

Whole Grains: Just for the Health of It


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Grains, even whole grains, are empty calories and cause wheat belly.

We did not evolve to eat grains.

White bread is as bad as soda

Modern grains are killing you.

Topics Covered

- The ingestion of the recommended mix of whole grain foods is associated with numerous health benefits.
- Myths and facts associated with grain and whole grain consumption.
- Grains deemed as processed or ultraprocessed by NOVA.
- Consumption of whole grains (and cereal fiber) is far below recommended levels.
- Optimal health is about the right mix and quantity of whole grains and enriched refined staple grains, with few indulgent grains.

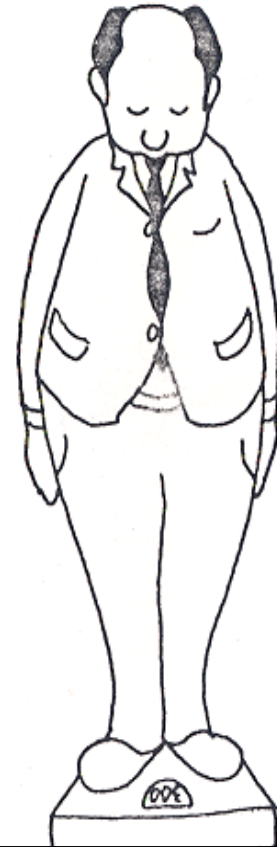
**MYTHS: CARBS AND GRAIN
FOODS, EVEN WHOLE GRAINS,
INCREASE BODY WEIGHT AND
IMPAIR WEIGHT LOSS**



Myth: Grains Cause Weight Gain

People believe

1. Overweight is caused by carbs - eg grain foods
2. Overweight is associated with refined grains
3. Weight gain can be reduced with whole grains
4. Weight loss can't occur with grains in the diet

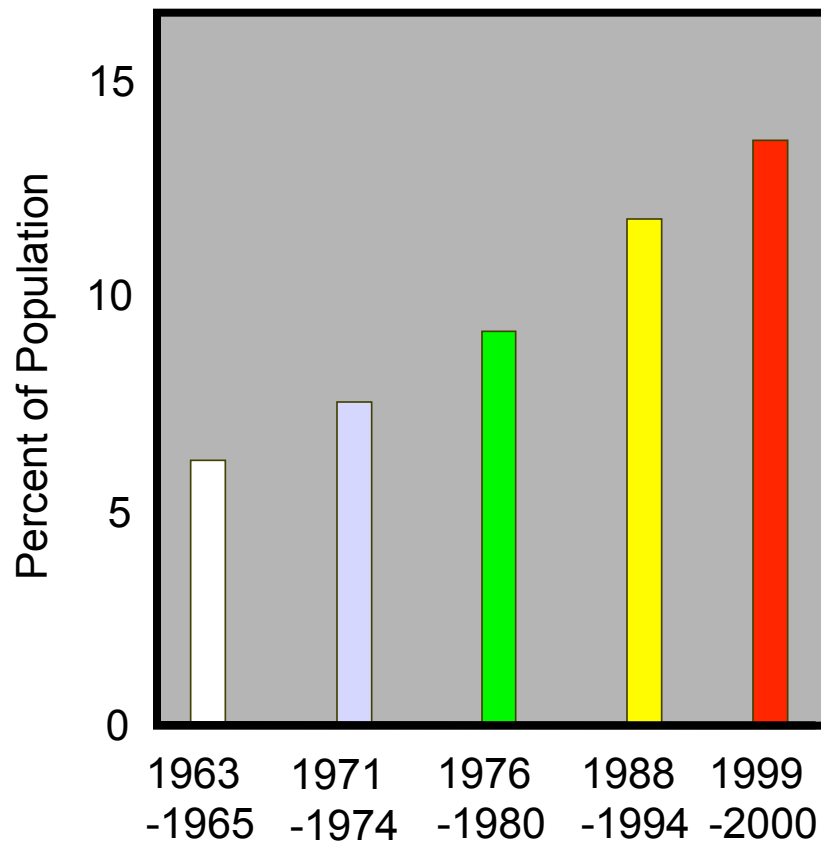


What does the evidence show?

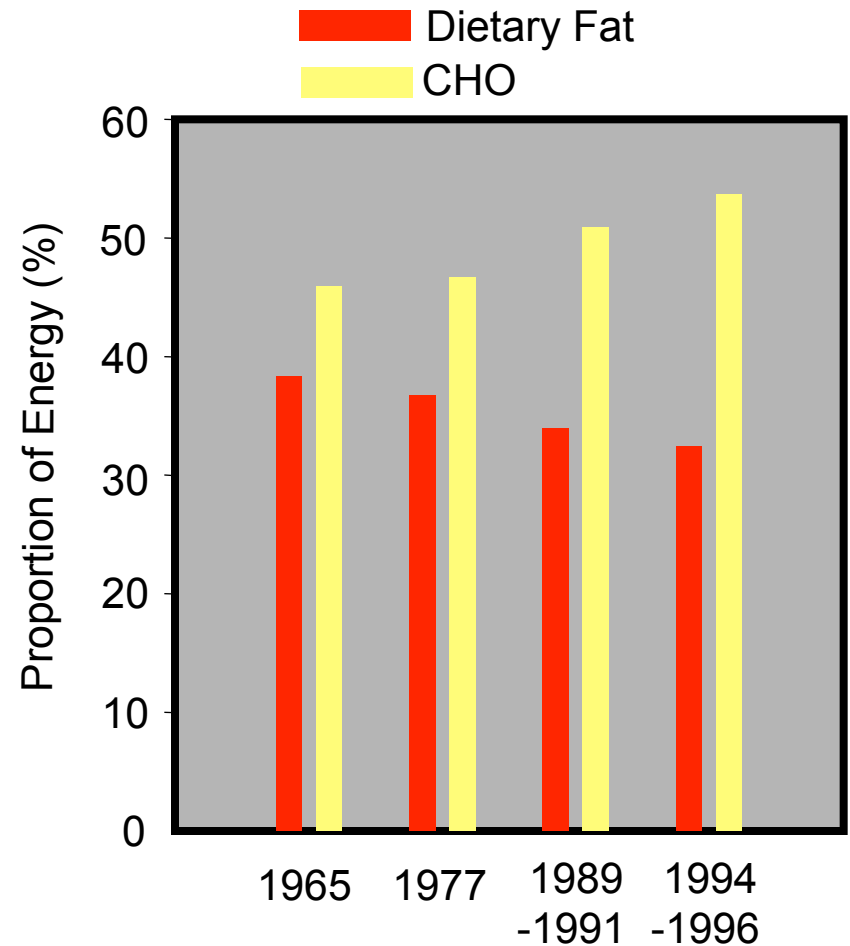
Oh dear, too much bread and pasta?

Do Carbs Cause Obesity?

Prevalence of Obesity

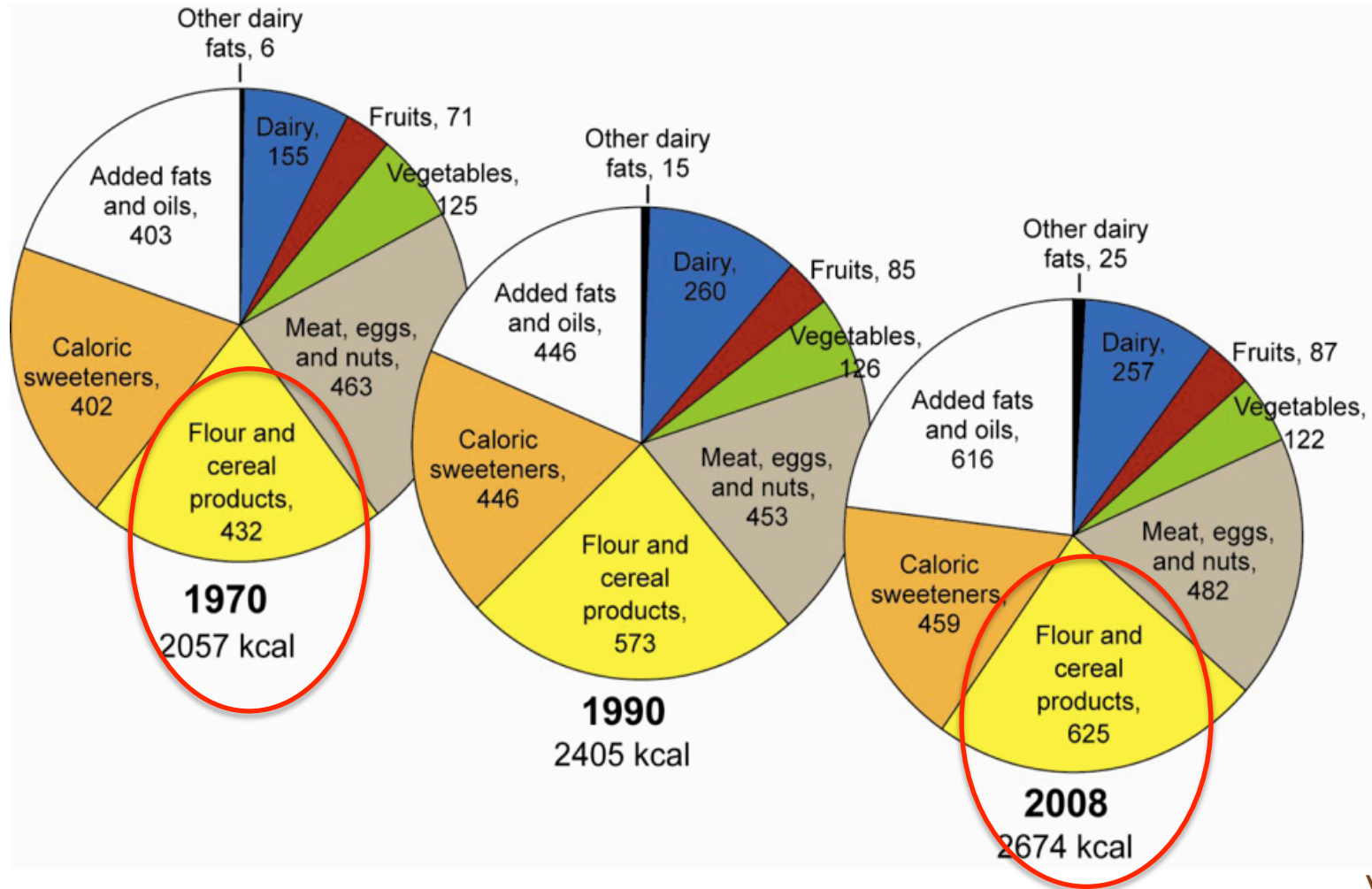


Ogden et al. JAMA 2002; 288: 1728



Cavadini et al. Arch Dis Child 2000; 83:18

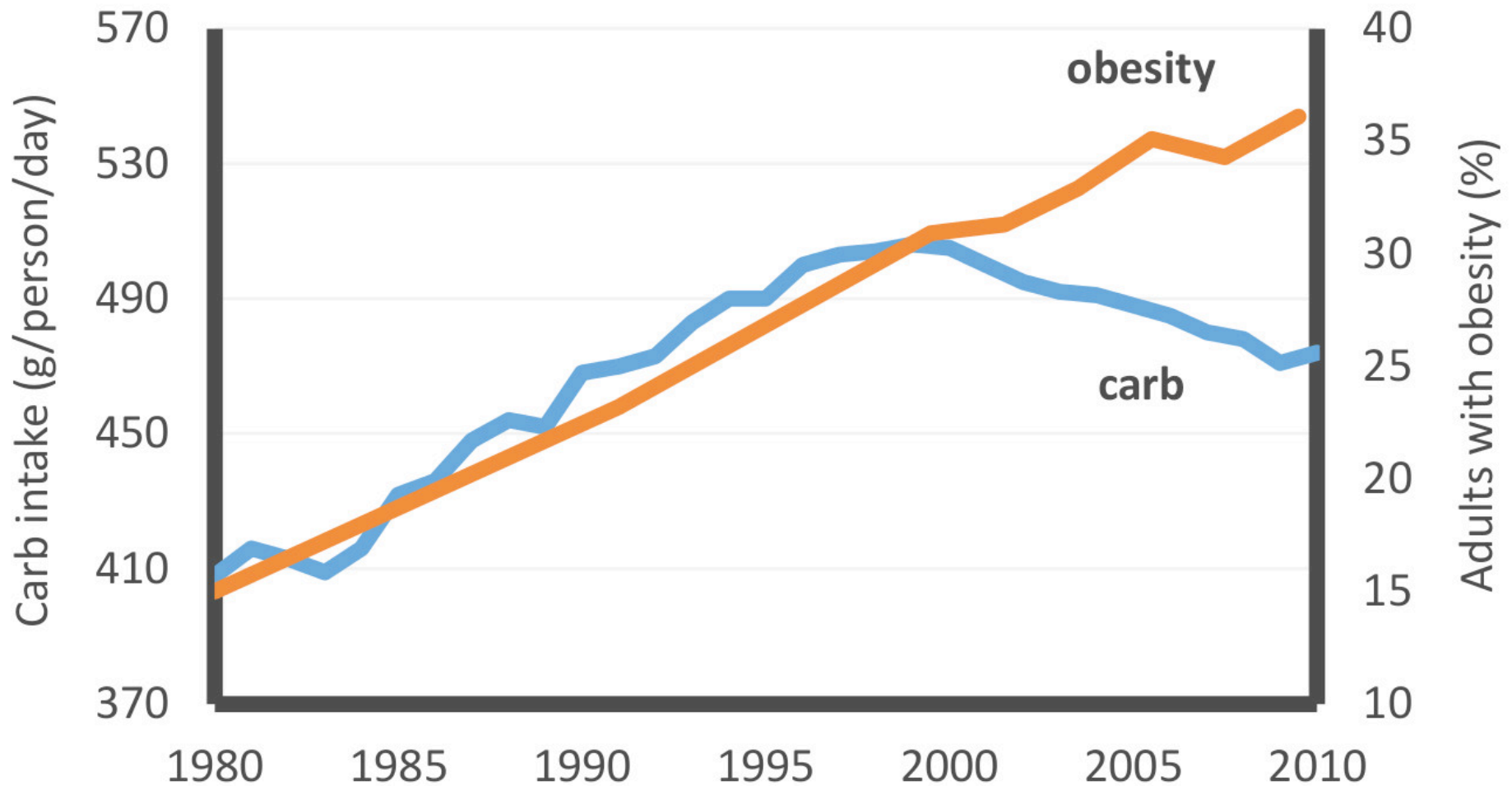
Calories Have Increased



~ 600 Kcal more overall, ~200 calories more each from fat and CHO; 50 cal more from sweeteners



US Carb Intake vs. Obesity Prevalence, 1980-2010



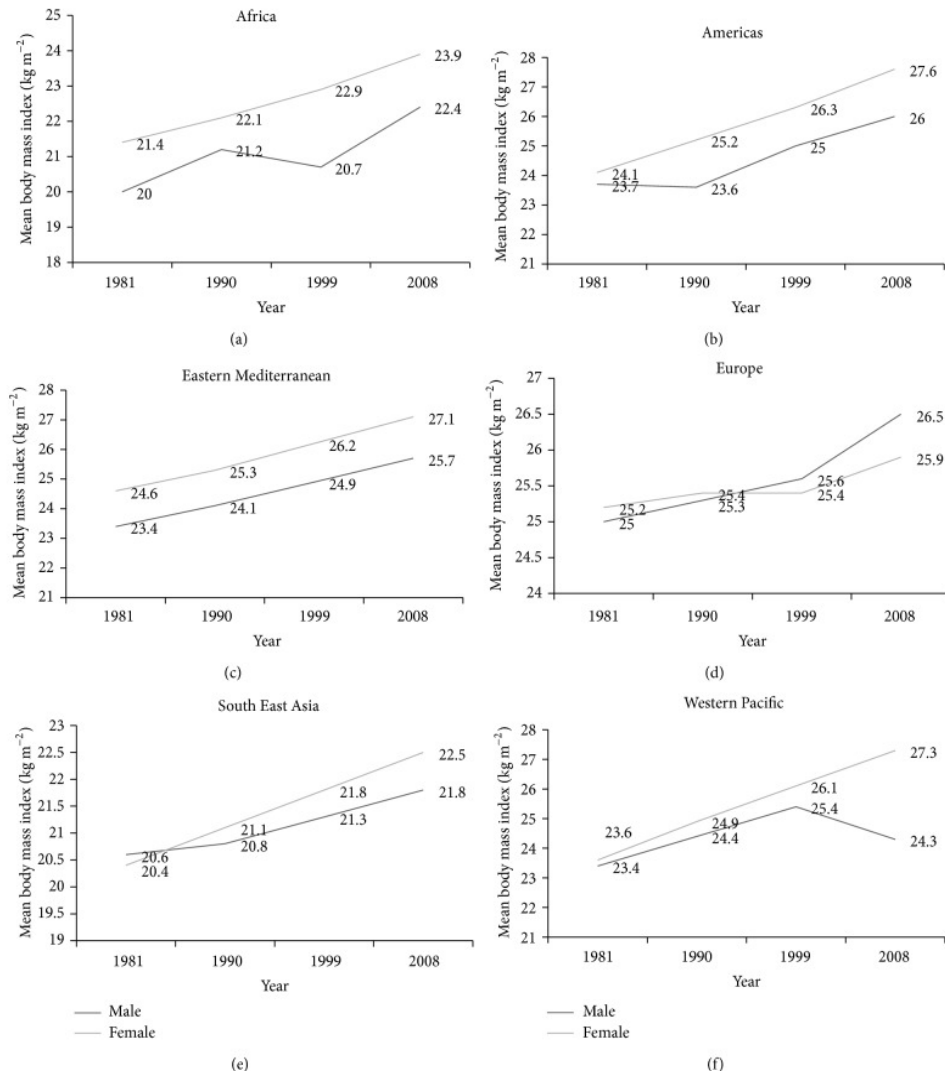
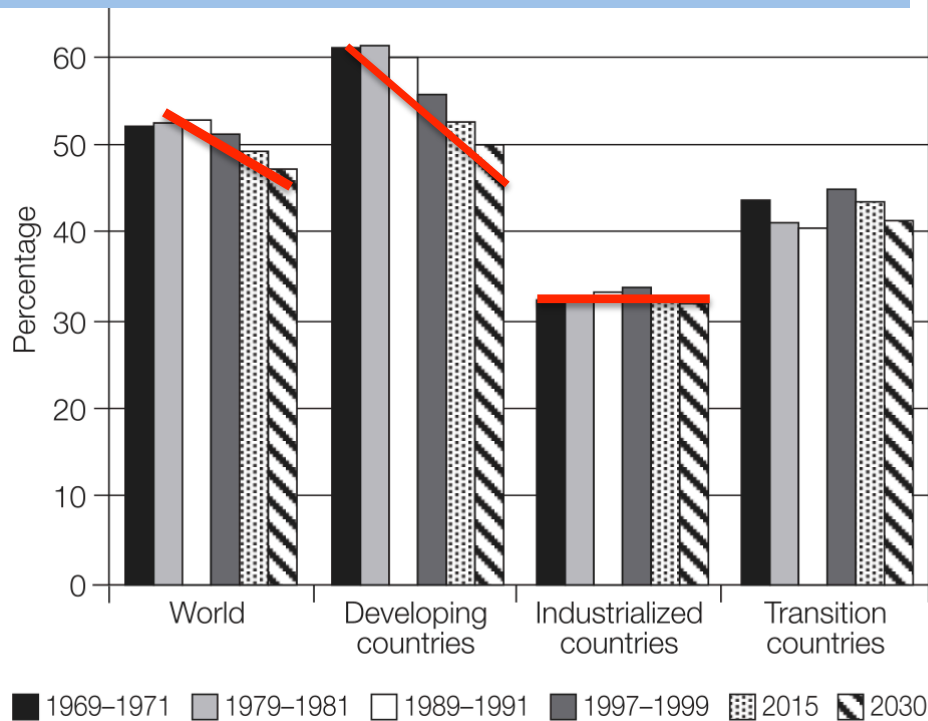
Sources: USDA Economic Research Service, CDC NHANES surveys

Prepared by Stephan J. Guyenet

Grain Consumption Has Decreased While Percent Overweight and Obesity Increased

BMI Increases by Region

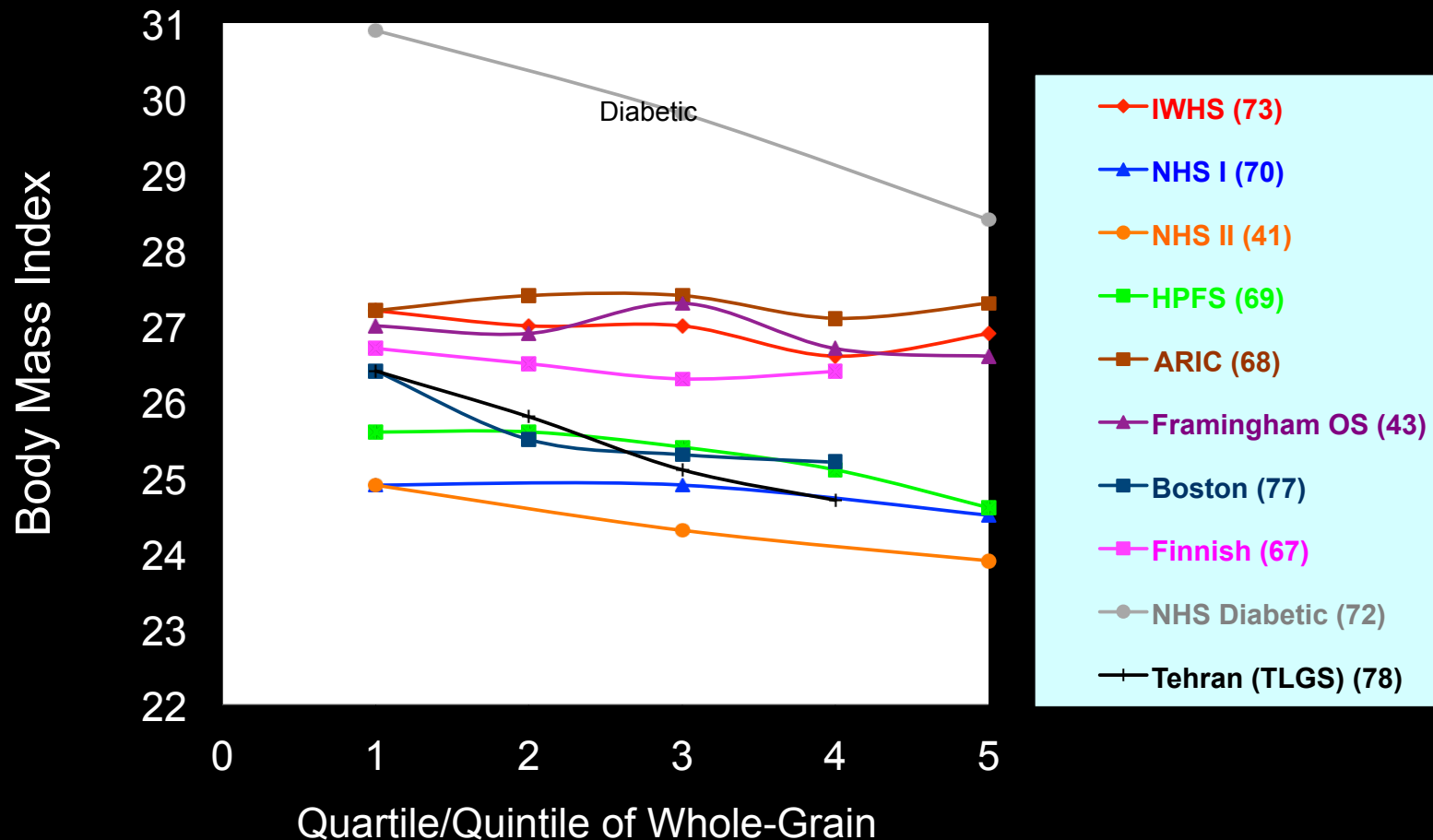
Percent Grain Calories Decr. Worldwide 1970-2015



<http://www.fao.org/docrep/005/ac911e/ac911e05.htm>

Bhurosy T, Jeewon R 2014 <https://www.ncbi.nlm.nih.gov/pmc>

Body Mass Index in Relation to Whole-Grain (WG) Intake



WG/Dietary Fiber (DF) Affects Energy Balance

WG Substituted for RG

6-wk RCT n=81

Whole grain-rich	~207g WG/d	~40g DF/d
Refined grain diet	0g WG/d	~21g DF/d

Δ WG versus Δ RG

Resting metabolic rate	↑	43 kcal/d
Stool weight	↑	76 g/d
Stool energy content	↑	57 kcal/d

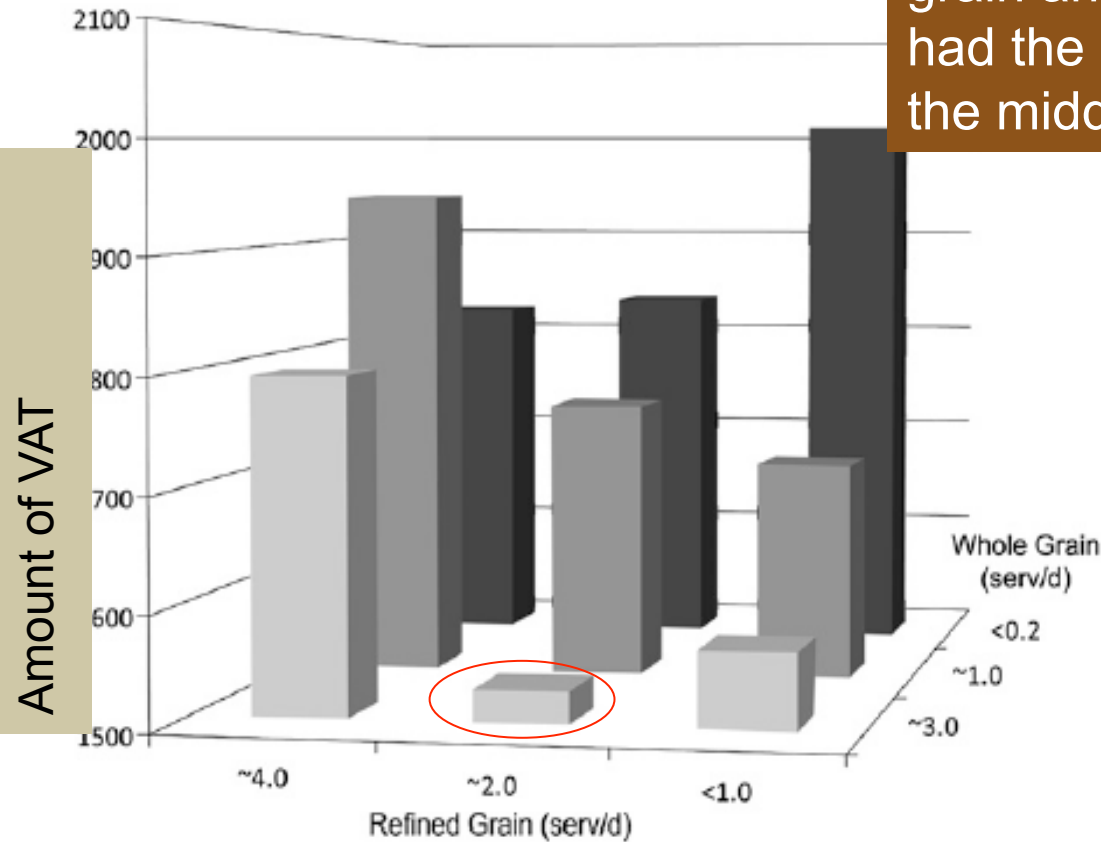


Karl et al Am J Clin Nutr. 2017;105:589-599.

“Make Half Your Grains Whole”

Lowest Visceral Abdominal Fat (VAT)

Adults -3 servings (slices) of whole grain and 2 of refined (white) grains had the least VAT or ‘excess fat around the middle’.



Framingham Heart Study (n=2834)

McKeown et al. *Am J Clin Nutr* 2010; 92:1165-71



Weight Loss with Whole & Refined Grains

Intervention Study Met Syndrome Subjects n=50

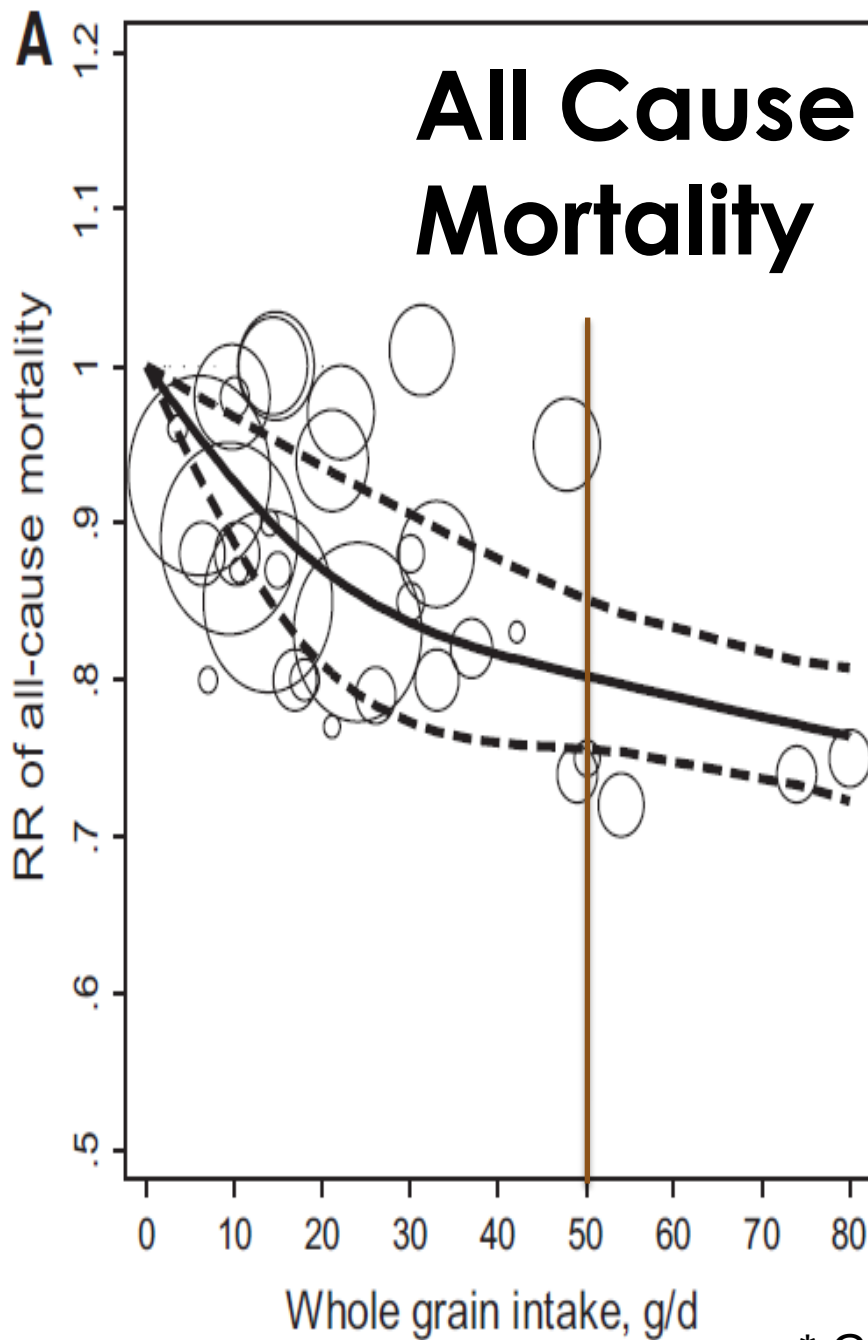
No difference in
weight loss
calorie
restricted diet

It's the calories!

Refined grains
Whole grains



Harris Jackson et al. Am J Clin Nutr. 2014; 100: 577–586.



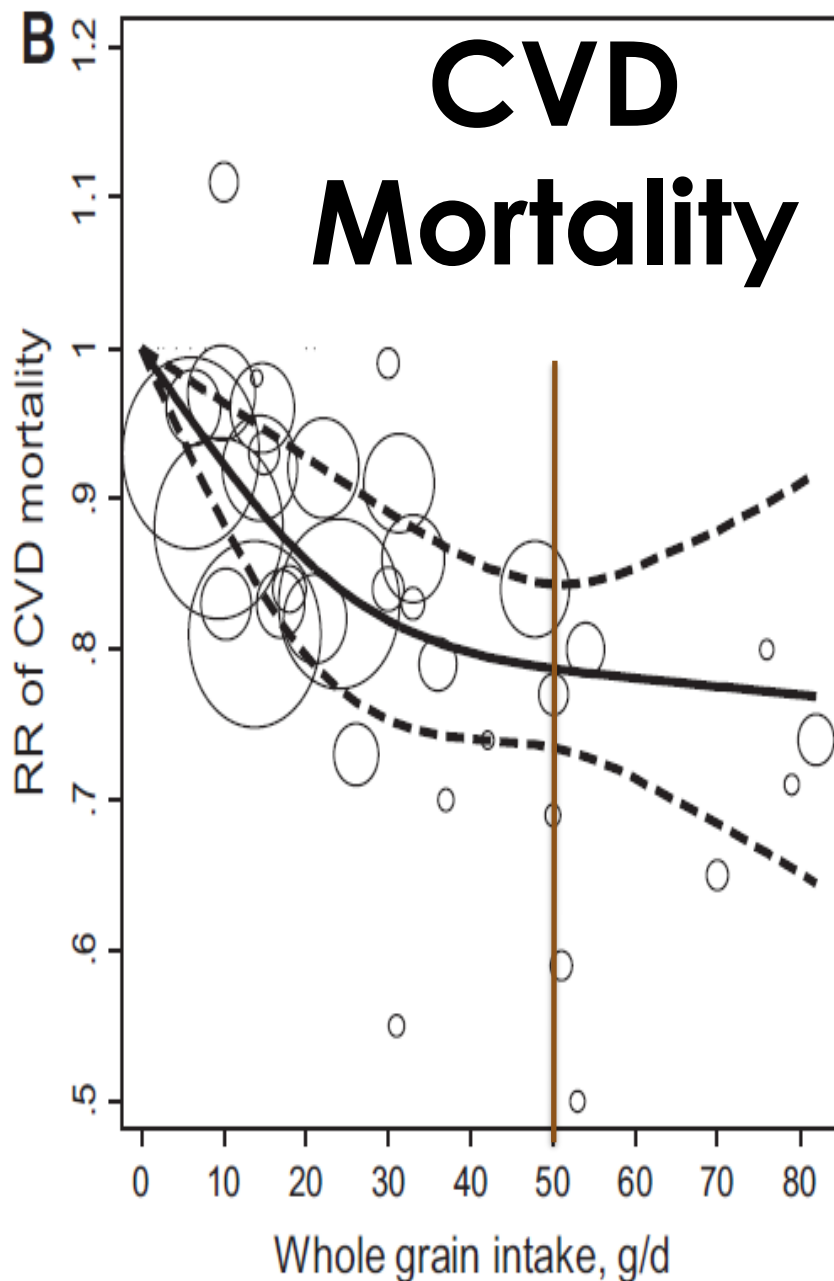
Whole Grain Intake and All-Cause Mortality

50 g/d*
recommended

**Zong et al,
Circulation
2016;133:2370-
2380**



* Grams of whole grain (not WG food)



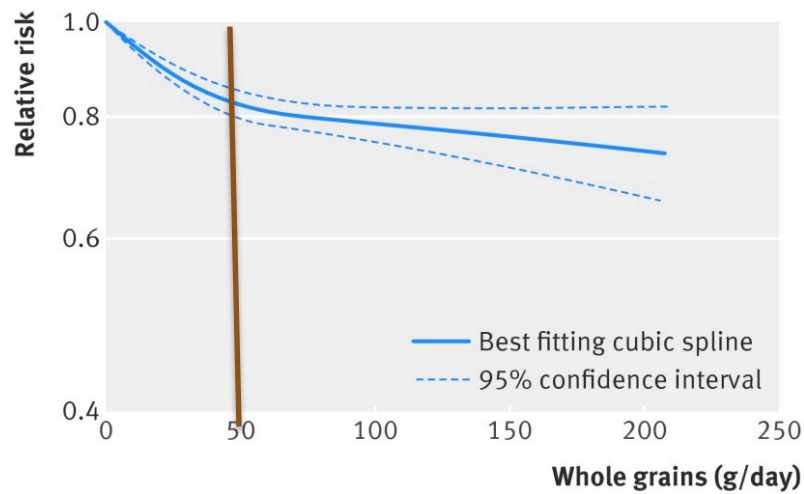
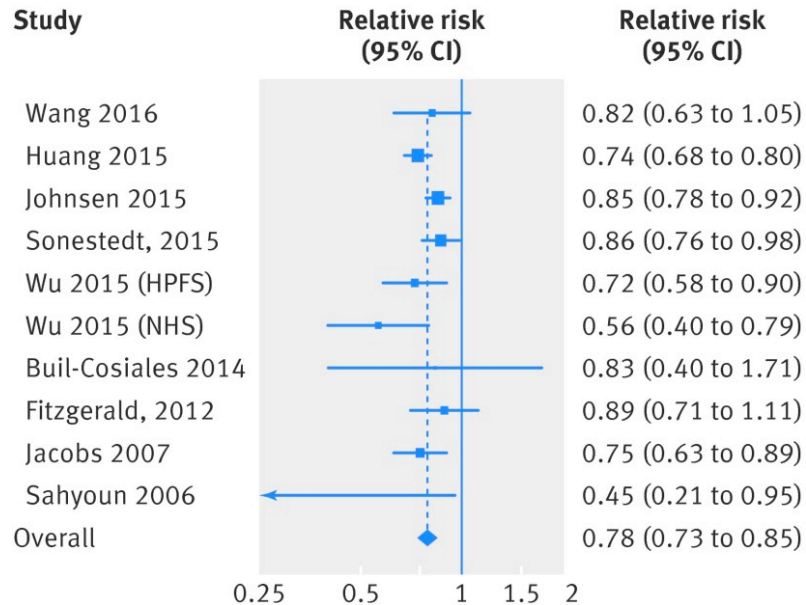
Whole Grain Intake and Cardiovascular Disease (CVD) Mortality

**Zong et al,
Circulation
2016;133:2370-
2380**



Whole Grains / Coronary Disease

Ave 22% Decreased Risk



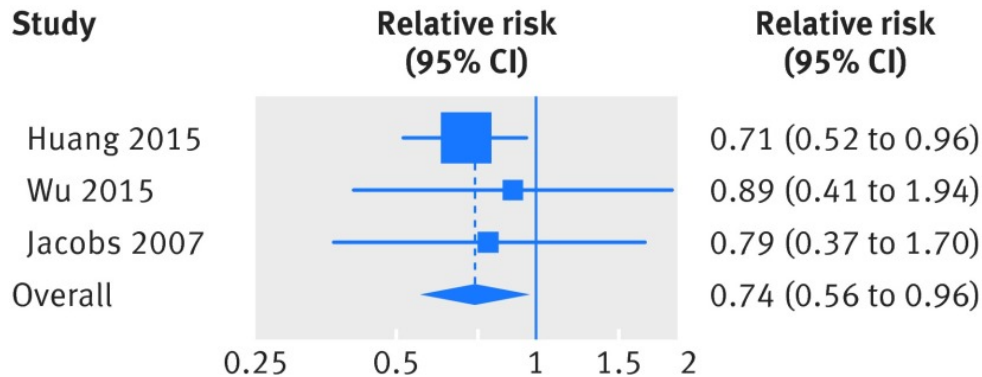
Meta-analysis of 45 prospective cohorts (64 publications)

Aune D, et al BMJ. 2016 Jun 14;353:i2716;
Tang G et al Am J Cardiol. 2015;115:625-9;
Mellen et al AJCN 2007;85:1495-502.



Whole Grain Intake & Type 2 Diabetes Risk

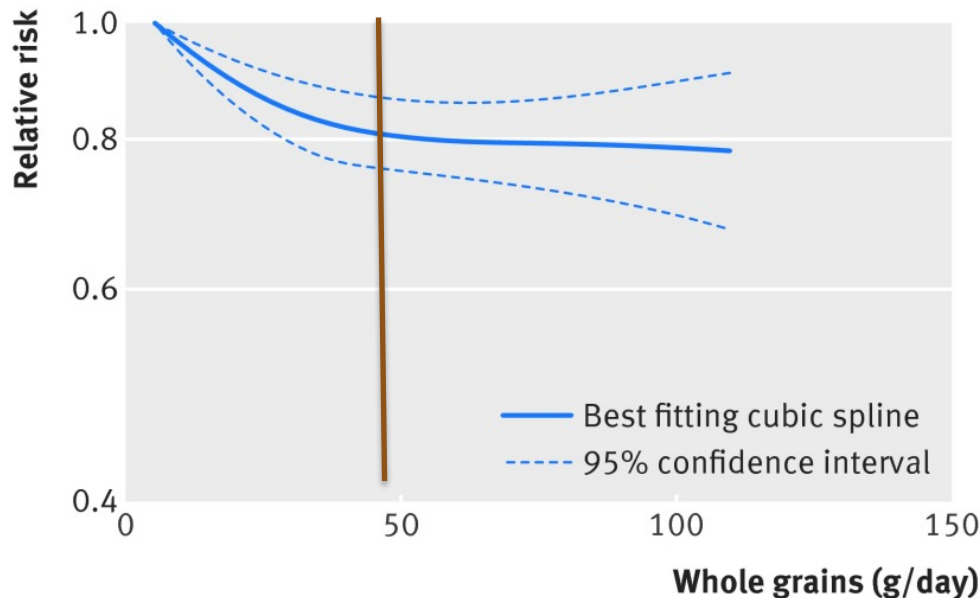
~ 25% Lower risk



Recommended Foods for Diabetics

Healthy Carbohydrates:

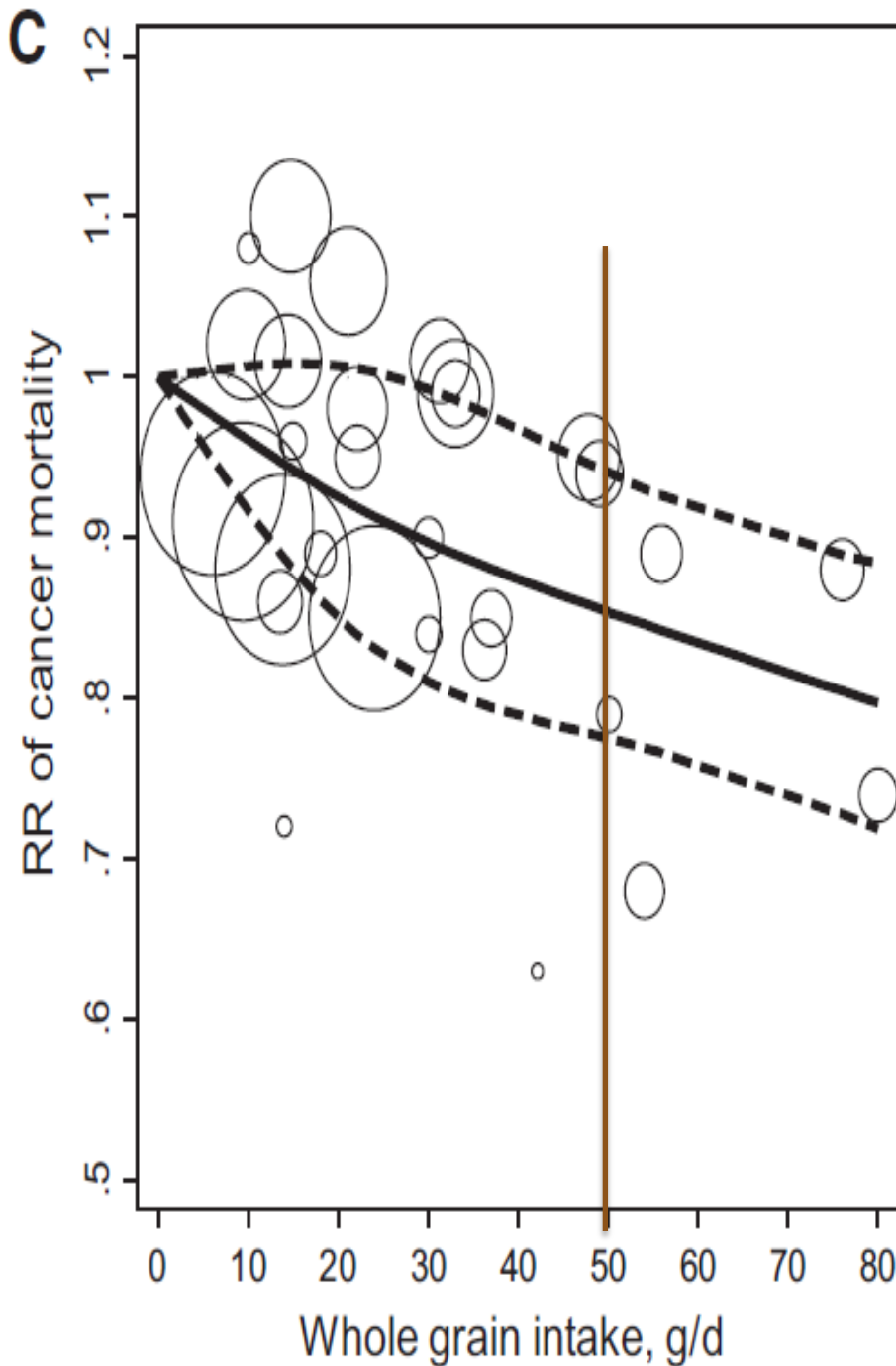
- ✓ Fruits
- ✓ Vegetables
- ✓ Whole grains
- ✓ Legumes (beans, peas, lentils)
- ✓ Low-fat dairy products



Meta-analysis of 45 prospective cohorts (64 publications)

Aune D, et al BMJ. 2016;353:i2716



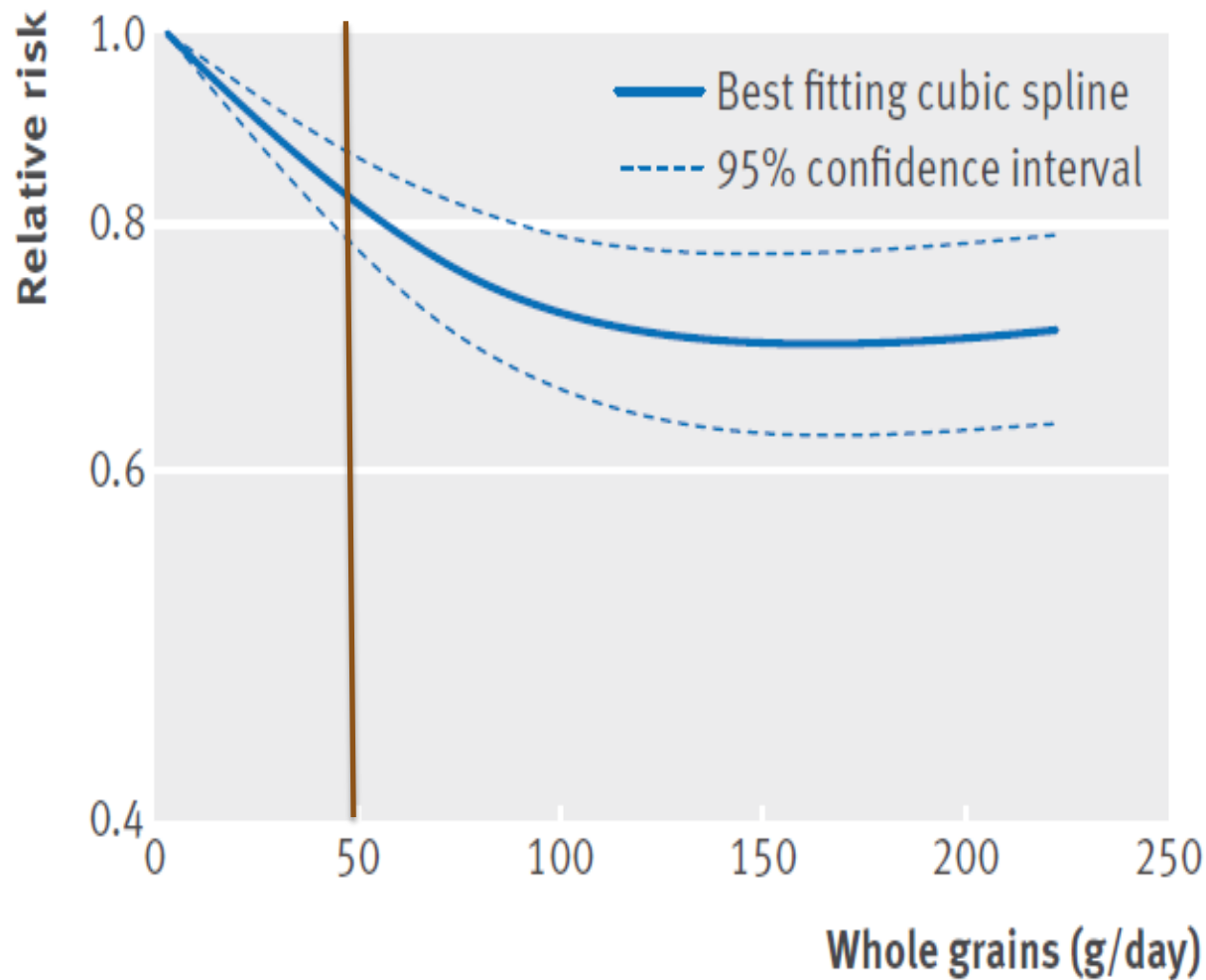


Whole Grain Intake and Cancer Mortality

Zong et al,
Circulation
2016;133:2370
-2380



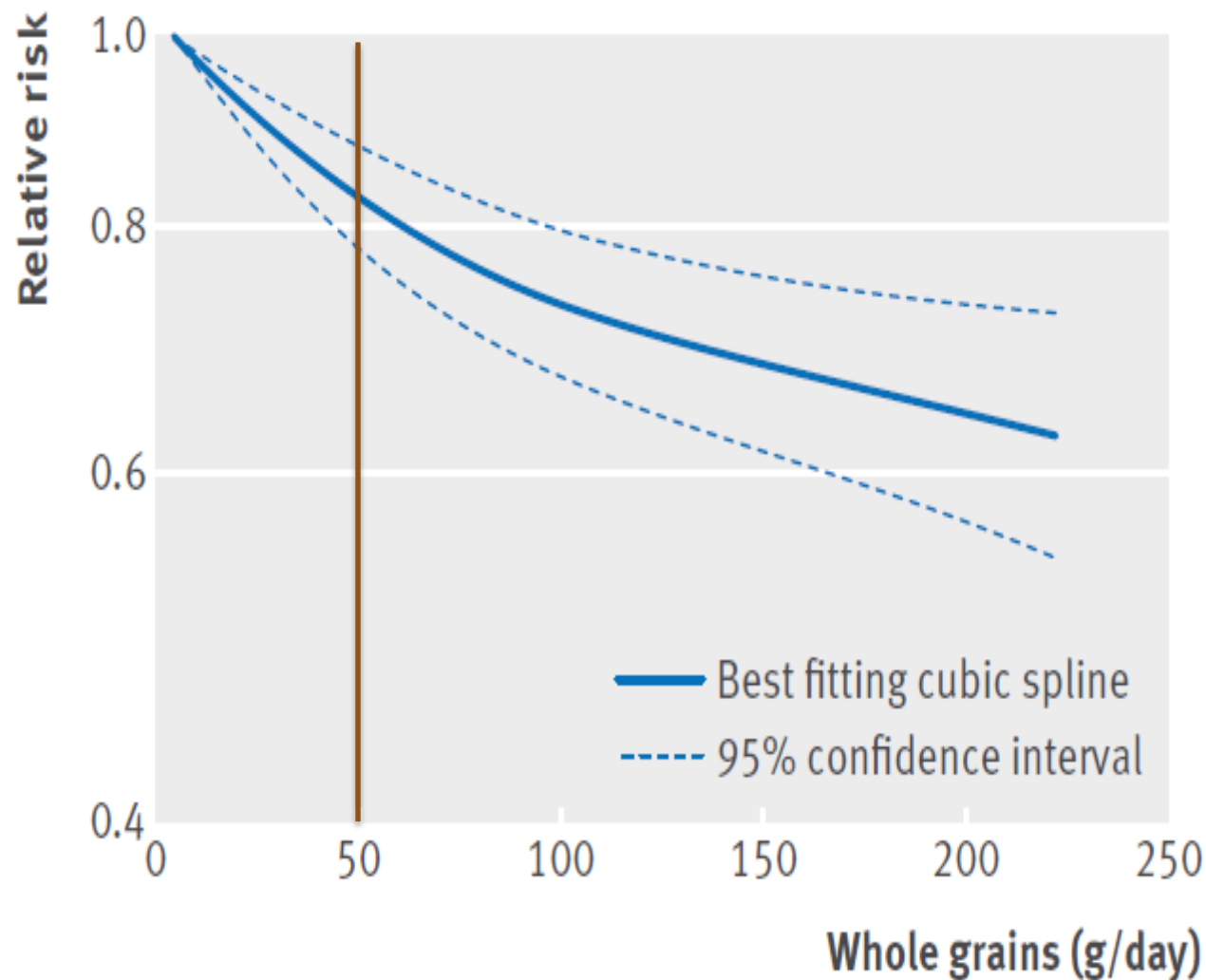
Whole Grain Intake and Stroke Mortality



Aune et al, *BMJ* 2016;
353:i2716



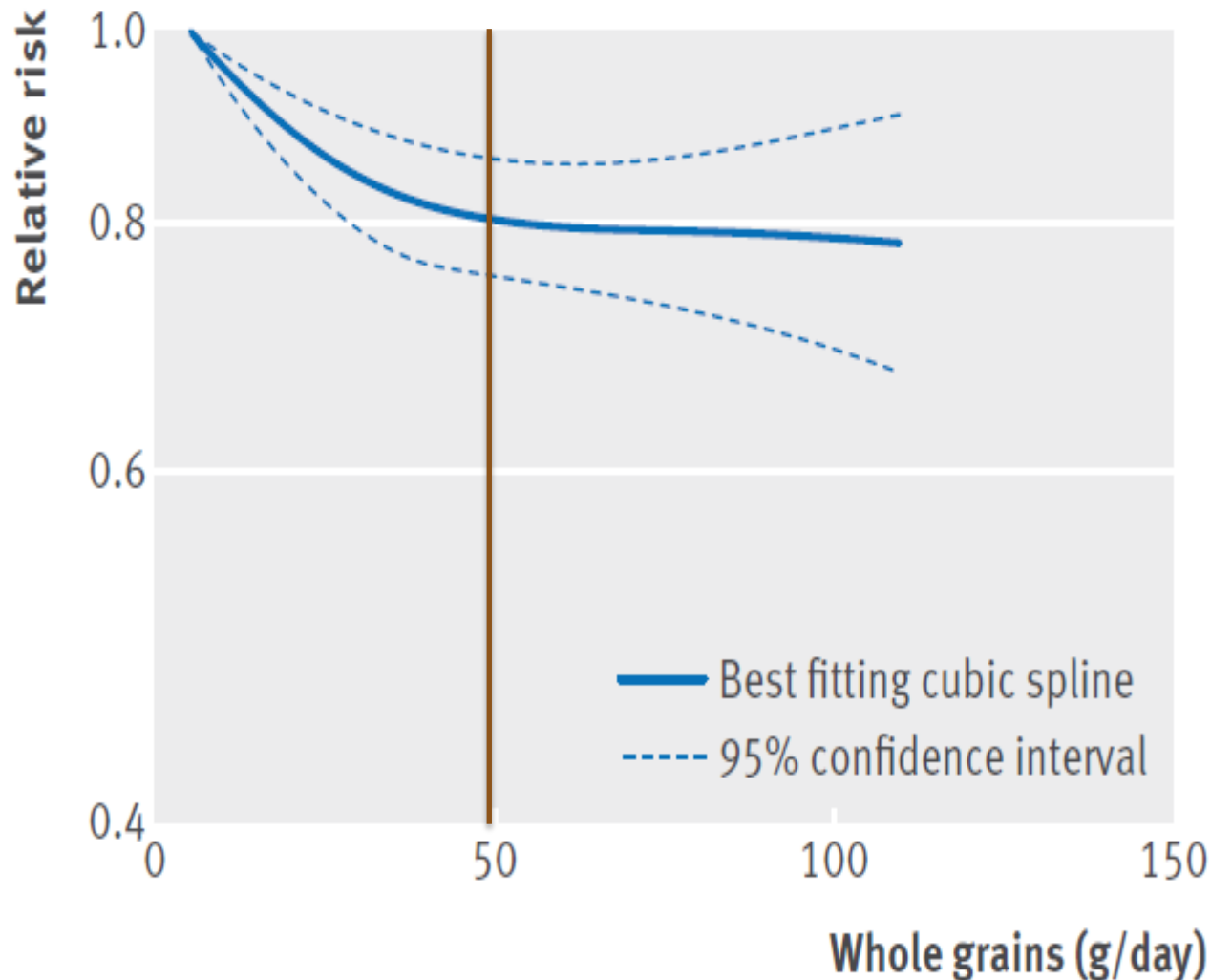
Whole Grain Intake and Respiratory Disease Mortality



Aune et al, *BMJ* 2016; 353:i2716



Whole Grain Intake and Infectious Disease Mortality



Aune et al, *BMJ* 2016; 353:i2716



Whole Grain Intake Lowers Relative Risk (RR)

90 g/day increase in **whole grain food** intake (3 servings)

2 sl. bread, 1 bowl of cereal or 1/5 sv. pita bread made from whole grains)

Very similar Relative Risks (RR) for both incidence and mortality

0.49 Diabetes

0.81 Coronary heart disease

0.78 Cardiovascular disease

0.88 Stroke

0.85 Total cancers

0.83 Death from all causes

Meta-analysis of 45 prospective cohorts (64 publications)

Aune D, et al BMJ. 2016 Jun 14;353:i2716



Whole Grain Intake Lowers Relative Risk

“These findings support dietary guidelines that recommend increased intake of whole grain to reduce the risk of chronic diseases and premature mortality.



“Intakes of specific types of whole grains including **whole grain bread**, **whole grain breakfast cereals**, and added **bran**, as well as **total bread** and **total breakfast cereals** were also associated with **reduced risks of cardiovascular disease and/or all cause mortality...**

...**little evidence of an association** with refined grains, white rice, total rice, or total grains.”

Meta-analysis of 45 prospective cohorts (64 publications)

Aune D, et al BMJ. 353, i2716. <http://doi.org/10.1136/bmj.i2716>



In the Refined Grain category, enriched staple foods are with indulgent grain-based desserts and snacks.

Virtually no whole grain indulgent Foods, mostly all staple foods.



Whole grain eaters do everything else right.

State of the Whole Grain Data



- Use processed (PF) or ultraprocessed (UPF) grains.
- Intervention studies – Mixed results
- Consistency across epidemiological studies
 - Confounding
 - Whole grain foods are compared with refined grains.
 - Staples vs. indulgent grain-based foods

All-Cause Mortality & Grain Products – Mostly Processed

High v low analysis

	No of studies	RR* (95% CI)	I ²	P value†
Whole grain bread	5	0.81 (0.74 to 0.88)	57	0.05
Whole grain breakfast cereals	3	0.79 (0.72 to 0.86)	50	0.14
Oats or oatmeal	3	0.89 (0.76 to 1.04)	90	<0.001
Refined grains	2	1.02 (0.93 to 1.12)	0	0.64
Pasta	1	0.61 (0.26 to 1.45)	—	—
Total bread	3	0.77 (0.72 to 0.81)	0	0.42
Total breakfast cereals	2	0.87 (0.81 to 0.93)	47	0.17
Total grains	13	0.91 (0.87 to 0.95)	4	0.41

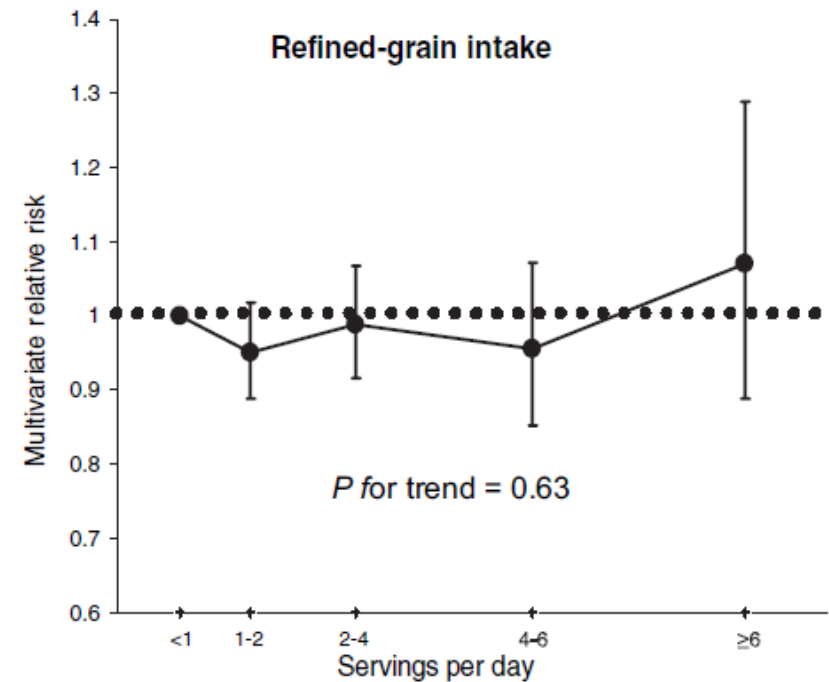
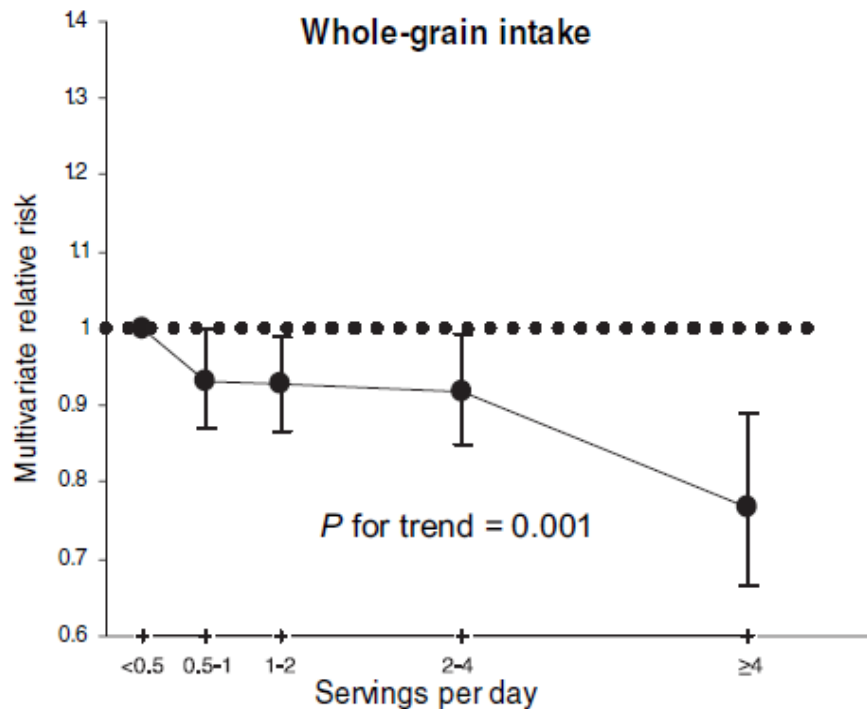
*RR<1 favours those with higher intake.

Meta-analysis of 45 prospective cohorts (64 publications)
Aune D, et al BMJ. 353, i2716. <http://doi.org/10.1136/bmj.i2716>



Whole & Refined Grain and Hypertension

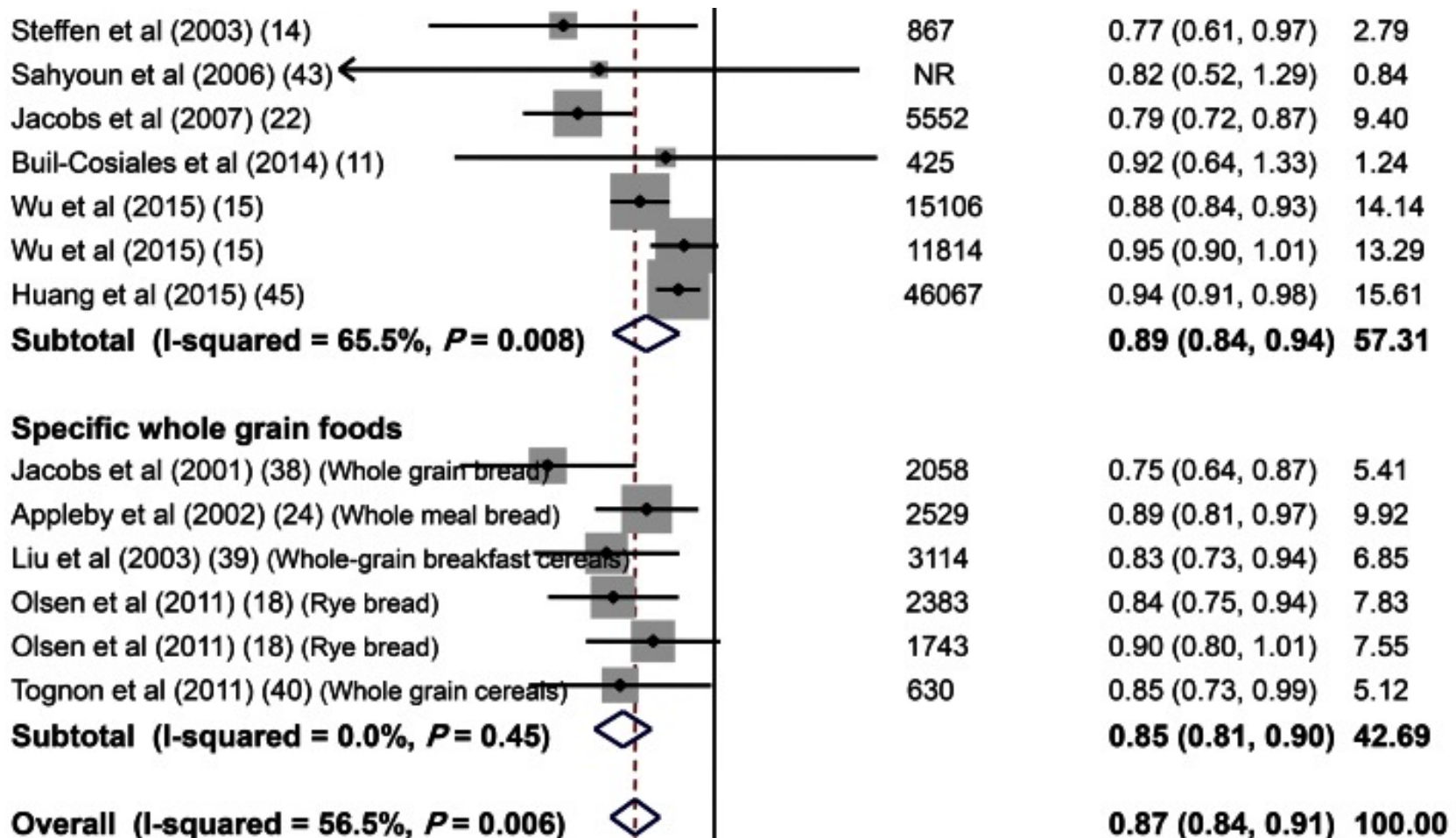
Women's Health Study; n = 28,926



Wang et al, *Am J Clin Nutr*, 2007;86:472-479

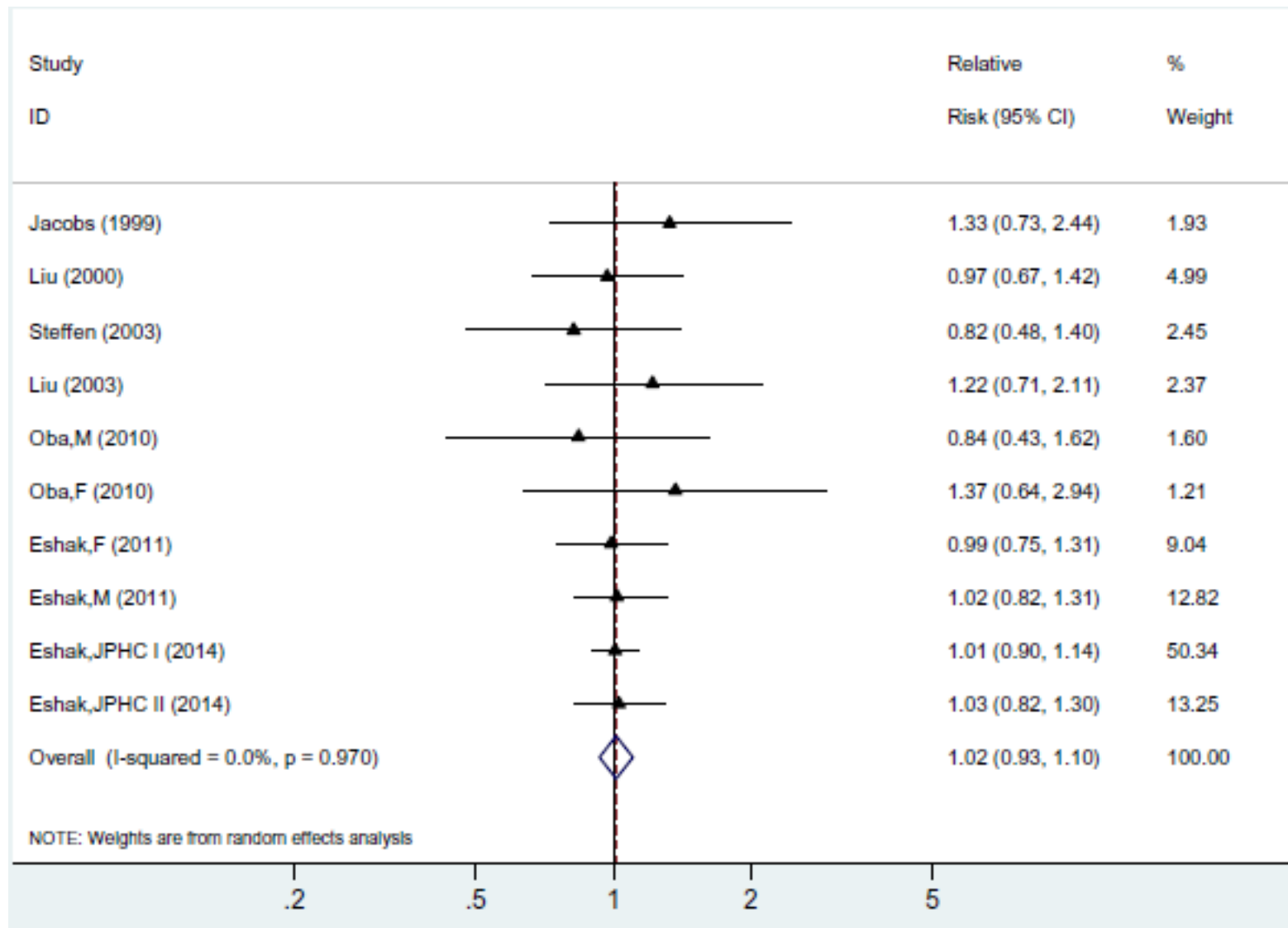


PF and UPF Whole Grain Breads and Cereals – All Cause Mortality – Mostly PF/ UPF in NOVA class



Stroke Risk

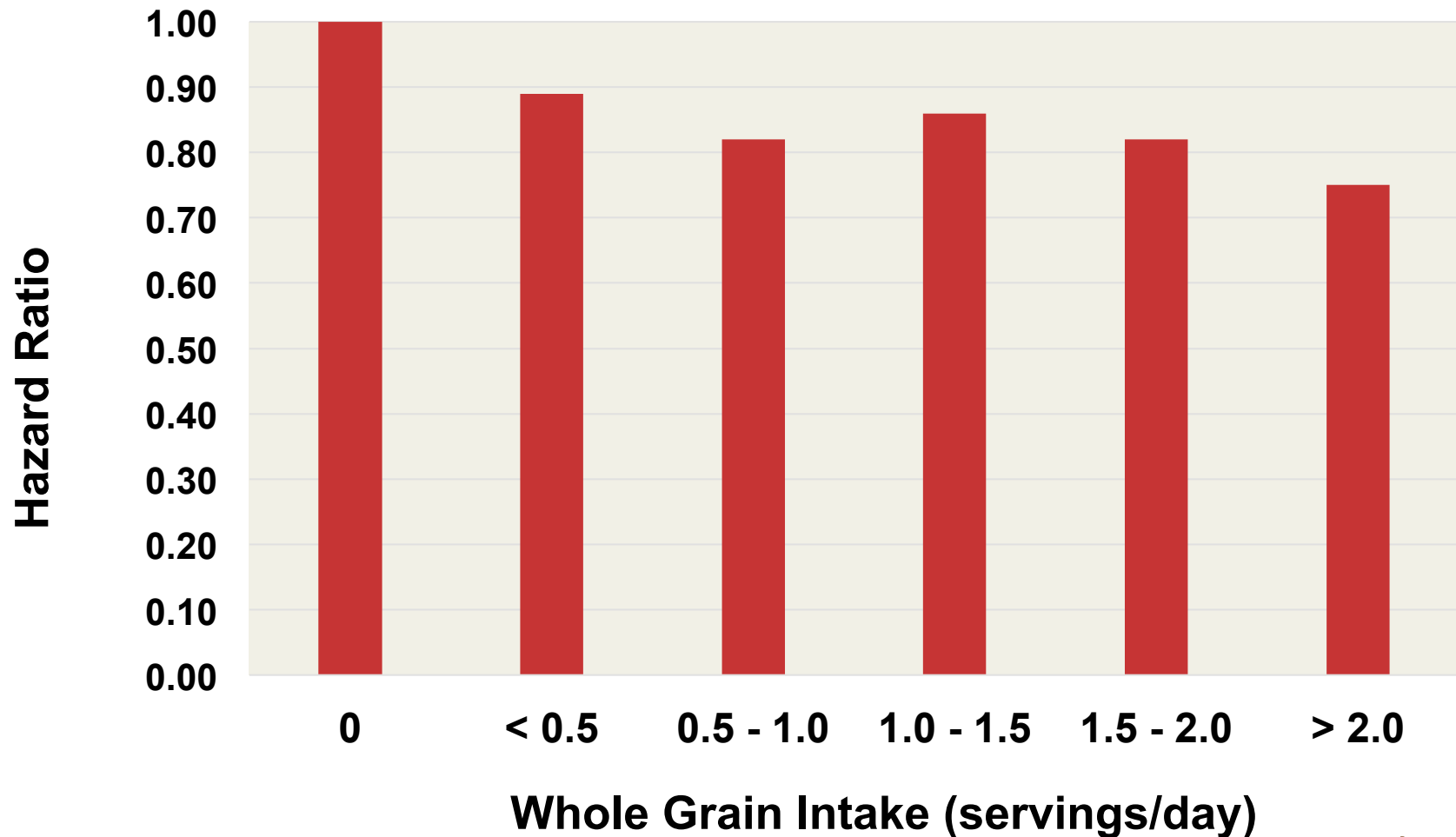
Low vs. High Intake of Refined Grains



Wu et al, *J Stroke Cerebrovasc Dis*, 2015;24:2738-2746



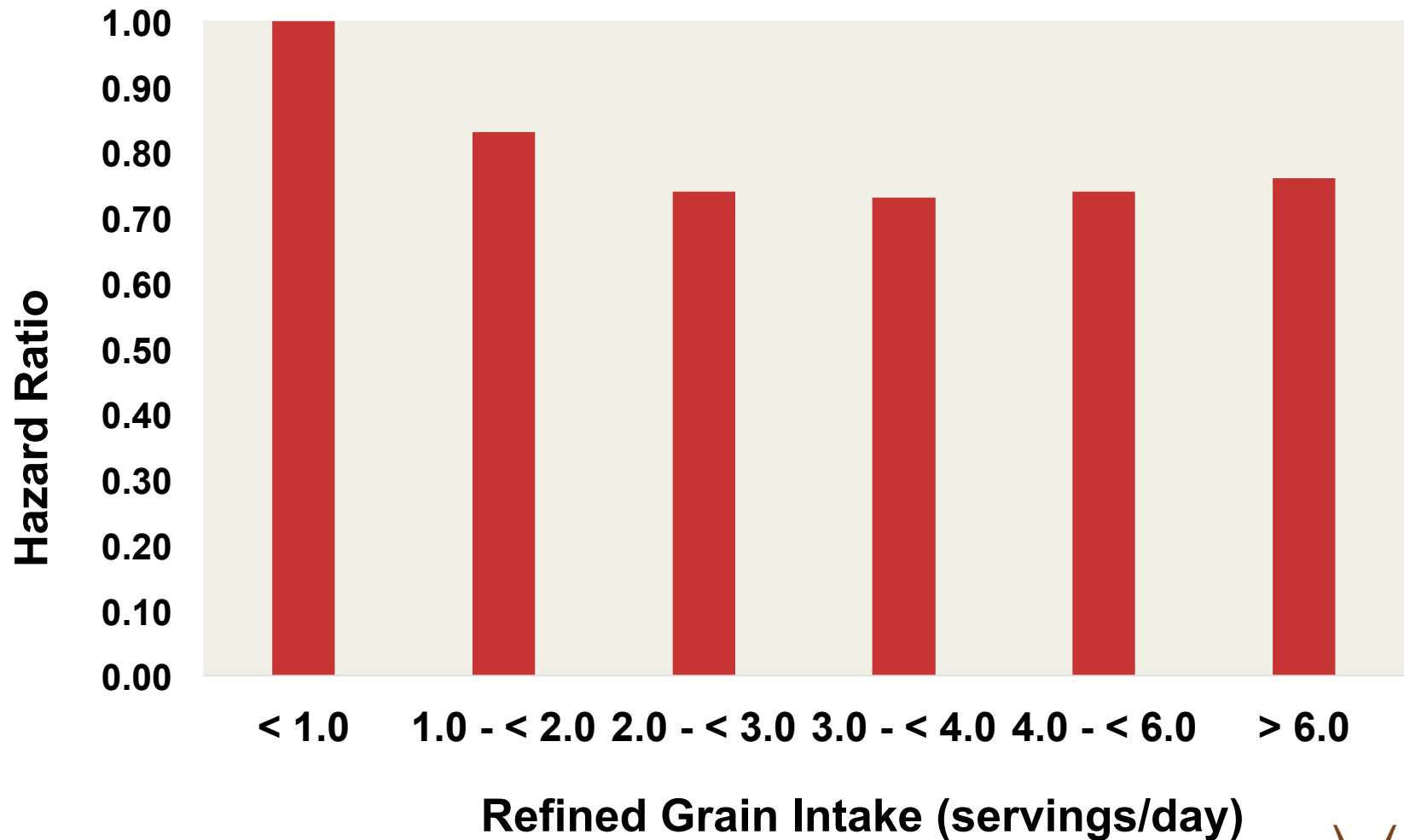
T2DM Risk: Whole Grain Intake



Women's Health Initiative (WHI) Observational Study, 1993 – 2005
Parker et al, *Ann Epidemiol* 2013; 23:321-327



T2DM Risk: Refined Grain Intake



Women's Health Initiative Observational Study (WHI), 1993 – 2005

Parker et al, *Ann Epidemiol* 2013; 23:321-327



Lowest Risk T2DM



Women who consumed the:

- *most whole grains also had the highest consumption of refined grains*
- *high grain consumption, from both whole and refined sources, was associated with the lowest risk of incident T2DM*

Parker et al, *Ann Epidemiol* 2013; 23:321-327



Diabetes Risk* by Rice Intake - China

Percent of Energy from white rice

				<i>P</i> – trend	
	Tertile 1	Tertile 2	Tertile 3		
North China					
Median intake, %	16.2	30.1	45.9		
Participants, n	504	512	513		RR= 1
No. of cases 25	28	26			
RR	1.00	0.99	0.98	ns	
Central China					
Median intake, %	0.0	13.5	39.9		RR=0.59
Participants, n	908	899	912		
No. of cases 57	60	38			
RR	1.00	0.95	0.59	0.03	
South China					
Median intake, %	27.7	43.0	57.9		
Participants, n	1106	1136	1138		RR= 1
No. of cases 48	42	35			
RR	1.00	0.96	0.95	0.83 ns	*adjusted risk

No association in Hong Kong

Dong F, et al. Ann Nutr Metab. 2015;66(4):209-18



Rice Intake and Diabetes (T2DM)



- Rice intake associated with blood glucose

- China

- Japan women not men

Singapore – higher quintiles

No difference Q1, Q 2, Q 3

Shanghai middle-
women

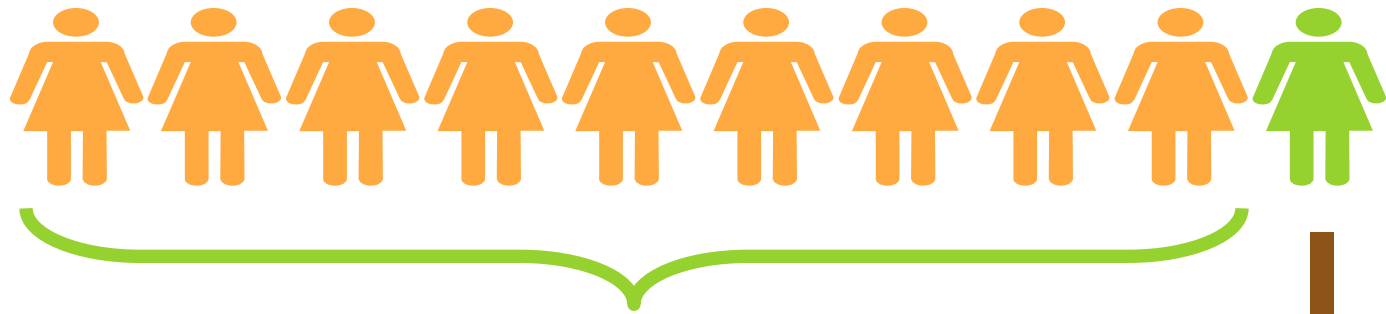
OR=1.78

**>200g/d white rice vs
<200g/d**

Soriguer F, et al. Clin Nutr. 2013;32:481-4; Nanri A, Am J Clin Nutr. 2010;92:1468-77; 66:209-18; Hu et al, BMJ, 344, e1454.

Most Are not Getting Whole Grains

9 out of 10 North Americans are **NOT** getting the recommended 3 servings of whole grains each day!




Not Getting Enough
Whole Grain

Getting the
Recommended 3
Servings of Whole
Grain/Day

Courtesy of GMI



Changes in **Bread Consumption** and **Adiposity** in Spanish Subjects at High Cardiovascular Risk **PREDIMED Trial – y yrs**



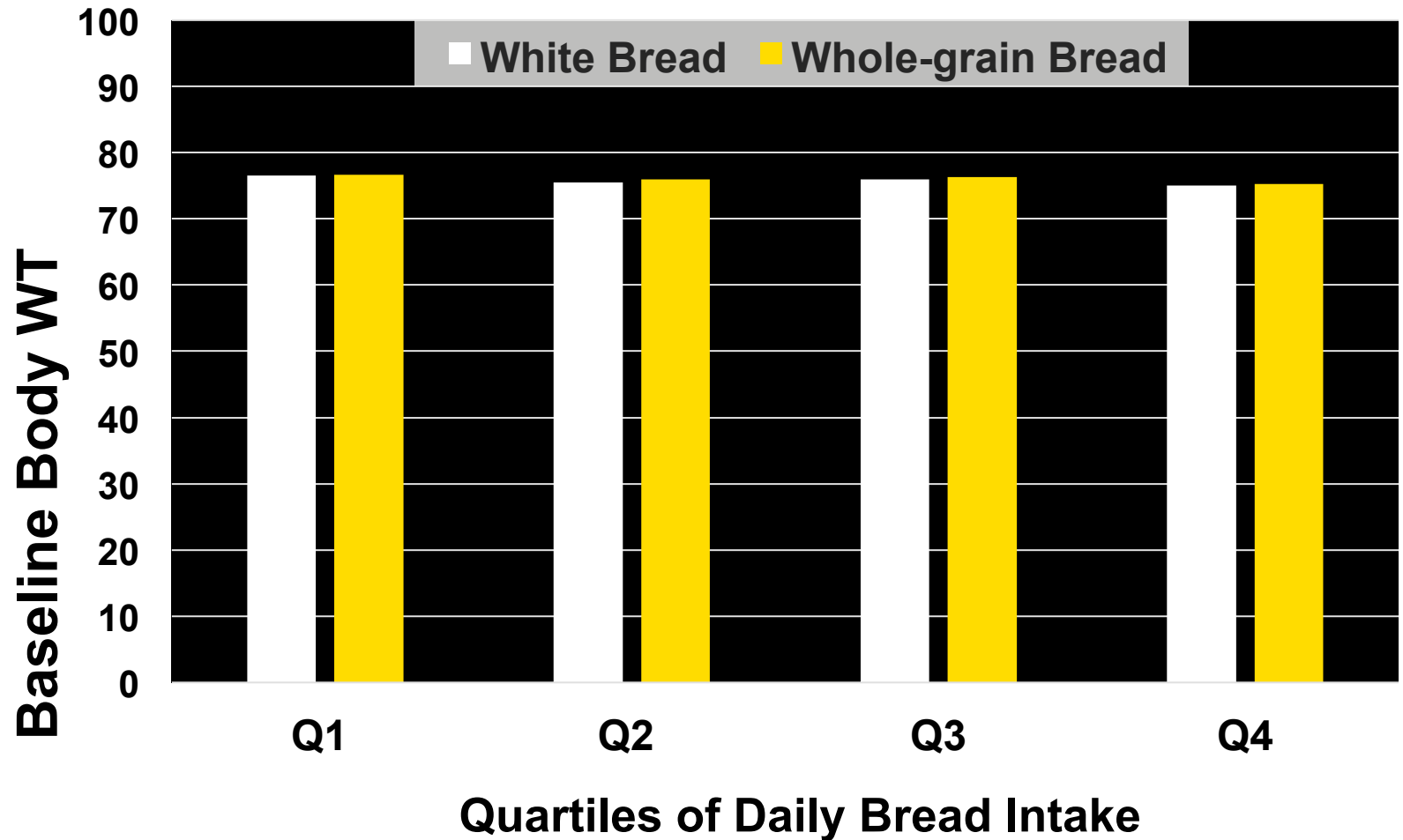
“the results of the present study show that decreasing total and white bread and maintaining wholegrain bread consumption in the setting of a Mediterranean-style diet could help in reducing weight and abdominal fat gain”

But....is the magnitude of the “effect” clinically meaningful?

Bautisto-Castano et al, *Brit J Nutr* 2013; 110:337-346

Body Weight by Quartile of Bread Consumption

[PREDIMED Trial – 2,213 Participants]



Bautisto-Castano et al, *Brit J Nutr* 2013; 110:337-346



Highest vs Lowest Changes in White Bread Consumption (4 yrs)

	Change in intake (g/d)	Change in intake (kg/4 yr)	Body weight change (kg)	Waist circumference (cm)
White Bread (Q1)	-108	-158	0.14	1.11
White Bread (Q4)	+87	+127	0.90	2.39

A difference of **285 kg of bread** consumption - 4 yrs resulted in a difference of only:

- **0.76 kg** of body weight gain
- **1.28 cm** waist

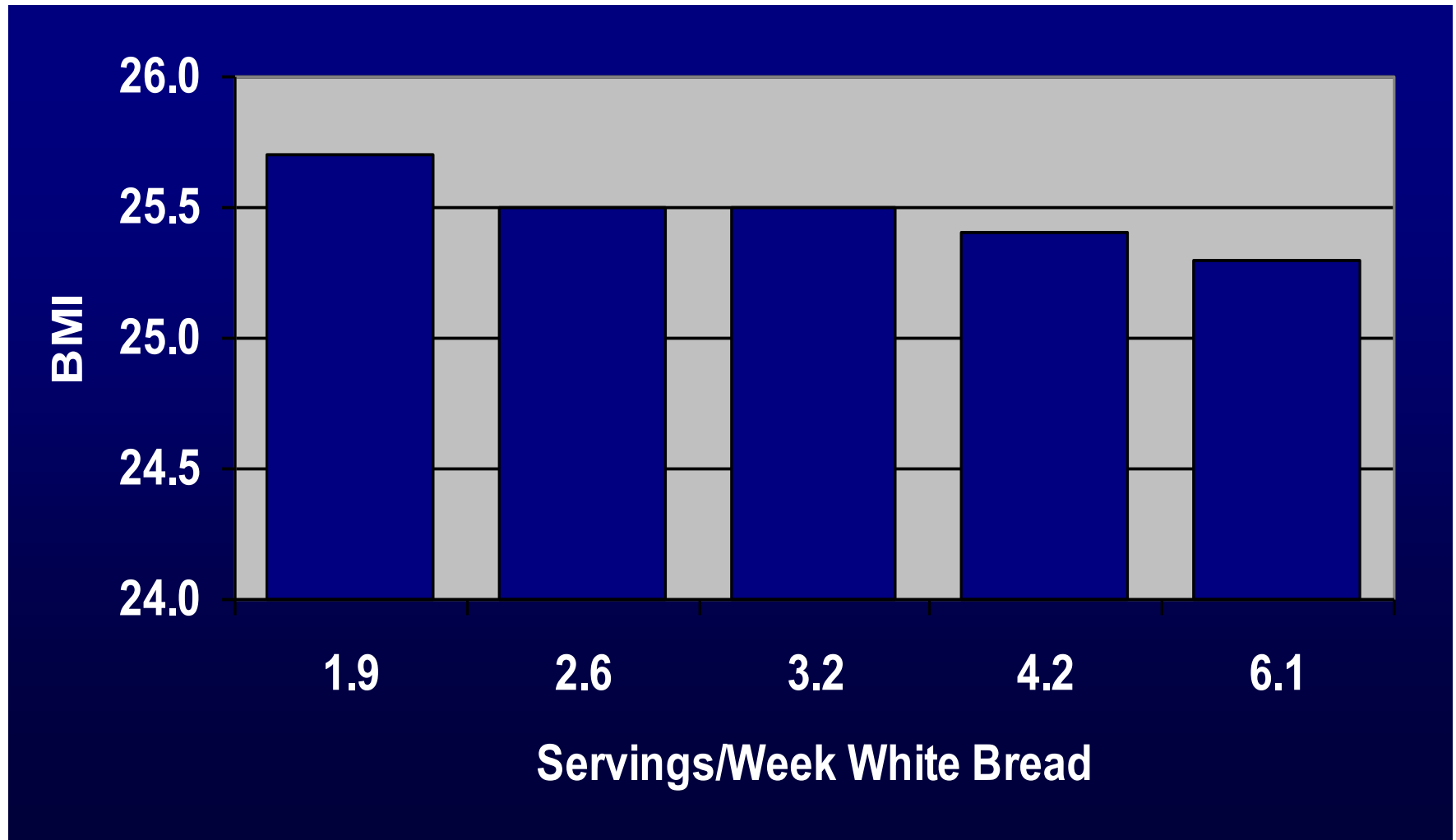


Conclusion

Changes in bread consumption appear to have rather modest effects on changes in body weight or central adiposity

Bautisto-Castano et al, *Brit J Nutr* 2013; 110:337-346

White Bread Consumption & BMI



Salmeron et al, *Diabetes Care* 1997; 20: 545-550; Health Professionals Follow-Up Study (n= 42,759)



Weight Gain & Breakfast Cereals

*Adjusted 13-year

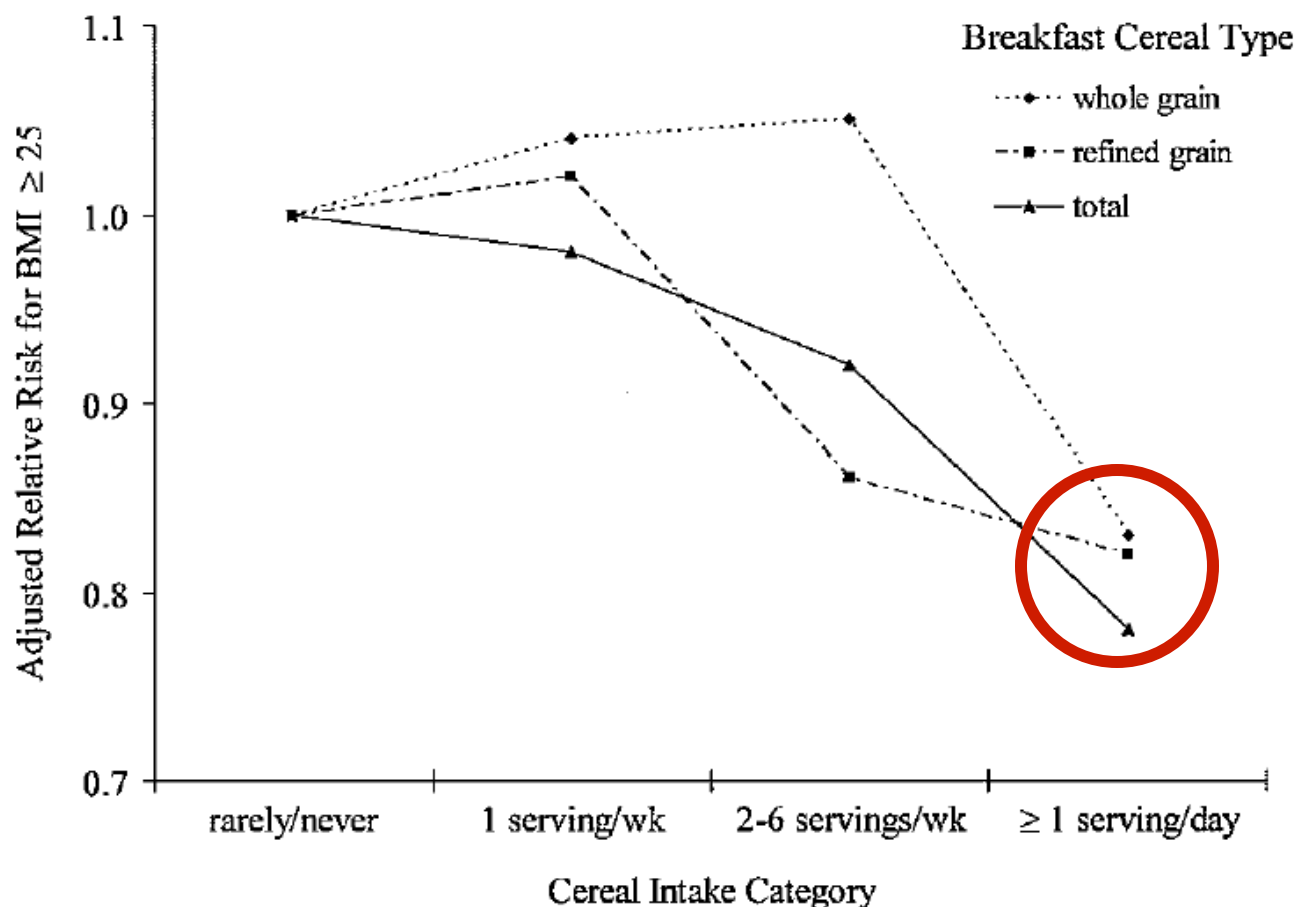
	Mean Body Weight Gain (kg)* Men			
	Rarely	1 Serving/ week	2-6 Servings/ week	> 1 Serving/ day
Whole Grain	2.18	2.24	2.07	1.83
Refined Grain	2.14	2.19	2.13	1.77
Total	2.27	2.22	2.09	1.81

Lowest weight gain associated with consuming more than 1 serving/day of grains regardless of whether they were whole or refined.

Physicians' Health Study – 17,881 men
Bazzano et al, *Obesity Res* 2005; 13:1952-1960



Relative Risks of Attained BMI ≥ 25 According to Intake of Breakfast Cereal Type (8 years of follow-up) [Physicians' Health Study – 17,881 men]



Bazzano et al, *Obesity Res* 2005; 13:1952-1960



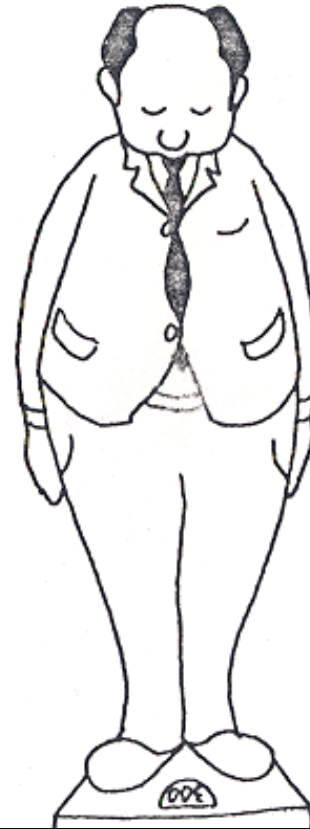
Cereals and Weight Gain

Weight gain is
inversely associated
with intake of refined-
grain and whole-grain
breakfast **cereals**

– independent of
other risk factors

Physicians' Health Study
N=17,881

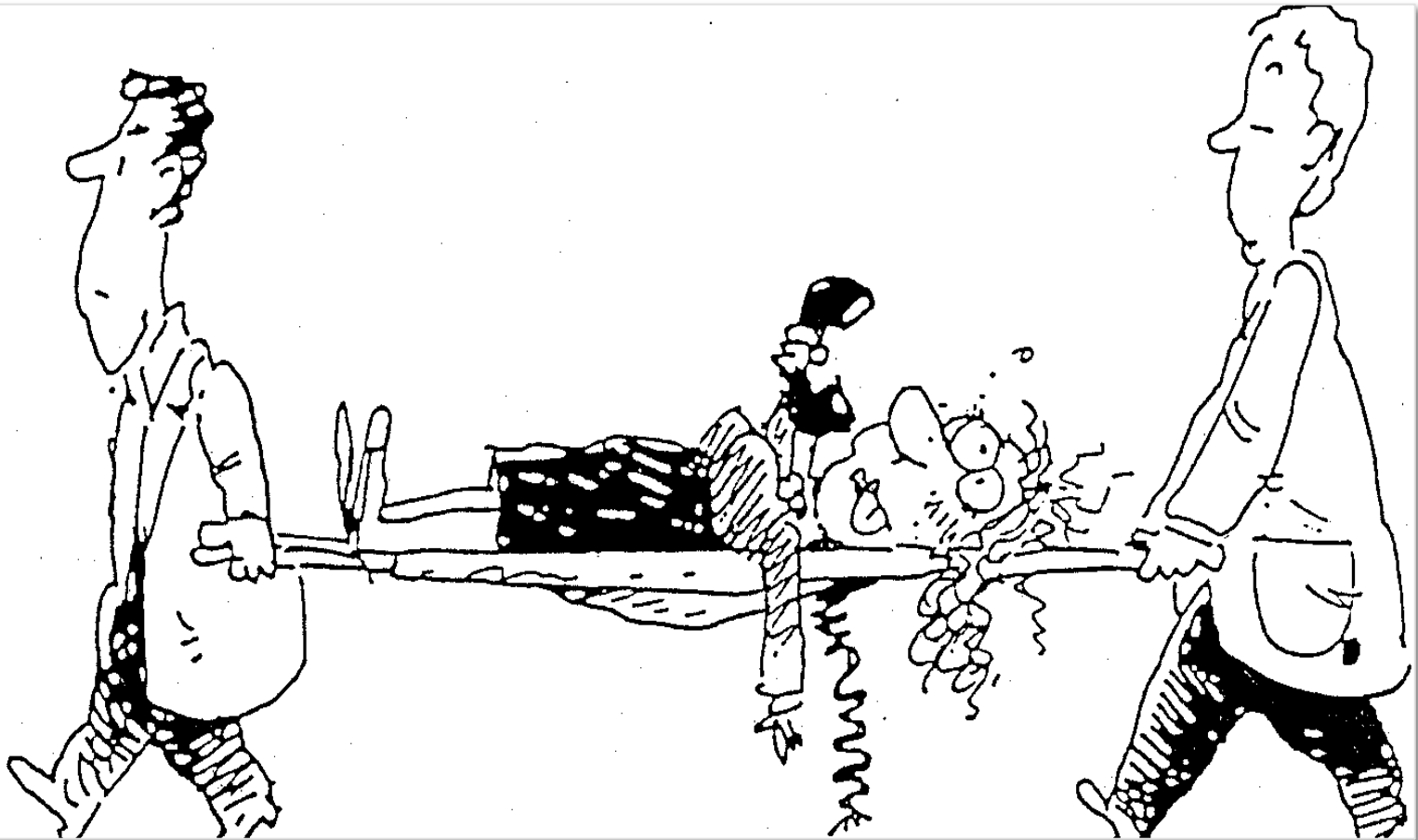
**Bazzano et al, *Obesity*
Res 2005;13:1952-1960**



That reminds me -where's
my breakfast cereal?

Go with the grain.

The Right Mix of Whole and Refined Grains



We have to convince them it's something they didn't eat?

All Types of Grain Fit - Seek Variety in Type & Process



Overall Conclusions

- **Whole grain foods including processed ones are associated with:**
 - **Reduced risk of chronic diseases**
 - **Reduced risk of obesity**
 - **Better weight control**
- **Refined grain foods intake**
 - **Relatively neutral with regard to its association with body weight and chronic diseases**
- **Whole grain foods are below recommended levels.**
- **Some eat too many grain servings and too many grain-based snacks.**
- **Both whole-grain and enriched, refined, staple grain foods can be part of a healthy diet.**

We need the right quantity and balance of grains, processed grains, grain types, for better diets and optimal nutrition.

