

BI 358 Lecture 5



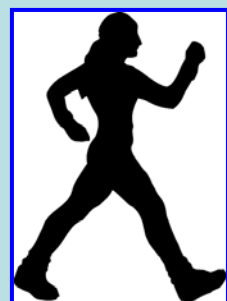
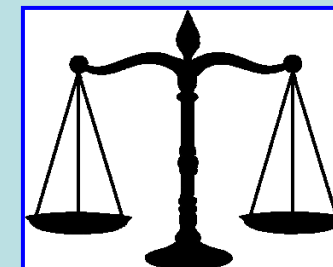
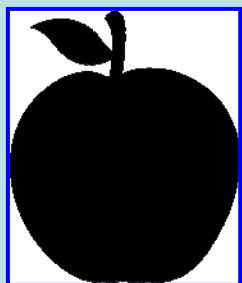
...Lab today! Yes, personal, lifetime data!
+ Outline update.

- I. Announcements Today **DA+ Nutritional Analyses** 112 HUE.
Save 6 .pdfs, check files then e-mail or save on flash drive!
- II. Nutritional Physiology News National Weight Control Registry
- III. GI Physiology Connections G&H ch 62, 71, 63, 64, 65 + LS2
 - A. GI regulation: Local, nervous & hormonal control
Gut histology, plexi fig 62-2, tab 62-1, fig 64-7
 - B. Energy regulation + neural centers fig 71-1, 71-2, tab 71-2
 - C. Secretions tab 64-1, fig 64-1, 64-2, pp 775-87
 - D. **Hydrolysis**: Central theme of digestion ch 65 p 789-93
Carbohydrate fig 65-1 p 790; Fat fig 65-3 p 791, fig 65-4 p 792; Protein fig 65-2 p 791
 - E. Overview: Stomach, small intestine, accessory organs, large intestine fig 63-2, 65-6, 65-7, 64-10, 64-11, 63-5...
- IV. Nutrition & Disease Prevention ...+ G&H ch 71
 - A. Dietary & exercise guidelines to prevent disease:
Eat the Rainbow!
USDA, AHA, AICR, DASH,
Mayo Clinic, ACSM Guidelines
 - B. Rationale for guidelines



Successful Dieting – National Weight Control Registry

- 5000 people, ≥ 30 lb weight loss, ≥ 5 yr
- High-carbohydrate (55-60%), low-fat (24%) diet with the rest (~ 16 -21%) from protein
- Wholesome vs. high-sugar carbohydrates including fruits, vegetables, high-fiber foods
- Conscious of calories knowing that total calories count, no matter what diet type
- Eight of 10 ate breakfast daily which may help better manage calories during the day
- Self-monitor, weigh themselves ≥ 1 x/wk & many still keep food dairies
- Much planned physical activity, 60-90 min/d, 1^0 walking + looked for other ways to be active



<http://www.nwcr.ws/Research/published%20research.htm>

UC Berkeley Wellness Engagement Calendar, September 2013

★ Myenteric motor plexus!

Serosa

cf: G&H fig 62-2

LOCAL

Epithelium

Submucosa

Lumen

Lamina
Propria

Muscularis
Externa

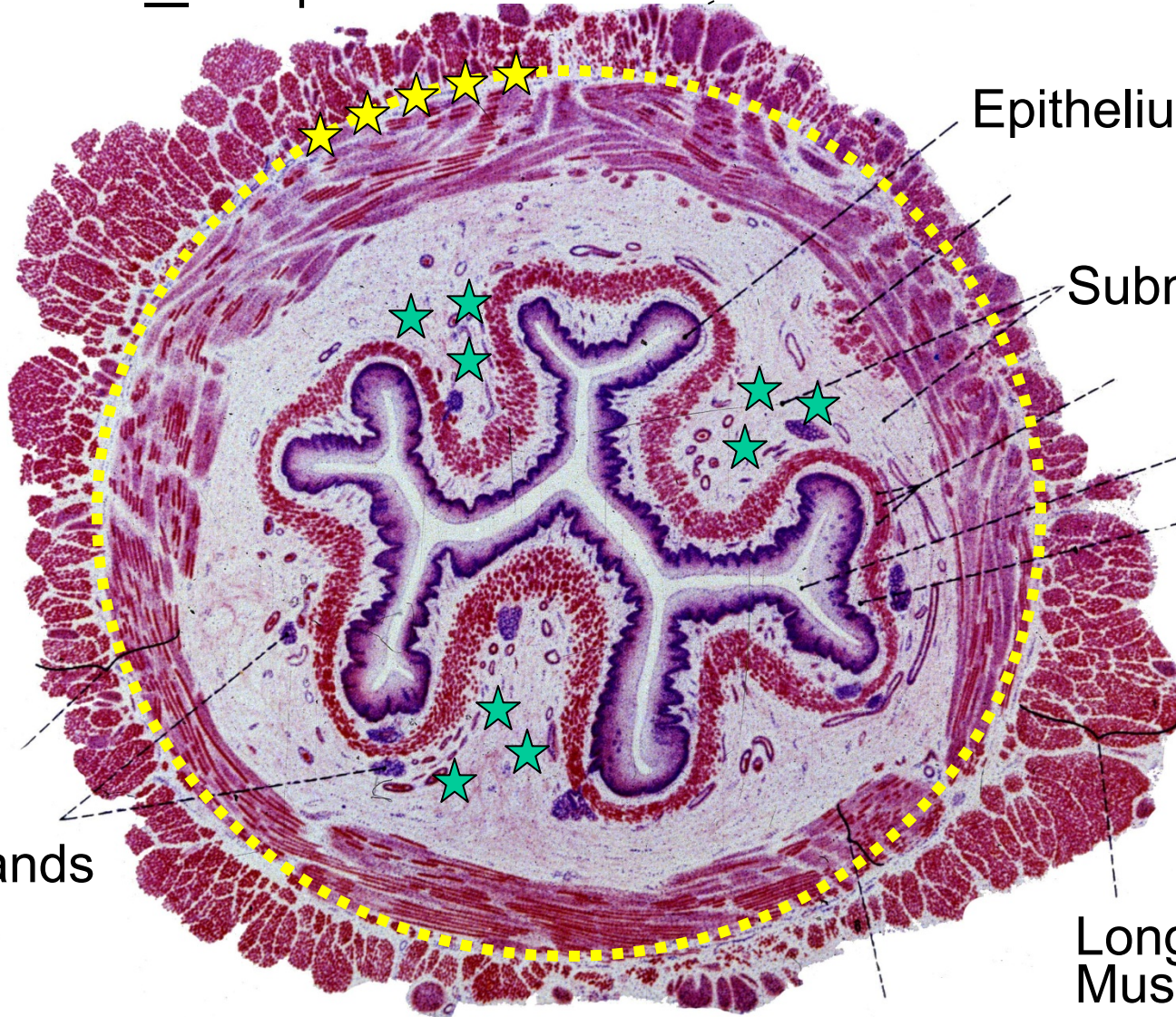
Glands

Longitudinal
Muscle

★ Meissner's sensory & secretory plexus!

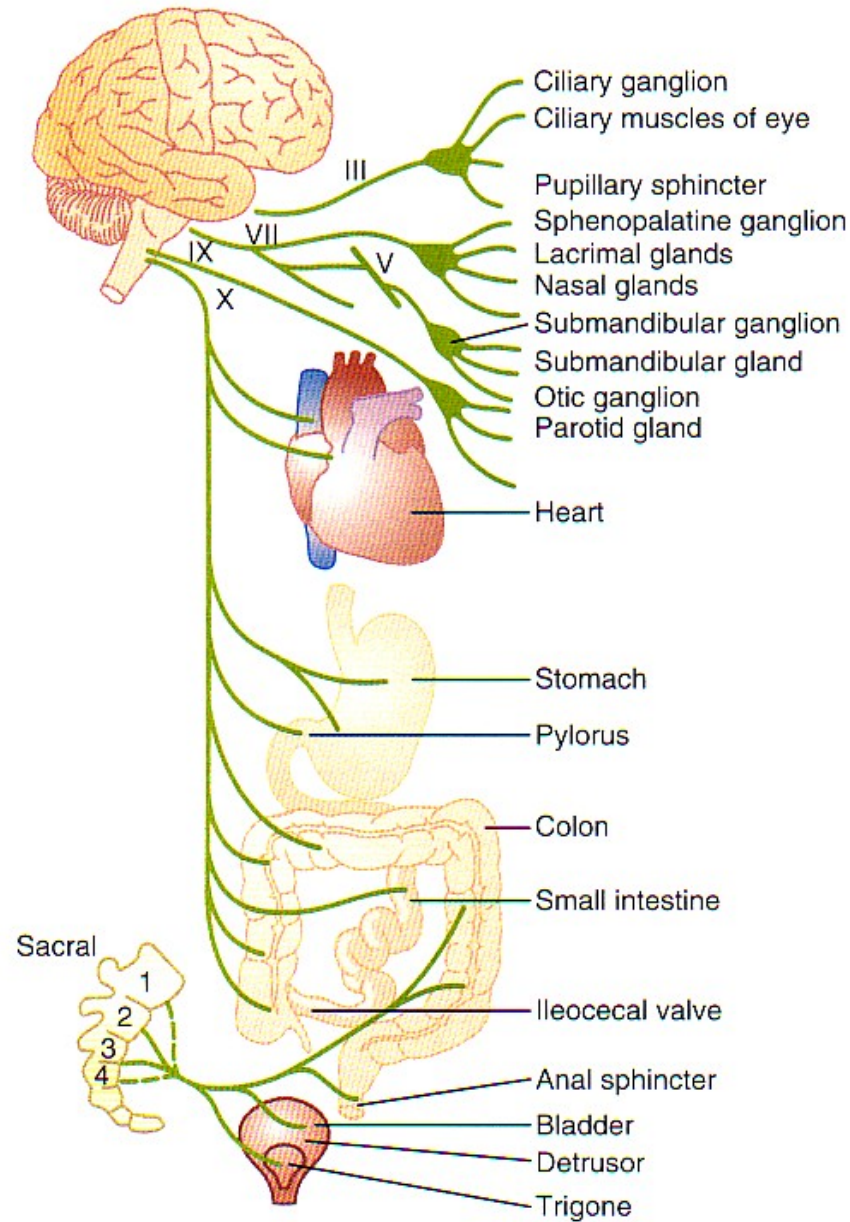
Circular
Muscle

H Howard 1990



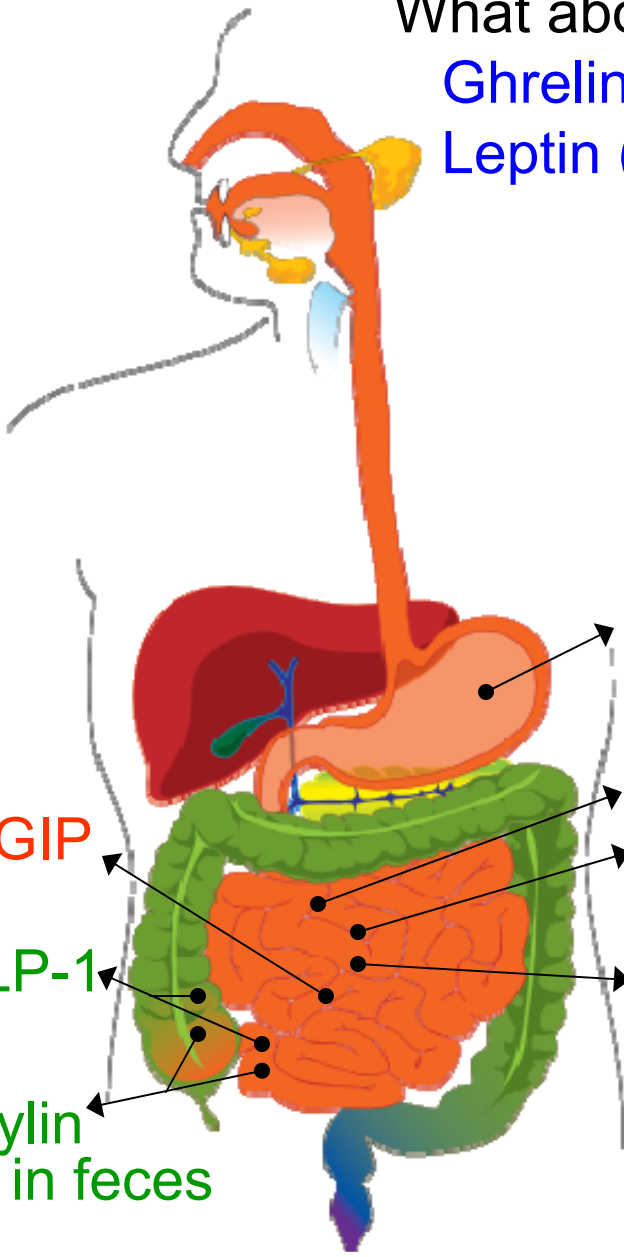
Parasympathetic Branch Activates the Gut!

NERVOUS



HORMONAL

What about feedback for hunger-satiety?
Ghrelin (stomach fundus, pancreas,...)
Leptin (adipocytes)



Gastrin → HCl, Pepsinogen by stomach

Motilin → ↑ Motility

Secretin → HCO₃⁻, H₂O by pancreas

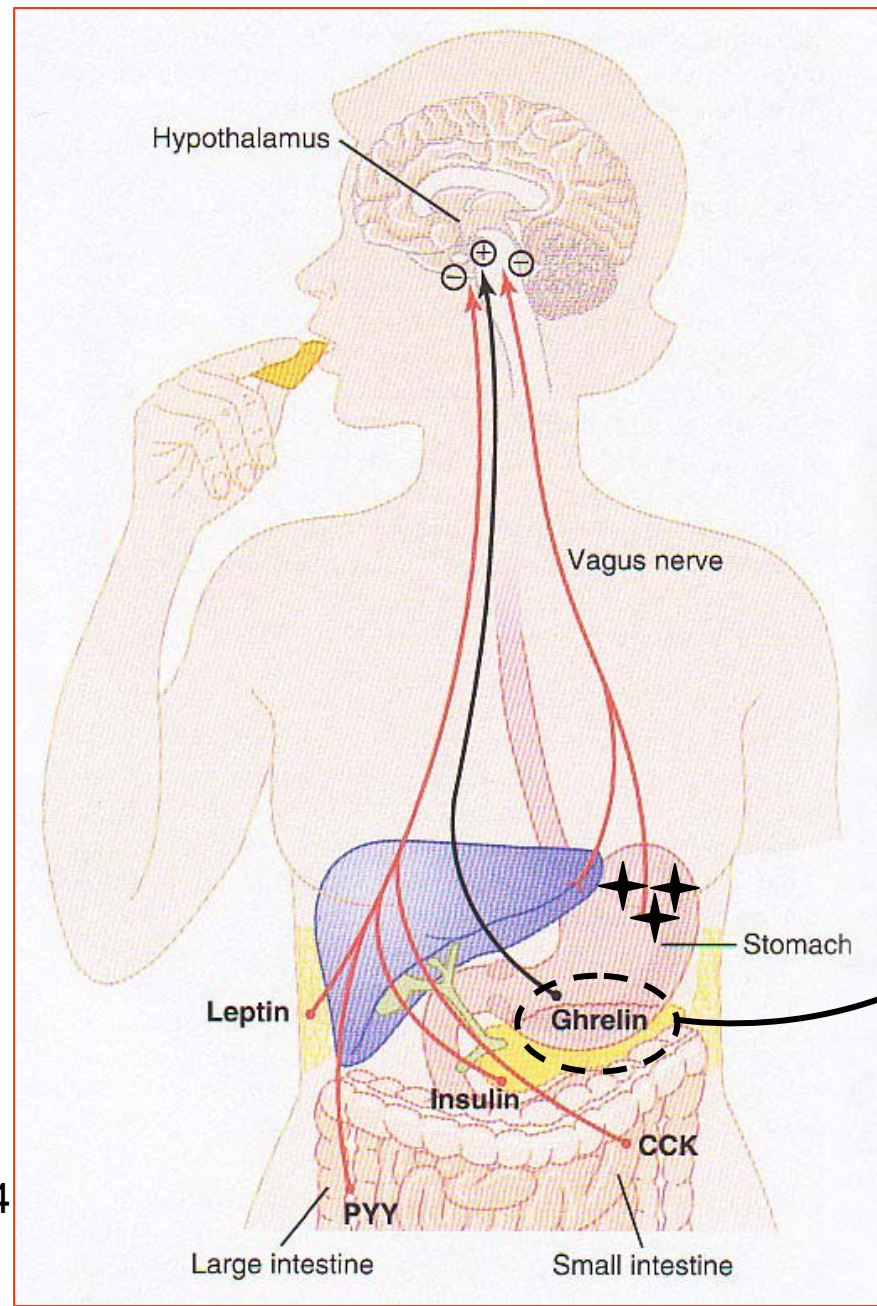
Cholecystikinin → Gallbladder contraction + Pancreatic enzymes

↓ Motility ← GIP
↑ Insulin

↓ Motility ← GLP-1
↑ Insulin

↑ Cl⁻ ← Guanylin
↑ NaCl + H₂O in feces

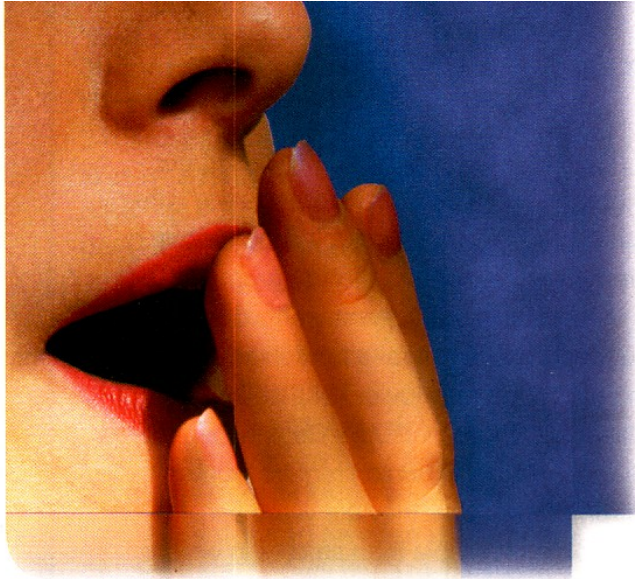
Feedback Mechanisms for the Control of Food Intake



Sleep deprivation promotes the release of ghrelin & abdominal obesity!

S Taheri & associates,
PLoS Medicine Dec 2004

<http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.0010062>



Sleep More, Eat Less

Wondering why you're so hungry? Maybe it's because you're not getting enough sleep.

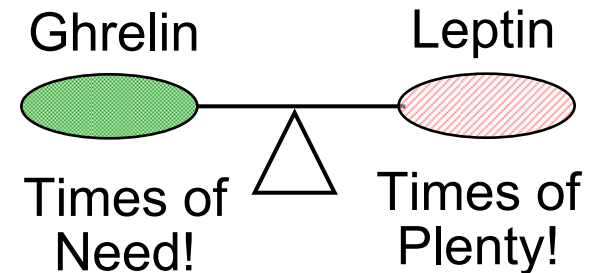
Researchers allowed 12 healthy young lean men to sleep for either four or eight hours in a laboratory. After one night of

four hours of sleep, the men ate 22 percent more calories the next day than they did after eight hours. They also reported being more hungry before breakfast and dinner.

In a separate study, scientists found that a single night with only four hours of sleep led to insulin resistance in nine healthy lean men and women in their 40s. After the night of restricted sleep, the participants were less able to move blood sugar into their cells, which suggests that their bodies were at least temporarily resistant to insulin. Insulin resistance can lead to heart disease, diabetes, and possibly breast cancer.

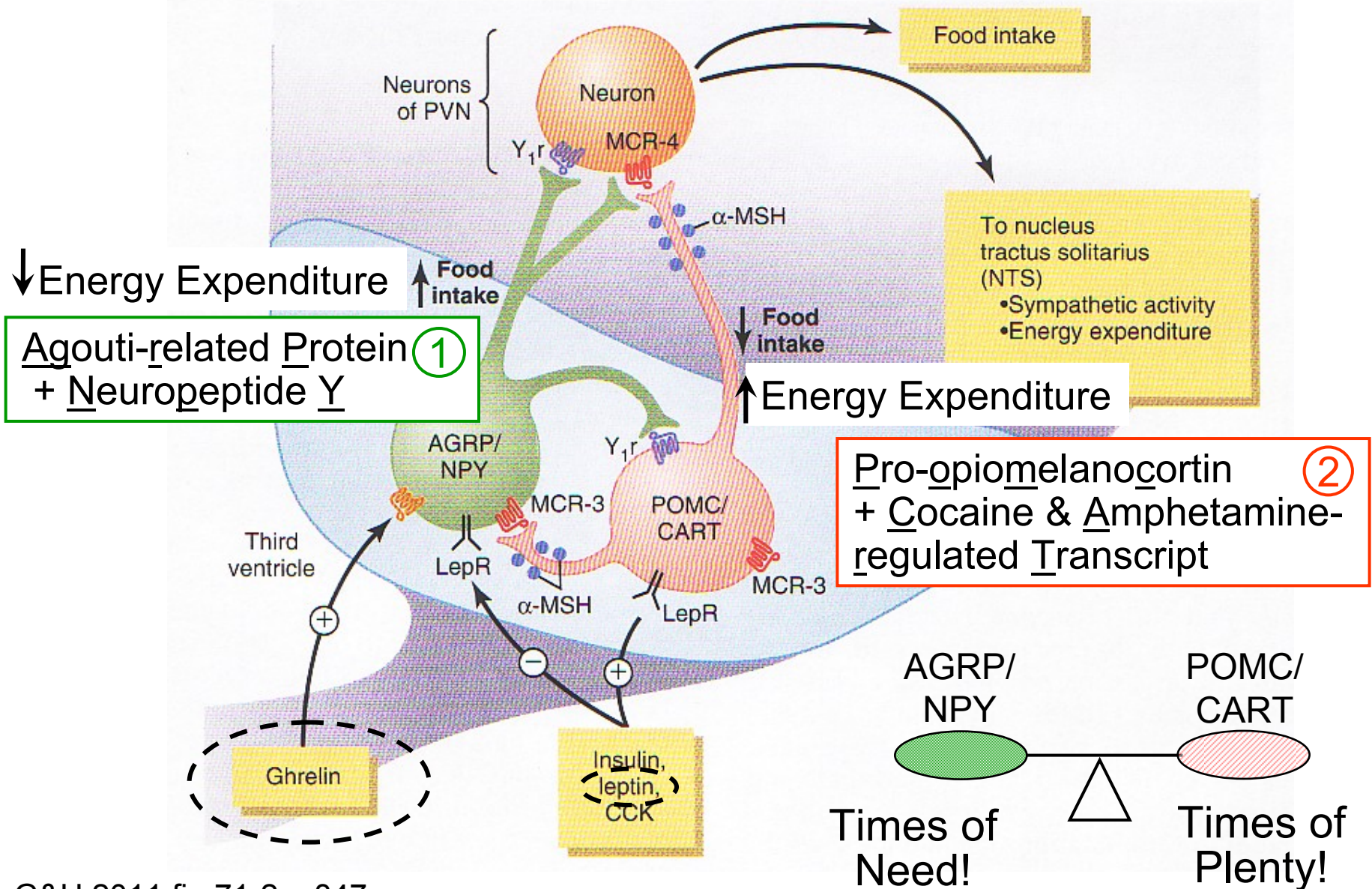
What to do: Get enough sleep. Most adults need 7 to 8 hours a night. (School-aged children need at least 9 hours.) Other studies that limit adults' sleep find higher levels of ghrelin (which makes people hungry) and lower levels of leptin (which makes people feel full) in their blood. Changes in ghrelin, leptin, and insulin resistance may explain why studies find a higher risk of obesity, heart disease, diabetes, and high blood pressure in people who get too little sleep.

**promotes
Leptin
release!**



<http://www.vivo.colostate.edu/hbooks/pathphys/endocrine/gi/ghrelin.html>

Control of Energy Balance by Hypothalamic Neurons



Neurotransmitters & Hormones that Influence Hypothalamic Feeding & Satiety Centers

↓ **Feeding = Anorexigenic**

Cocaine- & amphet-regulated tr (CART)

α -Melanocyte stimulating h...(α -MSH)

Leptin

Serotonin

Norepinephrine

Corticotropin releasing h...(CRH)

Insulin

Cholecystokinin (CCK)

Glucagon-like peptide (GLP)

Peptide YY (PYY)

↑ **Feeding = Orexigenic**

Agouti-related protein (AGRP)

Neuropeptide Y (NPY)

Melanin-concentrated h...(MCH)

Orexins A & B

Endorphins

Galanin (GAL)

Amino Acids (Glutamate & GABA)

Cortisol

Ghrelin

Endocannabinoids/Anandamide

Gut Secretions

Secretion

Release Site

1. Mucus

into GI Lumen

2. Enzymes

into GI Lumen

3. H₂O, acids, bases+

into GI Lumen

4. Hormones

into Blood

Table 64-1 Daily Secretion of Intestinal Juices

	Daily Volume (ml)	pH
Saliva	1000	6.0-7.0
Gastric secretion	1500	1.0-3.5
Pancreatic secretion	1000	8.0-8.3
Bile	1000	7.8
Small intestine secretion	1800	7.5-8.0
Brunner's gland secretion	200	8.0-8.9
Large intestinal secretion	200	7.5-8.0
Total	6700	

Hydrolysis of Energy Nutrients

...Central-linking theme!!

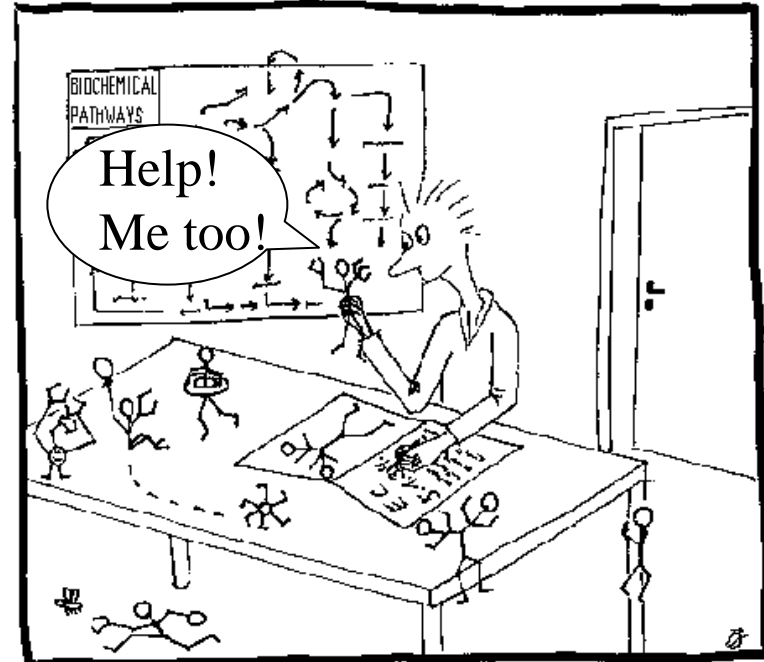


Hi gang!!
You need me
for digestion!!



+

The ENZYME data bank



H₂O

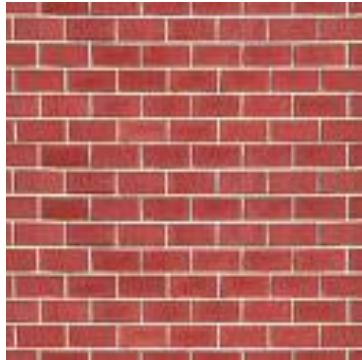
+

Enzyme

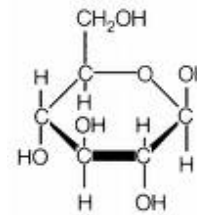
Polymer to Monomer (Many to One)



...Central-linking theme, again!!

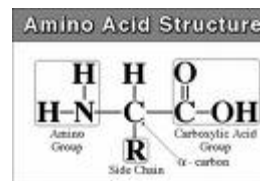


Carbohydrate

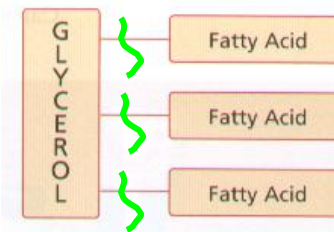


Glucose

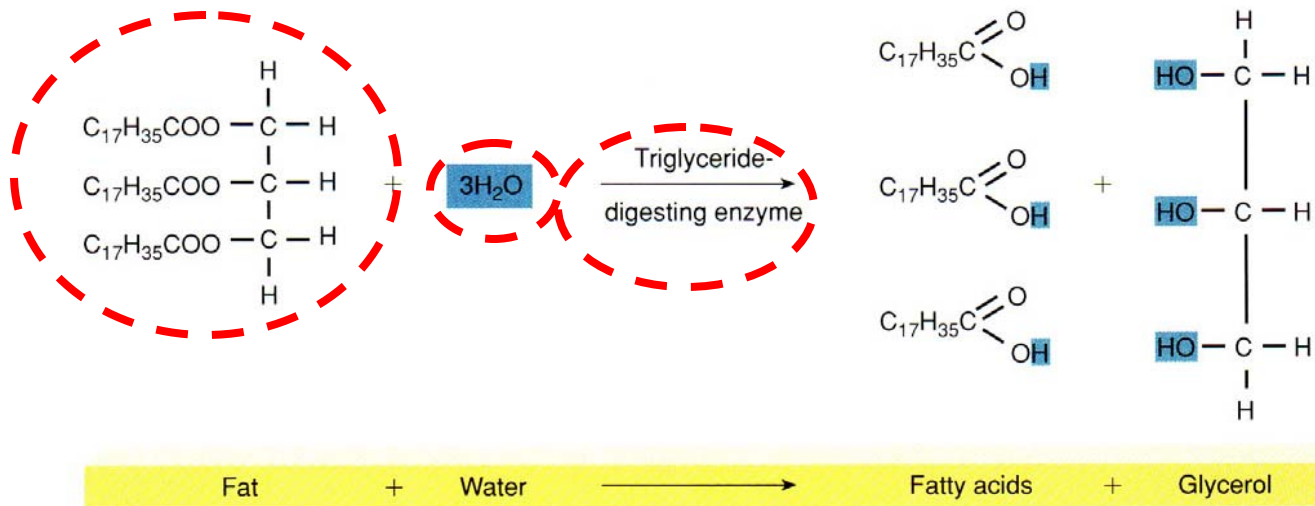
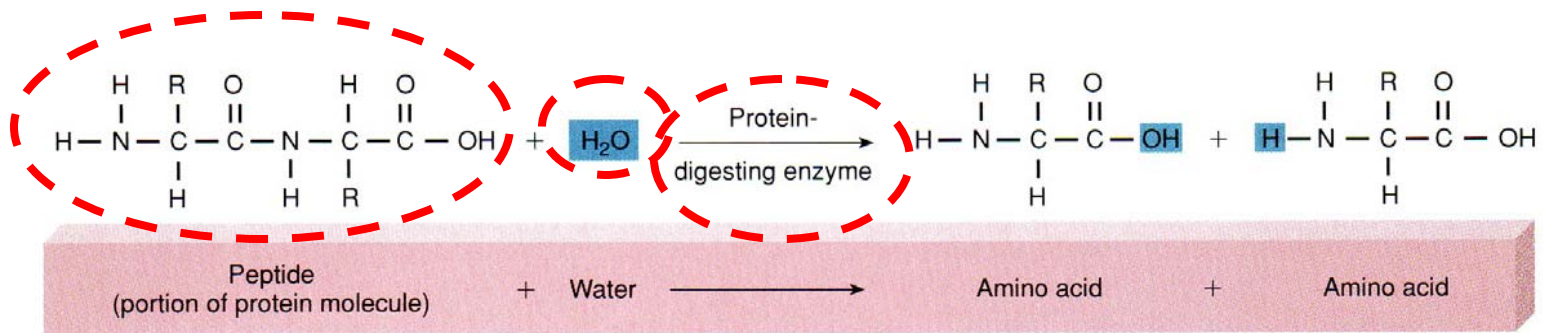
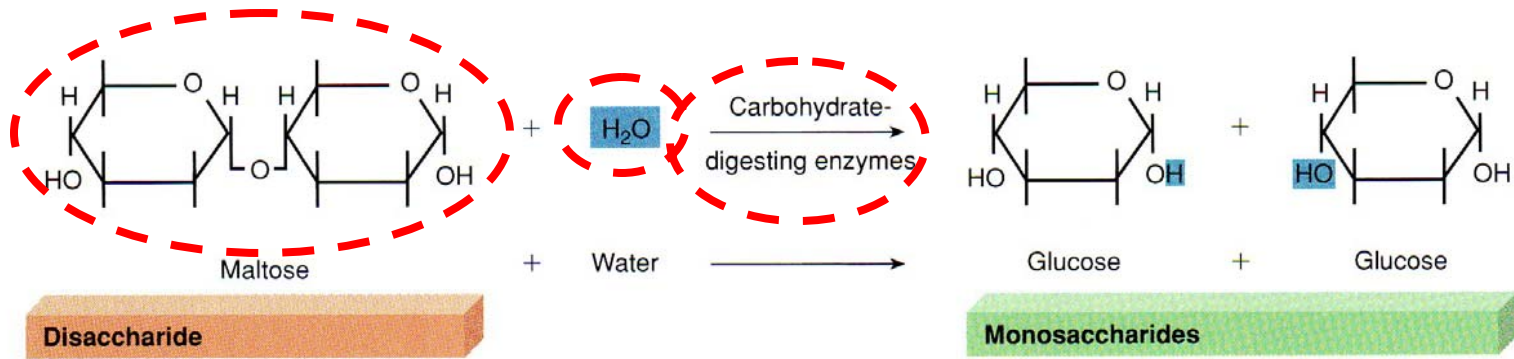
Protein
+
Fat



Amino Acids



Fatty Acids
+
Glycerol

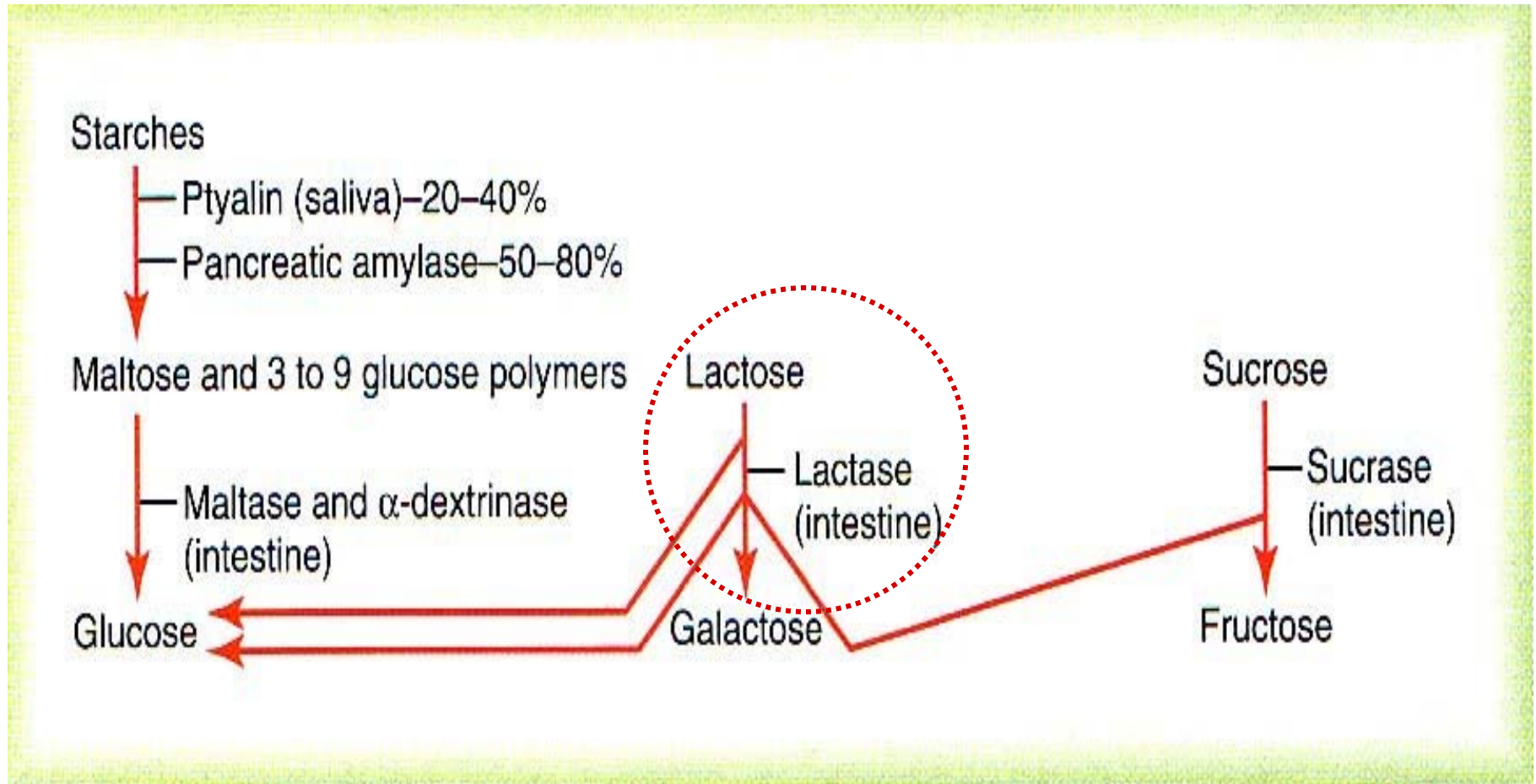


Carbohydrates in foods



Sizer & Whitney 2011 p 136

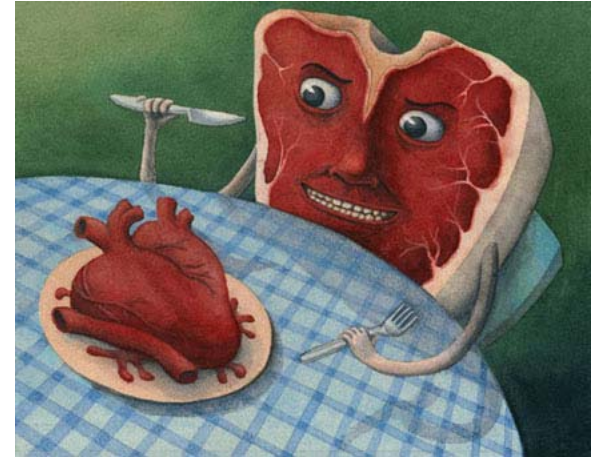
Carbohydrate Digestion = 1^o Energy Nutrient



Why Do Some People Have Trouble Digesting Milk?

- Ability to digest milk carbohydrates varies
 - Lactase
 - Made by small intestine
- Symptoms of intolerance
 - Gas, diarrhea, pain, nausea?
- Milk allergy?
- Nutritional consequences
- Milk tolerance and strategies

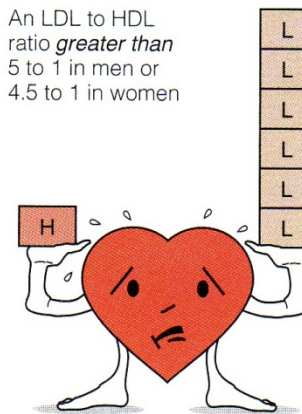




HIGH FAT FOODS



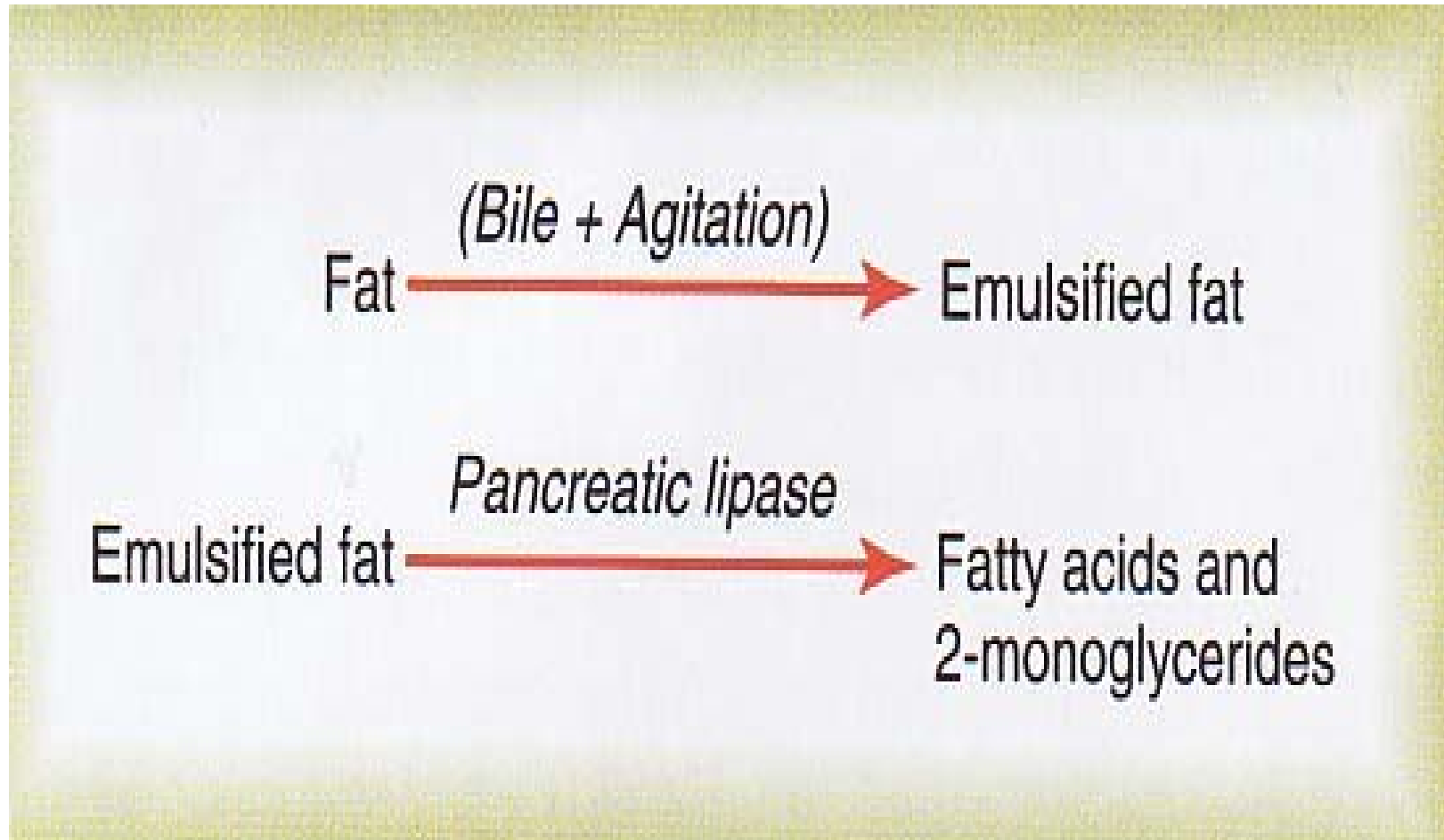
An LDL to HDL ratio *greater than* 5 to 1 in men or 4.5 to 1 in women

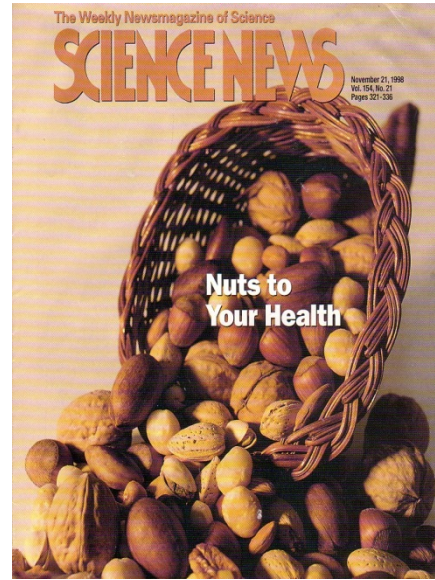


Increased risk of heart disease

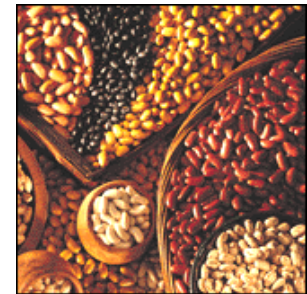
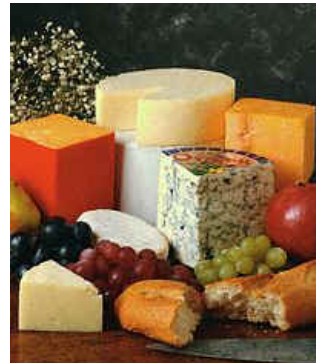


Fat Digestion = 2⁰ Energy Nutrient

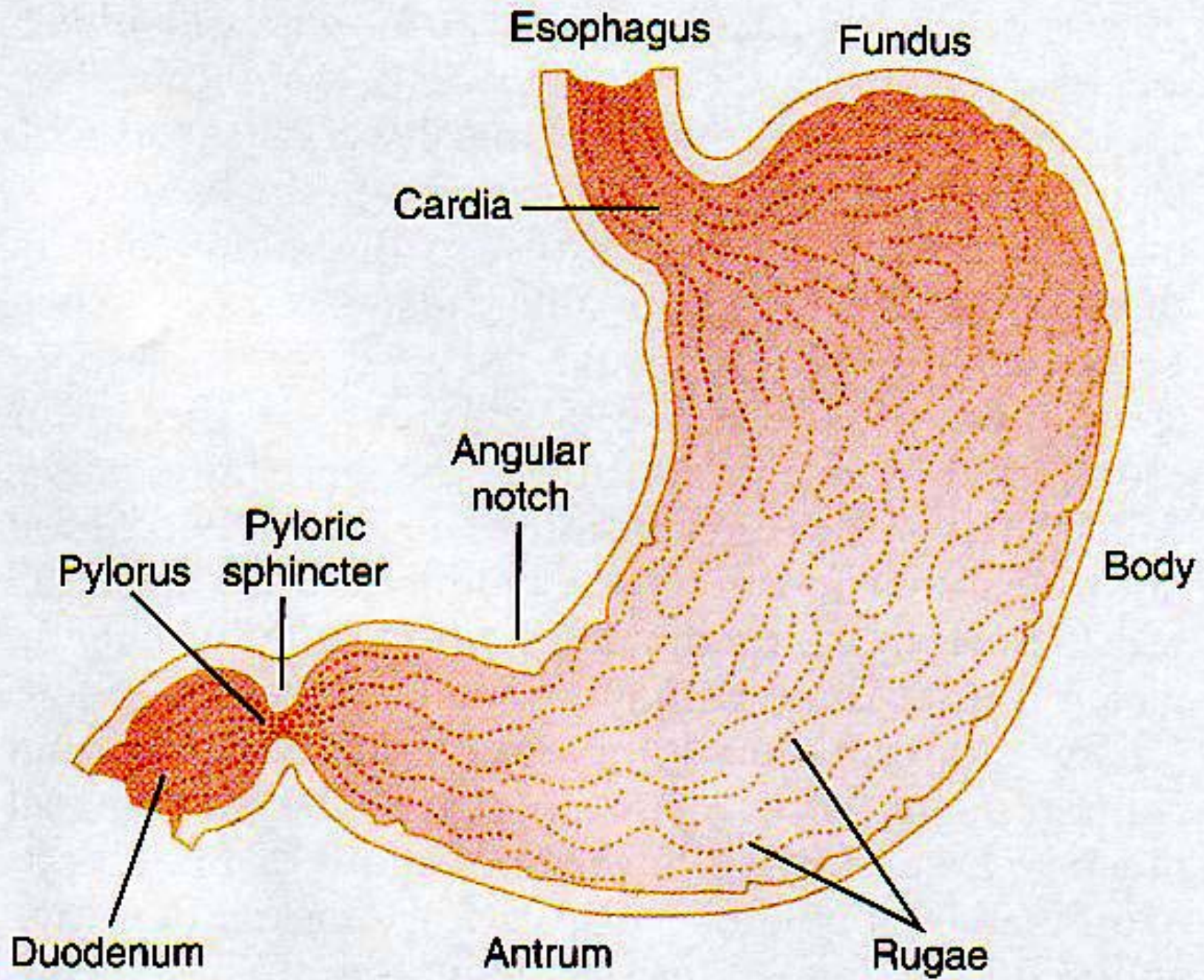




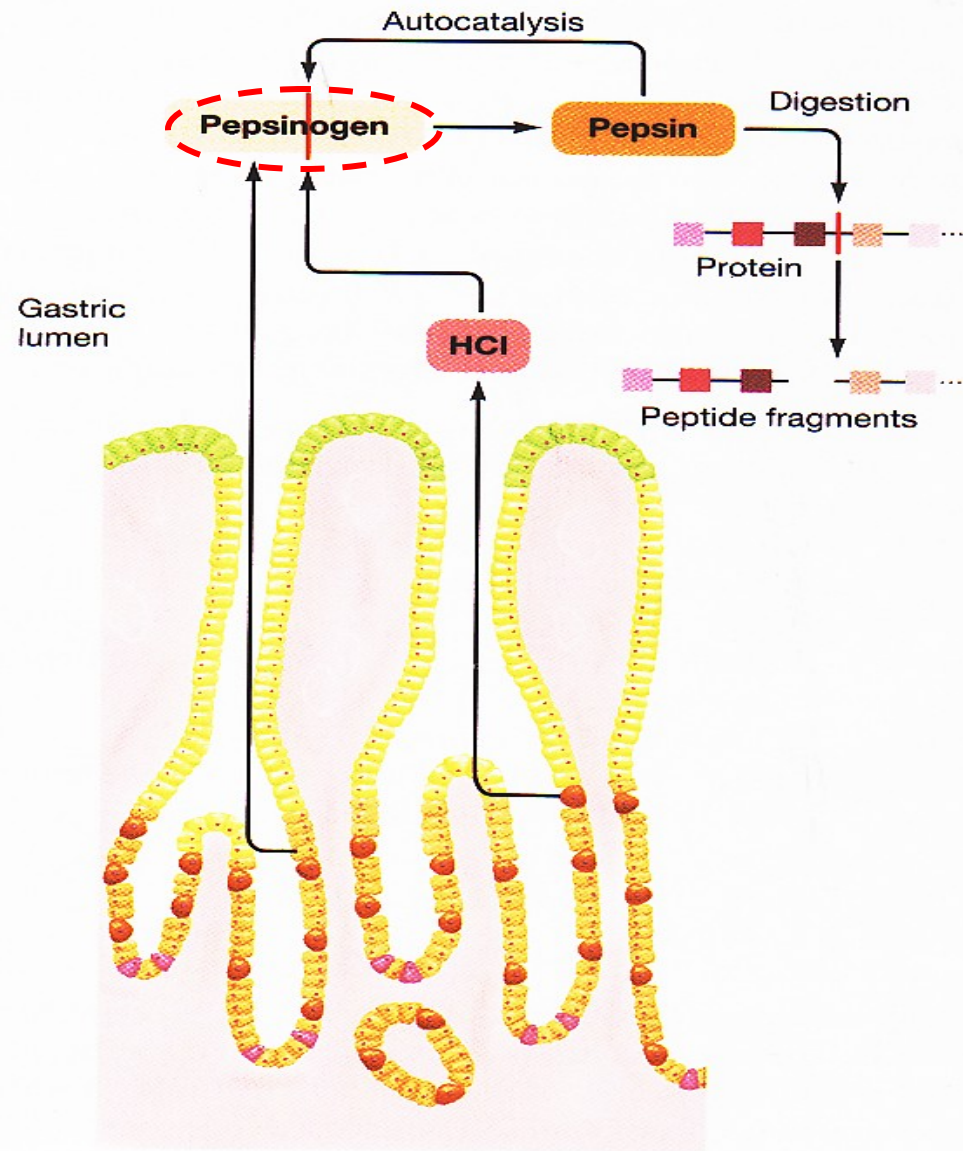
HIGH PROTEIN (FAT?) FOODS?



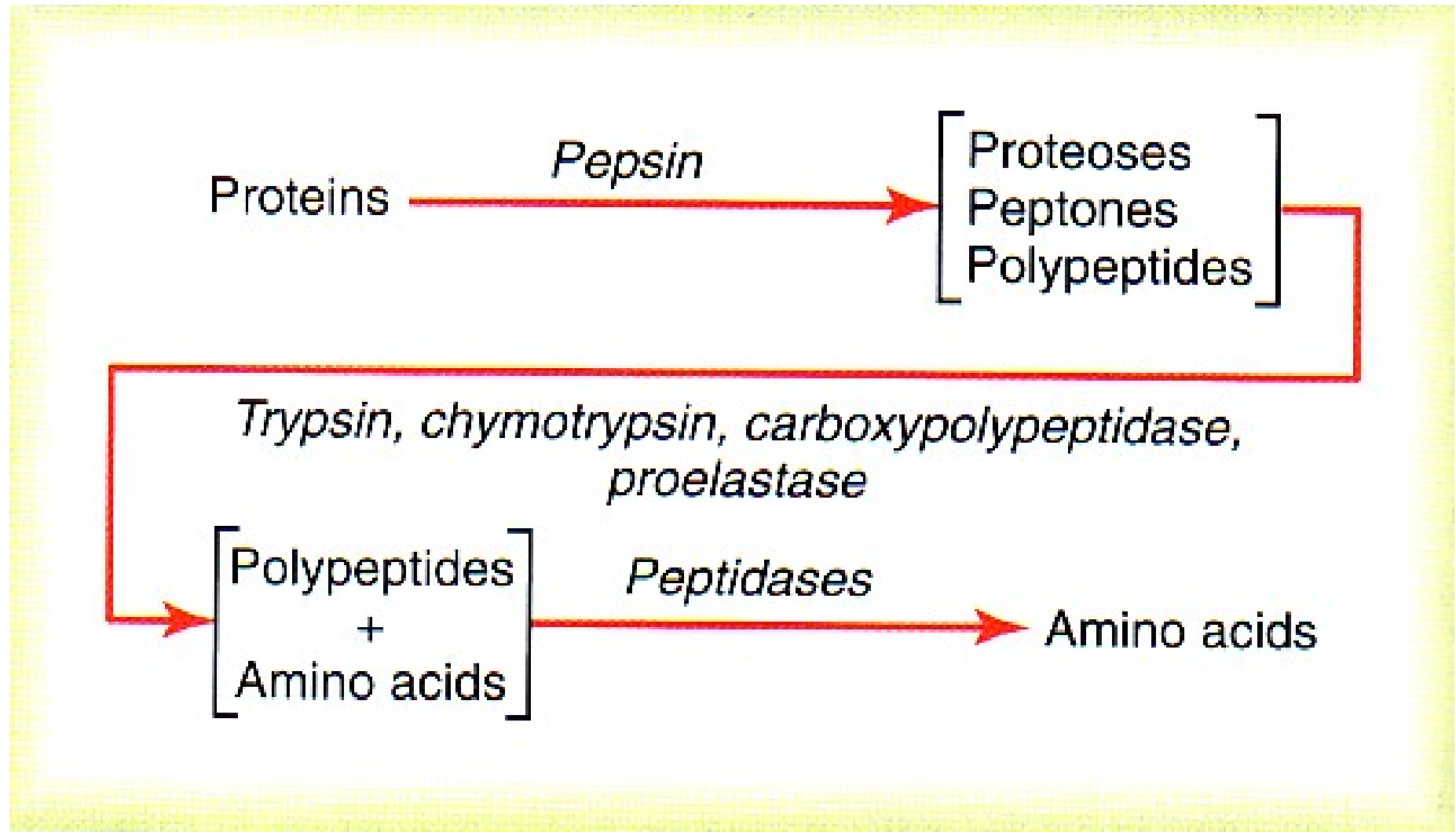
**Where does
enzymatic
digestion of
protein
begin?**



Zymogen
= *inactive precursor*

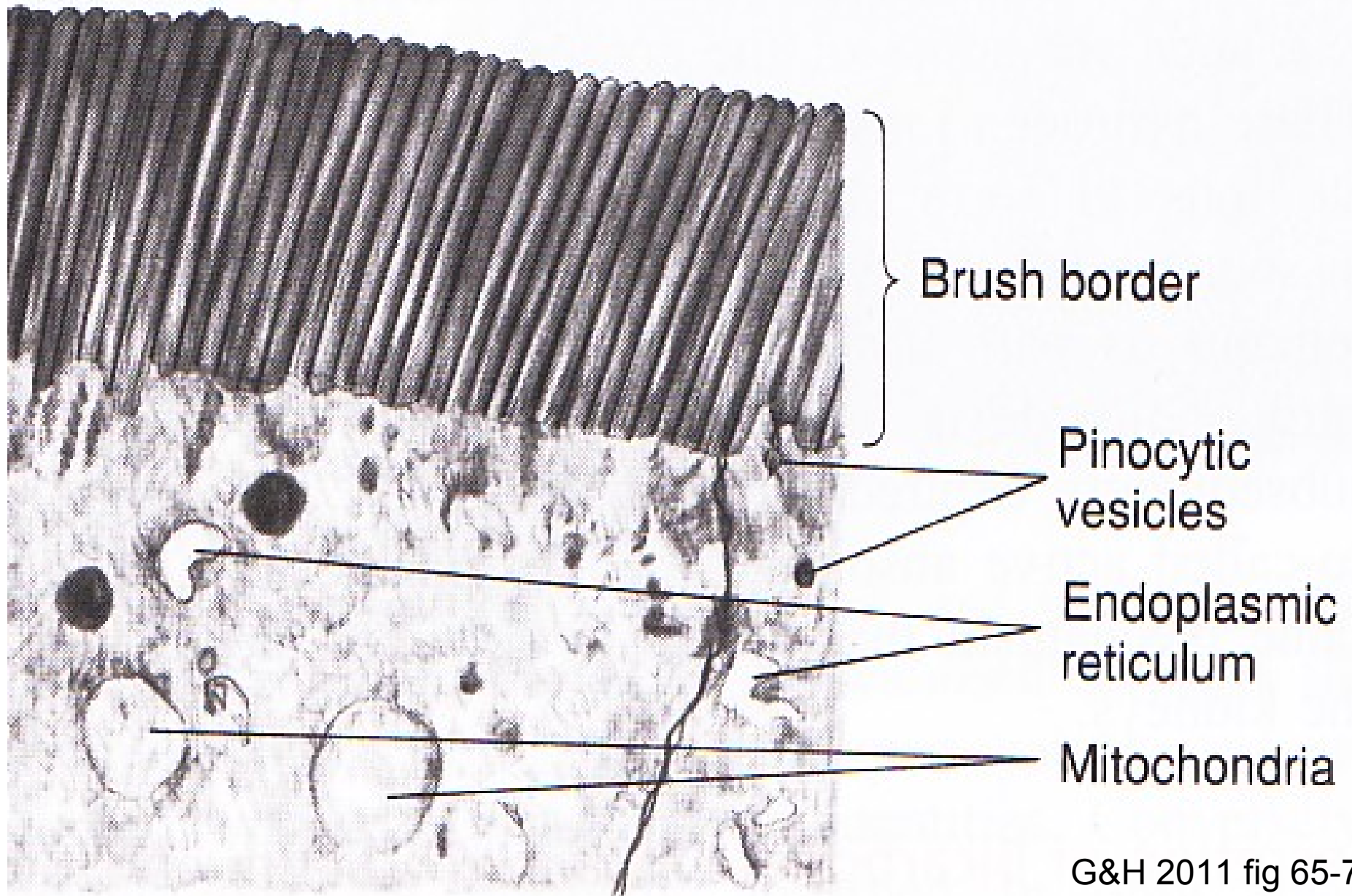


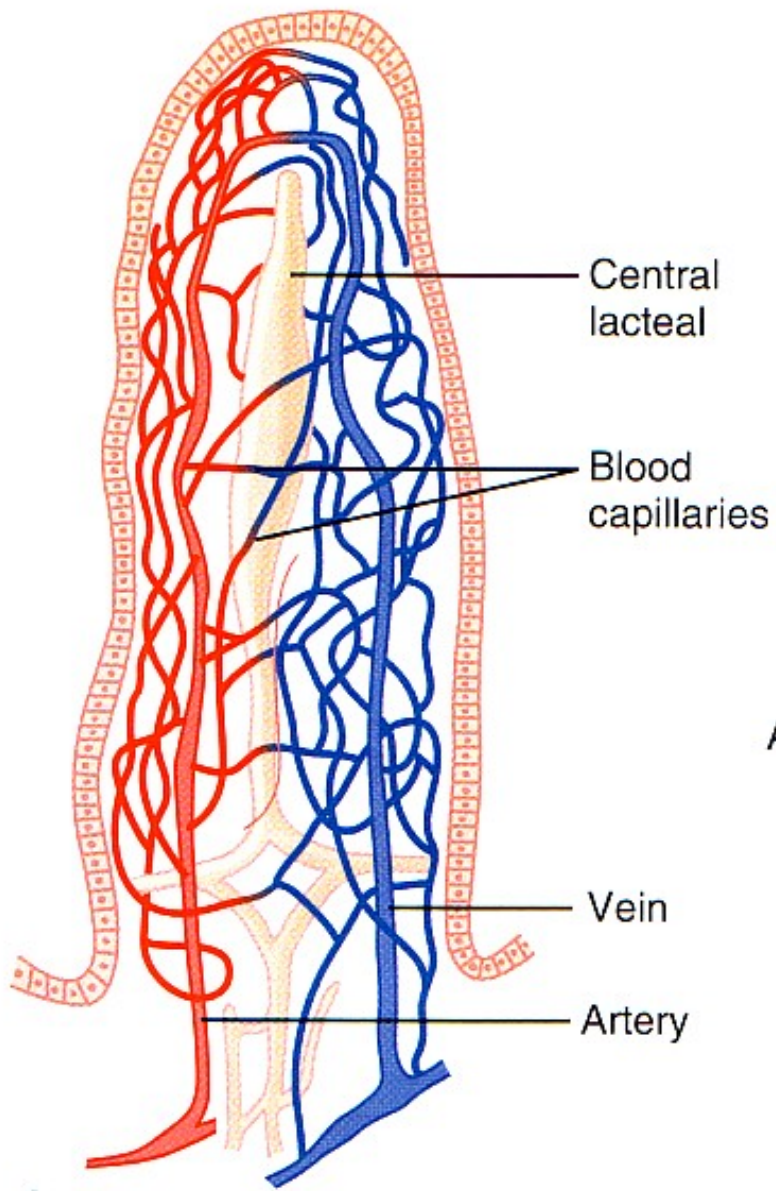
Protein Digestion = 3⁰ Energy Nutrient



What is the major
function of the
small intestine?

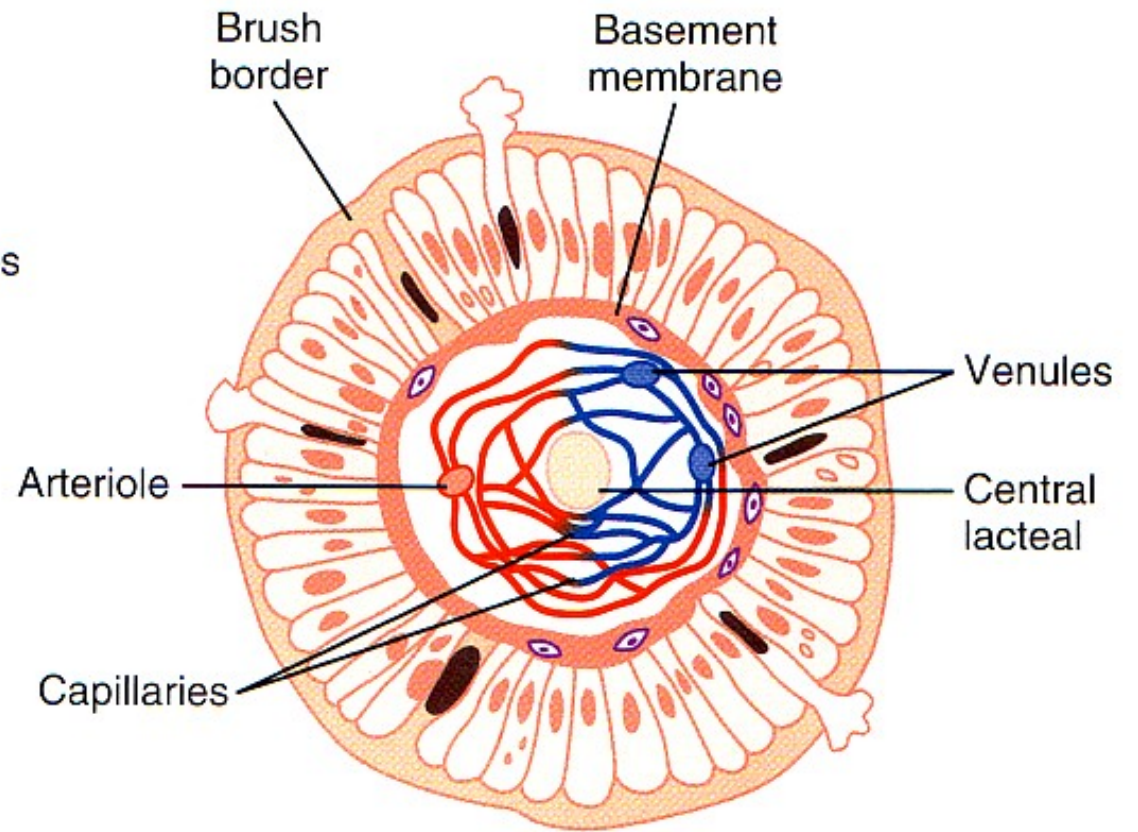
Absorption!!





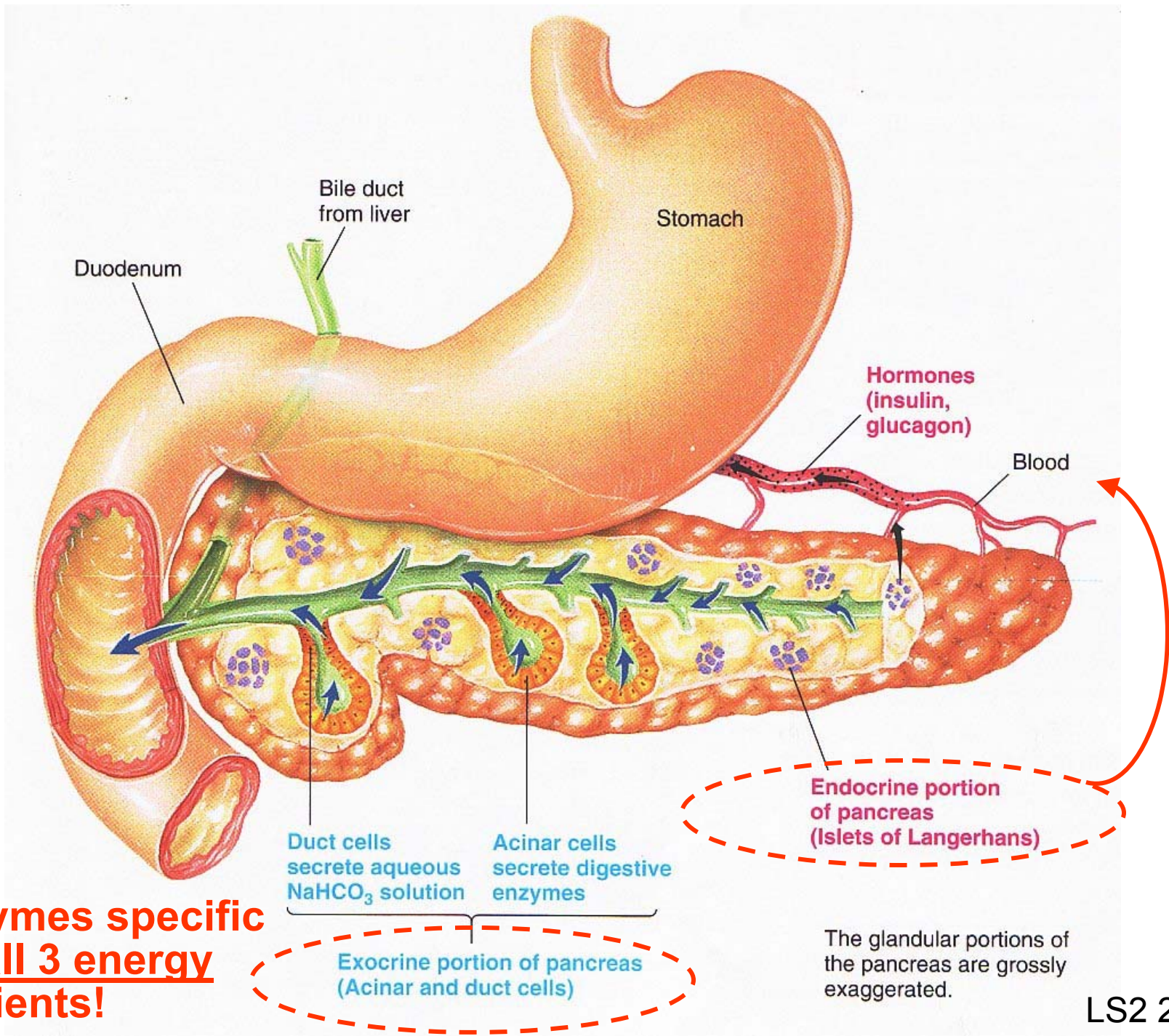
A

G&H 2011 fig 65-6



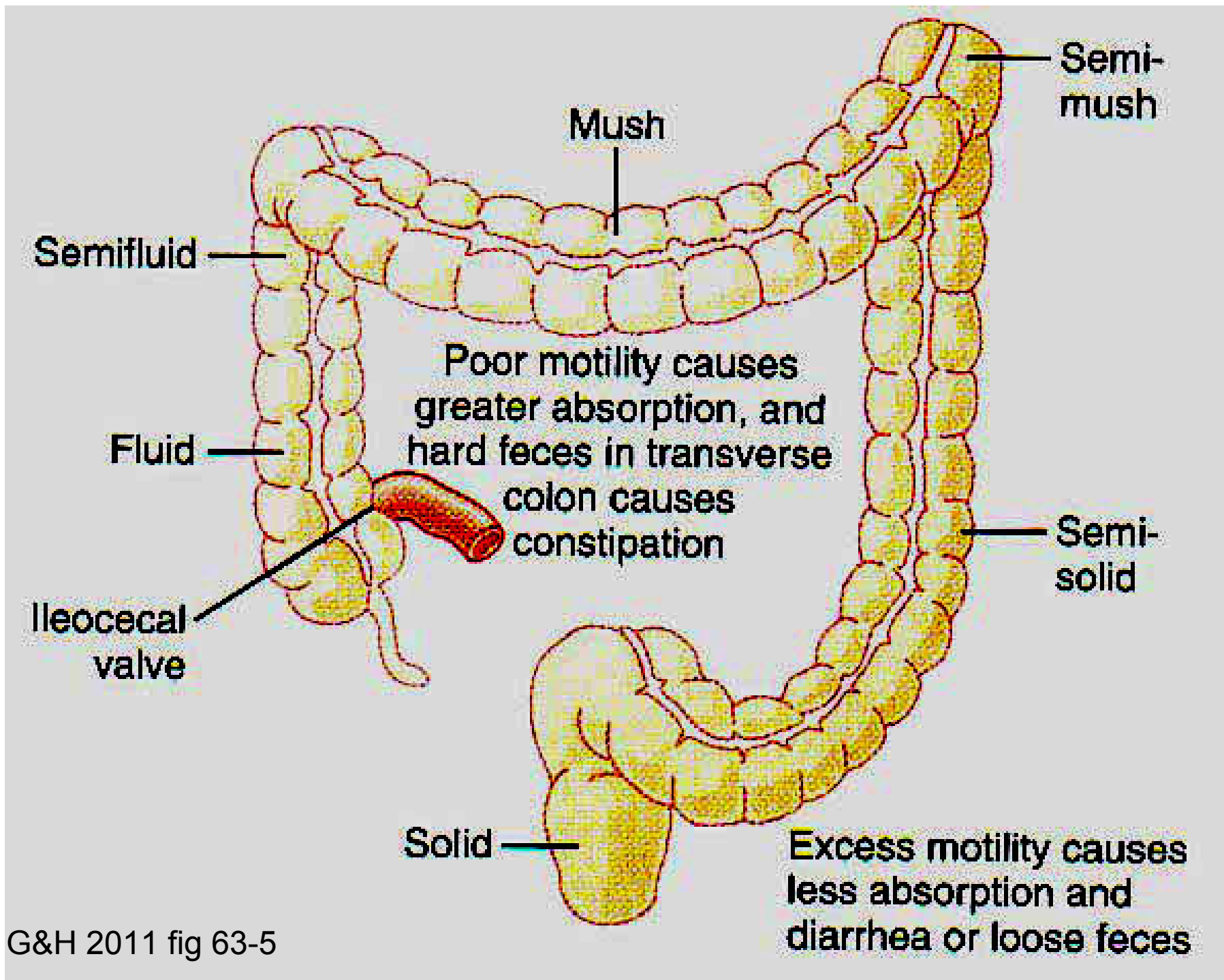
B

**Why is the
pancreas so
unique?**



Enzymes specific for all 3 energy nutrients!

The glandular portions of the pancreas are grossly exaggerated.

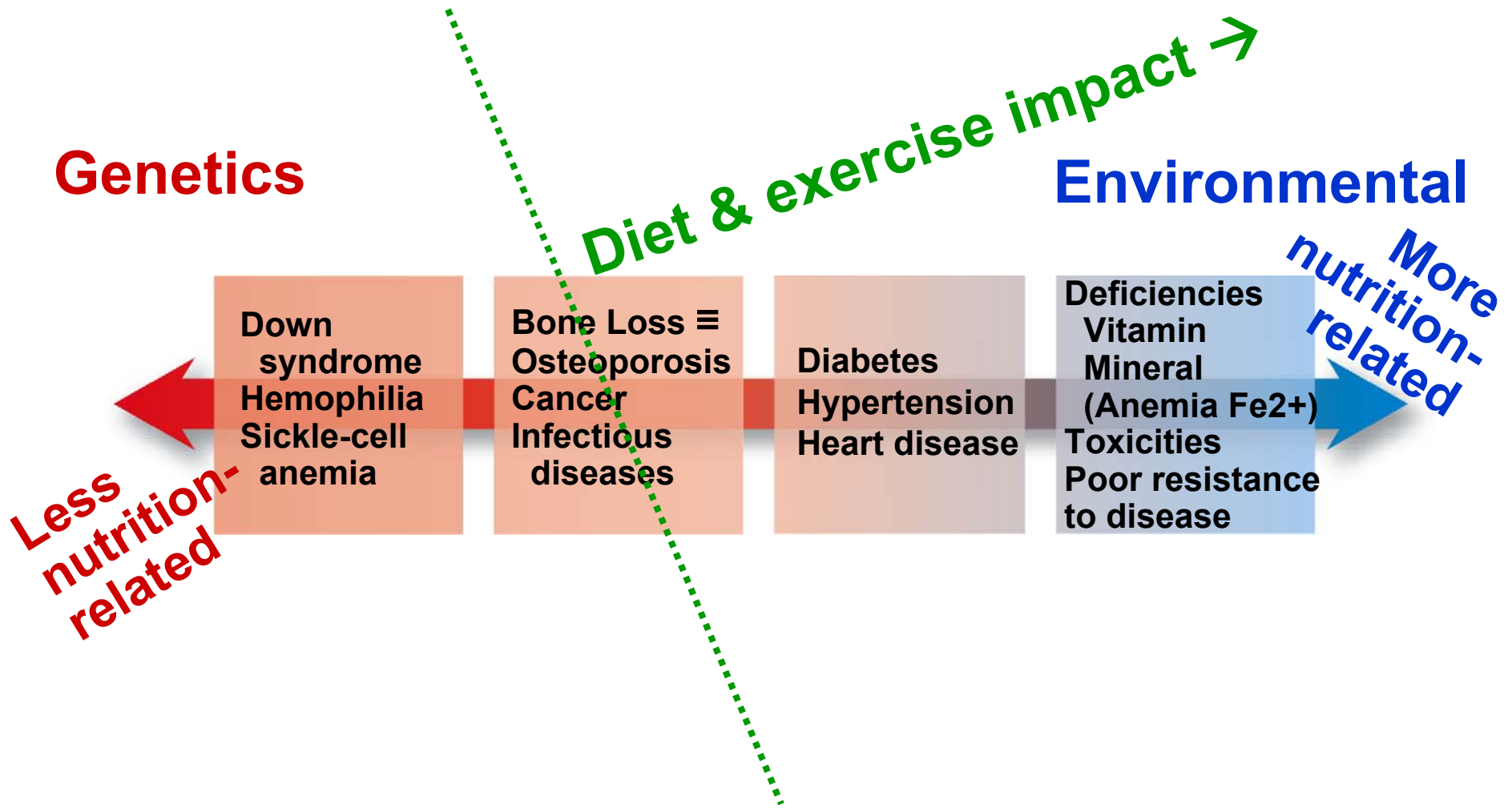


G&H 2011 fig 63-5

Questions Discussion?



Genetics & Environmental Disease Continuum



Nutrition Action

OCTOBER 2011 \$2.50

HEALTH LETTER®
CENTER FOR SCIENCE IN THE PUBLIC INTEREST

Eat Real, America!

"With the right food choices, physical activity, and not smoking, we could prevent about 80 percent of heart disease, about 90 percent of diabetes, and 70 percent of stroke," says Walter Willett, chair of the nutrition department at the Harvard School of Public Health in Boston. "Those are the three pillars. They really do make a difference."

The right food choices are simple: Eat less red meat, sweets, refined grains, and salt, and drink fewer sugary beverages. Replace unhealthy foods with vegetables, fruit, beans, and whole grains, and with smaller amounts of fish, poultry, and low-fat dairy. Those foods aren't just good for our health. They can also help protect the Earth.

Here's why—and how—to eat real.

Continued on page 3.

With the right food choices, physical activity, and not smoking, we could prevent about 80% of heart disease, about 90% of diabetes & 70% of stroke!

Photo: © Marisa Bazzani

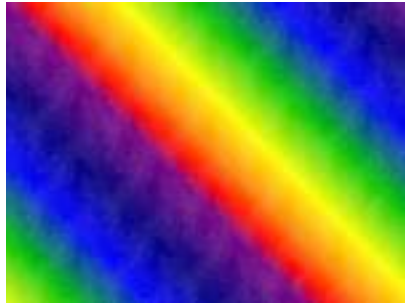
FOOD DAY

OCTOBER 24, 2011

JOIN US AT FOODDAY.ORG

40

CSPI • 1971-2011



Eating the Rainbow Hawaiian Style!!



Your plate should be the size of a Frisbee, not a manhole cover.

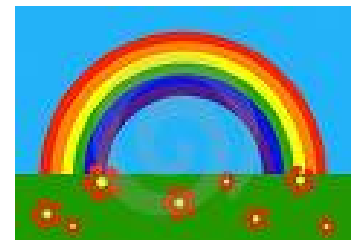
When it comes to colorful foods, Fruit Loops don't count.

A surprising number of people get 1/5 of their calories from sodas or other liquids.

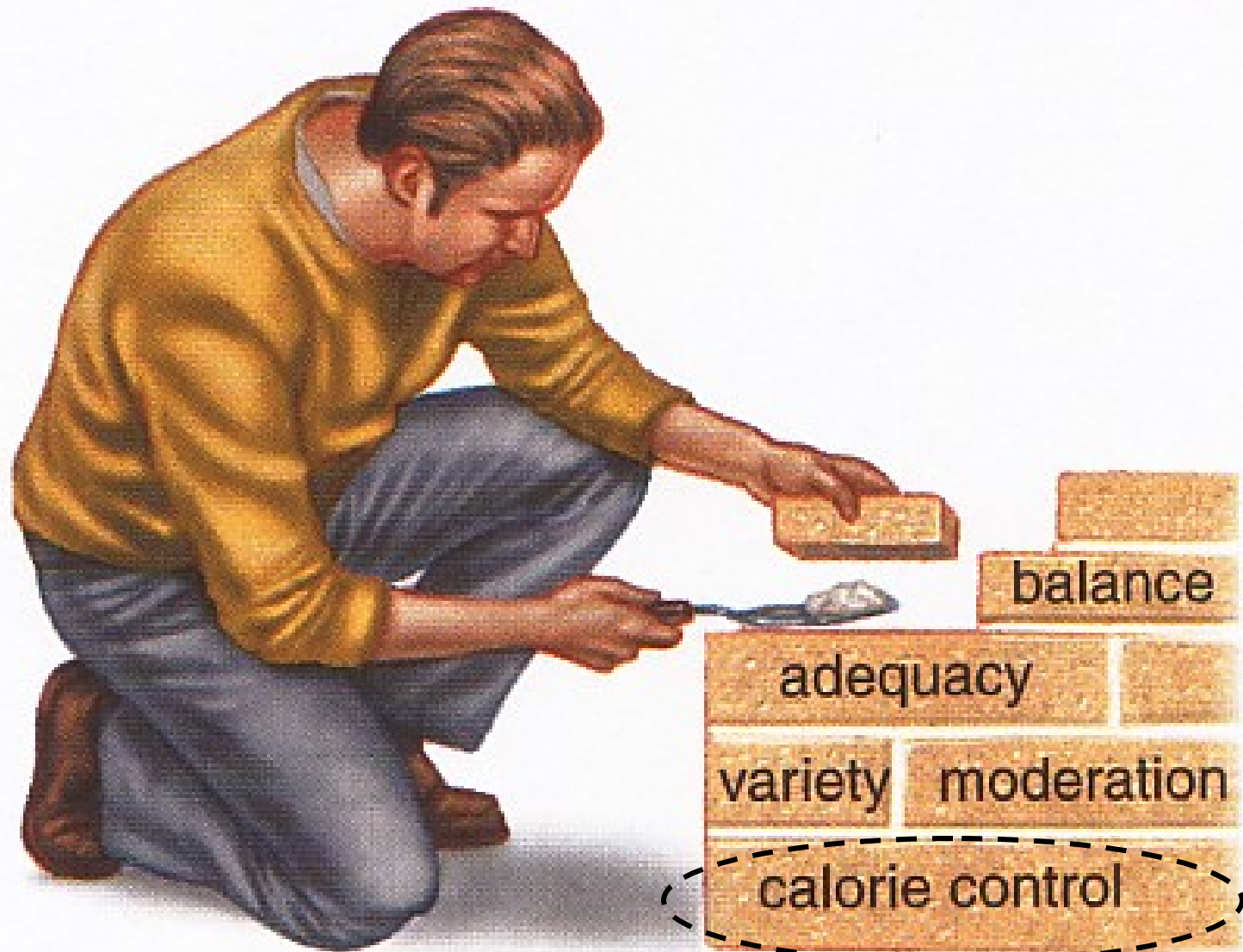
If you look at the label & need a chemistry degree to read it, put the item back on the shelf!



SOURCE: P. Rath, *Honolulu Advertiser*, September 11, 2008 citing D. Chong & N. Kerr.



*All of these factors help to build
a nutritious diet.*



To Help Lower Body Wt & %Fat
EXERCISE!! +*Minimize* These!!



FAT 9 Kcal/g

ETOH 7 Kcal/g

CARB 4 Kcal/g

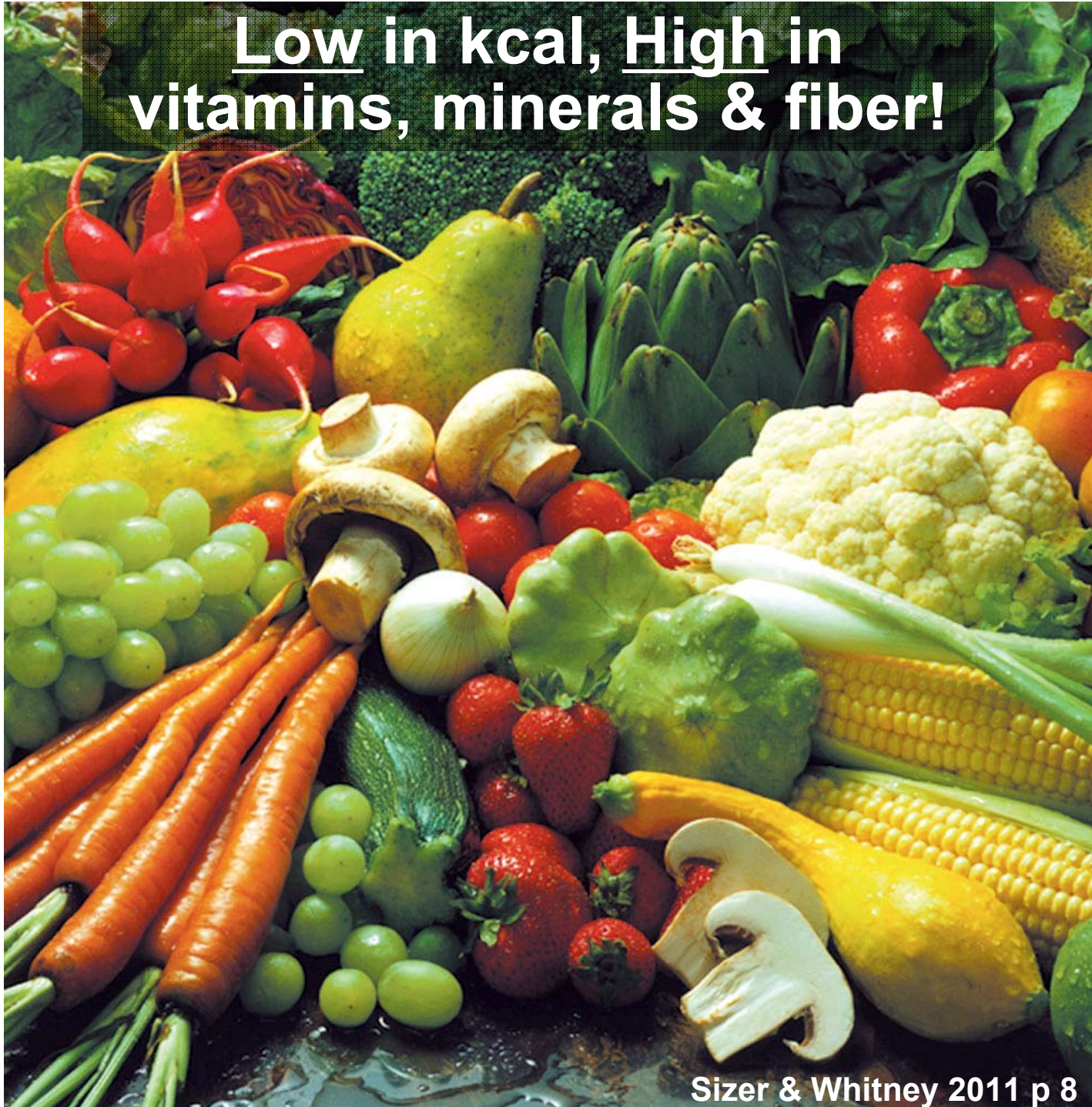
PRO 4 Kcal/g

**NB: *Minimize* not *Eliminate!*
 Moderation not *Abstinence!!***

***US Dietary Recommended Intakes (DRI)
Committee Acceptable Macronutrient
Distribution Ranges (AMDR)!***

<u>Energy Nutrient</u>	<u>% Total Calories</u>
Carbohydrate	45-65%
Fat	20-35%
Protein	10-35%

Low in kcal, High in
vitamins, minerals & fiber!





Low in price (relatively)!

High in kcal, low in vitamins, minerals & fiber!



MyPlate launched June 2, 2011!

2. Focus on fruits.
Whole fruit preferable to juice, but any fruit counts!
Fill $\frac{1}{2}$ your plate with fruits & vegetables!



3. Make at least $\frac{1}{2}$ of your grains whole grains!

5. Get your calcium-rich foods. Buy skim or 1% milk. Go easy on cheese!

1. Vary your veggies.
Fill $\frac{1}{2}$ your plate with fruits & vegetables!

4. Go lean with protein. Keep protein to $< \frac{1}{4}$ plate! Nuts, beans, peas, seeds, poultry, lean meat, seafood,...

Dietary Guidelines for Americans 2010

Released January 31, 2011, emphasizes 3 major goals:

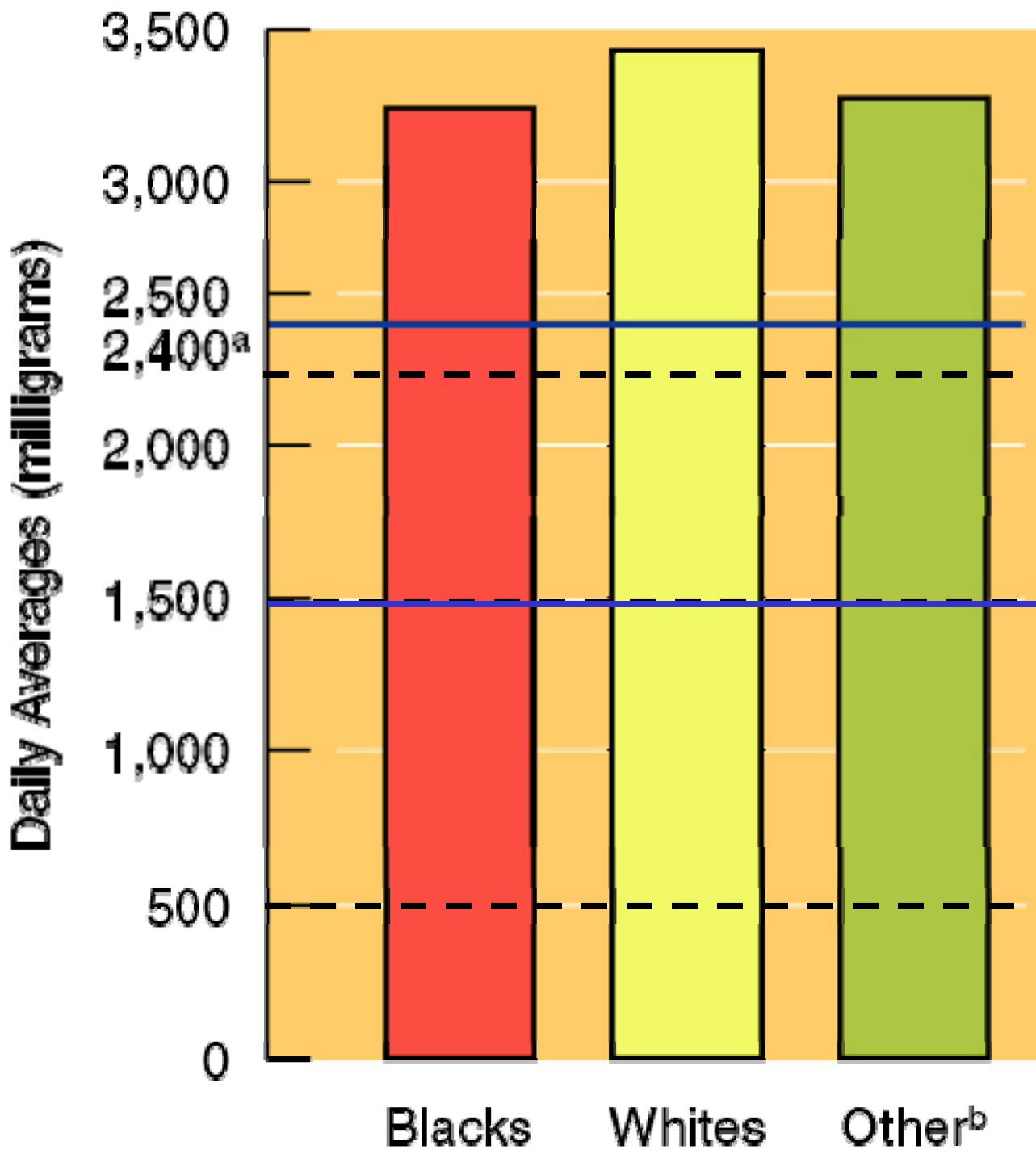
- Balance calories with physical activity to manage weight.
- Consume more fruits, vegetables, whole grains, fat-free & low-fat dairy products & seafood.
- Consume fewer foods with sodium (salt), saturated fats, *trans* fats, cholesterol, added sugars & refined grains.

Guidelines include 23 key recommendations for the general population & 6 additional key recommendations for specific groups, such as pregnant women. The recommendations are intended to help people choose an overall healthy diet.

<http://health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf>

Why Lower Sodium?





**Sodium (Na)
Intakes of
U.S. Adults**

**< 2400 mg ↓ BP
= 1 tsp of Salt
(NaCl ≅ 40% Na)**

< 1500 mg ↓ BP

**< 500 mg/d =
1/4 tsp Salt/d!**

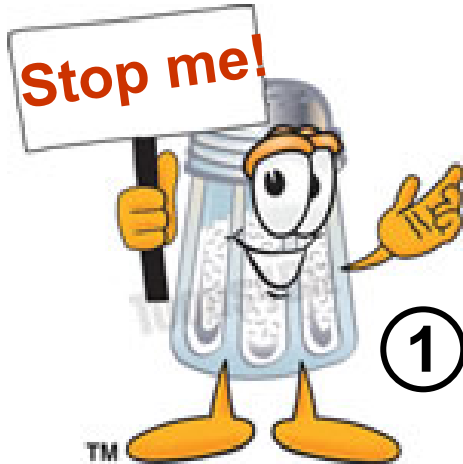
Body requirement

Sodium Reduction as a Means to Prevent Cardiovascular Disease and Stroke

- 1. Approximately 90% of Americans will develop high blood pressure or hypertension over their lifetime.***
- 2. BP-related diseases: stroke, CHD, heart failure & kidney disease are leading causes of morbidity & mortality in the US & throughout the world.***
- 3. Independent of its effects on BP, excess sodium intake adversely affects the heart, kidneys & blood vessels.***
- 4. Reducing sodium intake to < 1500 mg/d should reduce American deaths from CVD & stroke by 20%.***

***[http://www.heart.org/HEARTORG/GettingHealthy/
NutritionCenter/HealthyDietGoals/Sodium-Salt-or-
Sodium-Chloride UCM 303290 Article.jsp](http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/HealthyDietGoals/Sodium-Salt-or-Sodium-Chloride_UCM_303290_Article.jsp)***

More Reasons to Shake the Salt Habit



① ↓ blood vessel vasodilation w/in 30 min by ingesting 1500 mg Na+!

② ↑ Ca²⁺ excretion ↑ bone loss, risk of osteoporosis & fractures.

③ May directly impair kidney function & ↑ risk of kidney stones.

④ GI cancer risk, inflammation?

I'm outta here!!



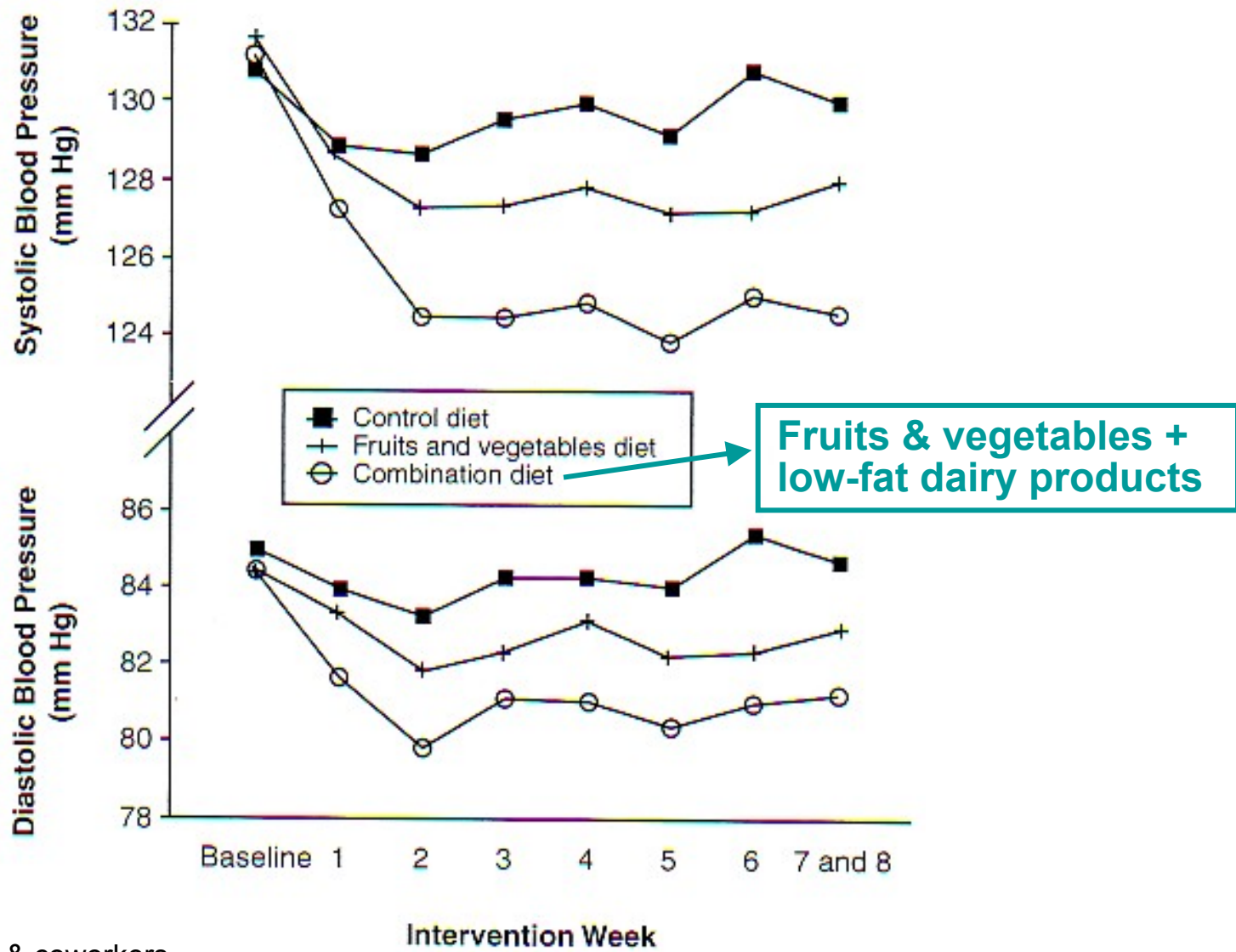
[UCB WellnessLetter Jun 2011, Jan 2012](#)

[Mayo Clinic How to tame your salt habit!](#)



TM © 0008-0892-2311-4151

Dietary Approaches to Stop Hypertension (DASH)



SOURCE: LJ Appel & coworkers,
NEJM 1997;336:1117-24

http://www.nhlbi.nih.gov/hbp/prevent/h_eating/h_e_dash.htm

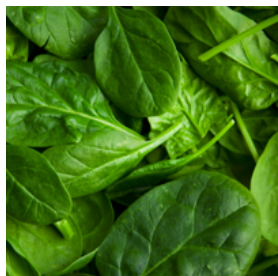
Why Fish & Healthy Oils?



AHA Statistical Fact Sheet 2011 Update ***What do Americans* eat per day?***



Whole grains: 0.5-0.7 servings/d
Only 3-5% consume ≥ 3 servings/d



Vegetables: 1.2-2.1 servings/d
Only 5-14% consume ≥ 5 servings/d



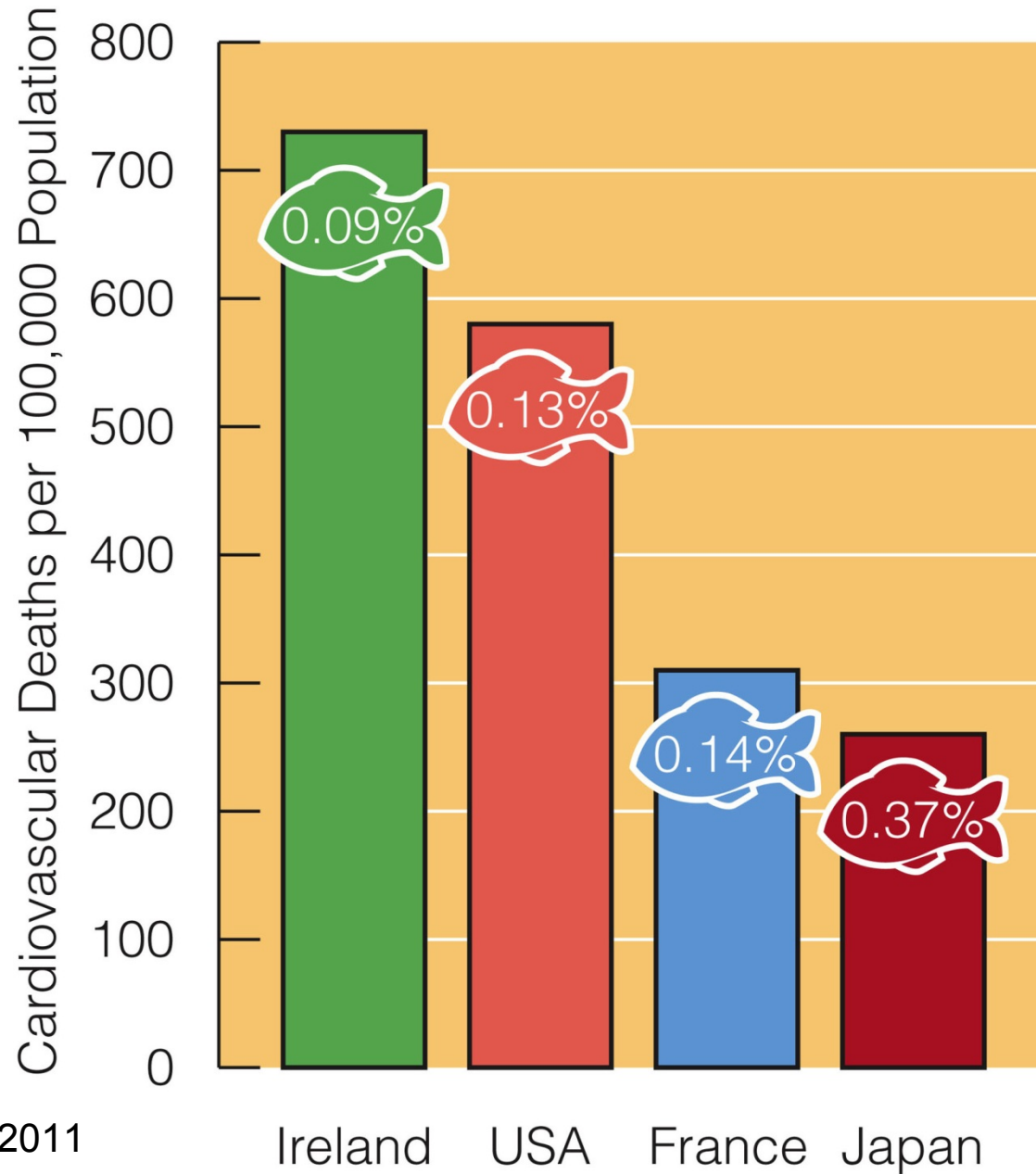
Fruits: 1.1-1.8 servings/d
Only 6-11% consume ≥ 4 servings/d



Fish & Shellfish 1.4-1.7 servings/wk
75%-80% or more consume < 2 servings/wk

http://www.heart.org/idc/groups/heart-public/@wcm/@global/documents/downloadable/ucm_319591.pdf

Fish Oil Intakes & Cardiovascular Death Rates



Sizer & Whitney 2011
fig 5-12 p 167

***Deep cold
water fish
are fabulous
sources of
 Ω -3 fatty
acids!***



Mediterranean Diet Pyramid

A contemporary approach to delicious, healthy eating

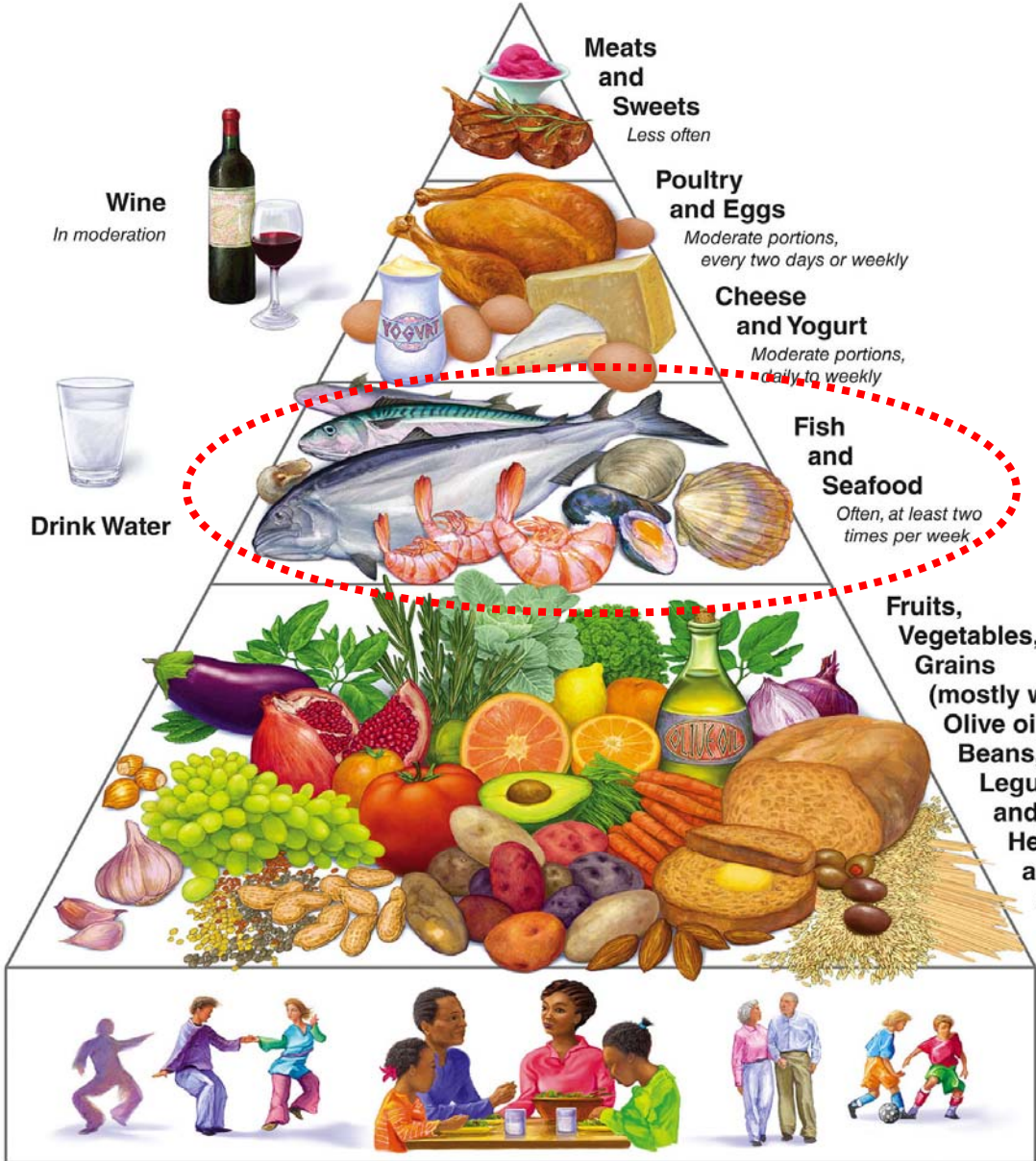


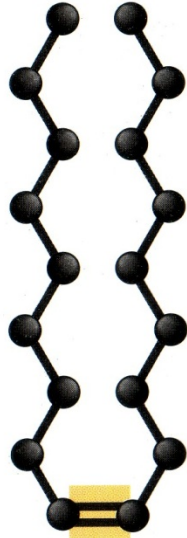
Illustration by George Middleton

©2009 Oldways Preservation and Exchange Trust www.oldwayspt.org

saturated

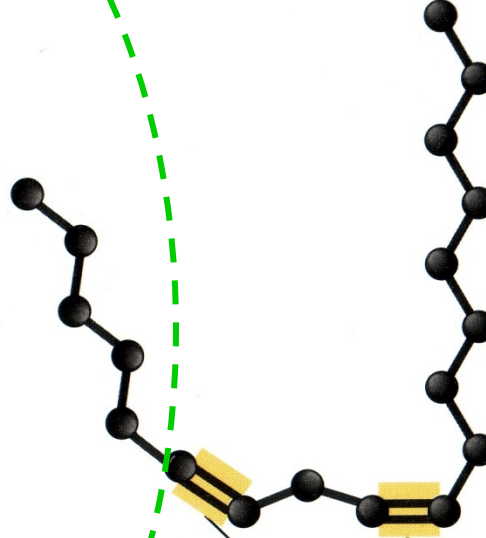


monounsaturated



**point of
unsaturation**

polyunsaturated



**points of
unsaturation**

NB: Minimize trans fats!

♥ *Healthy Oils to Minimize Atherosclerosis*
HAPOC?

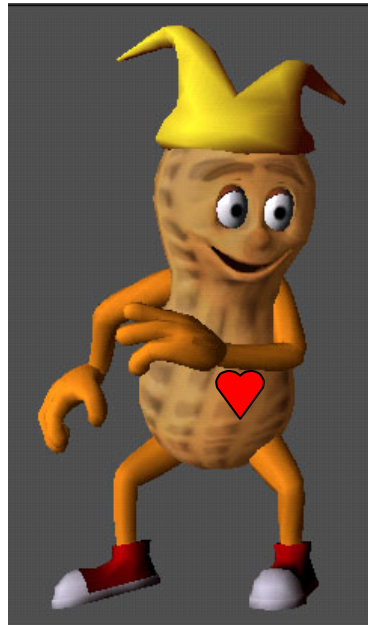
H



A



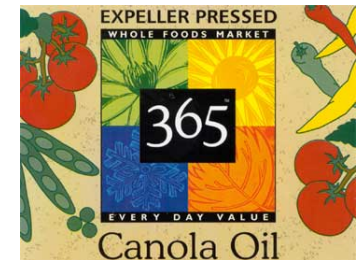
P



O



C



Essential Fatty Acids: Ω -6 Linoleic & Ω -3 Linolenic Acids



Linoleic \rightarrow Arachadonic Acid \rightarrow Inflammatory Cascade

Linolenic \rightarrow EPA, DHA \rightarrow Anti-inflammatory



Emphasize good fats from plant sources like avocados!




US Carbohydrate Intake Recommendations

- 1. 45-65% of total calories, so for 2000 kcal diet \sim 1/2 or 1000 kcal, for 2500 kcal, 1250 kcal from carbohydrates.**
- 2. Absolute minimum of 130 g/d (DRI) for CNS!**
- 3. Choose & prepare foods & beverages with little added sugars. Insufficient evidence exists to set UL, but DRI says a high maximum of 25% or less of total kcal.**
- 4. Added sugars may provide discretionary calories after all nutrient recommendations are met! (USDA)**
- 5. Not more than 1/2 of discretionary calories should come from sugars. For women \leq 100 kcal, for men \leq 150 kcal.**
- 6. Increase intakes of whole fruits & vegetables & make \geq 1/2 grain choices whole grain. Legumes several times/wk.**
- 7. \leq 50 yr, women 25 g fiber/d, men 38 g fiber/d.**

Why Lower Simple Sugars?



A man in a blue shirt is shown from the chest up, holding a spoon to his open mouth as if eating. In front of him is a table covered with a white cloth, featuring several glasses filled with a white liquid, a bowl of white powder, and a white cake with candles on a silver stand. The background is a plain, light-colored wall.

***Each person in the US
ingests ~ $\frac{3}{4}$ cup or 31
tsp of refined sugars
added to foods &
beverages each day \Rightarrow
140 lb per year!***

Sugar in processed foods?

**1 Tbs creamer =
2 tsp sugar**

**12 oz cola ≥
10 tsp sugar**

**8 oz sweetened
yogurt = 8 tsp
sugar**

**1 Tbs ketchup =
1 tsp sugar**

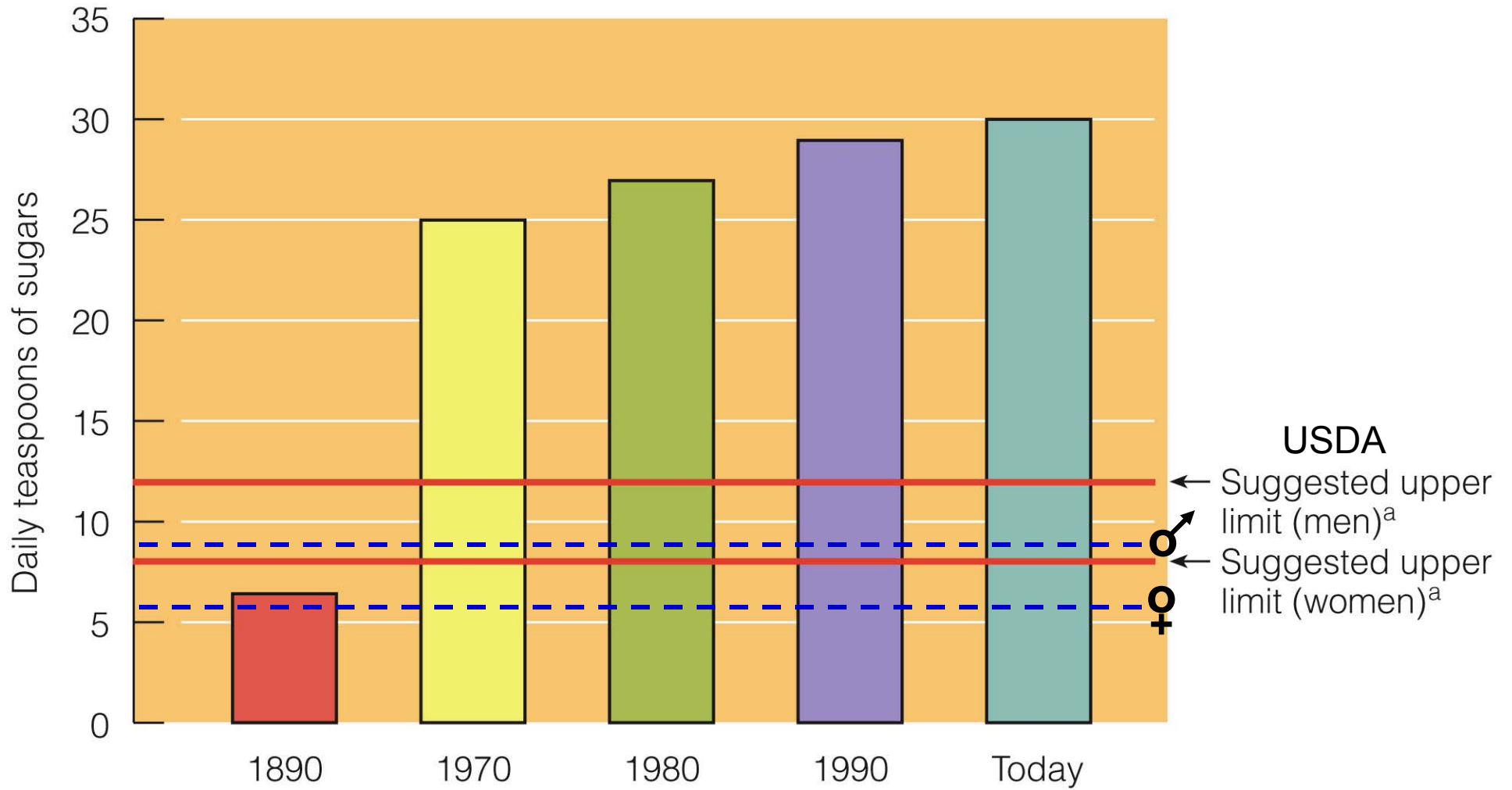
**½ cup canned corn
= 1 tsp sugar**

**2 oz chocolate =
8 tsp sugar**

Sizer & Whitney 2011 fig 4-17 p 139



Added Sugars: Average US Supply per Person



--- AHA suggested upper limits!

DIABETES

How to Play Defense

BY BONNIE LIEBMAN

"Number of people with diabetes increases to 24 million," announced the Centers for Disease Control and Prevention in June.

One out of four Americans aged 60 or older now has the disease. Another 57 million people—40 percent of those aged 40 to 70—have pre-diabetes. Diabetes has even started to show up in teenagers.

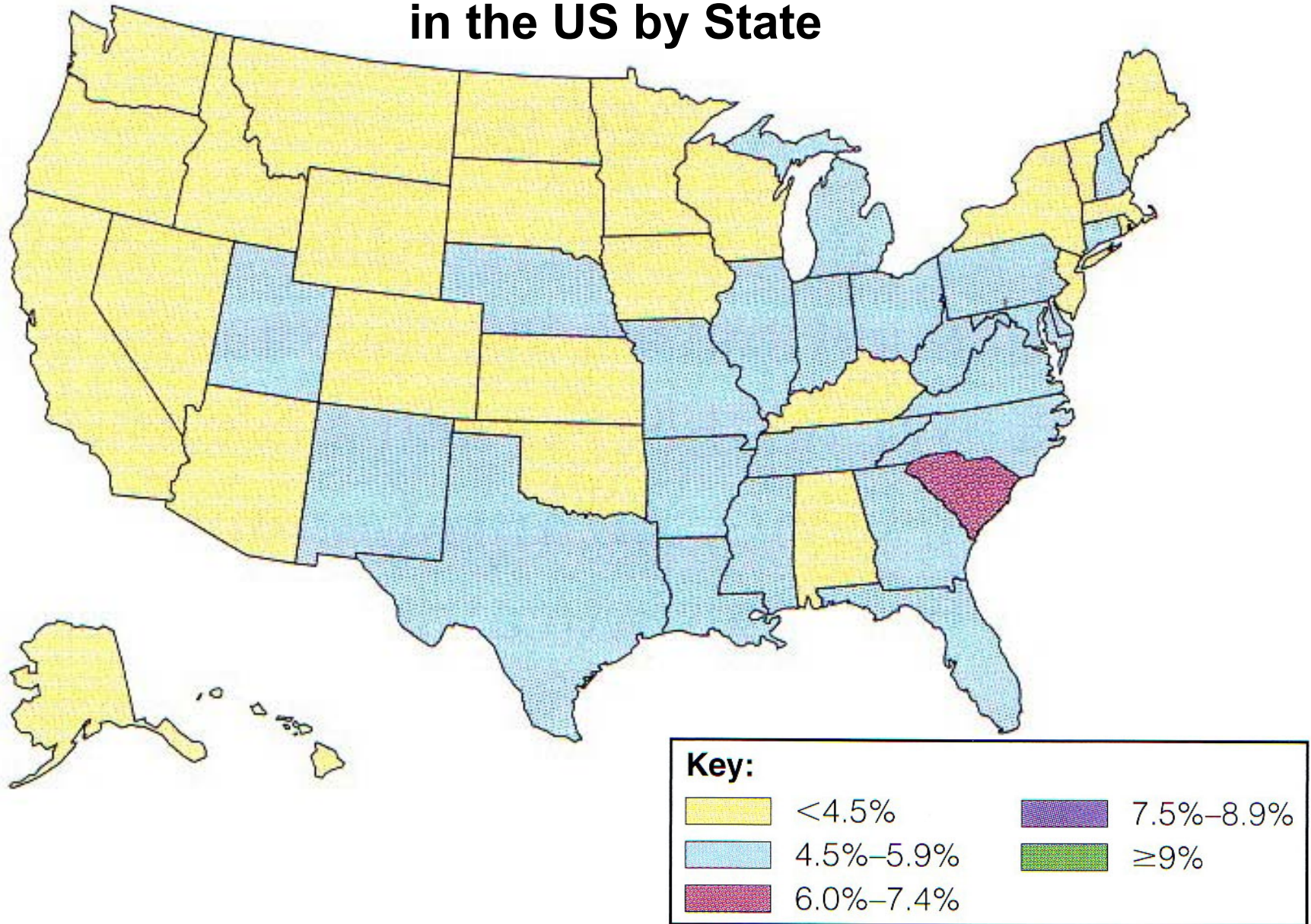
"We've seen strong and sustained increases in the incidence of diabetes since 1990, and they show no signs of slowing down," notes Linda Geiss, chief of diabetes surveillance at the CDC. "It's like a runaway train."

Is there any good news about an epidemic that's out of control?

"Diabetes is an almost totally avoidable disease," says Walter Willett of the Harvard School of Public Health in Boston. "We estimate that more than 92 percent of the cases could be avoided by diet and lifestyle."

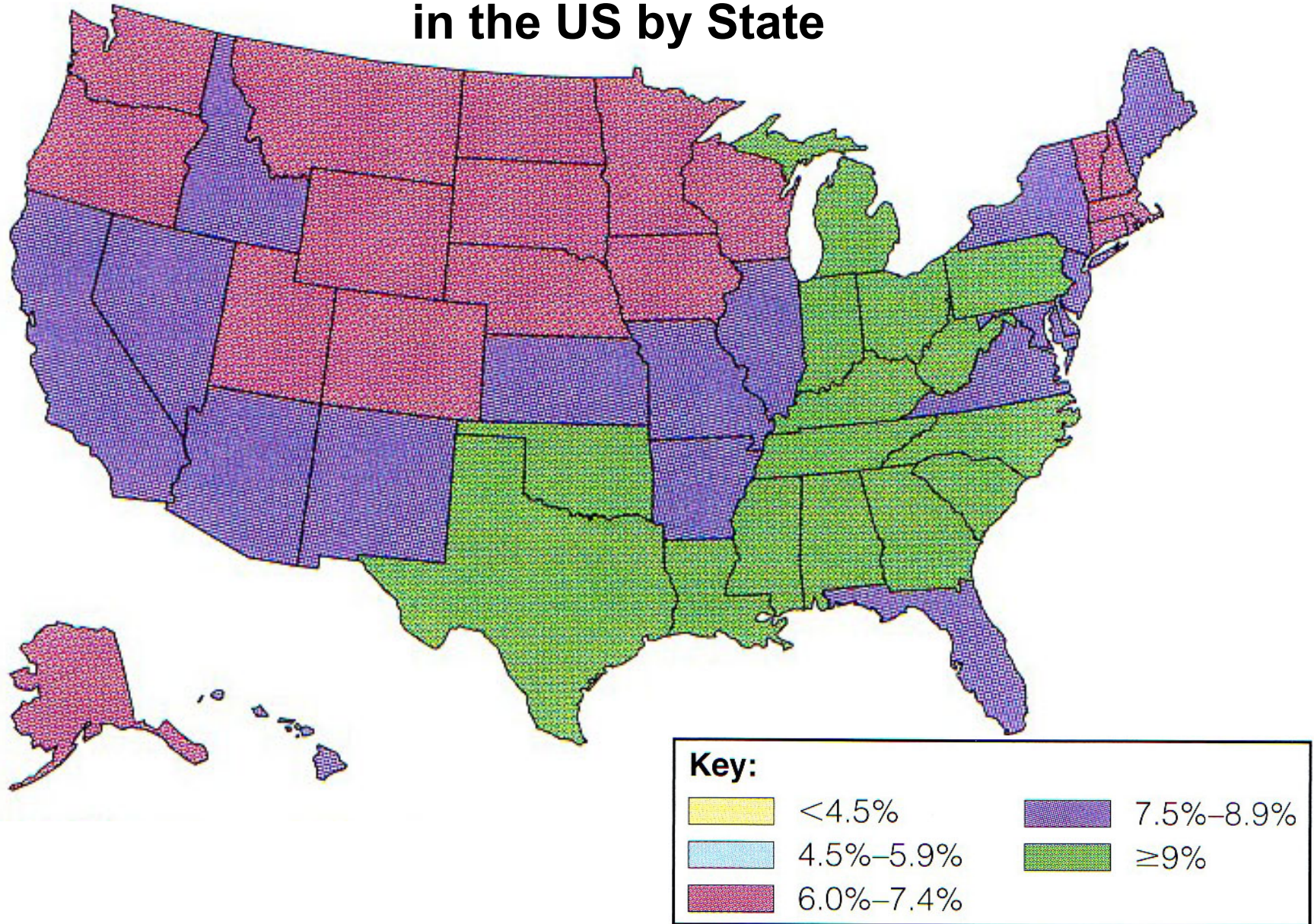


1994 Diabetes Prevalence in the US by State



Source: Centers for Disease Control, Division of Diabetes Translation,
<http://www.cdc.gov/diabetes/statistics>, S&W 2014 fig 4-15 p139A.

2010 Diabetes Prevalence in the US by State



Source: Centers for Disease Control, Division of Diabetes Translation,
<http://www.cdc.gov/diabetes/statistics>, S&W 2014 fig 4-15 p139B.



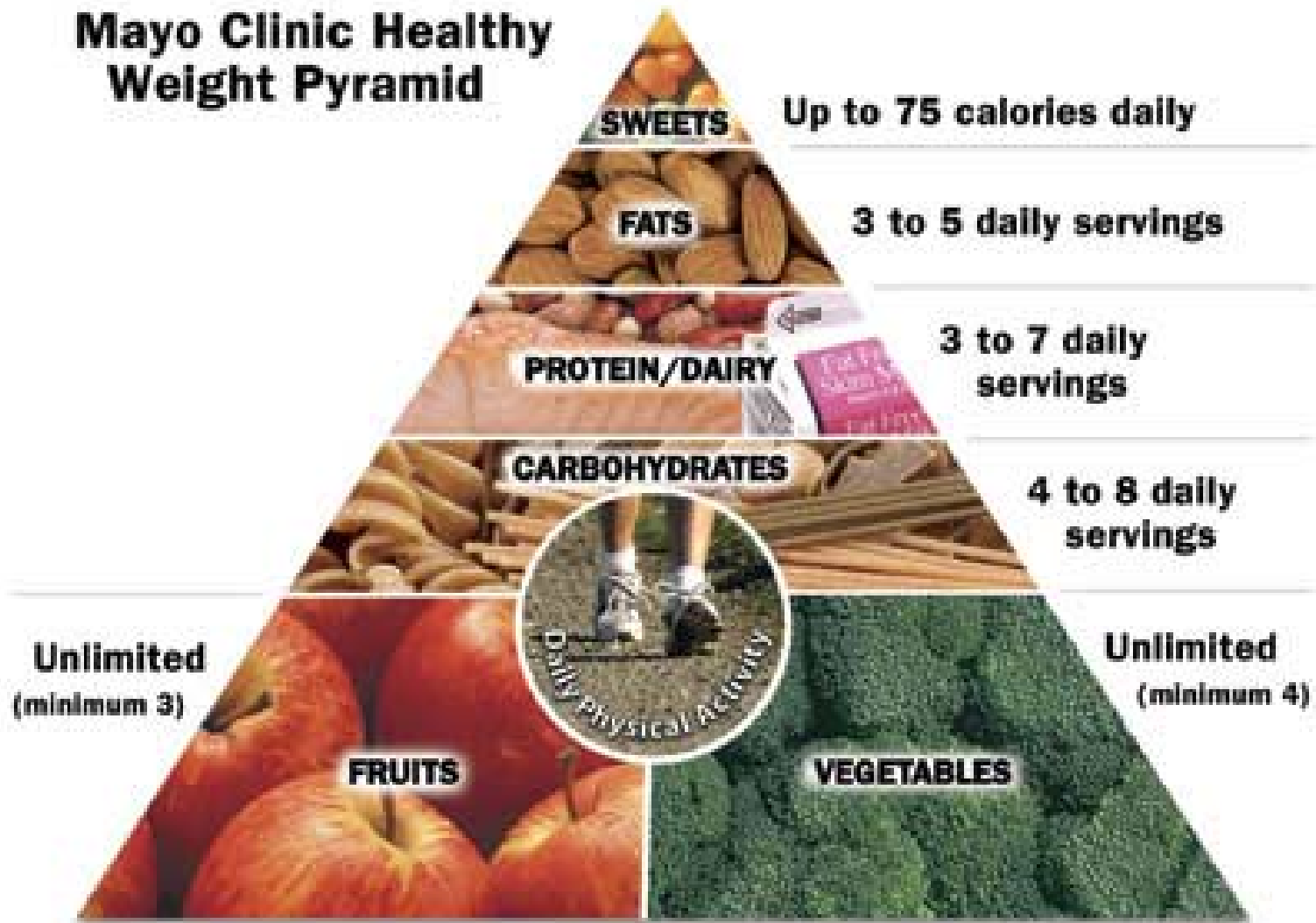
AMERICAN
INSTITUTE for
CANCER
RESEARCH

*Recommendations for **CANCER PREVENTION***

1. Be as lean as possible without becoming underweight.
2. Be physically active for at least 30 minutes every day.
3. Avoid sugary drinks. Limit the consumption of energy-dense foods particularly processed foods high in added sugar, or low in fiber, or high in fat.
4. Eat more of a variety of vegetables, fruits, whole grains & legumes such as beans.
5. Limit consumption of red meats (such as beef, pork & lamb) & avoid processed meats.
6. If consumed at all, limit alcoholic drinks to 2 for men & 1 for women a day.
7. Limit consumption of salty foods & foods processed with salt (sodium).
8. Don't use supplements to protect against cancer.

The Mayo Clinic Diet Emphasizes Vegetables, Fruits & Whole Grains, Too!

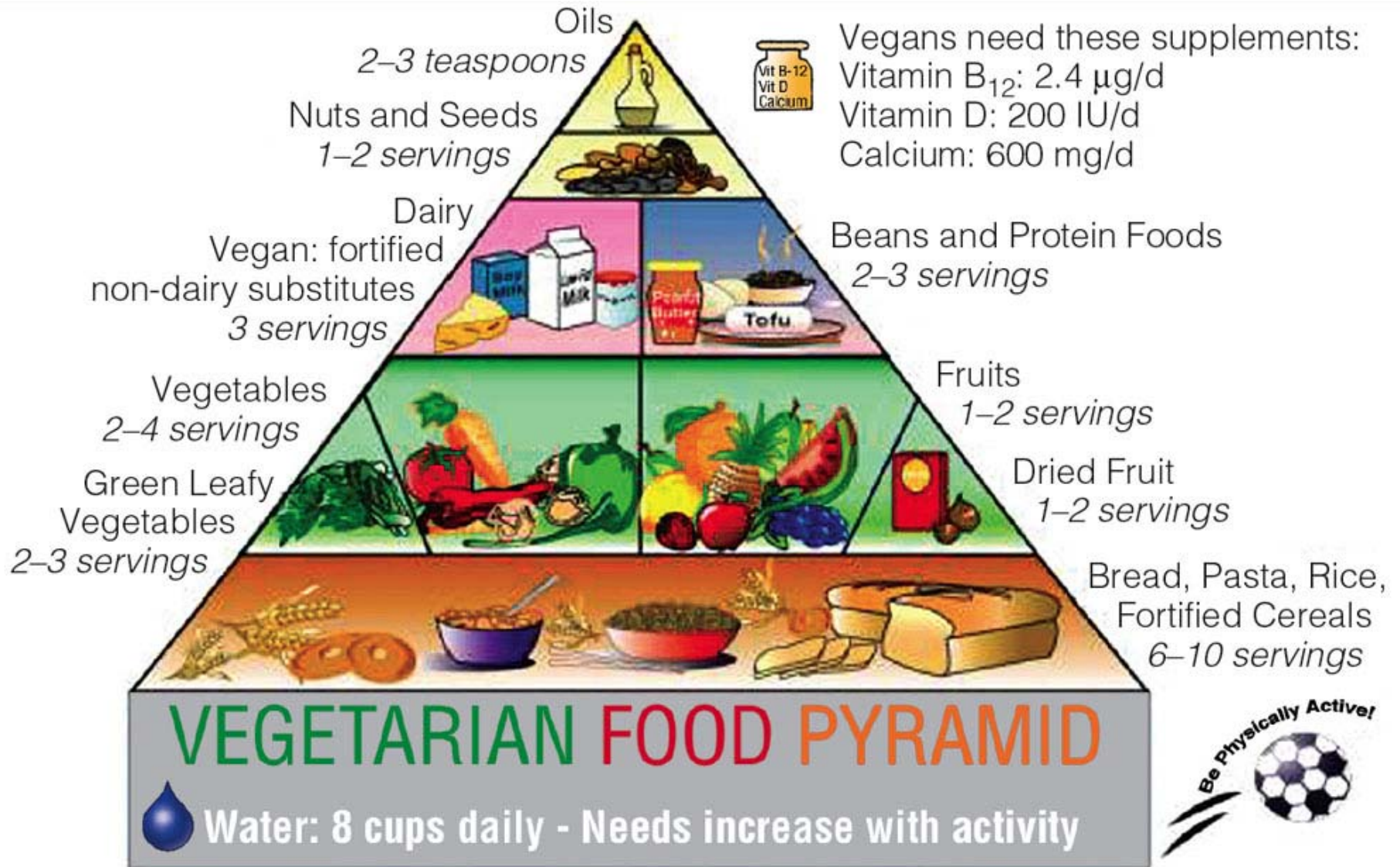
Mayo Clinic Healthy Weight Pyramid



© Mayo Foundation for Medical Education and Research. See your doctor before you begin any healthy weight plan.

<http://www.mayoclinic.com/health/mayo-clinic-diet/MY01040>

Vegetarian Food Pyramid? Yes, but be a scientist!



SOURCES: Sizer & Whitney 2006 *Nutrition: Concepts & Controversies*;
 Venti & Johnston 2002 *Journal of Nutrition* 132:1050-4.

Why More Fruits, Vegetables
Whole Grains & Beans?



Potential regulators
of health!

10s of thousands!

① Anti-oxidants
protect DNA from
oxidative damage

② Protein synthesis
regulation/control

③ Hormone-like
action
endocrine mimicry

④ Blood effects
modify blood chemistry



Phytochemicals ≡ Plant chemicals

aroma, color, taste

*Broccoli sprouts may contain
~ 10,000 unique phytochemicals!*





A Wealth of Phytochemicals

All cruciferous vegetables contain powerful cancer-fighting phytochemicals, including:

diindolylmethane (DIM), one of many *indoles* found in these vegetables, has been shown to inhibit proteins associated with breast and ovarian cancers.

crambene, plentiful in Brussels sprouts, may offer the most preventive benefits when combined with *indole-3-carbinol* (I3C).

glucosinolates, which turn into powerful protective agents called *isothiocyanates* when a cruciferous vegetable is chewed or chopped. May reduce inflammation, a factor in cancer development.



American Institute for Cancer Research

American Institute for Cancer Research

Foods that Fight Cancer

Beans fiber, saponins, protease inhibitors, phytic acid.

Berries fiber, vitamin C, ellagic acid, flavonoids

Cruciferous Vegetables glucosinolates: glucoraphin →
sulphoraphane, crambene, indole-3-carbinol & isothiocyanates

Dark Green Leafy Vegetables fiber, folate, carotenoids: 1^o lutein &
zeaxanthin; saponins, flavonoids

Flaxseed lignans (a phyto-E), α -linolenic acid (an Ω -3)

Garlic organosulfurs: allicin, alliin, allyl sulfides; quercetin,...

Grapes and Grape Juice resveratrol (a polyphenol)

Green Tea catechins (class of flavonoids), polyphenols

Soy isoflavones, saponins, phenolic acids, phytic acid, phytosterols,
protein kinase inhibitors

Tomatoes lycopene

Whole Grain fiber, vitamins, minerals, 100s of phytochemicals:
antioxidants, phenols, lignans (a phyto-E), saponins

http://www.aicr.org/site/PageServer?pagename=foodsthatfightcancer_home

≥ 5 tomato-containing meals per week may protect from cancers of the esophagus, stomach & prostate !



...but, the phytochemical candidate, lycopene with anti-oxidant activity is also in guava, papaya, pink grapefruit & watermelon!





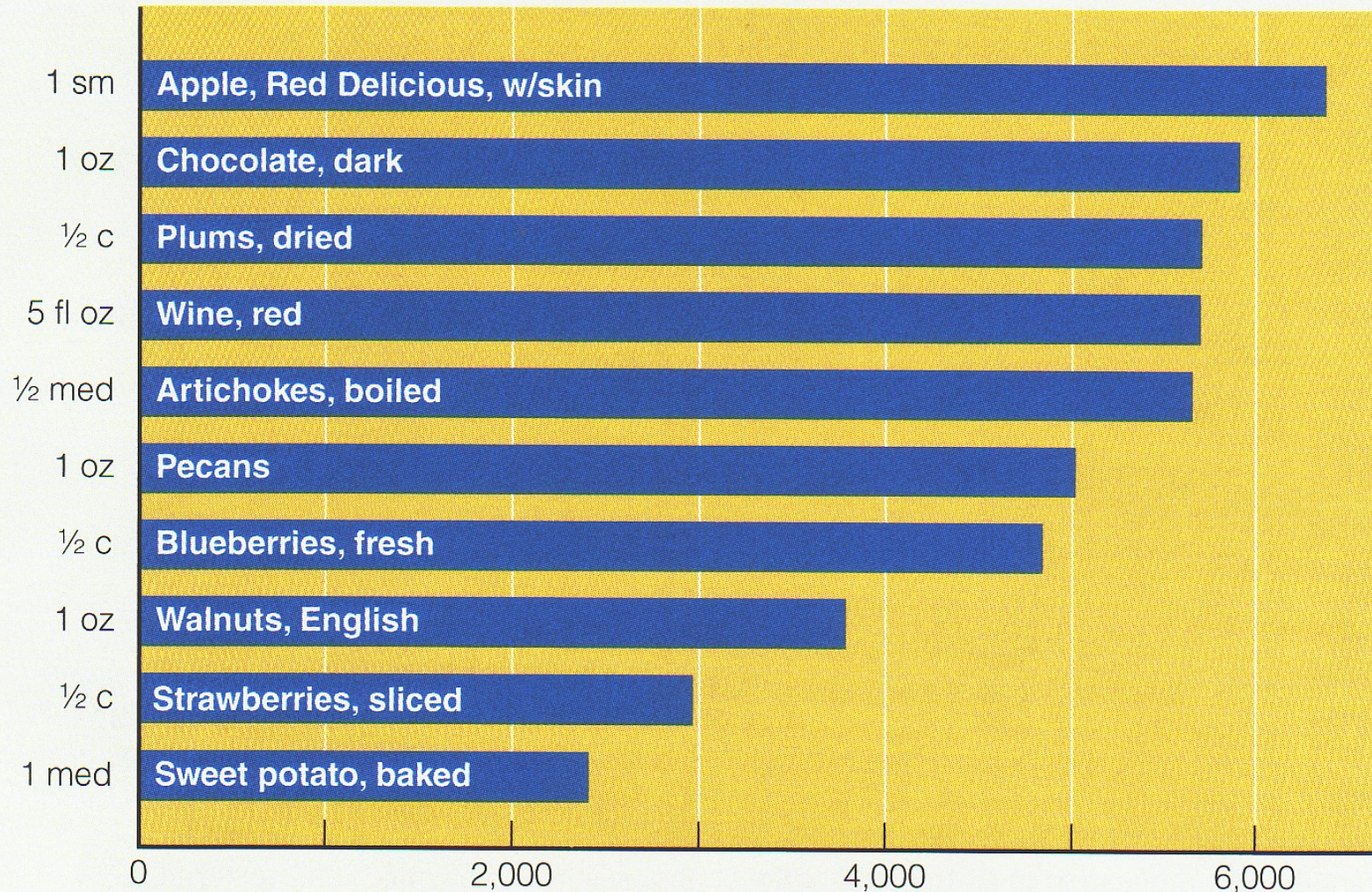
TABLE
C2-3

Common Foods Ranked by Antioxidant Content

1. Blackberries
2. Walnuts
3. Strawberries
4. Spinach
5. Artichokes, prepared
6. Cranberries
7. Coffee
8. Raspberries
9. Pecans
10. Blueberries
11. Cloves, ground
12. Grape juice, cranberry juice,
pomegranate juice
13. Chocolate, dark, unsweetened
14. Cherries, sour
15. Wine, red



Antioxidant Capacity Depends Upon Seasons, Storage, Testing Methods, Variety...



^aMeasured in micromole TE (Trolox equivalents), a laboratory-derived value used to measure the antioxidant activity of foods. Other laboratory methods yield other results.

Source: R. M. Bliss, Data on Food Antioxidants Aid Research, November 2007, available at <http://www.ars.usda.gov/is/pr/2007/071106.htm>.

Environmental Working Group Suggestions

12 Most Contaminated

Buy These Organic



• Apples



• Bell Peppers



• Celery



• Cherries



• Imported Grapes

• Nectarines



• Peaches



• Pears

• Potatoes



• Red Raspberries



• Spinach



• Strawberries



12 Least Contaminated

Not as Much Concern

- Asparagus
- Avocados
- Bananas
- Broccoli
- Cauliflower
- Corn (sweet)
- Kiwi
- Mangos
- Onions
- Papaya
- Pineapples
- Peas (sweet)

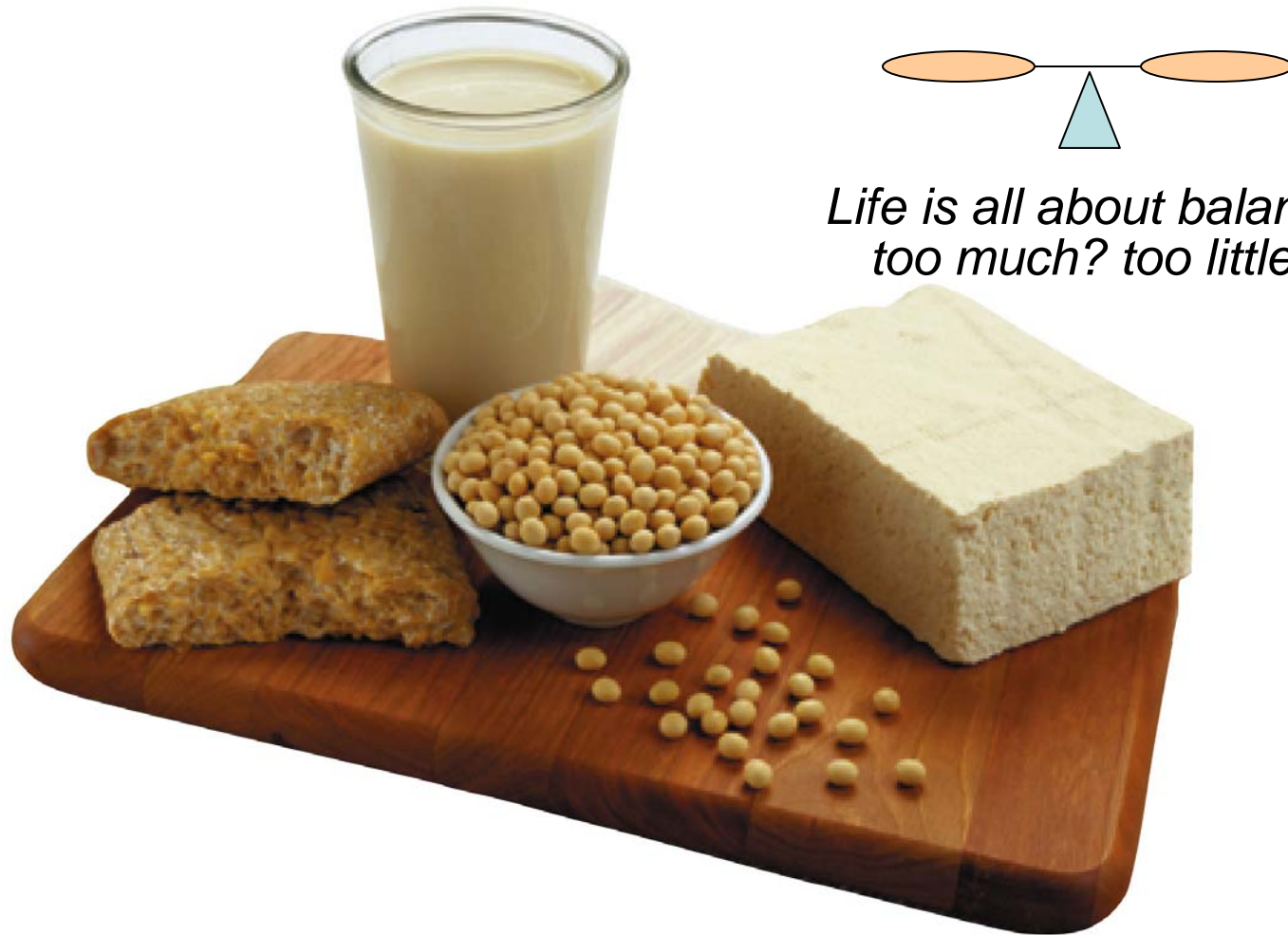
<http://www.foodnews.org/reportcard.php>



Resveratrol, a flavonoid in purple grape juice & red wine may lower incidence of cardiovascular diseases.

NB: ...but typical serving amounts may be too small to benefit human health!...Alcoholism?

*High doses of soy phytoestrogens may
lower blood cholesterol*

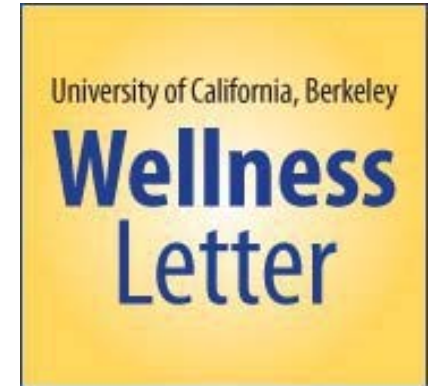


*Life is all about balance:
too much? too little?*

NB: ...but low doses of the phytoestrogen,
genistein promotes breast cancer cell
division (in lab cultures & mice).

Preventing Cancer: Strategies That Can Reduce Your Risk ***UC Berkeley Wellness Reports, 2012***

- 1. Don't smoke or use any tobacco product.**
- 2. Keep the weight off.**
- 3. Get off the couch.**
- 4. Eat a healthy diet.**
- 5. Drink less alcohol.**
- 6. Limit high-heat cooking.**
- 7. Limit sun exposure.**
- 8. Limit radiation from medical imaging tests.**
- 9. Test your home for radon.**
- 10. Test your water for arsenic.**
- 11. Decrease workplace exposure to carcinogens.**
- 12. Limit your exposure to air pollution (outdoors & indoors).**





Diet & Lifestyle Recommendations

- 1. Use up at least as many calories as you take in!***
- 2. Eat a variety of nutritious foods from all food groups.***
- 3. Eat less of the nutrient-poor foods.***
- 4. Don't smoke tobacco — and stay away from tobacco smoke.***

[http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/HealthyDietGoals/Dictionary-of-Nutrition UCM 305855 Article.jsp](http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/HealthyDietGoals/Dictionary-of-Nutrition_UCM_305855_Article.jsp)



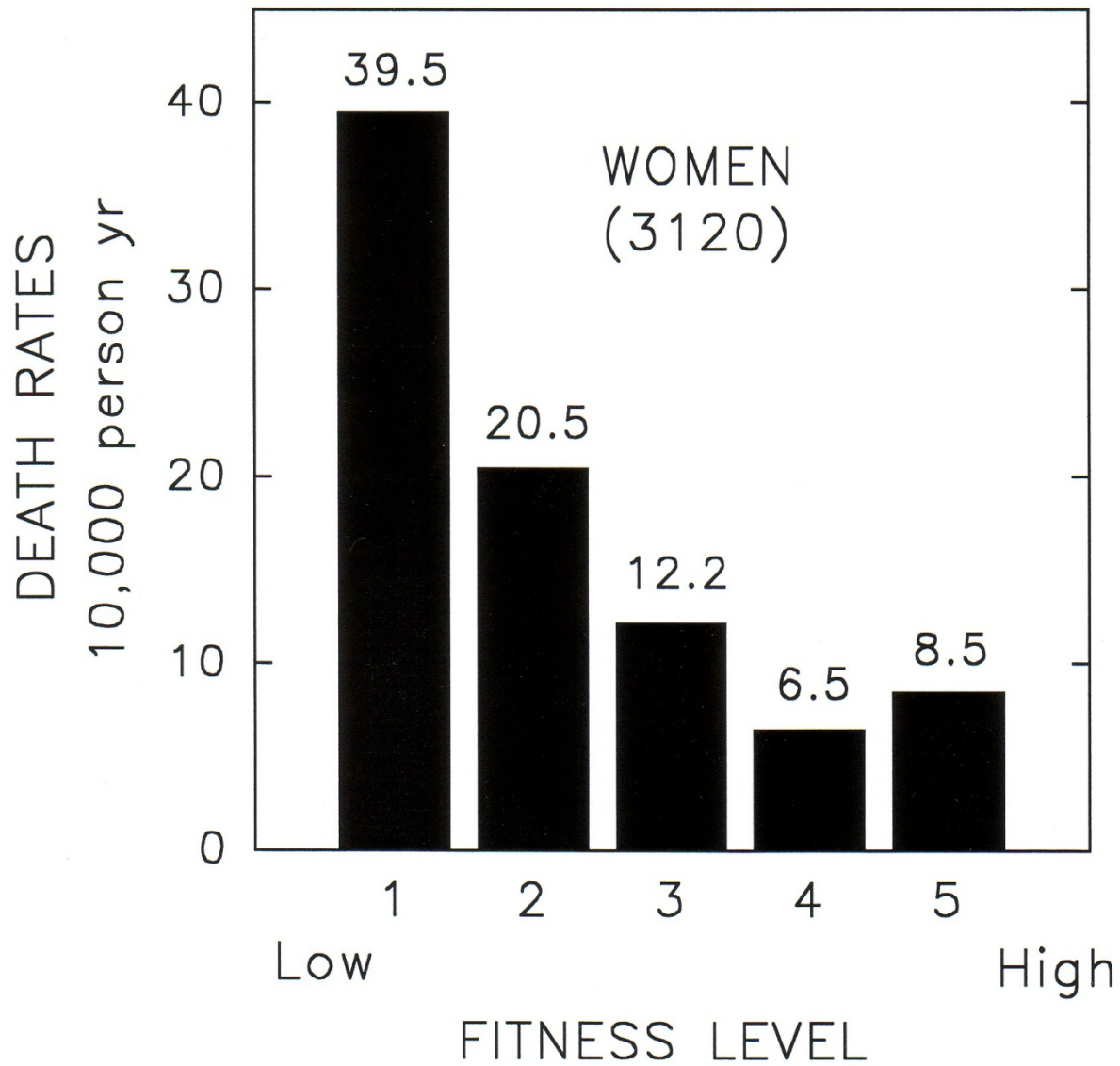
Daily Food Choice Recommendations

- 1. Choose lean meats & poultry without skin & prepare them without added saturated & trans fat.*
- 2. Select fat-free, 1 percent fat & low-fat dairy products.*
- 3. Cut back on foods containing partially hydrogenated vegetable oils to reduce trans fat.*
- 4. Cut back on foods high in dietary cholesterol. Aim to eat less than 300 milligrams of cholesterol each day.*
- 5. Cut back on beverages and foods with added sugars.*
- 6. Choose and prepare foods with little or no salt. Aim to eat less than 1,500 milligrams of sodium per day.*
- 7. If you drink alcohol, drink in moderation. 1 drink/day if you're a woman & 2 drinks/day if you're a man.*
- 8. Follow AHA recommendations when you eat out & keep an eye on portion sizes.*

Why exercise?



THE REWARD OF FITNESS: LONGEVITY



SOURCE: SN Blair & associates, JAMA, 1989, 263(15), 2395-401.

***Exercise is a must based on
its insulin-like effect!***



100s of other reasons! Exercise –

↑ lean body mass, ↑ cardiac output,
↑ myocardial contractility, ↑ central &
peripheral blood flow, ↑ fibrinolytic activity,
↑ HDL cholesterol, ↑ work capacity,
↑ sleep quality, ↓ % body fat,
↓ TOT & LDL cholesterol, ↓ triglycerides,
↓ platelet aggregation, ↓ blood pressure,
↓ CVD risk,...



AMERICAN COLLEGE
of **SPORTS MEDICINE**

Guidelines: Healthy Adults < 65 yr



**Do moderately intense aerobic exercise
30 min/d, 5 d/wk**

OR

**Do vigorously intense aerobic exercise
20 min/d, 3 d/wk**

AND

**Do 8-10 strength-training exercises
8-12 repetitions/each exercise, 2 d/wk**

http://www.acsm.org/AM/Template.cfm?Section=Home_Page&TEMPLATE=CM/HTMLDisplay.cfm&CONTENTID=7764

Federal exercise guidelines include strength training for all

<http://www.healthierus.gov/>

http://www.usatoday.com/news/health/weightloss/2008-10-07-physical-activity_N.htm



Adults: Moderate to Vigorous Exercise \geq 30 min, 5 d/wk

Children: Moderate to Vigorous Exercise \geq 60 min, 5 d/wk