



# Wheat: The Staff of a Healthy Life

## The Latest Science on Health Benefits

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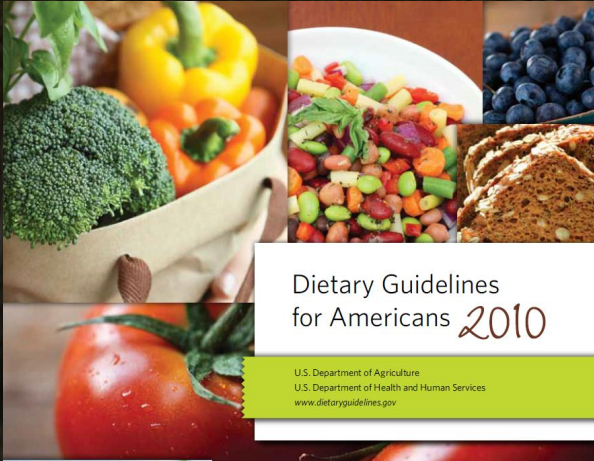
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# What Will Be Covered

- Recommendations regarding carbohydrates, wheat and grains
  - Wheat and grains and Disease Reduction
- Intake of Grains, Whole Grains & Dietary Fibre (DF)
  - Inadequacies of Intake
  - Nutritional Importance



## Dietary Guidelines for Americans 2010

U.S. Department of Agriculture  
 U.S. Department of Health and Human Services  
[www.dietaryguidelines.gov](http://www.dietaryguidelines.gov)



**DiabTürk** Türkiye Diyabet Önleme ve Kontrol Programı



Whole-grains contain more fibre, vitamins, minerals and phytochemicals (plant substances) than refined grains. For example, the vitamin content of brown rice is about 5-10 times higher than white rice.

The beneficial components in whole-grains work together to lower your risk of heart disease and diabetes. Fibre helps to reduce "bad" cholesterol and regulate blood sugar levels. Some of the vitamins, minerals and phytochemicals act as antioxidants to help protect against blocked arteries. Whole-grains may also support weight management as they help promote the feeling of fullness.

To learn more about whole-grains and try out delicious recipes, visit [www.fph.gov.sg/foodforhealth](http://www.fph.gov.sg/foodforhealth)

Have 2-3 servings of whole-grains daily in place of foods made from refined grains.  
 Examples of 1 serving are 1/2 bowl of brown rice or 2 slices of wholemeal bread.

Whole-grain products include:

- Brown rice
- Wholemeal bread
- 100% whole-grain wholemeal pasta
- 100% whole-grain breakfast cereals

# Carbohydrate Requirement

- 45-65% of Calories



# Per Capita Consumption: Wheat

- Turkey is 476 g/ d 2005
- North America 172g/d 2007

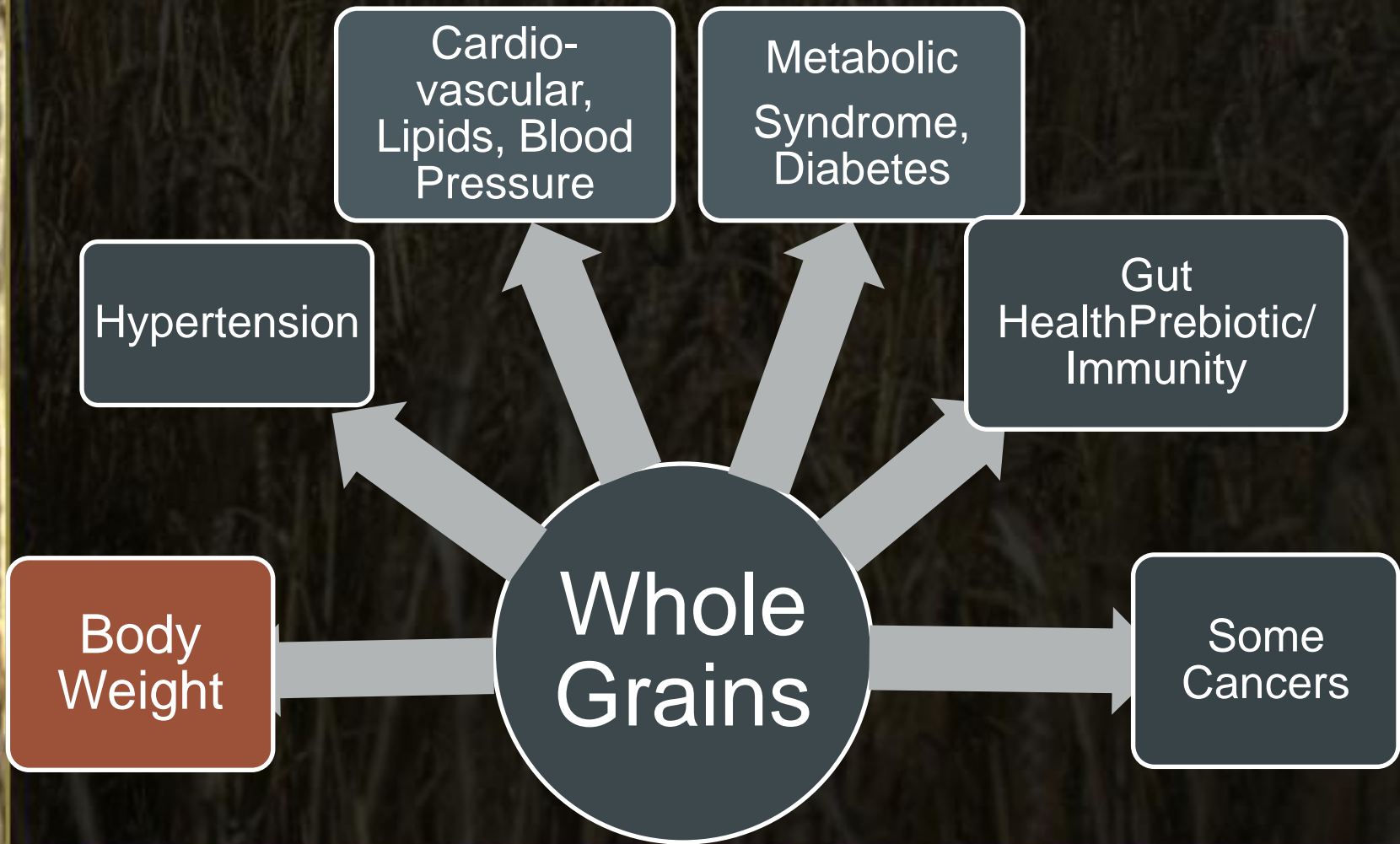


# Wheat, Grains, and Whole Grains and Chronic Diseases

- Observational studies have shown a links
  - Total Mortality
  - Hypertension
  - Weight & Obesity - McKeown
  - Diabetes / Metabolic Syn
  - Cardiovascular disease - Seal
  - Some Cancers & Other



# Health Benefits of Grains and Whole Grains



# The Economist

8 September 1999

## The western way to die



**SOUTH AFRICA SHUTS DOWN**

Globesity

# Overweight in Turkey

- 400 students -19 and 24 years
- Normal weight
  - 69.5% males
  - 77.7% of female

Neslişah& Emine, Nutr Res Pract. 2011;5:117-123.

US the ratio is nearly reversed

# Healthy Nutrition for Healthy Heart Study - Turkey

15,468 Caucasians >30 yrs ; 7 main regions

- 35% obese
  - females (F) > males (M) ↑ w/ age max 50-59yrs
- 14% hypertension    ↑ with age
- 4% diabetes    M > F; max 60-69 yrs
- 18 % metabolic syndrome (MetS)

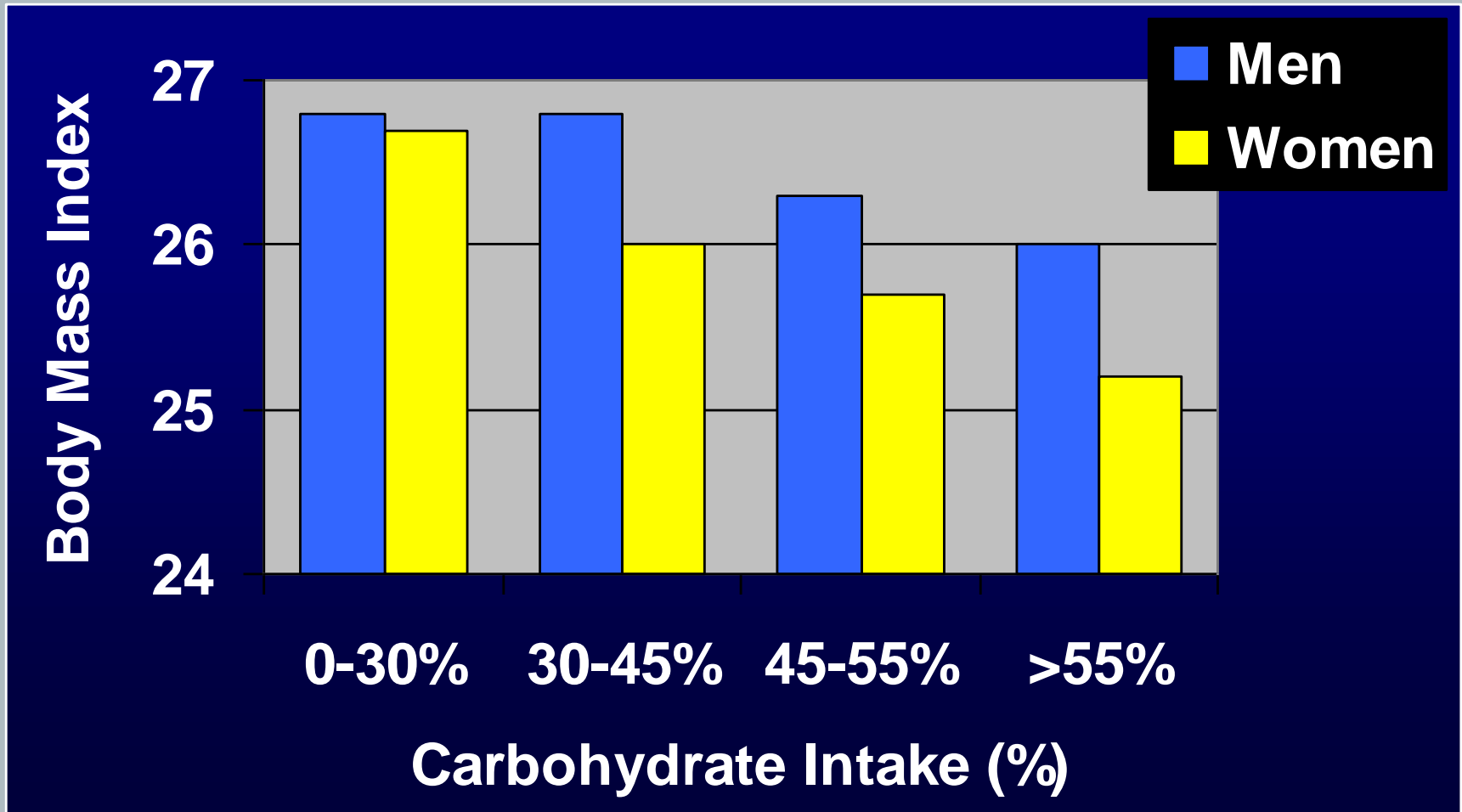
Sanisoglu SY et al. BMC Public Health. 2006;6:92.

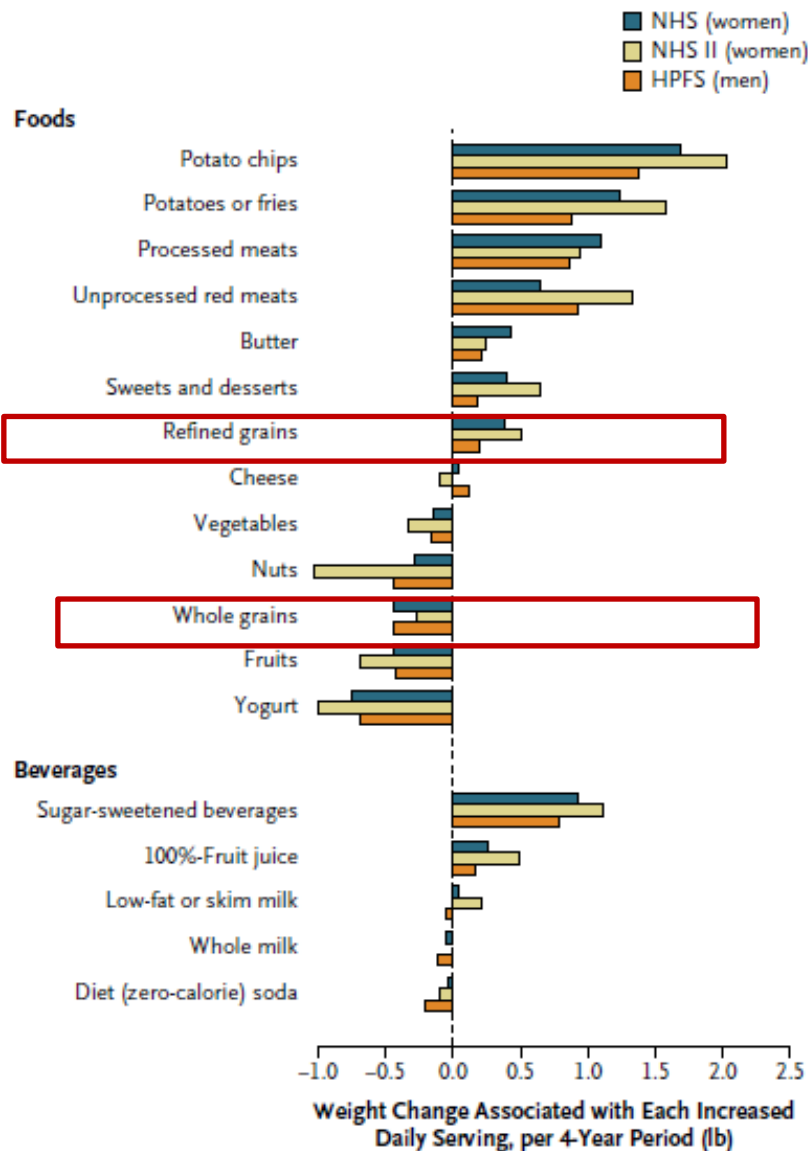
# Turkish Migrants to Europe

- Obesity and diabetes
- More common among Turkish migrants in Europe than in Europeans population.
  - Low high-density lipoprotein cholesterol levels.

Ujcic-Voortman JK et al *Obes Rev.* 2012 ;13:2-16

## Carbohydrate Intake and Body Mass Index: CSFII 1994 - 1996





Weight changes associated with particular foods (4 years)

Note - refined grains include grain-based pastries and desserts

Nurses Health Study  
 Nurses Health Study II  
 Health Professionals  
 Follow-up Study

Mozaffarian et al. *New Engl J Med* 2011;364:2392-2304

## All Refined Grains Are Not the Same



- **Grain-based desserts** and indulgent foods provide many calories
- Ave 138 cals /day US children
- Almost the same as sugar –sweetened beverages

Reedy & Krebs-Smith et al J Am Diet Assoc. 2010;110:1477-84.

# Refined-Grains and Body Mass Index in Adults

Iowa Women's Health Study (n = 34,492)

4.0 servings/week

30.0 servings/week

BMI

26.9

27.1

Health Professionals Follow-up Study (n = 42,540)

4.2 servings/week

30.1 servings/week

BMI

25.4

25.4

Gaesser, *J Amer Diet Assn*, 2007; 107: 1768-1780

# Refined-Grains and Body Mass Index in Adults

- **No or inverse** relationship of white flour products to weight
- 48,470 Brazilians
- 39,640 Portuguese



Williams P, Nutr Rev 70: 1-20

# WholeGrains and Body Mass Index in Adults

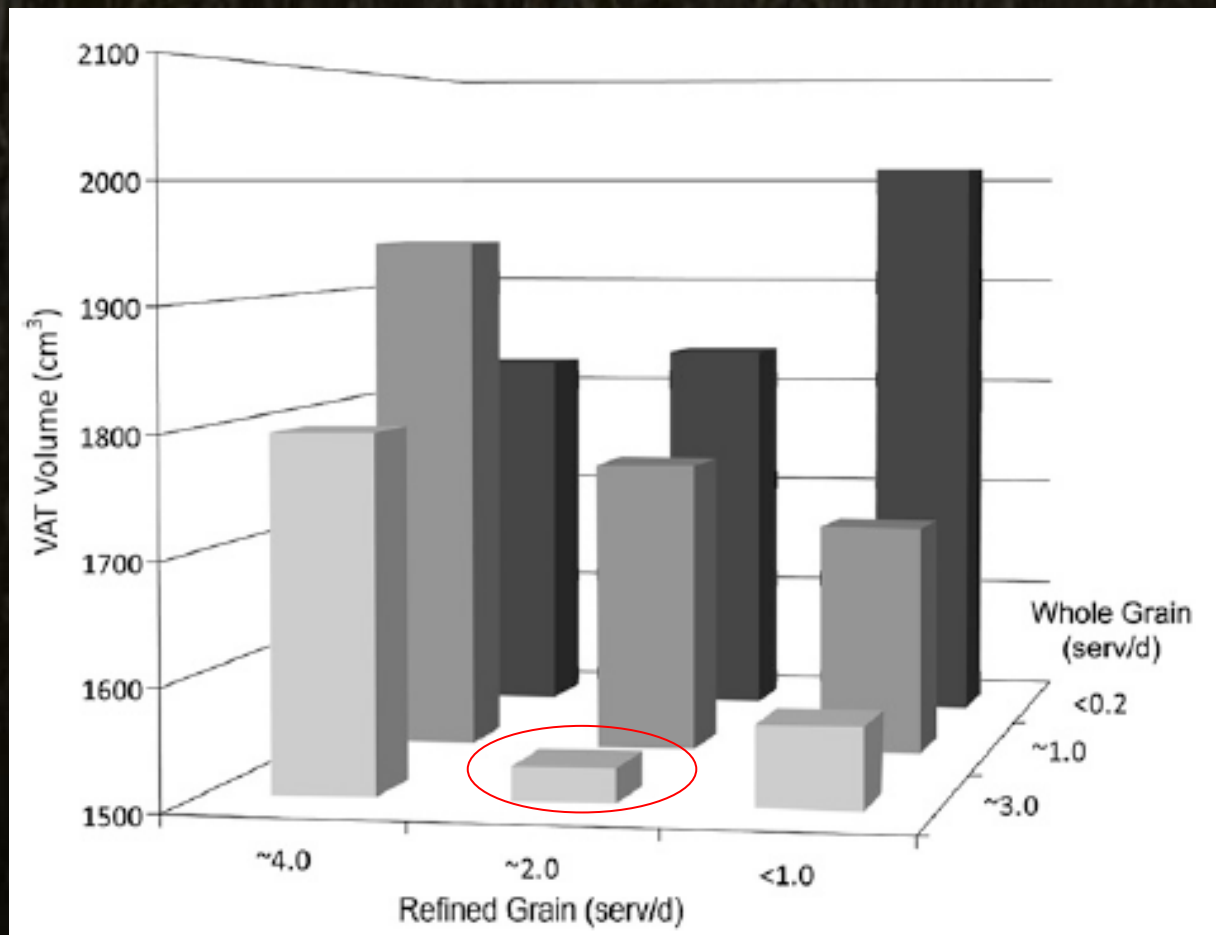
- Lower weights or less weight gain over time with whole grain.
- Numerous studies



Williams P, Nutr Rev 2012: 70:1-20

# Whole-grain and Refined-grain Intake and visceral abdominal fat

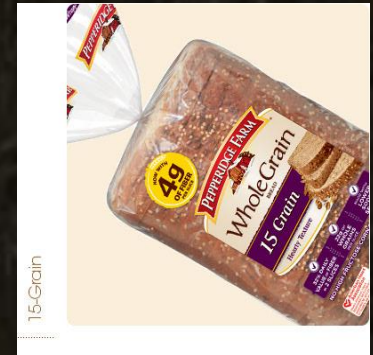
Framingham Heart Study n=2834



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

# Bread and Weight Loss

- 122 overweight and obese women
  - BMI  $\geq 25 < 40$  kg/m<sup>2</sup>
  - BREAD, n = 61 vs NO BREAD, n = 61
  - Low-calorie diet
  - Nutrition education and physical activity guidelines



16 weeks

**BREAD group - fewer dropouts**

Loria-Kohen V et al. Clin Nutr. 2011 Dec 30. [Epub ahead of print]

# WG, Weight & Weight Loss

**Comprehensive review** showed strong evidence

- significant **weight loss** is achievable with energy-controlled diets that are **high in cereals**



Maki et al J Am Diet Assoc. 2010;110:205-14;McKoewn et al 2009 J Nutr, 139: 1950-1955; Williams et al Nutr Rev. 2008; 66:171-82; Harland Newcastle AACC 2009; Good et al J Am Coll Nutr. 2008; 27:80-7

# WG and Weight Maintenance

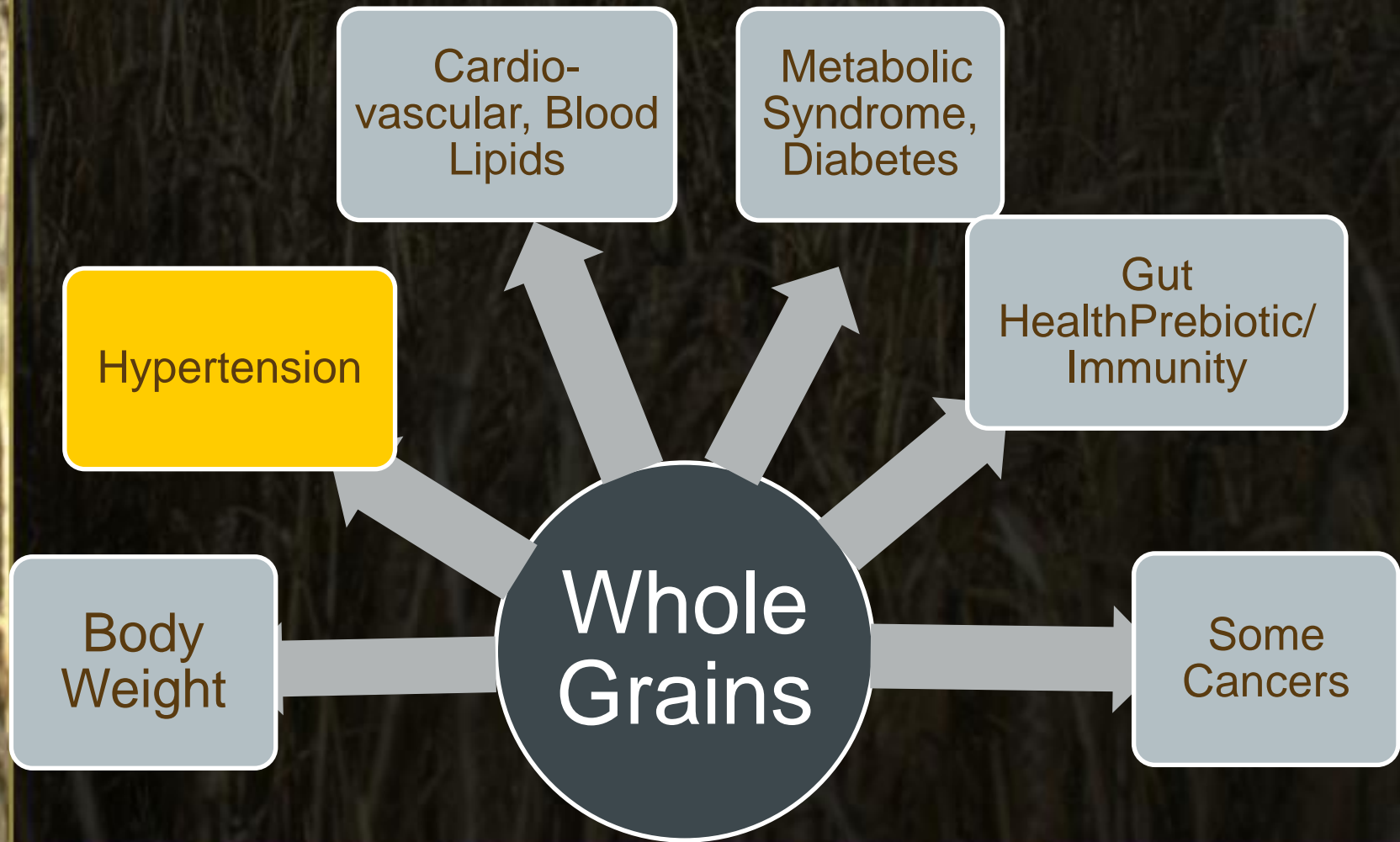
Successful losers - lost  $\geq 10\%$  of maximum body weight and maintained loss for  $\geq 5$  years.

**Wt loss maintainers** vs overweight or normal weight

- **Higher whole grains**
  - More vegetables
  - Lower energy density

Raynor et al Eat Behav. 2011;12:119-25

# Health Benefits of Whole Grains



# Whole Grain and Elevated Blood Pressure Risk

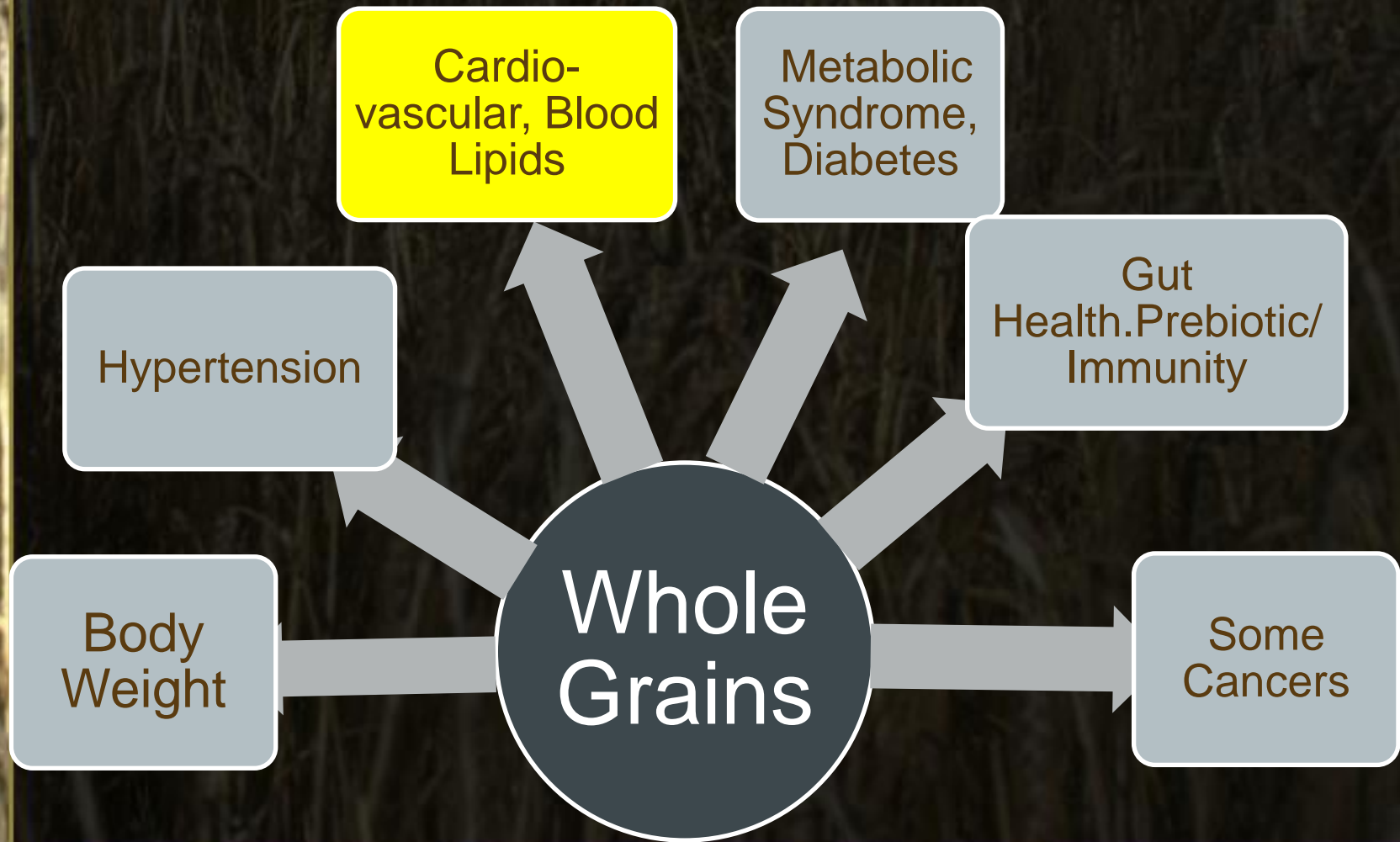


28 926 female US health professionals – quintiles of intake  
Male Health Professionals RR= 0.81

Servings of WG/ day	<1/2	1/2-1	1-2	2-4	>4
RR	1	0.93	0.93	0.92	0.77

Wang et al . Am J Clin Nutr. 2007; 86:472-9;Flint et al Am J Clin Nutr. 2009;90:493-8.

# Health Benefits of Whole Grains



# Fibre (DF), Whole Grain (WG) and Blood Lipids

- Baltimore Longitudinal Study of Aging - 7-d dietary records and quantified in g/d.

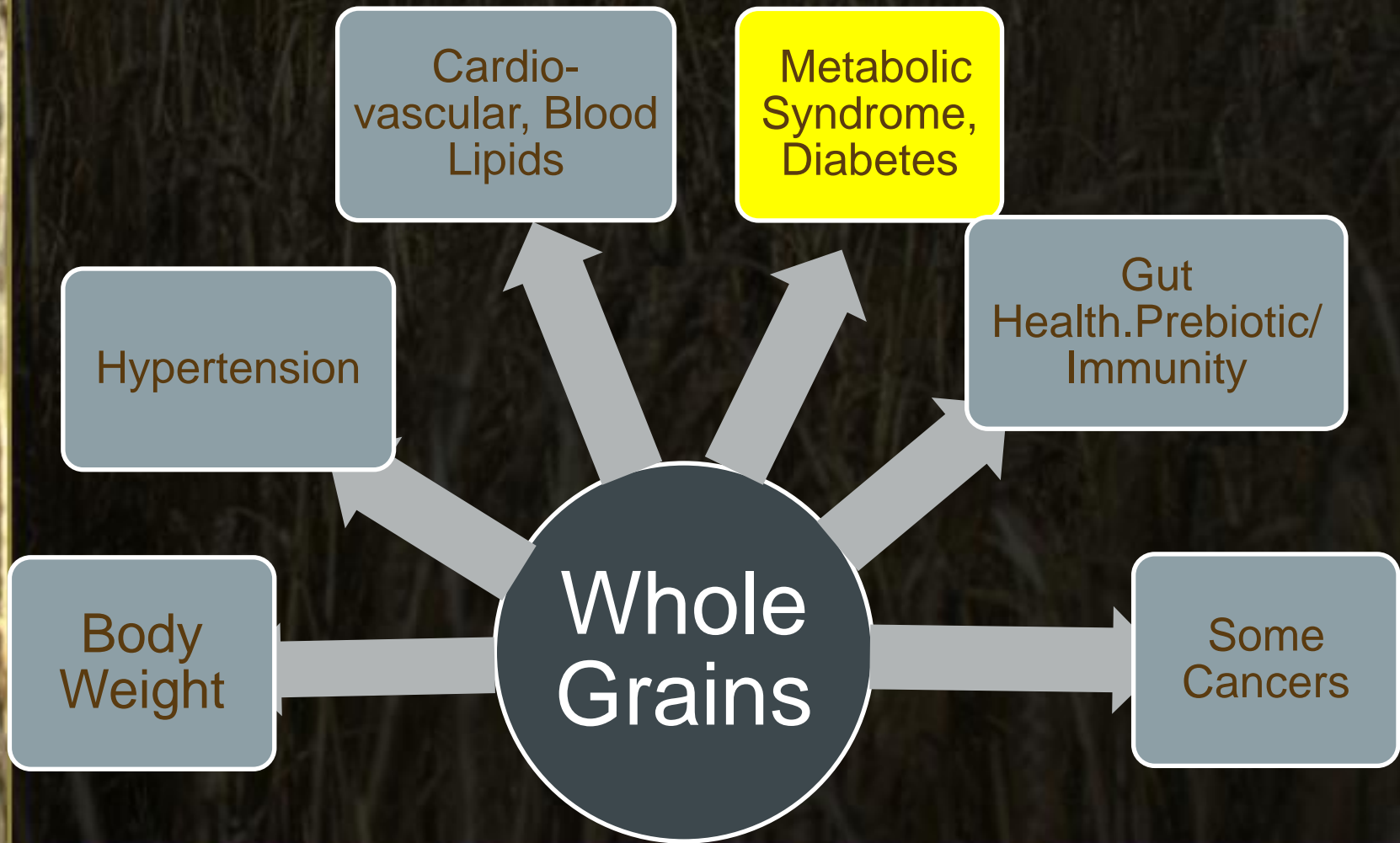
↑ Whole Grain and Dietary Fiber  
intake

↻ ↓ total cholesterol

↻ ↓ LDL cholesterol

Newby et al Am J Clin Nutr. 2007 ;86:1745-53

# Health Benefits of Whole Grains



# Diseases in Turkish Elderly

- 507 Care Center 62.5% female
- Hypertension
- Coronary artery disease
- Elevated blood lipids
- Type 2 Diabetes

Tekin et al. BMC  
Fam Pract. 2011;12:96.



# Whole Grains: Type 2 Diabetes

Iowa Women's Health  
Study N=35,000

**21% ↓ risk**

Nurses' Health Study N= 88,000

**27% ↓ risk**

Meyer, et al., *AJCN*, Apr. 2000; Liu, et al.,  
*AJP*, Sept. 2000; Montonen, et al., *AJCN*,  
2003

~ 3 servings of whole  
grains daily



# Whole Grains and Metabolic Syndrome

- Mean intake 0.5 sv/d; Multiethnic group n=5496
- The higher the whole grain intake the lower the risk of
  - obesity
  - insulin resistance
  - Inflammation
  - elevated fasting glucose
  - newly diagnosed diabetes

Lutsey et al. Br J Nutr. 2007 ;98:397-405



# Whole Grains and Fibre and Diabetes Prevention

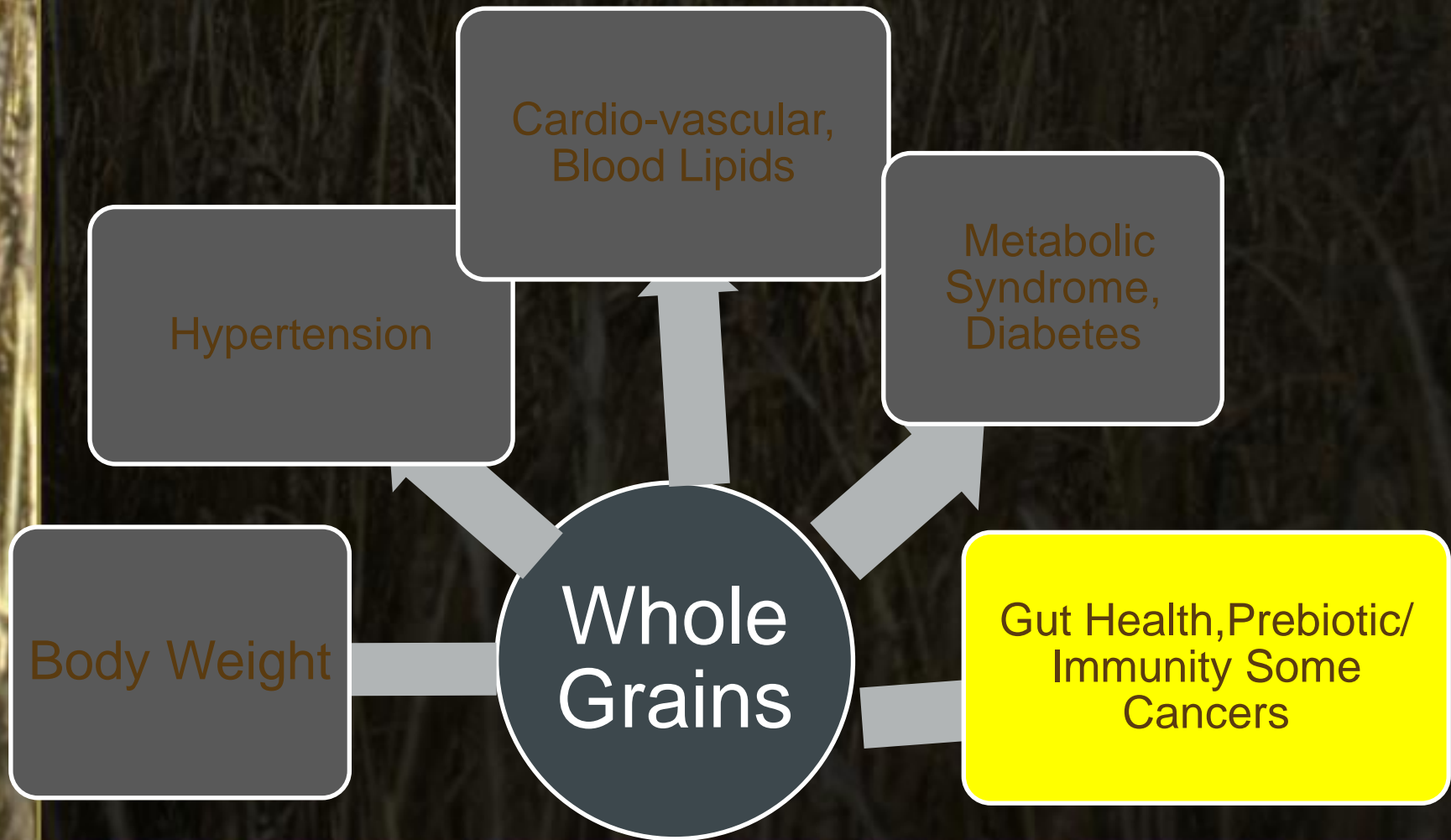
1 intervention & 11 prospective trials

- Cereal fibre intake 28-37% ↓
- WG intake (3/11 studies) 27-30% ↓

Data encouraging but too weak for firm conclusions

Priebe M et al Cochrane Database Syst Rev. 2008 Jan 23;(1):CD006061

# Health Benefits of Fibre and Grains



# Whole Grain and Cancers

291 988 men / 197 623 women aged 50-71 y  
prospective NIH-AARP Diet and Health Study

Whole-grain - RR = 0.79 colon

RR=0.59 overall gut cancers

– Breast cancer – no effect

Haas et al. Int J Food Sci Nutr. 2009 Mar 21:1-13; Schatzkin et al.

Am J Clin Nutr. 2007;85:1353-60; Gastroenterology. 2008;135:1163-7

# Whole Grain & Colorectal Cancer

~56, 000 Danish Diet, Cancer and Health cohort

- **Higher WG, particularly bread, intake**
- **↓** Risk of colon cancer (IRR 0.85) (assoc with bread only)
- **↓** Risk of rectal cancer (IRR 0.90) per 50 g increase in intake
  - No consistent associations in women

Egeberg et al Br J Cancer. 2010;103:730-4

# Whole Grains & Mortality

Harvard Male Health Professionals 86 000

1 or > sv/d whole grain cereal  
vs none or <<<1

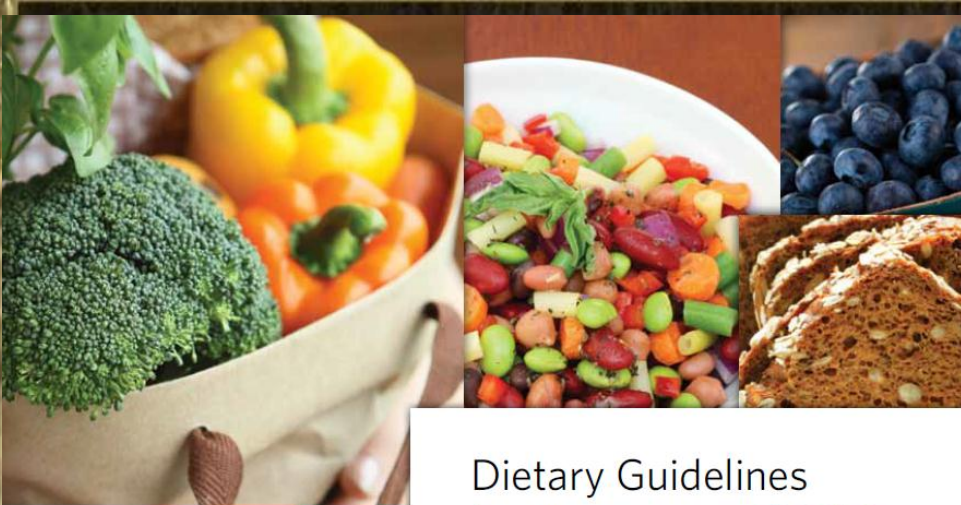
Mortality **20% lower risk at**  
**Any age**

Liu et al Am J Clin Nutr 2003;77:594-9

People who eat whole grains live longer. Is it the whole grain foods or do they do other things that are healthy?

Choose whole grain foods, it's the mark of a healthy diet





# Dietary Guidelines for Americans 2010

U.S. Department of Agriculture  
U.S. Department of Health and Human Services  
[www.dietaryguidelines.gov](http://www.dietaryguidelines.gov)

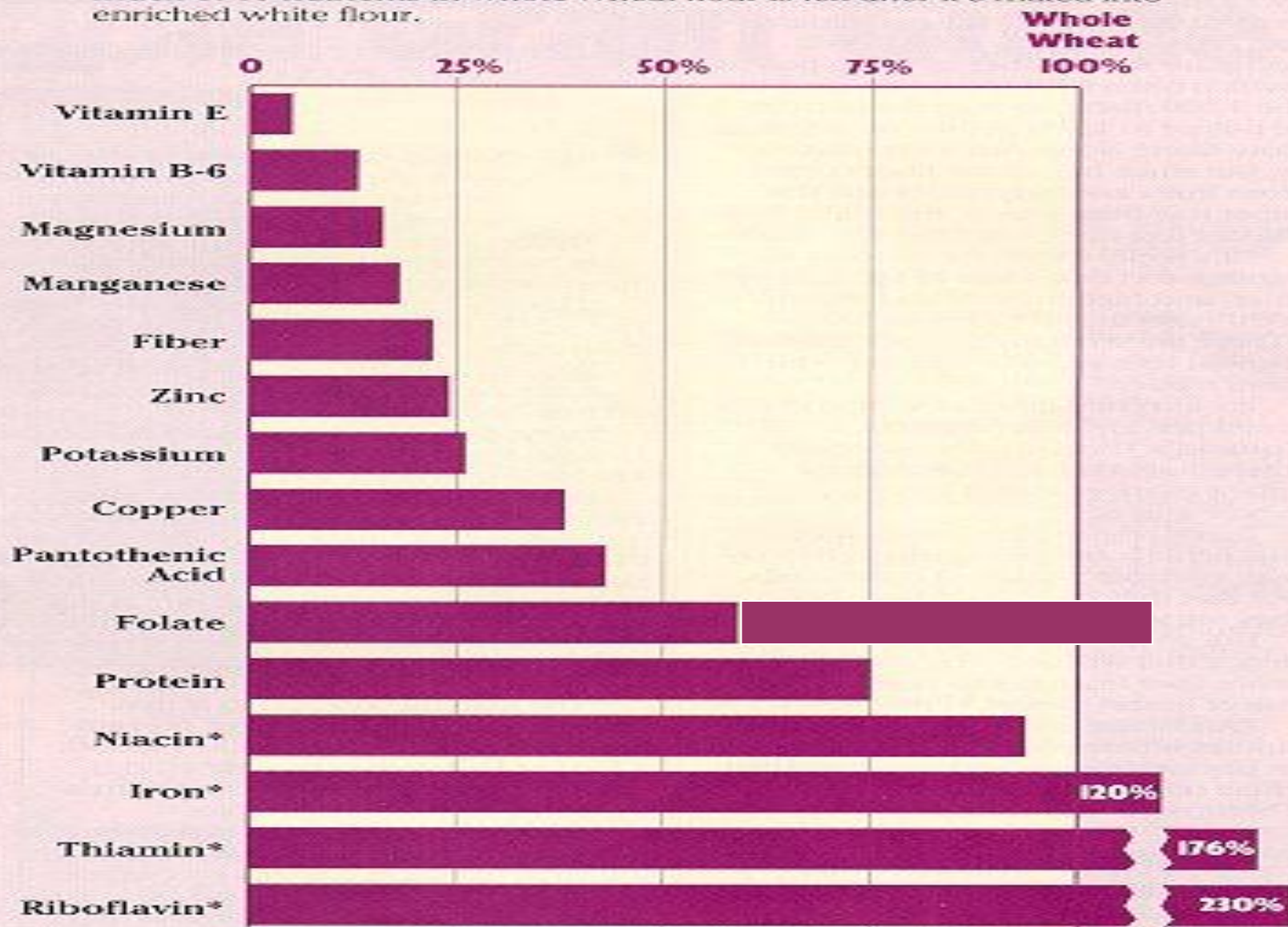


# Rationale- "Make Half Your Grains Whole"

- **Fortified and Enriched grains** esp. wheat
- important source of nutrients
  - Better absorption of some
- Fewer anti-nutritional / toxic factors
  - Concentrated in the outer layers
  - Phytate, mycotoxins, pesticides and heavy metals

## Whole vs. Refined

What's lost when whole grains are refined? This graph shows how much of 15 nutrients in whole wheat flour is left after it's milled into enriched white flour.



\* = This nutrient has been added to enriched white flour.

Source: USDA Nutrient Database for Standard Reference, Release 11 ([www.nal.usda.gov/fnic/foodcomp](http://www.nal.usda.gov/fnic/foodcomp)).

■ = Enriched white flour.

# Fortified Breads and Cereals

*Fortification of wheat flour.. is an effective, simple, and inexpensive strategy for supplying vitamins and minerals to the diets of large segments of the world's population.*



# Flour Fortification

The Americas 97%

Eastern Mediterranean 44%

Africa 31%

South-East Asia 21%

Europe 6%

2007

Fortification of flour with folic acid . Berry RJ. et al FFI, 2008

# Zinc Fortification of Bread

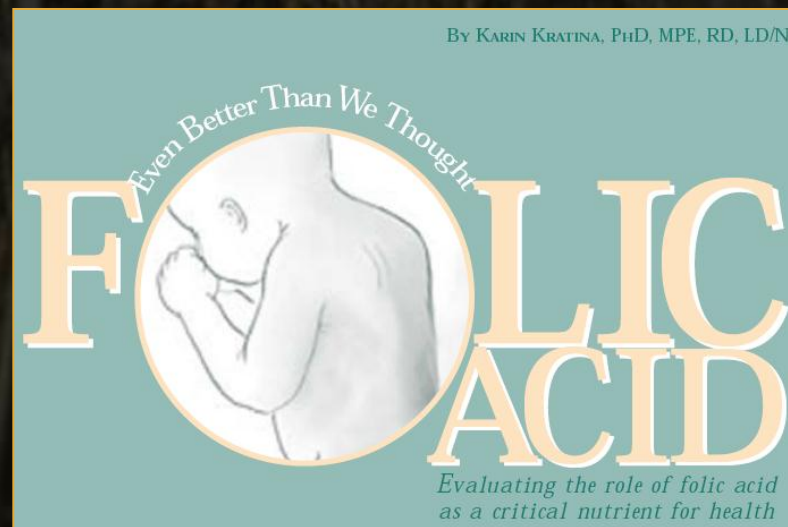
- Zinc-supplemented bread
- 24 Children 7-11 yrs old
  - Low zinc levels, but no overt deficiency
  - Zn in bread improved markers of immunity

Kiliç I, et al J Pediatr Gastroenterol Nutr. 1998 ;26:167-71. Pamukkale University, Denizli, Turkey.

# Grains and Folate Fortification : Incidence of NTD per 100000 live births

- 34-50% ++ drop neural tube defects depending on the country

- CDC, Other



# Folate Fortification of Flour Oman

- Folate supplementation
  - Pregnant women - 1990
  - Wheat flour 1996 (also iron)
- Spina bifida rates per 1000 deliveries
  - 1999      2.34 to 4.03
  - 2006      0.29

Alasfoor D, et al. East Mediterr Health J. 2010;16:533-8.

# Intakes in Turkey

12 to 17 years; 940 females and 1004 males. 3-day records

- Diets low in
- Magnesium                      Folic acid
- Vitamin E                        Thiamine
- Fibre                                Iron - females
- **Wheat** can provide these nutrients

Garipagaoglu M et al J Am Coll Nutr. 2008;27:394-400.

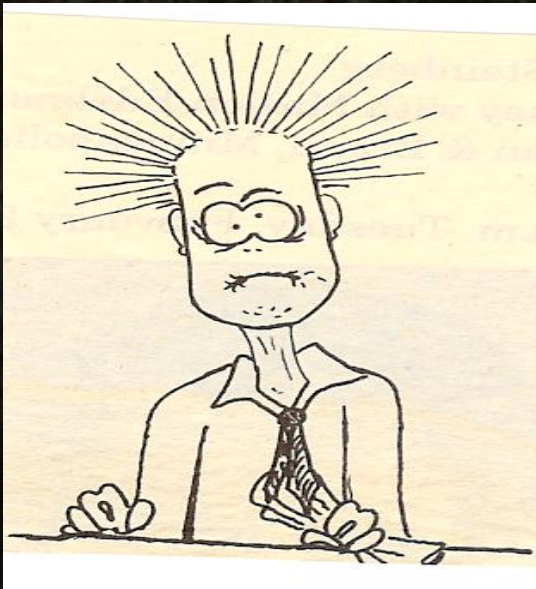
# Turkish Elderly

- Lower socioeconomic status
  - esp elderly in Turkey
  - Rely on wheat, cereals and cereal products

Akbulut GC, Ersoy G. Arch Gerontol Geriatr. 2008;47:241-52



# Whole Grain Confusion



Consumers Think They're  
Already Getting Enough  
Whole Grain

- **71%** - think they're getting enough
- **90%** think they know what it means

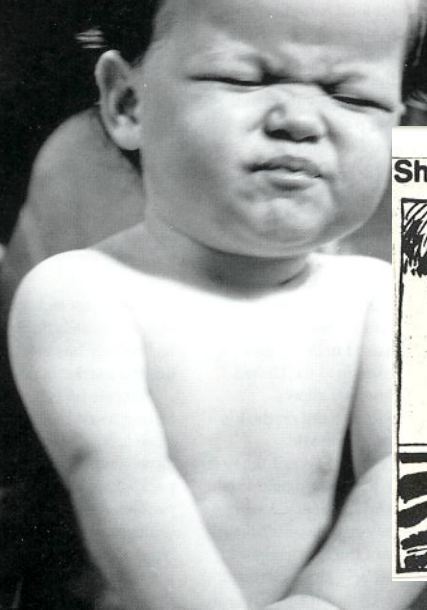
# Most are Missing Out



Not Getting Enough  
Whole Grain

**Getting the  
Recommended  
3 Servings of  
Whole Grain/Day**

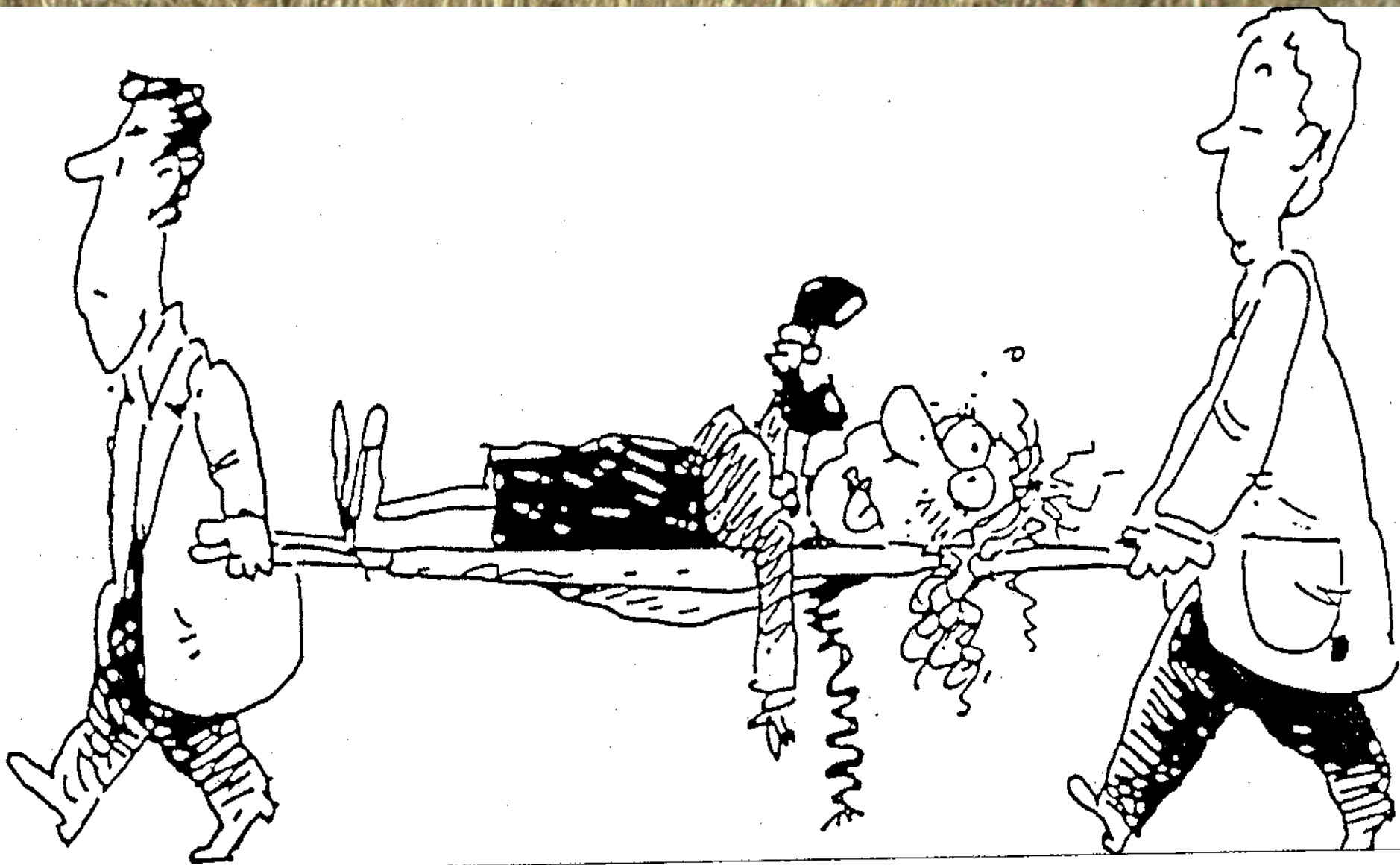
# Consumers Afraid of the Taste



Shoe / By Jeff MacNelly



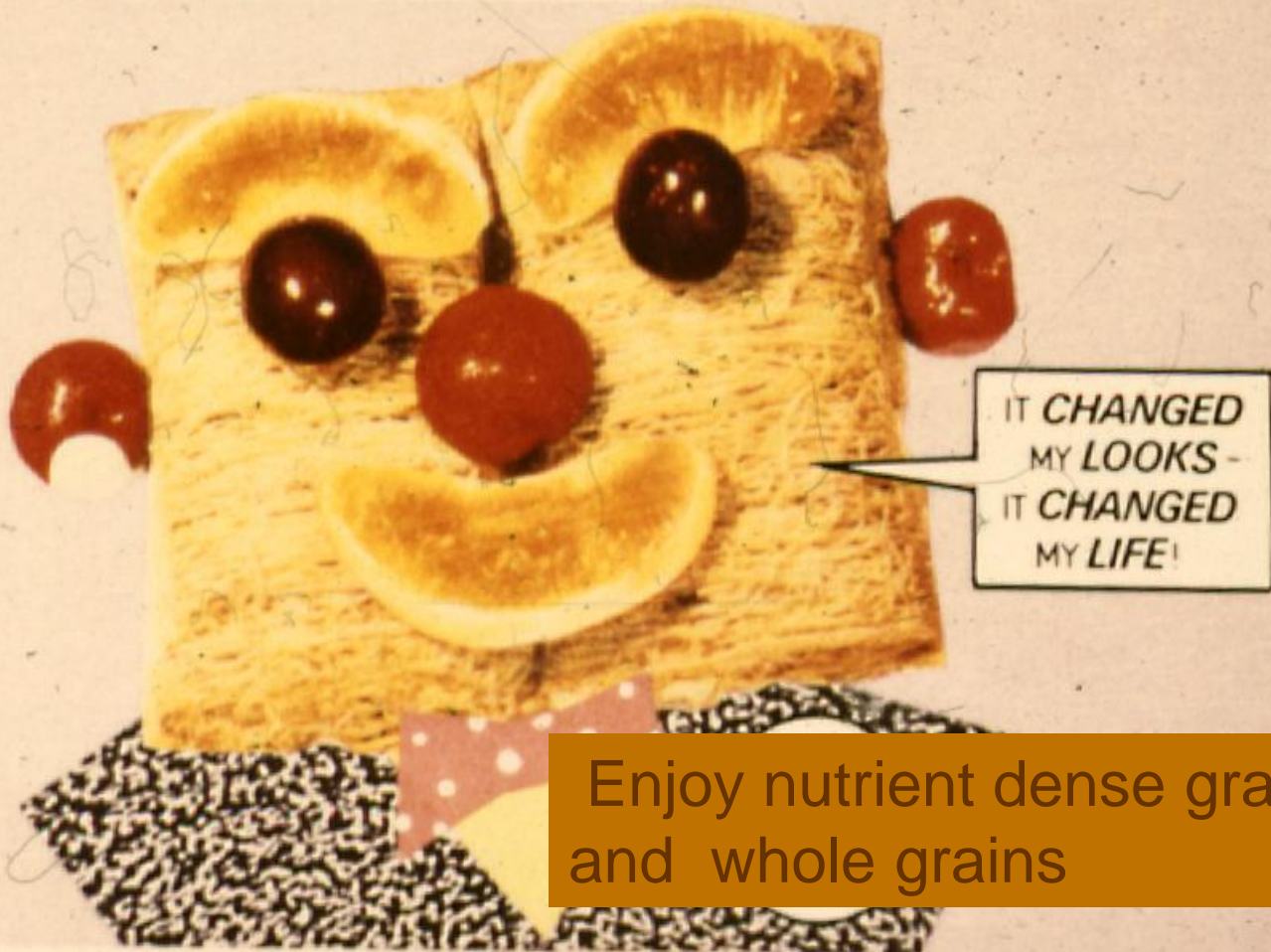
- My children won't eat it!
- It has to taste good.



It must have been something I didn't eat?

# Make This Your Typical Consumer

HEALTHY LIVING, HEALTHY EATING



Enjoy nutrient dense grains  
and whole grains