CARDS: Fill Out

1. **1st Name (preference), Last**
2. Class/Year and Major
3. High School
4. Outside interests- **fun** things you like to do
5. Do you work outside of school? Yes/No
6. **Future Plans- upon graduation**
7. Why are you taking this course?
8. Do you generally have a healthy diet and lifestyle? **Yes/No Comments**

What do you want to get out of this course?

Expectations

NUTRITION & DISEASE
Dr. Jerome L. Hojnacki

WHAT THE COURSE IS ABOUT

Write #1-7 in your notebook

#1

#2

#3

#4

#5

#6

#7

ANSWER **YES/NO** TO THESE QUESTIONS

1. Friend or relative sick with/death from **cancer**?
2. Mom, Dad, Aunt, or Uncle → **Heart Attack or Stroke?**
3. Your Friends- **Overweight?**
4. Friends or Family → **Diabetes?**

5. Grandmother/Older Relative- Thinning Bones? Falls?

Broken Hip?

6. Younger Brother/Sister/Cousin: Slug → Computer/TV → **No Exercise?**

7. Friend/relative: **Anorexia, bulimia?**

How many yes?

Above diseases/disorders related to:

1. **Nutrition**
2. **Physical Activity**

Nutrition Affects All Generations

In this course, learn about:

How to **prevent** these diseases:
people you love and care about

Course Overview:

- Summary of current **Dietary Guidelines for Americans**
- **Diet and Disease:**

  obesity, diabetes, heart disease, stroke, cancer, alcohol abuse
- Practical suggestions: **disease prevention**

SUMMARY
ASSIGNMENTS DUE
NEXT CLASSES

BRING IN 3 FOOD LABELS

Due: 1/25

Assignment: Due 1/30

Nutrition Scoreboard

Food Groups

Assignment: Due 1/30

How many do you eat?

Assignment: Due 1/30

What's a good potato chip?

How healthy is your lifestyle?

Questionnaire

Due: 1/30

"ADDED" SUGAR

DO YOUR ONE DAY

TOTAL OF "ADDED" SUGAR

Assignment Due 1/30

AFTER 1ST EXAM

MY DIET ANALYSIS

5 EXTRA CREDIT POINTS

Due: 2/13

Definitions

Nutrition:

- **Taking in food**
- **Assimilation** "You are what you eat"
- **Growth**
- **Repair**- wear/tear/injury
- All body activities
- Nutrients- **stored**- future use

Nutrients: Chemical Substances in Food

Energy

Structure

Regulate Body Processes

Macronutrients

- Water
- Carbohydrates
- Fats
- Proteins

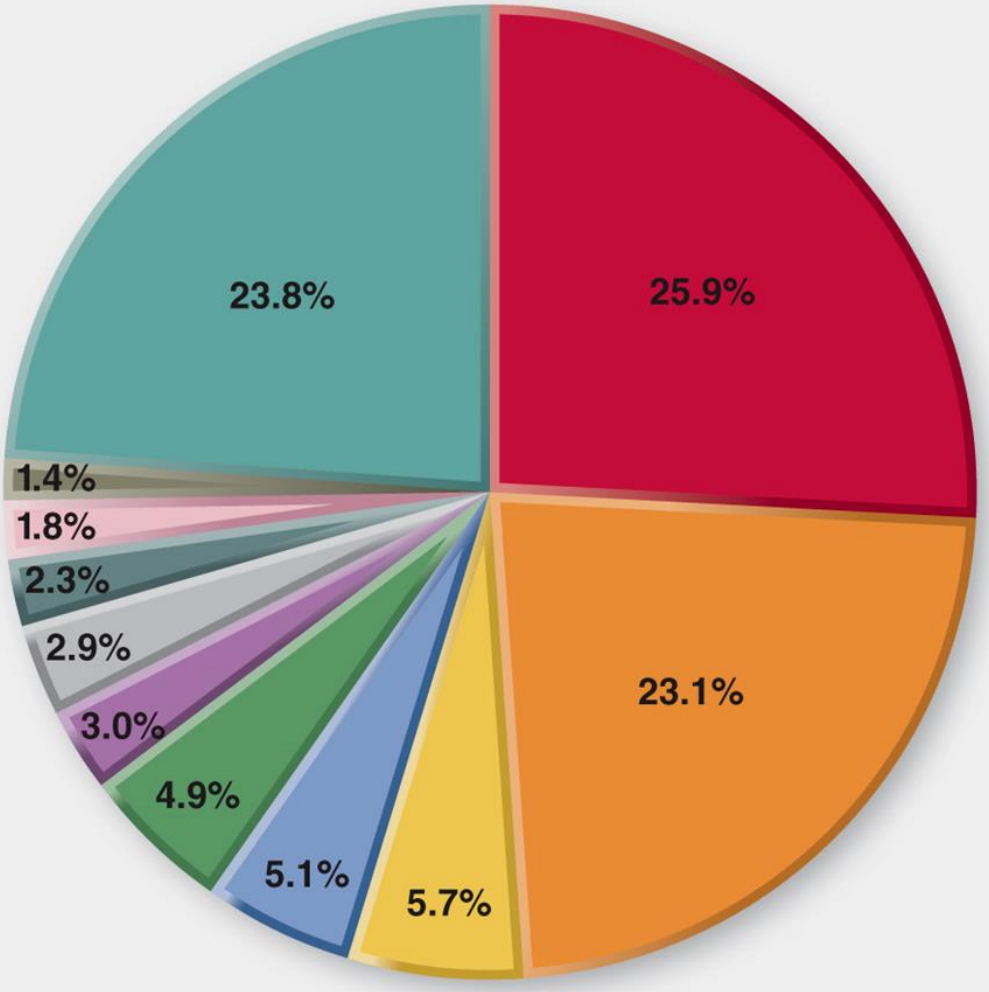
Micronutrients

- Vitamins
- Minerals

Diseases- Chronic

- **Heart Disease**
- **Cancer**
- Stroke
- High Blood Pressure
- Type 2 Diabetes
- Bone Thinning
- Obesity

Ten Leading Causes of U.S. Death (2006)



- Heart disease*†‡
- Cancer*†‡
- Stroke*†‡
- Chronic lower respiratory infections‡
- Accidents‡
- Alzheimer's disease*
- Diabetes*
- Influenza and pneumonia
- Kidney disease*‡
- Blood-borne infections
- All other causes

* Causes of death in which diet plays a part

† Causes of death in which excessive alcohol consumption plays a part

‡ Causes of death in which tobacco plays a part

Some diseases run in families

Genetic Risk

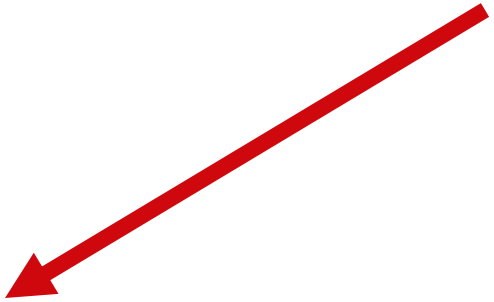
Modify your **lifestyle**: **prevention**

Develop a **"Family Health History"**

Starting place: family gatherings

Many Chronic Diseases

Start Early- **Children**



Problems Later in Life

Figure 3. Early lesions in human arteries (oil red "O" surface stain).

Juvenile intimal thickening

Juvenile fatty streaks and diffuse sudanophilia

Transitional fatty streaks in a young adult

Obesity in children- may start in **womb**

- Women gain excessive weight during pregnancy
- Have **bigger babies**
- ↑ **Risk of overweight children**
- ↑ **Risk diabetes,**
- **heart disease, cancer later in life**

US Congress Interested. Why?

Before **1965** Government → Smaller $ Medical Bills

1965: **Medicare & Medicaid**

↑ Cost US Government

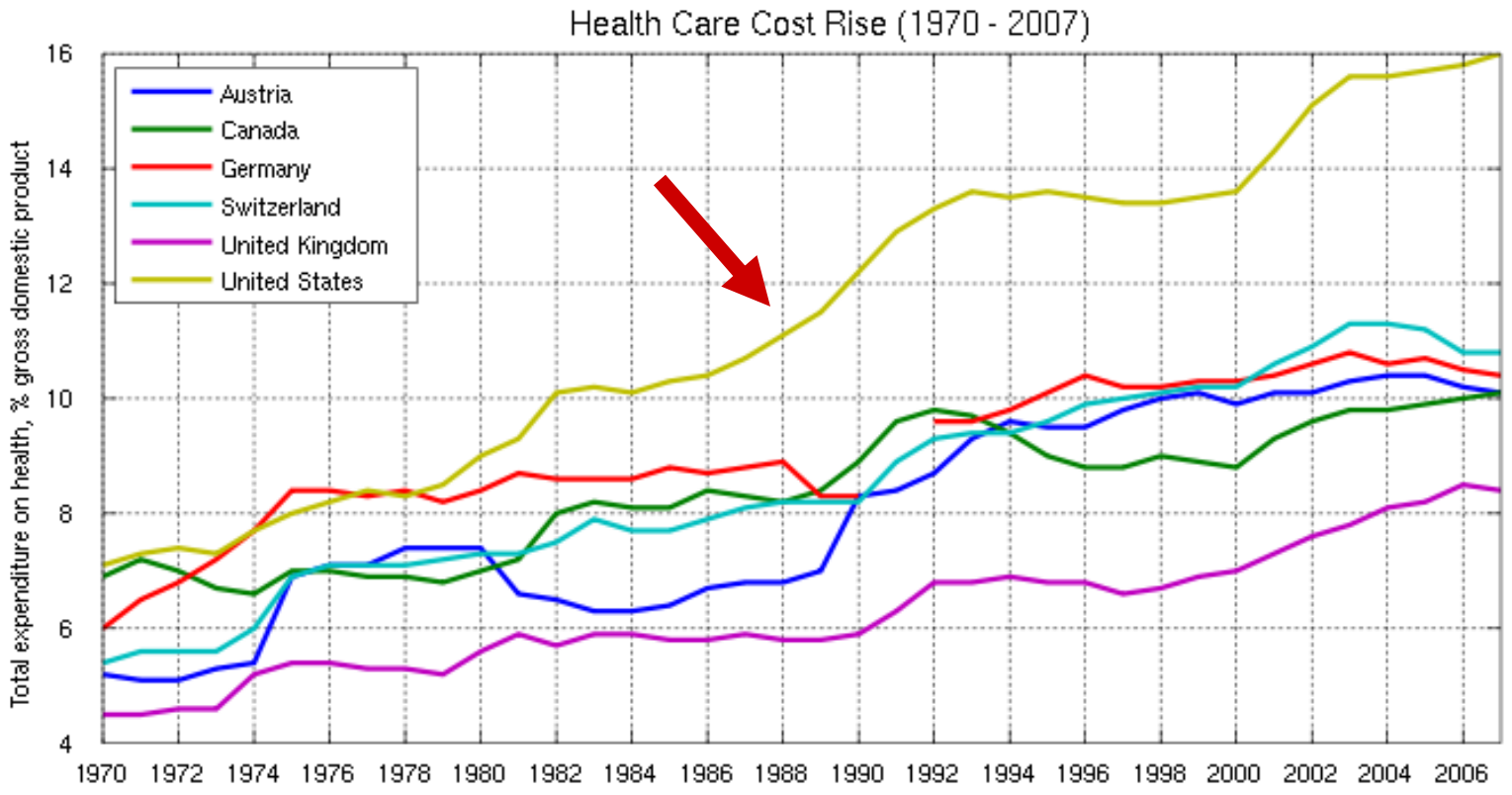
2017 Health Costs: 17.1% GDP

~$9,523/person

Warren Buffett

US Health Care costs vs. other countries

Warren Buffett: "like a tapeworm eating at our economic body"



How to Control Costs:

- **Health promotion**
- **Disease prevention**
- **HMO**
- Behavioral/**lifestyle** modifications
- **Stress management**
- **Early detection**
- **Screening**
- **Education (Nutrition)**

Your Lifestyle (small changes) and CANCER

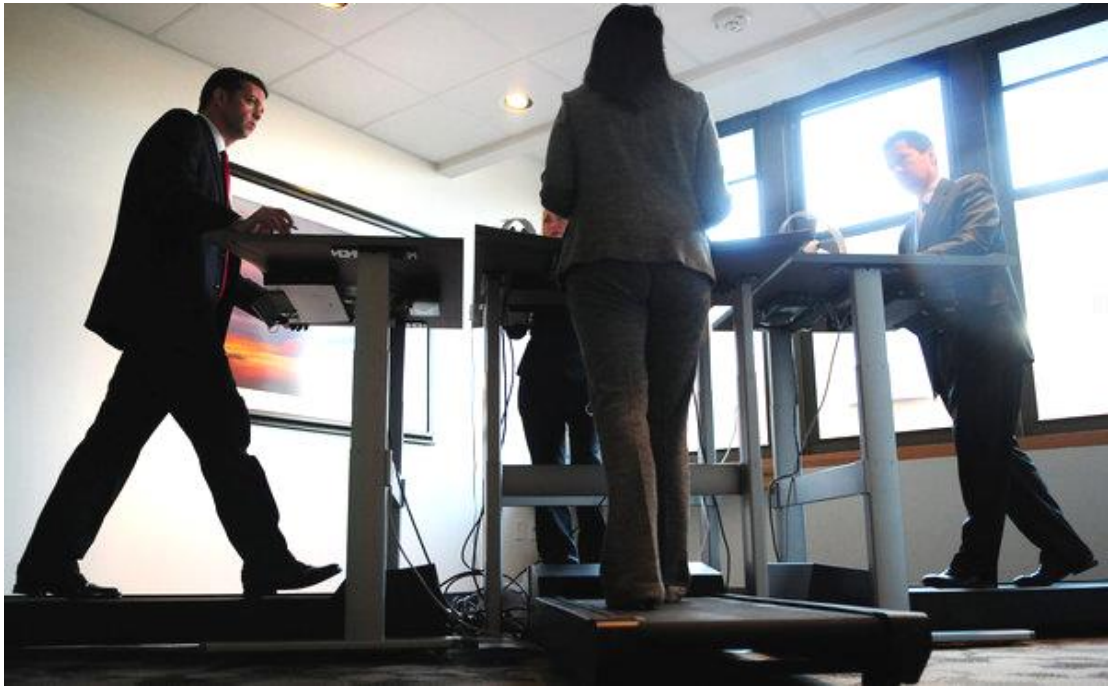
American Institute Cancer Research

- **30 minutes exercise/day**
- **Maintaining healthy weight**
- **Diet rich- whole grains, fruits, veggies, legumes (beans & peas)**

↓ **33% CANCER RISK**

Companies & Medical Care **Costs** of Employees

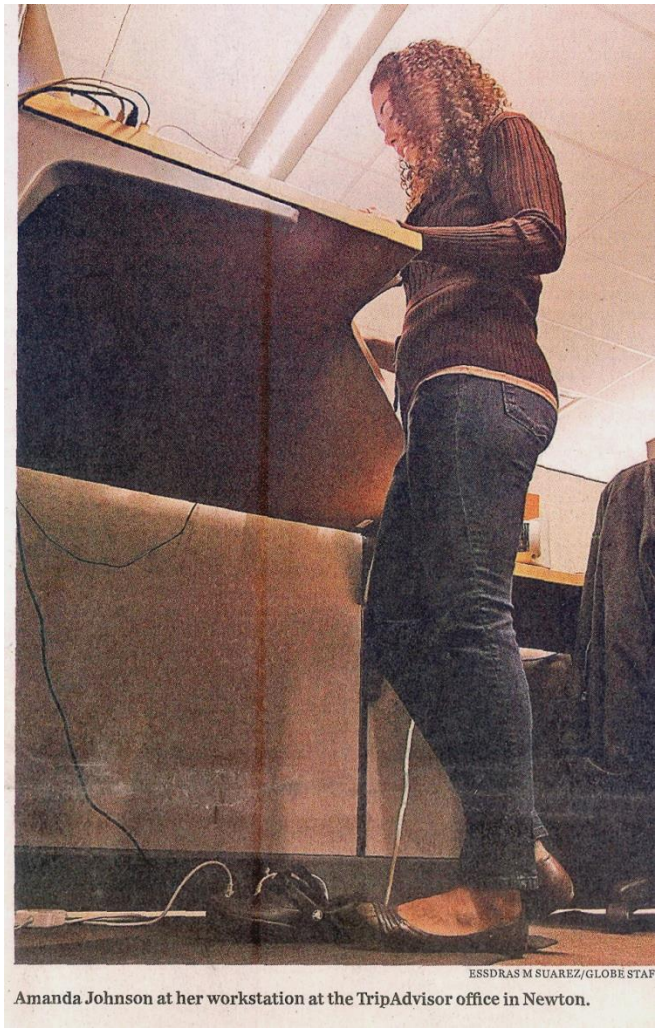
“Move while you work” NY Times 2011



Salo financial firm Minneapolis: 6 **treadmill desks**: managers- “Walking meetings” ↑ Employee health, ↓ Medical costs

Boston area employees health benefits:

Standing at work-better focus, more energy, alertness: **"sit-stand desks"**



ESSDRAS M SUAREZ/GLOBE STAF

Amanda Johnson at her workstation at the TripAdvisor office in Newton.

Amanda Johnson-TripAdvisor, Newton

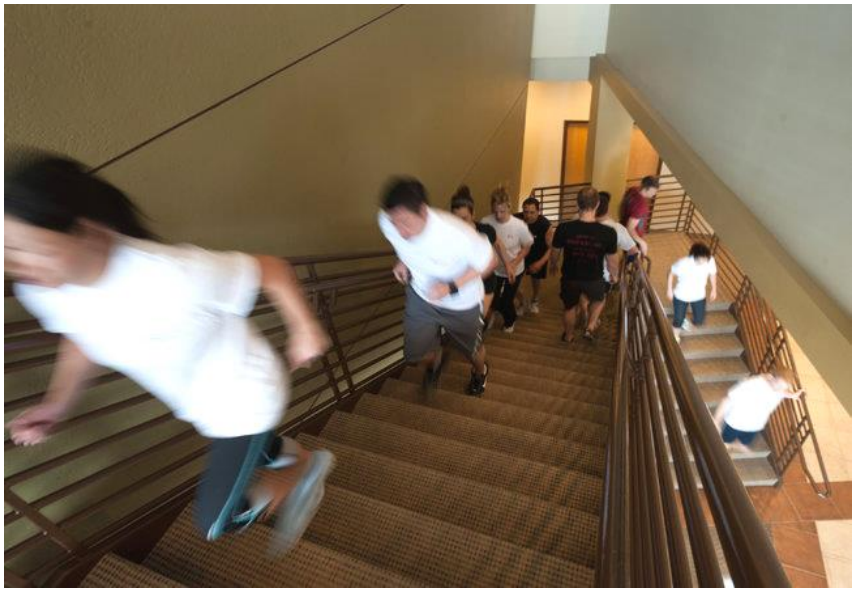
KAYANA SZYMCZAK FOR THE BOSTON GLOBE

Elyse Blanda, a contract specialist at the Blue Cross Boston office, has decided to use a treadmill desk at work.

Elyse Blanda, **Treadmill Desk**, Blue Cross, Boston

Datalogix Colorado

Crossfit Exercise, Stairway Sprints



Rewards- Lower insurance premiums

Penalties: Poor health choices measured by blood pressure, BMI, smoking

Cost of a Smoker

Ohio State Univ. Study 2013

$5,816 extra/year to private employer

- Breaks at work
- **Sick days**
- Lost productivity

Former New York City Mayor Michael Bloomberg's Plan to Fight Obesity

Ban large (> 16 oz) sugary drinks (liquid calories) at restaurants

Calorie Counts and Politics

- **Affordable Care Act** (2010):

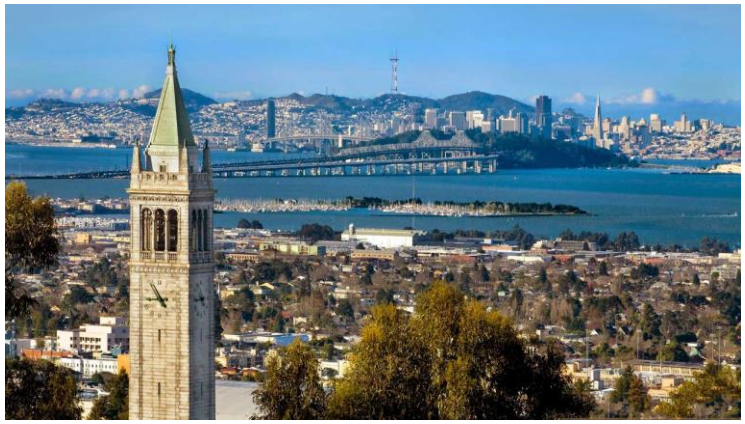
  Required postings all big restaurants-delayed by **FDA** until next year

- **NY City rule**: **"calorie posting"-** restaurants/convenience stores-delayed by lawsuit supported by current administration

- Do you read **calories**

  at restaurants/stores?

Soda Tax Works



Berkeley, CA: 2014

Tax: 1 cent/ounce

↓ Soda intake (21%)

↑ H20

Philadelphia, PA

$0.18/12 oz can tax.

68% overweight/obese adults, **41%** children

1980 US Department of Health and Human Services

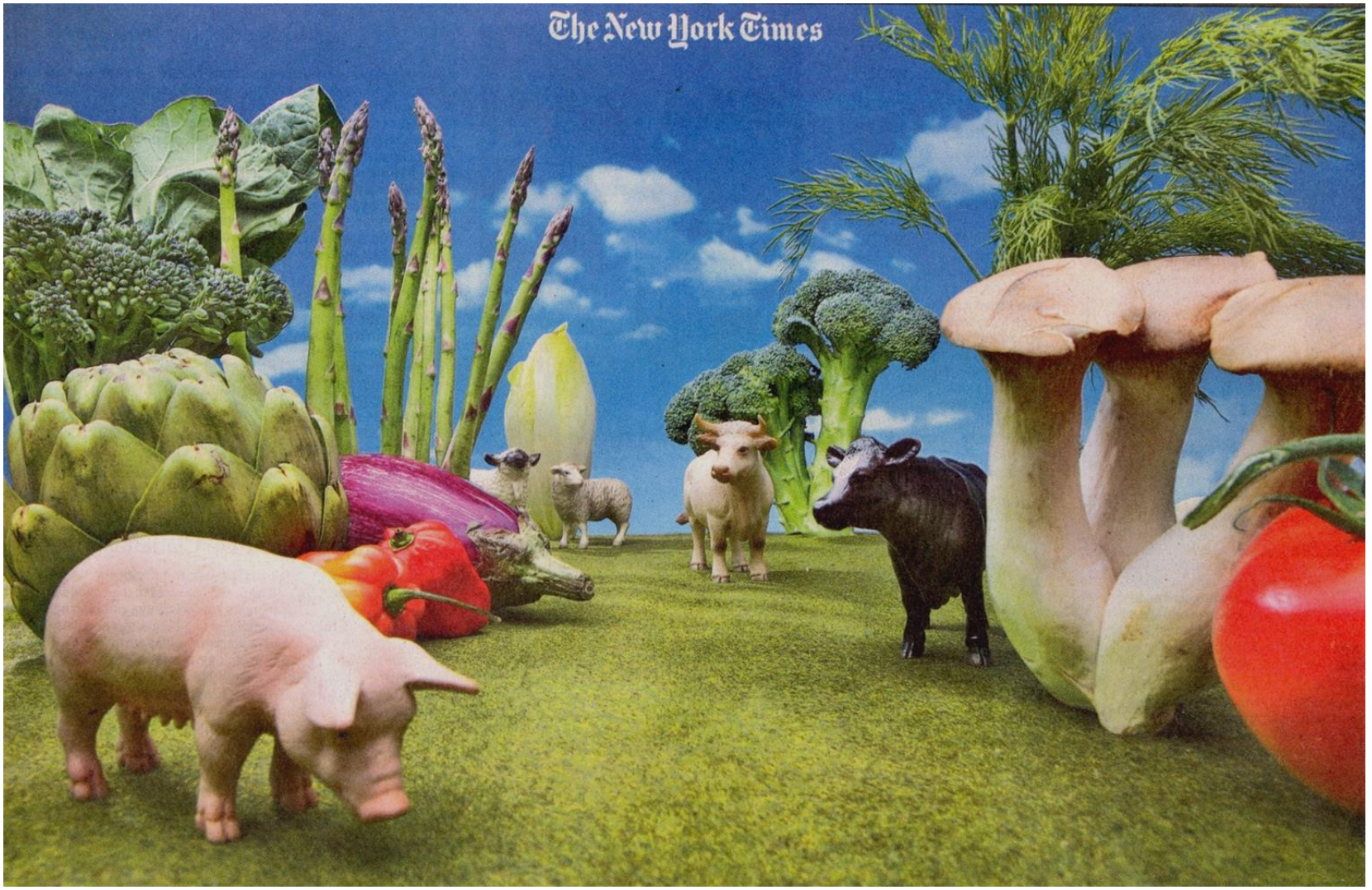
"Dietary Guidelines for Americans"

first published

By law- updated every 5 years

Dietary Guidelines for Americans **2005**

Plant based diet



Examples of eating patterns- range of calories:

- Choosemyplate.gov
- Dietary Approaches to Stop Hypertension (DASH)

  dashdiet.org
- Mediterranean Diet
- Vegetarian Diet

Mediterranean Diet

Portugal, Spain, Italy, France, Greece, Turkey, Israel

Mediterranean Diet

↑ Fruits, vegetables, breads, cereals, beans, nuts, seeds, peas, beans, fresh foods (fiber, vitamins, minerals)

↓ Processed foods

Mediterranean Diet

↓ **Saturated** (animal) fat & cholesterol

↑ **Monounsaturated fat (Olive Oil)**

↑ **Plant proteins**: peas, beans, nuts

Mediterranean Diet

↓ Cholesterol levels

↑ Longer Life

↓ Alzheimer's Disease

↓ **Breast Cancer**

Mediterranean vs. U.S. Women

↓ Heart Disease

↓ **Cancer**

Mouth

Esophagus

Stomach

Lungs

Intestine

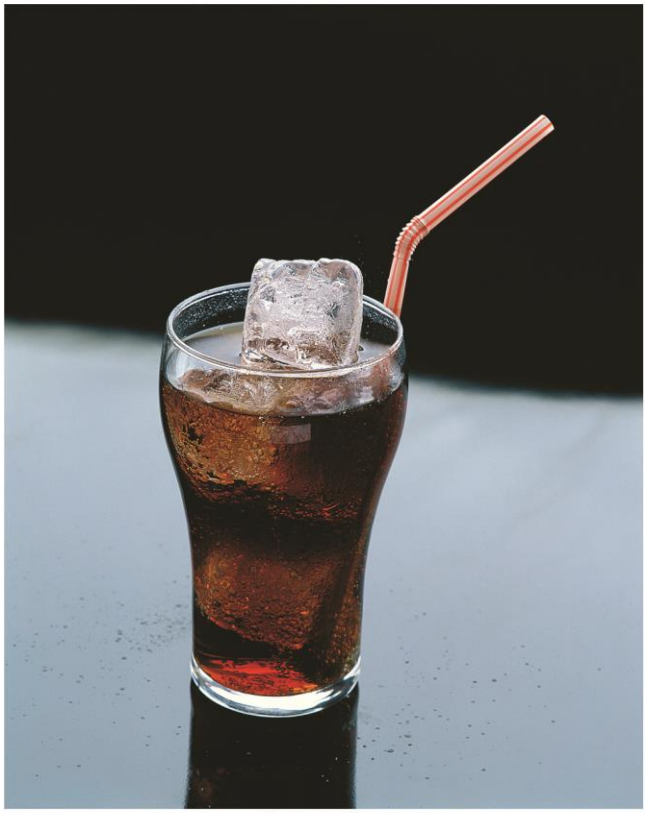
DIETARY GUIDELINES FOR AMERICANS 2010 and 2015 KEY RECOMMENDATIONS

Recommendations:

- **Shift eating to more plants foods**
- **Veggies**
- **Cooked dry beans and peas**
- **Fruits**
- **Whole grains**
- **Nuts and seeds**
- **Seafood**
- **Fat-free**, low fat milk and milk products
- Eat **moderate** amounts: **lean meats, poultry, eggs**

Recommendations:

- ↓ **Added sugars**
- ↓ **Solid fats**
- ↓ **Sodium**
- ↓ **Refined Grains**



Why? Foods linked: to **weight gain, high blood pressure, heart disease, diabetes**

Dietary Guidelines for Americans 2015

- **Decrease Sedentary Behavior**
- **Increase Physical Activity**

Dietary Guidelines for Americans

2005

Just the Facts

Recommendations

See WEB site: Packet #1

www.health.gov/dietaryguidelines

USDA **Healthy** US-Style Food Patterns- recommendations

EXERCISE

- 30 minutes/day- moderate
  Prevent heart disease
- 60 minutes/day- moderate-vigorous: healthy weight & prevent heart disease
- 60-90 minutes/day- moderate: help lose weight

FOOD GROUPS

1. **GRAINS** (1/2 WHOLE GRAINS)
2. **VEGGIES**
3. **FRUITS**
4. **DAIRY (MILK, YOGURT, CHEESE)**
5. **PROTEIN (MEAT, BEANS, CHICKPEAS, EGGS, SEEDS, AND NUTS)**

Grains

6 Ounce Equivalents/Day

(**1/2 as whole grains**)

1 Ounce Equivalent:

- 1 slice bread or
- 1 cup dry cereal or
- ½ cup cooked rice, cereal, pasta

VEGGIES

Fresh, Frozen, Cooked, Raw

21/2

Cups/Day

FRUITS

FRESH, FROZEN, CANNED, DRY

2 cups/day

DAIRY (FAT-FREE, LOW-FAT)

3 CUPS/DAY

1 CUP EQUIVALENT:

- 1 CUP MILK OR
- 1 CUP YOGURT OR
- 1 ½ OUNCES CHEESE

PROTEIN

(**LEAN** MEAT, CHICKEN, FISH, BEANS, CHICKPEAS, NUTS, SEEDS)

51/2 ounce equivalents/day

1 ounce equivalent:

- 1 ounce meat, poultry, fish
- ¼ cup cooked dry beans
- 1 egg
- 1 tablespoon peanut butter
- ½ ounce nuts or seeds

Total Fat*

65 grams/day

Saturated Fat

<**20** grams/d

Bad Fat

Mono + POLY

FATS

< **45** grams/d

Trans Fat

0

As little as possible

Cholesterol

< 300*

milligrams/d

Sodium

< 2300 milligrams/d

Better: <1500 mg/d

Potassium 4700 milligrams/d

CARBS

Limit: “Added Sugars”

(50 grams/day)

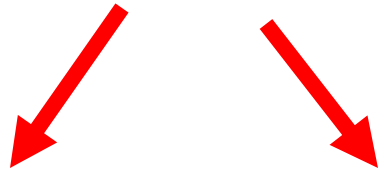
Fiber

Good Carb

25-28 g/day

Numbers to Memorize

65g



20g 45g

2300 mg

(1500mg)

0g

300mg*

4

4700 mg

50g

9

7

25-28g

Alcohol: moderation

1 drink/day women

2 drinks/day men

Average serving	Calories
Beer	144
Beer (light)	108
White wine	100
Red Wine	105
Sweet dessert wine	141
Liquor	96

Food Safety

- "When it doubt, throw it out"
- Wash hands- soap & water
- Wash fruits & veggies
- Keep separate: raw, cooked, ready-to-eat foods
- Cook foods: temperatures to kill bacteria (food thermometer)
- Refrigerate foods- after use
- Avoid raw, partially cooked, under cooked, unpasteurized foods

How to Read Food Labels

Nutrition Facts (Food Labels)

- Best way to know about what you are eating and drinking

- All food labels **uniform**: same information, same order

A Gram in the Hand

grams = g

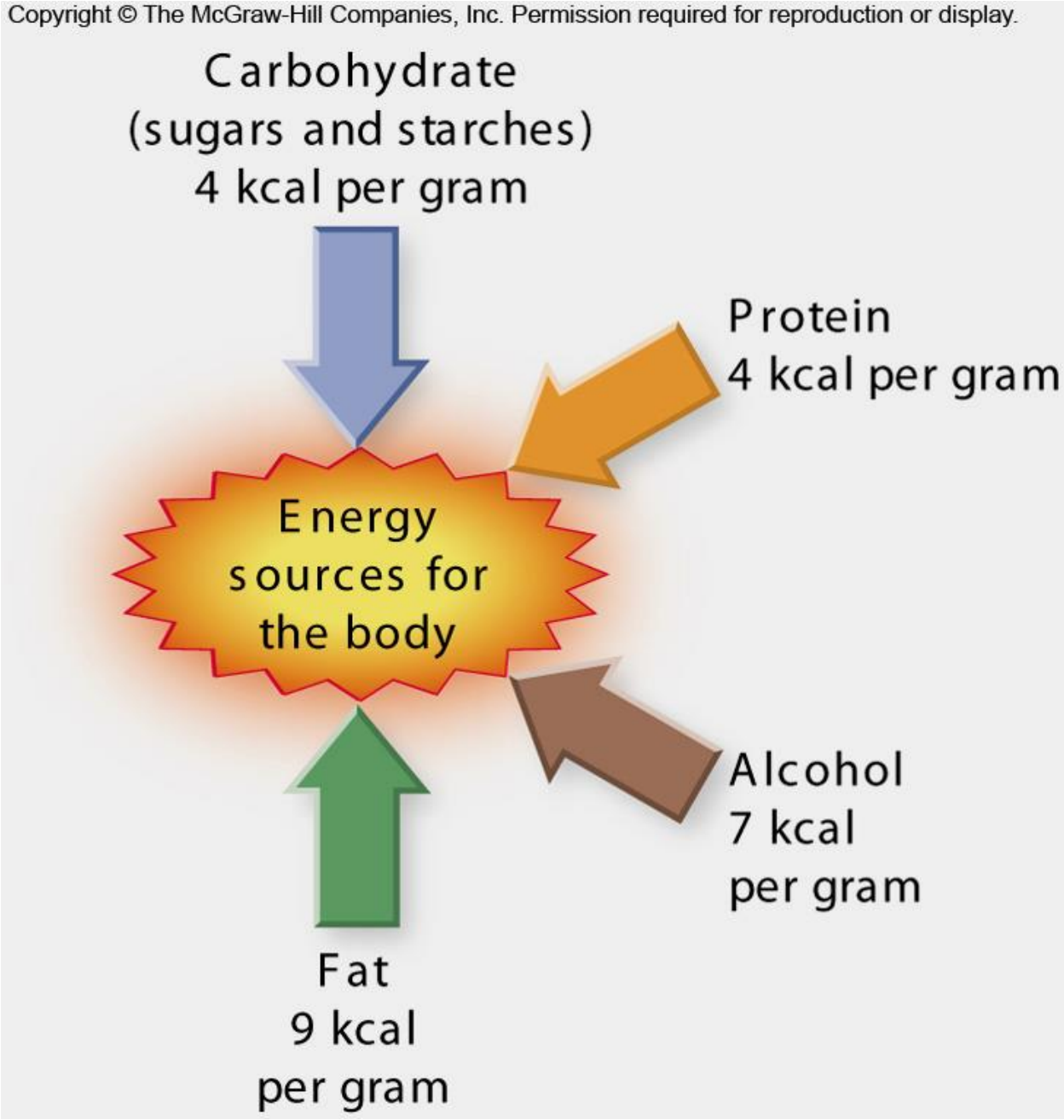
milligrams = mg

1 gram = 1000 milligrams

NUMBER EXERCISE

WRITE DOWN THESE NUMBERS FROM LEFT TO RIGHT

4 4 7 9



Reading Food Labels: a Simple Method

If you can add, you can use this method

Based on **2000** calorie "reference" diet

Two categories of nutrients:

1) **Limit per day**
2) **Goals per day**

Ingredients: Listed from **highest** to **lowest** in amount

- **Good words**: 100% whole-grain, whole wheat, fiber, vitamin A, vitamin C, vitamin E, calcium, iron

- **Not so good words**: hydrogenated, partially hydrogenated, sodium, salt, sugar, sucrose, glucose, high fructose corn syrup, corn syrup, maple syrup, fructose

Nutrition Facts

Serving Size

Servings Per Container

Amount Per Serving

Calories

% Daily Value*

Total Fat

Saturated Fat

Trans Fat

Polyunsaturated

Monounsaturated

Cholesterol

Sodium

Potassium

Total Carbohydrate

Dietary Fiber

Sugars

Protein

Vitamin A

Vitamin C

Calcium

Iron

Ingredients:

Nutrition Facts

Serving Size

Servings Per Container

Amount Per Serving

Calories

% Daily Value*

Total Fat

Saturated Fat

Trans Fat

Polyunsaturated

Monounsaturated

Cholesterol

Sodium

Potassium

Total Carbohydrate

Dietary Fiber

Sugars

Protein

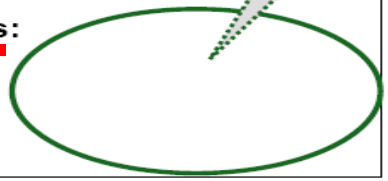
Vitamin A

Vitamin C

Calcium

Iron

Ingredients:



Look Here First

Read and know what you are eating.

Good: whole, whole grain

Not Good: salt, sodium, sugar, hydrogenated, partially hydrogenated

Nutrition Facts

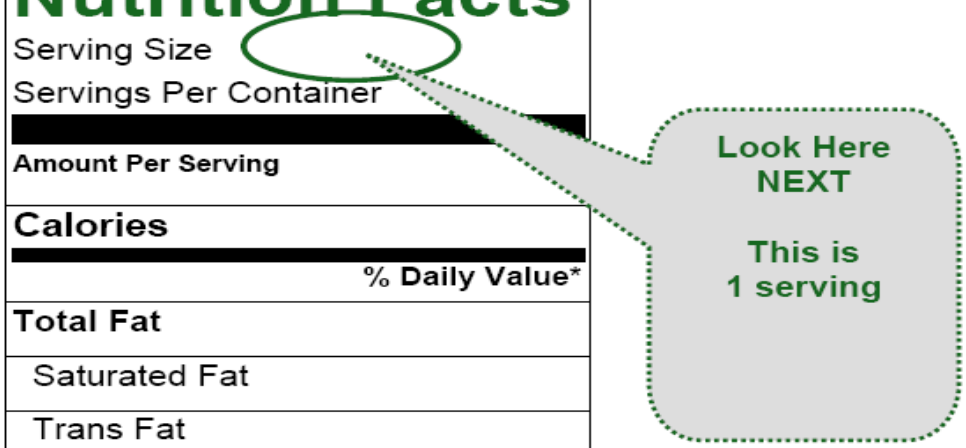
Serving Size

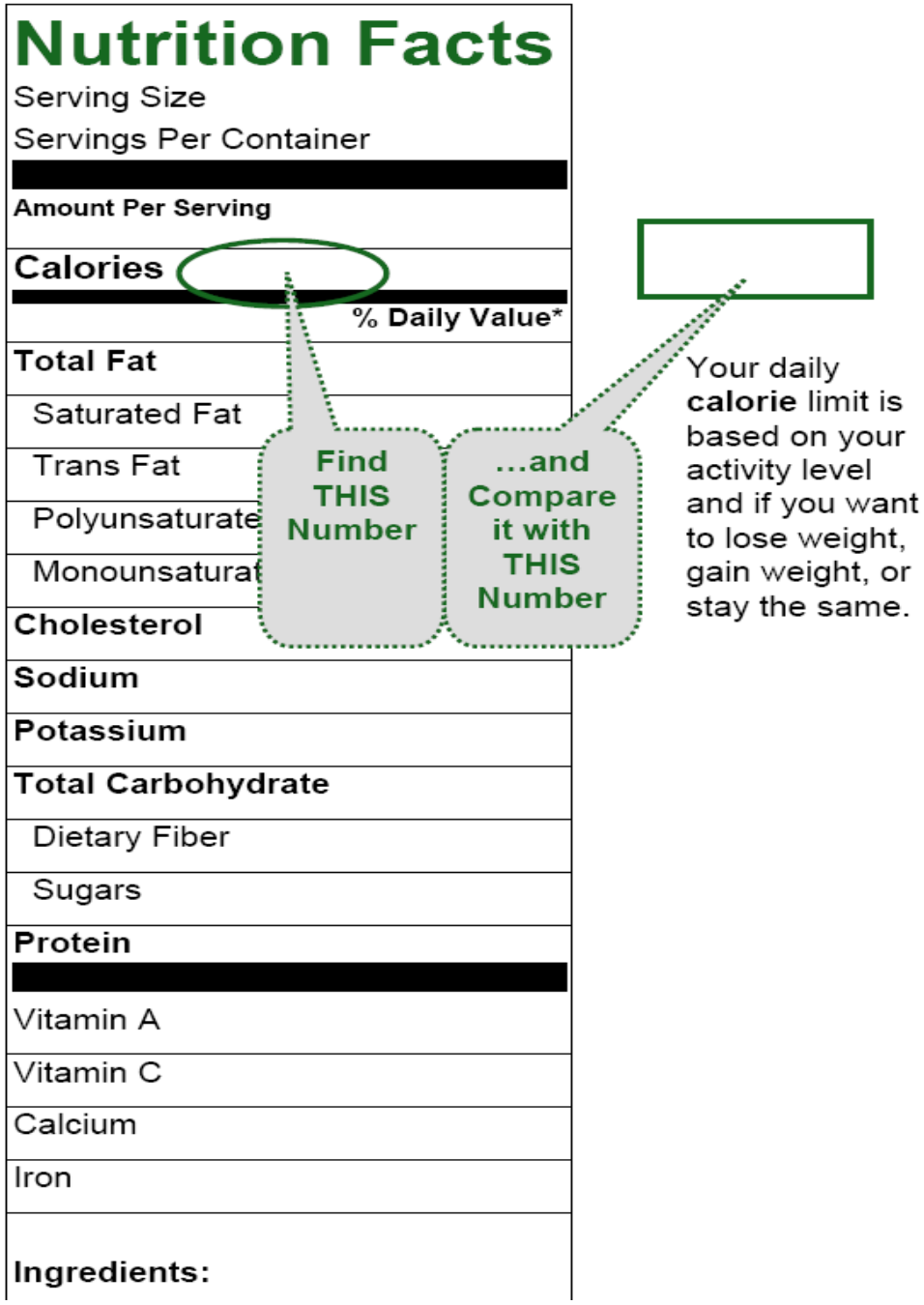
Servings Per Container

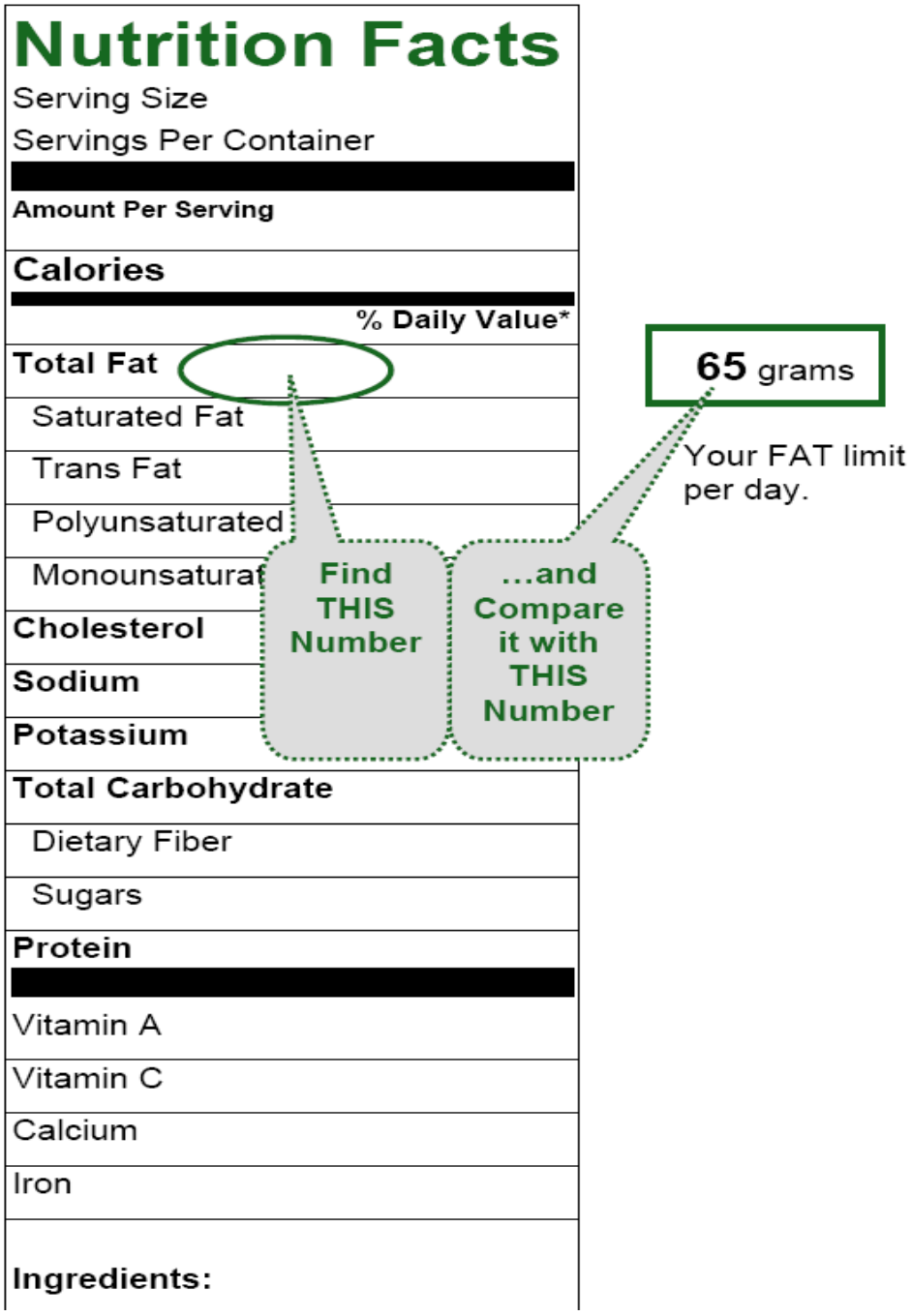
Amount Per Serving

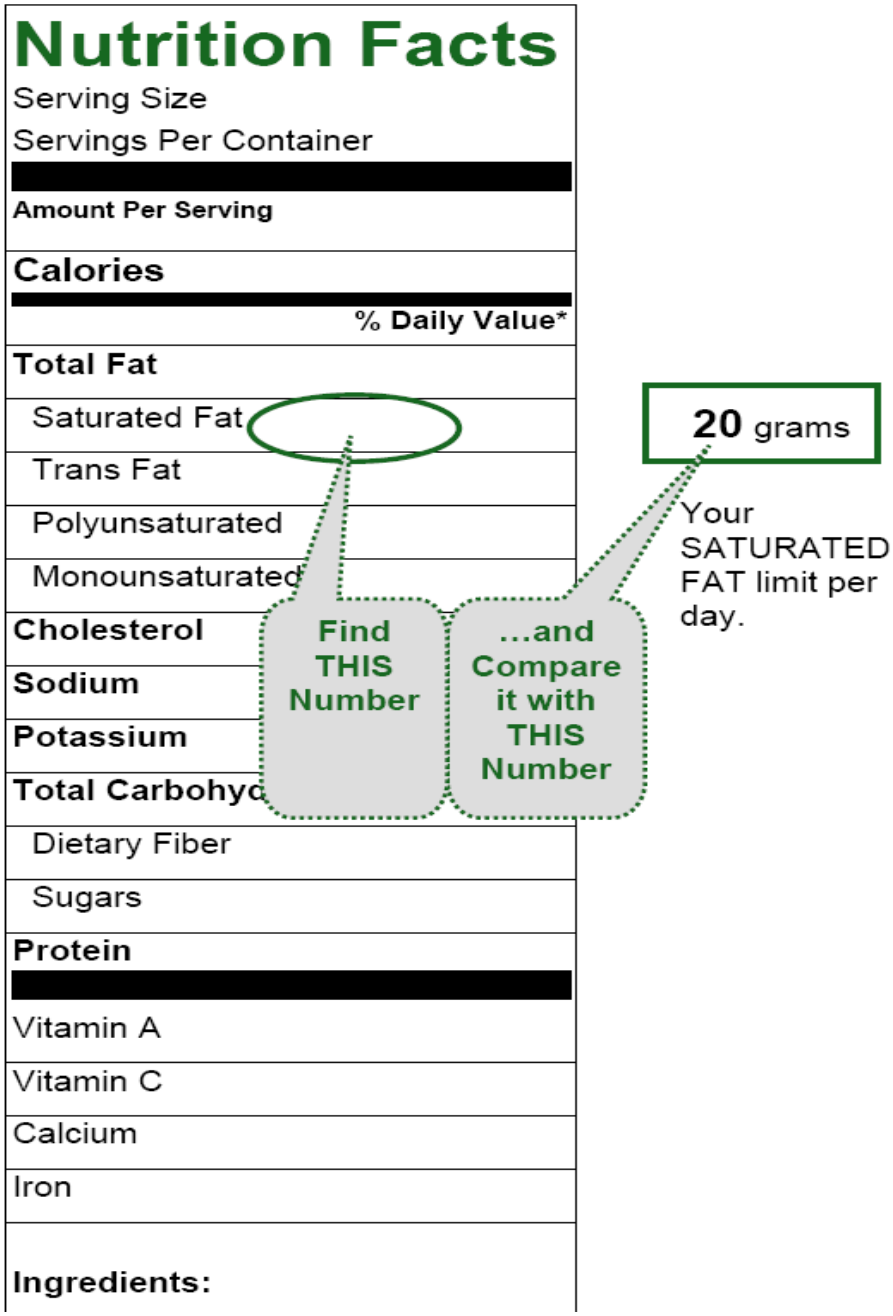
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohydrate
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron

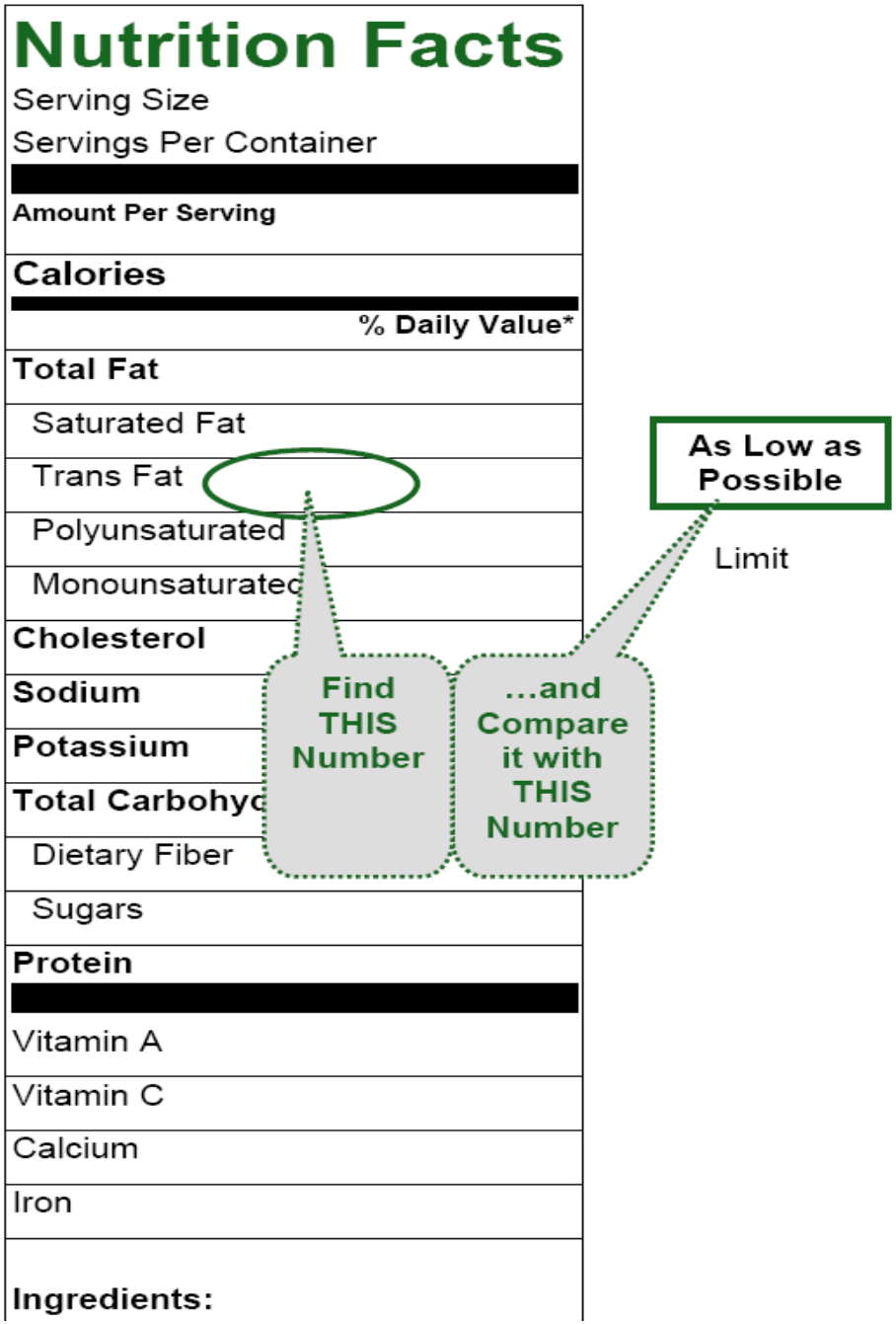
Ingredients:

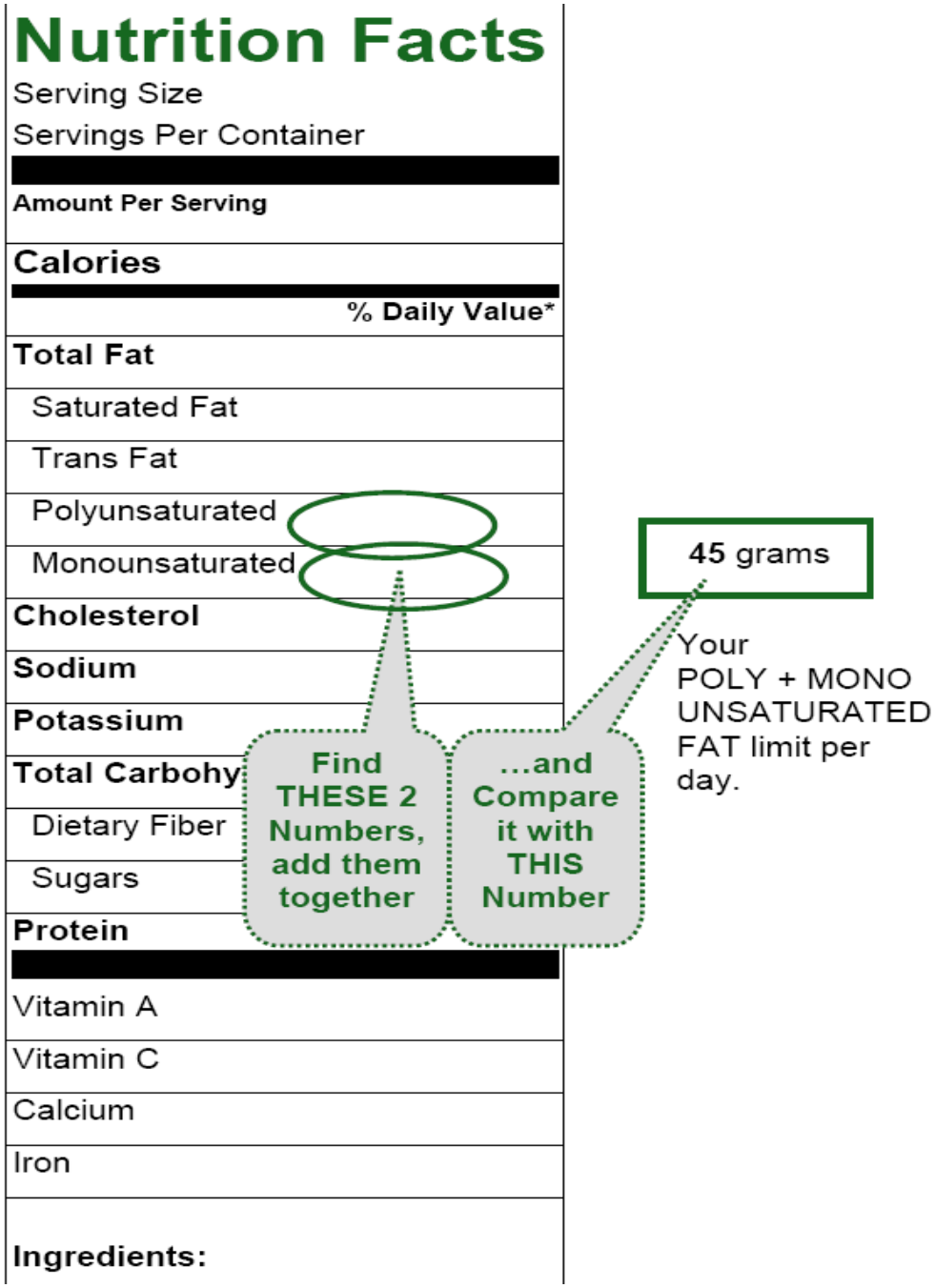


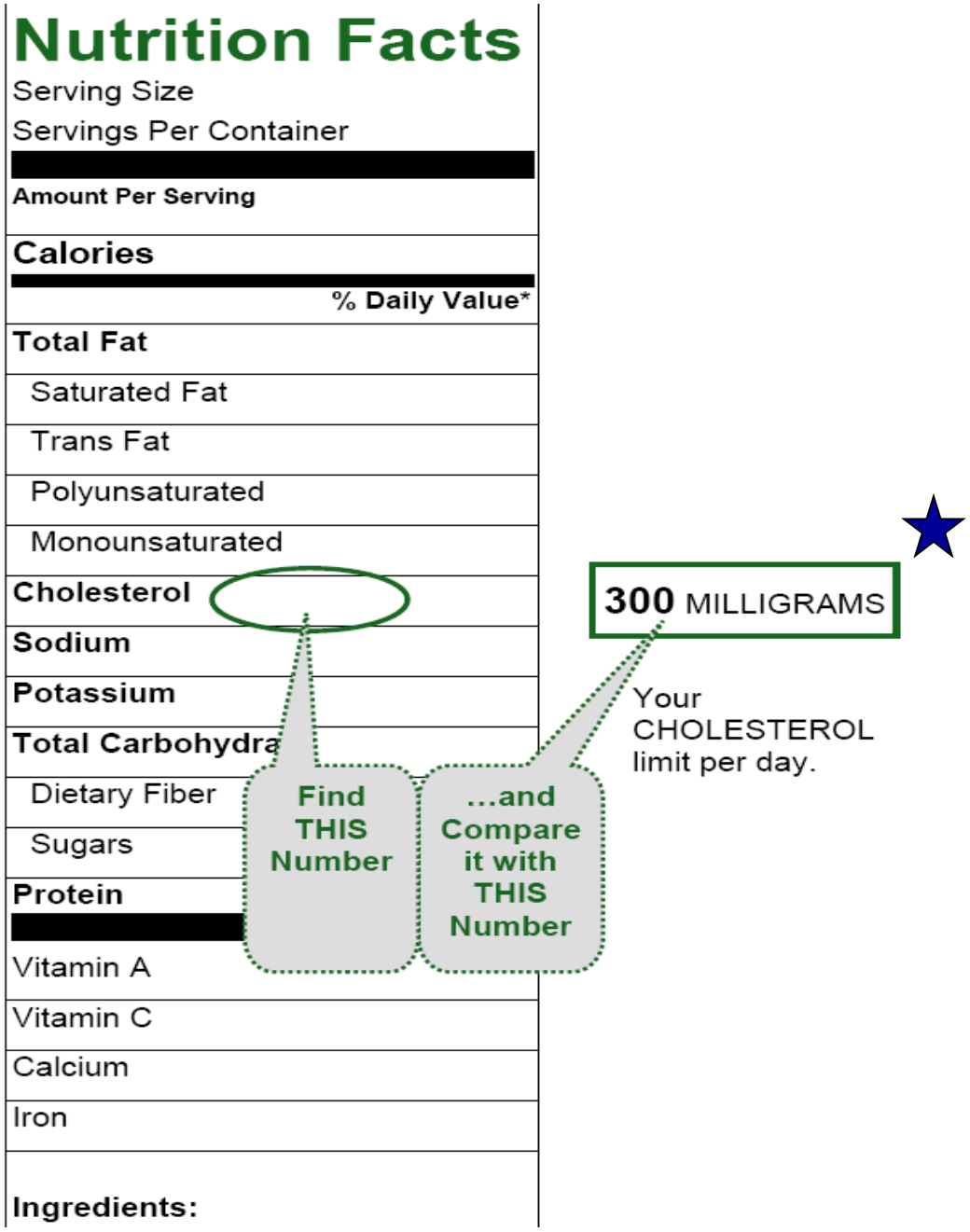

Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturate
Monounsaturat
Cholesterol
Sodium
Potassium
Total Carbohydrate
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THIS Number
...and Compare it with THIS Number
Your daily calorie limit is based on your activity level and if you want to lose weight, gain weight, or stay the same.

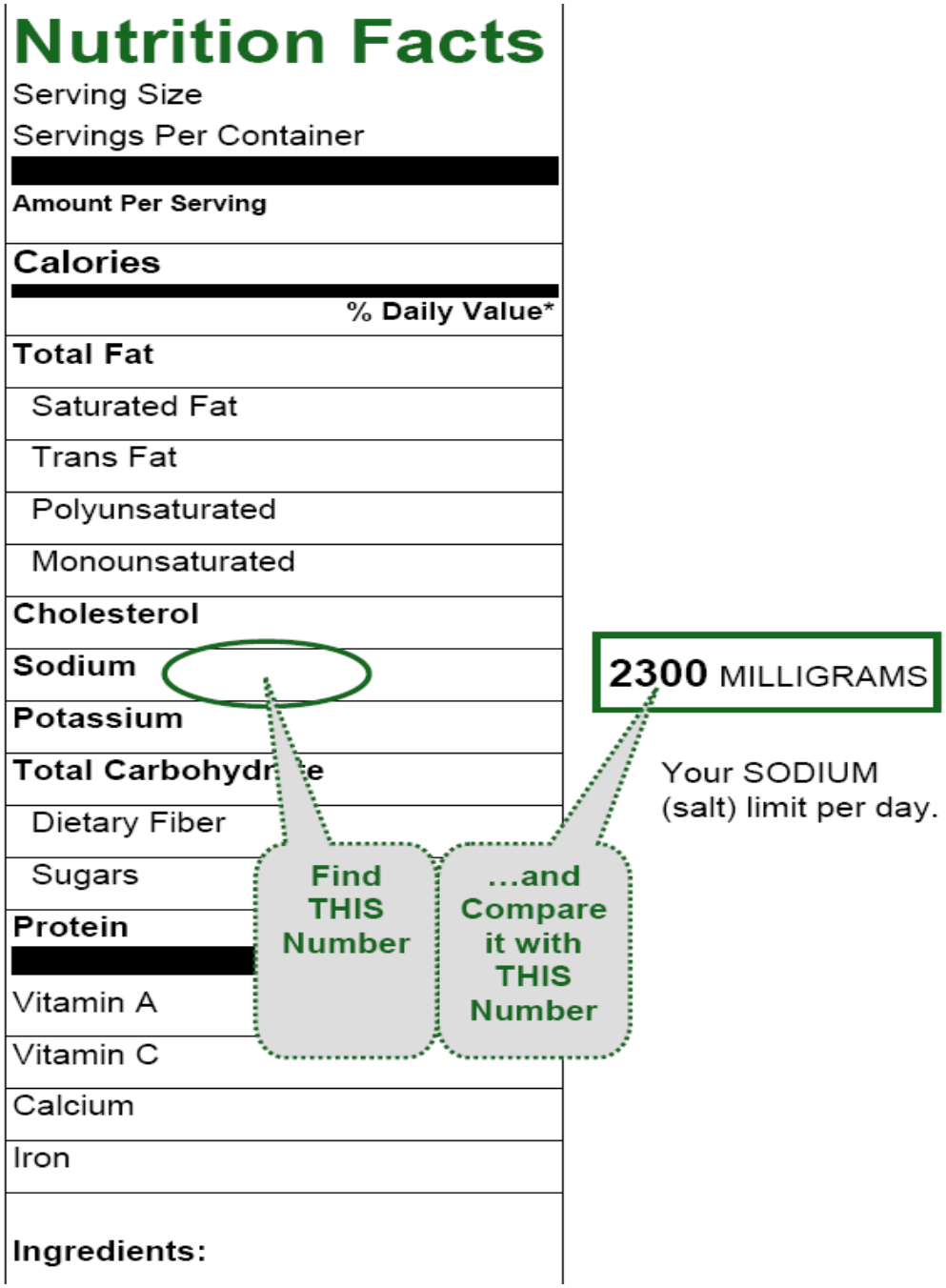

Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturat
Cholesterol
Sodium
Potassium
Total Carbohydrate
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THIS Number
...and Compare it with THIS Number
65 grams
Your FAT limit per day.

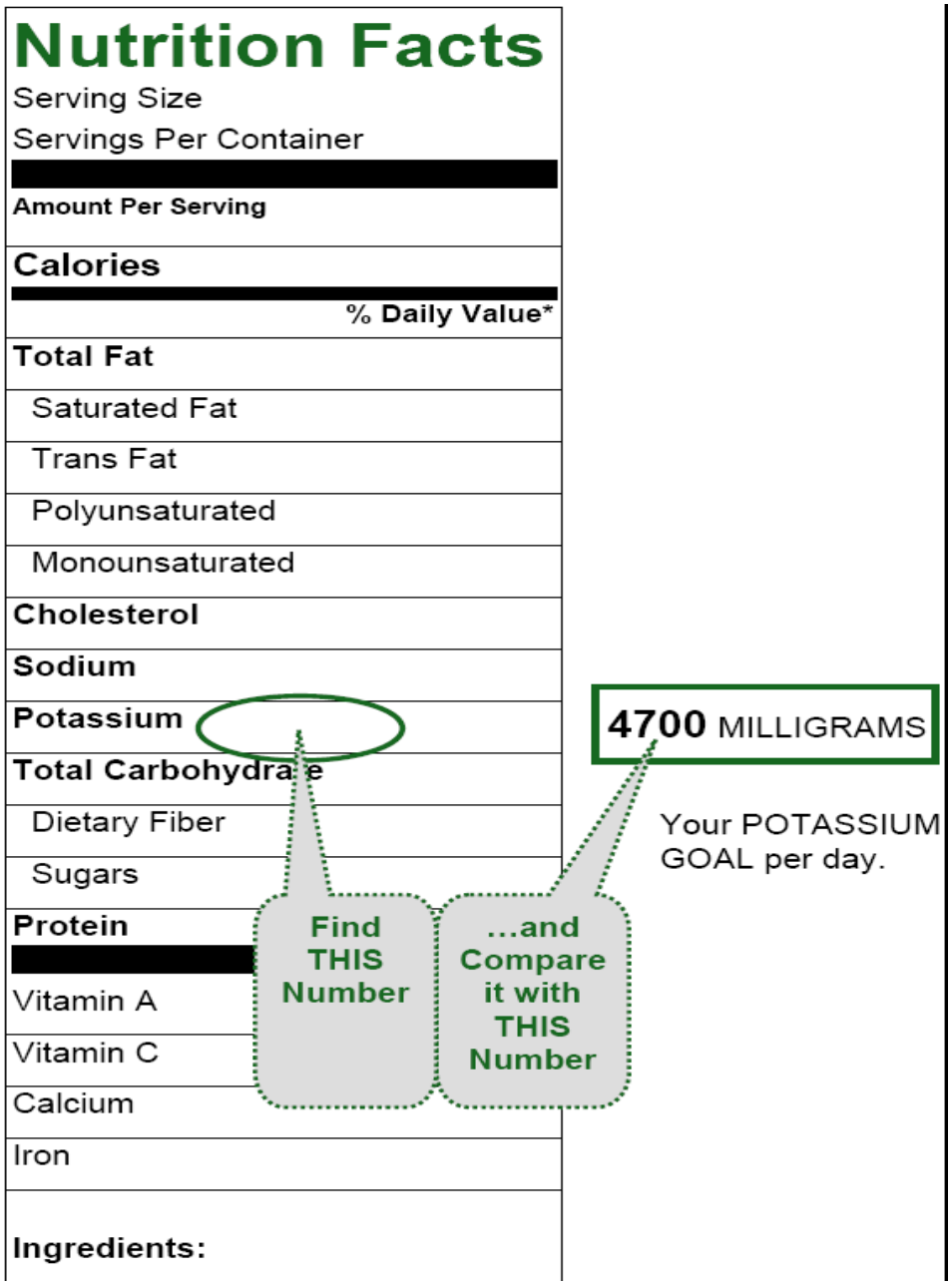

Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohyd
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THIS Number
...and Compare it with THIS Number
20 grams
Your SATURATED FAT limit per day.


Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohyd
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THIS Number
...and Compare it with THIS Number
As Low as Possible
Limit


Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohy
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THESE 2 Numbers, add them together
...and Compare it with THIS Number
45 grams
Your POLY + MONO UNSATURATED FAT limit per day.


Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohydra
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THIS Number
...and Compare it with THIS Number
300 MILLIGRAMS
Your CHOLESTEROL limit per day.


Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohydrate
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THIS Number
...and Compare it with THIS Number
2300 MILLIGRAMS
Your SODIUM (salt) limit per day.


Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohydrate
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THIS Number
...and Compare it with THIS Number
4700 MILLIGRAMS
Your POTASSIUM GOAL per day.

Nutrition Facts

Serving Size

Servings Per Container

Amount Per Serving

Calories

% Daily Value*

Total Fat

Saturated Fat

Trans Fat

Polyunsaturated

Monounsaturated

Cholesterol

Sodium

Potassium

Total Carbohydrate

Dietary Fiber

Sugars

Protein

Vitamin A

Vitamin C

Calcium

Iron

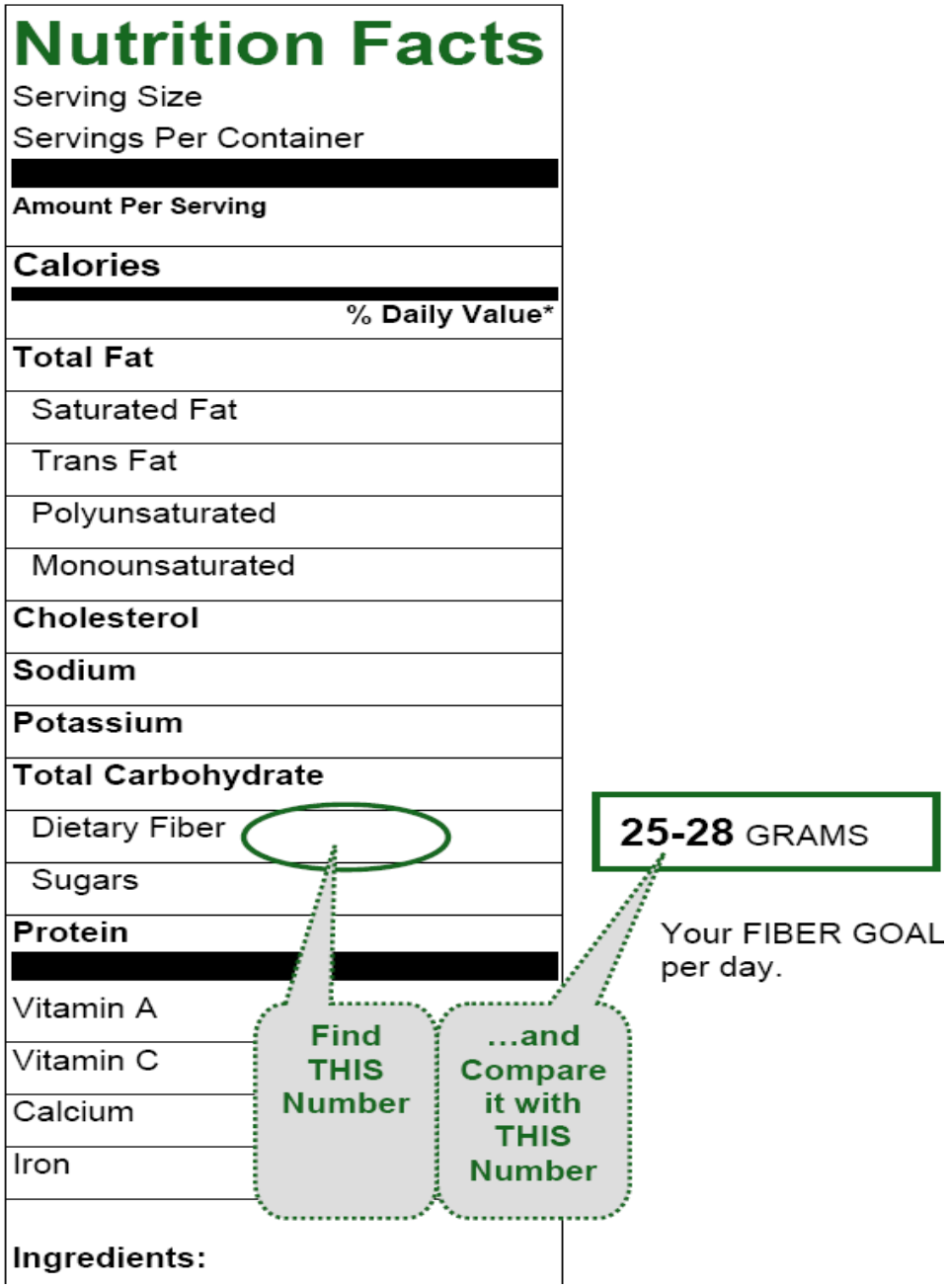
Ingredients:

This amount will vary in your diet

...get most of your carbs from these

Fruits, Vegetables, Whole Grains, & Low/Non-Fat Milk Products

Most Important


Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohydrate
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
Find THIS Number
...and Compare it with THIS Number
25-28 GRAMS
Your FIBER GOAL per day.

Nutrition Facts

Serving Size

Servings Per Container

Amount Per Serving

Calories

% Daily Value*

Total Fat

Saturated Fat

Trans Fat

Polyunsaturated

Monounsaturated

Cholesterol

Sodium

Potassium

Total Carbohydrate

Dietary Fiber

Sugars

Protein

Vitamin A

Vitamin C

Calcium

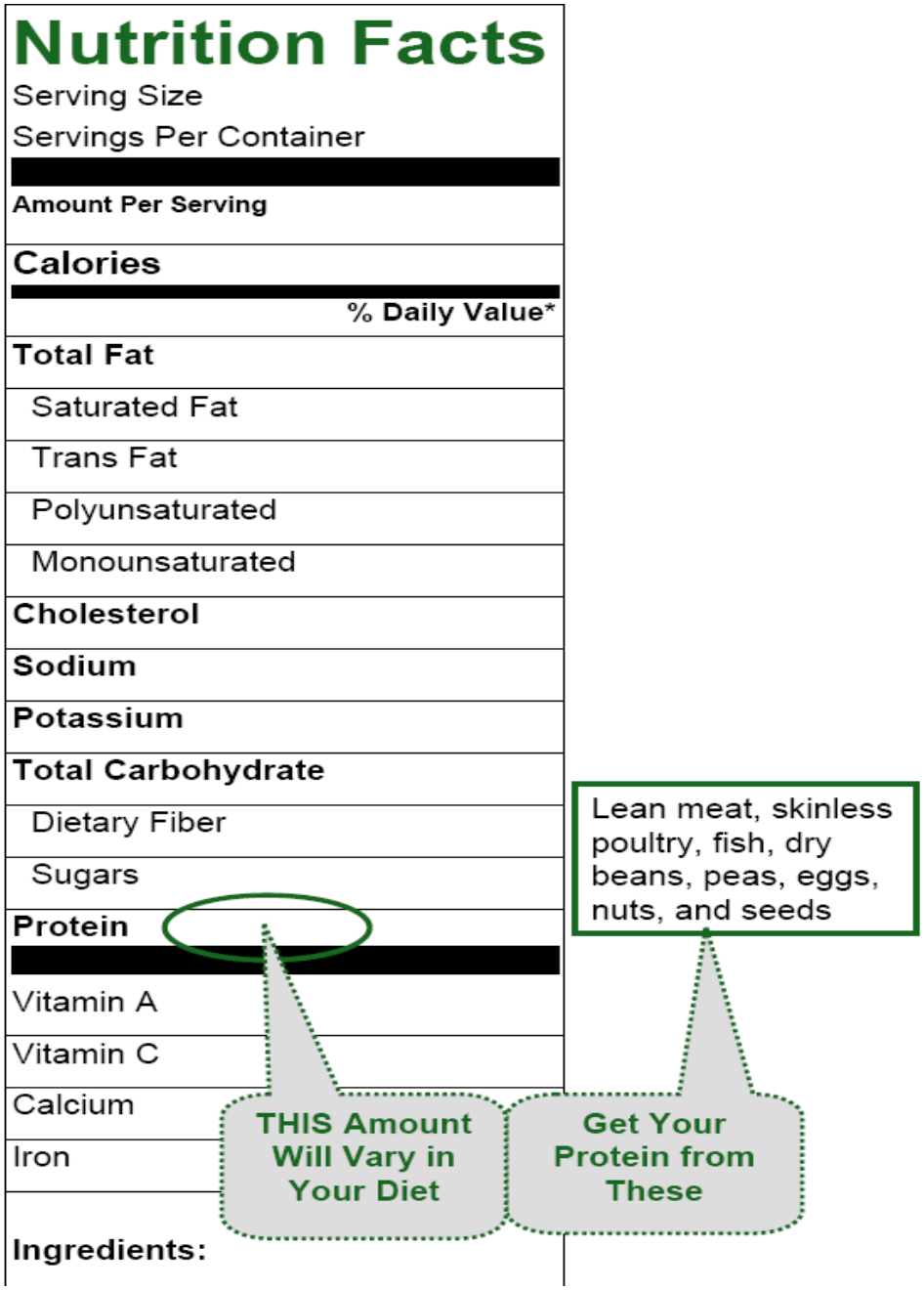
Iron

Ingredients:

Does not separate sugars into "added" vs. "natural"

Look HERE to find the "added" sugar

LIMIT THESE:
(all are "added" sugars")
Brown sugar, corn sweetener, corn/malt syrup, dextrose, fructose, fruit juice concentrate, glucose, honey, lactose, maltose, molasses, sucrose, sugar


Nutrition Facts
Serving Size
Servings Per Container
Amount Per Serving
Calories
% Daily Value*
Total Fat
Saturated Fat
Trans Fat
Polyunsaturated
Monounsaturated
Cholesterol
Sodium
Potassium
Total Carbohydrate
Dietary Fiber
Sugars
Protein
Vitamin A
Vitamin C
Calcium
Iron
Ingredients:
THIS Amount Will Vary in Your Diet
Lean meat, skinless poultry, fish, dry beans, peas, eggs, nuts, and seeds
Get Your Protein from These

Nutrition Facts

Serving Size

Servings Per Container

Amount Per Serving

Calories

% Daily Value*

Total Fat

Saturated Fat

Trans Fat

Polyunsaturated

Monounsaturated

Cholesterol

Sodium

Potassium

Total Carbohydrate

Dietary Fiber

Sugars

Protein

Vitamin A

Vitamin C

Calcium

Iron

Ingredients:

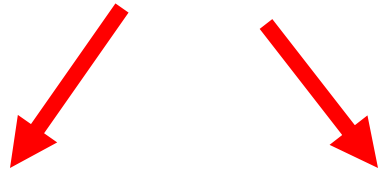
Find THESE Percentages

Compare with Your Goals for the Day

100%

Numbers to Memorize

65g



20g 45g

2300 mg

(1500mg)

0g

300mg*

4

4700 mg

50g

9

7

25-28g

% Calories/Day
(Complicated)

vs.

"Follow the Grams"
(Simple)
My Method

American Heart Association:

Keep your **Saturated Fat** (Bad Fat)

< 10% calories/day

How to calculate:

Example: You ate **20g Sat Fat** today

Your **Total Calories** today **?**

Assume: **2000** calories

20 g Sat Fat X 9 calories/g= **180** calories

180/2000 X 100= **9 %**

"Follow the Grams" Simple Method

- **Read Food Labels**
- **Add** up all **grams**/day of saturated fat
- Keep this number **≤ 20** grams in foods

If you know your **Total Calories/Day**

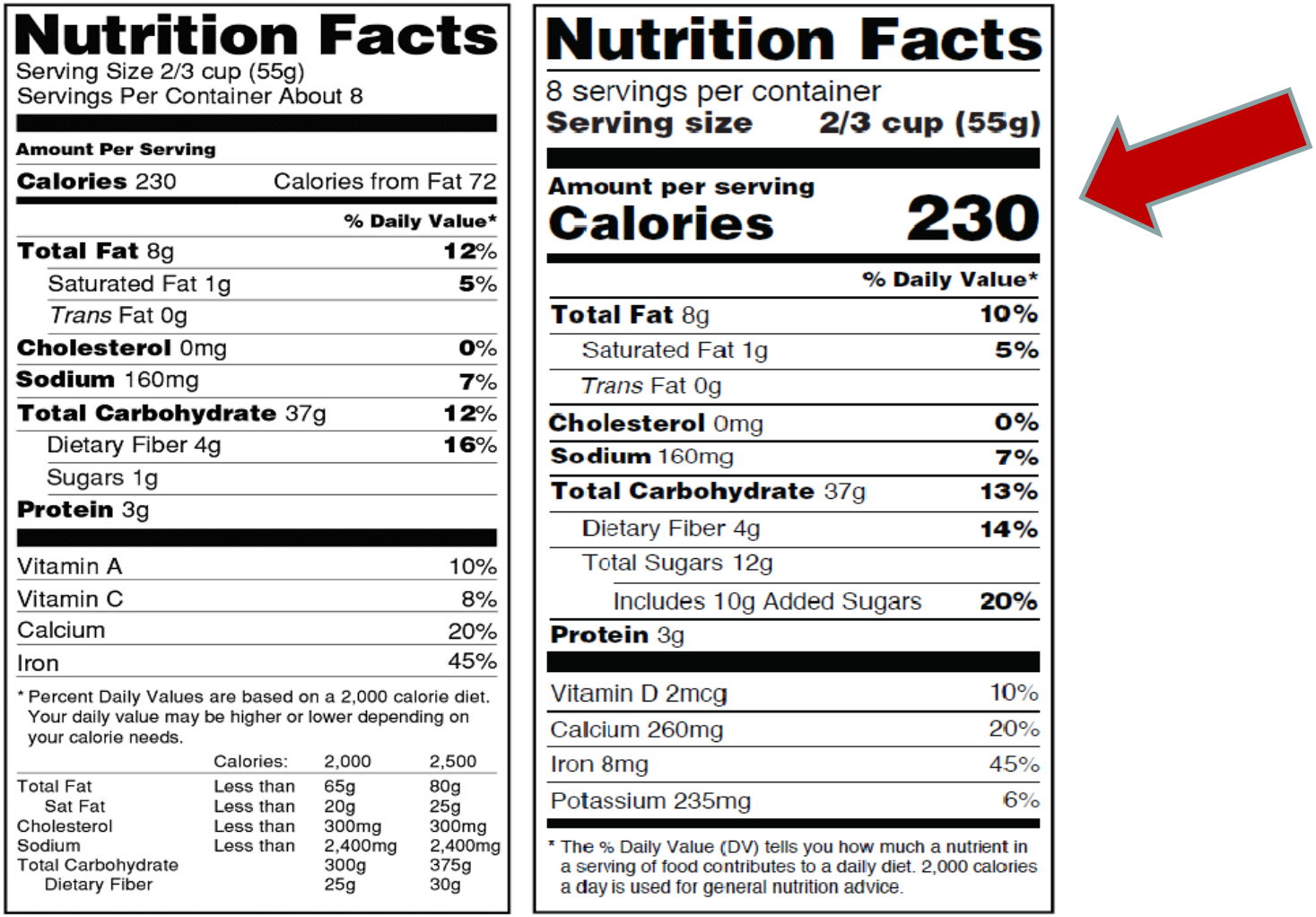
Make Adjustment:

Your total calories X **20 g** = **grams**

2000 calories **Specific to You**

Nutrition Facts (Food Labels): **2018 ?**

FDA Delays



Nutrition Facts

Serving Size 2/3 cup (55g)
Servings Per Container About 8

Amount Per Serving

Calories 230	Calories from Fat 72
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**12%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Nutrition Facts

8 servings per container
Serving size **2/3 cup (55g)**

Amount per serving
Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Nutrition Facts (Food Labels): **2018**

Nutrition Facts

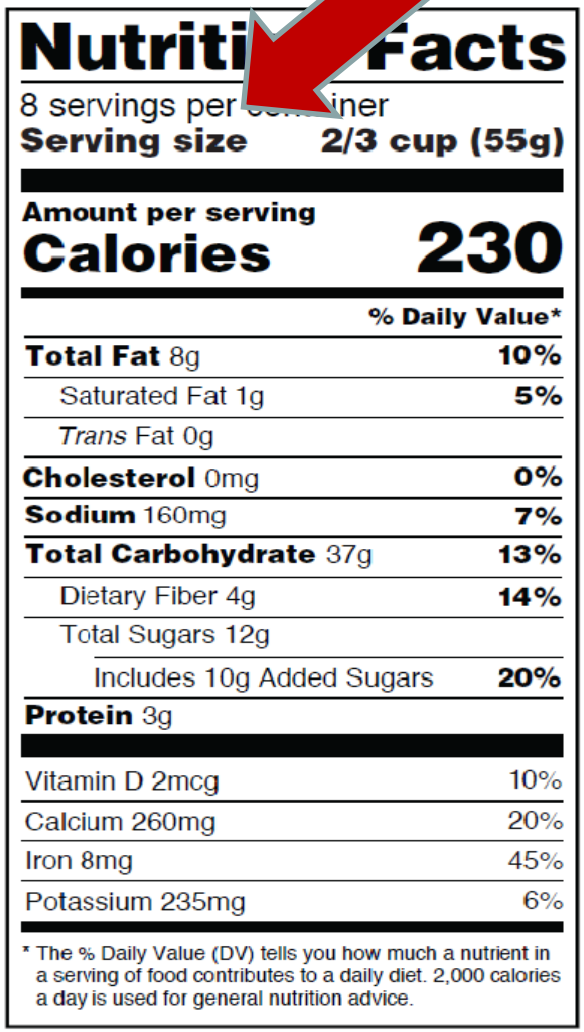
Serving Size 2/3 cup (55g)
Servings Per Container About 8

Amount Per Serving

Calories 230	Calories from Fat 72
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**12%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g



Nutriti Facts

8 servings per iner
Serving size **2/3 cup (55g)**

Amount per serving
Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

What people typically eat, not what they should eat

Problem: Package Size

Everything is bigger today

12 Oz **20 Oz**

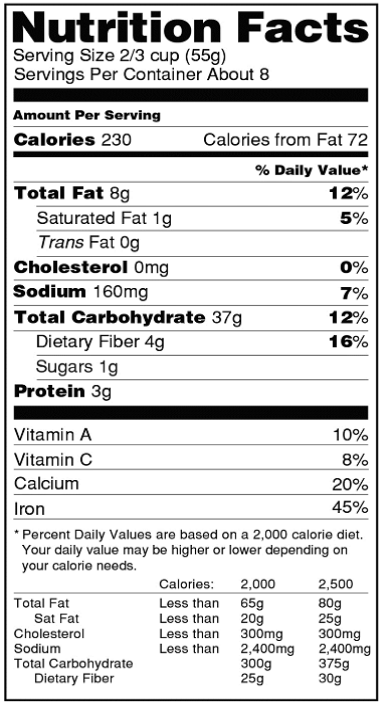
Both = 1 serving (typical consumption in 1 sitting)

Dropped from label:

- Calories from fat
- Vitamins A & C

Added to label:

- Added sugar (chronic diseases)
- Vitamin D (bones)
- Potassium (blood pressure)



Nutrition Facts

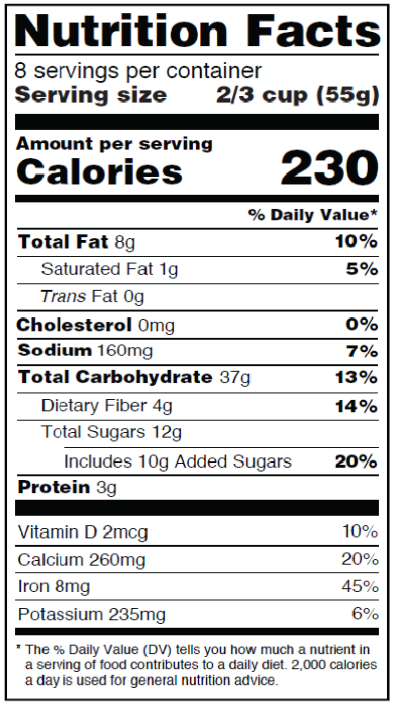
Serving Size 2/3 cup (55g)
Servings Per Container About 8

Amount Per Serving

Calories 230	Calories from Fat 72
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**12%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g



Nutrition Facts

8 servings per container
Serving size **2/3 cup (55g)**

Amount per serving
Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Older Label

Nutrition Facts

Serving Size 2/3 cup (55g)
Servings Per Container About 8

Amount Per Serving

Calories 230	Calories from Fat 72
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**12%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

grams/milligrams

Footnote

New Label

Nutrition Facts

8 servings per container
Serving size **2/3 cup (55g)**

Amount per serving
Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

no grams/mg

Footnote

YOUR DIET ANALYSIS

5 extra credit points

Start collecting 3 Day Data

Assignment

What's a good potato chip?

	WISE	TriSum	Lay's Baked
Ingred.	Veg. oil, one of following oils, salt	Partially hydrogenated soybean oil, salt	Starch, sugar, corn oil, salt, soy lecithin
Serving	28g (16 chips)	28g (20 chips)	28g (15 chips)
Calories	150	150	**110**
Fat (g)	10	9	**1.5**
Sat Fat (g)	**3**	2.5	0
T-Fat (g)	0	**3.5**	0
Chol. (mg)	0	0	0
Na (mg)	**190**	115	**180**

	LAY'S CLASSIC	RUFFLES	CAPE COD
Ingred.	Sunflower oil, salt	Sunflower oil, salt	Canola oil, salt
Serving	28g (15 chips)	28g (12 chips)	28g (19 chips)
Calories	150	160	150
Fat (g)	10	10	8
Sat Fat (g)	1	1	**0.5**
T-Fat (g)	0	0	0
Chol. (mg)	0	0	0
Na (mg)	**180**	**160**	**110**

Marketing Food

Nutrition Facts

Serv Size 2 Tbsp (32g)
Servings About 16
Calories 190
Fat Cal 130

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/Serving	%DV*	Amount/Serving	%DV*
Total Fat 16g	**24%**	**Total Carb** 8g	**3%**
Sat Fat 2.5g	**13%**	Dietary Fiber 2g	**9%**
Trans Fat 0g		Sugars 3g	
Cholest 0mg	**0%**	**Protein** 7g	
Sodium 140mg	**6%**		

Iron 4% • Vitamin E 10% • Riboflavin 2% • Niacin 20%
Not a significant source of vitamin A, vitamin C and calcium.

INGREDIENTS: MADE FROM ROASTED PEANUTS AND SUGAR. CONTAINS 2% OR LESS OF: MOLASSES, FULLY HYDROGENATED VEGETABLE OILS (RAPESEED AND SOYBEAN), MONO AND DIGLYCERIDES, SALT.

LOOK FOR THE FLAVOR SEAL
CONTAINS NO PRESERVATIVES
NO REFRIGERATION REQUIRED

©/® THE J.M. SMUCKER COMPANY
ORRVILLE, OH 44667 USA

PROUD SPONSOR
BOYS & GIRLS CLUBS OF AMERICA

THIS PACKAGE IS RECYCLABLE
HOWEVER, RECYCLING PROGRAMS FOR THIS PACKAGE MAY NOT EXIST IN YOUR AREA.

QUESTIONS? COMMENTS? 1-800-283-8915

CONTAINS 12g FAT PER SERVING COMPARED TO 16g IN PEANUT BUTTER

Nutrition Facts

Serv Size 2 Tbsp (36g)
Servings About 14
Calories 190
Fat Cal 100

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/Serving	%DV*	Amount/Serving	%DV*
Total Fat 12g	**19%**	**Sodium** 220mg	**9%**
Sat Fat 2g	**10%**	**Total Carb** 15g	**5%**
Trans Fat 0g		Fiber 2g	**7%**
Polyunsat Fat 3.5g		Sugars 4g	
Monounsat Fat 6g		**Protein** 7g	
Cholest 0mg	**0%**		

Calcium 2% • Iron 4% • Niacin 30% • Vitamin B6 6%
Folic Acid 8% • Magnesium 15% • Zinc 6% • Copper 10%
Not a significant source of vitamin A and vitamin C.

INGREDIENTS: PEANUTS, CORN SYRUP SOLIDS, SUGAR, SOY PROTEIN, CONTAINS 2% OR LESS OF: SALT, FULLY HYDROGENATED VEGETABLE OIL (RAPESEED AND SOYBEAN), MONO AND DIGLYCERIDES, MOLASSES, MAGNESIUM OXIDE, NIACINAMIDE, FERRIC ORTHOPHOSPHATE, ZINC OXIDE, COPPER SULFATE, FOLIC ACID, PYRIDOXINE HYDROCHLORIDE.

CONTAINS NO PRESERVATIVES
NO REFRIGERATION REQUIRED

THIS PACKAGE IS RECYCLABLE. HOWEVER, RECYCLING PROGRAMS FOR THIS PACKAGE MAY NOT EXIST IN YOUR AREA.

©/® THE J.M. SMUCKER COMPANY, ORRVILLE, OH 44667 USA

QUESTIONS? COMMENTS? CALL TOLL-FREE 1-800-283-8915

	Regular	Reduced Fat	Taste?
Calories	**190**	**190**	
Fat	**16g**	**12g**	↓ **Fat**
Sat Fat	**2.5g**	**2g**	↓ **Sat Fat**
Trans	0	0	
PUFA	?	3.5g	
Mono	?	6g	
Chol	0	0	
Sodium	**140 mg**	**220mg**	↑ **Sodium**
Total Carb	**8g**	**15g**	↑ **Carb**
Fiber	2g	2g	
Sugars	**3g**	**4g**	↑ **Sugars**
Protein	7g	7g	Serving size 2 Tbsp

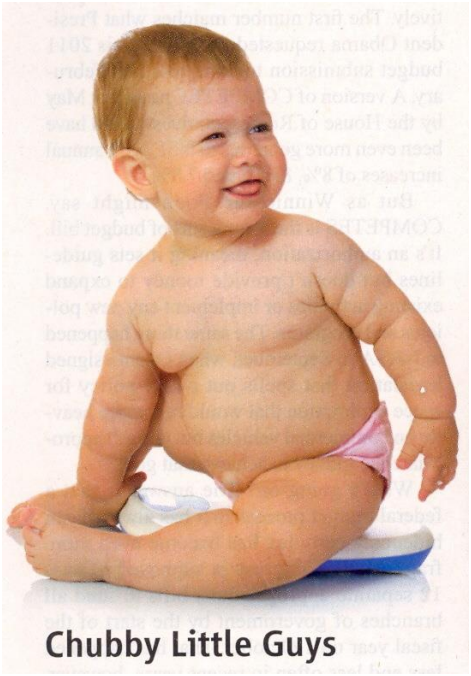
ADDED SUGAR & CHILDREN

Chubby Babies

2001 University of Michigan Study

US Children at **9 months: 32%** obese or **at risk** of obesity

Importance: Early Intervention (prevention)



American Heart Association

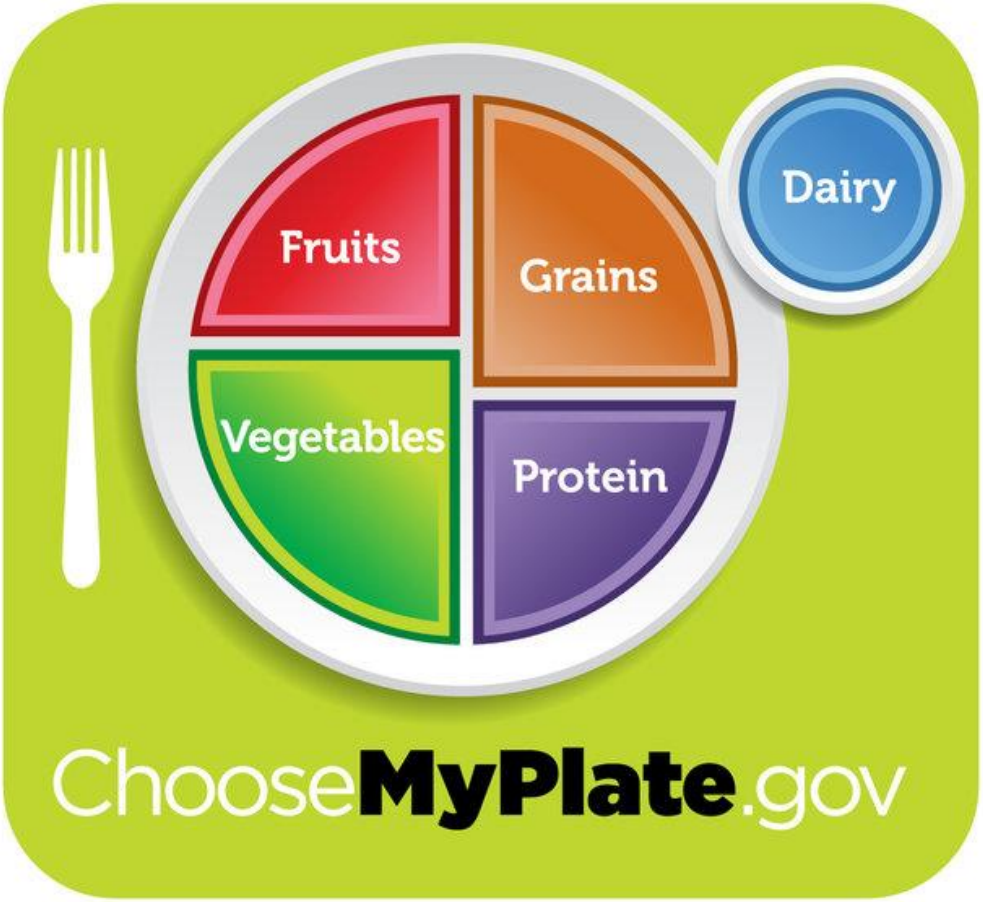
Children: 2-18

Added sugar **<25g/day**

Limit- sugar drink: **8oz/wk**

< 1 year: No fruit juice

US Department of Agriculture (June 2011): simple way to eat healthy: all food groups, portions of each



Michele Obama

"Partnership for healthier America"

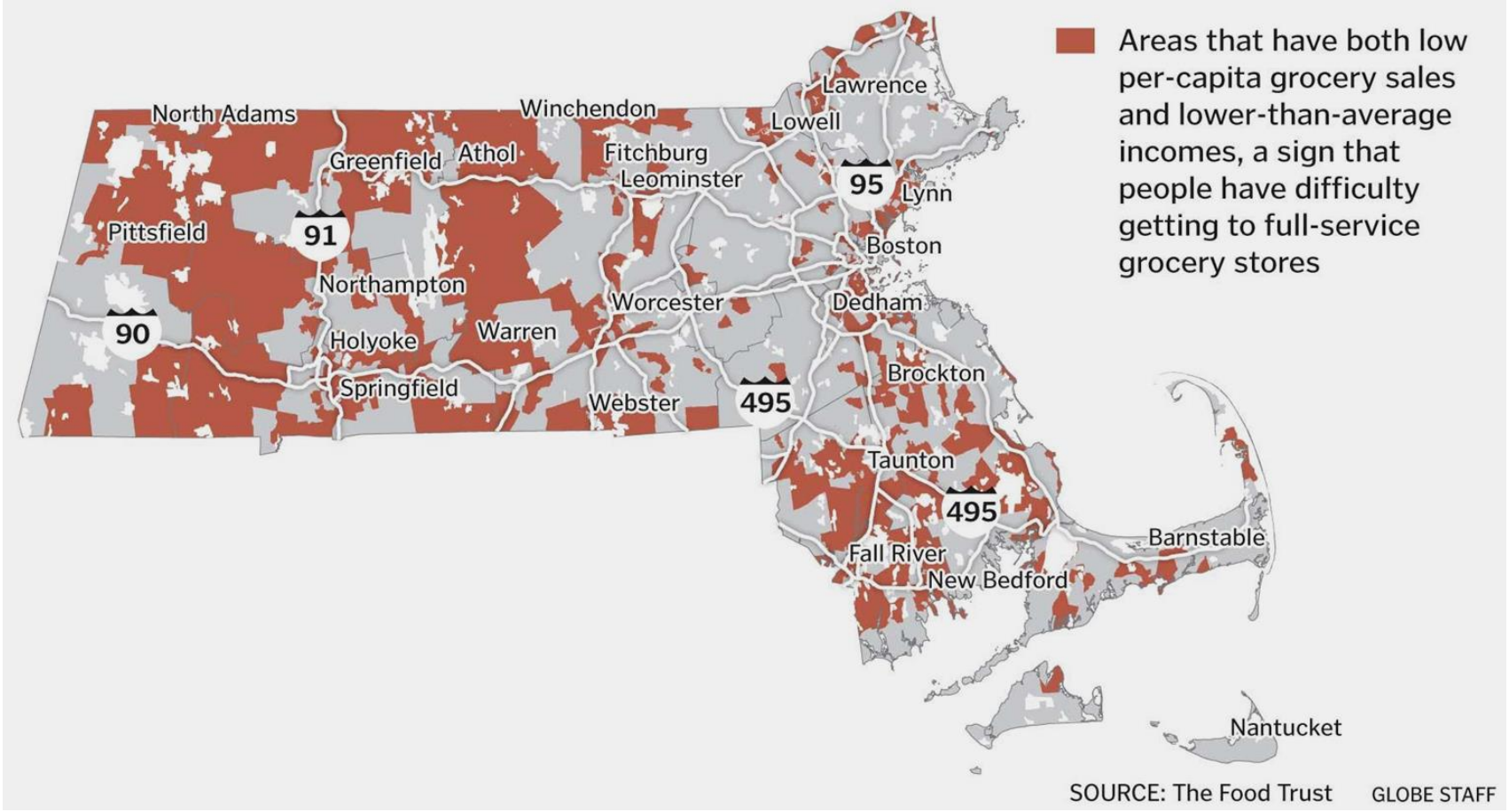
Pledge: Wal-Mart, Walgreens, SuperValu: expand/open 1500 stores in **"Food Deserts"**

Wal-Mart 5 year plan:

- ↓ **Salt, fats, sugars in packaged foods**
- ↓ Price: **fruits and veggies**

Boston Globe 5/3/17 **40%** Mass residents: poor access to supermarkets

FOOD DESERTS



Food Insecurity: **Lowell**

Janelle Goode unemployed mom: difficulty feeding sons **healthy diet**

WENDY MAEDA/GLOBE STAFF

Janell Goode, a single Lowell mother who is now unemployed, has struggled to feed her young sons a healthy diet.

A rising hunger among children

College Food Pantries

- 300 US Colleges
- Poor students- Food Insecurity
- Stress/anxiety:

Where is next meal?

- Also food vouchers, Food "swipes" donations

Rebecca Harmata

Brooklyn College

Outside work, soccer goalie

ARAMARK: UML food service

- Serves $2 billion meals/year
- Schools, hospitals, sports arenas
- Serves 40 teams: NBA, NFL, NHL
- By 2020: ↓ 20% **fat and sodium**
- ↑ Fruits, veggies, whole grains

aramark

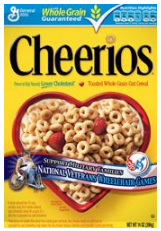
Public Pressure on Food Industry

McDonald's, Panera, Chick-fil-A, Tyson:

Chickens treated with **antibiotics**

Panera: "transparency- consumer right"

Artificial colors, preservatives, sweeteners, flavors



Cheerios, Similac (baby formula), Chipotle

GMO's

Know for exam:

1) **What is a macronutrient?**
2) **What is an example of a chronic disease?**
3) **Know about Dietary Guidelines: foods to limit vs. increase**
4) **Know about foods in the Mediterranean Diet**
5) **What are the major food groups?**

For exam:

6) **Understand: saturated, monounsaturated, polyunsaturated, trans fats**

7) **Know calories/gram for: fat, carb, protein, and alcohol**

8) **Know Dietary Guideline recommendations for sodium, potassium, fiber, added sugar**

American Diet

Past	Present
Milk	Meat, fish
Fruit/Veggies	Poultry
Plant Protein (low fat, no cholesterol)	Sugar, soft drinks
More Fiber	Animal Protein
	Processed Foods
	High salt/calories

People – other countries:

↑ Starches

↑ Vegetables

↓ Meat, Fat

↓ Sugar

↓ Chronic Diseases

HUMAN EVOLUTION

What's for Dinner? Researchers Seek Our Ancestors' Answers

In general:

↑ Affluence ↑ Meat

↑ Heart Disease & Cancer

People other countries

U.S.

Adopt our diet

Develop our chronic diseases

First McDonald's in Moscow

Major change: Communism & foreign investment- 30,000 people served- opening day

Today: Dramatic increase American fast food in Russia: **279 McDonald's**

Wendy's 2011

NY Times June 20, 2006 "McDonald's **operating profit** in **France** last year was **second** only to that of McDonald's in the United States."

NY Times 10/19/86 "**McDonald's** sells more than **$400** million worth of food in **Japan**."

China

McDonald's: largest state-run union in **China** 2002: **184** million overweight

31 million **obese**

Affluent young people in India acquiring "new tastes" for Fast Food

$2.5 billion Fast Food market in India: 2013

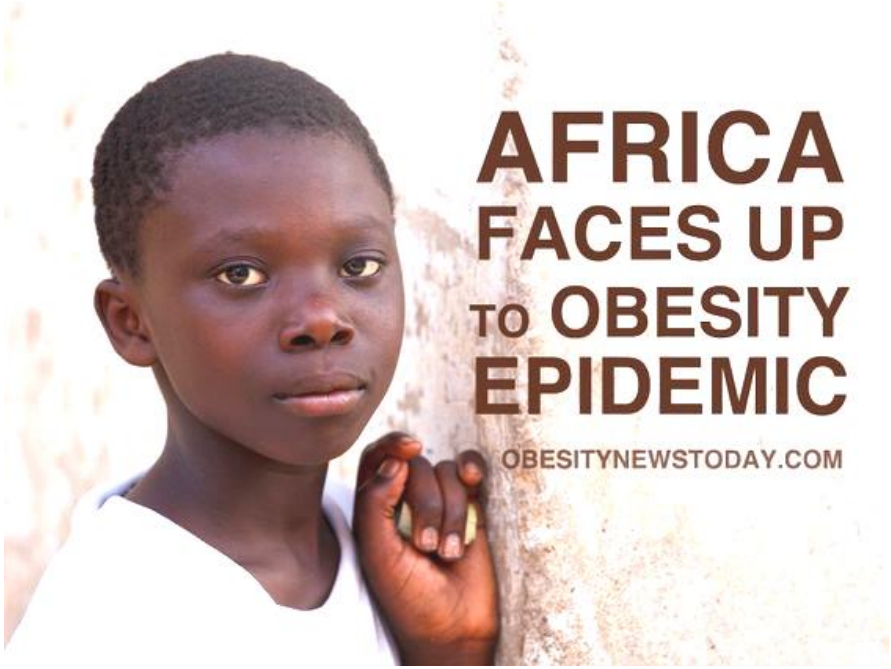
Prosperity in Viet Nam

↑ Fast Food Restaurants (KFC)

↑ Type 2 Diabetes

"diabetes foot": amputations

"**Africa's** Gains Come with an Alarming Byproduct: **Obesity**" NY Times 1/28/18



Poorest Continent

AIDS Epidemic

Africa: Malnutrition High

- Some parts: ↑ Economic Growth
- ↑ **Obesity, Diabetes**
- Rural Farming → Cities → Sedentary Living
- ↑ Cars/Motorbikes ↓ **Walking**
- Traditional Diet: beans, carrots, kale
- Cities: **Cheap** Chips, Fries, Fried Dough
- Expensive: Fish, veggies, apples
- ↑ **Coca-Cola, Burger King, Domino's**

Stigma: Thin: poor, sick vs. heavy-wealthy

Eating at Restaurants/Fast food

Americans eat **>1/3** meals outside home

Significant effect on diet

92% Restaurant meals **too** high in calories (2016 study)

Dining Out

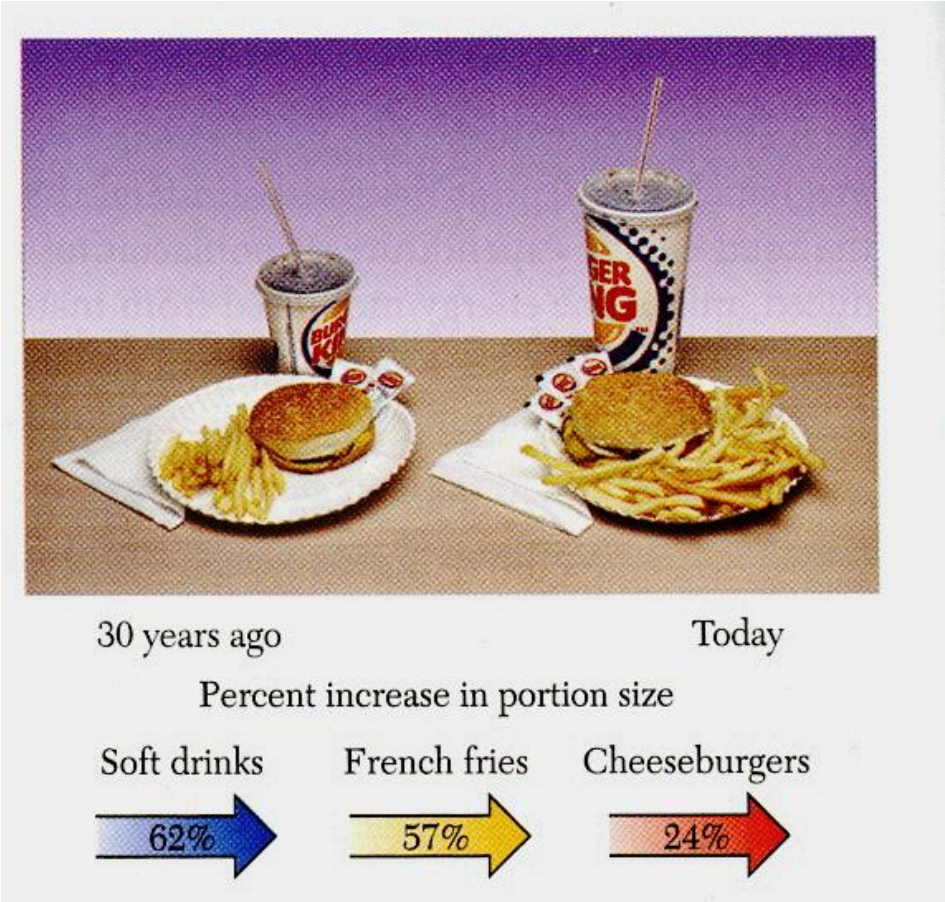
Good Tips

Review Sheets-
Packet #1 (Web site)
for 1st Exam

USDA- Restaurant Food

Serving size over the years

More food- more calories



Your Body Chemistry

YOUR BODY

ATOMS: 99% Hydrogen

Oxygen

Carbon

Nitrogen

Held together: **Chemical Bonds**

Biomolecules: carbon based

Carbohydrates

Fats

Protein

DNA/RNA

Your Food: most **energy** from carbohydrates & fats

Your body: energy **stored** as carbohydrates & fats

Protein: **not** stored for body energy

Calories: amount of **energy** in chemical bonds of food

Fats:	**9** calories/gram
Carbohydrates:	**4** calories/gram
Protein:	**4** calories/gram
Alcohol:	**7** calories/gram

Carbohydrates

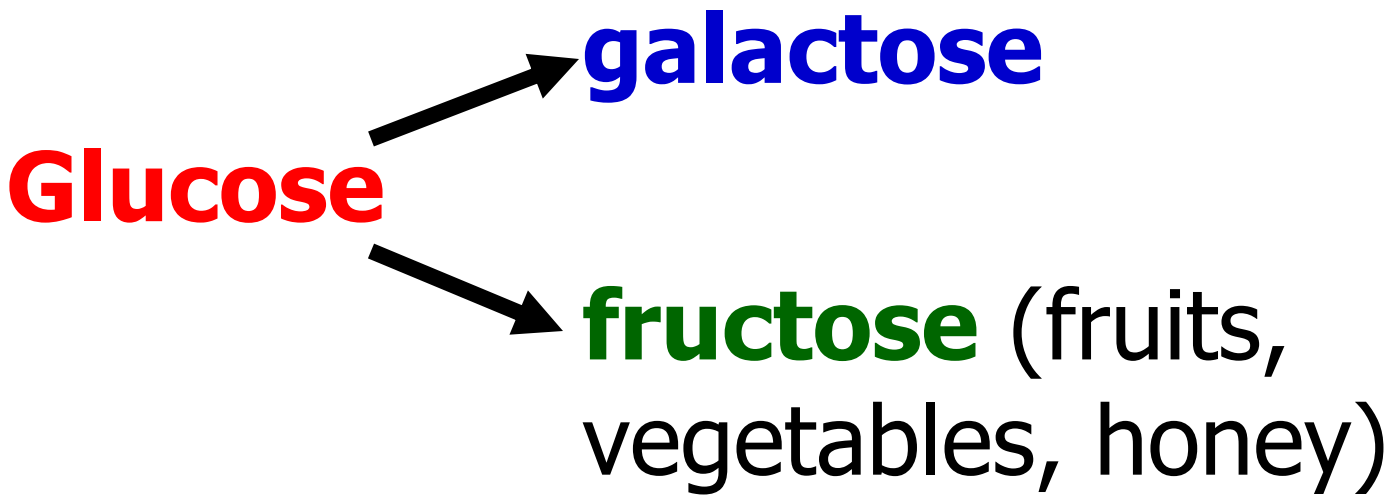
1) **Simple Sugars**

2) **Complex Carbohydrates (starch, glycogen, fibers)**

Simple Sugars

- **Monosaccharides**:

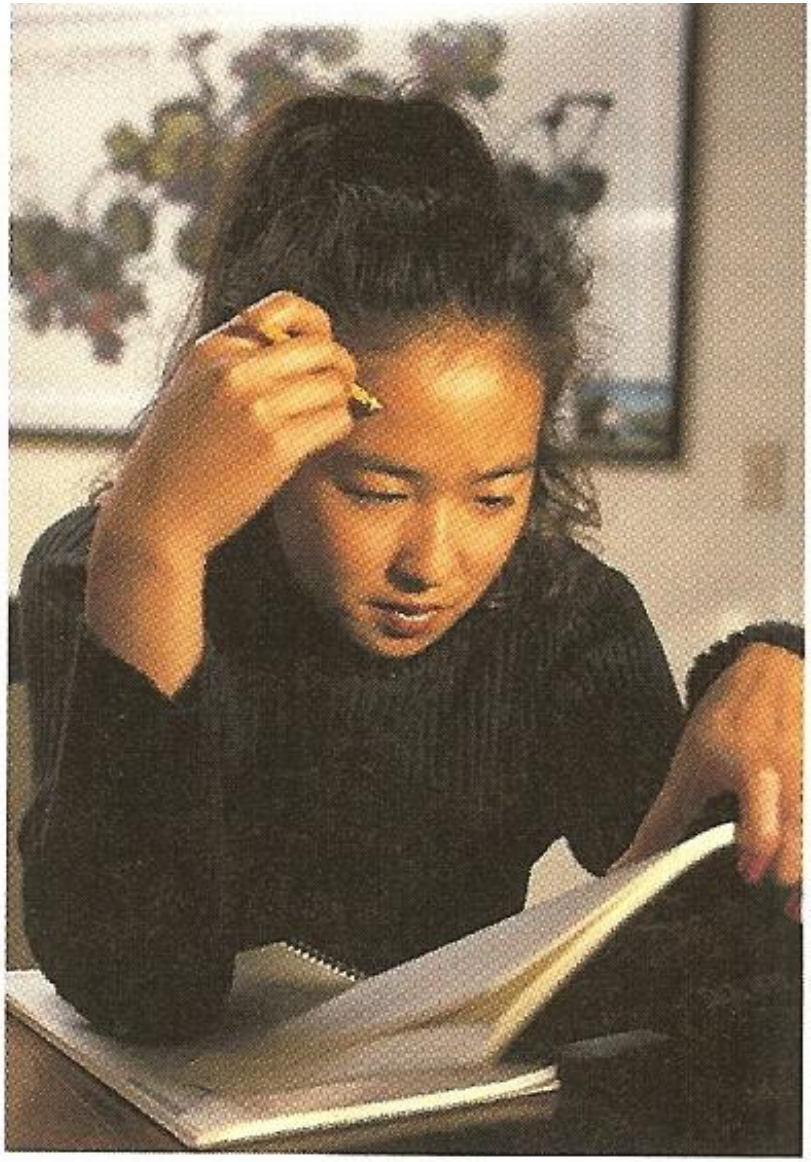
  Example: **glucose (blood sugar)**



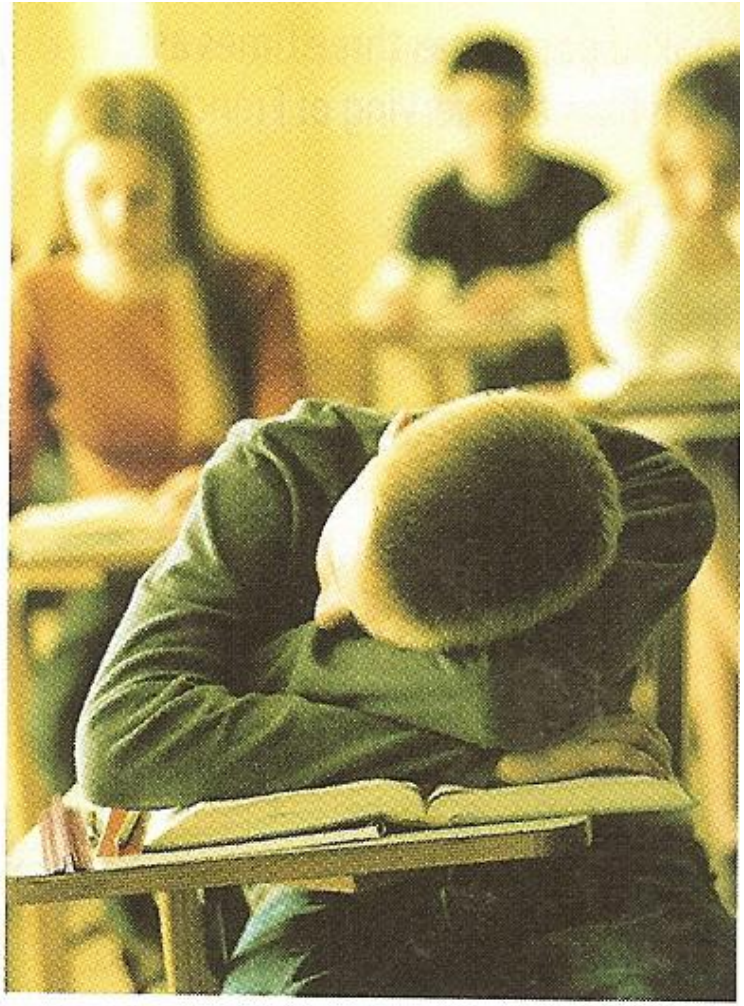
Glucose: very important

Only source energy- **red blood cells**

Preferred energy: **brain, nervous system, placenta, fetus**



In our bodies, glucose is the preferred source of energy for the brain.



Our red blood cells, brain, and nerve cells primarily rely on glucose. This is why you get tired, irritable, and shaky when you have not eaten for a prolonged period of time.

Tufts University Study 2009

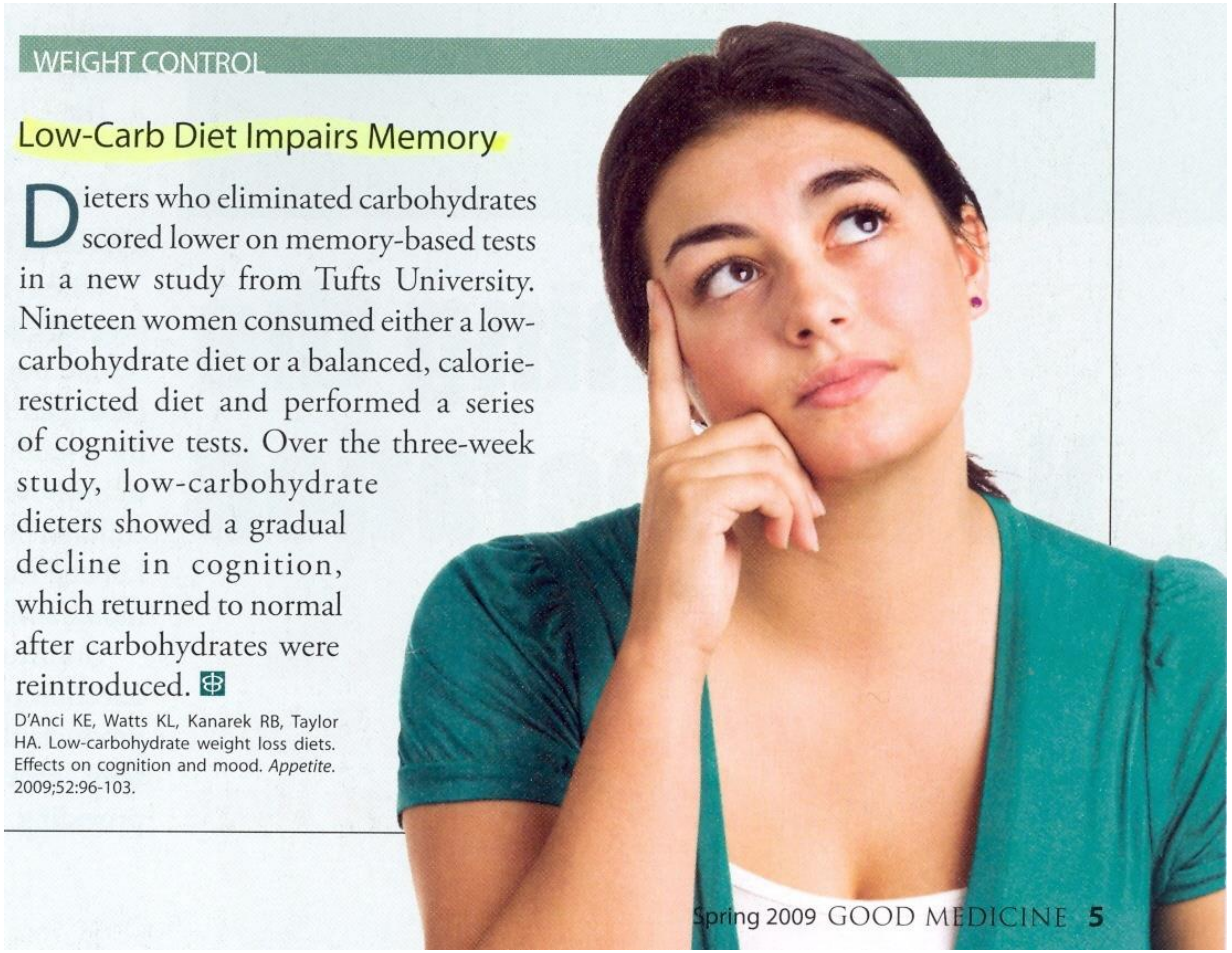
Dieters:

Eliminate Carbs

Score

Lower:

Memory tests



WEIGHT CONTROL

Low-Carb Diet Impairs Memory

Dieters who eliminated carbohydrates scored lower on memory-based tests in a new study from Tufts University. Nineteen women consumed either a low-carbohydrate diet or a balanced, calorie-restricted diet and performed a series of cognitive tests. Over the three-week study, low-carbohydrate dieters showed a gradual decline in cognition, which returned to normal after carbohydrates were reintroduced.

D'Anci KE, Watts KL, Kanarek RB, Taylor HA. Low-carbohydrate weight loss diets. Effects on cognition and mood. *Appetite.* 2009;52:96-103.

Sugars

- **Disaccharides**

  Maltose: malt products (brewing, distilling, yeast making)

  Sucrose: table sugar (sugar cane, maple syrup, honey)

  Lactose: milk sugar (human & cow's milk)

High Fructose Corn Syrup (HFCS)

Corn starch → enzyme → **high fructose corn syrup**

HFCS: 55% fructose, 45% glucose (unbound)

Sucrose: 50% fructose, 50% glucose **(Bound-chemical bonds)**

High Fructose Corn Syrup (HFCS)

"Devil's Candy": found everywhere

Why use it?

1. **Safe**
2. **Cheaper** than sugar
3. **Liquid**: easier to mix with drinks and food
4. **Sweeter** than sucrose

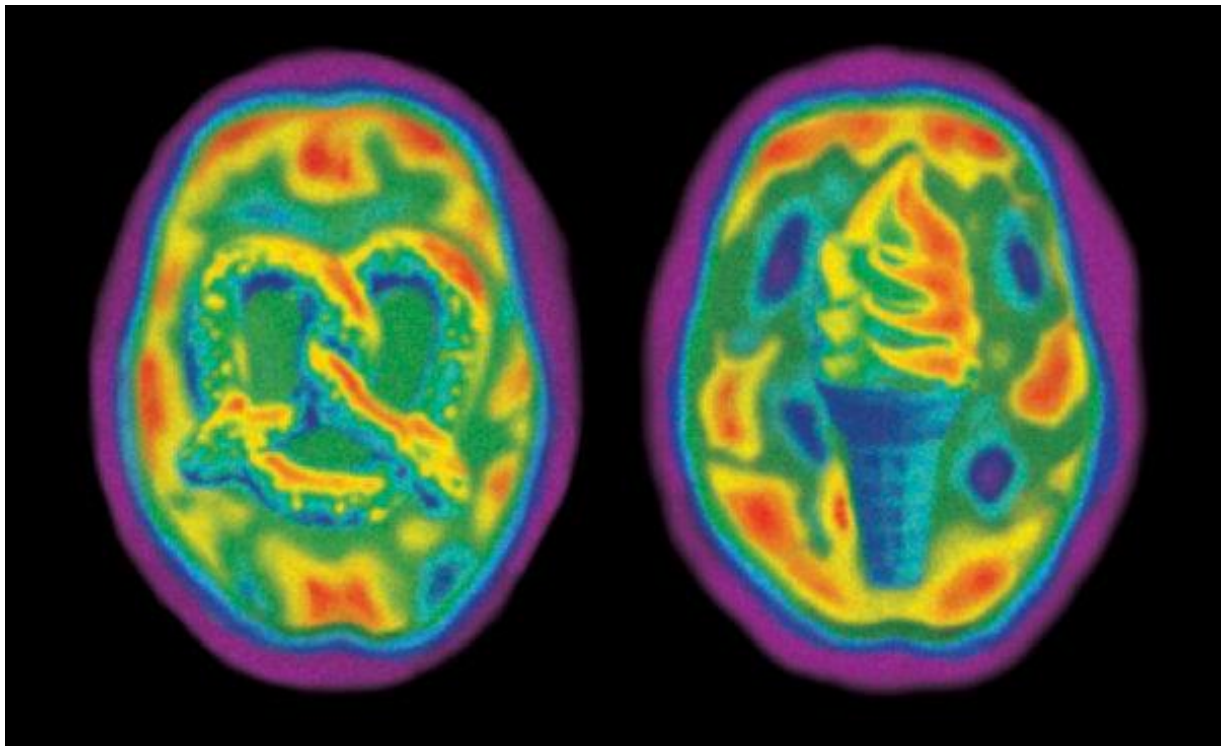
HFCS and Obesity?

- Some studies: yes
- Other research: HFCS **"not uniquely fattening"**
- More important: **drinking too** much sweetened soft drinks: ↑ **obesity**
- **1** 12 ounce soft drink/day = **"added"** sugar **allowance (USDA)**

Glucose vs. **Fructose** Metabolism

Normal weight people: drank **300** calories: **Glucose** or **Fructose**

Measure **MRI blood flow** in brains



After Glucose

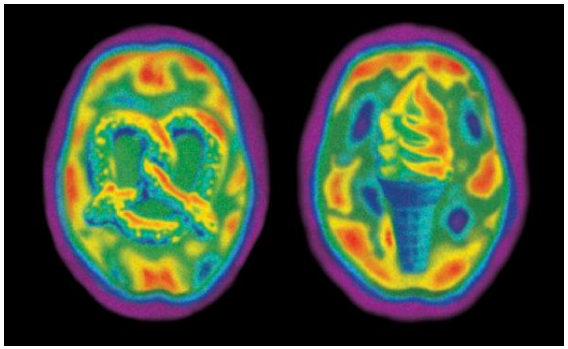
- ↓ Blood flow: key brain areas- **appetite** regulation
- People feel "full" **Satiety**

After Fructose

Brain **appetite** areas

Stay **"active"**

People **don't** feel **"full"**



YOUR DIET ANALYSIS

5 extra credit points

USDA National Nutrient Database for Standard Reference

Release #28 → Search database online

Food Search → **Select Source** → **Standard Reference**

Foods Listed in Alphabetical Order

Or by **Type** of Food: "Enter 1 or More Items"

Click on Food for Detailed Composition

(Na, K, Fiber, Saturated Fat)

Ex. **Sirloin Steak**: At top- change amount eaten (ounces)

Ex. **Broccoli**: listed: 1 cup, 1 bunch, 1 stalk

Complex Carbohydrates

Many glucose molecules linked: **chemical bonds**

Differ in **structure** (straight vs. branched) and **type** of chemical bonds

Animals

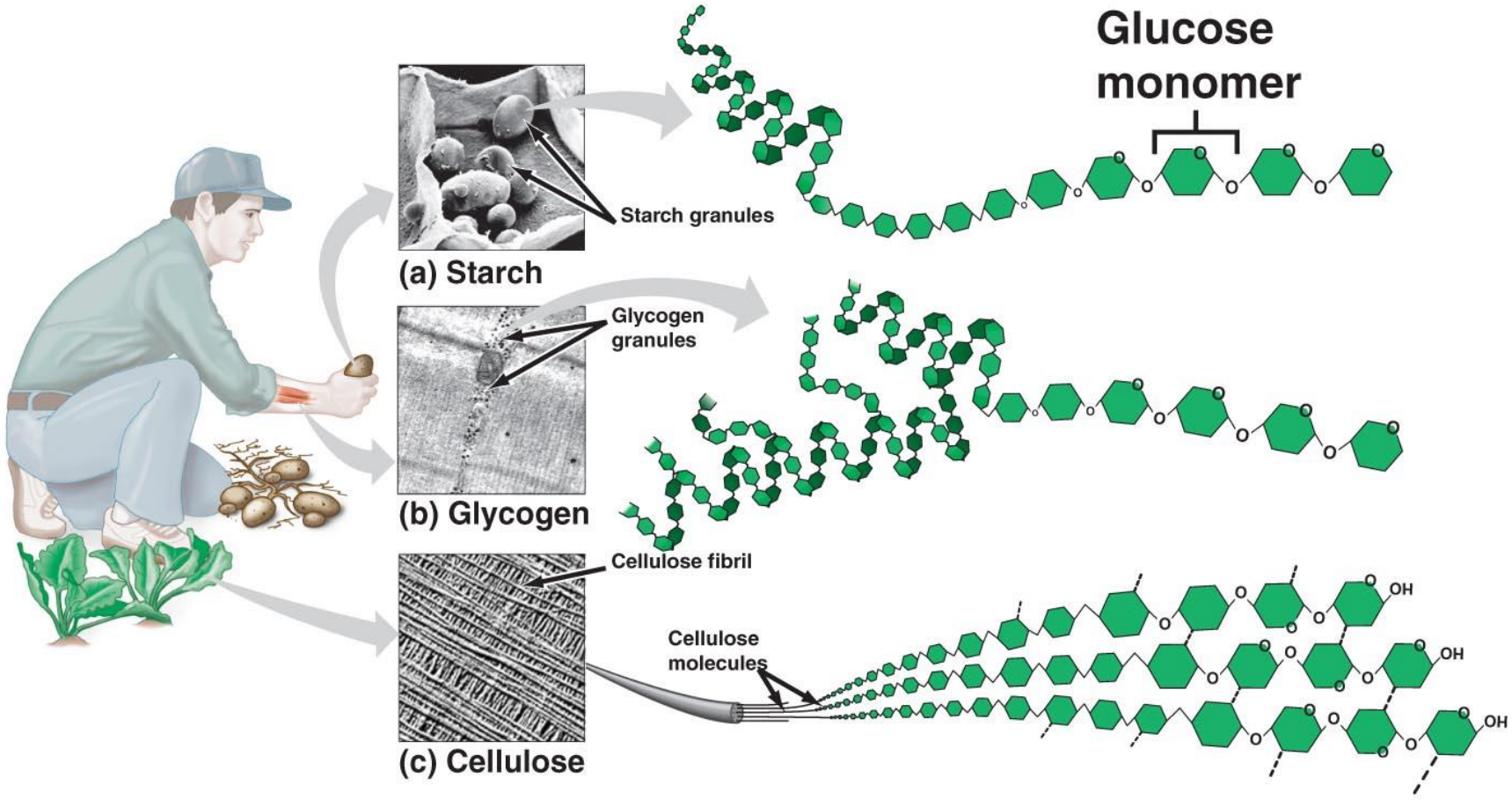
Glycogen- stored glucose: **liver, muscles**

Plants

Starch-stored glucose

&

Fibers (cellulose)



Starch → Glucose → Glycogen

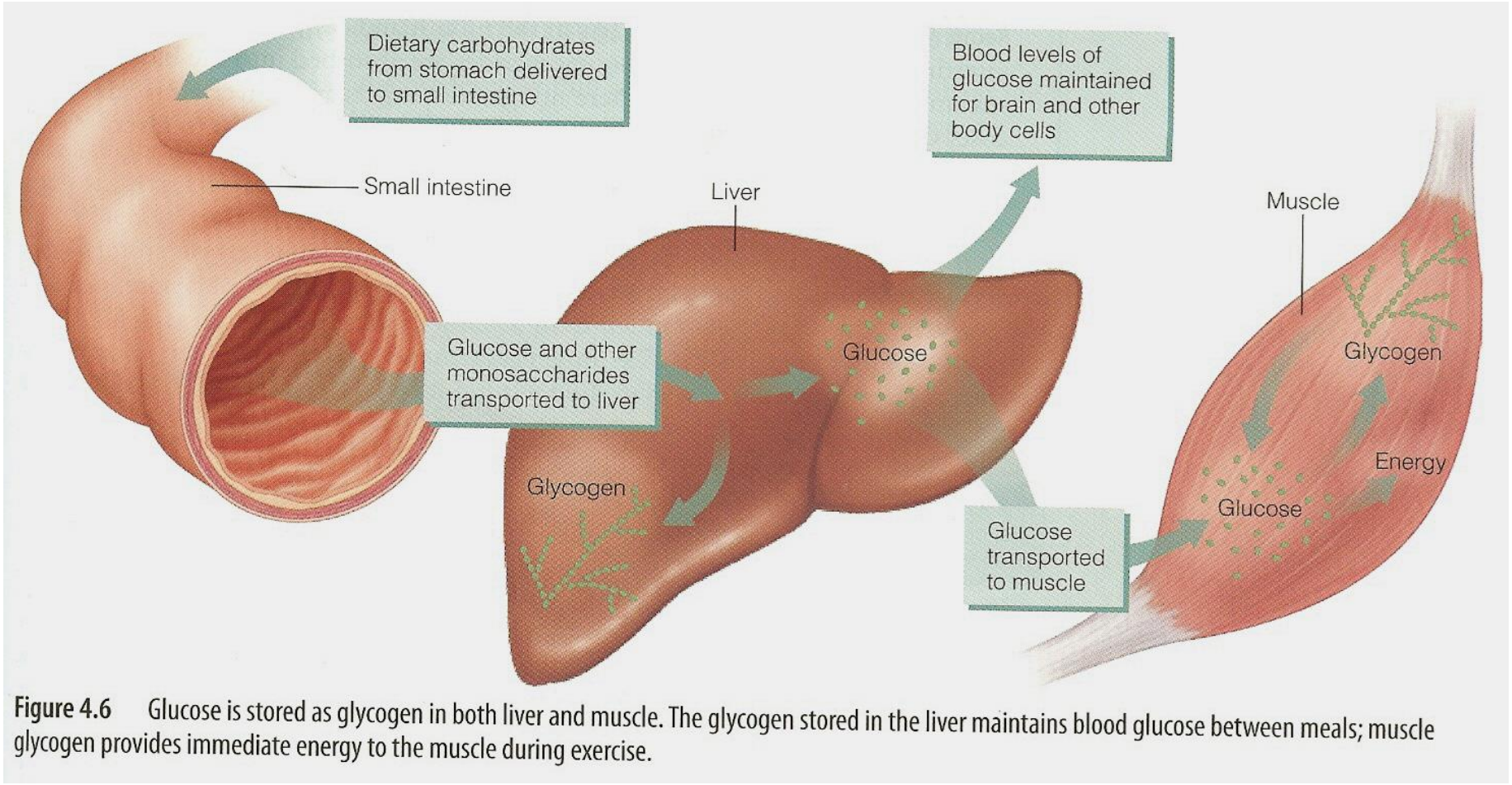
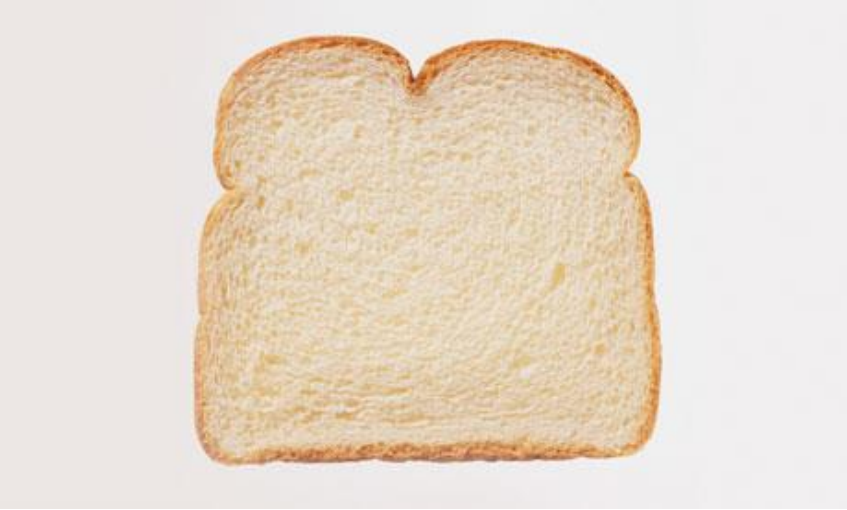


Figure 4.6 Glucose is stored as glycogen in both liver and muscle. The glycogen stored in the liver maintains blood glucose between meals; muscle glycogen provides immediate energy to the muscle during exercise.

Chewing Assignment

Bread (starch)

enzyme

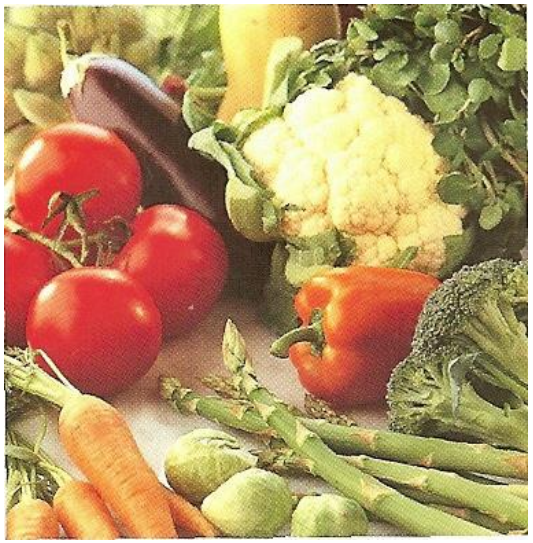


maltose (sweet)

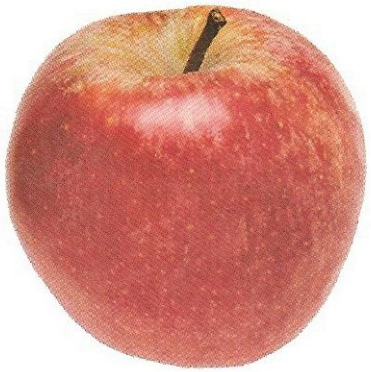
Fiber(s)

- Mostly many **glucose** molecules
- Example: **cellulose-** plant cell walls
- **Nondigestible** carbohydrate
- Fiber breakdown: ~~human enzymes/chemical bonds~~

Whole-grain foods provide more nutrients and fiber than foods made with enriched flour.



Brown rice is a good food source of dietary fiber.



Fibers

2 types

Soluble **Insoluble**

Most fiber rich foods: both types

Soluble Fiber

- Holds (dissolves in) **H2O**
- Forms **gel-like mass** in intestine
- ↑ **Weight of feces**
- Partially digested **bacteria**

gas fatty acids (absorbed)

Soluble Fiber Examples

- **Apples (pectin) (Kaopectate)**
- **Grains (oats, barley, rye)**
- **Fruits**
- **Vegetables**
- **Oatmeal**
- **Legumes (peas, chickpeas, beans, lima beans, soybeans, peanuts, lentils)**

Insoluble Fiber

- **Doesn't** dissolve in H2O
- **Not digested** by intestinal bacteria
- Adds **bulk** to feces
- **Not changed** during passage through intestine

Insoluble Fiber Examples

- Wheat, rye bran (covering-seed)
- Brown rice
- Whole wheat breads & cereals
- Seeds
- Legumes
- Skins of fruits and vegetables
- Broccoli
- Celery

Why should you eat fiber?

- Slows breakdown starch → glucose
- Slows **increase** in blood glucose
- **Binds** to **cholesterol** in intestine
- **Lowers blood cholesterol**
- Promotes **fullness, reduces hunger feelings**

Why should you eat fiber?

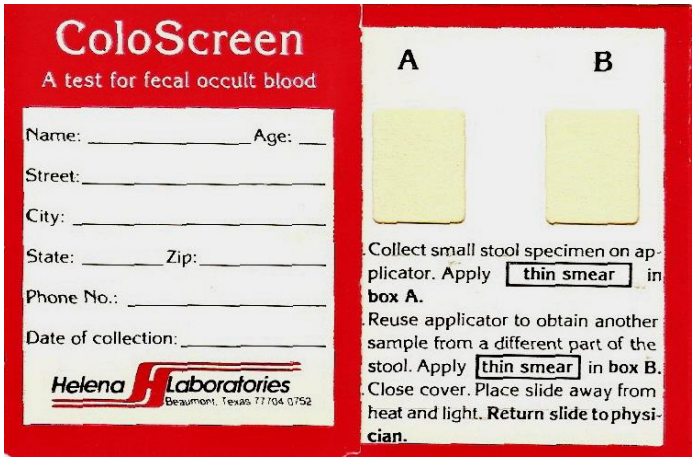
- Keeps GI tract **clean/healthy**
- **Exercises** your colon muscles
- Regular/easier **bowel** movements
- Prevents: **constipation**
- **Speeds up movement food through intestines** (Transit)
- Protects against: **? colon cancer**

Fiber and Colon Cancer

Fecal Stool Based Cancer Screening

Detects

Blood



Blood & DNA mutations: cancer or polyps (FDA 2014)

2011, 2014 compilation many studies

(meta-analysis)

↑ **DIETARY FIBER**

↓ **RISK BREAST CANCER**

↓ **Heart Disease**

Significant inverse relationship

Fiber Supplements

Psyllium (vegetable fiber):
Metamucil, psyllium enriched cereals & breads

Stool softeners/bulk formers

Help with **constipation & diarrhea**

Fiber and Fluid

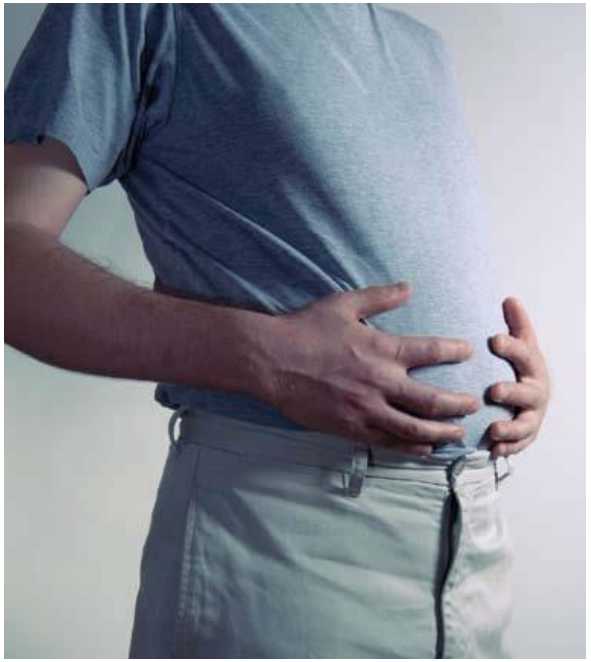
↑ **Fiber** need ↑ **Fluid**

Without fluid **(H2O):** stools hard/difficult bowel movements

Adding fiber to your diet

Sudden ↑ fiber in diet

- **Gas**
- **Diarrhea**



Therefore: ↑ fiber in diet

gradually & drink enough **fluid**

Lactose Intolerance

- Babies digest milk **(lactase)**
- ↓ Lact**ase** with age
- Some people ↓ ↓ lactase: can't digest milk
- Lactose → large intestine

bacteria: acids + gas

- Bloating, gas, cramps, diarrhea

Lactose Intolerant Adults

- 5% people Northwestern Europe descent
- **75%: African Americans**
- **90%: Asian Americans**

Problem: ↓ Milk/milk products

↓ **Calcium** intake

Leonard Hofstadter:

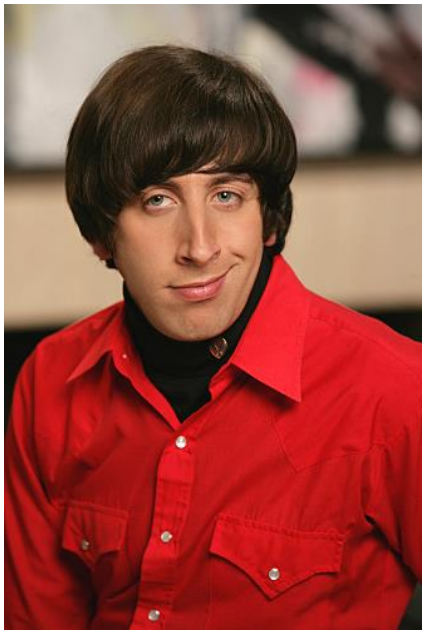
Lactose intolerant

Howard Wolowitz:

tolerates lactose

but **only** has a

master's from **MIT**



Solutions

- **Small intake** dairy products throughout day
- **Yogurt/cheese**- during processing- lactose digested
- **Lactase** tablet- before drinking milk
- **Lactose-free** milk

Figure 4.18 There are many products available on the market today that contain the lactase enzyme or are low in lactose. These products are developed for people with lactose intolerance.

Plant "Milks"

Soy, Almond, Rice

- No lactose
- Low saturated fat
- No cholesterol
- Soy milk: "complete" protein
- Fortified with vitamins A, D, and calcium

Sugar Substitutes

- **Little/no calories**
- Added to **sugar-free, low-calorie, "light" foods**
- Alternative to simple sugars
- **Generally safe**
- **Don't make food "healthy"**

Artificial Sweeteners

Sugar Substitutes

- Benefits: **diabetic**- control blood sugar & ↓ **dental cavities**
- **Weight control?** Maybe if part of weight control program
- **??** ↑ American obesity epidemic with ↑ **sugar substitutes**

Imperial College London 2017 Study

Artificially Sweetened Drinks (**Diet** Drinks)

- **No sugar, low/no calories**
- **No better** than regular **sugar drinks** for **weight control**
- Why? **Compensation** Rationale:
  ↓ calories- diet drink ↑ calories-food
- **Concern: long-term weight gain**

Review for Exam: WEB Site

1. **Food Allergies: Examples**
2. **Vitamins: Fat soluble vs. water soluble**

   Examples & how they work
3. **Minerals: Examples & how they work**
4. **Water: why it is important**
5. **Metabolism/Cell Respiration**
6. **Read all articles in Packet #1**

How much protein do you need each day to be in nitrogen balance?

Pick one day

	Food & Drink Amount	Protein (grams)
Breakfast		
1		
2		
3		
Lunch		
1		
2		
3		
Dinner		
1		
2		
3		
Snacks		
1		
2		
3		

Total Protein (grams) _____

Average adult protein needs:

0.8 grams/kilogram body weight/day

How to find your daily protein needs:

1) First calculate your **weight** in **kilograms**:

Weight in **pounds** divided by

2.2

RDA for Protein

Male & Female	Age (years)	RDA Factor (grams/kg)
	0-0.5	1.52
	0.5-1	1.50
	1-3	1.10
	4-8	0.95
	9-13	0.95
	14-18	0.85
	≥ 19	**0.80**

What about this?

Weight X RDA Factor **(0.80)** =
(kilograms)

How much protein you need daily

(nitrogen balance)

Typical American

Eats: **100** grams protein/day

Reference person:

154 pounds divided by 2.2= **70** kg (wt)

RDA: 70 kg X **0.8** = **56** grams/day protein

In general:

Most healthy people don't need more than 2X RDA for protein

Quick Way to Calculate your RDA Daily Protein Need (adults)

0.36 X your weight

Athletes and Protein

Newer studies: athletes benefit from **1.2 to 1.7 g/kg/day** of protein

- Especially true: endurance athletes, weight lifters, resistance training, football, hockey, other power sports
- **Protein used for: repair of sports damage, lean muscle mass, "remodeling" muscle proteins (exercise stress/strain), optimal levels for body physiology**

Hot Dog Man: "The Tsunami"

July 4, 2004: Brooklyn- Nathan's famous hot dog eating contest

Takeru Kobayashi- Japan

5' 7" **132** pounds

Ate **53.5** hot dogs in 12 minutes- world record

Extra credit points

1) How much protein does he need/day?
2) How much protein did he get in 53.5 hot dogs (Fenway Franks)?

Extra Credit

Name: _____

Grams of protein I eat each day:____

My RDA (grams) for protein:____

Nitrogen balance: yes or no (circle)

Hot Dog Man

Hot Dog Man's RDA (grams):_____

Grams of hot dog protein he ate:____

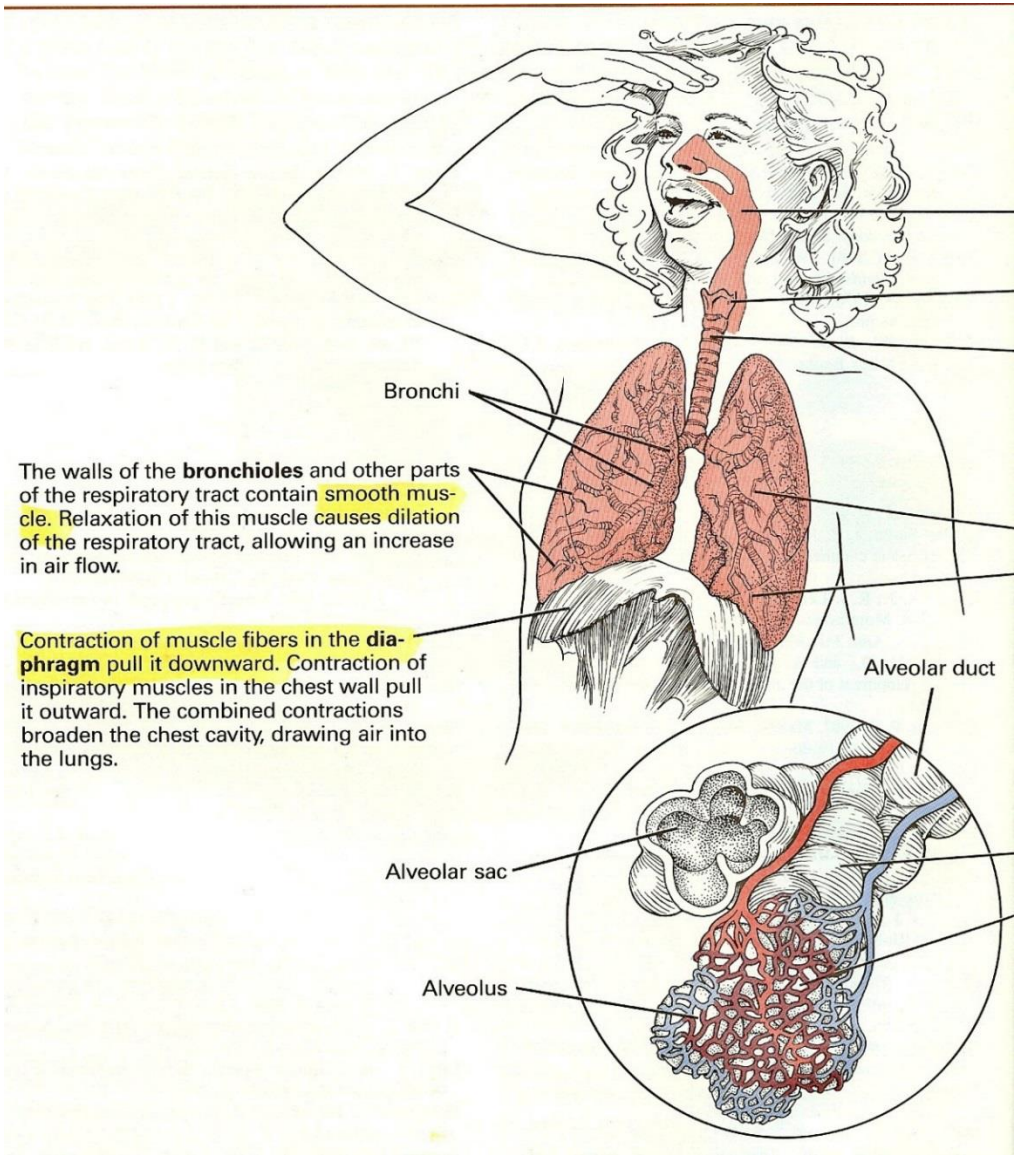
Metabolism

All body chemical reactions

1. **Anabolism**- building up processes: e.g. making new cell protein
2. **Catabolism**: breaking down:

e.g. energy release from glucose

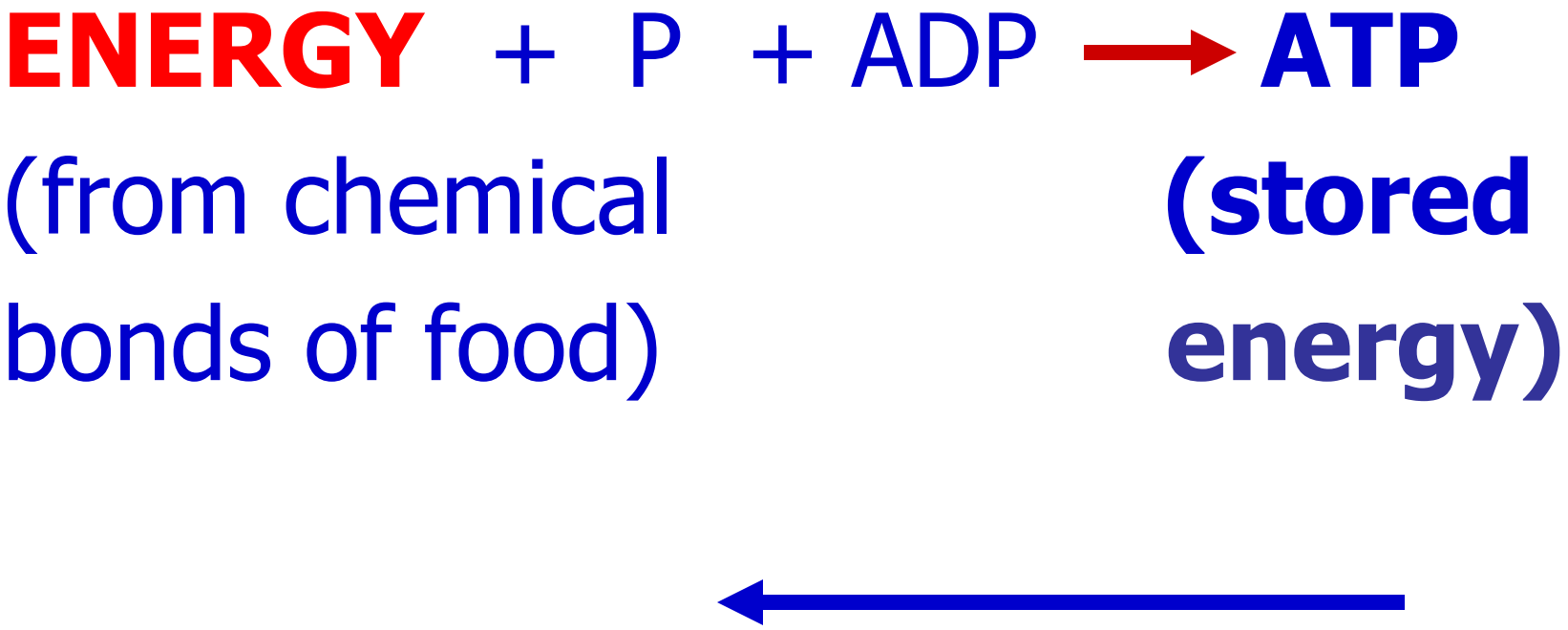
What happens when you breathe?



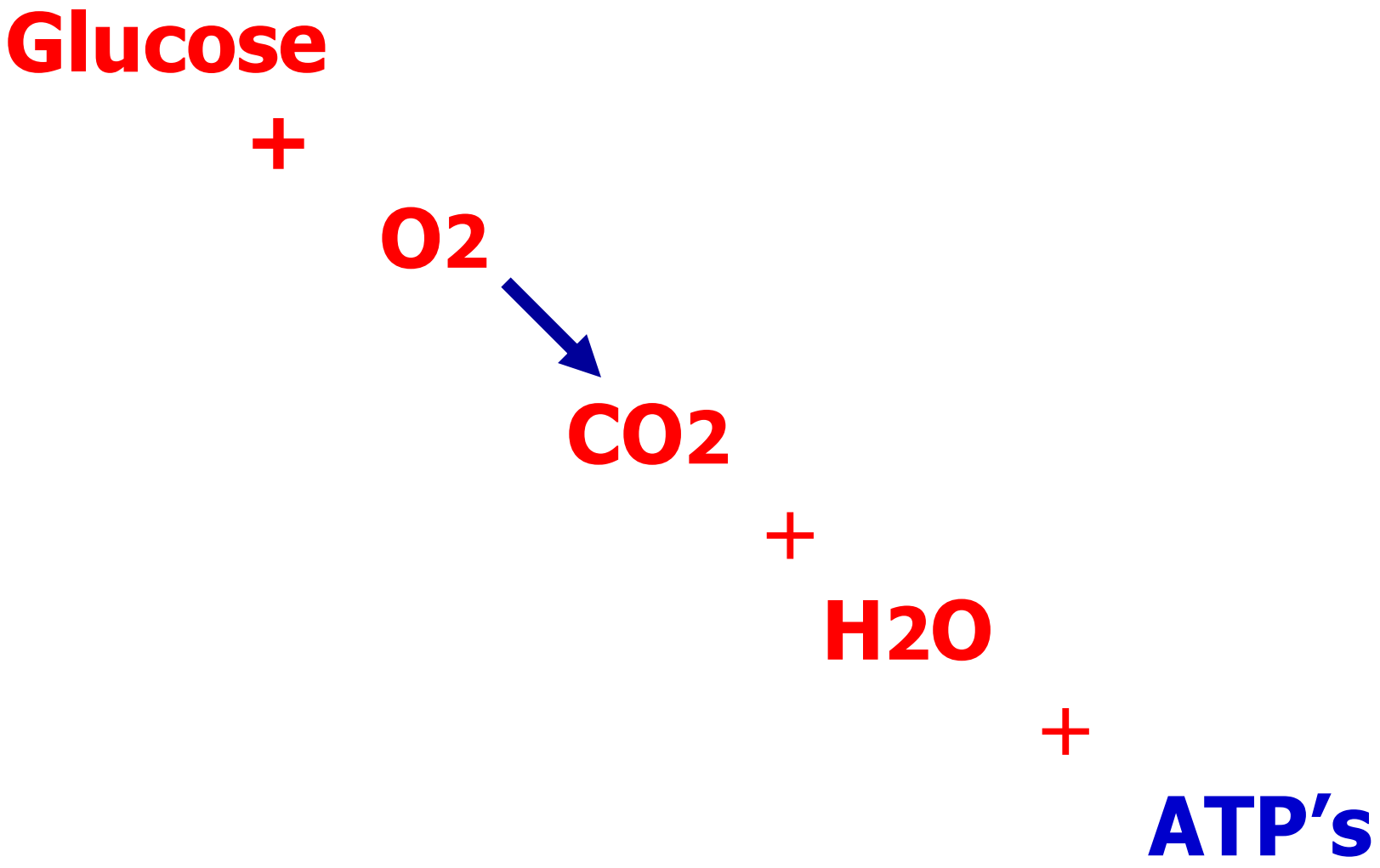
Cell Respiration: inside your cells

- Energy trapped in **chemical bonds**: **carbohydrates, fats, protein**

- Break chemical bonds → energy

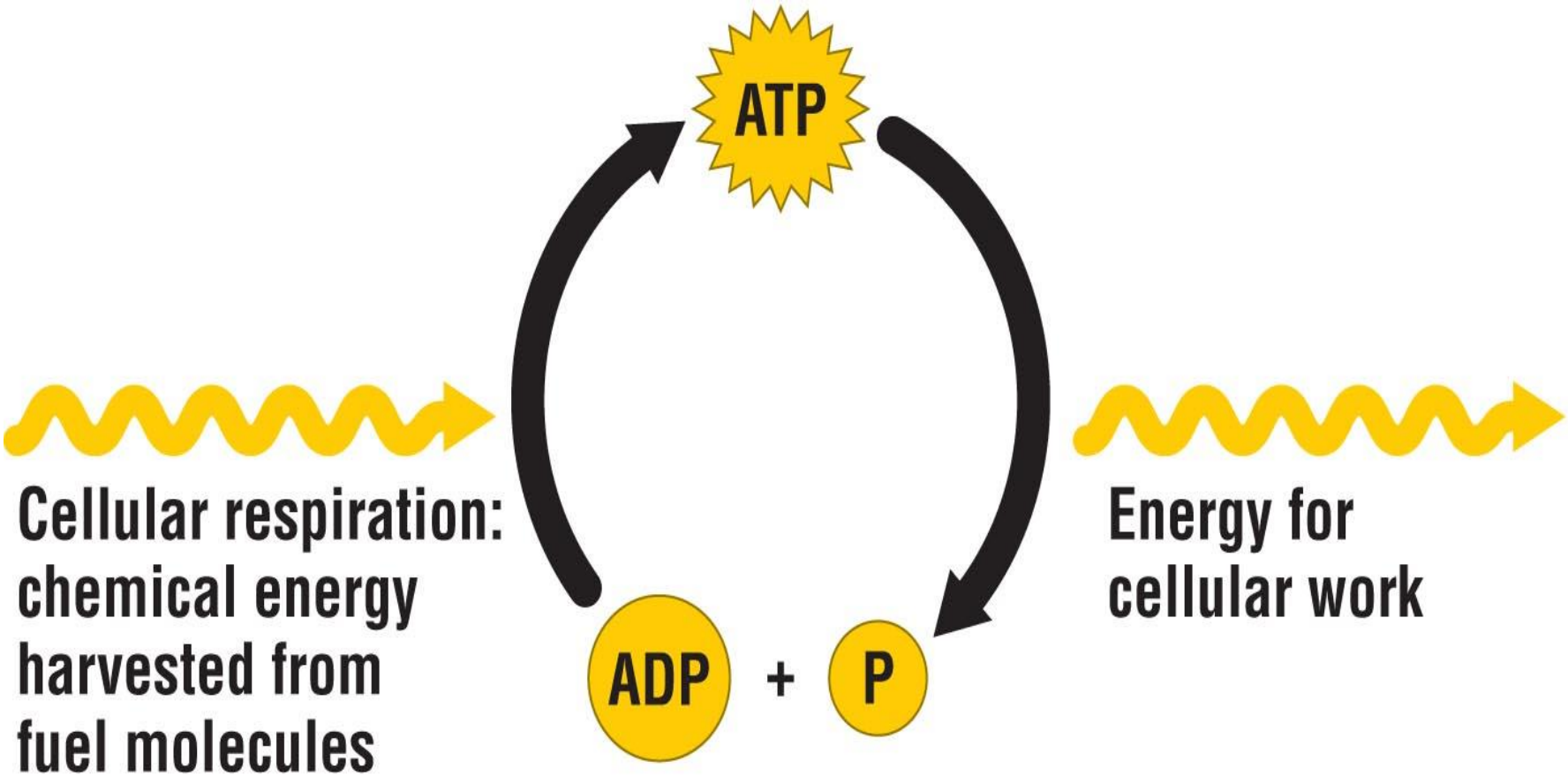

ENERGY + P + ADP → ATP
(from chemical bonds of food)
(stored energy)
Energy release: all body activities

Cell Respiration



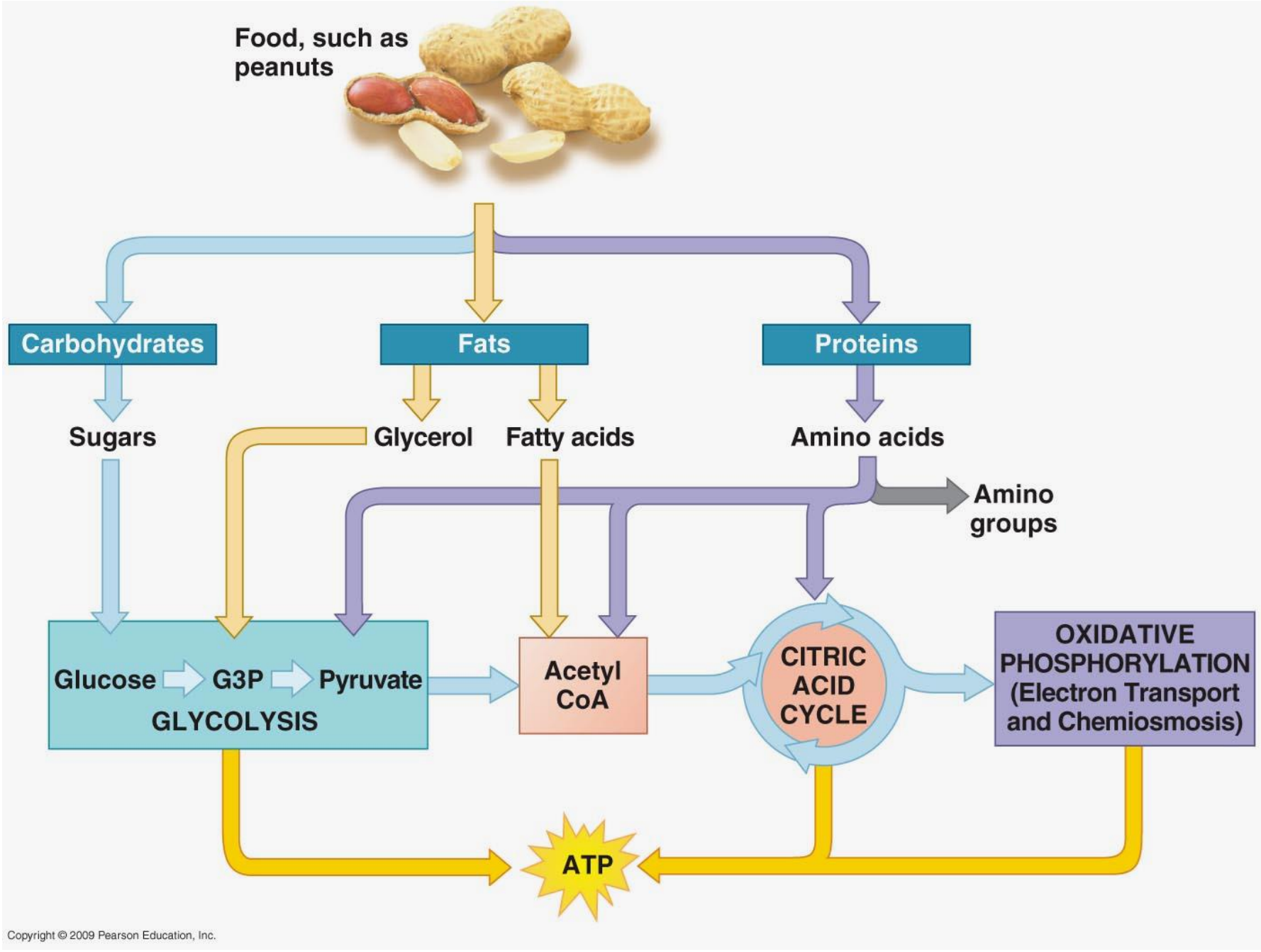
40% Energy
trapped in **ATP**

60%: HEAT
Body temperature



Metabolism: Carbohydrates, Fats, & Protein

All Interconnected



Examples:

1. Eat too many **carbs** → **FAT** (adipose tissue)

2. Protein burned for energy (ATP)

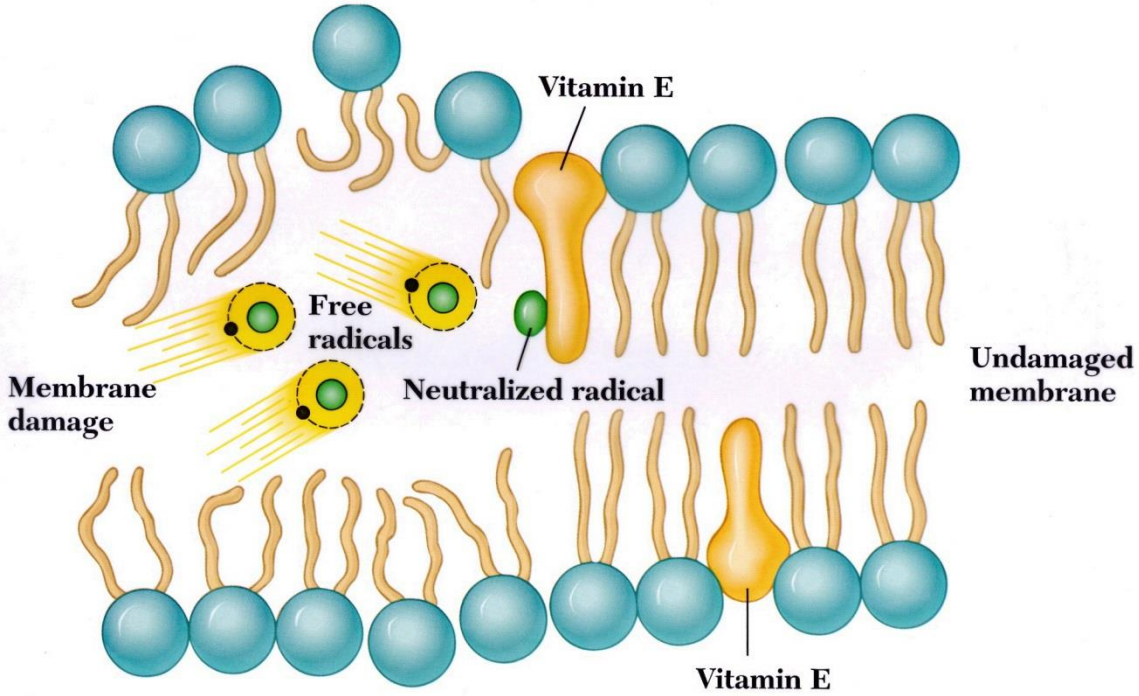
3. Protein → blood glucose during fasting or starvation

Oxidation: removing electrons from molecules

- Happens during **metabolism,** exposure air pollution, cigarette smoke
- Produces: Very reactive **"free radicals"**
- **May cause cell death, cancer, aging, artery damage**

- Your body: built in protection:

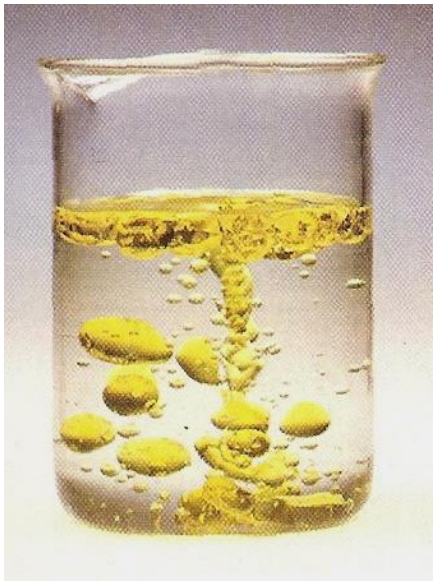
  anti-oxidation- enzyme systems
- **Diet: Vitamin C, E , beta carotene (carrots), selenium (mineral): antioxidants:** destroy free radicals



FATS

Fats = Lipids

- **Organic** compounds- mostly **carbon**
- Found in animals & plants
- Don't **dissolve** well in **H20**



Fats in Food

- Solids: butter, lard

- Semi-solids: margarine (tub)

- Liquids: vegetable oils

Some fats, such as olive oil, are liquid at room temperature.

Types of Fat

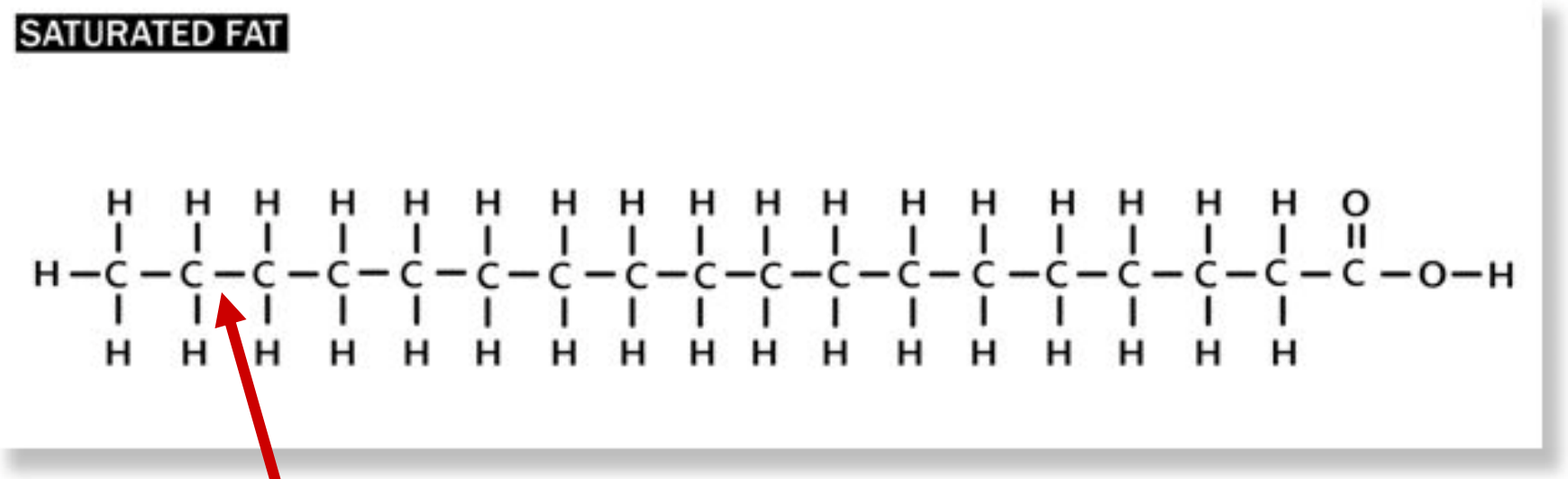
- **Fatty acids**: long **chain** of **carbon atoms**

3 types **A) Saturated**

B) Monounsaturated

C) Polyunsaturated

Saturated Fat



Single Chemical Bonds

Saturated Fat

- Found in: **meats**, whole milk, cheese, ice cream, prepared foods

- ↓ **Plants** except ↑ **palm/coconut oils**

- **Solid** at room temperature

Saturated Fats

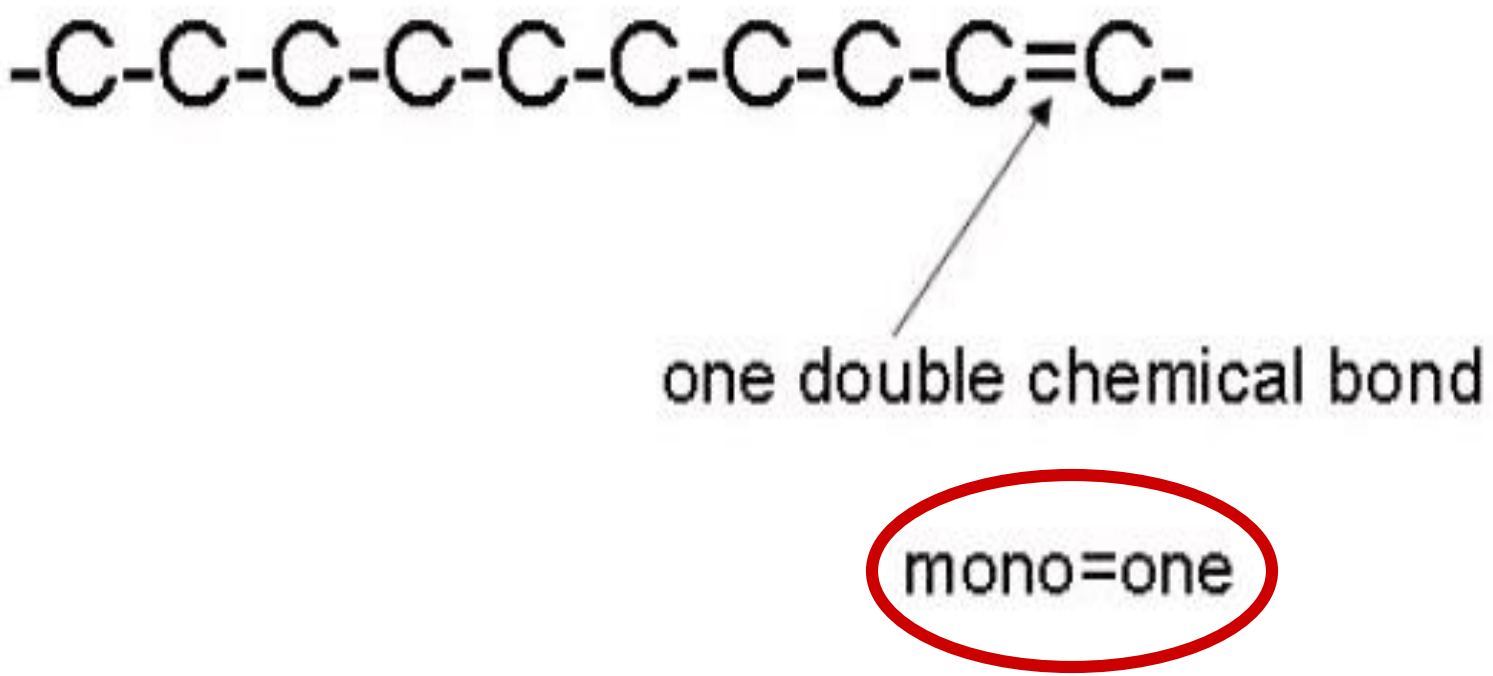
Saturated Fat: BAD

↑ **Blood Cholesterol**

↑ Risk Heart Disease

Women ↑ **Risk Breast Cancer**

Monounsaturated fatty acid



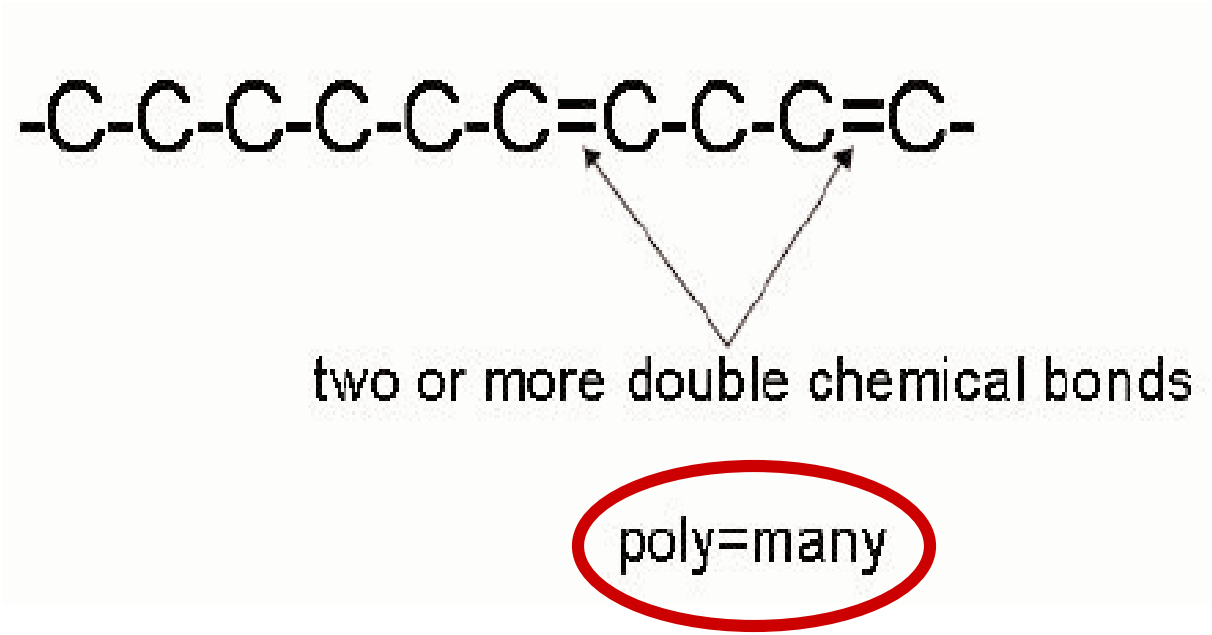
Monounsaturated Fat

- **Liquid** at room temperature

- Found in: canola, **olive oil**, peanuts, some safflower and sunflower oils,

  nuts

Polyunsaturated fatty acid



Polyunsaturated Fatty Acid

- Also **liquid** at room temperature

- Found in: **vegetable oils (soybean, corn, safflower, sunflower) and margarines (liquid, tub)**

Mono and Polyunsaturated Fats

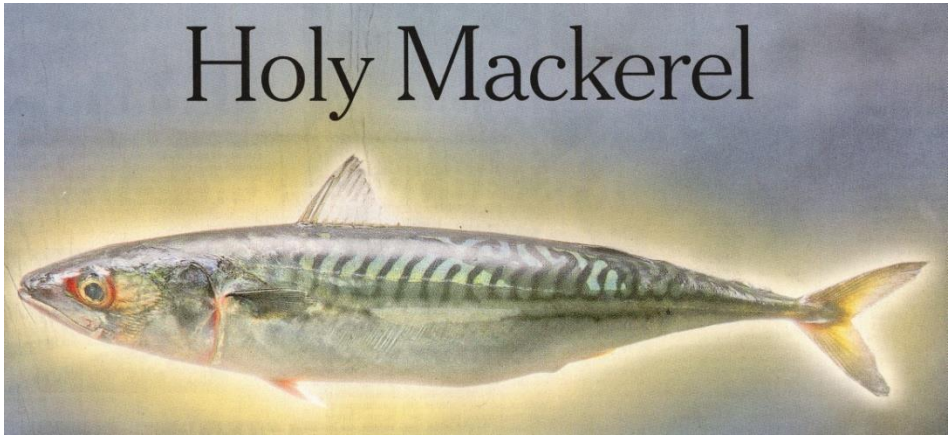
Good Fats

↓ Blood Cholesterol

↓ Heart Disease Risk

Omega 3: **Good Fat-** Special Type of **Polyunsaturated** fat

Protect against:



- Heart attack
- Stroke
- Sudden death
- Lower blood triglycerides
- Help maintain normal heart rhythms

Omega 3 fatty acids

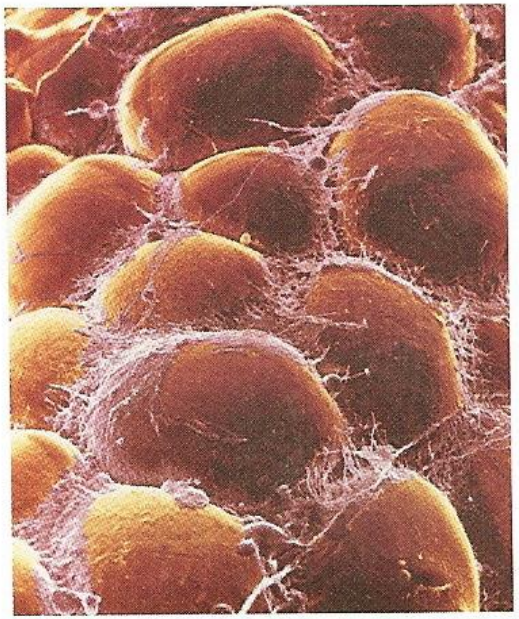
- **Retina (eye)** & **nervous system**
- Normal **brain** development in **babies** (breast milk, formulas)
- Found: **vegetable oils** (soybean, canola), **nuts** (walnuts), **seeds** (flaxseed), **fish** (salmon, tuna, trout), **shellfish**


OMEGA-3
1000 mg
NATURAL
Fish Body Oils
Providing EPA and DHA
200 Softgels
Country

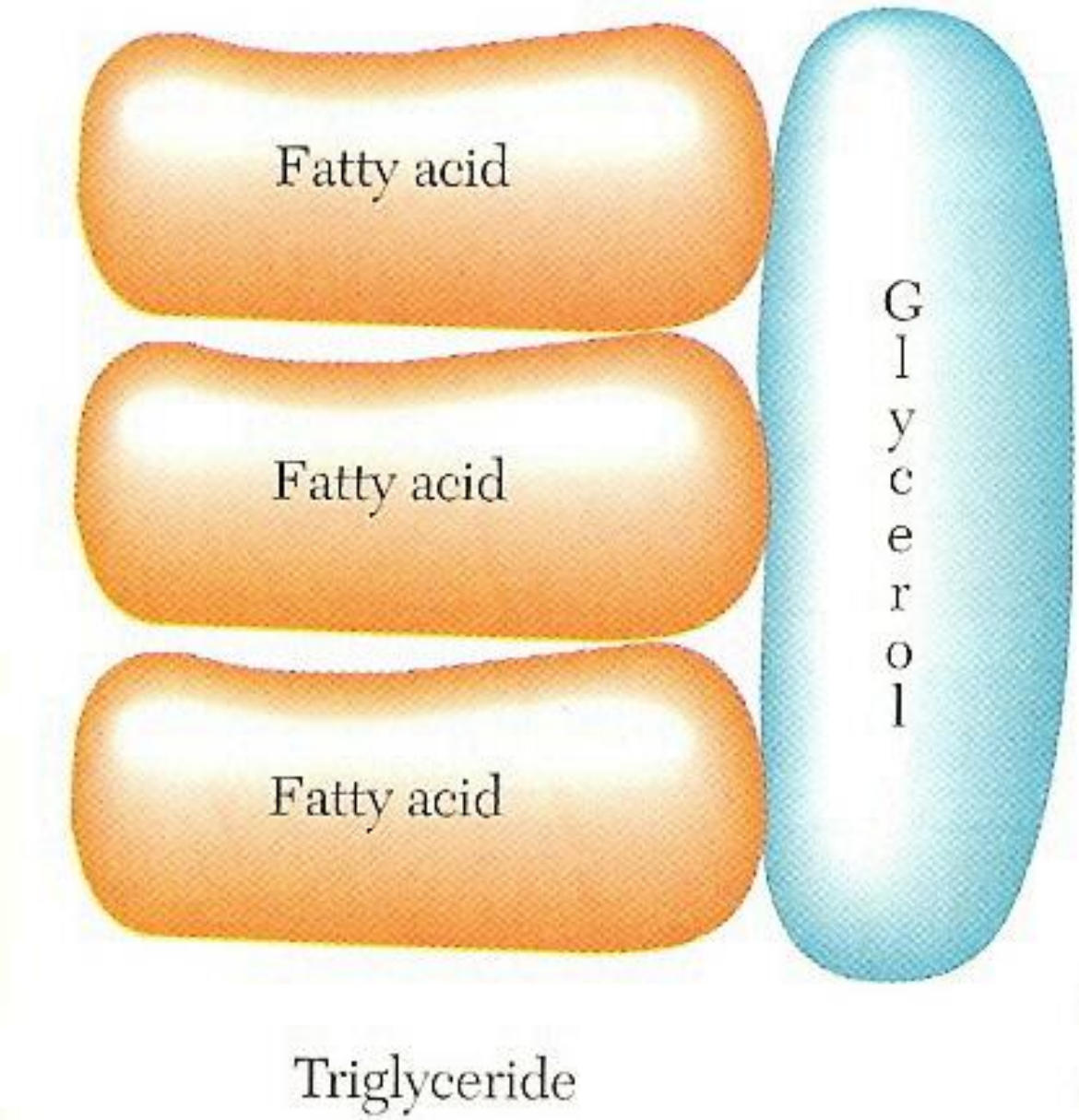
2) Triglyceride

Most of **fat** in your **foods**

Major fat **stored** in fat **(adipose) &** muscle tissue



Adipose tissue. During times of weight gain, excess fat consumed in the diet is stored in the adipose tissue.

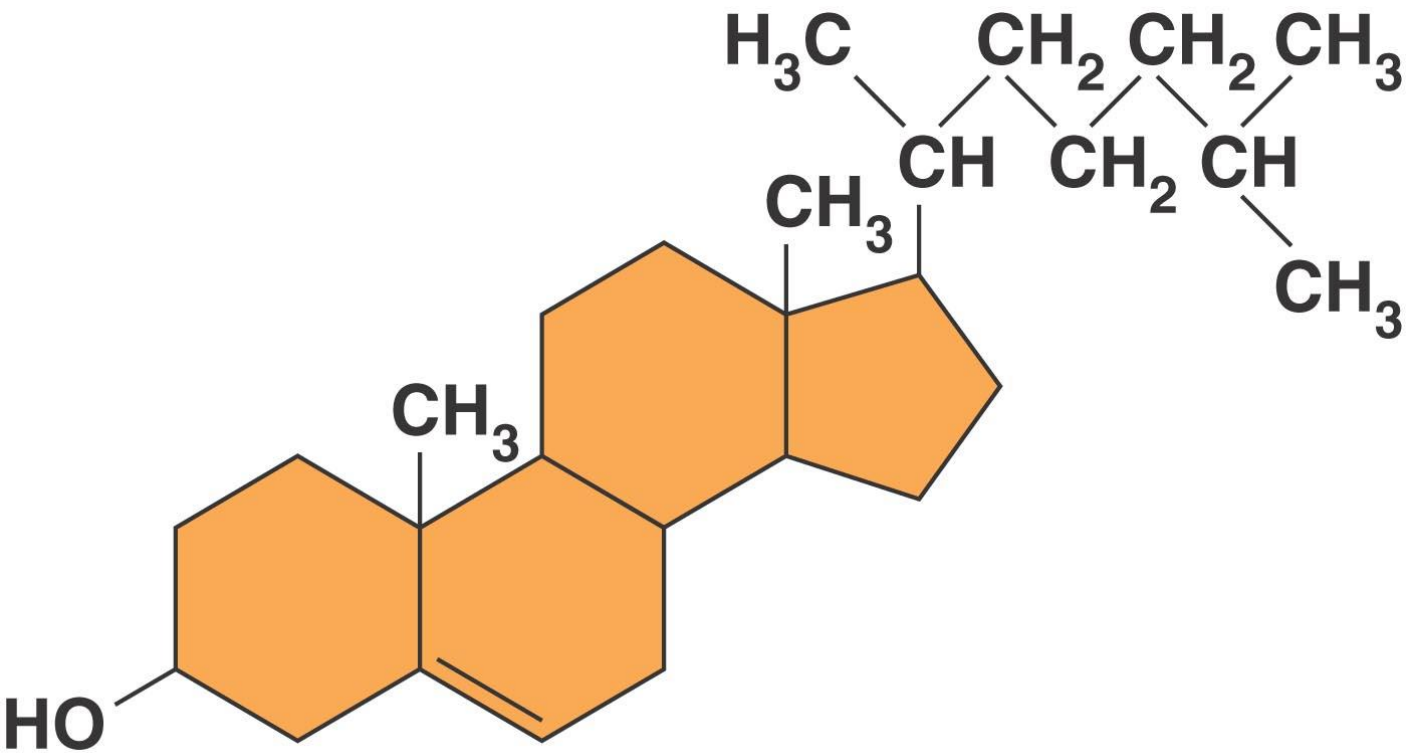


Triglyceride

3) Sterols

4 Interconnected rings

"chicken wire"



Sterols: Examples

- **Plants**: **Phytosterols**- help lower your blood cholesterol

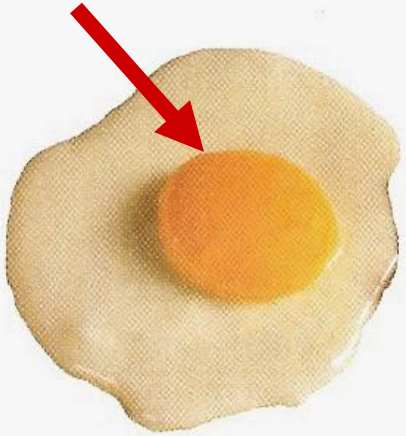
- **Animals**: **Cholesterol**

  Made in your **liver**

  Don't need to eat in foods

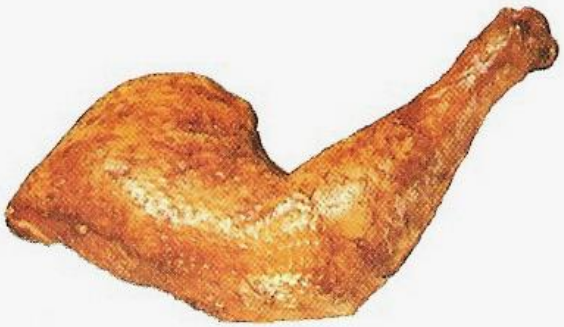
  ↑ **egg yolk, liver, kidney, some prepared foods**

No cholesterol in plants

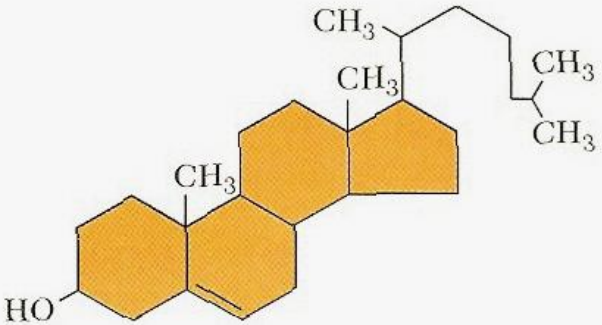


212 mg cholesterol

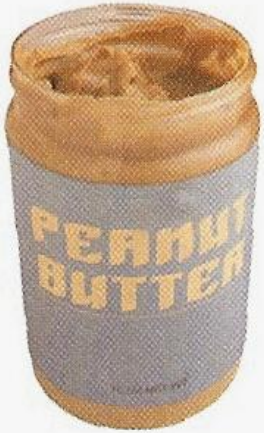
0 mg cholesterol



138 mg cholesterol



Cholesterol



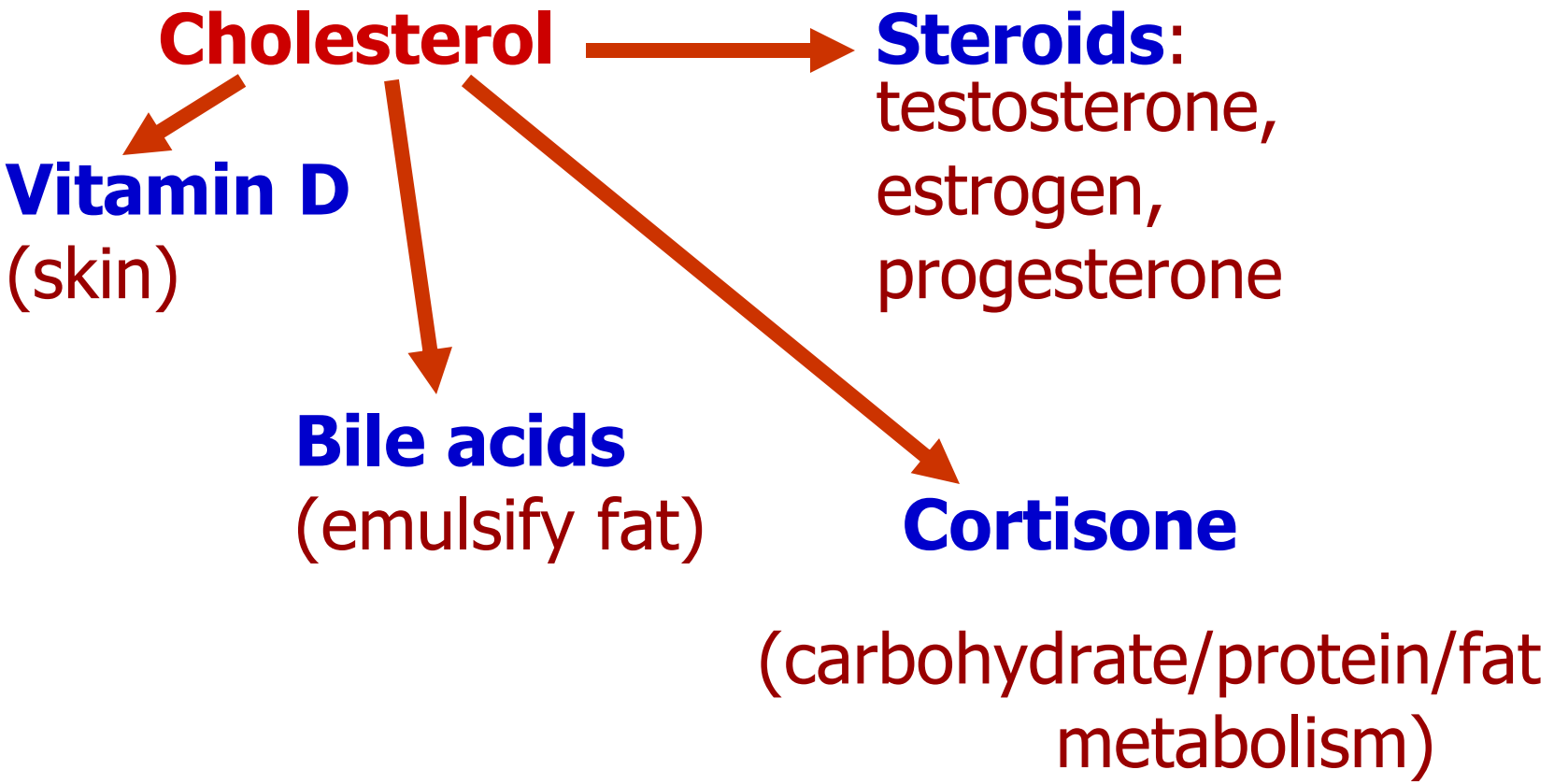
0 mg cholesterol

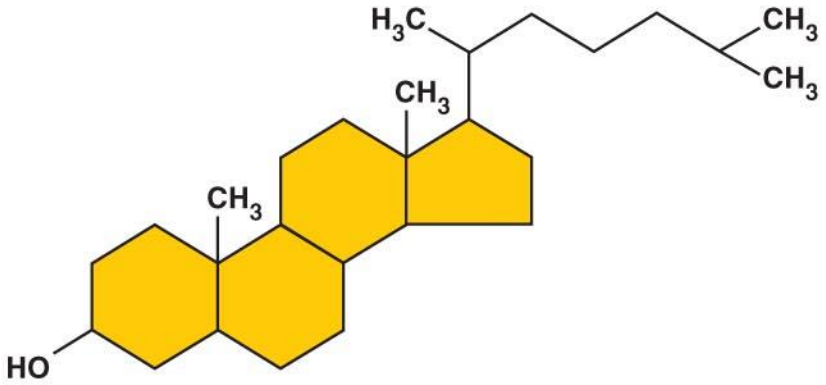
33 mg cholesterol

130 mg cholesterol

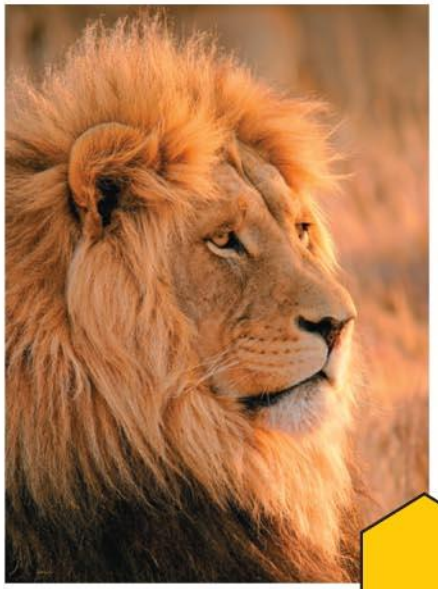
Cholesterol

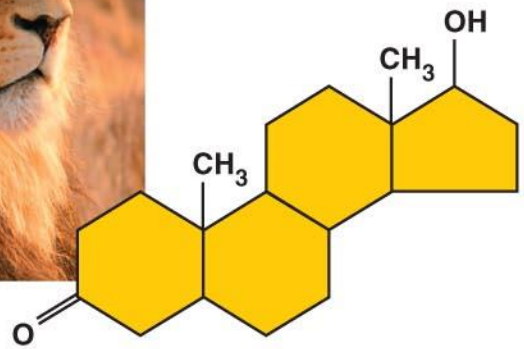
- Most cholesterol: your **cell membranes**, coating nerve cells **(nerve impulses)**



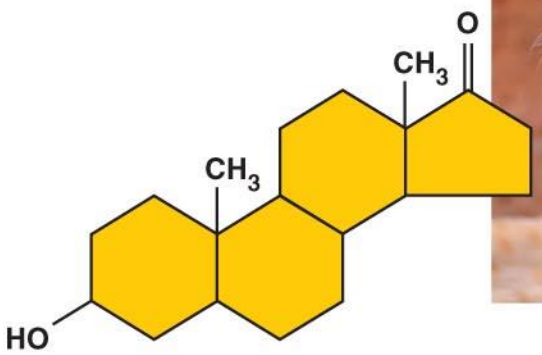


Cholesterol





Testosterone

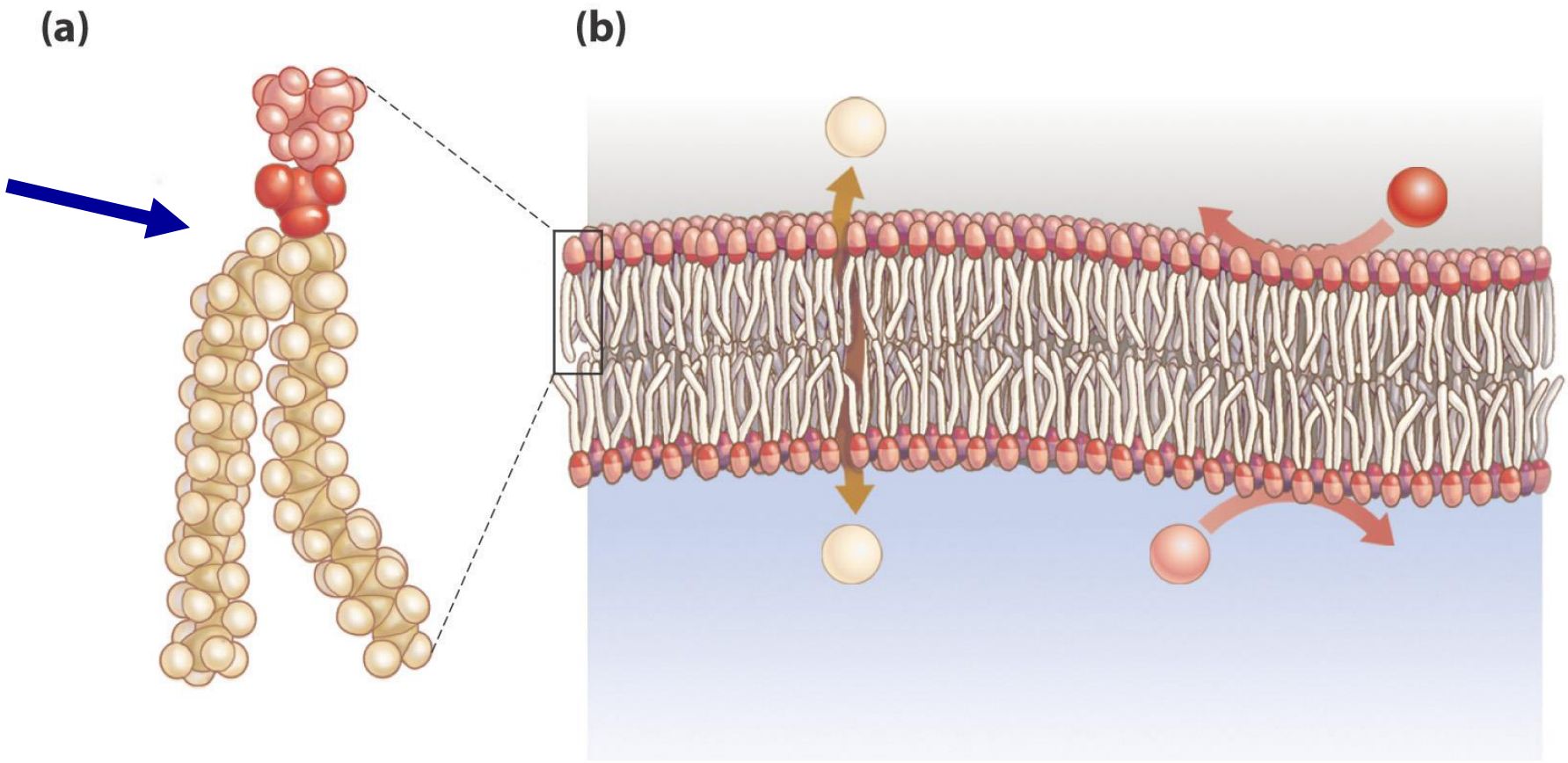


A type of estrogen

Types of Fat

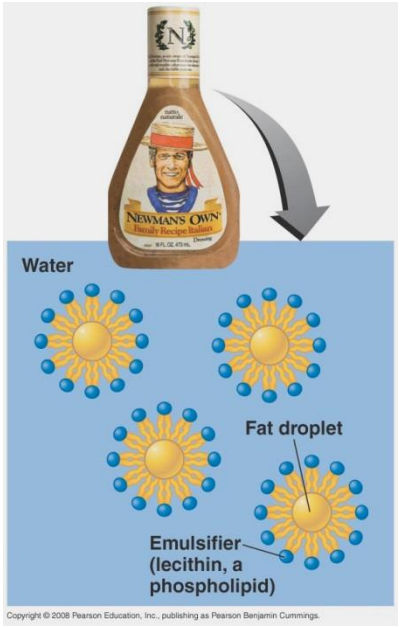
4) Phospholipids

- Contain phosphorus
- **Emulsification**: break other fats → small droplets, helps fat **mix** with water
- Found in **bile** (gallbladder)- **emulsifies** fat your **intestine**
- In all your **cell membranes**



Example: **Lecithin**

- In **eggs** and **soybeans**
- Used in: **mayonnaise, margarine, salad dressings, chocolate, frozen desserts, baked foods**
- Keeps **oil mixed** with other ingredients



It's lecithin.

That's right. Lecithin. Direct from nature's soybean. It took the makers of PAM to discover the way to put lecithin's unique characteristics to work in the pan.

The result?

Great no-stick cooking and easier clean-up.

Health conscious cooks all over America are turning to PAM for another reason, too.

Cooking with PAM drastically reduces fat, calories and cholesterol. PAM adds no salt, either. Use it to fry, braise, bake... for broiling, too. Read the chart for important facts.

COMPARE PAM® TO BUTTER, MARGARINE, OIL AND SHORTENING.

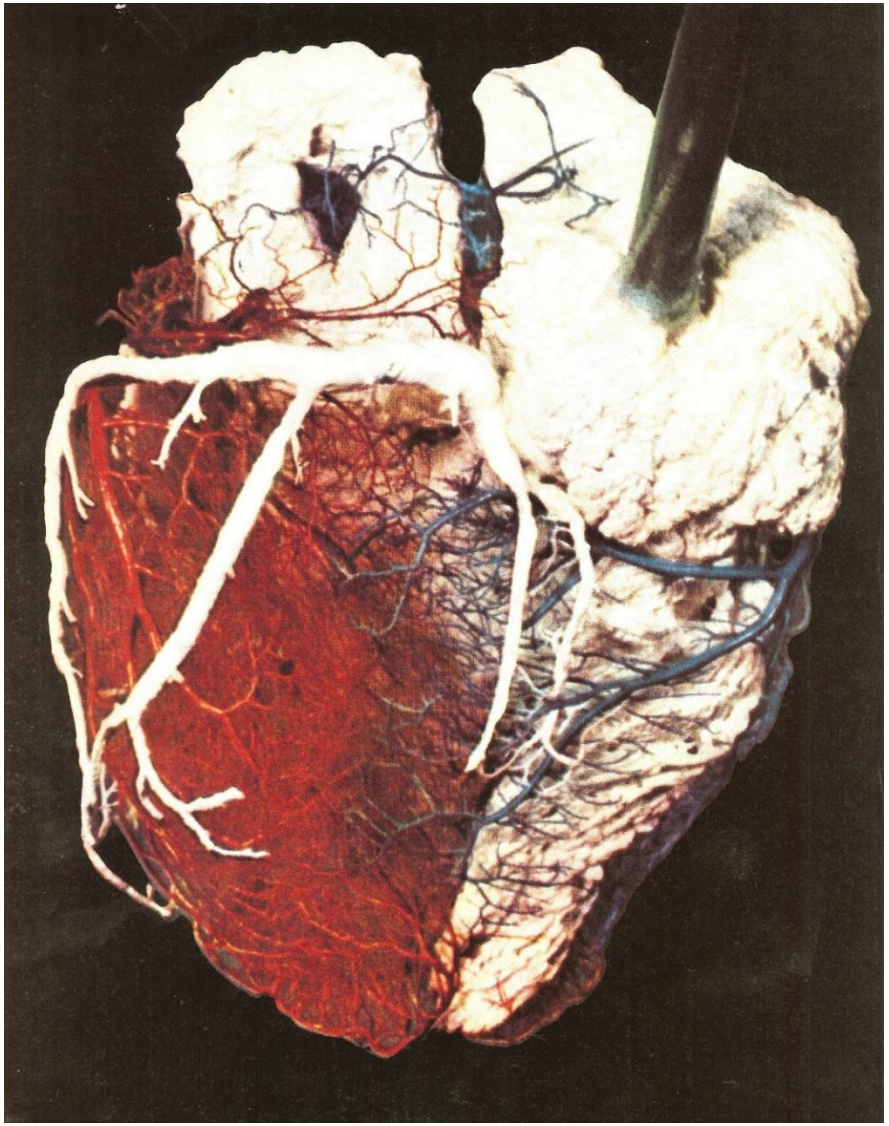
	AMOUNT	FAT	CAL-ORIES*	CHOLES-TEROL	SODIUM
PAM® AEROSOL	1¼ Sec. Spray	LOW 1 gm.	LOW 7	NONE	NONE
PAM® PUMP	10 Sprays	LOW 1 gm.	LOW 10	NONE	NONE
BUTTER	1 Tbsp.	HIGH 11.5 gm.	HIGH 102	HIGH	140 mg.**
MARGARINE	1 Tbsp.	HIGH 11.5 gm.	HIGH 102	NONE	140 mg.**
VEGETABLE COOKING OIL	1 Tbsp.	HIGH 13.6 gm.	HIGH 120	NONE	NONE
VEGETABLE SHORTENING	1 Tbsp.	HIGH 12.5 gm.	HIGH 111	NONE	NONE

PAM.® No-stick cooking, pure and simple.

*Calories absorbed into food will be less.
**Refers to salted butter and margarine only.

Trans Fat: Bad Fat

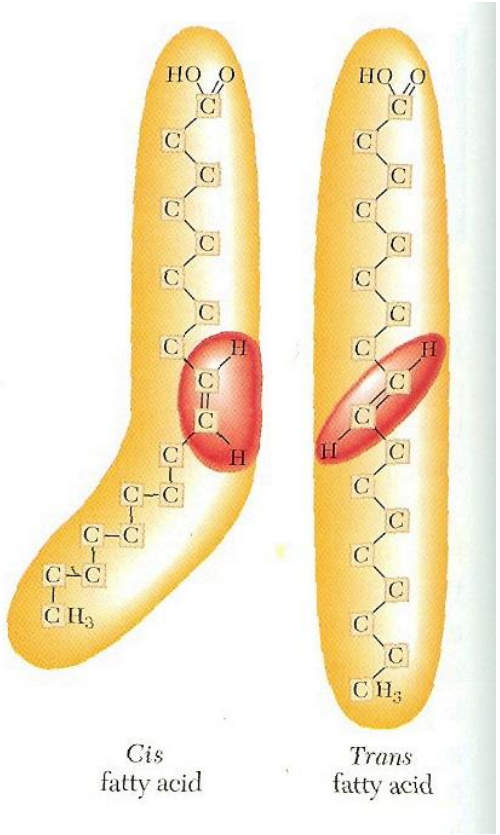
Heart Disease Risk

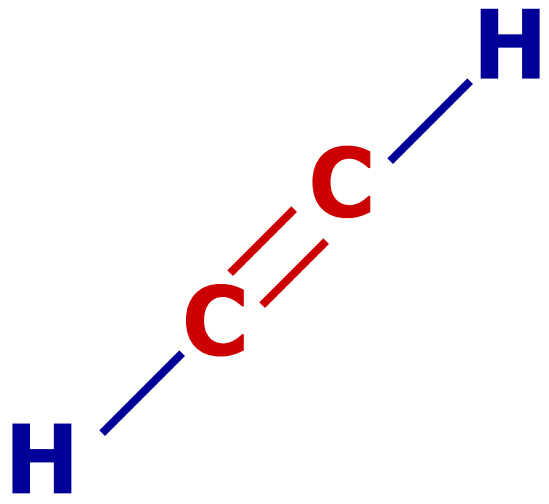


Artificially modified fat

- Bubble hydrogen gas through **vegetable oil**
- **"Partially hydrogenated"**
- Some **double bonds** **single bonds**
- **Semi-solid, like saturated fat**

- Changes **shape**- some double bonds
- **"Trans"** = **"Across"** in **Latin**





- **Cheaper to use, longer shelf-life**

Fat facts

Trans fats are used in many fried foods, packaged foods, and baked goods to give them a longer shelf life and a crispy outer coating. Not found in nature in significant quantities, trans fats are made by adding hydrogen to vegetable oil and are also called partially hydrogenated vegetable oils. Labels on packaged foods now have to indicate whether a single serving includes more than .5 grams of trans fat. The US Department of Agriculture recommends that people consume as little trans fat as possible. Now, some are pushing restaurants to eliminate trans fats from their menus.

Trans fat content:

As high as

5 grams

Dunkin' Donuts
A chocolate glazed doughnut

11 grams

Kentucky Fried Chicken
4 pieces of Extra Crispy chicken

5 grams

McDonald's
One medium serving of fries

Fats and You: Bottom Line

Bad Fats:

Saturated (20g)

Trans Fat (0g)

Cholesterol (300* mg)

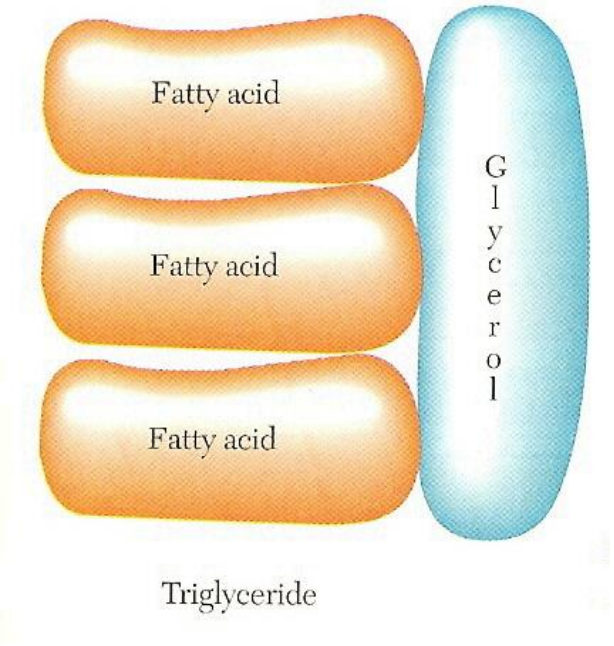
Good Fats:

45g { Monounsaturated
Polyunsaturated
Omega-3 Fats

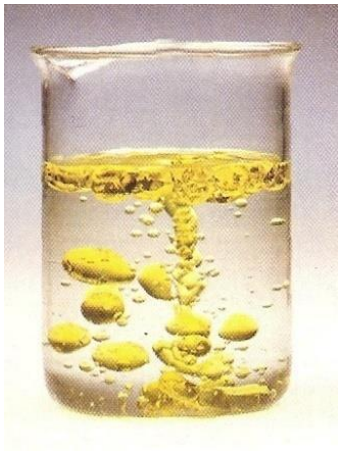
Fats (lipids): why are they important?

Energy supply for your cells

9 calories/gram



Problem: Fat + H20 ≠ Mix

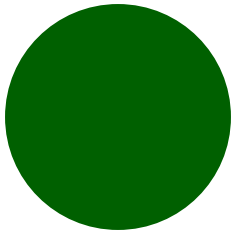


How do you **dissolve** fat in blood?

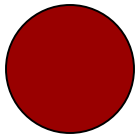
Solution: **Attach** fat (lipid) to **protein**= **lipoprotein**

Lipoproteins: Balls of Fat + Protein

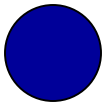
Light



Chylomicrons



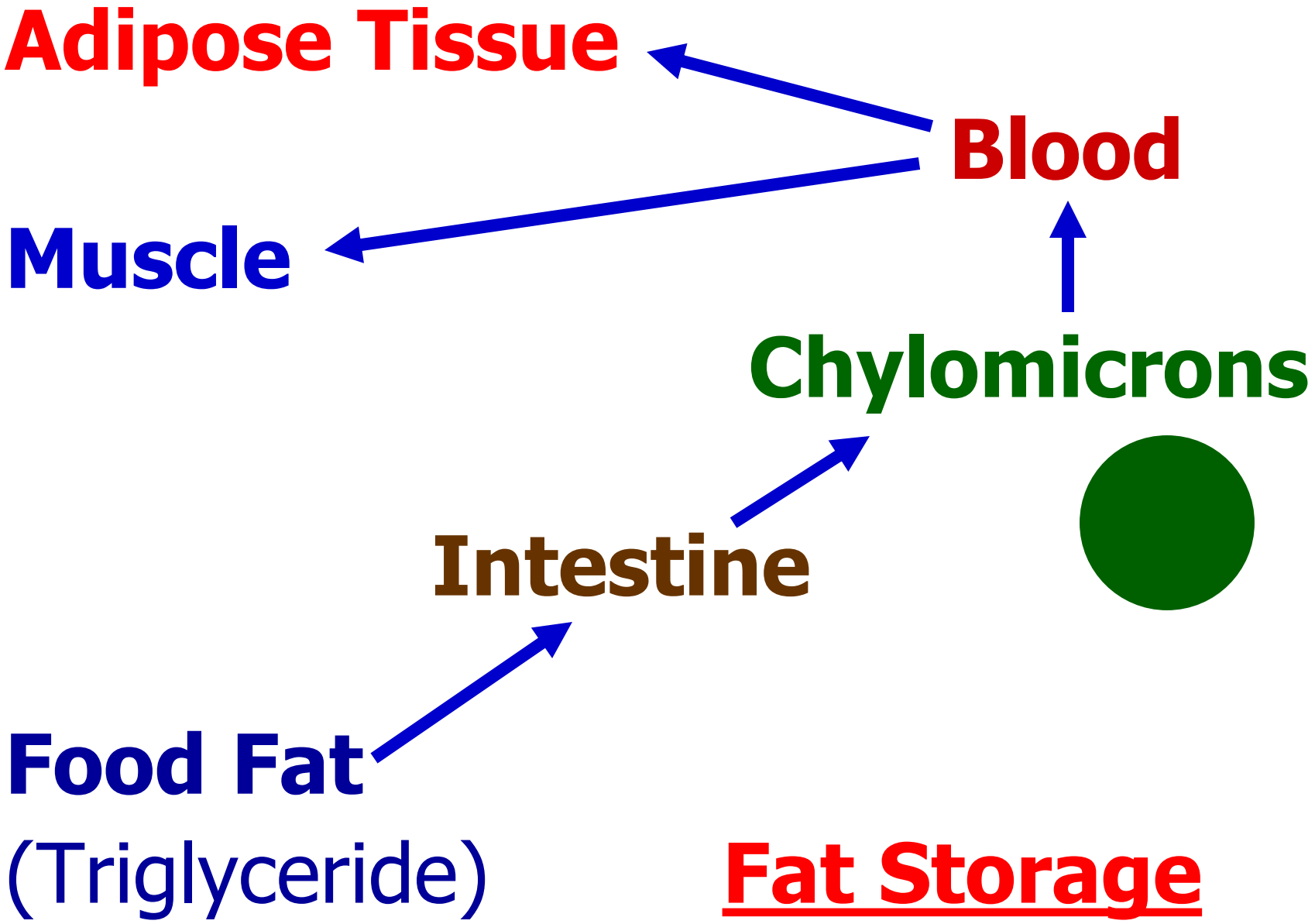
Low Density Lipoproteins

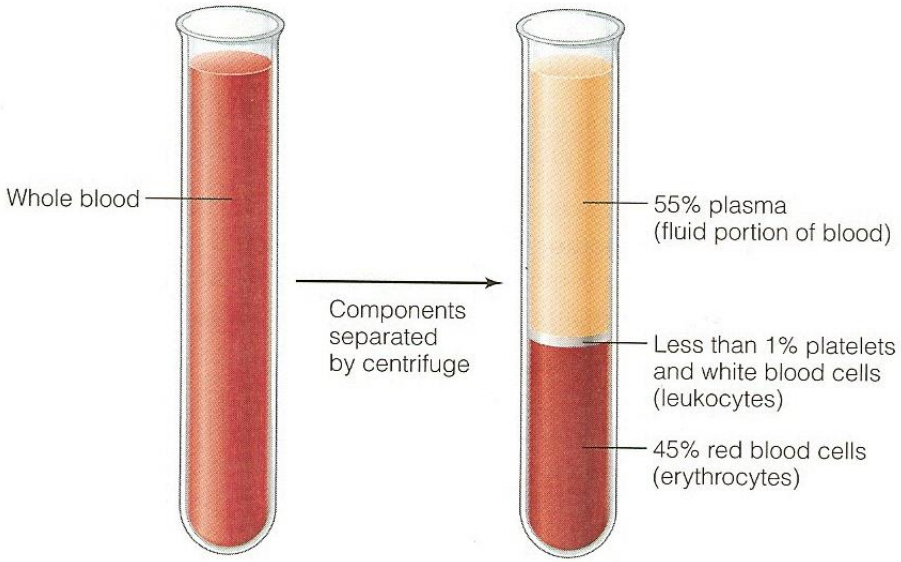


High Density Lipoproteins

Density= Heaviness

Heavy


Adipose Tissue
Blood
Muscle
Chylomicrons
Intestine
Food Fat
(Triglyceride)
Fat Storage

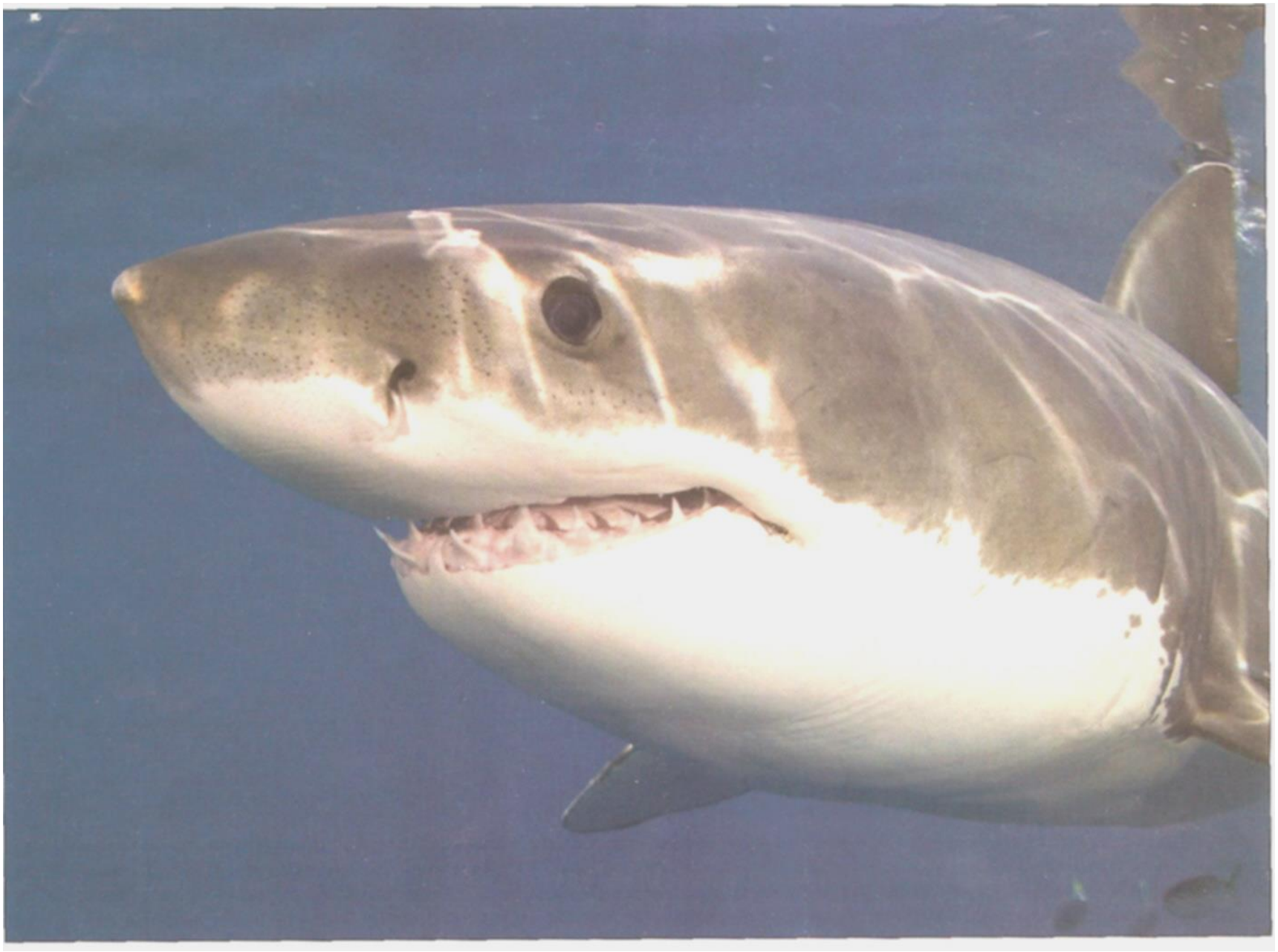


- 1-2 hours after fatty meal: see **chylomicrons** in **blood**
- Plasma = cloudy
- **Chylomicrons** in blood 8-10 hours
- **Fasting** before **lipid** blood test

Fat Deposition

Baby seals: **50%** fat by weight

Whales: **40%** fat



Fat Mobilization

Triglyceride (adipose tissue) → fatty acids → blood → cells/tissues → **Energy**

- **Smoking**
- **Coffee**
- **Fasting**
- **Starvation**
- **Exercise**

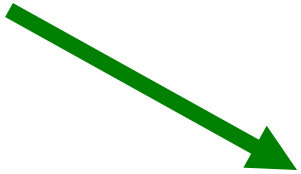
#2 **Low Density Lipoprotein**

- Major cholesterol carrier in **blood**
- **Good role vs. bad role**

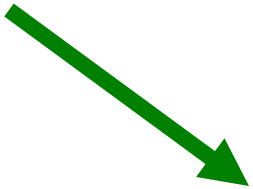
Good role

- Readily available **source** of **cholesterol** for cell needs;
- Cells take cholesterol from LDL

LDL

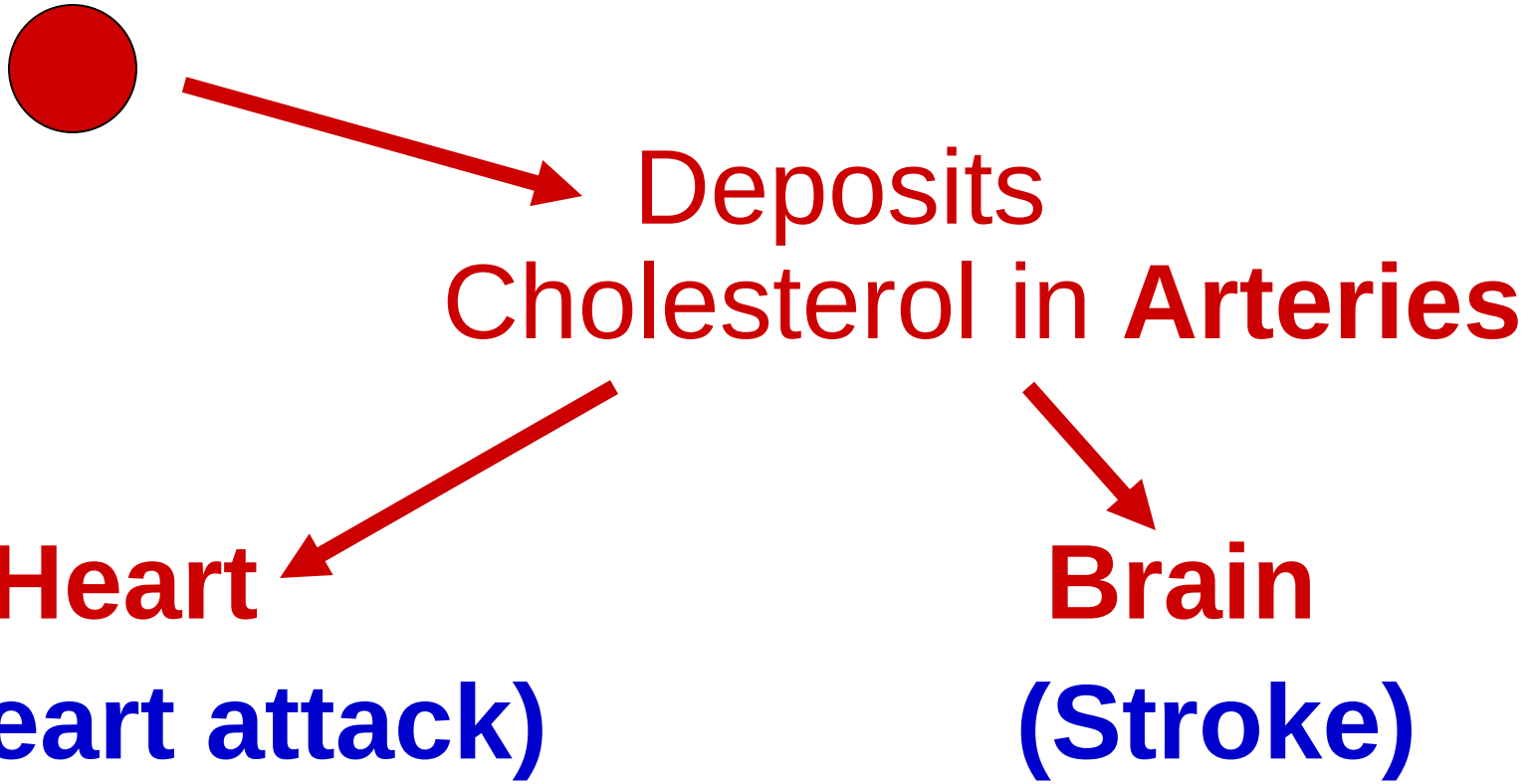


delivers cholesterol

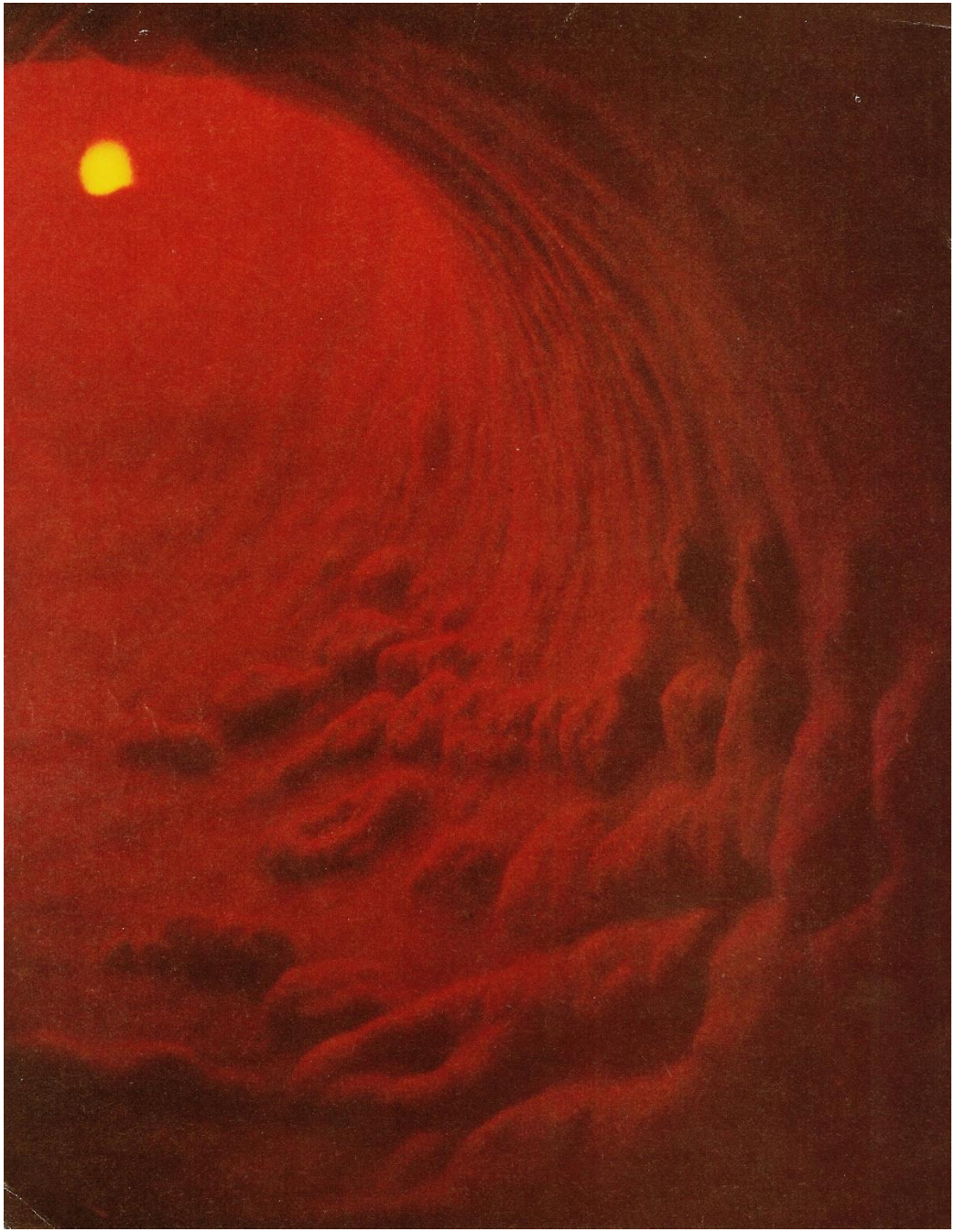


cells: make new membranes (replacement worn out parts)

LDL
Bad Role


Deposits
Cholesterol in **Arteries**
Heart
(Heart attack)
Brain
(Stroke)

Aorta 42 year old man



#3 High Density Lipoproteins (HDL)

↑ **HDL** ↓ **Heart Disease**

HDL removes cholesterol from cells

(arteries)

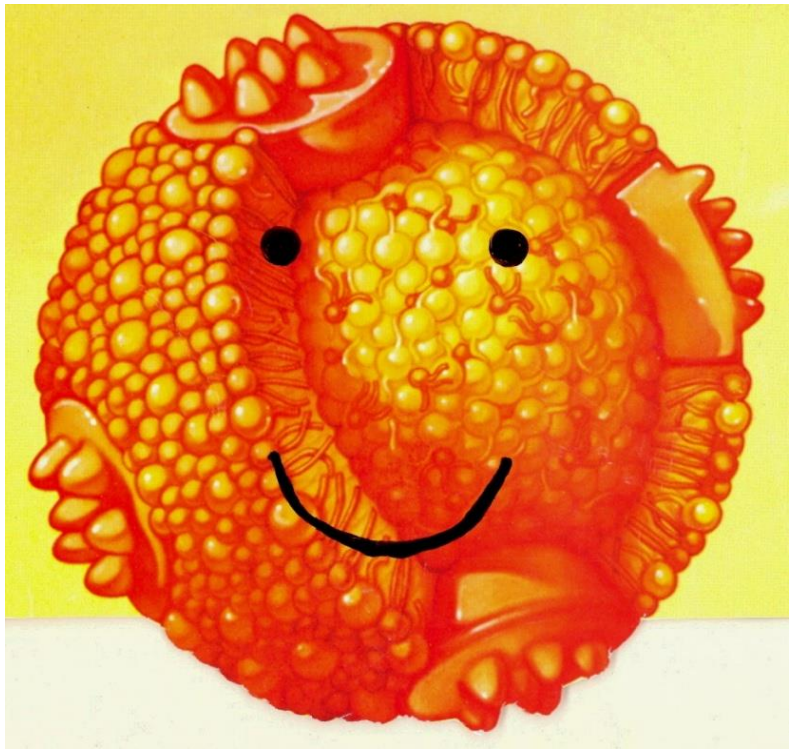
liver

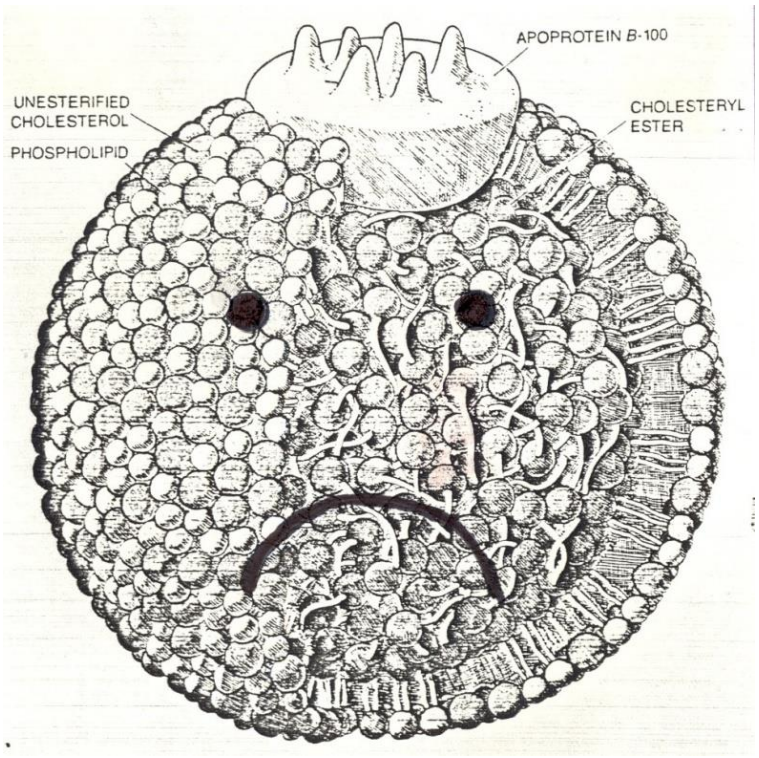
Removed in **bile**

(feces)

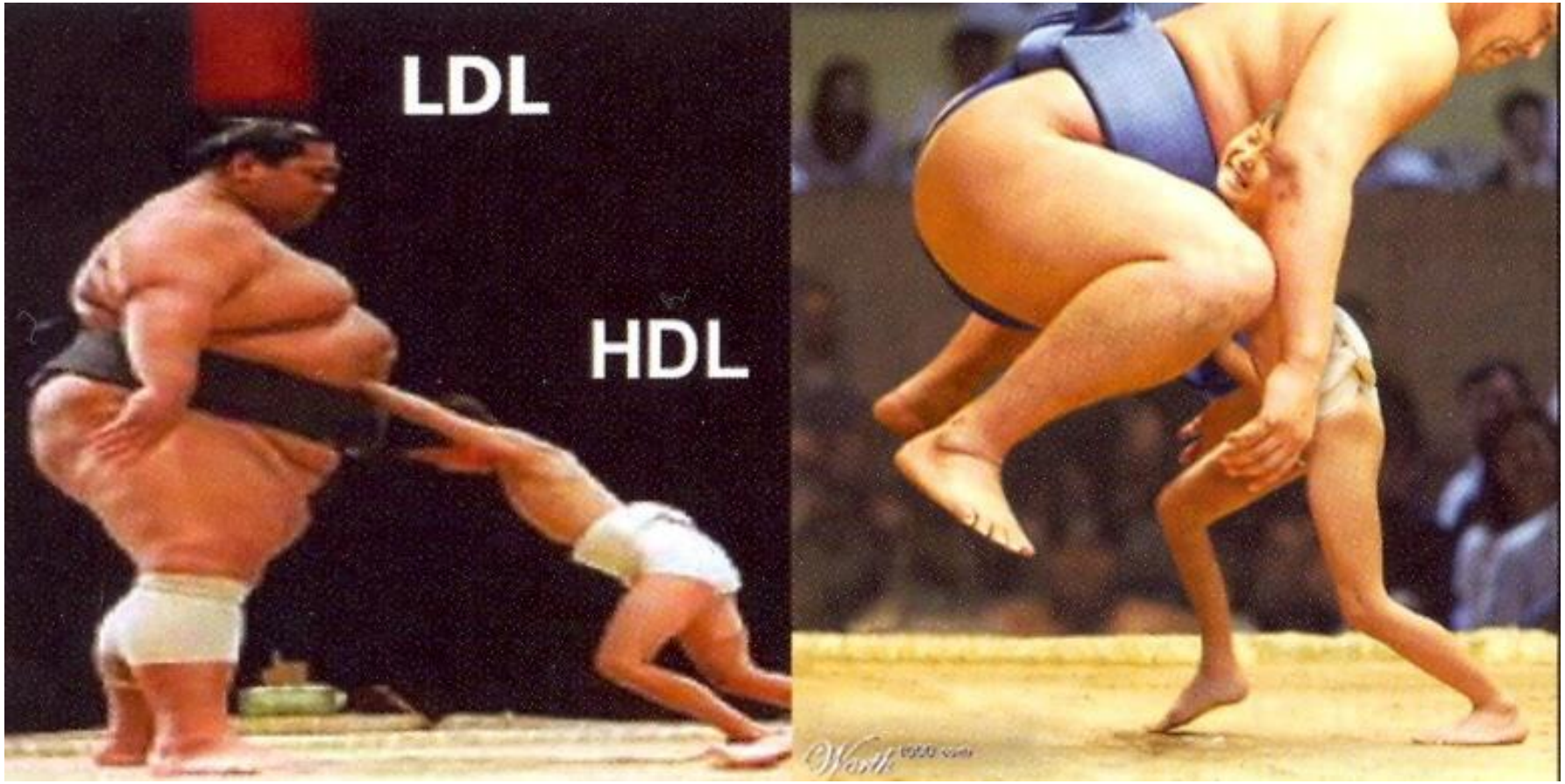
Cholesterol

The Good HDL and The Bad LDL



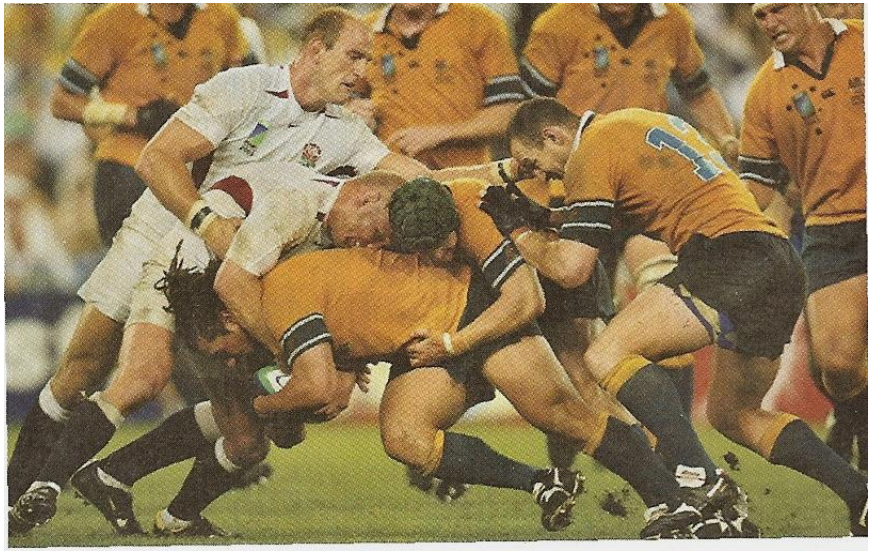


LDL vs. HDL: Balance is important



Fat Functions

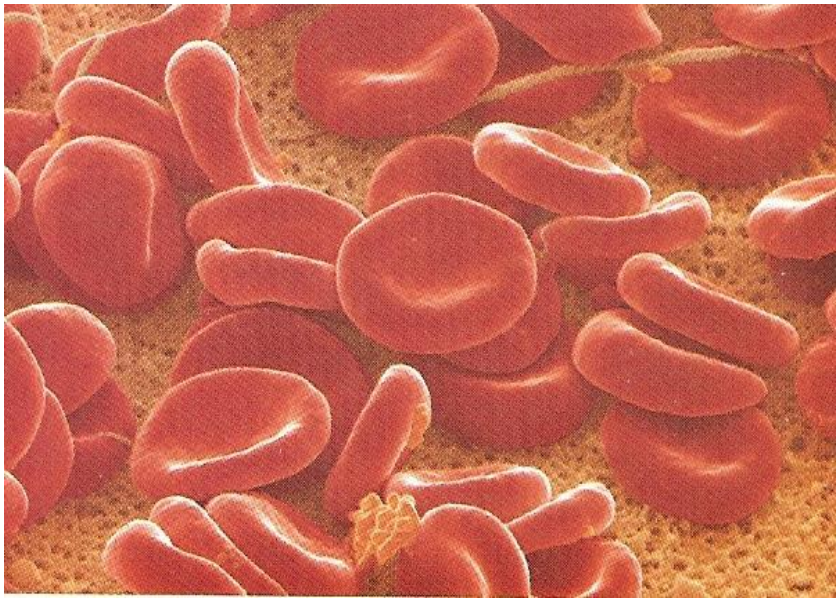
- Stored **energy** (9 calories/gram)
- **Insulates** body (fat under skin, around internal organs)
- Cushions/protects against shocks



Adipose tissue pads our body and protects our organs when we fall or are bruised.

Fat Functions

- Provides **structure** to cell membranes (regulates what goes in/out)
- Keeps cell membranes **fluid (flexible)**



Fat Functions

- **Lubricates** body surfaces:

  oil in skin

- Adds **taste, texture, flavor, aroma** to foods

Fat Functions

- Help us feel **satiated** after meal

- Dissolves fat-soluble vitamins **(A, D, E, K)** in intestine for proper **absorption**

PROTEINS

Proteins: C, H, O, and N

Protein Synthesis (in cells)

Amino acids → Polypeptides → Protein

Protein Breakdown (in cells & during digestion → absorption)

Amino acids ← Polypeptides ← Protein

Amino Acids

20 different kinds: in human protein

11 can be made in cells =

Nonessential

Made in body or from diet

9 you can't make=

Essential

Must eat in diet

- Absence of **essential** amino acids in diet → Protein

Children ↓ Growth

Not enough protein: world health problem

Protein/calorie malnutrition

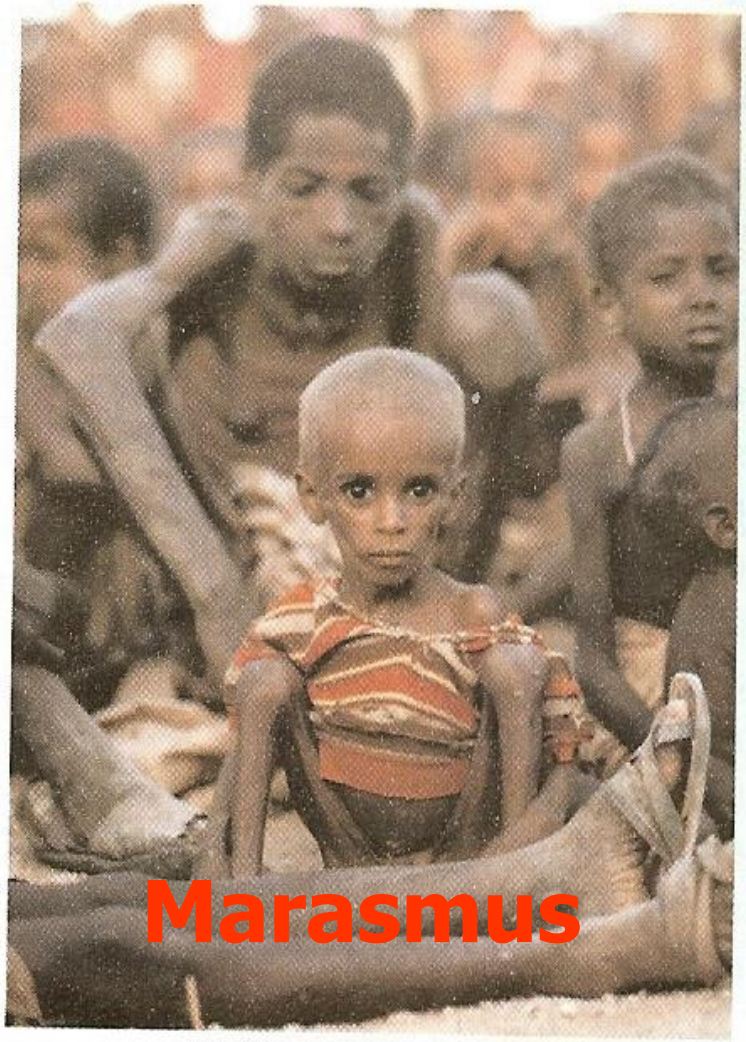
Kwashiorkor (↓ protein)

Marasmus

(↓ calories/nutrients)

Starvation

(a) Kwashiorkor



(b) Marasmus

The Peanut Butter Project

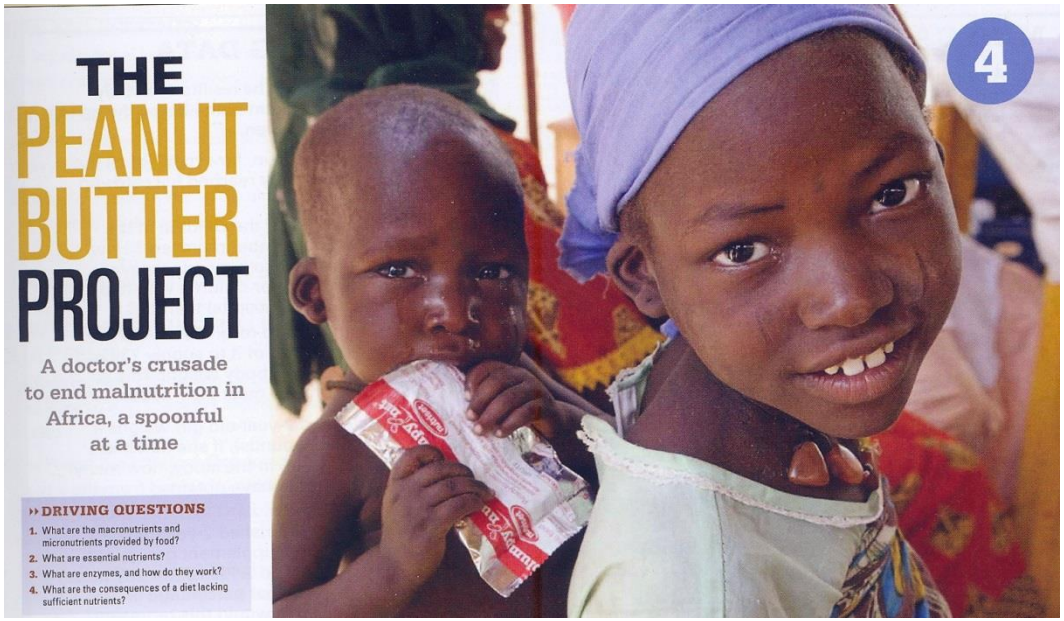
US pediatrician Dr. Mark Manary

New way to treat malnutrition in poor African children: **peanut butter**

Doesn't spoil for 3 months in tropics

95% success rate

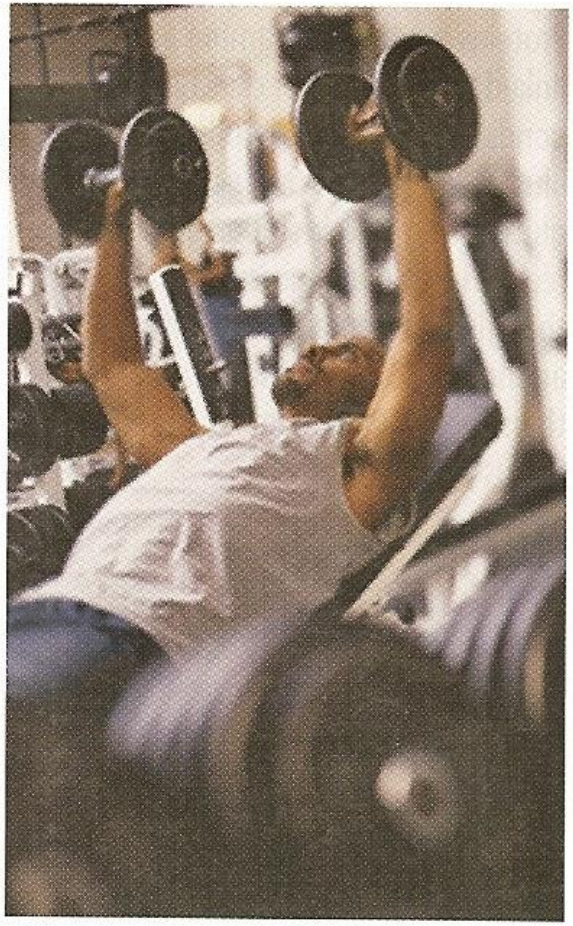
Physician Mark Manary tends to a malnourished child.



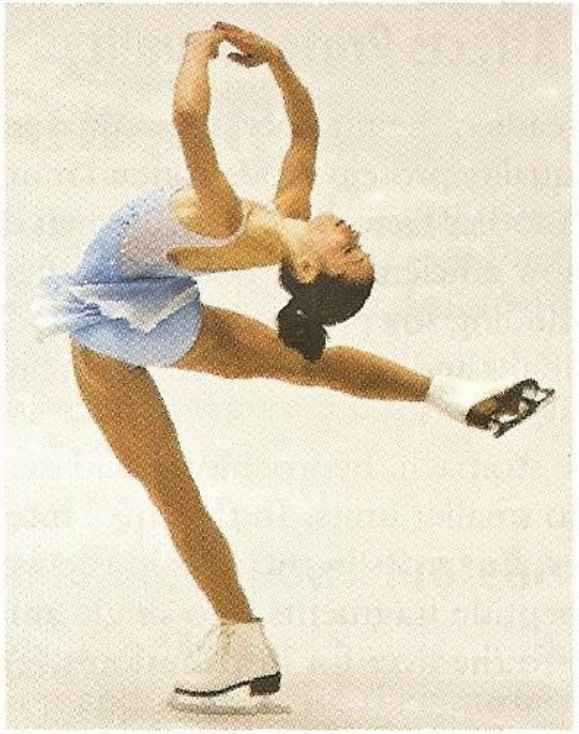
What Proteins do in Your Body

1. Enzymes
2. Tissue growth, maintenance, repair
3. Movement- contraction
4. Hormones- chemical messengers
5. Antibodies- response to antigens

6. **Carrier molecules (hemoglobin)**
7. **Fluid balance in tissues**
8. Acid/Base **(pH)** balance- tissue, blood **buffers**
9. **Receptors (magnets) cell membranes**
10. **Energy: 4 calories/gram**



Proteins are an integral part of our body tissues, including our muscle tissue.



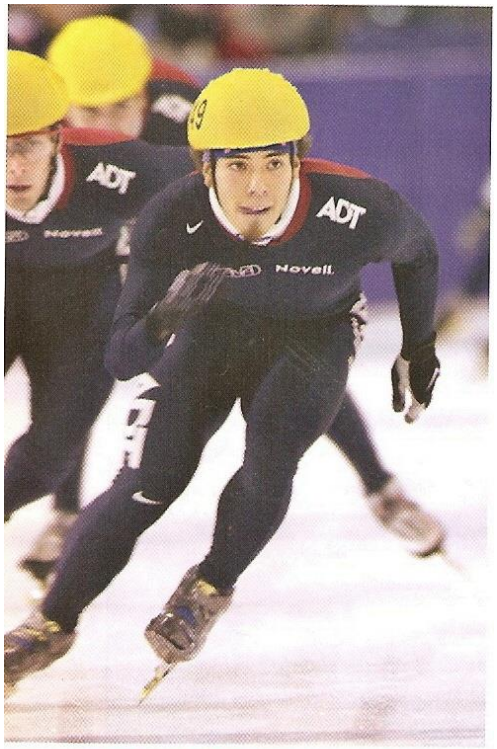


FIGURE 6.12

The extra muscle protein in Apollo Ohno's thigh muscles gives them extra size and strength and helped him to win gold in the 2002 Winter Olympics. (© AP/Wide World Photos)

Edema can result from deficient protein intake. This foot with edema is swollen due to fluid

How your body uses protein

1st amino acids → **new body proteins**

(structure, enzymes, hormones)

2d amino acids → **energy**

or

3rd amino acids → **glucose**

If very low calories (fat and carbohydrate) & protein in diet:

- **Tissue proteins "cannibalized"** for **energy**

Therefore: **fat & carbohydrate- "spare"** tissue protein from **breakdown**

Protein Quality

1. Ease of digestion → release amino acids

2. Supply proper amounts- **essential amino acids**

In general

Animal proteins

dairy products, eggs, beef, poultry, fish

High quality

(complete)

Plant proteins

Lower quality

(incomplete)

Exception

soy protein

Vegetarians

To get enough essential amino acids:

Variety is important

- Examples: **beans, nuts, peanut butter, peas, soy products, eggs (ovo-vegetarians)**

www.vrg.org

www.vegansociety.com

Other NFL quarterbacks adopt **Tom Brady's** (40) **vegetable**-based diet

"Lean diet", cut out **carbs** and **sugar**

Change diet → change **body** → play longer, better

Aaron Rogers

Russell Wilson

Differences: Plant vs. Animal Foods

- **Plant Foods**

Most, not all B vitamins

Good amounts iron, zinc, calcium

↓ Quality protein

↑ **Fiber (good for you)**

↑ **Phytochemicals (promote health)**

↑ **Unsaturated fat/no cholesterol (good for you)**

- **Animal Foods**
  - ↑ High quality protein
  - ↑ **B vitamins (B12)**
  - ↑ Minerals (iron, zinc, calcium)
  - ↓ **Fiber**
  - ↑ **Saturated fat/cholesterol (heart disease)**

Dietary Guidelines: Advantages of both types of food

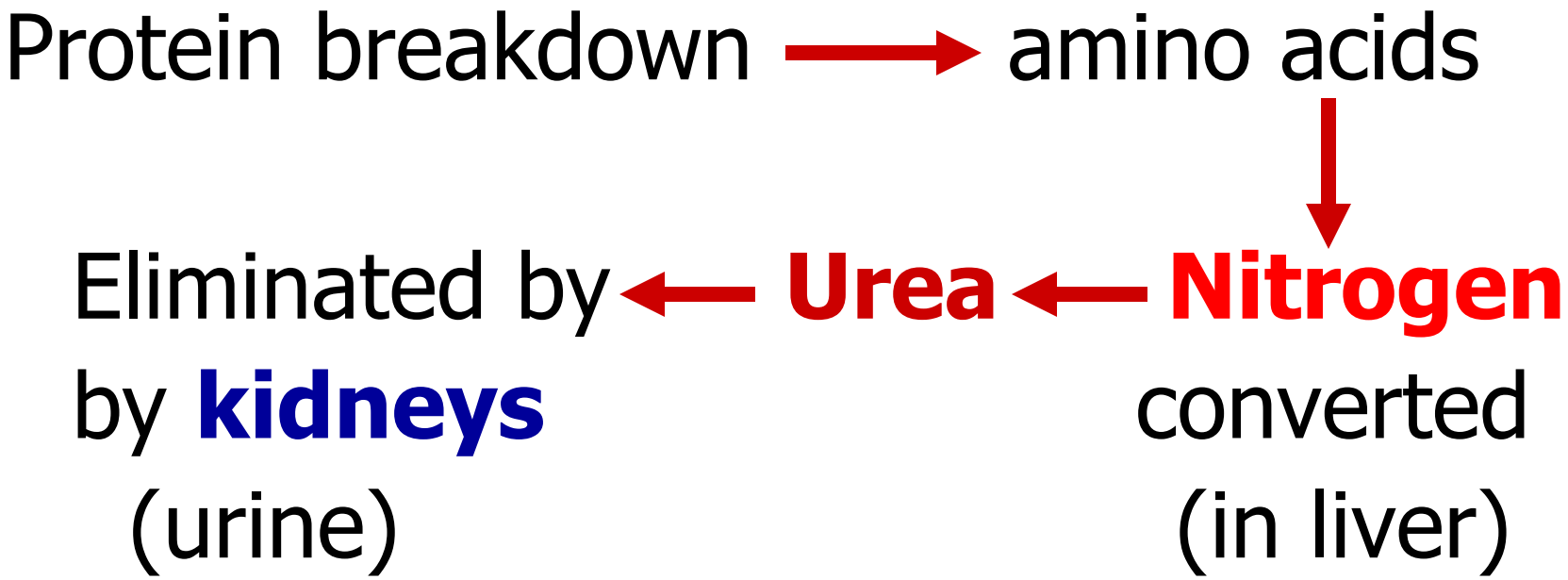
- Whole Grains
- Fruits
- Vegetables

} PLANTS

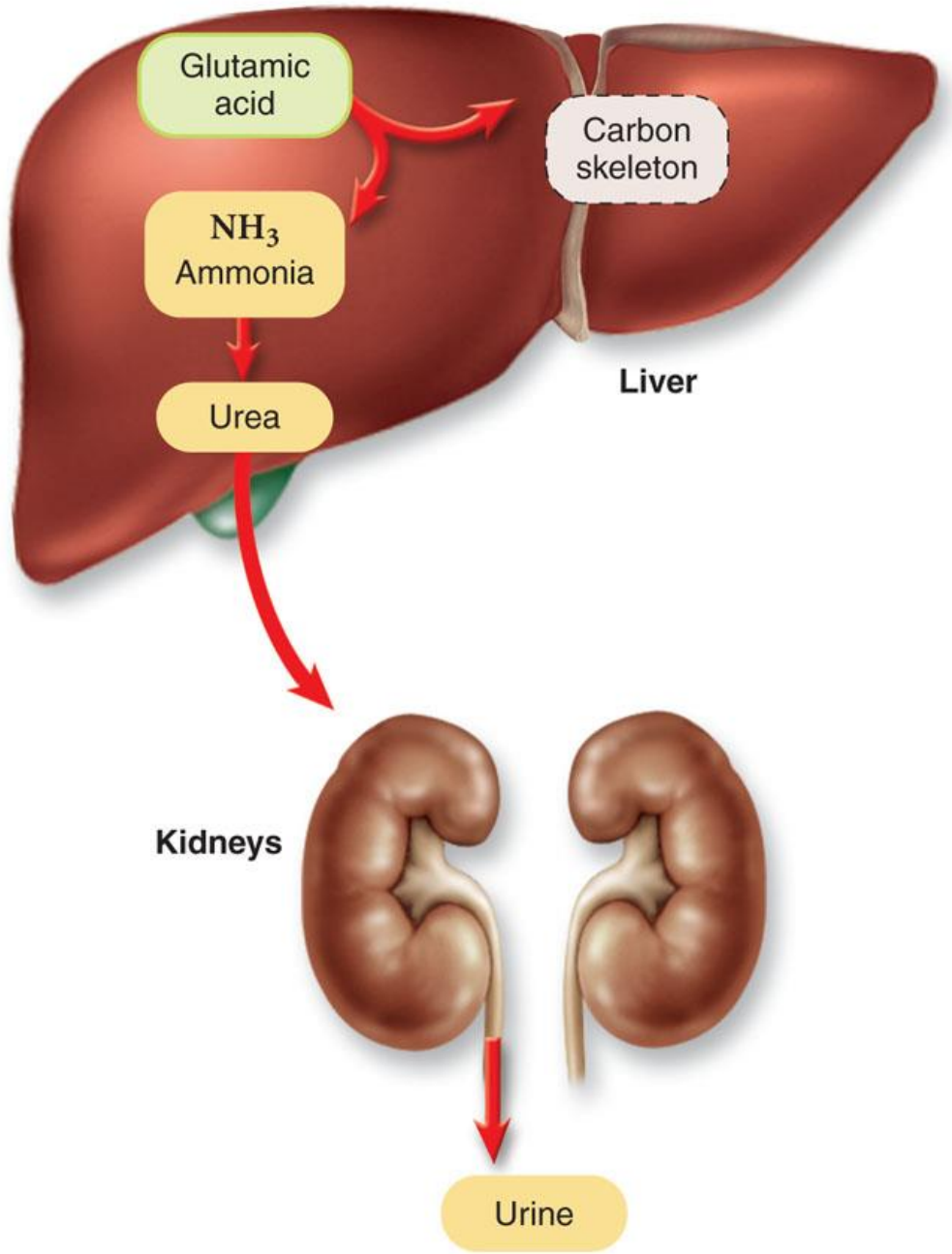
- Low/nonfat dairy products
- Low fat meat

} ANIMALS

Nitrogen Balance



Diet Intake of Protein = Urine output
(nitrogen) **(nitrogen)**

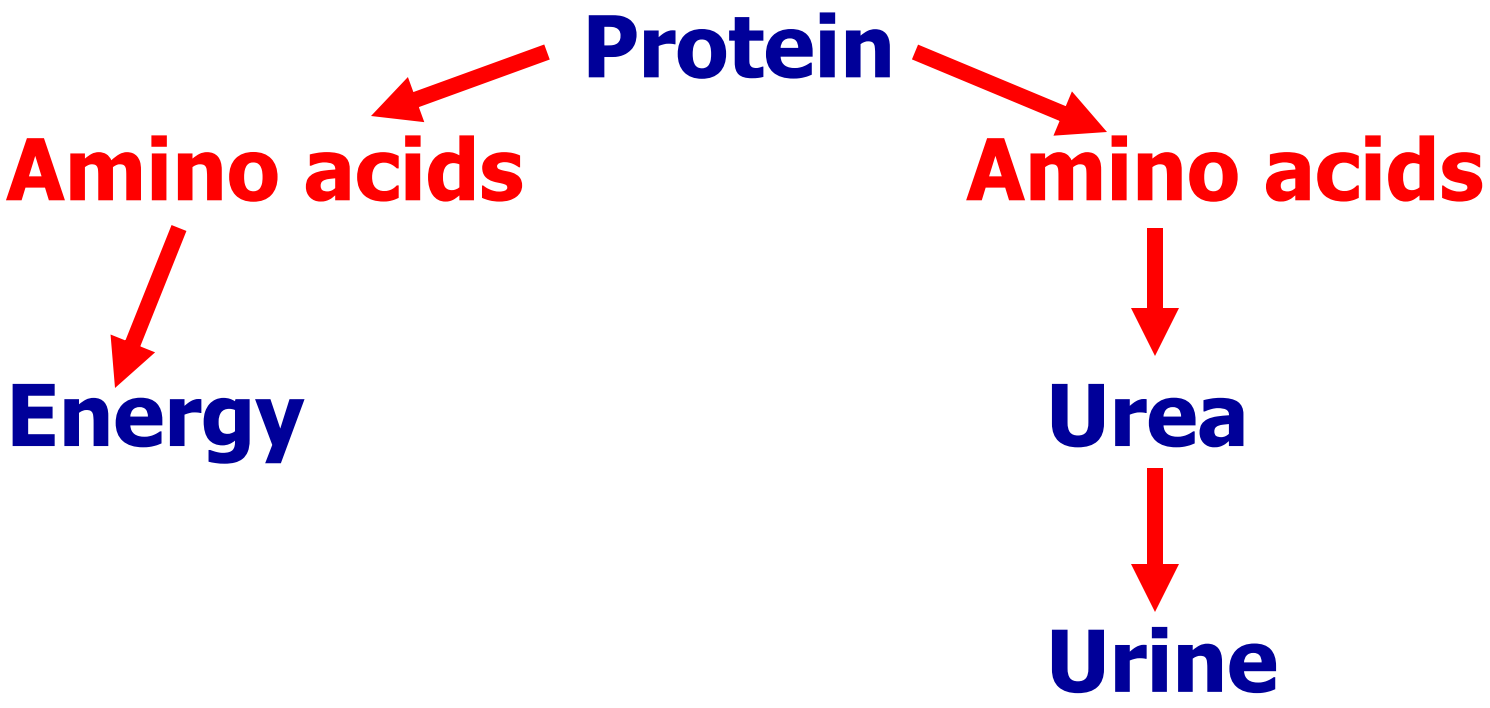


Normal Situation: Being **in** Nitrogen balance

Nitrogen in urine: best measure of **protein breakdown** in body

Urine nitrogen should equal nitrogen (protein) in your diet

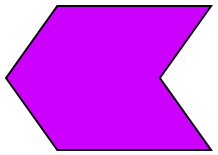
Extra protein beyond your body needs



* Remember: You don't store protein in your body

Negative Nitrogen Balance

Diet intake of Protein (N)



Urine Output Nitrogen

Loss of protein: breakdown of body protein

Negative Nitrogen Balance

- Starvation/AIDS patients/Cancer
- Fevers/illness/infections
- Burns
- Surgery/injury
- Forced immobilization (broken leg)
- Low protein diets
- Homeless
- Eating disorders/alcoholics
- Elderly-nursing homes/hospitals

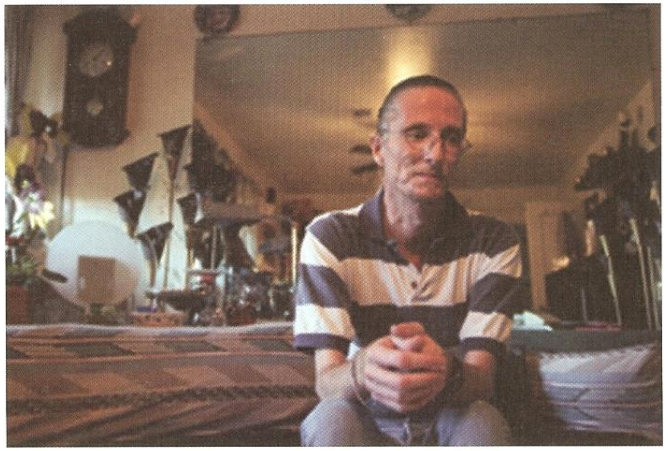
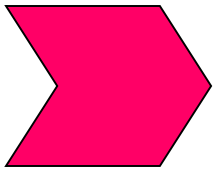


Figure 6.14 Protein-energy malnutrition occurs in several populations in the United States, including those with such wasting diseases as AIDS and cancer.

Positive Nitrogen Balance

Diet intake of Protein (N)



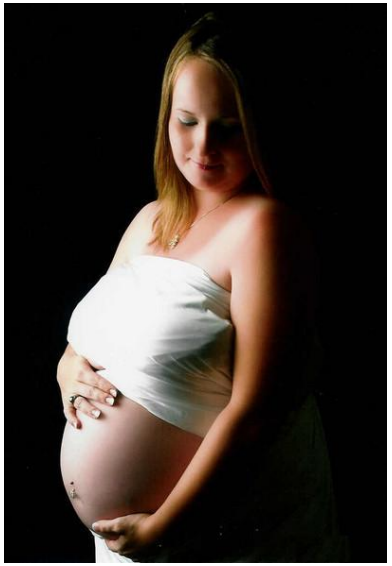
Urine output Nitrogen

Your body gains protein (synthesis)

Building new muscle, bone, skin

Positive Nitrogen Balance

- **Growth** (children)
- Recovery: severe illness/infections (healing)
- **Anabolic steroids**
- **Body building**
- **Pregnancy**



"Techie Diet" busy **Silicon Valley** coders, engineers: **no time** for food

Add H20 to **protein powder packets** (magnesium, zinc, vitamins)

Liquid meal, taste: bland, gritty batter

Schmilk, Schmoylent, Soylent

$85: week's supply

"Time wasted by eating", "Get the calories as quick as you can": NY Times 5/25/15

Review for Exam: WEB Site

1. **Food Allergies: Examples**
2. **Vitamins: Fat soluble vs. water soluble**

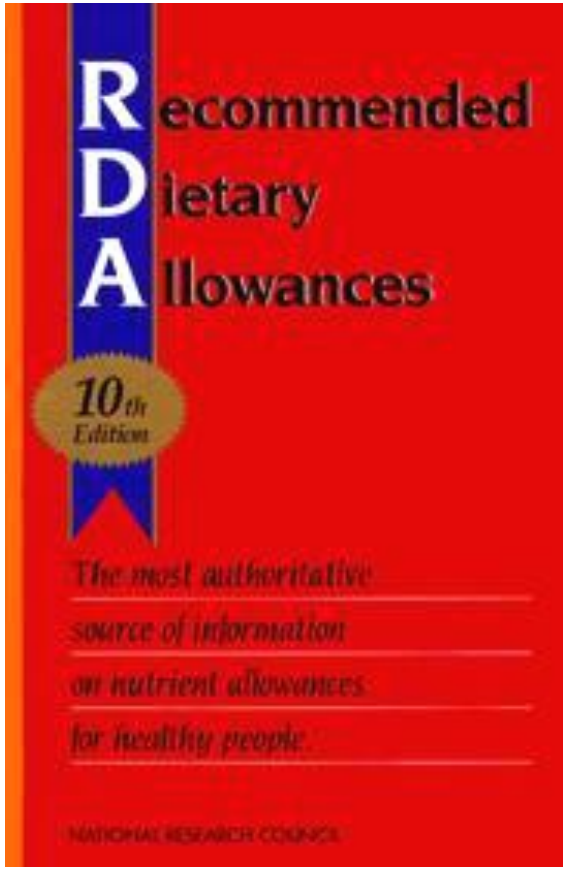
   Examples & how they work
3. **Minerals: Examples & how they work**
4. **Water: why it is important**

First Exam:

Look up definition

of

RDA

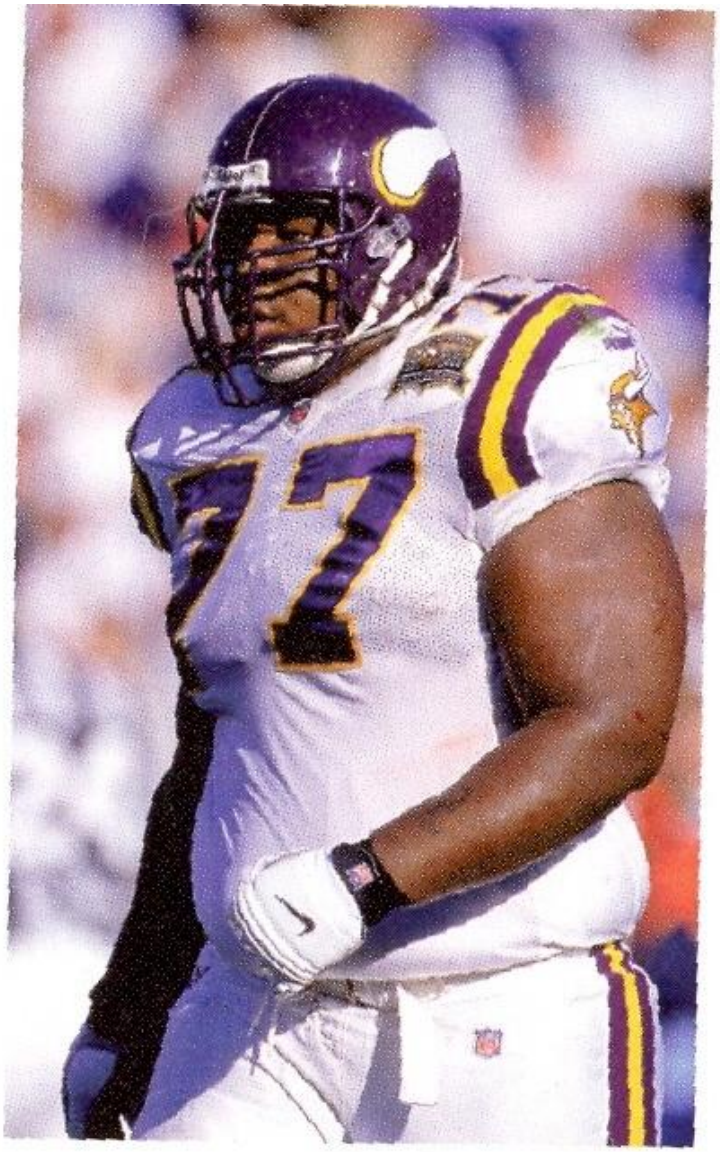


Water: **Macronutrient**

- **60%** body weight
- **No calories**
- Critical: normal body functions
- **Lubricates** body parts
- Controls **body temperature**
- Carries **oxygen, nutrients, wastes** in blood around body

Water

- You **don't** store water in body
- Loss continuously: **lungs, sweat, urine**
- Need adequate amounts- **everyday**
- No water intake- **3** days: **death**
- **Thirst response** ↓ with **age**
- Elderly/nursing homes: concern- **dehydration**



National Football League all-star Korey Stringer died in 2001 as a result of heat stroke.

Fruits & Veggies: H20 Content

Ice berg lettuce, cukes	96%
Cabbage, celery	95%
Tomatoes	94%
Watermelon, strawberries	92%
Spinach, eggplant	
Broccoli	91%
Carrots, pineapple, peaches	87%
raspberries	
Blueberries, plums	85%
Apples	84%
Bananas	74%

Intoxicated by Water

Intoxicated by Water, NY Times 9/1/15

- Coach concern: player **dehydration**
- Players drink H20 before, during, after practice: even if not thirsty
- **Overhydration**: death 2 high school football players (water intoxication)
- ↑ Blood H20, ↓ Na: water swells cells
- Key: drink when **thirsty**; dehydration **doesn't** lead to **cramping** (Central Michigan University studies)

Found a Peanut

Food Allergies: Allergic Reactions

- **Skin**: Redness, swelling, hives
- **Circulation**: drop blood pressure
- **Mouth**: itching/tingling of lips/tongue
- **Lungs**: asthma, breathing difficulty

Common Allergens

- **Adults**: seafood, **peanuts**, fish, tree nuts, eggs

- **Children**: eggs, milk, peanuts, soy, wheat

- **Gluten Intolerance (celiac disease)**

Gluten: **wheat protein** irritates intestine lining: cramping, diarrhea, weight loss, malabsorption nutrients

Read food labels- avoid specific foods

2015 studies: give peanuts to infants 4-11 months old: at age 5: "peanut tolerance"

Micronutrients: **needed small amounts**

Vitamins:

- All contain **carbon**
- **Don't** provide **calories**
- Most **can't** be made in your body
- Source: **foods/supplements**
- Important: all normal body **functions**

Vitamins: 2 Groups

- **Fat Soluble**
- **Water Soluble**

Fat Soluble Vitamins

- **Don't dissolve in H2O**
- **A, D, E, K**
- **Absorbed** in intestine with **fat** ↘
  liver/other organs ← lipoproteins
- **Stored in tissues (liver, adipose)**
- **Don't** need to consume everyday

Fat Soluble Vitamins

- Large amounts- diet/supplements

  toxic ⟵ build up tissues

- **Found: meats, dairy products, vegetable oils, nuts, seeds**

Water Soluble Vitamins

- Dissolve in **H2O**
- **B complex (many types) & C**
- Absorbed- intestine directly → **blood** → body cells
- You **don't store** large amounts
- Need to consume **everyday**

Water Soluble Vitamins

- Not enough: **deficiency**
- **Too** much: kidneys filter excess urine
- **Found: whole grains, vegetables, meat, dairy products**

Minerals

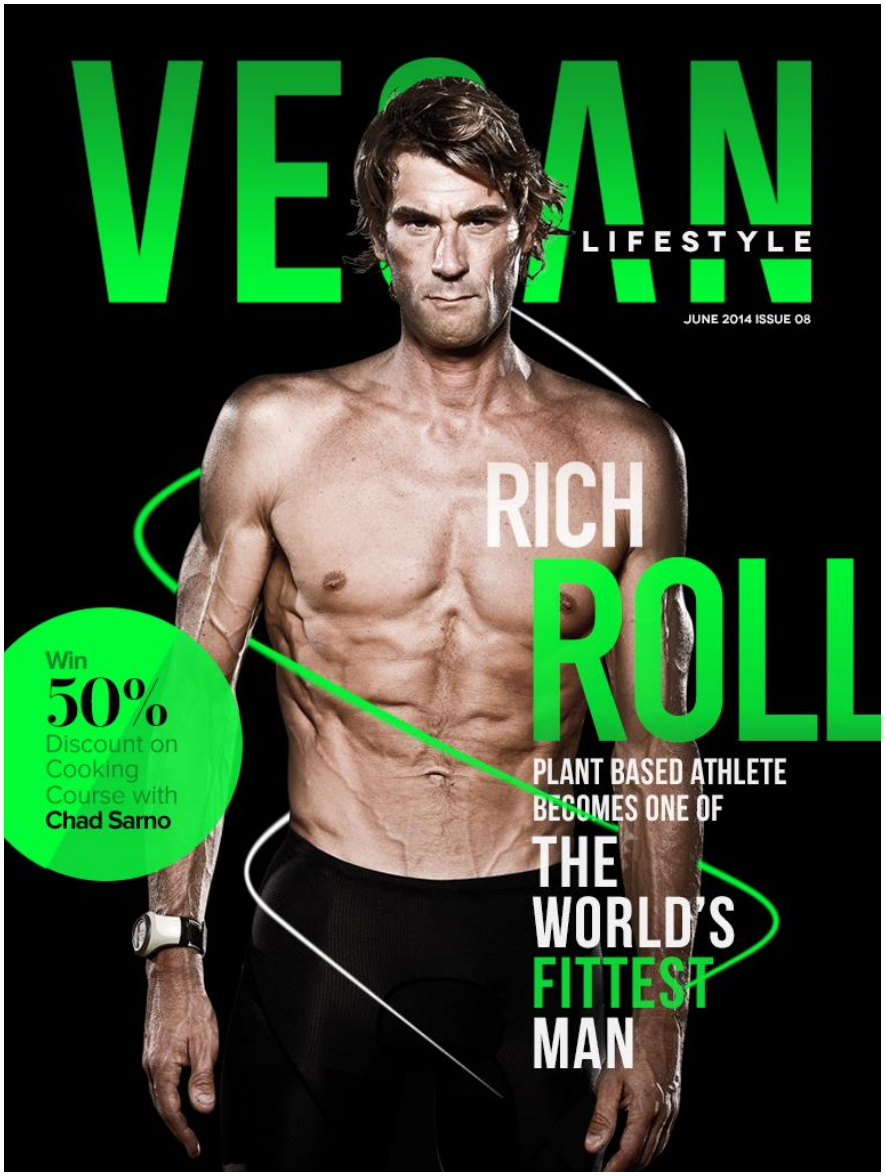
- **Don't** contain carbon
- **Not** broken down: digestion or in normal body functions

  Ex. **Calcium** in milk same as calcium in bones
- **Found: meats, dairy products, fruits, vegetables, nuts**
- Regulate many body functions

Minerals: Functions

- **Body structure:** calcium, phosphorus, magnesium in **bone**
- **Regulate blood pressure:** sodium & potassium
- **Nerve impulses/muscle contractions:** calcium, magnesium, potassium, sodium
- **Fluid balance:** sodium, potassium, chloride

Vegans and Vitamin B12



Vitamin B12: DNA synthesis (RBC's) and nerve cell coating

Sources: Animal (not plant) foods: **attached** to protein

Meat, milk, chicken, fish, shellfish, eggs, **liver**

Stomach acid → Releases B12 → Absorbed Intestine

Vitamin B12 deficiency:

Nerve damage, muscle weakness, fatigue, memory loss/confusion, depression, problems walking/balance, tingling/numbness hands/feet

B12 deficiency at risk people:

- Over 50 years (↓ stomach acid)
- **Elderly, living alone, poor diet**
- **Nursing homes**
- **Celiac, Crohn's Disease**
- **Acid reducers (Nexium)**
- **Weight loss surgery**
- **GI tract removal- cancer**
- Adults 26-49 (poor B12 **absorption**)

- **Vegans**

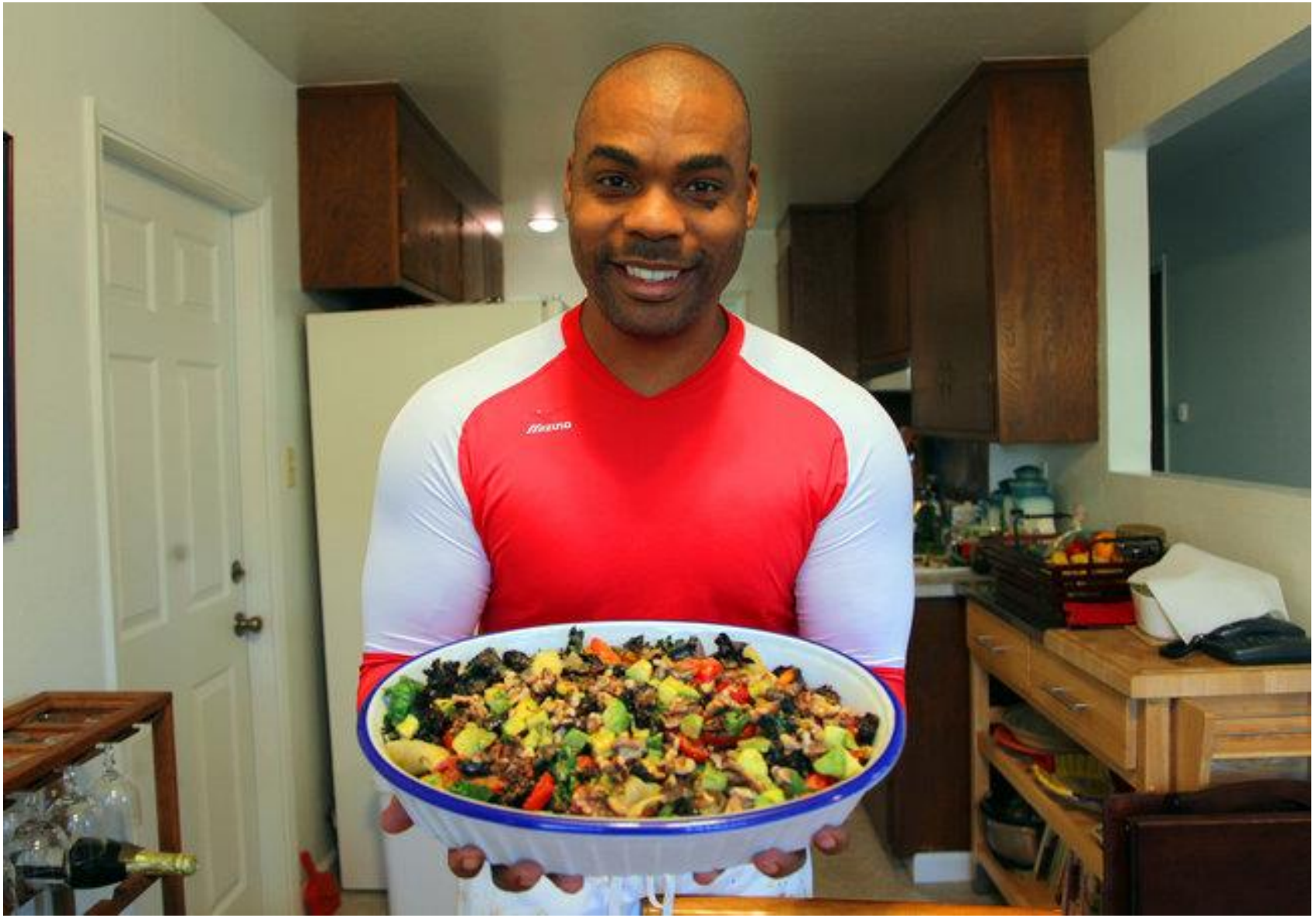
Vegan Society: Eat **2-3 fortified** food servings/day (3 micrograms)

Recommendation: Check blood B12 every 2 years

Treatment: non-animal sources

- **Fortified** breakfast cereals, plant milks, soy products
- **Supplements** (synthetic B12)
- **Injections**

Vegetarians and Bodybuilding



Jim Sitko (29): 5’11” 180 pounds

Vegan Bodybuilder- bench presses nearly twice weight

“Does not eat anything that comes from an animal” (NY Times Jan. 2012)

Lisa Koehn: vegan Bodybuilder- Hawaii

- Only problem:

Plant foods don't contain all essential amino acids **(vs. animal proteins)**

- **Need to eat variety & large quantities- veggies, nuts, rice beans**

Marketing Food

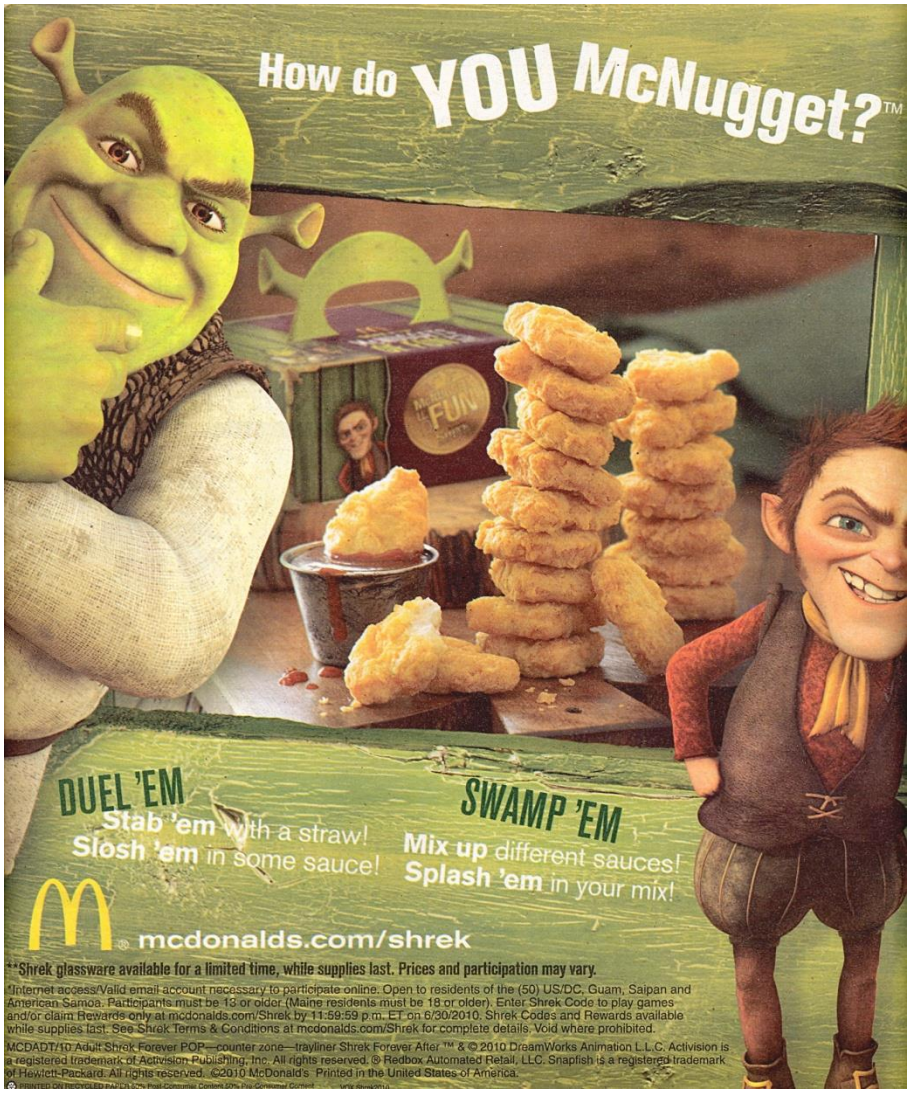
"Life Tastes Better with KFC"

"Eat Like a Man" Taco Bell

"Come Hungry, Leave Happy"
IHOP

"Better-For You Choices"
DDSmart

Marketing Food to Children



How much protein do you need each day to be in nitrogen balance?

Pick one day

	Food & Drink Amount	Protein (grams)
Breakfast		
1		
2		
3		
Lunch		
1		
2		
3		
Dinner		
1		
2		
3		
Snacks		
1		
2		
3		

Total Protein (grams) _____

Average adult protein needs:

0.8 grams/kilogram body weight/day

How to find your daily protein needs:

1) First calculate your **weight** in **kilograms**:

Weight in **pounds** divided by **2.2**

RDA for Protein

Male & Female	Age (years)	RDA Factor (grams/kg)
	0-0.5	1.52
	0.5-1	1.50
	1-3	1.10
	4-8	0.95
	9-13	0.95
	14-18	0.85
	≥ 19	**0.80**

What about this?

Weight X RDA Factor **(0.80)** =
(kilograms)

How much protein you need daily

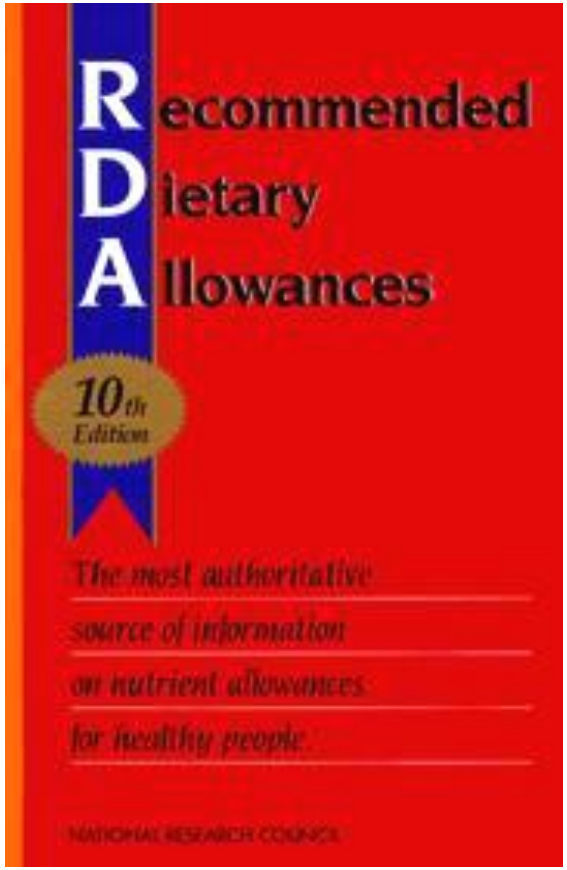
(nitrogen balance)

First Exam:

Look up definition

of

RDA



Typical American

Eats: **100** grams protein/day

Reference person:

154 pounds divided by 2.2= **70** kg (wt)

RDA: 70 kg X **0.8** = **56** grams/day protein

In general:

Most healthy people don't need more than 2X RDA for protein

Athletes and Protein

Newer studies: athletes benefit from **1.2 to 1.7 g/kg/day** of protein

- Especially true: endurance athletes, weight lifters, resistance training, football, hockey, other power sports
- **Protein used for: repair of sports damage, lean muscle mass, "remodeling" muscle proteins (exercise stress/strain), optimal levels for body physiology**

Quick Way to Calculate your RDA Daily Protein Need (adults)

0.36 X your weight

Hot Dog Man: "The Tsunami"

July 4, 2004: Brooklyn- Nathan's famous hot dog eating contest

Takeru Kobayashi- Japan

5' 7" **132** pounds

Ate **53.5** hot dogs in 12 minutes- world record

Extra credit points

1) How much protein does he need/day?
2) How much protein did he get in 53.5 hot dogs (Fenway Franks)?

Extra Credit

Name: _____

Grams of protein I eat each day:____

My RDA (grams) for protein:____

Nitrogen balance: yes or no (circle)

Hot Dog Man

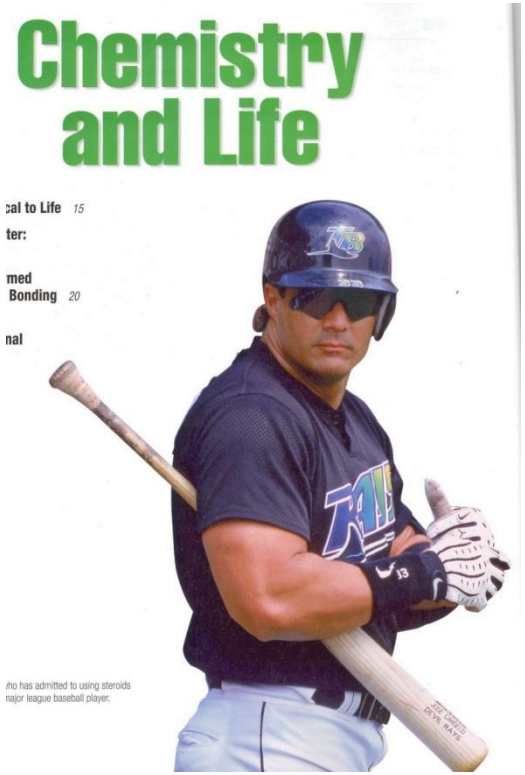
Hot Dog Man's RDA (grams):_____

Grams of hot dog protein he ate:____

Metabolism
&
Cell Respiration

Metabolism: all **chemical reactions** in your body

Anabolism: building up processes



Example:

Making **new cell protein**

Anabolic steroids- mimic **testosterone**

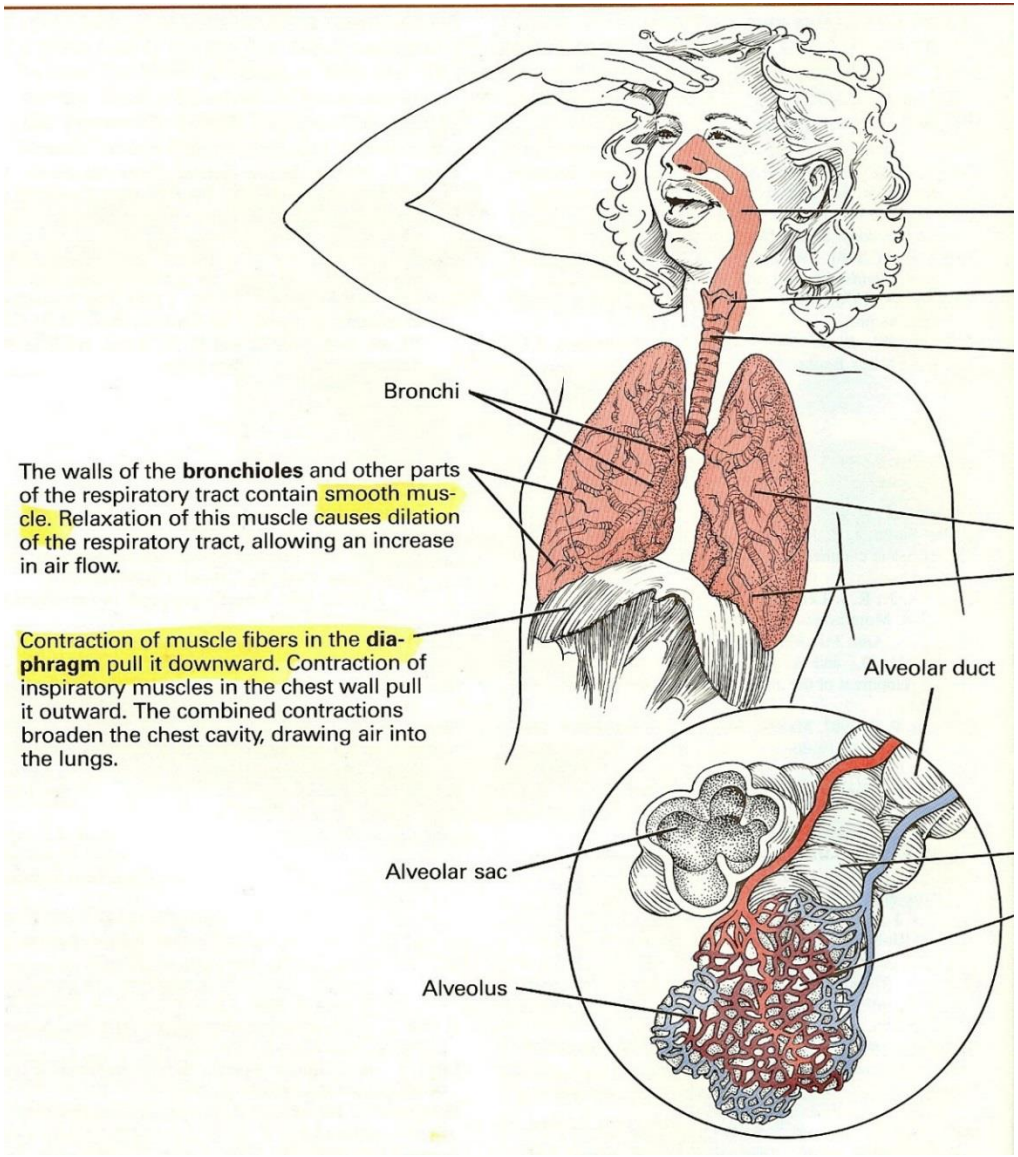
↑ muscle strength, mass

Metabolism:

Catabolism- breaking down processes

Example: energy release from **glucose**

What happens when you breathe?



Cell Respiration: inside your cells

- Energy trapped in **chemical bonds**: **carbohydrates, fats, protein**

- Break chemical bonds → energy

ENERGY + P + ADP → **ATP**

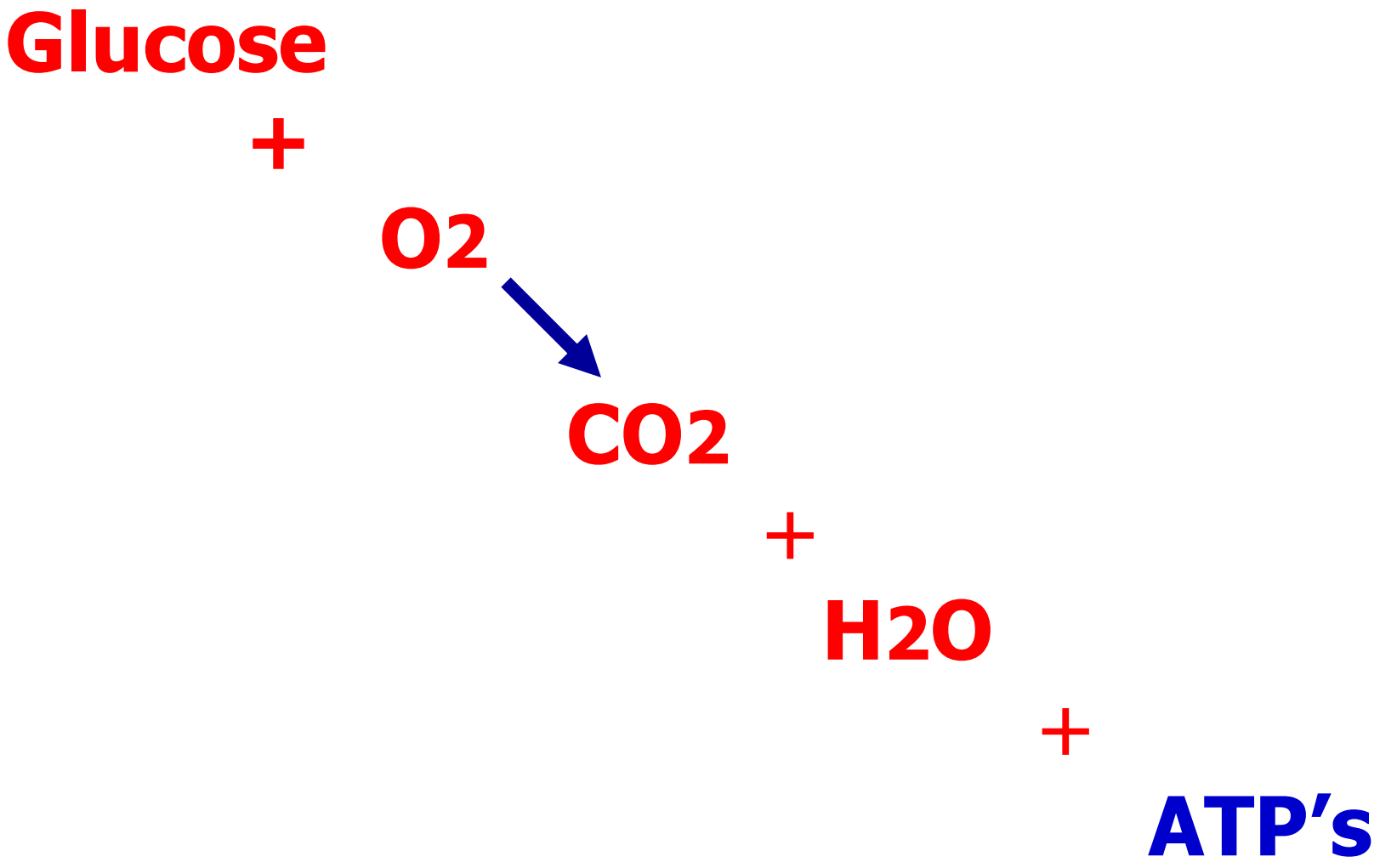
(from chemical bonds of food)

(stored energy)

←

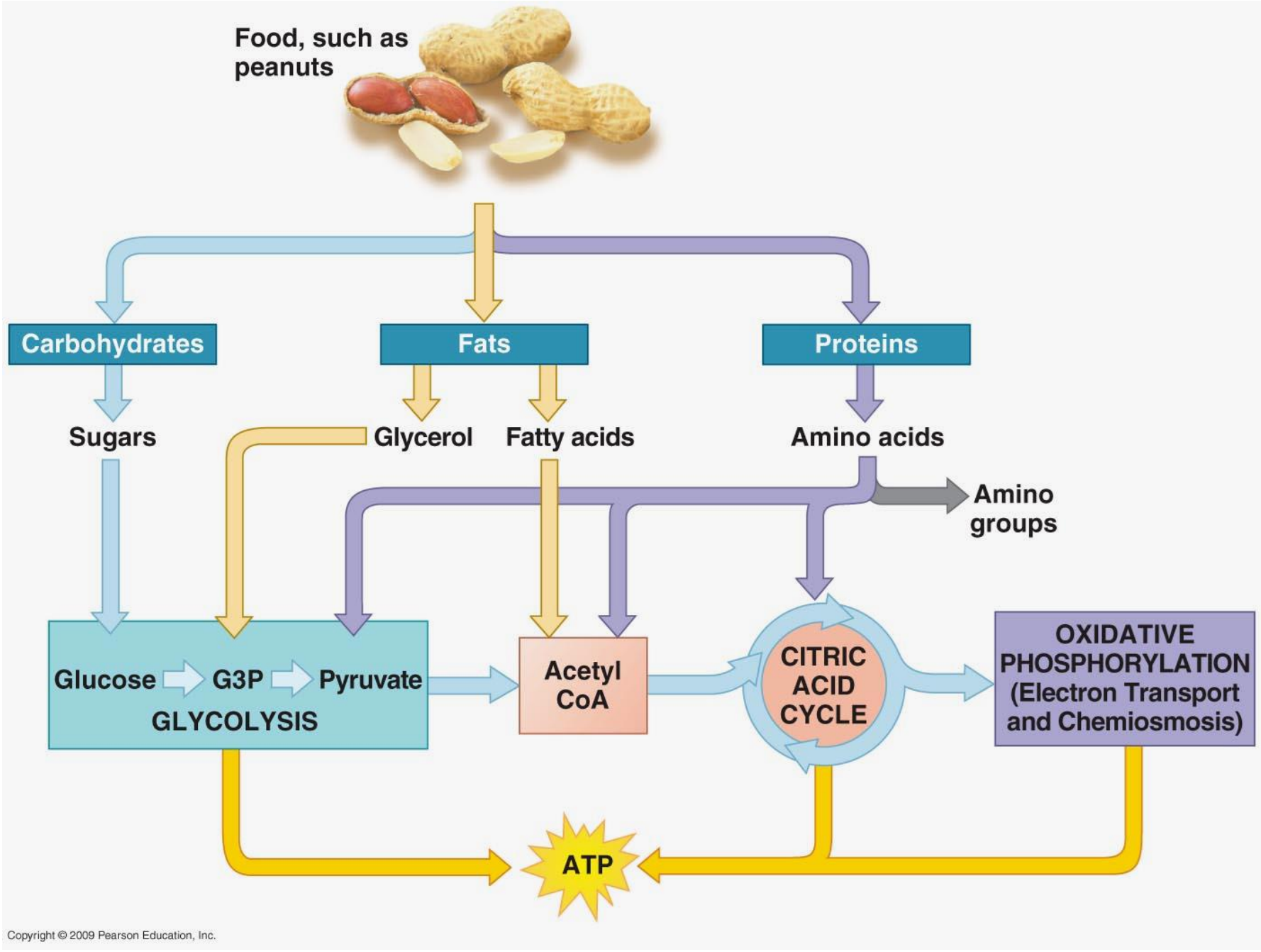
Energy **release**:
all body activities

Cell Respiration



Metabolism: Carbohydrates, Fats, & Protein

All Interconnected



Examples:

1. Eat too many **carbs** → **FAT** (adipose tissue)

2. Protein burned for energy (ATP)

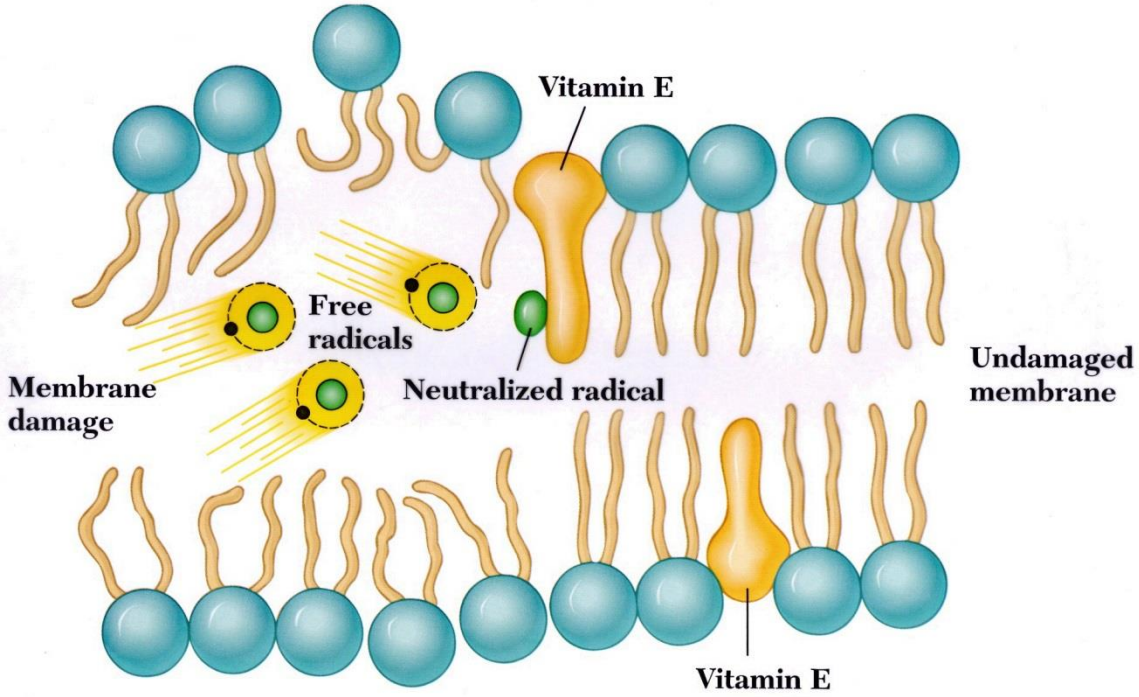
3. Protein → blood glucose during fasting or starvation

Oxidation: removing electrons from molecules

- Happens during **metabolism,** exposure air pollution, cigarette smoke
- Produces: Very reactive **"free radicals"**
- **May cause cell death, cancer, aging, artery damage**

- Your body: built in protection:

  anti-oxidation- enzyme systems
- **Diet: Vitamin C, E , beta carotene (carrots), selenium (mineral): antioxidants:** destroy free radicals



Found a Peanut

Food Allergies: Allergic Reactions

- **Skin**: Redness, swelling, hives
- **Circulation**: drop blood pressure
- **Mouth**: itching/tingling of lips/tongue
- **Lungs**: asthma, breathing difficulty

Common Allergens

- **Adults**: seafood, **peanuts**, fish tree nuts, eggs
- **Children**: eggs, milk, peanuts, soy, wheat

Gluten Intolerance (celiac disease)

Gluten: **wheat protein** irritates intestine lining: cramping, diarrhea, weight loss, malabsorption nutrients

Read food labels- avoid specific foods

Micronutrients: **needed small amounts**

Vitamins:

- All contain **carbon**
- **Don't** provide **calories**
- Most **can't** be made in your body
- Source: **foods/supplements**
- Important: all normal body **functions**

Vitamins: 2 Groups

- **Fat Soluble**
- **Water Soluble**

Fat Soluble Vitamins

- **Don't dissolve in H2O**
- **A, D, E, K**
- **Absorbed** in intestine with **fat** ↘
  liver/other organs ← lipoproteins
- **Stored in tissues (liver, adipose)**
- **Don't** need to consume everyday

Fat Soluble Vitamins

- Large amounts- diet/supplements

  toxic ⟵ build up tissues

- **Found: meats, dairy products, vegetable oils, nuts, seeds**

Water Soluble Vitamins

- Dissolve in **H2O**
- **B complex (many types) & C**
- Absorbed- intestine directly → **blood** → body cells
- You **don't store** large amounts
- Need to consume **everyday**

Water Soluble Vitamins

- Not enough: **deficiency**
- **Too** much: kidneys filter excess urine
- **Found: whole grains, vegetables, meat, dairy products**

Minerals

- **Don't** contain carbon
- **Not** broken down: digestion or in normal body functions

  Ex. **Calcium** in milk same as calcium in bones
- **Found: meats, dairy products, fruits, vegetables, nuts**
- Regulate many body functions

Minerals: Functions

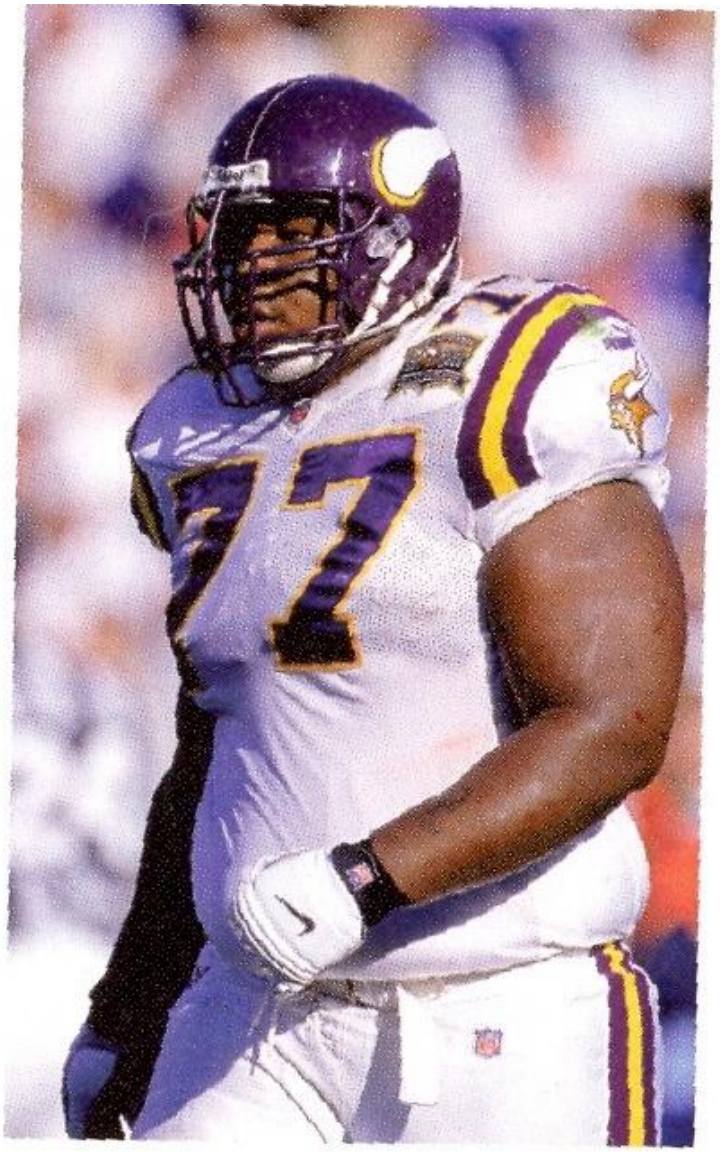
- **Body structure:** calcium, phosphorus, magnesium in **bone**
- **Regulate blood pressure:** sodium & potassium
- **Nerve impulses/muscle contractions:** calcium, magnesium, potassium, sodium
- **Fluid balance:** sodium, potassium, chloride

Water: **Macronutrient**

- Makes up **60%** body weight
- **No calories**
- Found inside/outside cells
- Critical: normal body functions
- **Lubricates** body parts
- Helps control **body temperature**
- Carries **oxygen, nutrients, wastes** in blood around body

Water

- You **don't** store water in body
- Loss continuously: **lungs, sweat, urine**
- Need adequate amounts- **everyday**
- No water intake- **3** days: **death**
- **Thirst response** ↓ with **age**
- Elderly/nursing homes: concern- **dehydration**



National Football League all-star Korey Stringer died in 2001 as a result of heat stroke.

Athletes Competitive Edge: Juice

Beetroot juice, Tart cherry juice

Many Olympians- London 2012 used **Beetroot and Tart Cherry juices**

- ↑ **Performance**
- ↑ **Blood and oxygen flow to muscles**
- ↑ **Body recovery after hard exertion**
- ↓ **Muscle pain and weakness after strength training, marathons**

Fruits & Veggies: H20 Content

Ice berg lettuce, cukes	96%
Cabbage, celery	95%
Tomatoes	94%
Watermelon, strawberries	92%
Spinach, eggplant	
Broccoli	91%
Carrots, pineapple, peaches	87%
raspberries	
Blueberries, plums	85%
Apples	84%
Bananas	74%

Dietary Guidelines for Americans 2010

AMERICANS EAT TOO MUCH:

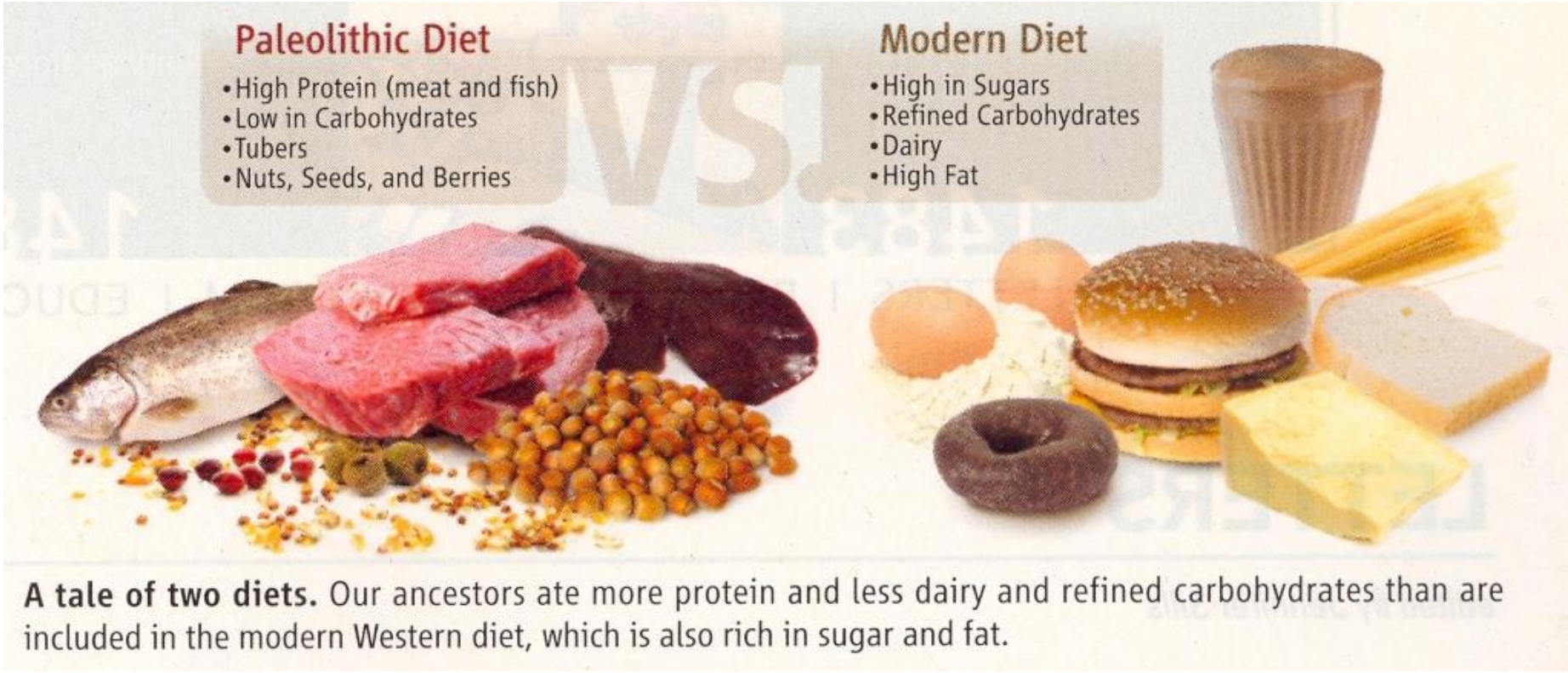
1) Calories
2) Solid Fat (Saturated, Trans)
3) Added Sugars
4) Refined Sugars
5) Sodium

Dietary Guidelines for Americans **2010**

AMERICANS DON'T GET ENOUGH:

1) **Potassium**
2) **Fiber**
3) **Calcium**
4) **Vitamin D**
5) **Unsaturated Fat: Oils, Nuts, Seafood**
6) **Other Nutrients in: Veggies, Fruits, Whole Grains, Low Fat Milk, Yogurt, Cheese**

Caveman vs. Modern Diet



A tale of two diets. Our ancestors ate more protein and less dairy and refined carbohydrates than are included in the modern Western diet, which is also rich in sugar and fat.

NY Times 9/13/06 "The number of new **diabetics** now totals around **35 million**" ….. "in a country better known for **famine**."

The New York Times

WEDNESDAY, SEPTEMBER 13, 2006

Namas Bhojani for The New York Times

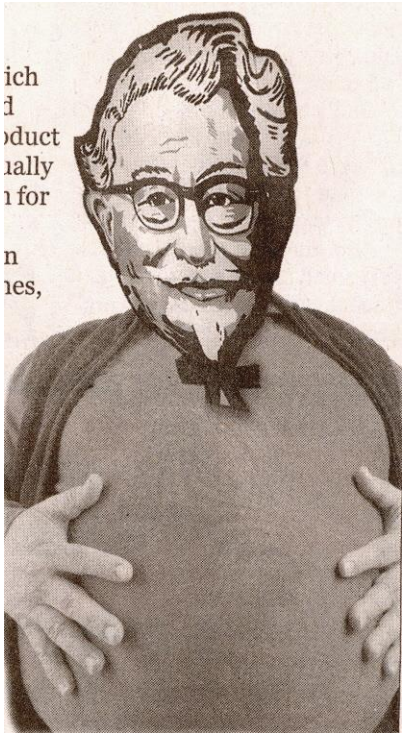
A taste for sweets, like those in this bakery, and the growing popularity of fried and processed foods are contributing to diabetes in India.

Modern Ways Open India's Doors to Diabetes

Hewlett Board

KFC: "Who's the fattiest of them all?"

4/26/10 NY Times



Double Down sandwich: 2 fried chicken breasts, bacon, cheese, special sauce

540 calories

Two Groups of Nutrients

- **Limit Some**
- **Increase others**

Some people in world don't eat like Americans

(But they are starting to)

HUMAN EVOLUTION

What's for Dinner? Researchers Seek Our Ancestors' Answers

You Are What You Eat

Bill Clinton: Heart Disease

- 2004: quadruple bypass
- 2010: 2 stents

Now: dedicated **vegan**

- **Breakfast:** almond milk smoothie, fresh berries, nondairy protein
- **Lunch**: Green salad, beans
- **Snacks:** nuts, hummus, raw veggies
- **Dinner**: Quinoa or veggie burger

A vegan feast Clinton prepares to enjoy lunch in his midtown Manhattan offices.

Medical Tourism: Michael Shopenn

Artificial hip replacement (2007)

Choices: US vs. Belgium

Cost of Operation

	US	Belgium
Hospital	$8,050	$3,700
Implant	$36,861	$4,200
Surgeon	$17,500	$1,110

New York City added **255** miles **bike lanes**: 66% approval by New Yorkers

Assignment
Nutrition Scoreboard

Brendan Ryan- Framingham

Food Services Director

High School Produce Garden (1/2 football field): squash, peppers, basil, tomatoes

PHOTOS BY JOHN TLUMACKI/GLOBE STAF

Brendan Ryan admires produce tended by Framingham High senior Ari Cauchon.

Dietary Guidelines for Americans **2005 and 2010**

- **Goals:** Reduce **chronic diseases,** healthier, longer lives
- **Developed by Expert Scientists**
- **Primary source nutrition information:**

  all health care professionals

China

Tufts University Study 2013

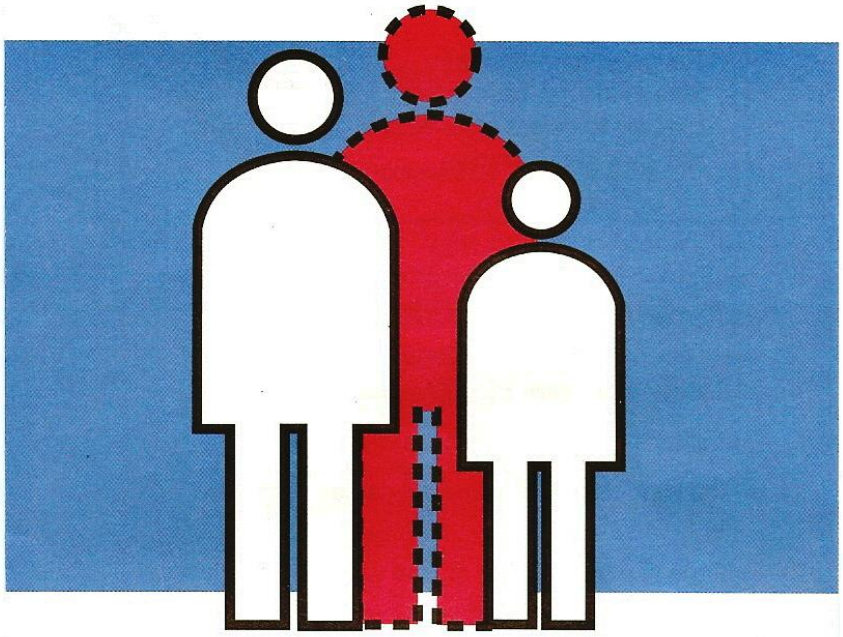
Meals at small-chain restaurants that **don't post calories:**

2-3 X more calories than needed

Suggestion: Eat half, Doggie Bag the rest

Colorectal Cancer

is **90% CURABLE** when caught early,
but **ONLY 8%** when detected late.



Control your health. GET TESTED.

Screening Saves LIVES

Hemoccult II® BRAND SENSA®

ColoScreen

A test for fecal occult blood

Name: _____ Age: ___

Street: _____

City: _____

State: _____ Zip: _____

Phone No.: _____

Date of collection: _____

Helena Laboratories
Beaumont, Texas 77704-0752

A	B

1. Collect small stool specimen on applicator. Apply thin smear in **box A.**
2. Reuse applicator to obtain another sample from a different part of the stool. Apply thin smear in **box B.**
3. Close cover. Place slide away from heat and light. **Return slide to physician.**

Rapper **Easy A.D.** (Adrian Harris) in Harlem raps to young people about good foods: **fruits and veggies**

Dietary Guidelines for Americans 2010

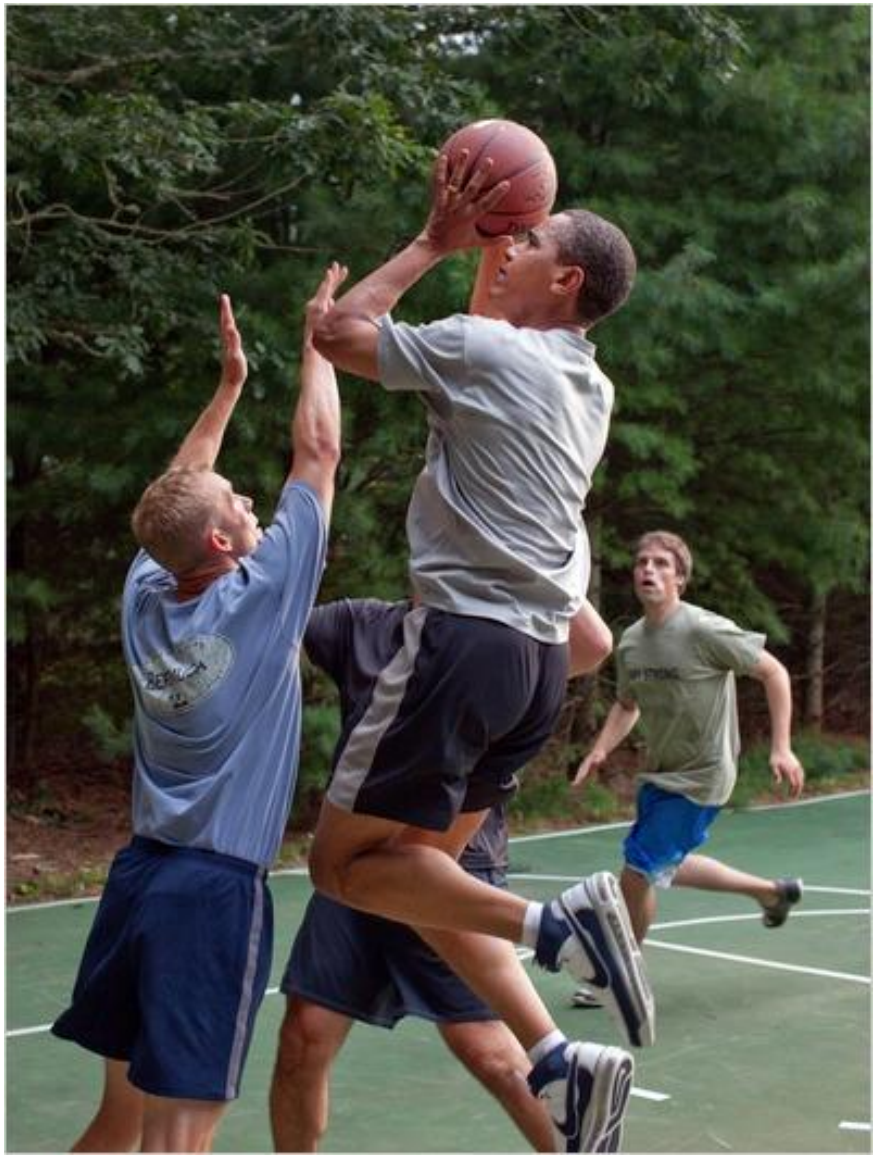
- Know your calorie need: age, sex, activity
- ↓ Calories from **added sugars, solid fats, refined grains**
- ↑ **Variety** veggies, fruits, fiber-rich whole grains

Dietary Guidelines for Americans 2010

- ↓ **Sugar-sweetened drinks**
- Eat smaller portions- of high calorie foods
- **Dining out: eat low calorie foods**
- ↑ **Physical activity**

President Obama and Health Promotion

Emphasis: Regular Exercise



Mass. rules- school systems (2012)

Cafeteria a la carte & vending machines

- Follow **2010 Dietary Guidelines**
- **Smaller portions**
- **No trans fat/no deep fryers**
- One **fruit or veggie/tray** required

Mass. rules- school systems

- **Juice servings** ½ cup or less
- **Less sodium**
- More **fruits, veggies, whole grains**
- **Fat-free** or **low-fat** milk available
- **H20** available free all day

Boston Globe 10/23/06

"Americans eat more than **one third** of their meals outside the home."

Conclusion: Restaurant food can have a **significant** influence on your diet

Eating at Restaurants/Fast food

- **Assignment**

1. Count out **3 Cheerios**
2. Hold them in your hand
3. Eat them if you want to

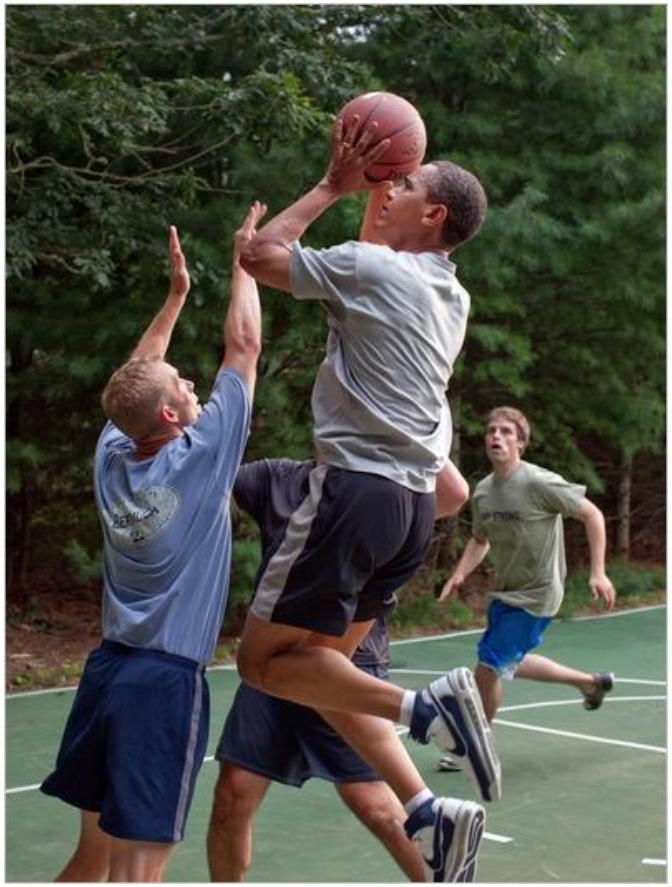
- **Assignment**

1. Count out exactly **18 grains of white or brown rice**
2. Hold them in your hand

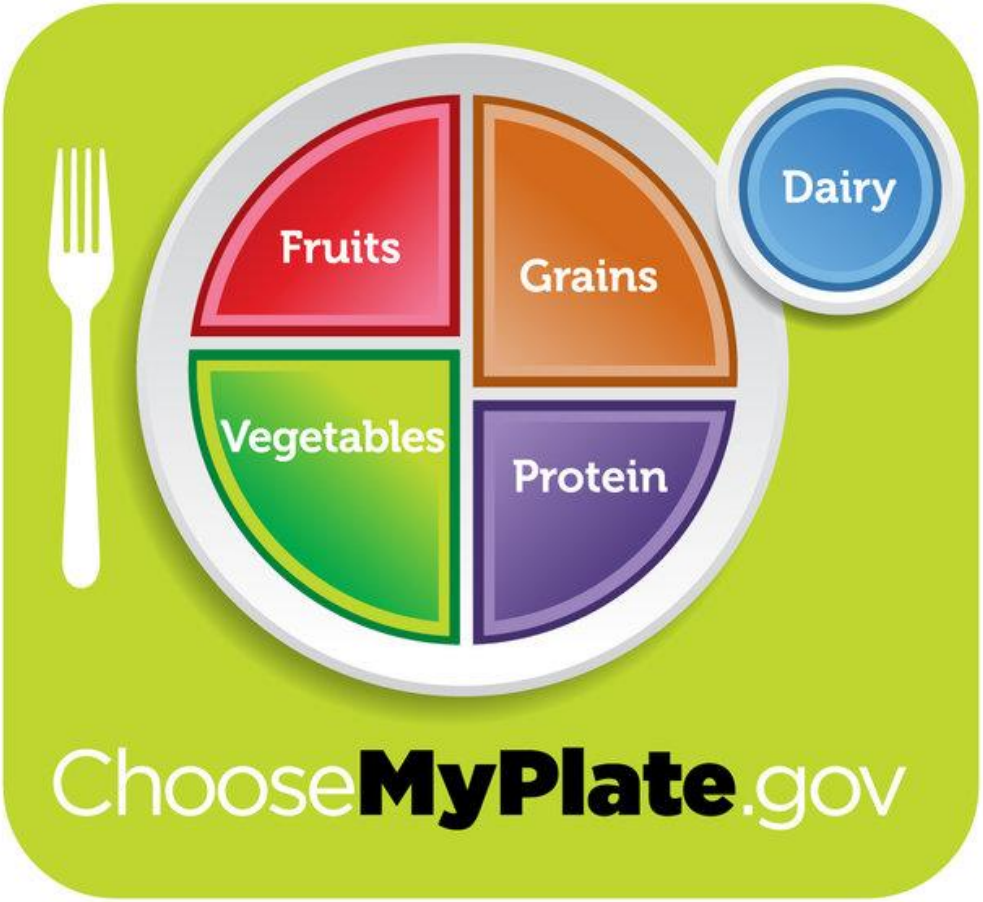
3 Cheerios or **18** grains of rice = **300*** milligrams

300* milligrams = your cholesterol limit for one day

President Obama and Health Promotion



Michele Obama and US Department of Agriculture (June 2011): simple way to eat healthy: all food groups, portions of each



Ultimate Marketing

McDonald's Happy Meal + **Fitness Tracker**

Recalled: skin irritations, burns

Peanut Exercise

Wellness Program: Harvard Pilgrim Health Employees

Shop at supermarkets

Electronically monitor

Unhealthy Foods

- **Points**

Healthy Foods

+ points

Cash Reward

ADDED SUGAR & CHILDREN

Ultimate Marketing

McDonald's Happy Meal + **Fitness Tracker**

Recalled: skin irritations, burns

Docs giving **prescriptions** to children:

"get outside and move"

Boston ranked one of healthiest cities

4/5 people **exercise**, **94%** have **health insurance**, highest per capita **# docs**, **green space**, fresh foods, **healthy eating**

Calories: Americans eating less

From peak in **2003**, continued **decline** in **calories** eaten (little less of everything)

NY Times 7/26/15

Becky Lopes-Filho & son- Cambridge:
seaweed rice crackers + pear

YOUR DIET ANALYSIS (9/27)

- Cover page (name, title)
- Summary sheet 3 day average
- Raw data: food + exercise for days 1, 2, 3
- Conversion tables: ounce equivalents, cups
- Conversion tables: grams, mg
- Interpretation of data

Teenage boys, **young** men, and protein

2015 Dietary Guidelines recommendation:

↓ **Protein foods** (meats, poultry, eggs)

↑ **Veggies**, and ↓ junk food

Teenage boys

- 9-13, puberty
- Growth spurt
- Adding muscle
- "Always hungry"
- **Eating too much protein**

Underlying Issues

- Body image important, athlete role models
- **Marketing**- quick results: **protein supplements** (kidney damage if dehydrated)
- Recommendation: **drink water**

Quick Salad: Sweet Kale (Eat Smart)

- **Broccoli**
- **Brussels Sprouts**
- **Green Cabbage**
- **Kale**
- **Chicory**
- **Dried Cranberries**
- **Roasted Pumpkin Seeds**

150 calories, 150 mg sodium, 2 g fiber

Just add salad dressing

Bigger packages: 2 columns required

Nutrients

"Per Serving"

"Per Package"

Public Pressure on Food Industry

Burger King: **Satisfries** ↓ calories, fat, salt

General Mills: Trix and Reese's Puffs

~~**Artificial**~~ colors & flavors, ~~**Caged chickens**~~

Pressure on Costco: "Free the Hens"

NY Times 7/10/15

COSTCO WHOLESALE

Lovin' Spoonfuls: Food Rescue

Lovin' Spoonfuls: Food Rescue

1 in 5 Bostonians: food insecure

700,000 people: Mass.

in US **> 70 billion** pounds food **wasted/year**

- 95% → landfills

Food rots → methane gas → global warming

- Lovin' Spoonfuls: Boston, 5 refrigerated trucks

Fresh fruit, veggies, lean meat, whole grains

From grocery stores, farms → Community

French's vs. Heinz

Ketchup/Mustard Wars

Heinz ↑ Marketing Mustard

French's ↑ Marketing new **Ketchup**

No **high fructose corn syrup**,
artificial flavors, preservatives

Adipose tissue

- Almost **limitless** capacity- **store fat**
- World's **fattest man**: died 1983, **age 42**
- Weighed **1397** pounds
- **80%** body was **fat**
- 4 million **stored** calories

Being overweight is associated with higher rates of death from cardiovascular disease.

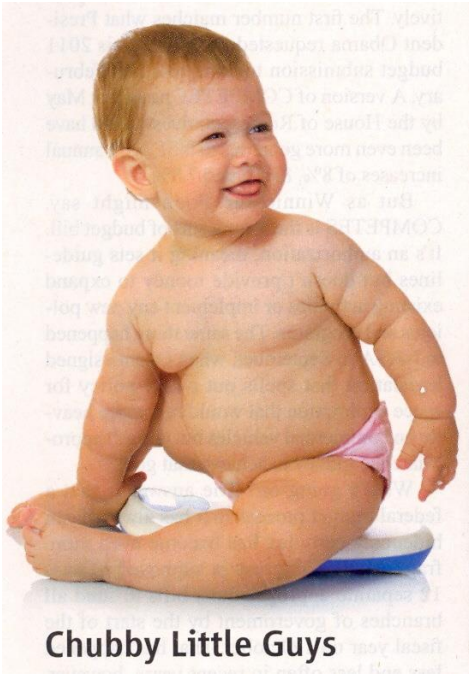
ADDED SUGAR & CHILDREN

Chubby Babies

2001 University of Michigan Study

US Children at **9 months: 32%** obese or **at risk** of obesity

Importance: Early Intervention (prevention)



American Heart Association

Children: 2-18

Added sugar **<25g/day**

Limit- sugar drink: **8oz/wk**

< 1 year: No fruit juice

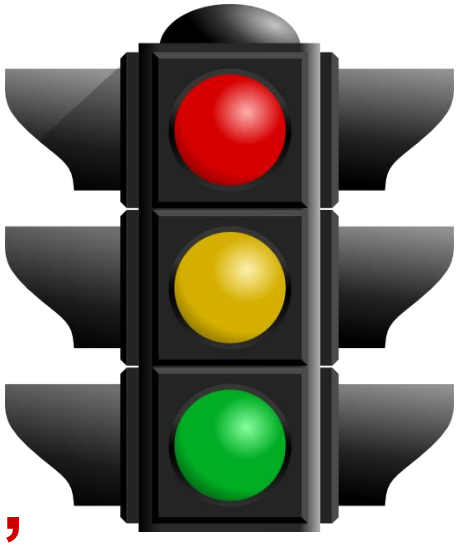
MGH Cafeteria: Traffic Light Diet

Label foods: people in line see **dots:**

Red= Unhealthy

Yellow= Moderately healthy

Green= More healthy

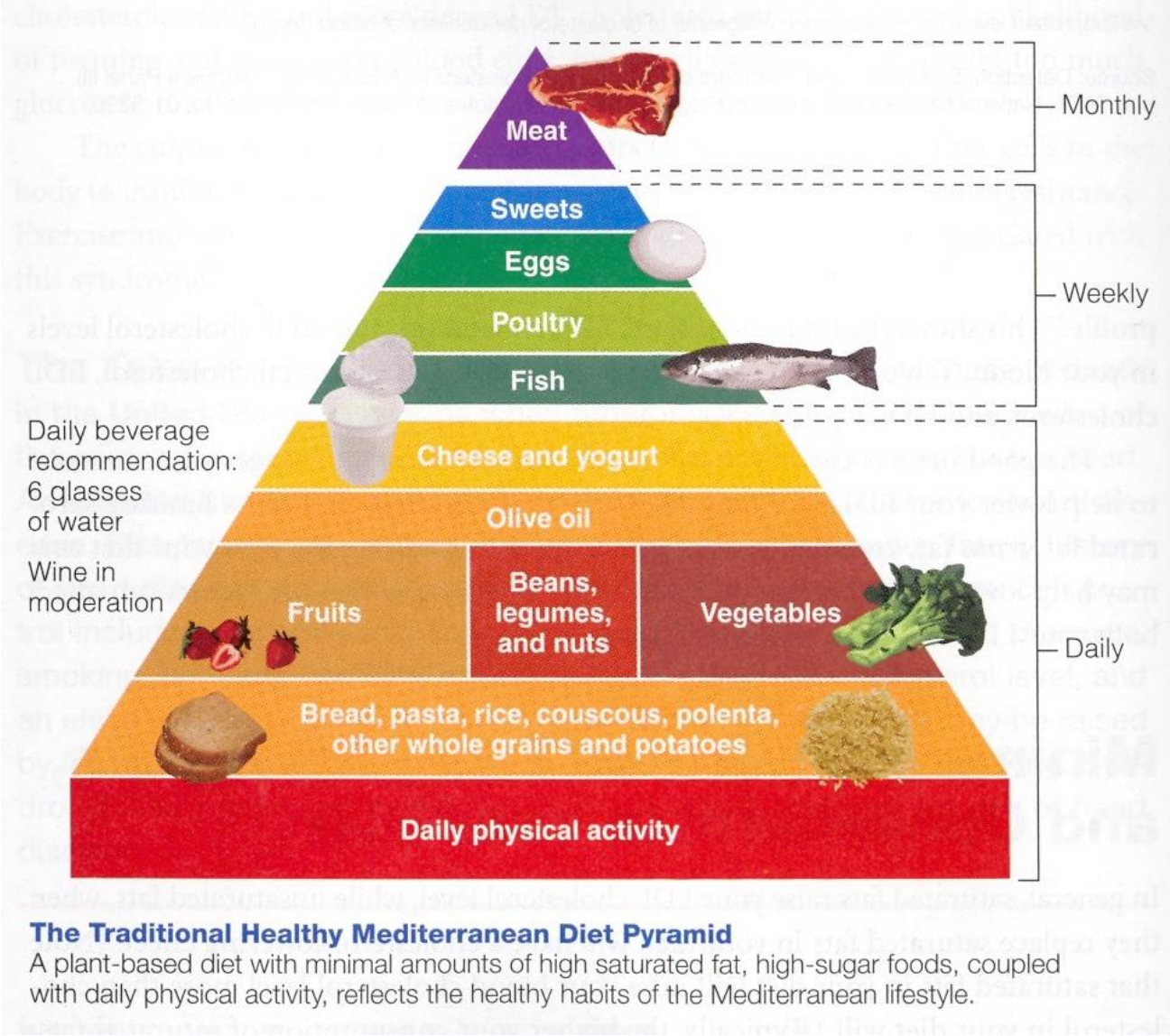


Over 2 years: ↓ **Sale "red items"**

↑ **Sale "green items"**

? Future: packaging & marketing foods at stores

Mediterranean Food Pyramid



The Traditional Healthy Mediterranean Diet Pyramid
A plant-based diet with minimal amounts of high saturated fat, high-sugar foods, coupled with daily physical activity, reflects the healthy habits of the Mediterranean lifestyle.

Assignment

What's a good potato chip?

	WISE	TriSum	Lay's Baked
Ingred.	Veg. oil, one of following oils, salt	Partially hydrogenated soybean oil, salt	Starch, sugar, corn oil, salt, soy lecithin
Serving	28g (16 chips)	28g (20 chips)	28g (15 chips)
Calories	150	150	**110**
Fat (g)	10	9	**1.5**
Sat Fat (g)	**3**	2.5	0
T-Fat (g)	0	**3.5**	0
Chol. (mg)	0	0	0
Na (mg)	**190**	115	**180**

	LAY'S CLASSIC	RUFFLES	CAPE COD
Ingred.	Sunflower oil, salt	Sunflower oil, salt	Canola oil, salt
Serving	28g (15 chips)	28g (12 chips)	28g (19 chips)
Calories	150	160	150
Fat (g)	10	10	8
Sat Fat (g)	1	1	**0.5**
T-Fat (g)	0	0	0
Chol. (mg)	0	0	0
Na (mg)	**180**	**160**	**110**

Marketing Food

Nutrition Facts

Serv Size 2 Tbsp (32g)
Servings About 16
Calories 190
Fat Cal 130

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/Serving	%DV*	Amount/Serving	%DV*
Total Fat 16g	**24%**	**Total Carb** 8g	**3%**
Sat Fat 2.5g	**13%**	Dietary Fiber 2g	**9%**
Trans Fat 0g		Sugars 3g	
Cholest 0mg	**0%**	**Protein** 7g	
Sodium 140mg	**6%**		

Iron 4% • Vitamin E 10% • Riboflavin 2% • Niacin 20%
Not a significant source of vitamin A, vitamin C and calcium.

INGREDIENTS: MADE FROM ROASTED PEANUTS AND SUGAR. CONTAINS 2% OR LESS OF: MOLASSES, FULLY HYDROGENATED VEGETABLE OILS (RAPESEED AND SOYBEAN), MONO AND DIGLYCERIDES, SALT.

LOOK FOR THE FLAVOR SEAL
CONTAINS NO PRESERVATIVES
NO REFRIGERATION REQUIRED

©/® THE J.M. SMUCKER COMPANY
ORRVILLE, OH 44667 USA

PROUD SPONSOR
BOYS & GIRLS CLUBS OF AMERICA

THIS PACKAGE IS RECYCLABLE
HOWEVER, RECYCLING PROGRAMS FOR THIS PACKAGE MAY NOT EXIST IN YOUR AREA.

QUESTIONS? COMMENTS? 1-800-283-8915

CONTAINS 12g FAT PER SERVING COMPARED TO 16g IN PEANUT BUTTER

Nutrition Facts

Serv Size 2 Tbsp (36g)
Servings About 14
Calories 190
Fat Cal 100

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/Serving	%DV*	Amount/Serving	%DV*
Total Fat 12g	**19%**	**Sodium** 220mg	**9%**
Sat Fat 2g	**10%**	**Total Carb** 15g	**5%**
Trans Fat 0g		Fiber 2g	**7%**
Polyunsat Fat 3.5g		Sugars 4g	
Monounsat Fat 6g		**Protein** 7g	
Cholest 0mg	**0%**		

Calcium 2% • Iron 4% • Niacin 30% • Vitamin B6 6%
Folic Acid 8% • Magnesium 15% • Zinc 6% • Copper 10%
Not a significant source of vitamin A and vitamin C.

INGREDIENTS: PEANUTS, CORN SYRUP SOLIDS, SUGAR, SOY PROTEIN, CONTAINS 2% OR LESS OF: SALT, FULLY HYDROGENATED VEGETABLE OIL (RAPESEED AND SOYBEAN), MONO AND DIGLYCERIDES, MOLASSES, MAGNESIUM OXIDE, NIACINAMIDE, FERRIC ORTHOPHOSPHATE, ZINC OXIDE, COPPER SULFATE, FOLIC ACID, PYRIDOXINE HYDROCHLORIDE.

CONTAINS NO PRESERVATIVES
NO REFRIGERATION REQUIRED

THIS PACKAGE IS RECYCLABLE. HOWEVER, RECYCLING PROGRAMS FOR THIS PACKAGE MAY NOT EXIST IN YOUR AREA.

©/® THE J.M. SMUCKER COMPANY, ORRVILLE, OH 44667 USA

QUESTIONS? COMMENTS? CALL TOLL-FREE 1-800-283-8915

	Regular	Reduced Fat	Taste?
Calories	**190**	**190**	
Fat	**16g**	**12g**	↓ **Fat**
Sat Fat	**2.5g**	**2g**	↓ **Sat Fat**
Trans	0	0	
PUFA	?	3.5g	
Mono	?	6g	
Chol	0	0	
Sodium	**140 mg**	**220mg**	↑ **Sodium**
Total Carb	**8g**	**15g**	↑ **Carb**
Fiber	2g	2g	
Sugars	**3g**	**4g**	↑ **Sugars**
Protein	7g	7g	Serving size 2 Tbsp

Reading Food Labels: a Simple Method

Based on **2000** calorie "reference" diet

Two categories of nutrients:

1) **Limit per day**

2) **Goals per day**

Nutrition Facts

Serving Size 2/3 cup (55g)
Servings Per Container About 8

Amount Per Serving

Calories 230	Calories from Fat 72
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**12%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

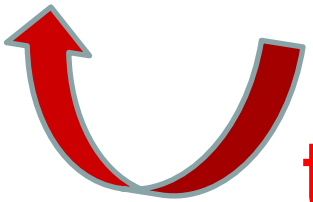
Nutrition Facts

8 servings per container
Serving size **2/3 cup (55g)**

Amount per serving
Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.



Footnote: % Daily Value (2000 calorie):

to **consume** or

to **limit**

Former First Lady Michelle Obama

Let's Move campaign against **childhood obesity**: partners- government, science, medicine, business, educators, **sports**

Major League Baseball joins **Let's Move**

TV/radio **ads** **daytime** TV audience **(young children)**

Goal: "Kids born today reach adulthood at healthy weight"

Curtis Granderson

Mets

Jeff Francoeur

Atlanta

Papa John’s Pizza Delivery: Russia