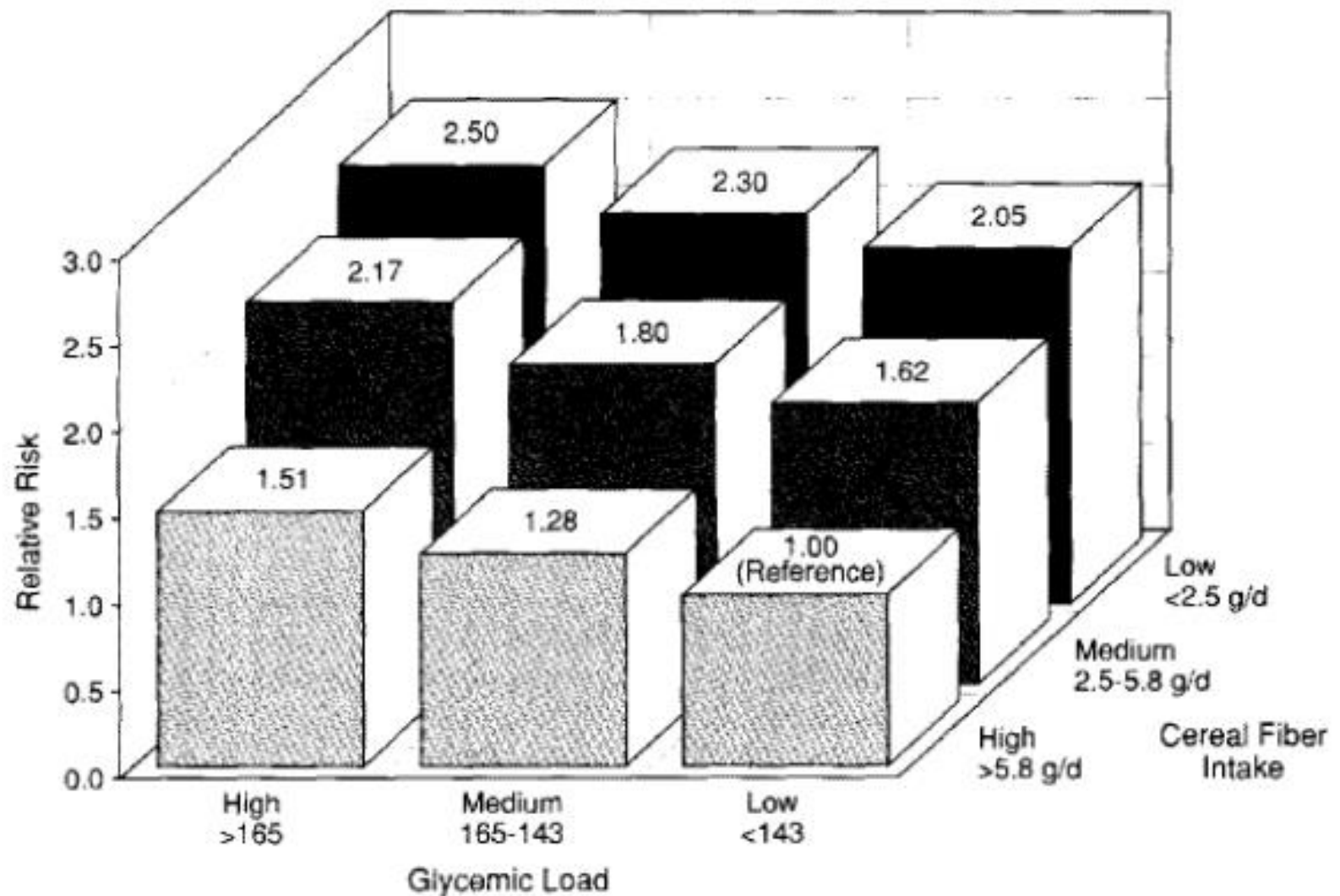
Precursor Syndromes

- Women
 - PCOS
 - Decreased fertility
 - GDM
 - Baby > 9 lb even in absence of GDM
- Men
 - Hypogonadism

Behavioral Risk Factors

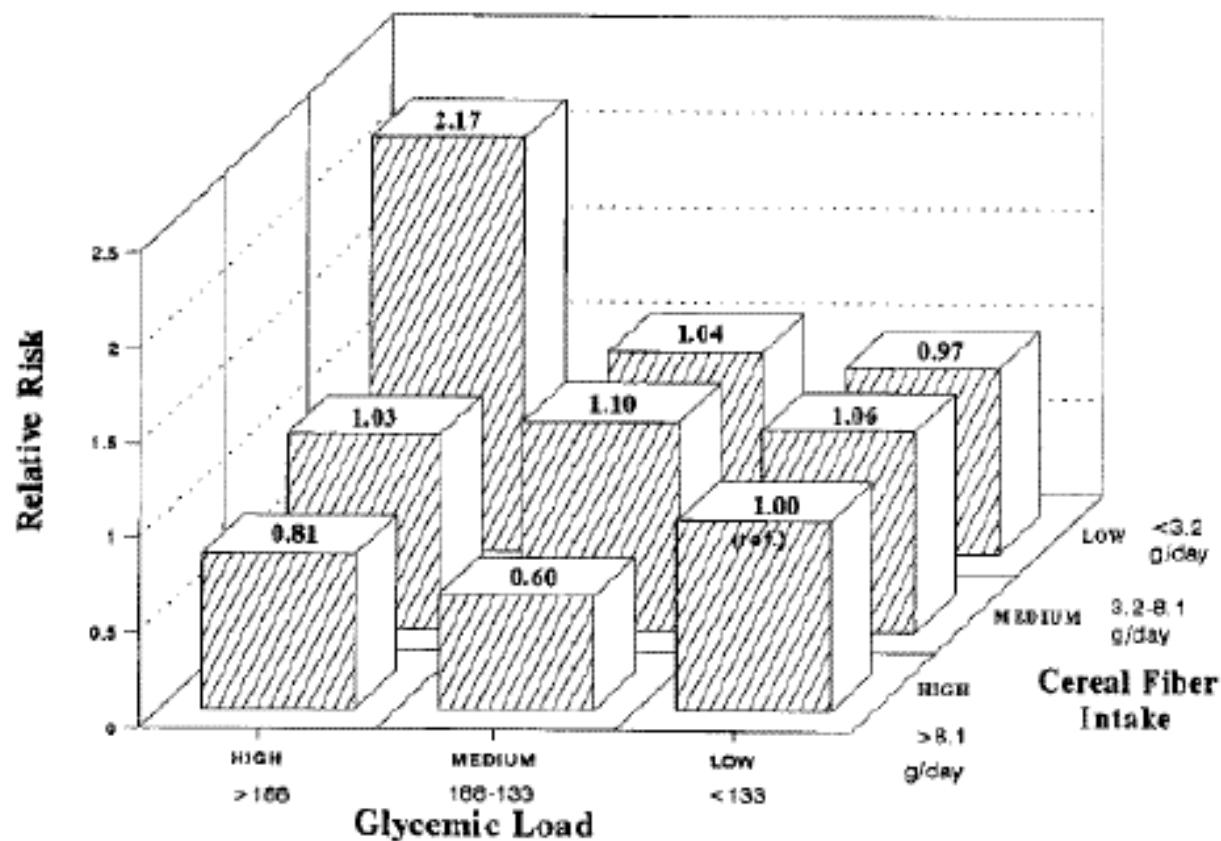
- Lifestyle history
 - Nutrition
 - Exercise/ physical activity

Glycemic Load and Cereal Fiber Intake in Women And Risk of Type II Diabetes



Salmeron et al. JAMA 1997;277:472-7

Glycemic Load and Cereal Fiber Intake in Men and Risk of Type II Diabetes



Salmeron et al. Diabetes Care 1997;20:545-50

*Dietary fat and risk of DM2 in women

	Quintile					P for trend
	1	2	3	4	5	
Total fat	1	0.87	1.01	0.97	0.97	0.96
Animal fat	1	0.90	1.08	1.17	1.25	<0.0001
Vegetable fat	1	0.88	0.71	0.71	0.68	<0.0001
Trans fat (adjusting for other fats)	1	1.12	1.18	1.14	1.31	0.02

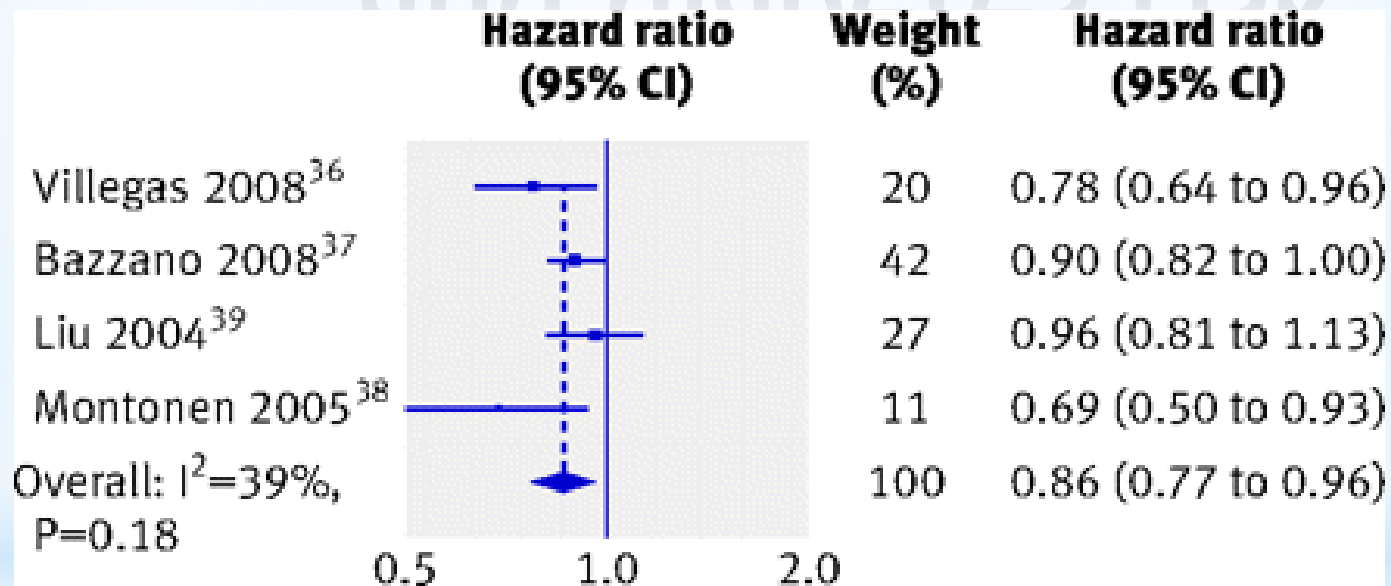
14 yr prospective study

Authors estimate 40% decreased risk of DM2 with substitution of 2% of energy from trans fat to PUFA

Multivariate adjusted

Am J Clin Nutr June 1, 2001 vol. 73 no. 6 1019-1026

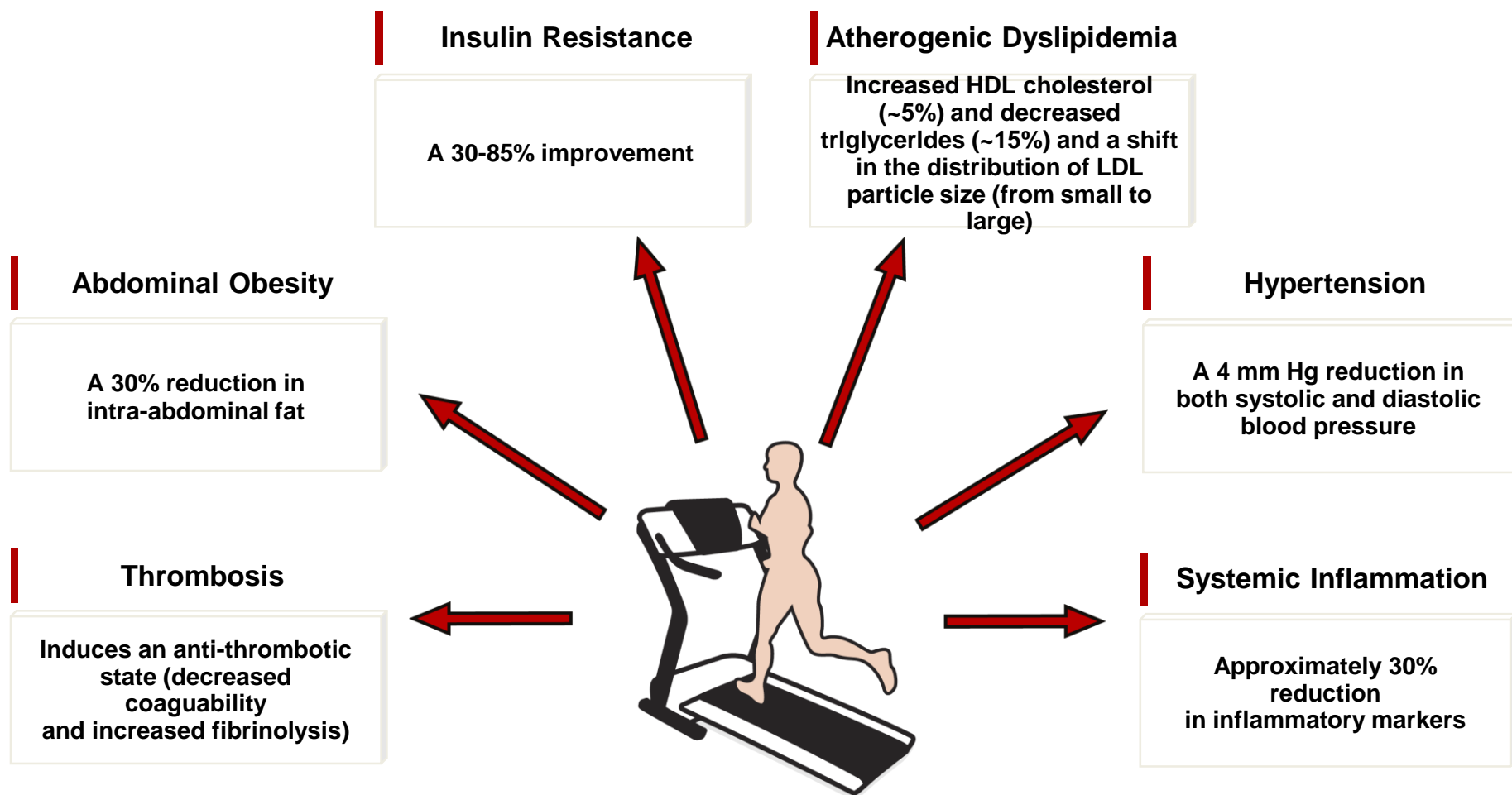
*Green leafy veggies and diabetes risk



**BMJ*2010;341:c4229



IMPROVEMENTS IN CARDIOMETABOLIC RISK FACTORS INDUCED BY REGULAR EXERCISE



Moderate intensity endurance exercise on most days of the week

Additional Risk Factors

- Stress

- Poverty

- A Randomized Trial - A Social Experiment: Moving from higher to lower poverty community associated with 13 to 21% reductions in obesity and diabetes. NEJM October 20, 2011

- PTSD - Diabetes Care 33:1771-1777, 2010

- Work stress – mixed studies, metaanalysis says no

Occup Med 2012 Apr;62(3):167-73

- Stressful life events

- 46% MetS with 8 or more stressful life events
 - 23.4% with < 8 stressors [Metab Syndr Relat Disord.](#) 2010 Dec;8(6):483-7

- Mechanisms:

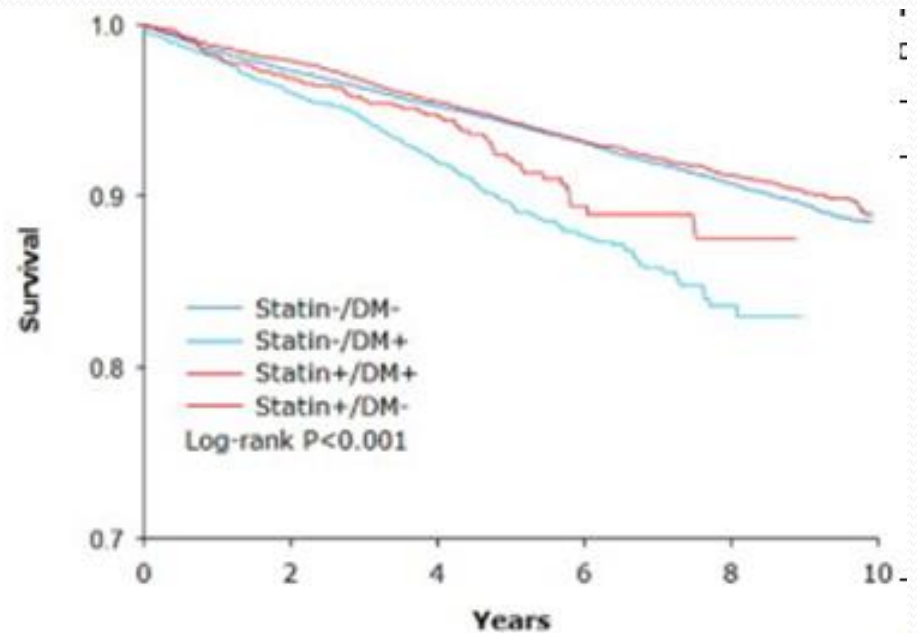
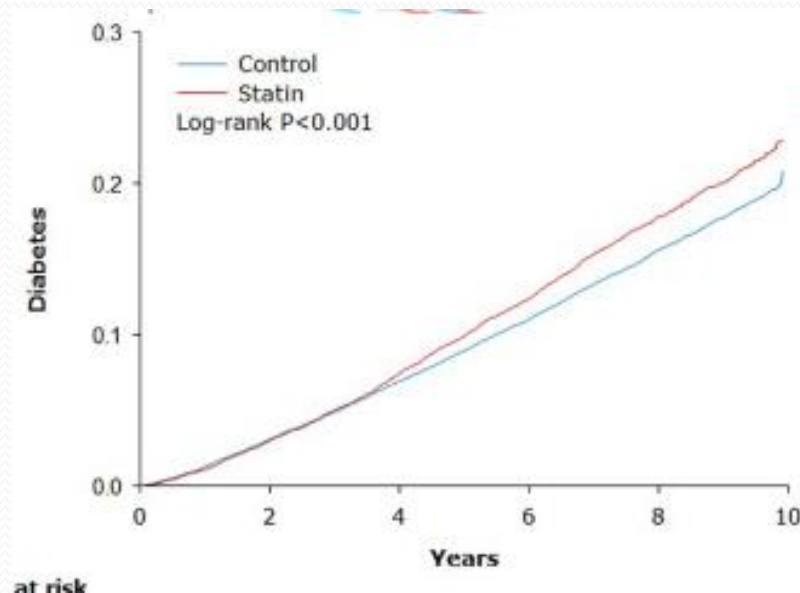
- Sleep deprivation Internal Medicine 50(21):2499-2502, 2011
Elevated cortisol
 - Stress-related unhealthy behaviors

Additional Risk Factors

- Toxin exposure

- Smoking
- Alcohol (>1/d women, 2/d men)
- Medications
 - Statins
 - **47% increase incidence of type 2 diabetes in postmenopausal women** Arch Intern Med 2012; 172: 144-52
 - Antipsychotics – least for ziprasidone, aripiprazole
 - Beta blockers Am J Cardiology 100(8):1254-1262, 2007
 - Diuretics
- Iron overload

Statins — still worth it in high risk populations



Journal of the American College of
Cardiology Vol. xx, No. x, 2012

Toxins continued

- Persistent organic pollutants (POPs)
 - Phthalates
 - BPA
 - Arsenic
 - Atrazine
 - Others. . .

(next talk)

Additional Risk Factors

Gut Permeability, Dysbiosis, & Synbiotics

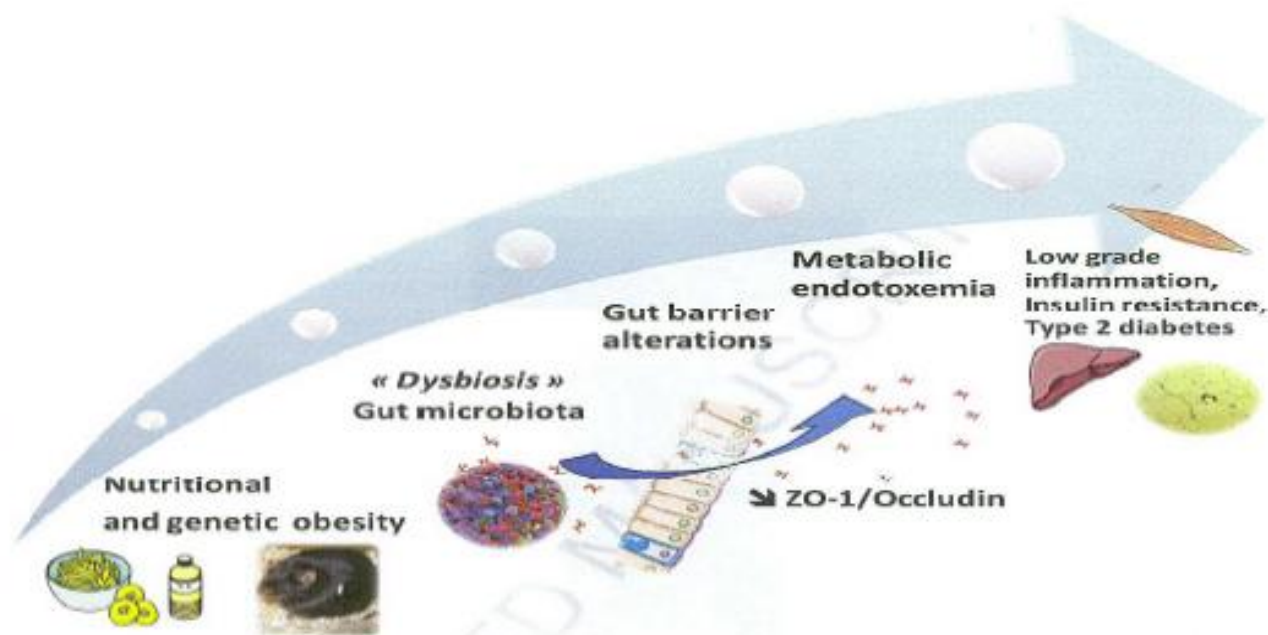
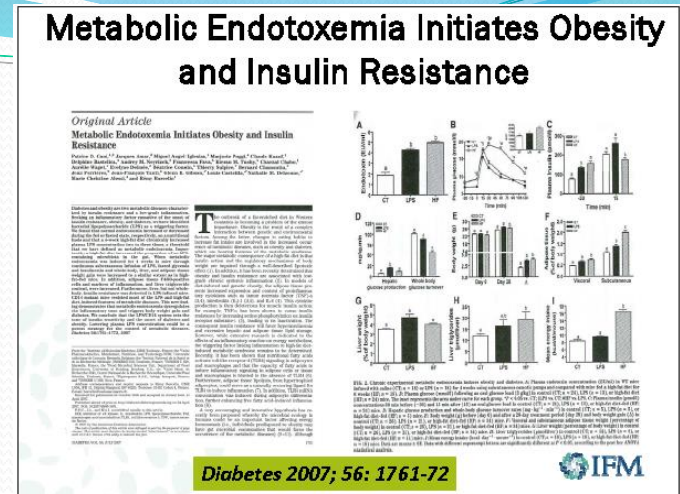


Figure 3 : The gut microbiota are involved in the onset of metabolic disorders associated with obesity: a model.

- Allergies/Adverse food reactions
 - Endotoxemia
 - Low-grade endotoxemia may contribute to the postprandial inflammatory state and could represent a novel potential contributor to endothelial activation and the development of atherosclerosis". *Am J Clin Nutr* 2007; 86:1286-92
- Periodontal Disease
 - Friedewald VE, Kornman KS, et al, *Am J Cardiol.* 2009 Jul 1;104(1):59-68



Today:

- Definitions
- Assessment
- Risk factors: standard and additional
- Treatment Recommendations
- Monitoring


Acute vs. Chronic Disease

Cellulitis

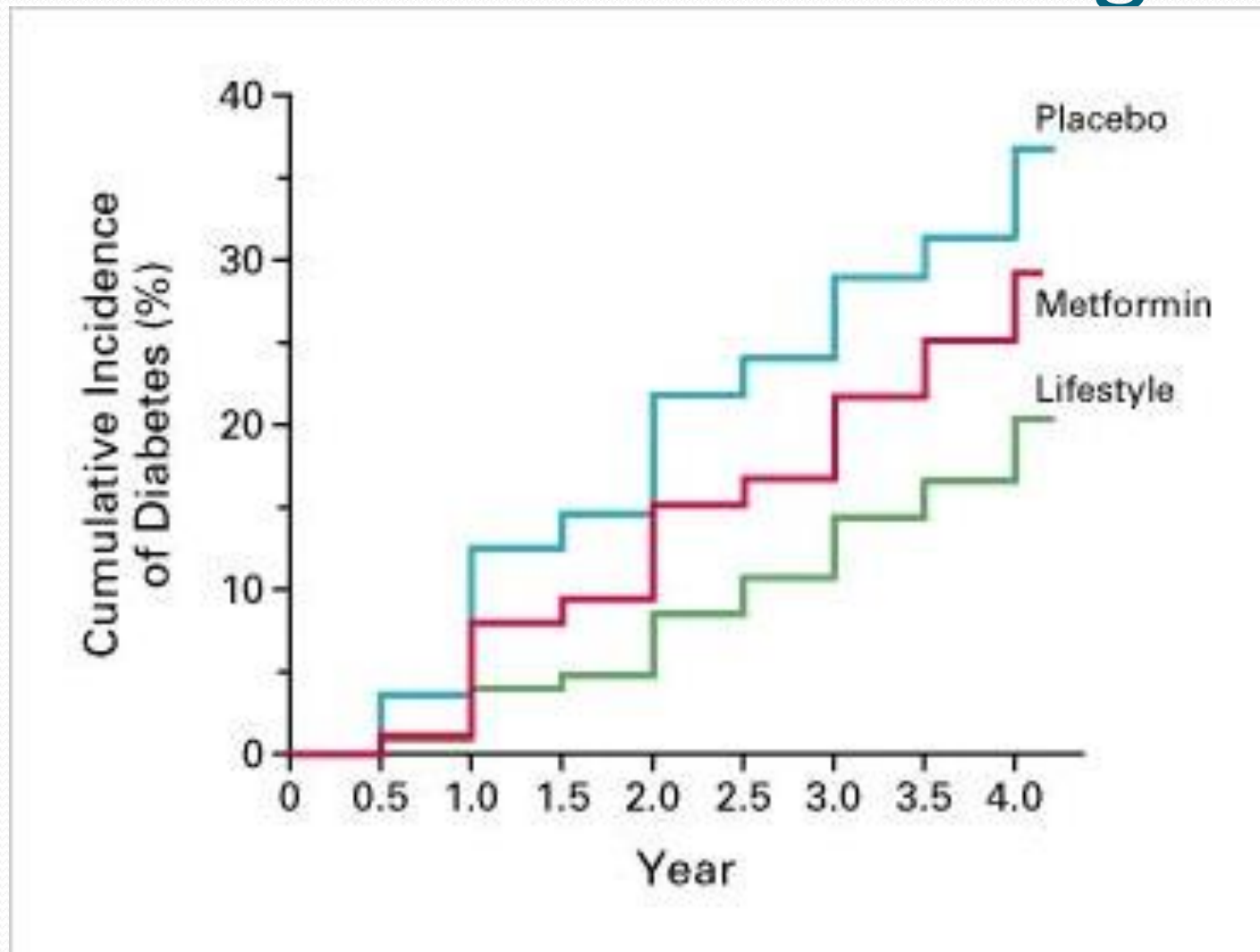
- Diagnose
- Rx Treatment
- Prevention
- Behavior change

Cardiometabolic Syndrome

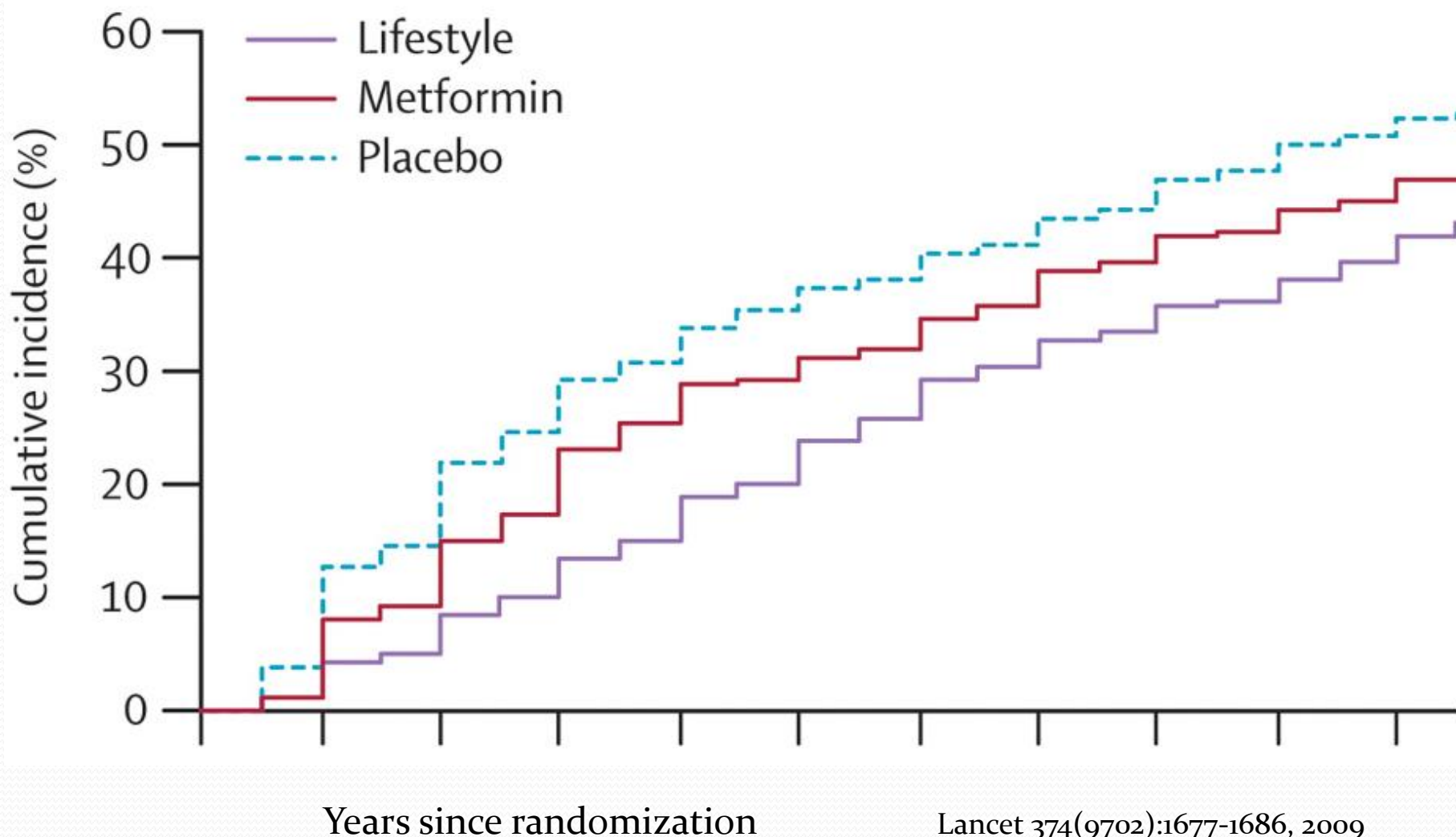
- Diagnose
- Rx Treatment
- Create Partnership
- Promote Behavior Change

- 
- Assess global risk
 - Multifactorial risk reduction strategy
 - target each risk factor
 - emphasize lifestyle & pharmacologic therapy
 - Consensus Statement from the American Diabetes Association and the American College of Cardiology Foundation, April 2008

Diabetes Prevention Program



Diabetes Prevention Program





**“Lose some weight, quit smoking, move
around more, and eat the carrot.”**

Shorthand: .dmpreven

For diabetes prevention, the main things you can do are:

1. Eat low glycemic index (see handout or <http://www.mendosa.com/gilists.htm>)
2. Increase fiber in the diet
3. Increase fruits and vegetables to 5-9 servings per day, especially dark green leafy vegetables
4. Increase exercise (30 minutes 5 days per week) - include muscle building as well as aerobic
5. Avoid trans fats (hydrogenated oils in baked goods, fried foods)
6. Avoid environmental endocrine disruptors (like PCB's, phthalates, BPA, PFOAs, etc.) - learn more at healthychild.org

Increasing nuts in the diet may be helpful, and eating cinnamon, about ½ tsp per day, may also be helpful, as may the medication metformin.

Embedded polls only work in PowerPoint for Windows

This object is the poll's placeholder

To view the poll live, enter slideshow mode by pressing F5

Glycemic Index

Not All Carbs are Created Equal

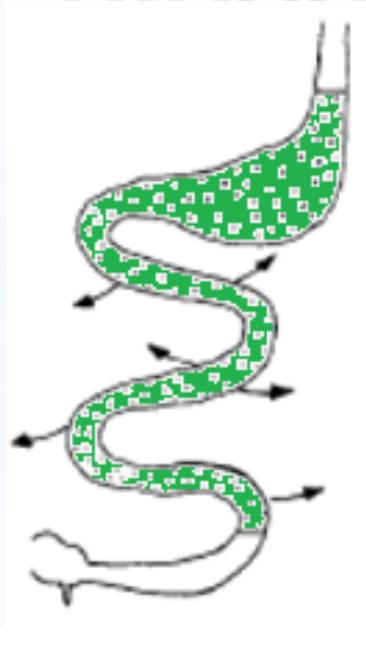
Cola and chips snack vs. Raisins and peanuts
(Equal calories from sugar)

75% more insulin mobilized over two hours ($p < .001$)

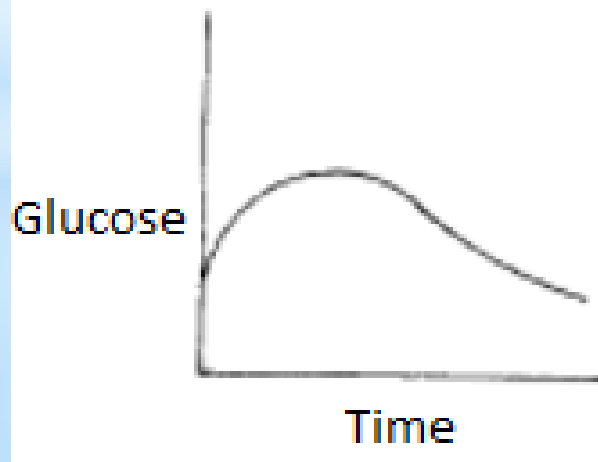
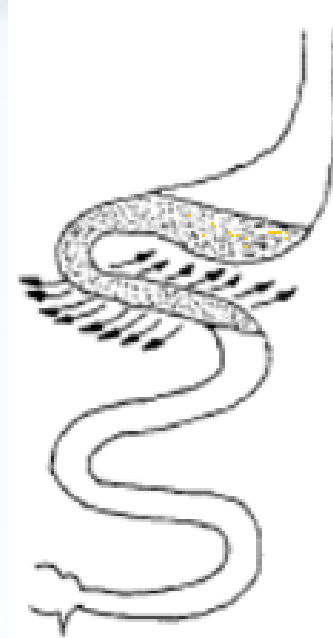
Oettle GJ et al. *Am J Clin Nutr* 1987; 45:86

Glycemic Index and Blood Sugar

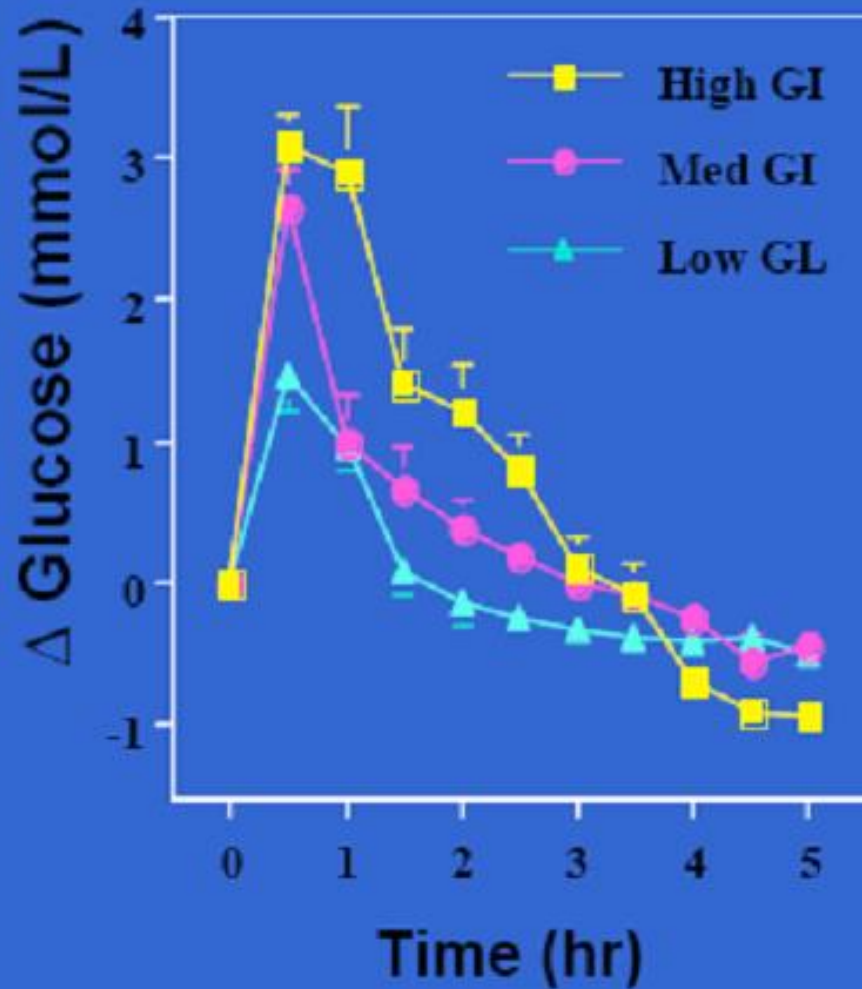
Low GI



High GI



The Overshoot



Blood Glucose

Glycemic Index -

Why do we care?

- * Long-term health effects
 - * Diabetes risk
 - * Cancer risk
- * Medium term effects
 - * Weight loss, fat loss
- * Immediate effects
 - * Hunger and snacking
 - * Ability to think straight
 - * Mood, Irritability

Glycemic Index and Snacking

High-GI breakfast (instant oatmeal) vs.
Low-GI breakfast (eggs, fruit)
equal calories

81% more snacking in next 5 hours

Ludwig DS et al. *Pediatrics* 1999; 103:E26

GI & Regulation of Food Intake

Low GL

55 g whole egg
45 g egg white
40 g lowfat cheese
200 g spinach
30 g tomato
185 g grapefruit
115 g apple slices

Medium GI

63.9 g steel-cut oats
160 g 2% milk
15 g H & H cream
16.0 g fructose
0.0 g saccharine
397 g water

High GI

60.9 g instant oatmeal
160 g 2% milk
15 g H & H cream
19.0 g dextrose
0.2 g saccharine
397 g water

Macronutrients (% carbohydrate/protein/fat):

40/30/30

64/16/20

64/16/20

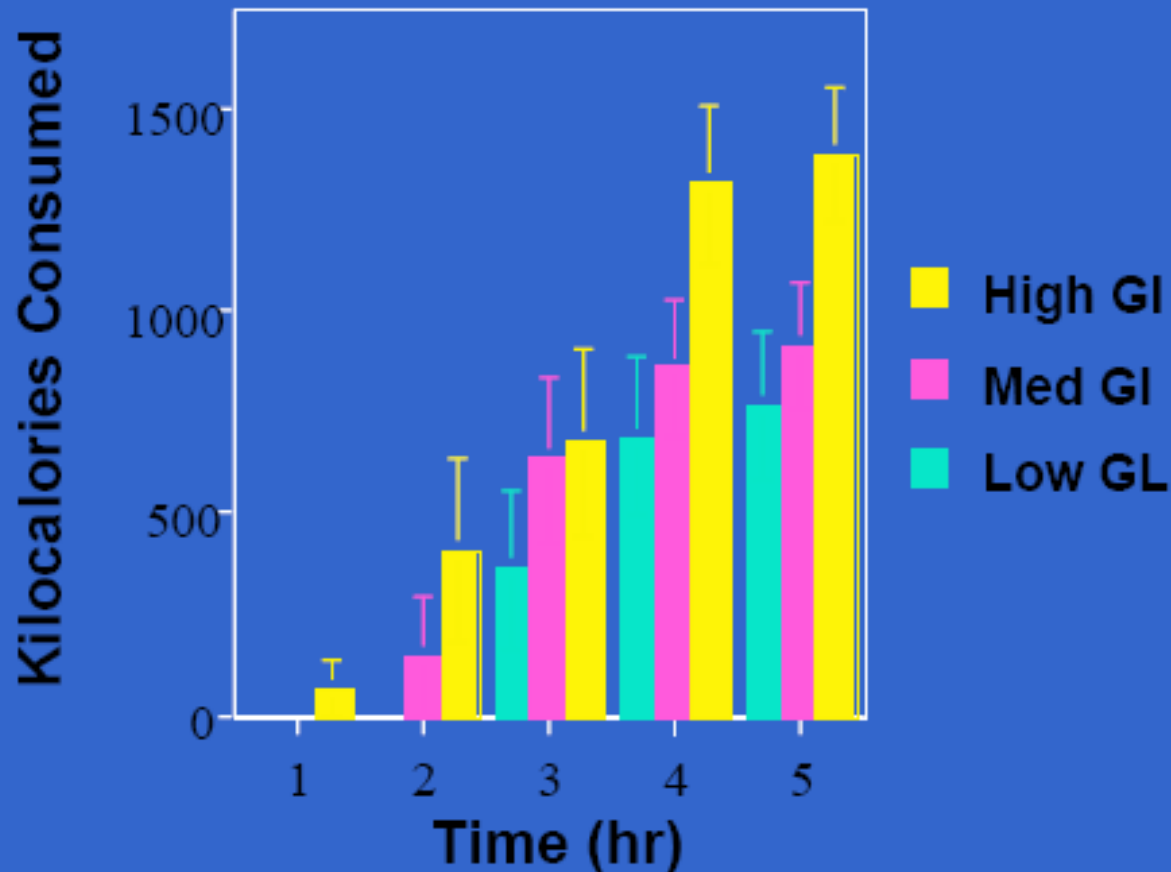
Energy density (KJ/g):

2.46

2.52

2.52

GI & Regulation of Food Intake



Ludwig. Pediatrics 1999, 103:e261-6

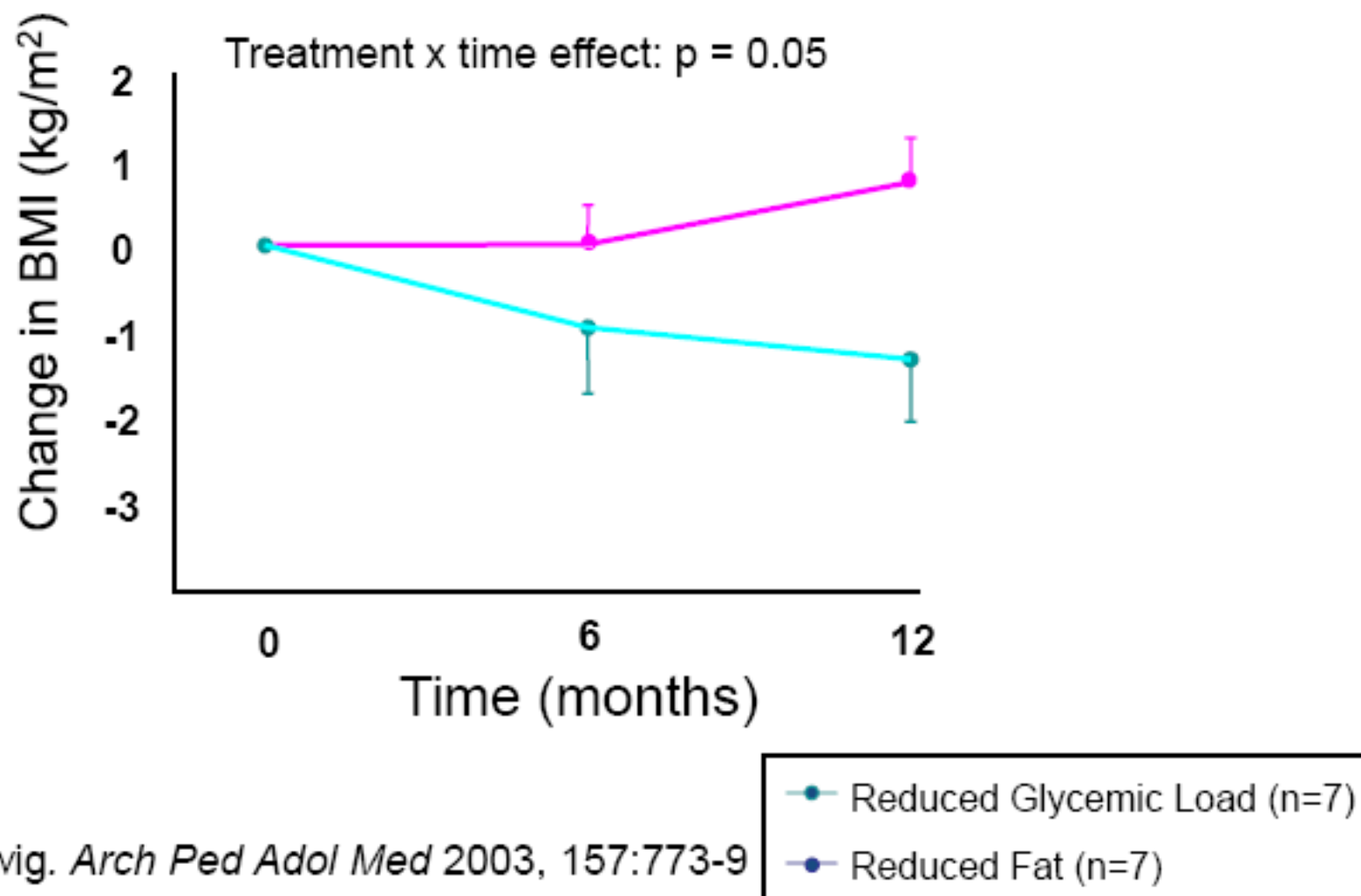
Effects of Glycemic Load on Body Weight

A 12-month Pilot Study

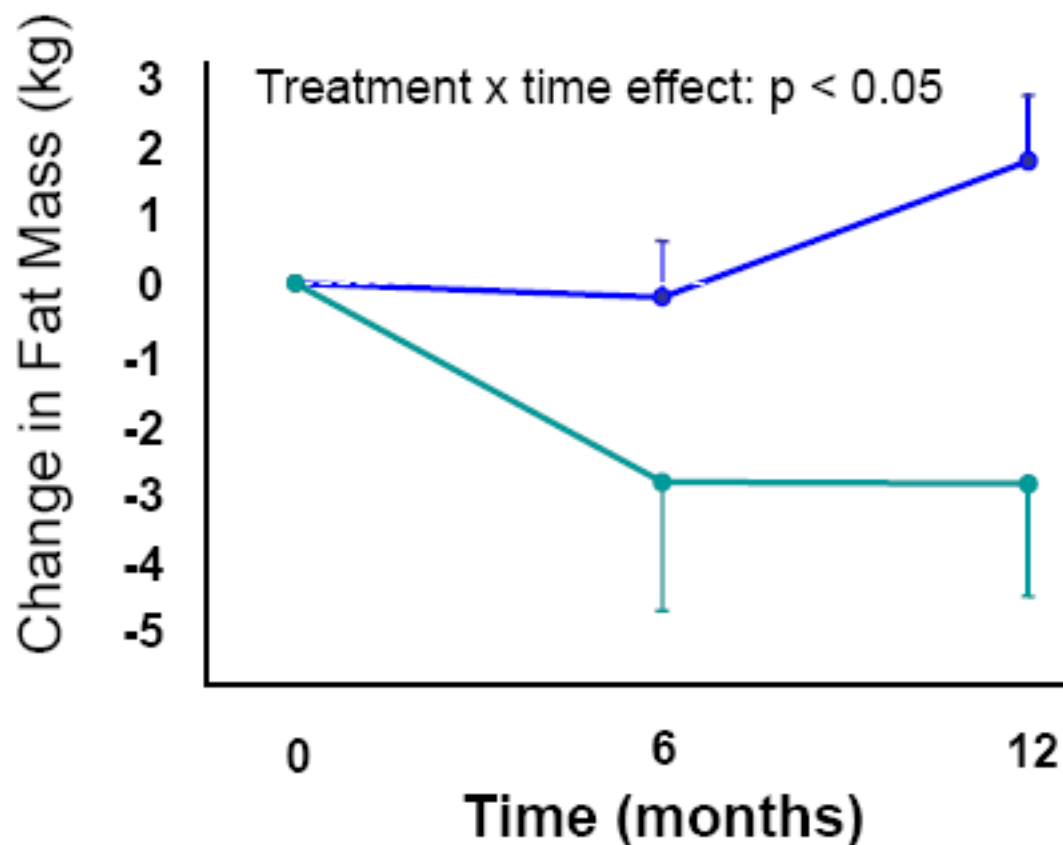
Methods

- 16 obese adolescents, age 13 - 21 years
- Intervention:
 - *Ad lib* low GL vs energy-restricted reduced-fat diet
 - Total of 14 treatment visits with a dietitian
- Treatment intensity, behavioral approaches, physical activity prescription identical between groups
- Changes in diet assessed by 3 and 7 day food records
- > 85% completion rate at **12 months** (7 of 8 per group)

Change in BMI

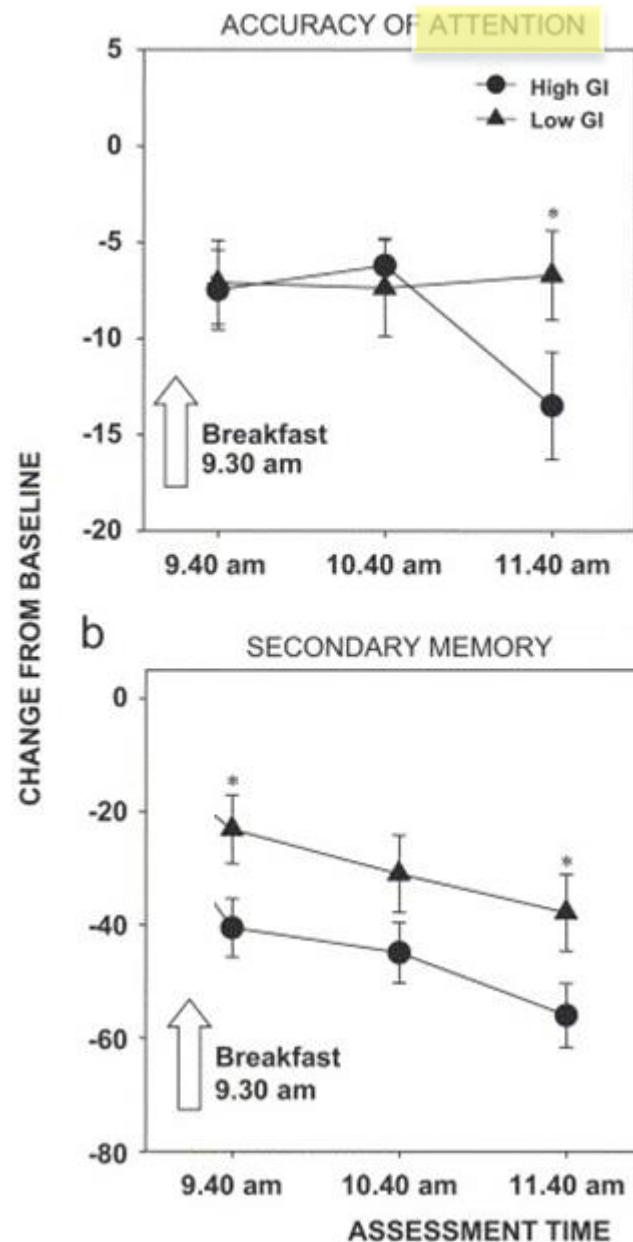


Change in Fat Mass by Dexa Scan



Ebbeling, Ludwig. *Arch Ped Adol Med* 2003, 157:773-9

- Reduced Glycemic Load (n=7)
- Reduced Fat (n=7)



School Performance

All-Bran vs. Coco Pops

35g

35 g

	Kcal	Pro- tein	CHO	Fat	Fiber	GI
All Bran	98	4.9	16.1	1.6	9.5	42
Coco pops	133	1.6	29.8	0.9	0.7	77

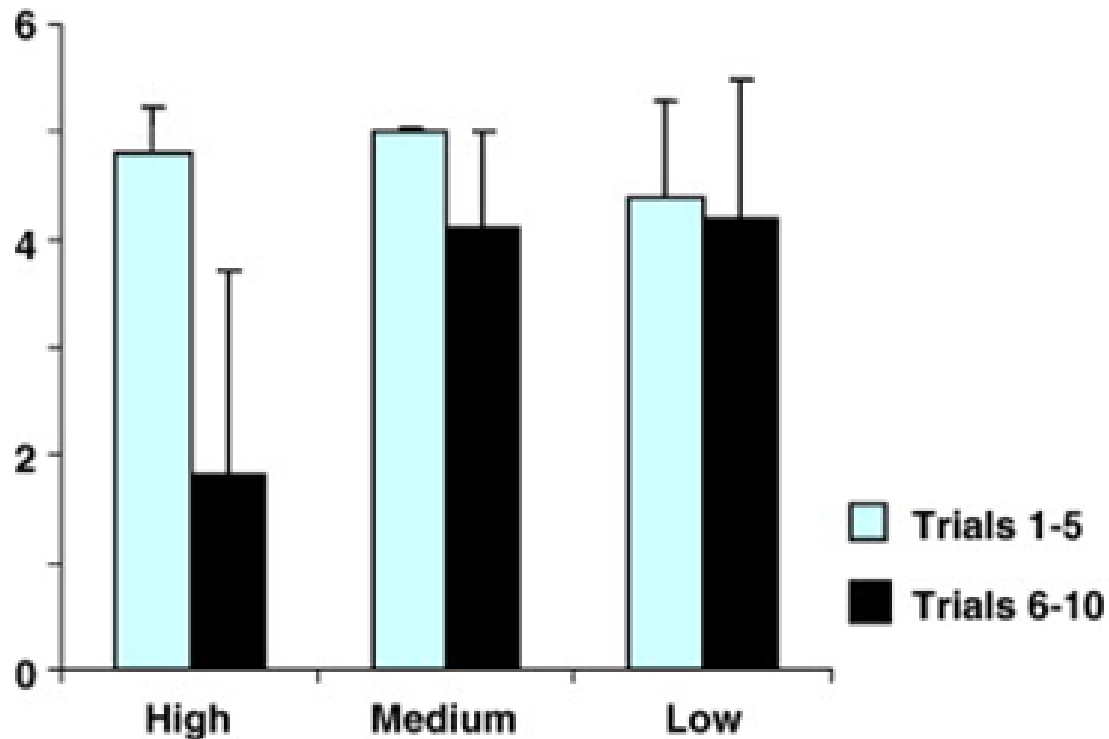
Persistence with Frustrating Task

High, Medium, or Low
GL breakfast

High: 39
cornflakes, waffle

Medium: 14.8
scrambled egg, toast
and jam, yogurt

Low: 5.9
Ham, cheese, Burgen
bread (soy, flax)

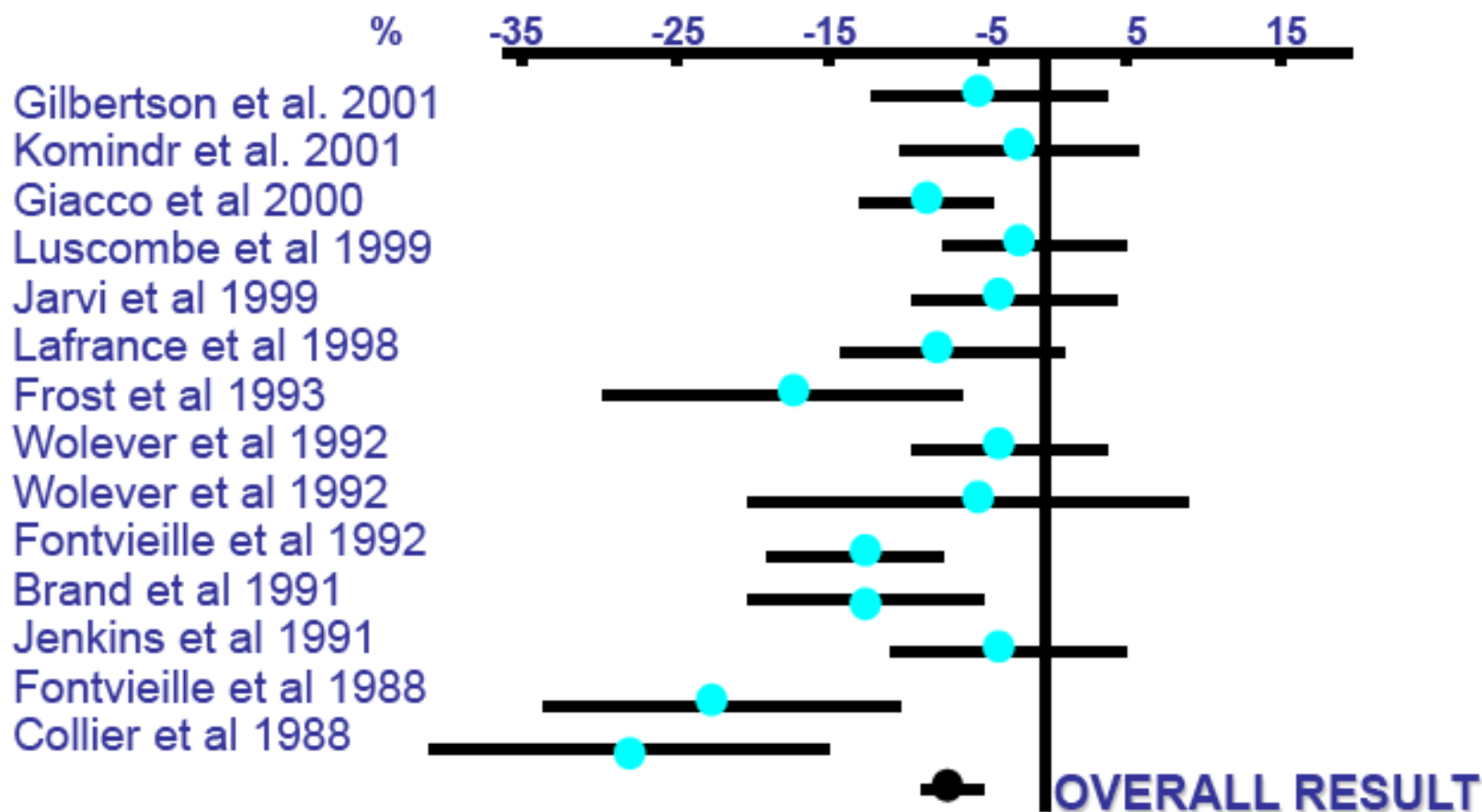


Kids age 6-7

Also imp verbal memory, fewer lapses in attention

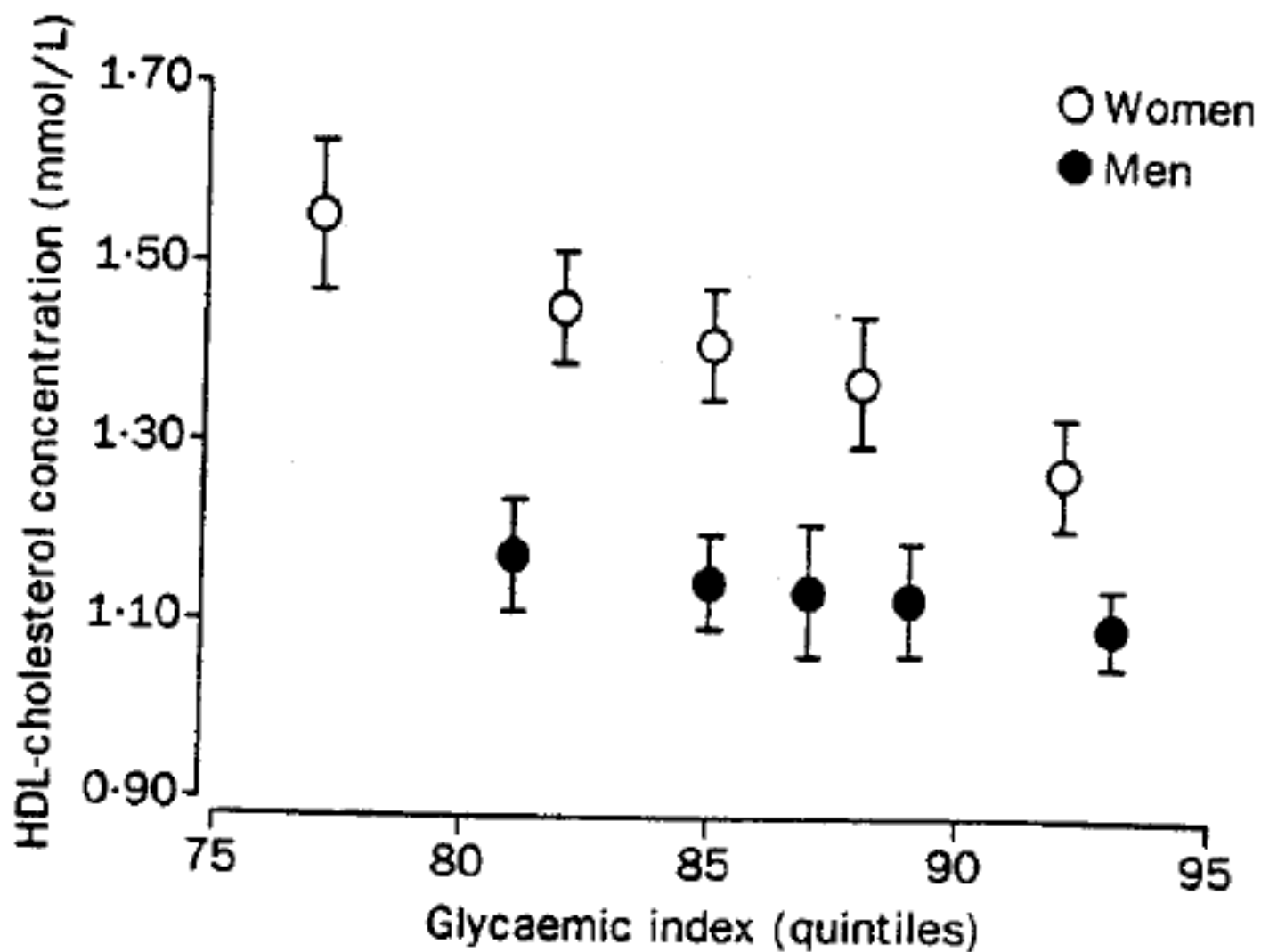
Low vs High GI Diet: a Meta-Analysis

% Difference in Glycated Proteins



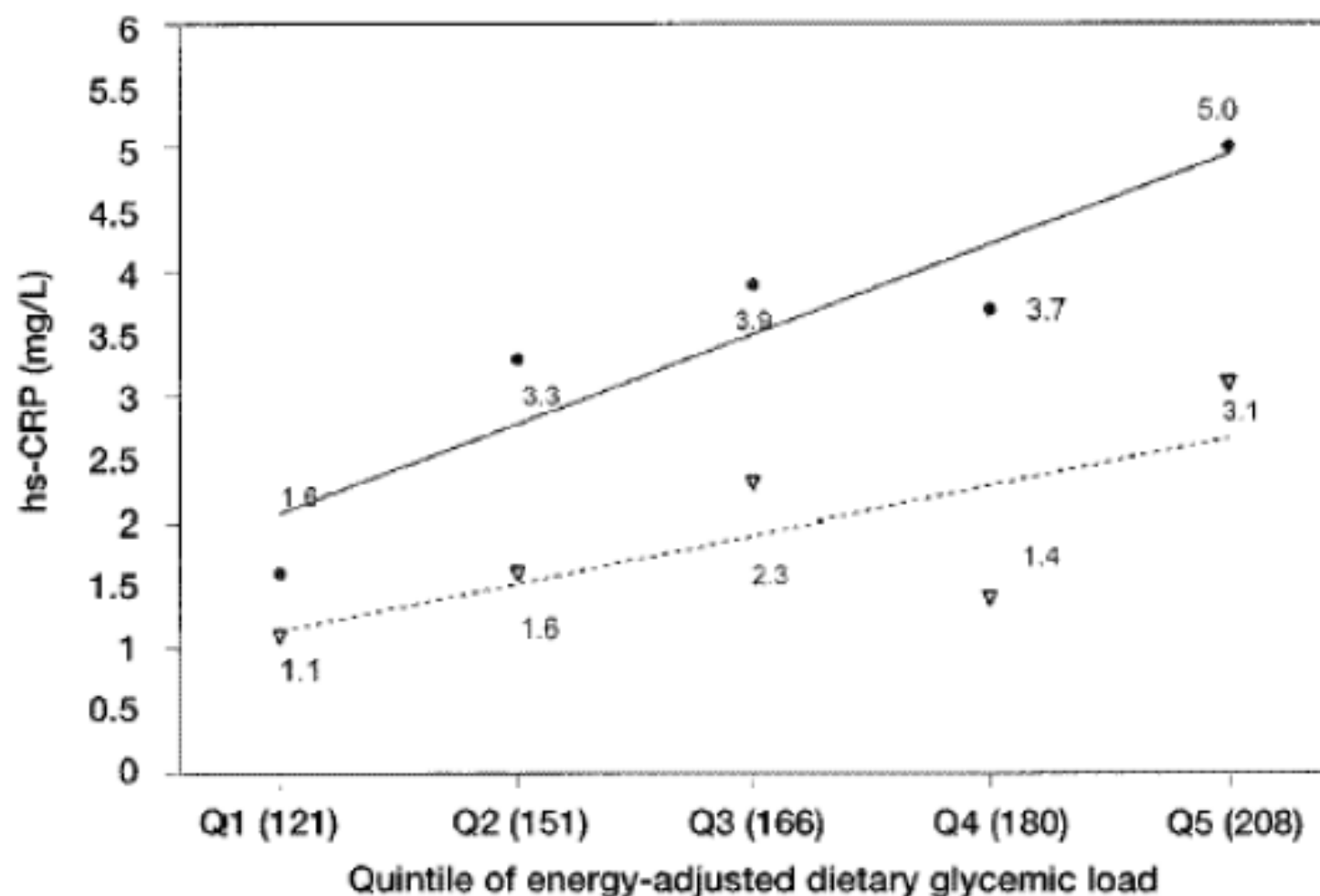
Mean %difference in 14 studies = -7.4% (CI -8.8 to -6.0%)

Brand-Miller et al, Diabetes Care 2003;26:2261-67



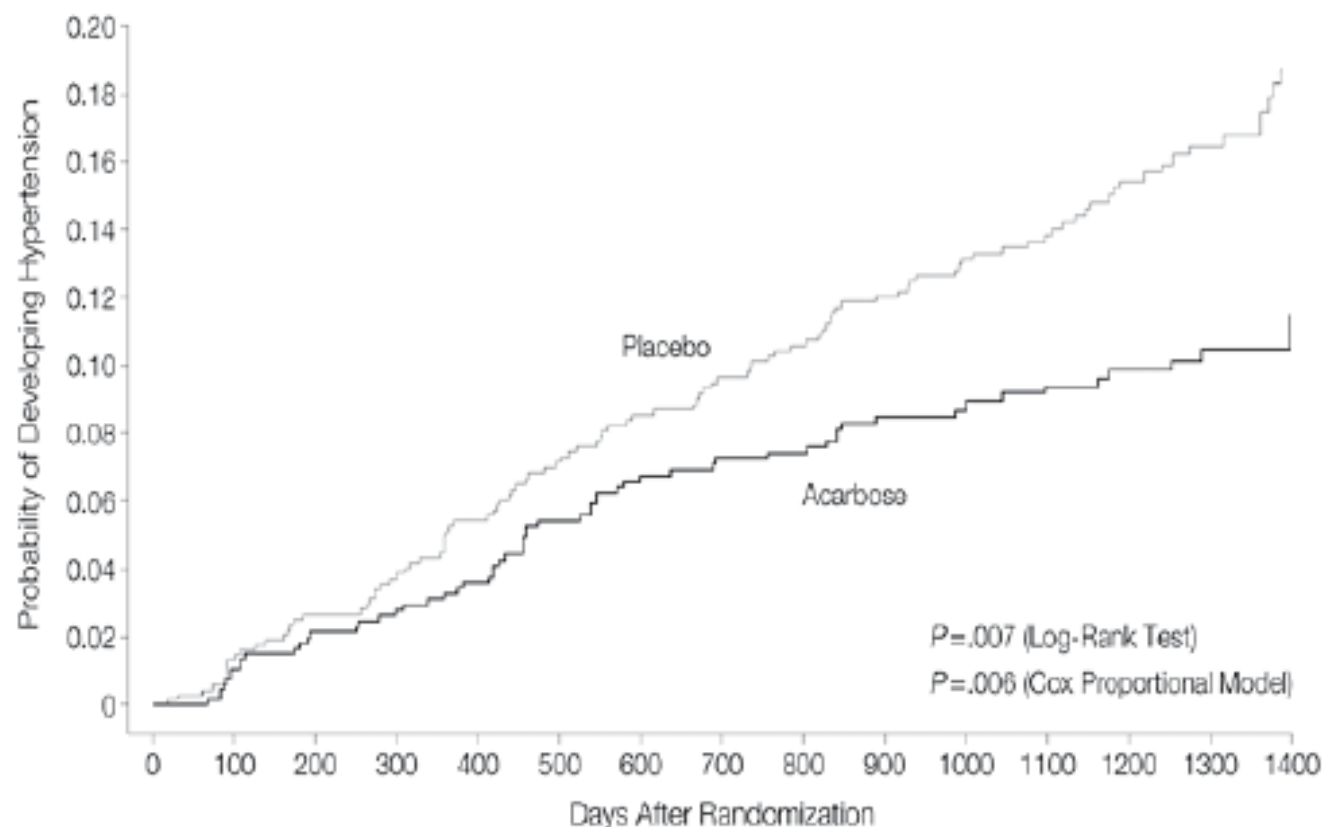
Relation between HDL-cholesterol concentration and glycaemic index in men and women

Glycemic Load and CRP



Liu et al. Am J Clin Nutr 2002;75:492-8

STOP-NIDDM Trial



Hypertension
(new cases)

Acarbose

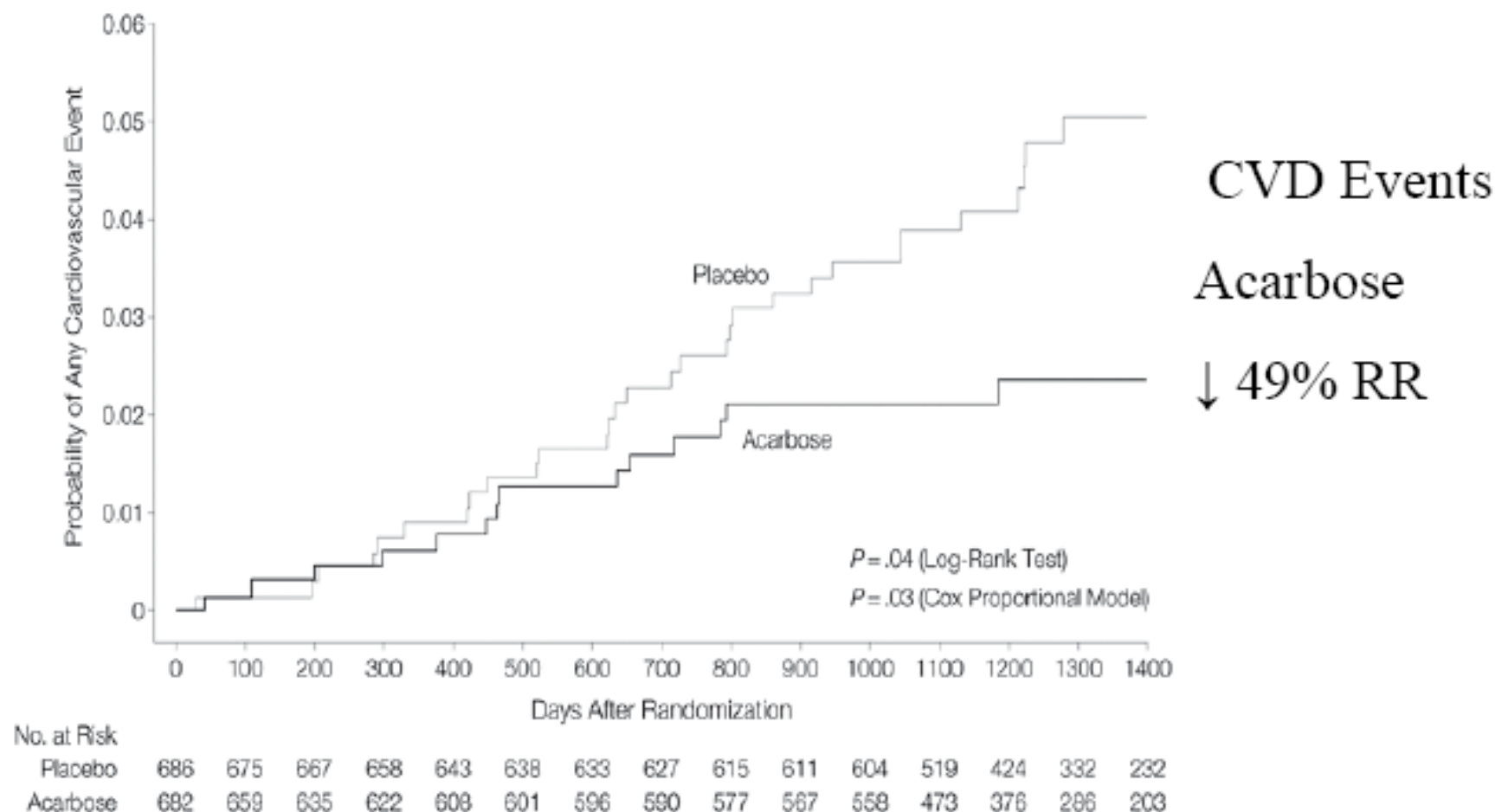
↓ 34% RR

No. at Risk

Placebo	686	663	646	632	607	593	581	573	562	550	538	458	368	287	196
Acarbose	682	645	617	601	585	570	559	559	552	524	514	435	342	254	178

Chiasson J-L, Josse RG, Hanefeld M, et al. JAMA 2003;346:393

STOP-NIDDM Trial



Chiasson J-L, Josse RG, Hanefeld M, et al. JAMA 2003;346:393

What Affects Glycemic Index/Load

- Eating Pattern (Nibbling vs. Meals)
- Food Composition and Preparation

Sipping

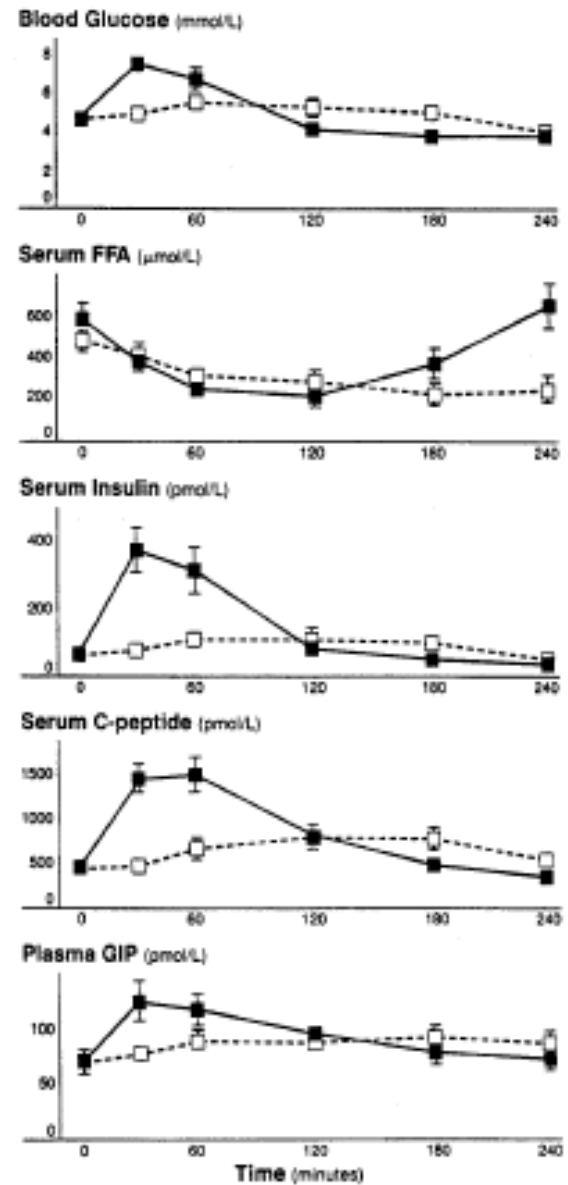


FIGURE 1 Mean \pm SE blood glucose; serum free fatty acid (FFA), insulin, and C-peptide; and plasma gastric inhibitory polypeptide (GIP) after taking bolus of glucose solution over 5 minutes (50 g in 700 ml water) at time 0 (□) or sipping same solution over 0-3.5 hours at even rate (■).

Bolus vs. Grazing

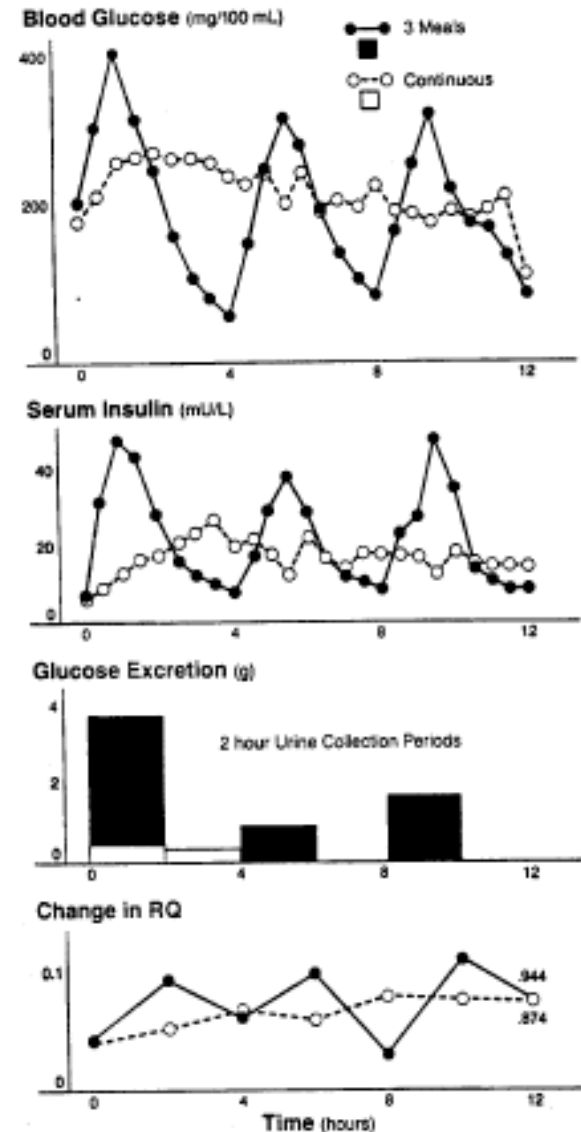
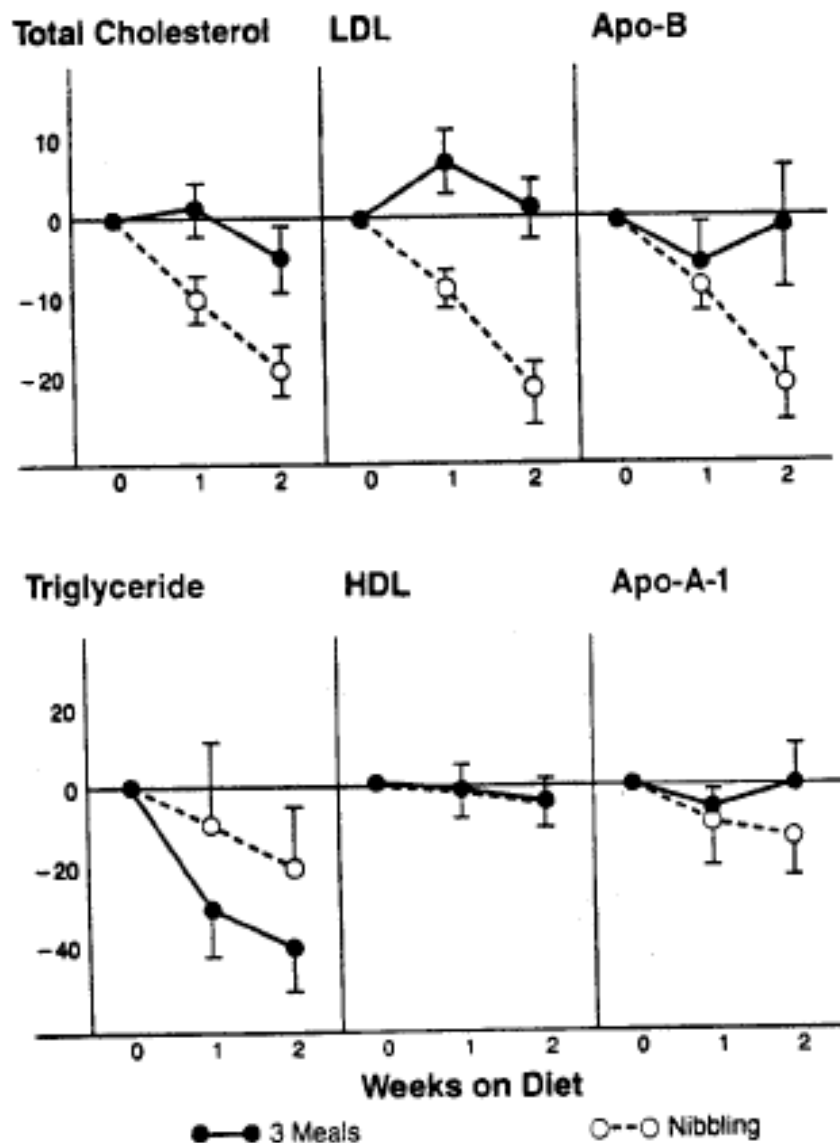


FIGURE 3 Blood glucose, insulin, and respiratory quotient (RQ) response and 2-hour urinary glucose loss, measured over 12 hours are shown in a diabetic controlled on diet. On one occasion 80 g glucose drinks were taken at 0, 4, 8 hours — and on another 5 g glucose in solution was taken every 15 minutes by continuous sipping o---o.



Nibbling vs. 3 Meals

FIGURE 4 Mean (\pm SE) percentage change from time zero in serum lipid and apolipoprotein (Apo) concentrations in seven men during the nibbling diet and the three-meal diet.

What Affects Glycemic Index/Load

- Eating Pattern (Nibbling vs. Meals)
- Food Composition and Preparation

Glycemic Index –

What Makes it High or Low?

Yogurt, <u>lowfat</u> , <u>unsweetened</u> , plain	14	Orange	43
Lentils	29	Corn	49
Black beans	30	Spaghetti, <u>durum</u>	55
Apple	36	Rice, white	59
Spaghetti, <u>ww</u>	37	Ice Cream	61
Tortilla, corn	38	Macaroni & cheese	64
All-bran cereal	42	Grape-nuts cereal	67
		French baguette	95

- Think Primitive!

“Whole wheat flour” ≠ Whole grain

Table 3 Comparison of glycaemic index between grains with intact or disrupted structures

Reference	Study subjects	Disrupted structure	GI ^a	Intact structure	GI
Jenkins <i>et al</i> (1986)	Diabetics (<i>n</i> = 15–17)	Wholemeal wheat bread	96 ± 5	Wheat kernels	63 ± 6*
Jenkins <i>et al</i> (1986)	Diabetics (<i>n</i> = 15–17)	Wholemeal wheat bread	96 ± 5	Cracked wheat kernels	65 ± 4*
Jenkins <i>et al</i> (1986)	Diabetics (<i>n</i> = 14)	Wholemeal rye bread	89 ± 6	Rye kernels	47 ± 5*
Jenkins <i>et al</i> (1988)	Diabetics (<i>n</i> = 6–8)	Wholemeal wheat bread	92 (11)	75% cracked wheat bread	69 (4)*
Jenkins <i>et al</i> (1988)	Diabetics (<i>n</i> = 6–8)	Barley flour bread	96 (6)	75% barley kernel bread	39 (7)*
Liljeberg <i>et al</i> (1992)	Non-diabetics	80% Wholemeal barley flour bread	94.9 ± 15.1	80% barley kernel bread	57.1 ± 10.3
Granfeldt <i>et al</i> (1994)	Non-diabetics (<i>n</i> = 9–10)	Barley flour porridge	65 ± 9**	Barley kernels	35 ± 8*
Granfeldt <i>et al</i> (1995)	Non-diabetics (<i>n</i> = 9)	Rolled oat porridge	93 ± 7	Oat kernel porridge	60 ± 7*

^aGI with reference to white wheat bread (GI = 100); mean ± s.d., mean (s.e.).

*Significantly different from GI of food with disrupted structure.

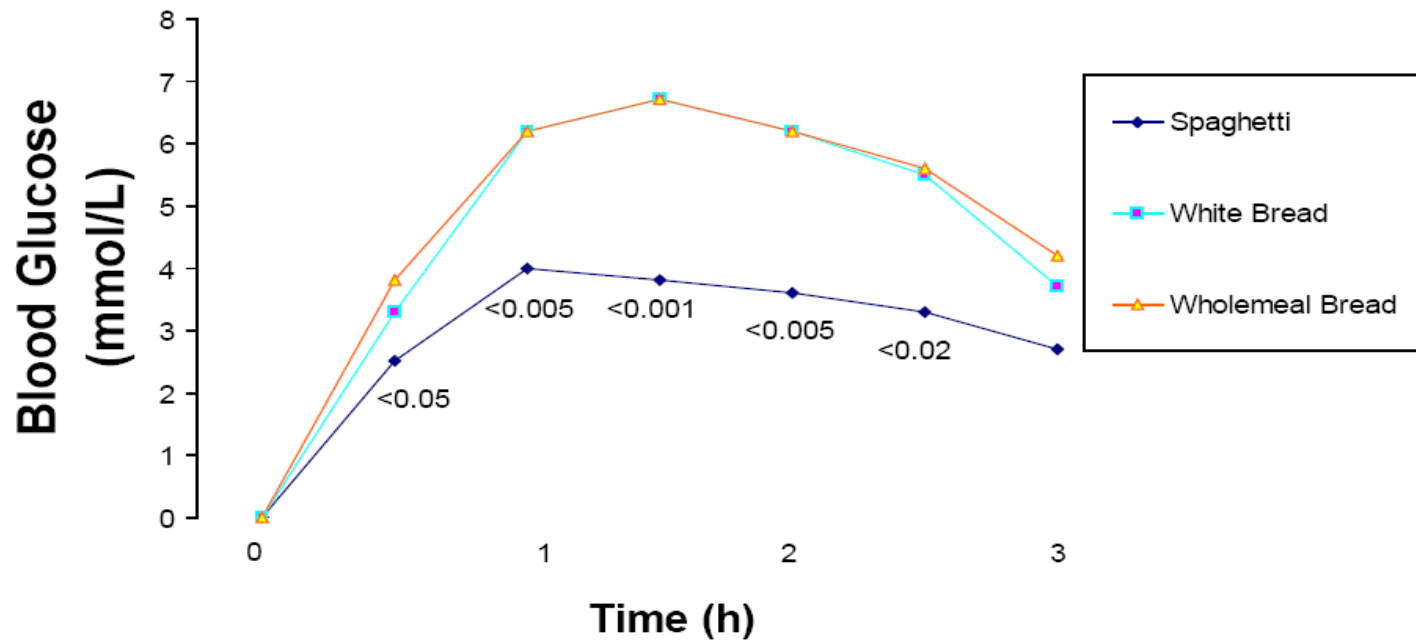
**Significantly different from white wheat bread.

European Journal of Clinical Nutrition
(2004) 58, 1443–1461.

Surface area exposed to enzymes will raise the GI (i.e. grinding flour)

Lack of fat, protein, fiber will raise the GI

Blood Glucose Increments After Spaghetti vs. Bread



Jenkins et al. *Diab Care* 1983;6:155-9

Glycemic Load

- Some High-GI foods have so little carbohydrate in an average serving, their impact will be low.
- Examples include
 - Watermelon
 - Popcorn

Glycemic Index vs Glycemic Load

Carrots GI 47

40g carb – 6 2/3 cups carrots



1 cup carrots (1 large carrot)
Glycemic Load 3

Spaghetti noodles GI 44

40g carb = 1 C cooked noodles

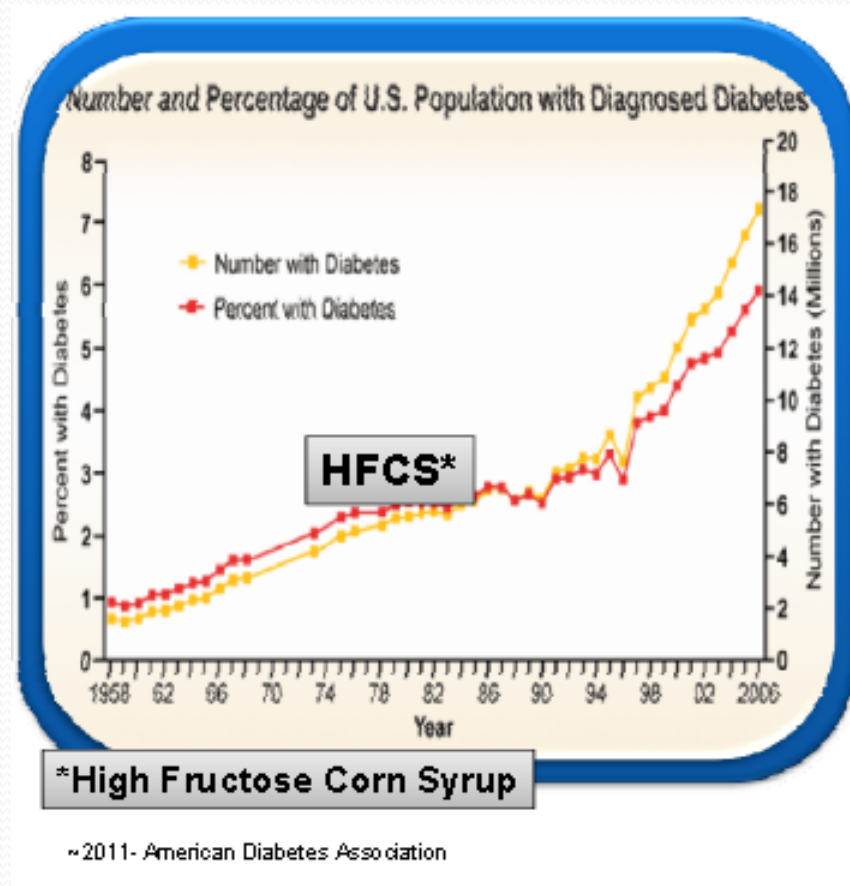


1 Cup Spaghetti
Glycemic Load 18

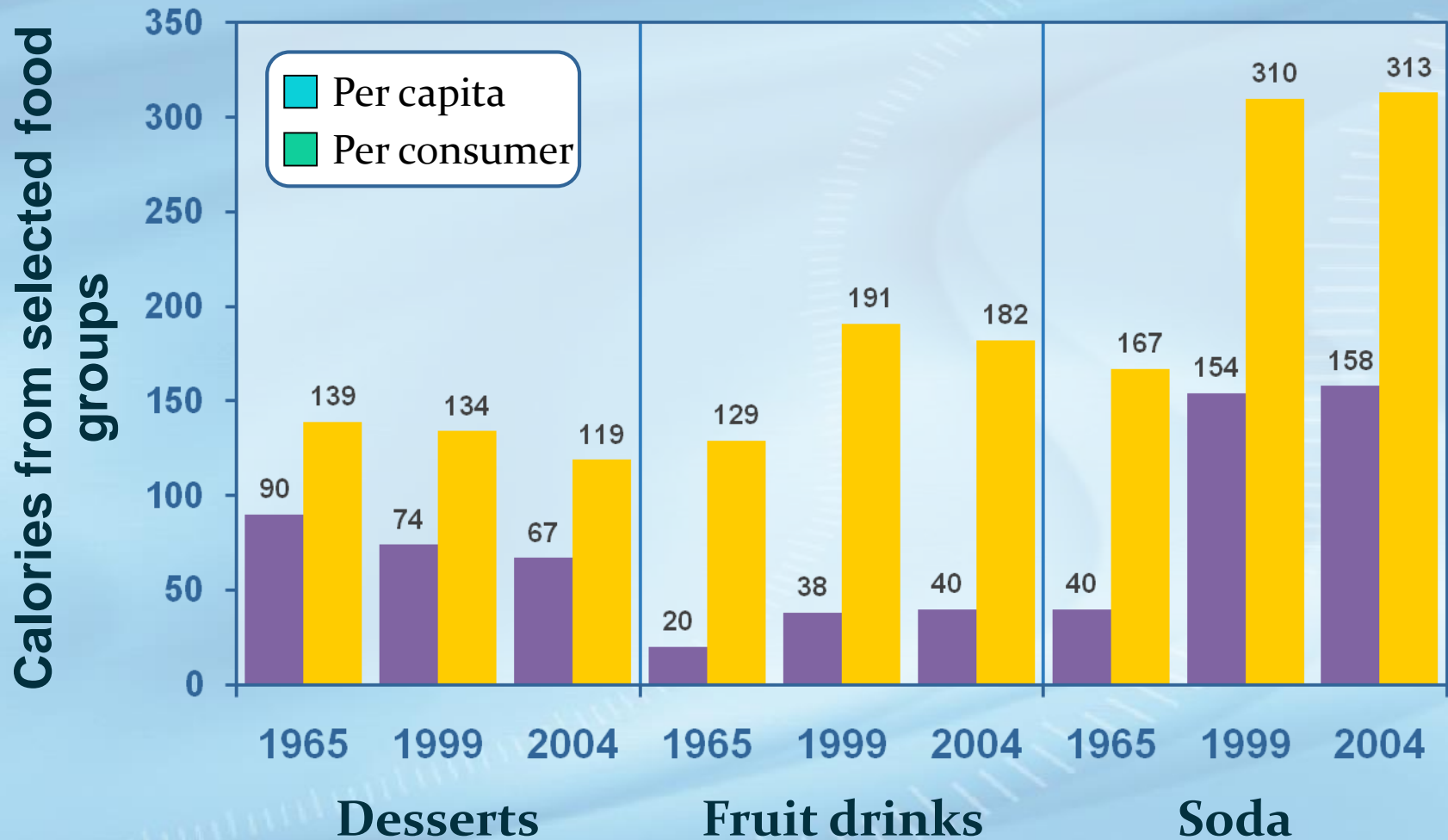
Resources for Patients

- <http://mendoza.com/gi.htm>
- The GI Diet by Rick Gallup

Beverage Choices

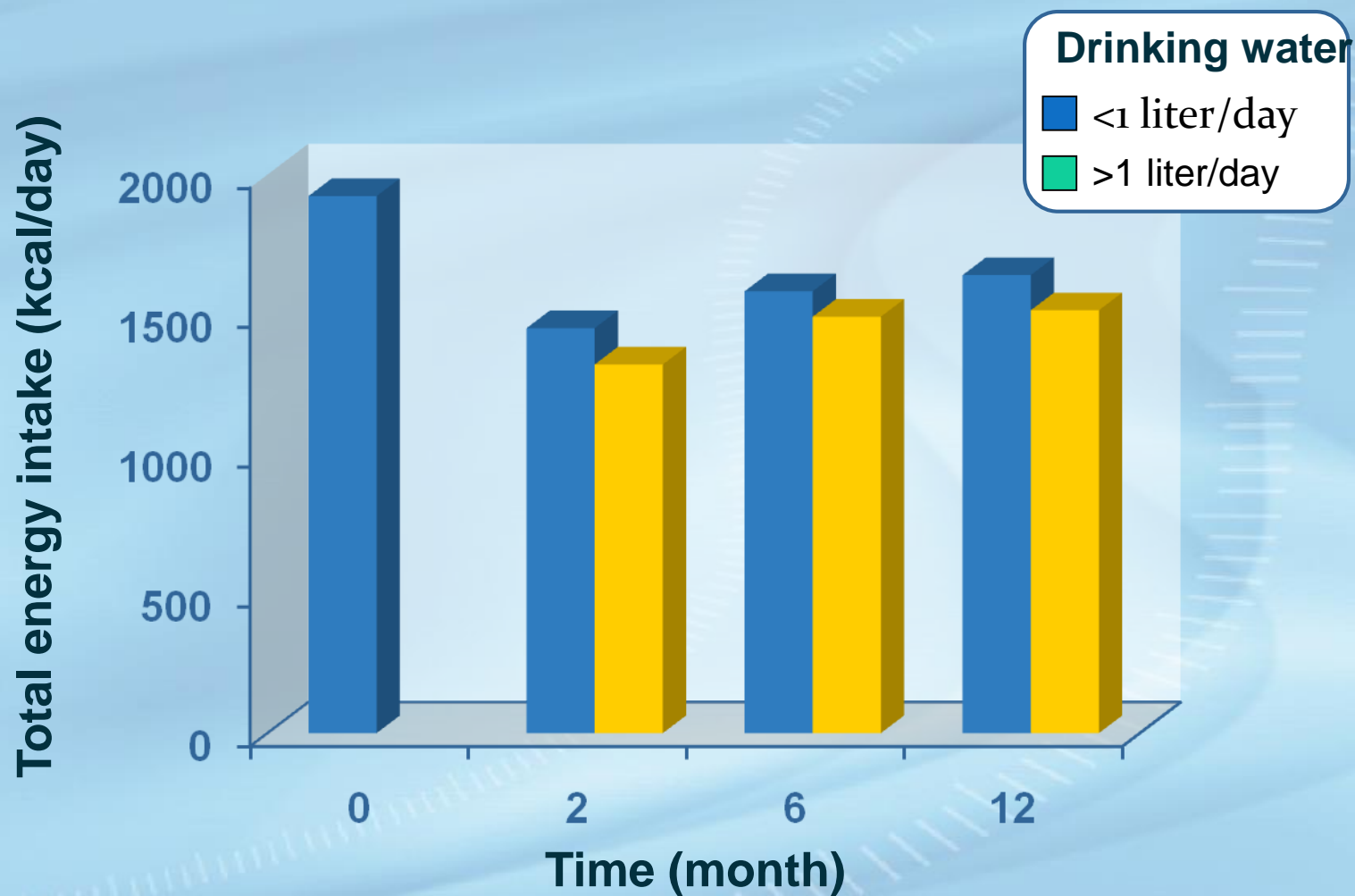


Steepest Increase in Calories of Added Sugar From Soda, per Capita and Consumer Estimates



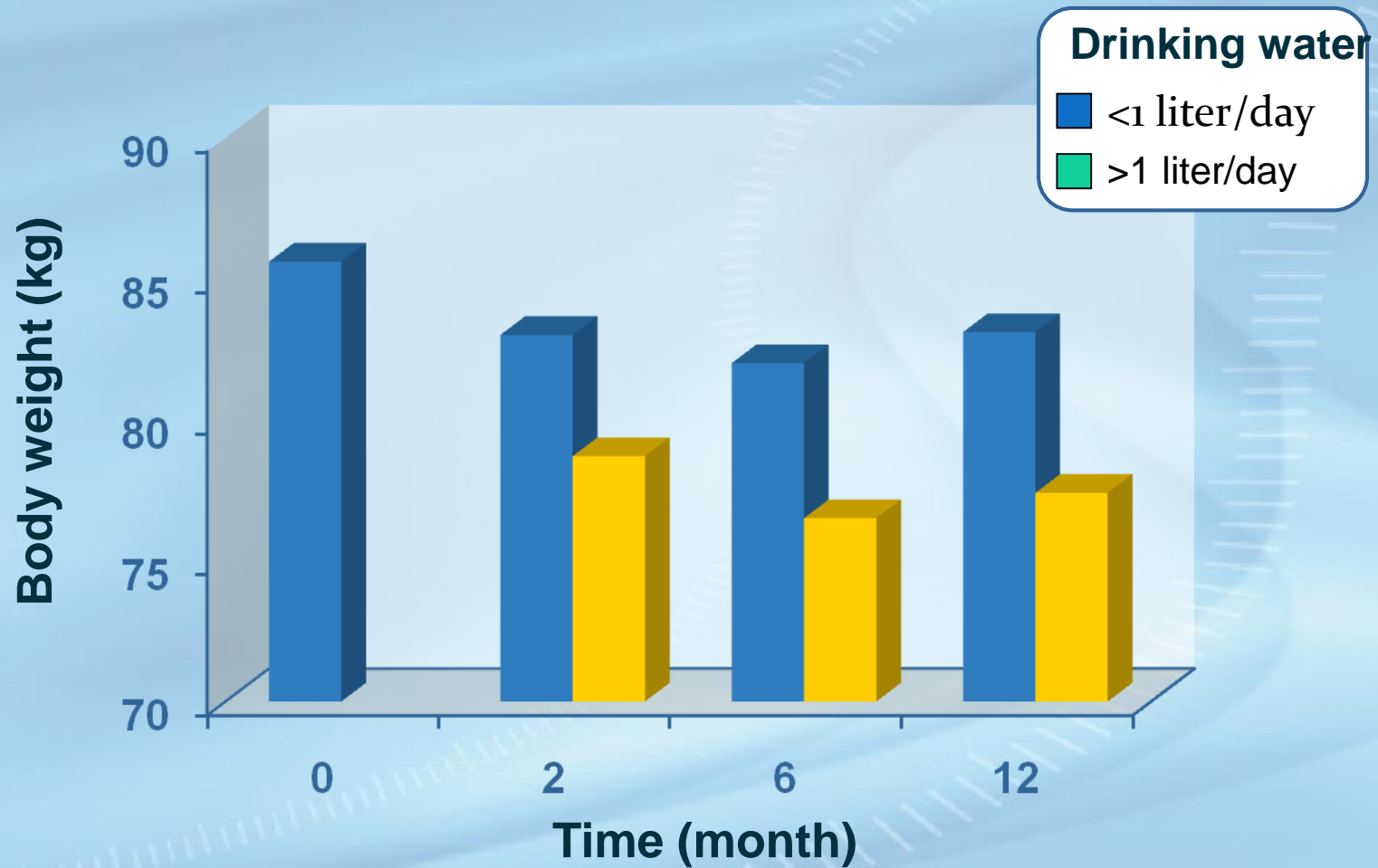
Adapted from Duffey KJ and Popkin BM Am J Clin Nutr 2008; 88:1722S-32S

The A to Z Study: The Relationship of Water Intake With Adjusted Mean Daily Total Energy Intake



Adapted from Stookey JD et al. Obesity 2007; 15: 3013-22

The A to Z Study: The Relationship of Water Intake With Mean Body Weight



Adapted from Stookey JD et al. Obesity 2008; 16: 2481-8



THE INVERTED PYRAMID OF HEALTHY HYDRATION



Produced by the
International Chair on
Cardiometabolic Risk

Source: www.myhealthywaist.org

“Diet” Beverages

	Q ₁	Q ₂	Q ₃	Q ₄	<i>P</i> for trend
Sugar-sweetened beverages					
Servings	Never	2/mo	1–4/wk	4.5/wk to 7.5/d	
Multivariate adjusted ²	1.00	1.01 (0.90, 1.13)	1.03 (0.92, 1.15)	1.21 (1.08, 1.36)	<0.01
Previous weight change and low-calorie diet	1.00	1.07 (0.95, 1.20)	1.07 (0.95, 1.20)	1.25 (1.12, 1.40)	<0.01
Artificially sweetened beverages					
Quartile range (servings)	Never	2/mo	1–4/wk	4.5/wk to 18/d	
Multivariate adjusted ²	1.00	1.21 (1.06, 1.37)	1.29 (1.16, 1.44)	1.94 (1.75, 2.14)	<0.01
Previous weight change and low-calorie diet	1.00	1.13 (1.00, 1.29)	1.10 (0.99, 1.23)	1.35 (1.22, 1.50)	<0.01

Increasing Water

- Instant Lemon
- Cucumber Slices
- Celestial Seasonings teas
- Your ideas?

Shorthand: .dmpreven

For diabetes prevention, the main things you can do are:

1. Eat low glycemic index (see handout or <http://www.mendosa.com/gilists.htm>)
2. Increase fiber in the diet
3. Increase fruits and vegetables to 5-9 servings per day, especially dark green leafy vegetables
4. Increase exercise (30 minutes 5 days per week) - include muscle building as well as aerobic
5. Avoid trans fats (hydrogenated oils in baked goods, fried foods)
6. Avoid environmental endocrine disruptors (like PCB's, phthalates, BPA, PFOAs, etc.) - learn more at healthychild.org

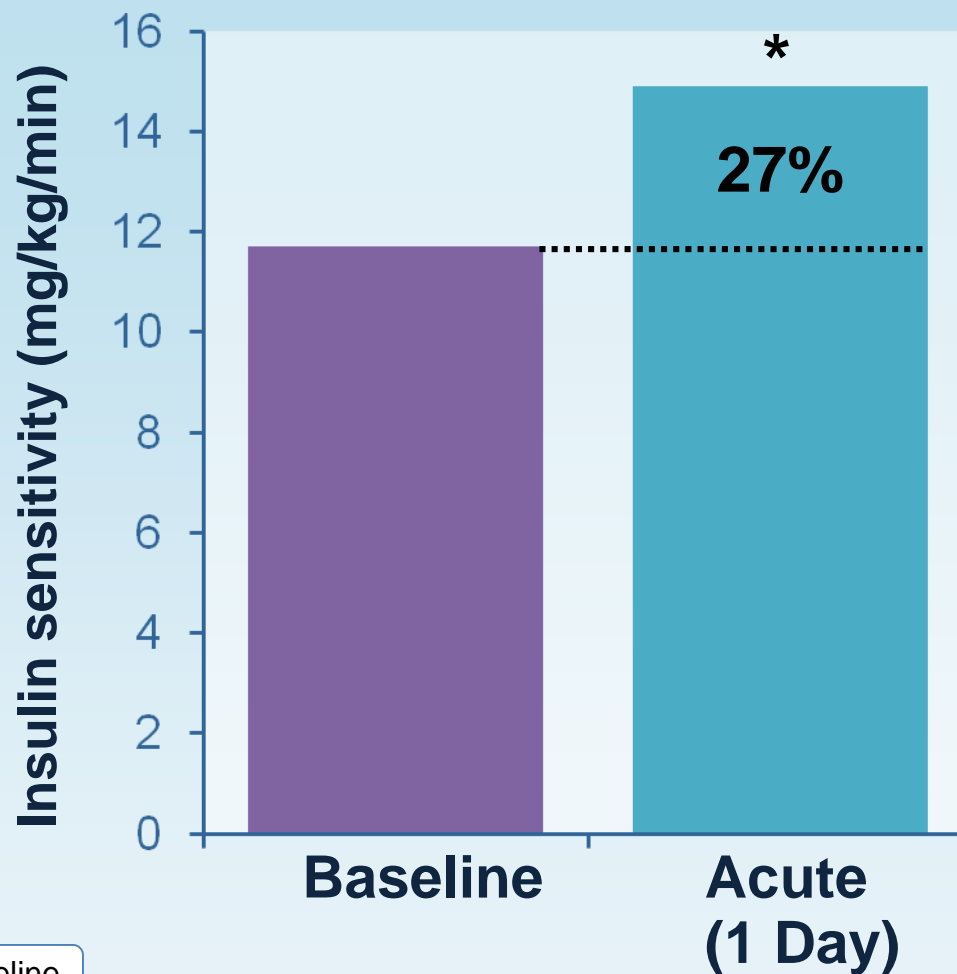
Increasing nuts in the diet may be helpful, and eating cinnamon, about ½ tsp per day, may also be helpful, as may the medication metformin.

Exercise

- Q: What type do you recommend?
- A: Aerobic and Resistance



Effect of Acute Exercise on Insulin Sensitivity in Men and Women



*p=0.05 compared to baseline



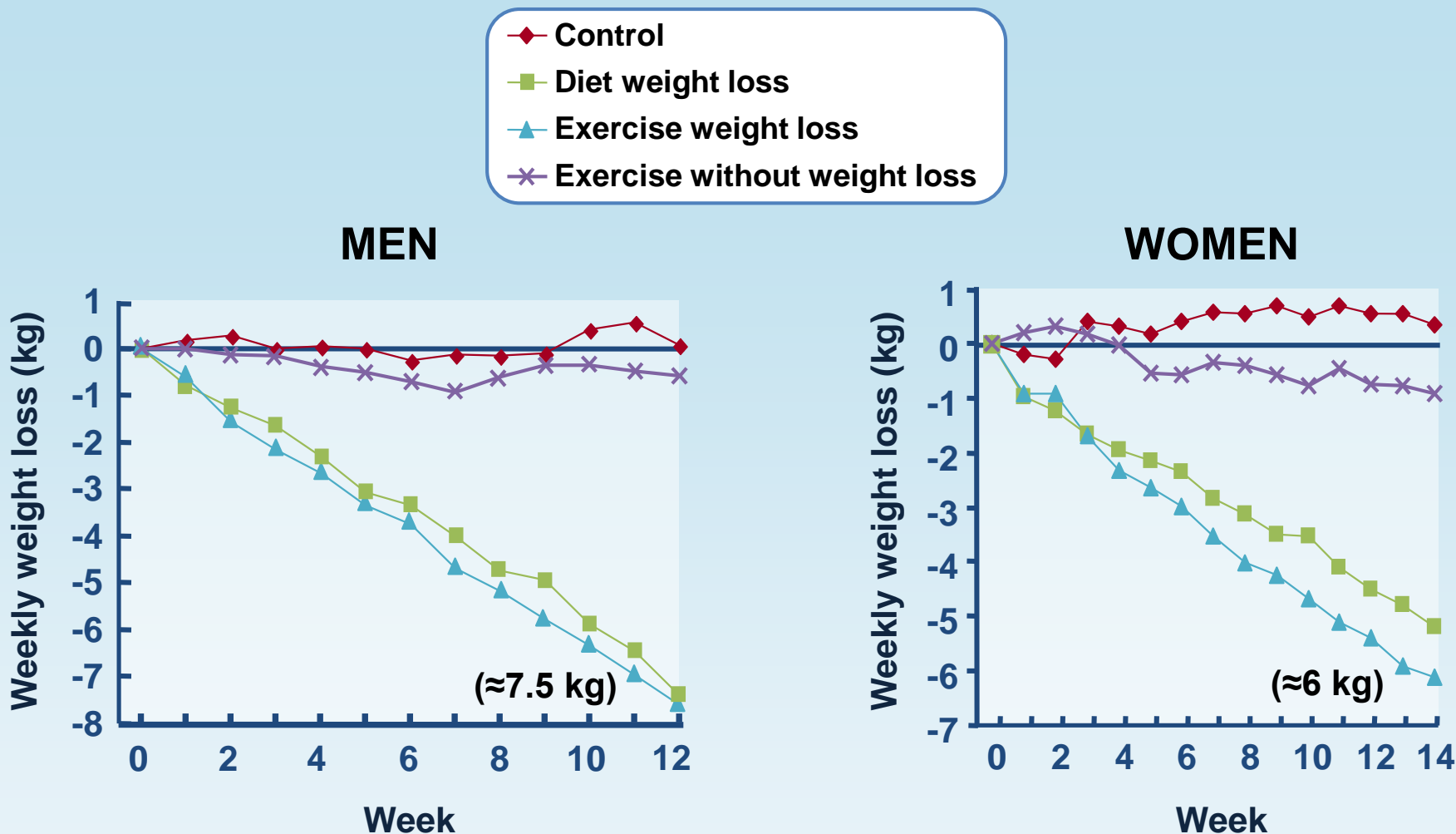
Effects of Diet or Exercise With or Without Weight Loss on Abdominal Obesity and Insulin Resistance



- ❑ Abdominally obese men and women (age ≈45 years): **14-16 weeks**
- ❑ Intervention **≈50 minutes of daily walking** on treadmill under supervision
- ❑ All participants: balanced diet, no caloric restriction

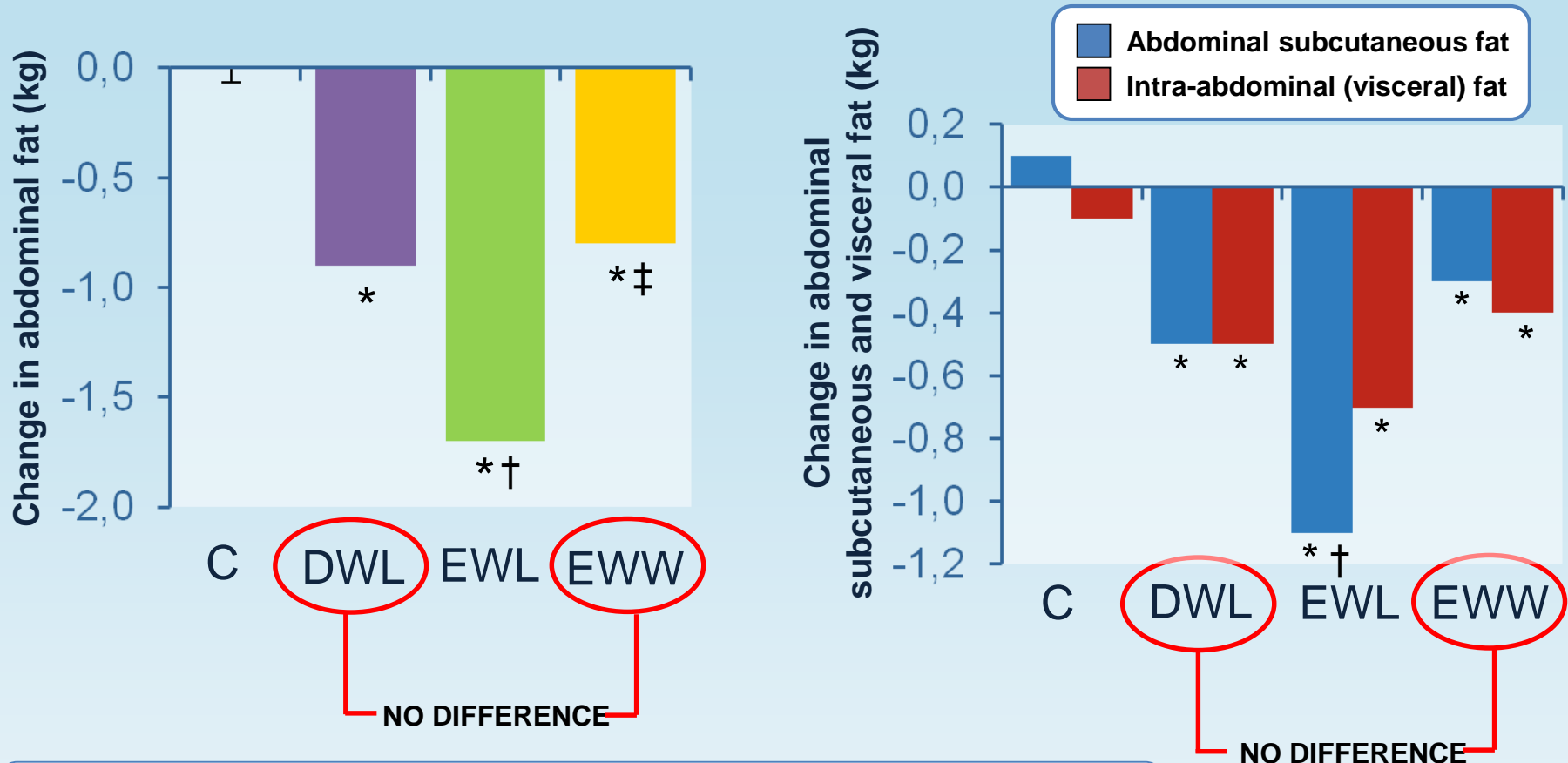


Effects of Diet or Exercise with or Without Weight Loss on Abdominal Obesity and Insulin Resistance





Influence of Equivalent Diet- or Exercise-Induced Weight Loss on Abdominal Fat (MRI) in Obese Women



* Significant treatment differences (pre vs. post) compared with control ($p < 0.05$)

† Significant treatment differences (pre vs. post) compared with diet weight loss ($p < 0.05$)

‡ Significant treatment differences (pre vs. post) compared with exercise weight loss ($p < 0.05$)

C: control

EWL: exercise weight loss (6 kg)

MRI: magnetic resonance imaging

DWL: diet weight loss (6 kg) EWW: exercise without weight loss



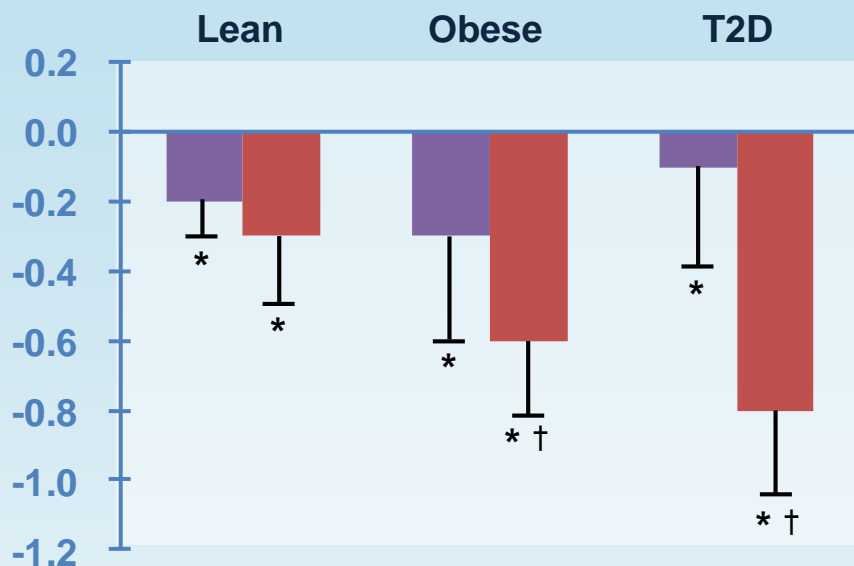
Produced by the
International Chair on
Cardiometabolic Risk



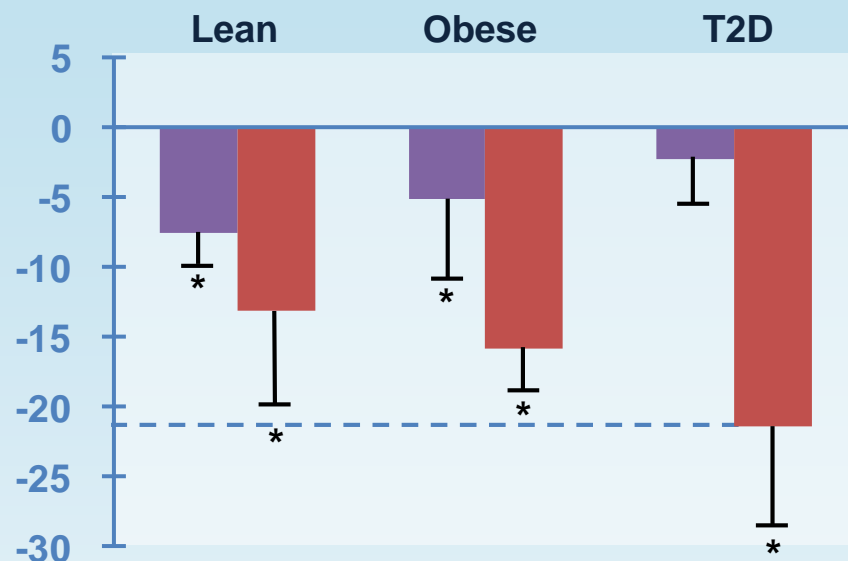
Exercise Without Weight Loss is an Effective Strategy for Obesity Reduction in Men With and Without Type 2 Diabetes (T2D)

- Abdominal subcutaneous adipose tissue
- Intra-abdominal (visceral) adipose tissue

Absolute change (kg)



Relative change (%)



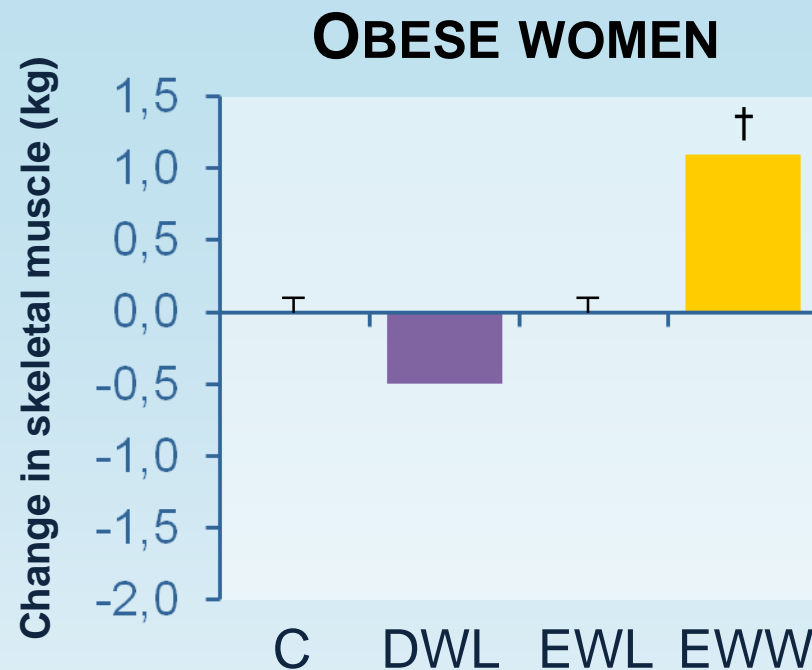
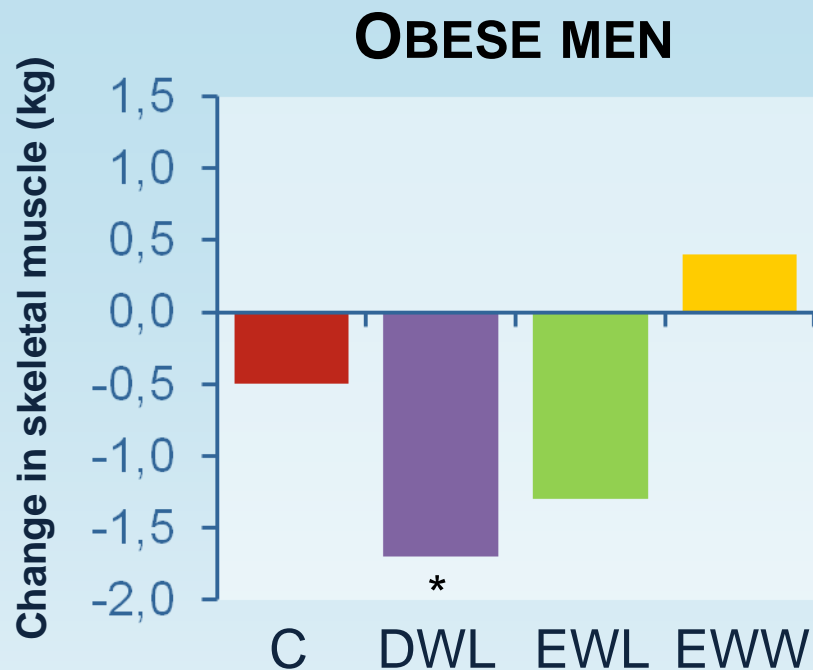
* Significant treatment differences (pre vs. post) within group, $p < 0.01$

† Significantly greater reduction in intra-abdominal fat by comparison to the lean group, $p < 0.01$

Balanced diet, no caloric restriction, no weight loss



Exercise With or Without Weight Loss on Skeletal Muscle Mass in Obese Men and Women



* Significant treatment differences (pre vs. post) compared with control ($p < 0.05$)

† Significant treatment differences (pre vs. post) compared with diet weight loss ($p < 0.05$)

C: control

DWL: diet weight loss (6 kg)

EWL: exercise weight loss (6 kg)

EWW: exercise without weight loss

MRI: magnetic resonance imaging



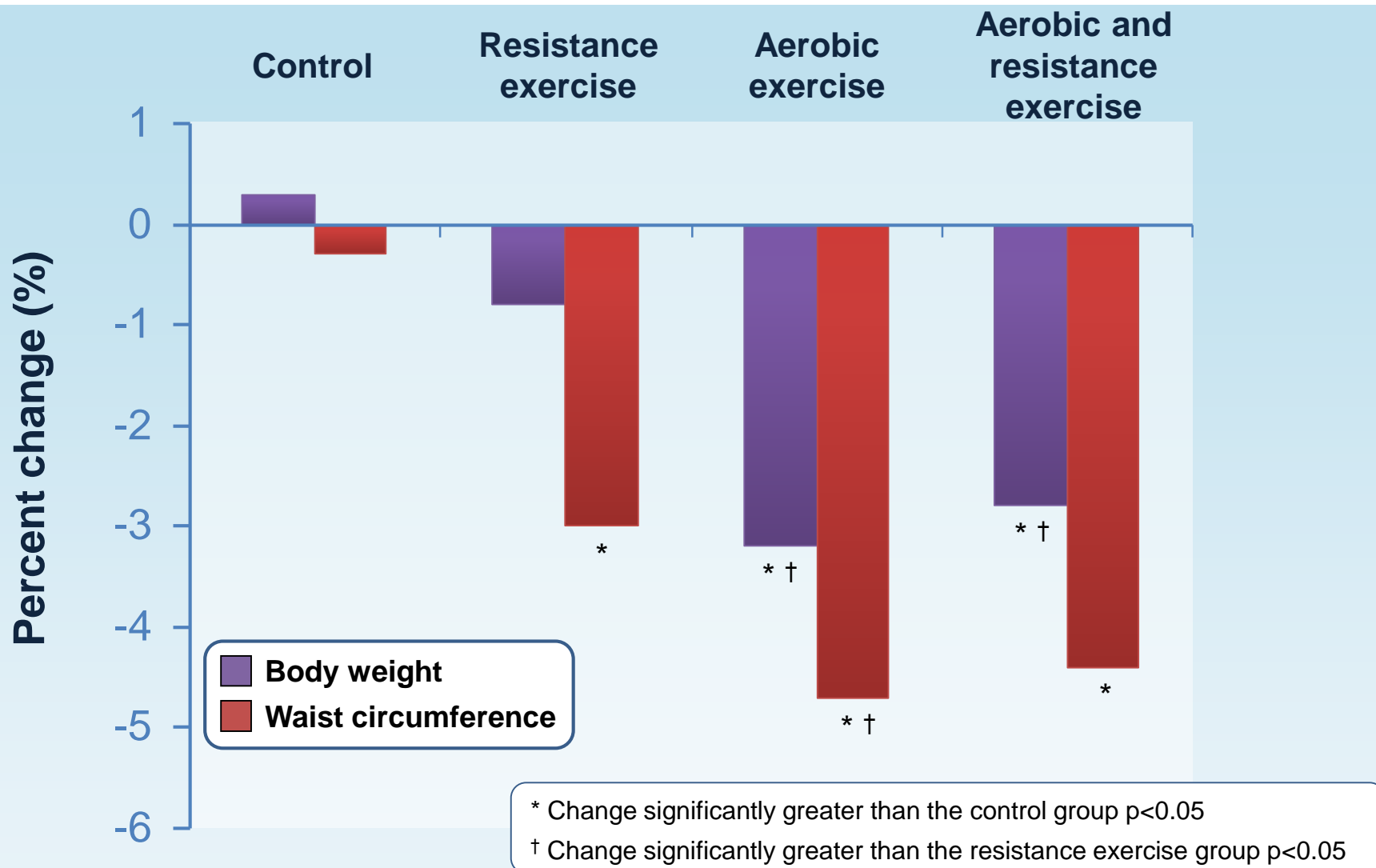
Effects of Exercise Modality on Insulin Resistance and Functional Capacity in Aging: A Randomized Controlled Trial



**Abdominally obese men and women (age ≈68 years):
6-month exercise intervention, **without caloric restriction**.**

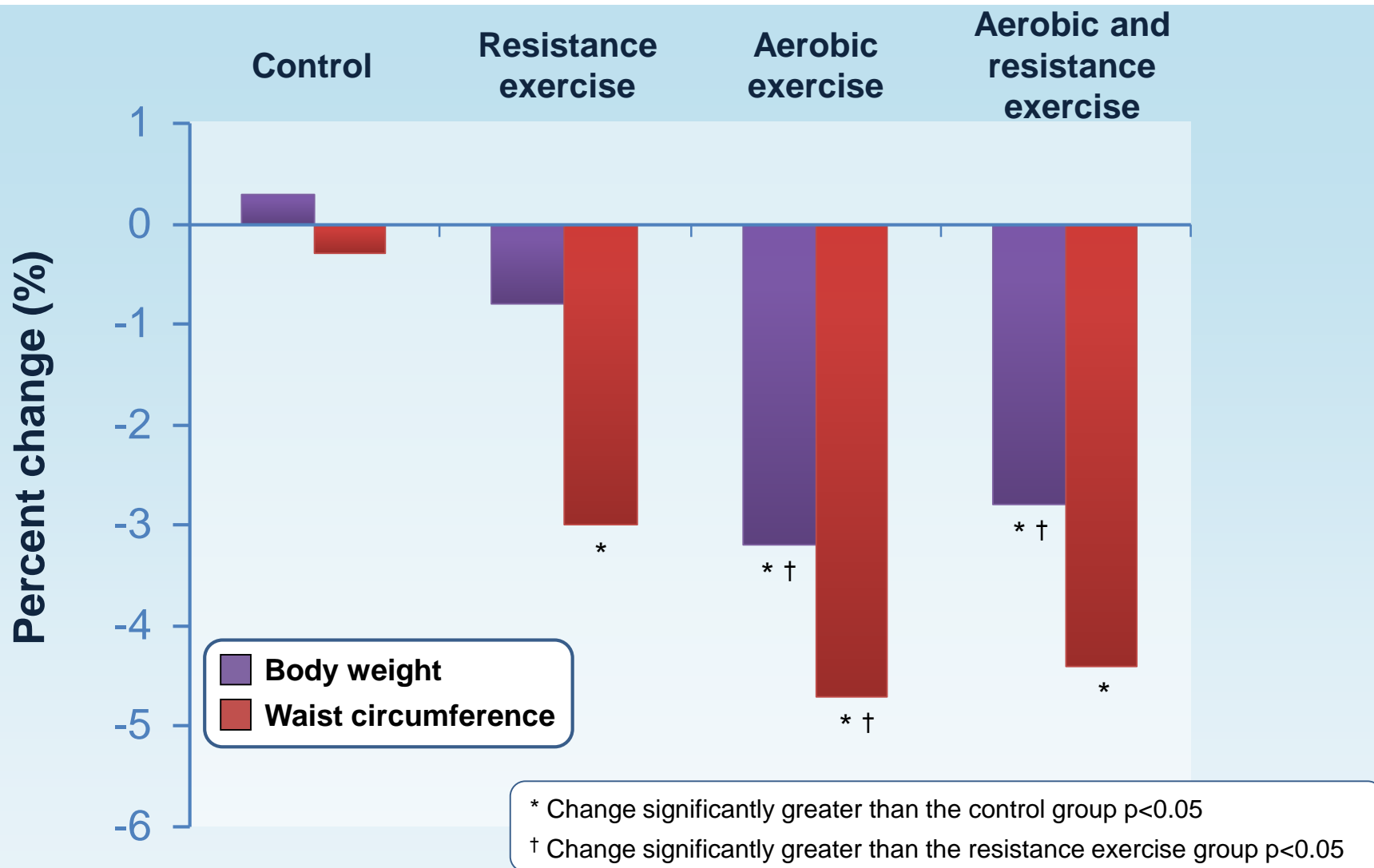


Effects of Exercise Modality on Body Weight and Waist Circumference in Older Men and Women



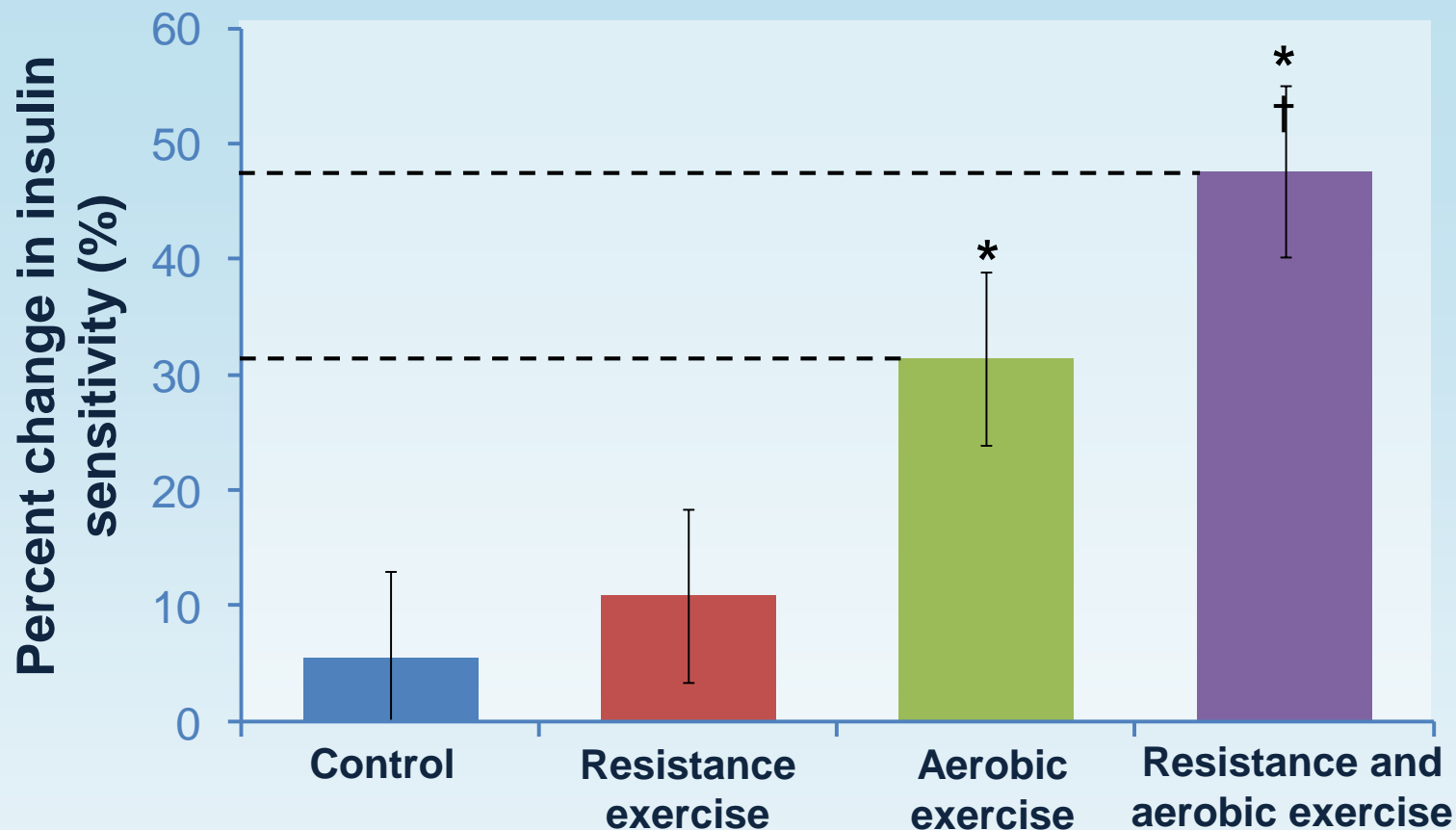


Effects of Exercise Modality on Body Weight and Waist Circumference in Older Men and Women





Effects of Exercise Modality on Insulin Sensitivity in Older Men and Women



* Change significantly greater than the control group $p < 0.05$

† Change significantly greater than the resistance exercise group $p < 0.05$

Some other issues

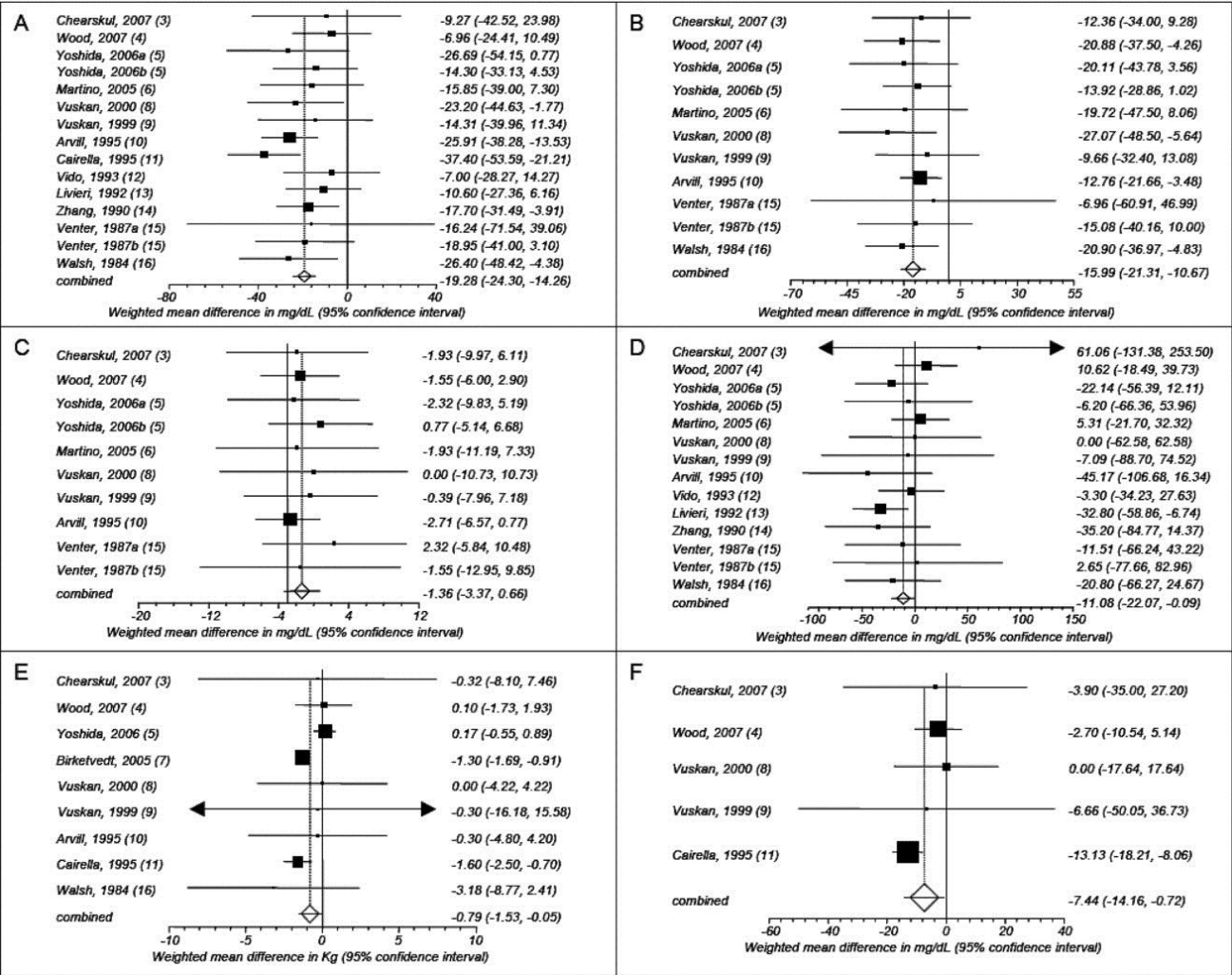
- Stress Reduction
 - Relaxation
 - Build Community – thedanielplan, etc.
 - **If you want to travel swiftly go alone, if you want to travel far, travel together. ---African Proverb**
- Gut Flora
- Dietary Supplements



Effect of glucomannan on characteristics of the metabolic syndrome.

Total cholesterol

LDL cholesterol



Sood N et al. Am J Clin Nutr 2008;88:1167-1175

And a word on Diabetes Treatment

Embedded polls only work in PowerPoint for Windows

This object is the poll's placeholder

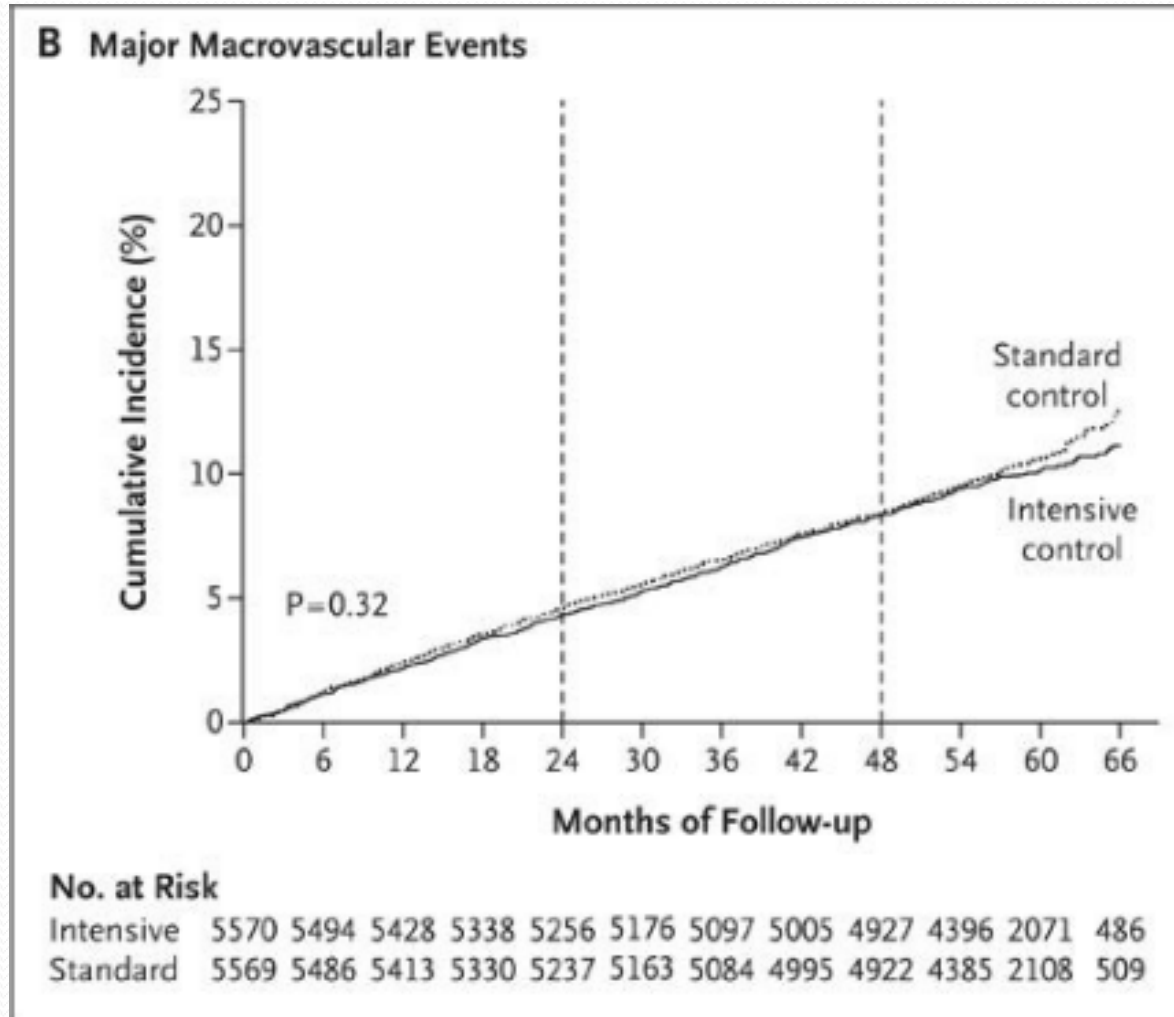
To view the poll live, enter slideshow mode by pressing F5

The paradox. . .

- In prospective epidemiologic studies, the incidence of many of these outcomes is directly associated with the degree of hyperglycemia
- After adjustment for other risk factors, an increase of 1% in hgbA1C is associated with an increase of
 - 18% in the risk of cardiovascular events
 - 12 to 14% in the risk of death
 - 37% in the risk of retinopathy or renal failure

N Engl J Med 2008; 358:2545-2559

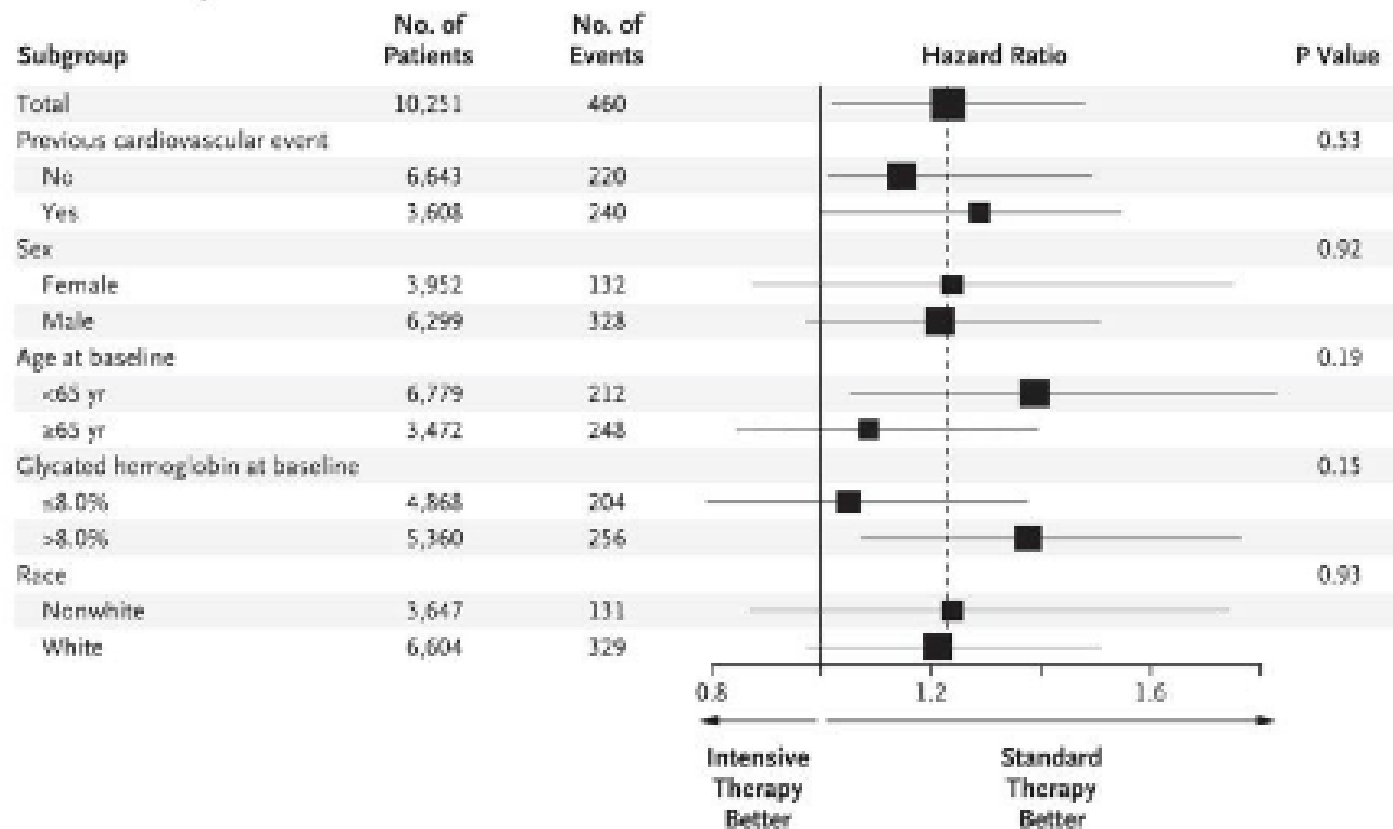
ADVANCE



N Engl J Med
2008;
358:2560-
2572

ACCORD

B Death from Any Cause



N Engl J Med 2008; 358:2545-2559

Hyperinsulinemia is toxic, even with normal glucose

- “The real problem is that muscle and fat are resistant to the insulin signal, BUT other tissues, bathed in high insulin, are still exquisitely sensitive.”
- Drives appetite and further weight gain
- Atherogenic
 - Inhibition of Fatty Acid Oxidation
 - Growth factor properties, stimulating cell hypertrophy
- Carcinogenic

Epidemiology:

Diabetes Treatment and Cancer Incidence

	Diagnosis of cancer	Adjusted for age, sex, HbA _{1c} , smoking status, and BMI		
	N (%)	OR	95% CI	P
No DM ₂	185 (3.0 %)	1.00		
DM ₂	66 (5.1 %)	1.64	1.12 - 2.41	.01
DM ₂ : monotx with insulin	6 (2.8 %)	1.19	0.46 - 3.08	.71
DM ₂ : monotx w/ metformin	6 (3.1 %)	0.92	0.39 - 2.20	.85
DM ₂ : oral combo incl metformin	9 (3.9 %)	1.53	0.71 - 3.31	.28
DM ₂ : oral combo excl metformin	3 (10.7 %)	4.04	1.07 - 15.26	.04

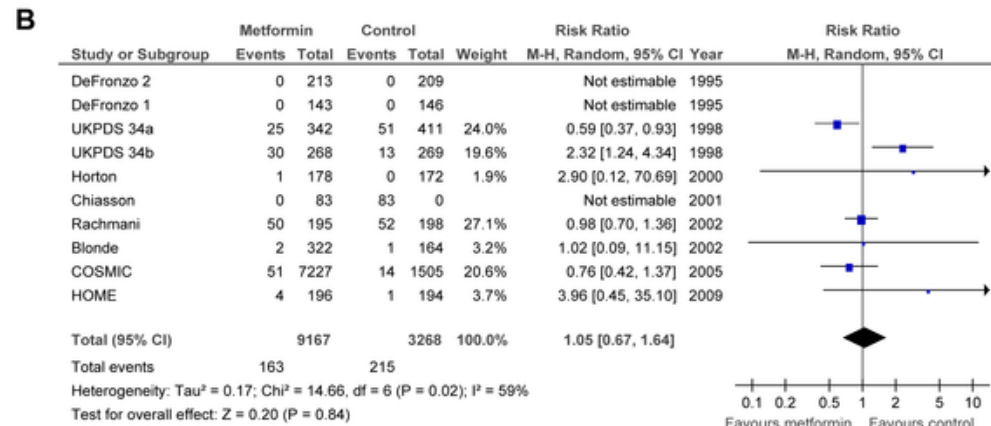
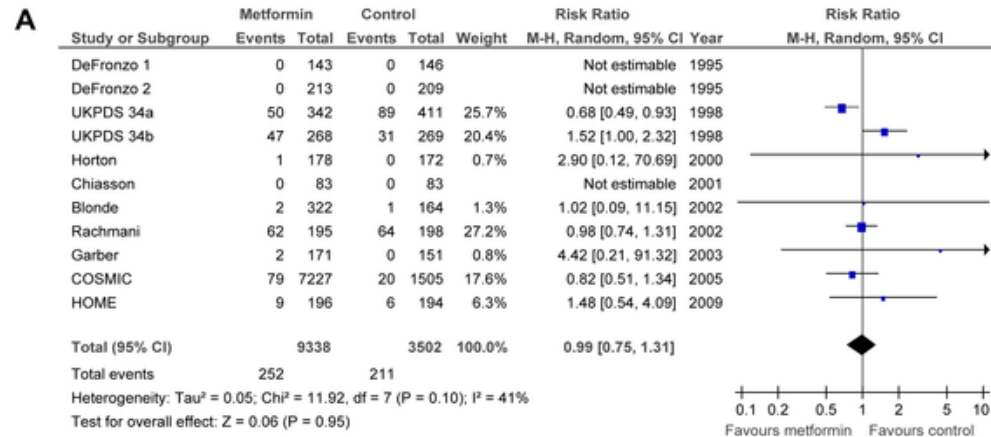
From: **Cardiovascular Outcomes in Trials of Oral Diabetes Medications: A Systematic Review**

Arch Intern Med. 2008;168(19):2070-2080. doi:10.1001/archinte.168.19.2070

Meta-analysis suggested that, compared with other oral diabetes agents and placebo, metformin was moderately protective and rosiglitazone possibly harmful

A Metformin Alone B. Sulfonylurea C. Rosiglitazone D. Pioglitazone

Or even metformin may not be helpful. . . .



But note they included metformin + sulfonylurea in their analysis

Boussageon R, Supper I, Bejan-Angoulvant T, Kellou N, et al. (2012) Reappraisal of Metformin Efficacy in the Treatment of Type 2 Diabetes: A Meta-Analysis of Randomised Controlled Trials. PLoS Med 9(4): e1001204. doi:10.1371/journal.pmed.1001204

<http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.1001204>

Take one a
day with tomato
and cucumber.

FARMACY



Bottom Line in Treating Diabetes

- Shorthand: .dmplan
- Individualized target:
 - Low risk/high benefit patients: <6.5%.
 - Intermediate risk/intermediate benefit patients: < or = 7%.
 - High Risk/low benefit patients(elderly, high risk for developing hypoglycemia or being injured by low blood sugar): 7.5-8%.
- Identify and Treat Comorbidities
 - HTN
 - HPL
 - Depression
 - Tobacco
 - (+/- periodontal disease, etc.)

Medication changes/additions:

- Step 1: Lifestyle +/- metformin
- Step 2: Lifestyle + metformin +sulfonyleurea or Lifestyle + metformin + basal insulin
- Step 3: Lifestyle + metformin + Intensive insulin
- Tier 2 (less proven therapies): lifestyle + metformin + pioglitazone or GLP-1 agonist

Additional medications:

- ACEI/ARB or reason patient cannot take one
- Aspirin for documented CAD, additional risk factors for CAD, or men >50 or women > 55
- Statin if overt cardiovascular disease or if > 40 yo and have one or more other CVD risk factor
 - note one recommendation that all should be on statins unless T2DM <32 yo men/38 yo women with disease < 10 years and no apparent CVD risks factors Diabetes Care

November 2009 vol. 32 no. suppl 2 S384-S391

Patient education/empowerment

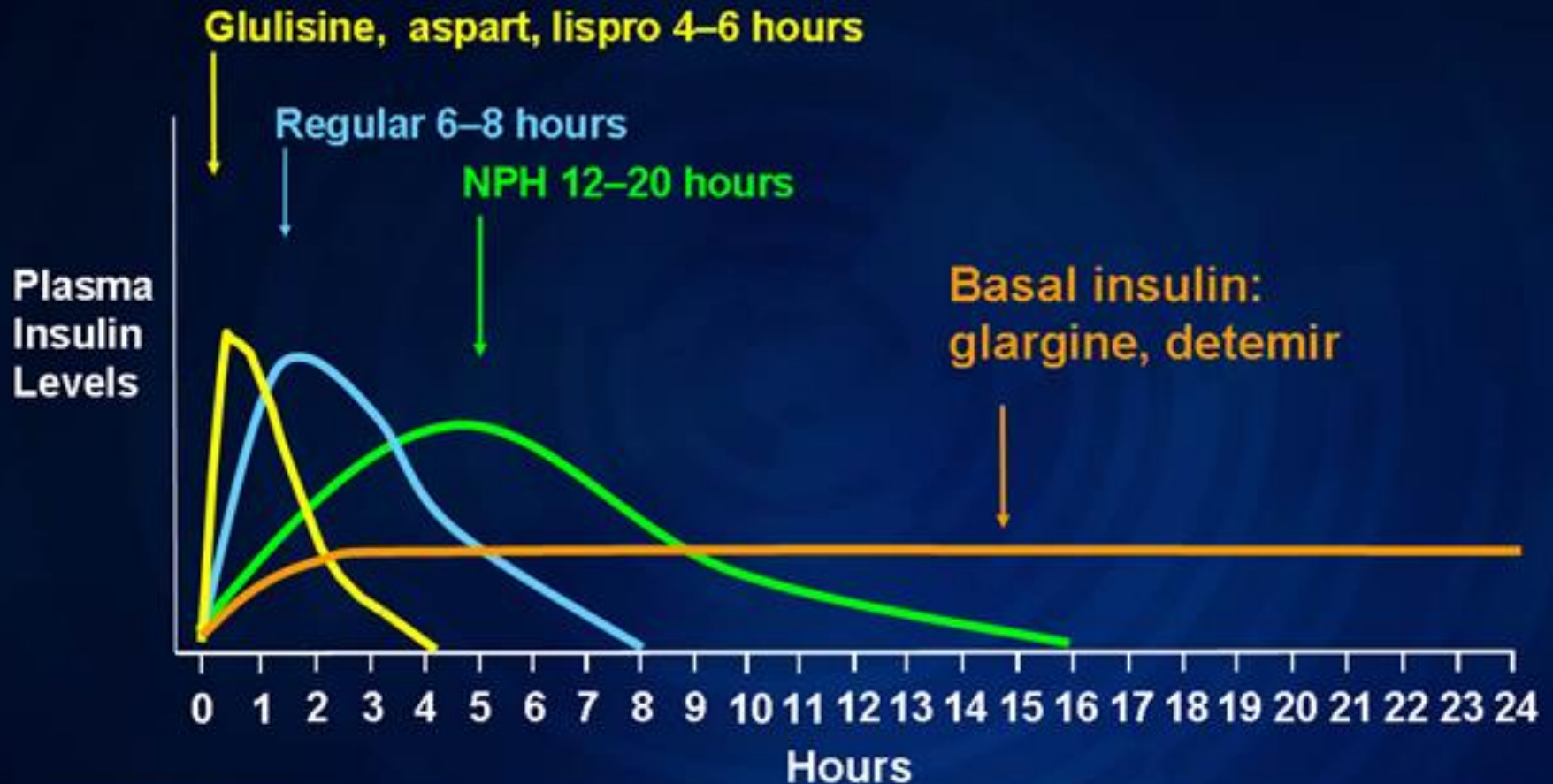
- See list in .dmplan
 - Emphasis on lifestyle
 - Hypoglycemia
 - Finding support
- Shorthand: .dmpted
 - Set a goal!!

Integrative Additions

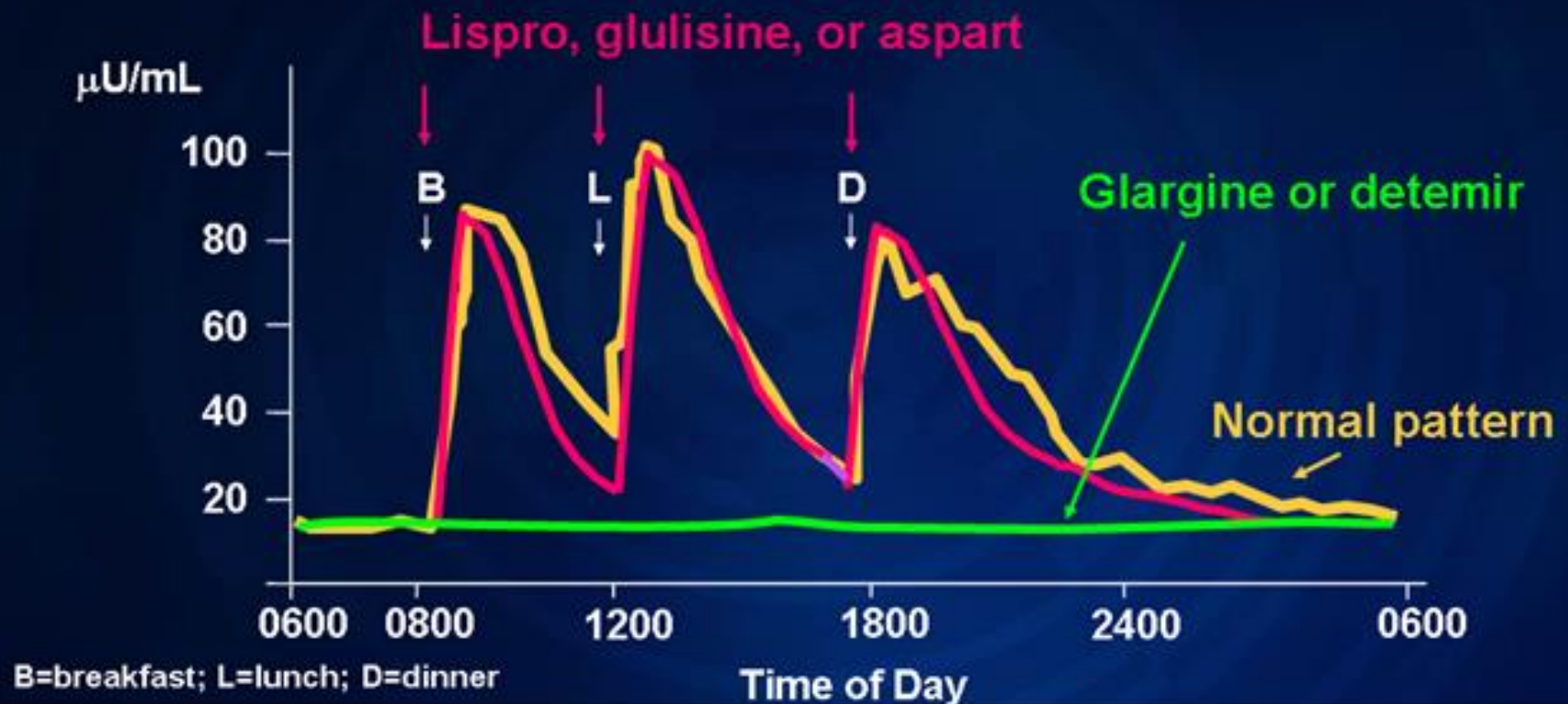
- Glucomannan 1-8 grams before meals
- Fish oil 2000 mg EPA+DHA per day
- ALA (alpha lipoic acid) 100 mg BID
- Cinnamon 500mg BID
- I am less convinced:
 - [Vanadium 0.5 mg BID]
 - [Chromium picolinate 600 mg BID]
 - Bitter melon
 - Etc.

Insulin Varieties

Action Profiles of Injectable Insulins

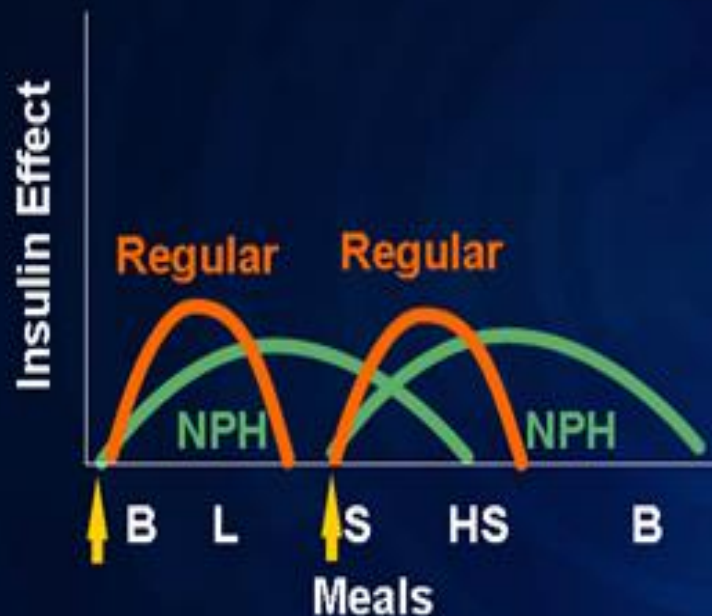


Basal-Bolus Insulin Treatment with Insulin Analogues

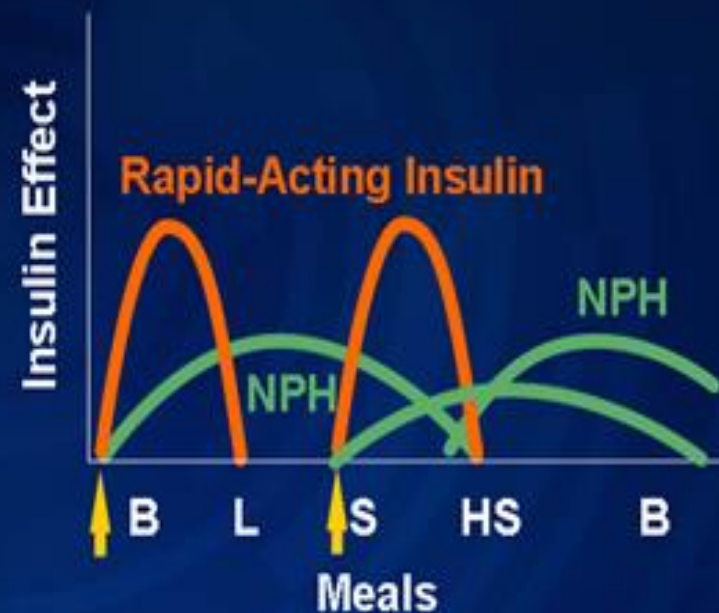


Twice Daily Split-Mixed Regimens: Adjustments in Overnight Coverage

Regular Insulin

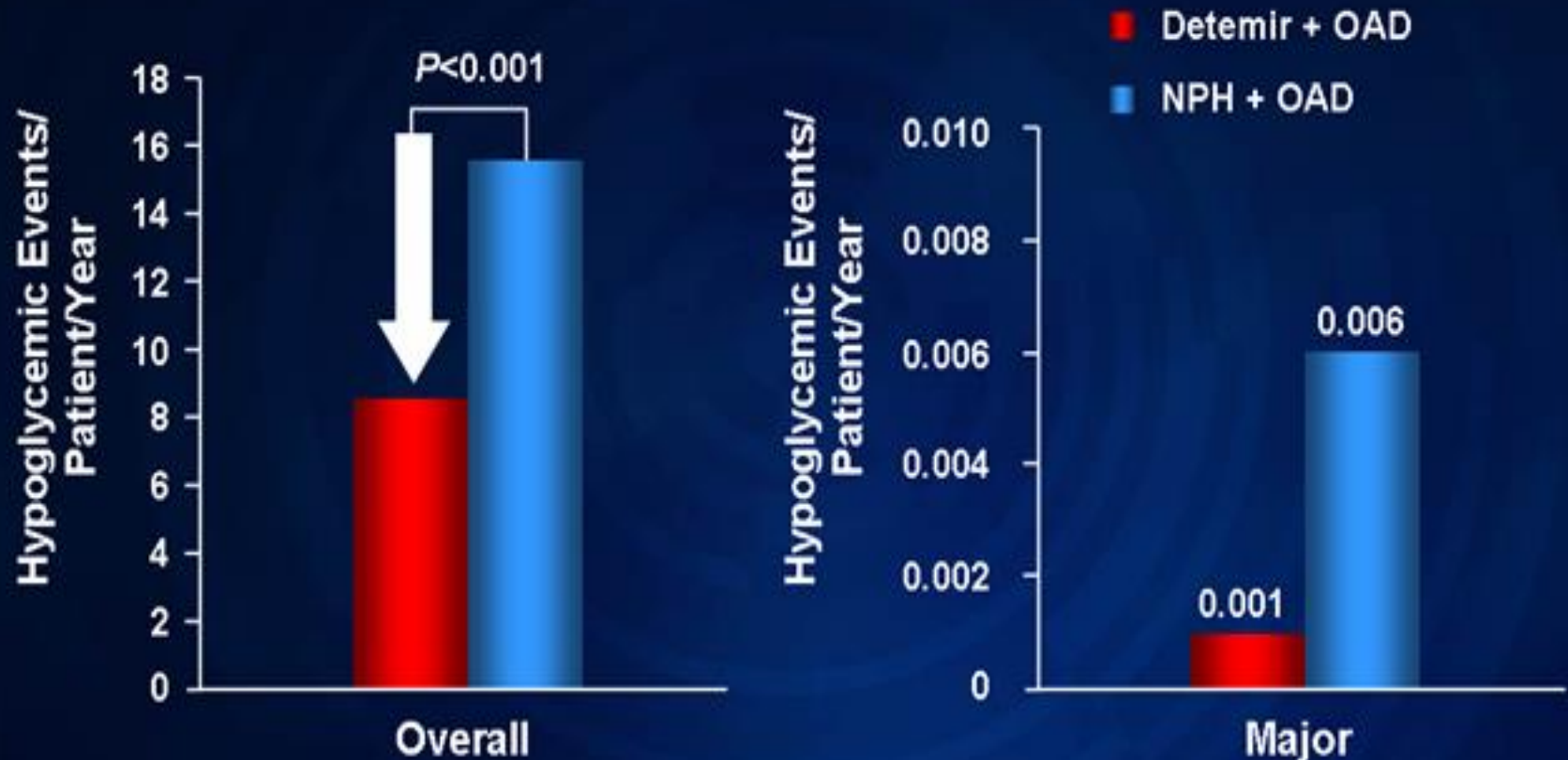


Rapid-Acting Insulin



NPH moved to hs for better a.m. peak
NPH added to supper for better early night coverage

Hypoglycemia Rates with Detemir vs NPH



Adapted from Hermansen K et al. *Diabetes Care*. 2006;29:1269-1274.

Cost

	Cost for 10 mL
NPH	\$73.99
Humulin R	\$73.99
Novolin 70/30 vial	\$75.99
Levemir 10 mL	\$136 (\$378 for 3)
Levemir flexpen	\$161.99
Novolog 70/30 flexpen	\$172.65
Humulin 70/30 pen	\$150.66
Lantus	\$124.99
Novolog	\$140.70

On drugstore.com 1/2012

Starting insulin in Type 2 DM

- Start with basal at hs
 - 0.1 units/kg, or 8-10 units

If FBG >	Increase insulin by _____ every 3-4 days
120	2 units
140	3 units
160	4 units

- ?Whole-food, mostly plant based diet
 - ?Omega 3 fatty acids
 - ?Anti-oxidants
 - ?Phytonutrients
 - ?Supplements
 - ?High dose EPA+DHA
 - ?Insulin sensitizers - Insulin sensitizers: Glucomannan – 1-2 gm 5-10 minutes before Meals, Chromium 600 mg BID
 - ? • ALA 100 mg BID
 - • Cinnamon 500mg BID
 - • Vanadium 0.5 mg BID
-
- ? Hypertriglyceridemia
 - ? Obesity/ Weight gain
 - ?Biotransformation/Elimination support
 - ?Movement Medicine
 - ?Stress Management
 - ?Reduce Toxic Burden