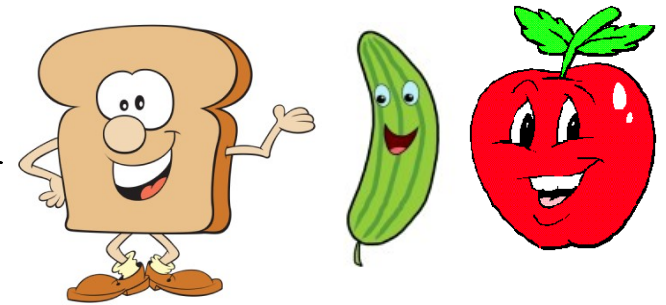


Presentations next session! Hooray!

BI 199 Discussion 8



- I. Announcements Paper draft due when? Presentations all remaining sessions. Q? DA+ contest tonight! Q? Protein overview S&W ch 6**
- II. Overview of Presentations Group I Hooray! Staying > for review!**
- III. Scoring for Presentations Format & guidelines**
- IV. Structure of Proteins Amino acids, peptides, polypeptides, proteins pp 197-200**
- V. Protein Functions Enormous variety pp 200-3, 208-13**
- VI. Protein Synthesis fig 6-6 p 204; Protein denaturation? p 205**
- VII. Think Fitness: Can Eating Extra Protein Make Muscles Grow Stronger? p 205**
- VIII. Digestion & Absorption of Dietary Protein pp 205-7**
- IX. Food Protein: Quantity & Quality? pp 213-19 *NB*: Presentations! How much protein do you need? (-) Protein & amino acid (-) supplements, vegetarianism & complementation**
- X. Protein Deficiencies & Excesses pp 219-32**
- XI. Diet Analysis Plus Computer Activity Science Library**

Monday, November 24, 2014

Nutrition, Health & Disease

Seth Kinel, The truth about ...(GMOs)

Joshua Pham, Genetically-modified foods

Brooke Whitney, Prenatal alcohol exposure

Isaac Crowe, Vitamin C & the common cold I

Abby Taylor, Vitamin C & the common cold II

Pete Merickel, Ascorbic acid effects on cancer

Ashley Campbell, Foods for healthy hair & nails?

Hunter Neuharth, Health benefits of garlic



PRESENTER #1 Phantom, Creatine Monohydrate & Strength Enhancement

1. Was the focus or topic of the presentation clear?

Not Too Clear		Moderately Clear		Extremely Clear
1	2	3	4	5

2. Do you feel that the presenter's presentation was well-designed? That is, was the presentation medium appropriate & well-displayed?

Another Medium Better		Reasonable Choice		Best Choice Possible
1	2	3	4	5

3. To what extent was nutrition from documented, research-based sources covered in the presentation?

Not Much Anat/Phys		Moderate Amount		Extensive Amount
1	2	3	4	5

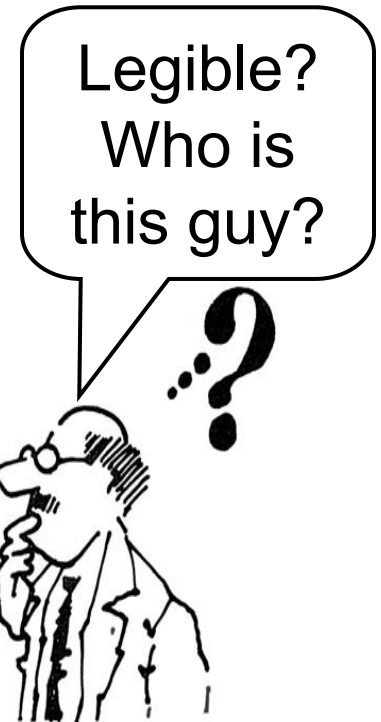
4. Did the presenter answer questions clearly and directly during the question/answer/discussion period?

Not Too Well		Moderately Well		Extremely Well
1	2	3	4	5

5. How do you personally evaluate the presenter's overall participation in their project?

Limited Participation		Moderate Participation		Extensive Participation
1	2	3	4	5

Please feel free to make additional comments below.

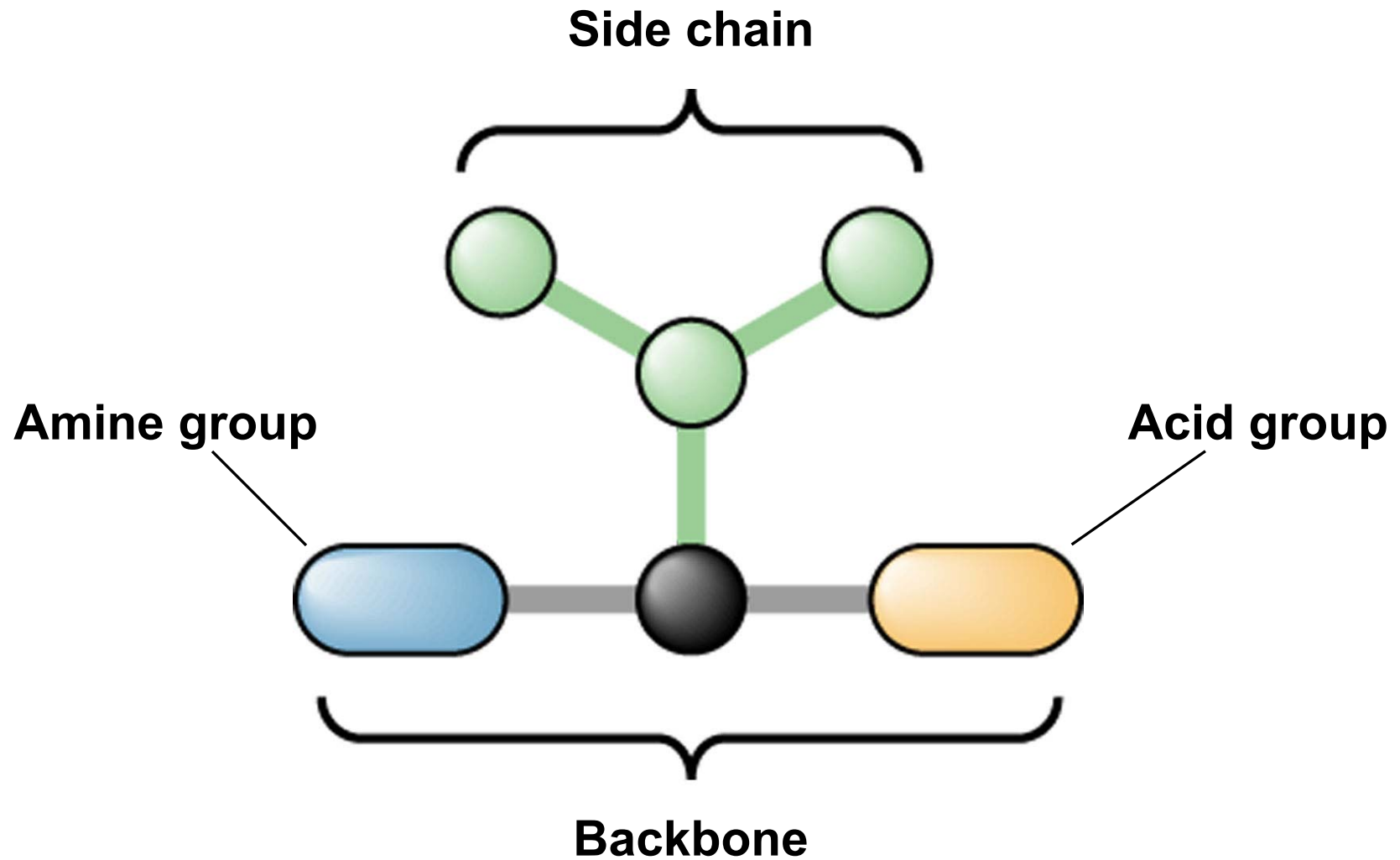


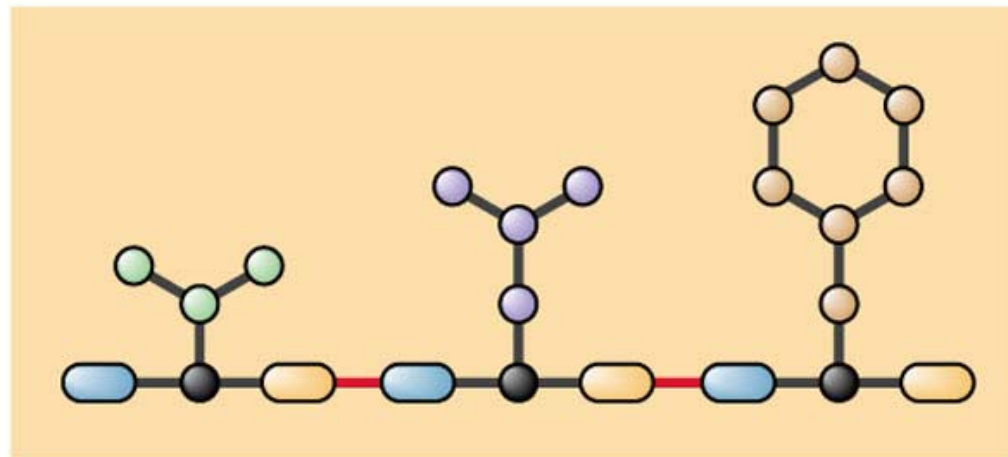
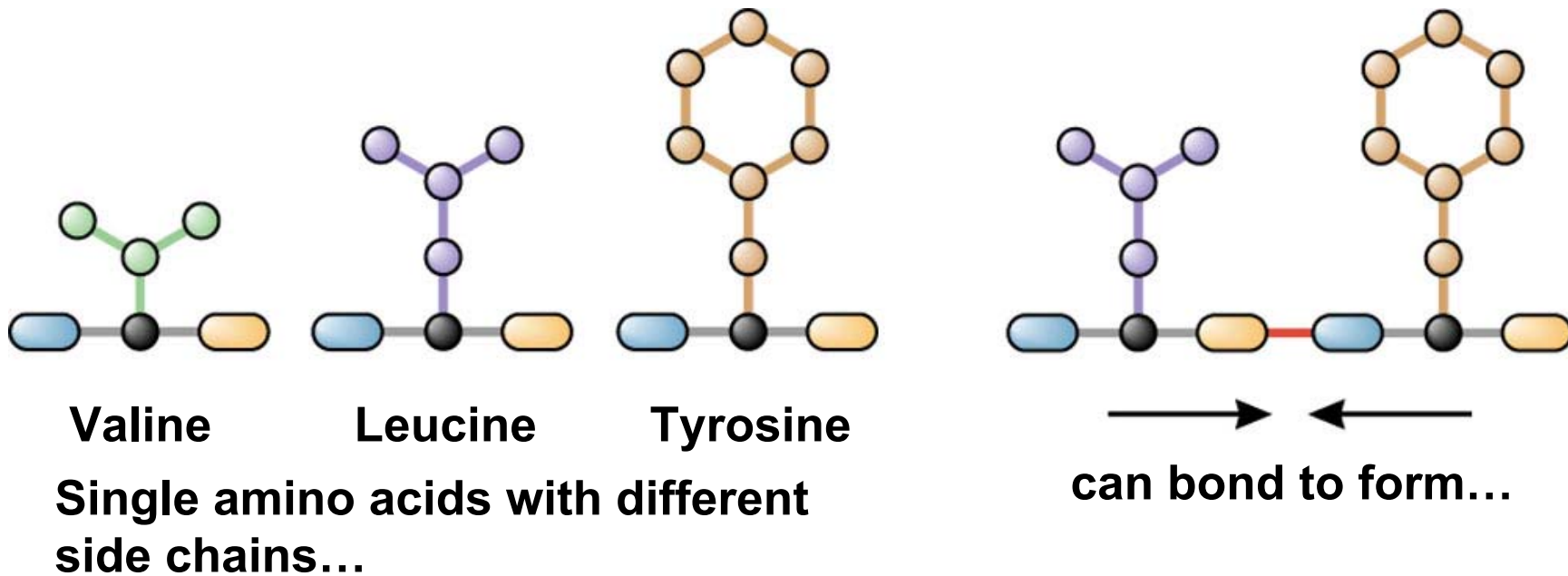
The phantom did a beautiful job! I really liked his color choices and the layout of his presentation. He also knocked us out in the Q & A session! Fabulous effort!!

$\Sigma = 25$

EVALUATOR'S NAME _____

Amino Acid Schematic

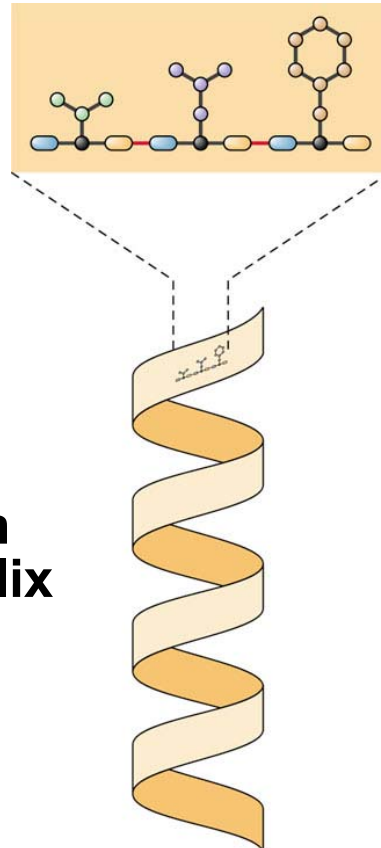




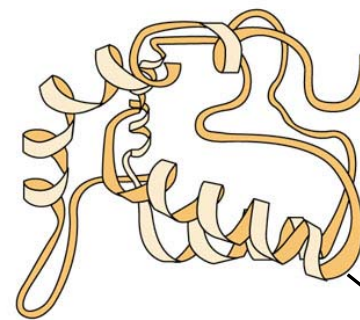
a strand of amino acids, part of a protein.

- 1 1^o structure: Amino acids sequence in a chain Helix (α) or sheet (β)!
- 2 2^o structure: Amino acids repel or attract & form a special shape
- 3 3^o structure: Special shape folds onto itself so that it's functional
- 4 4^o structure: Once coiled/folded maybe functional or may need to join with other molecules to be fully functional.

2 Strand coils like a ribbon into an α helix

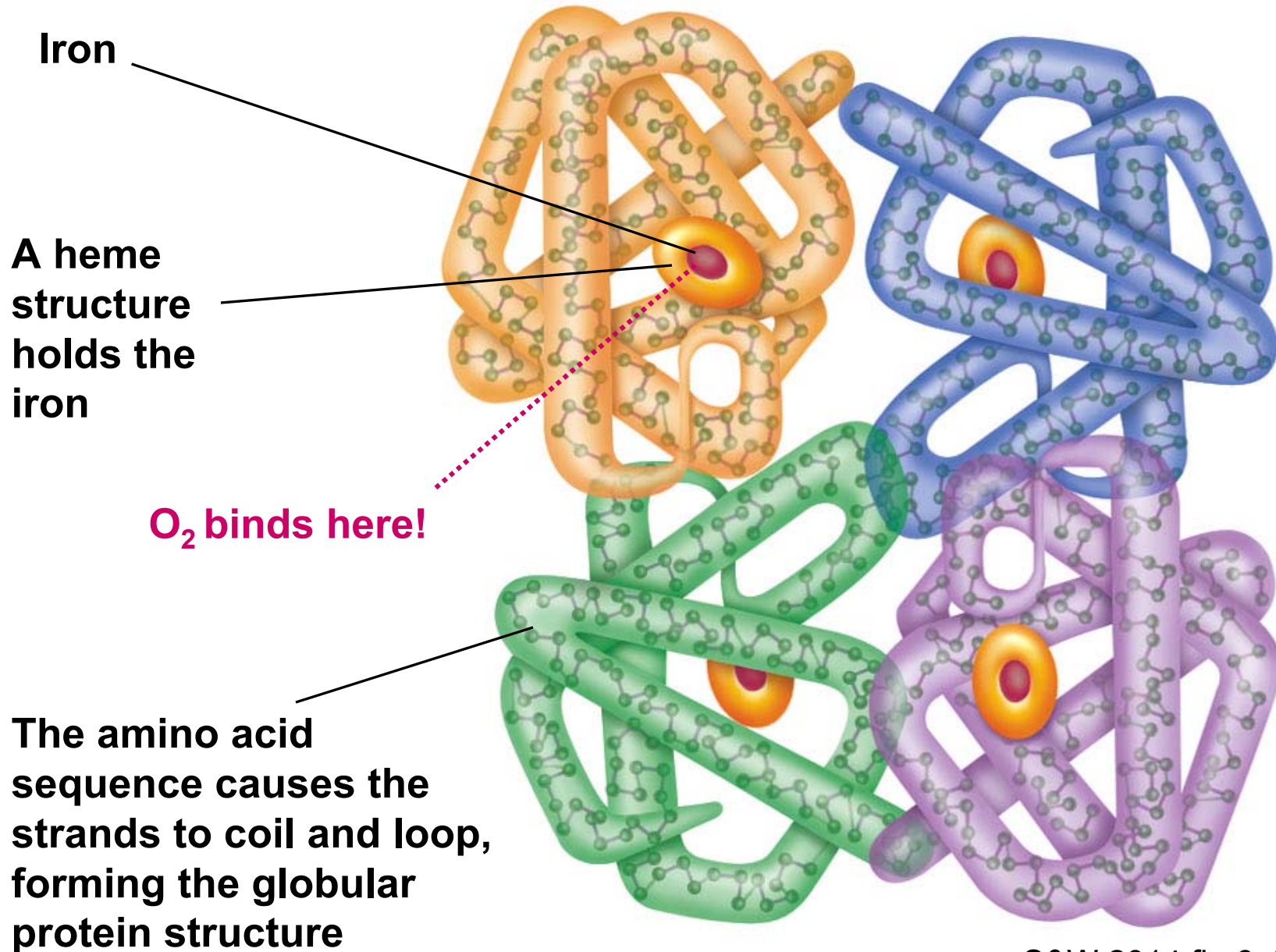


1 Amino acid strand



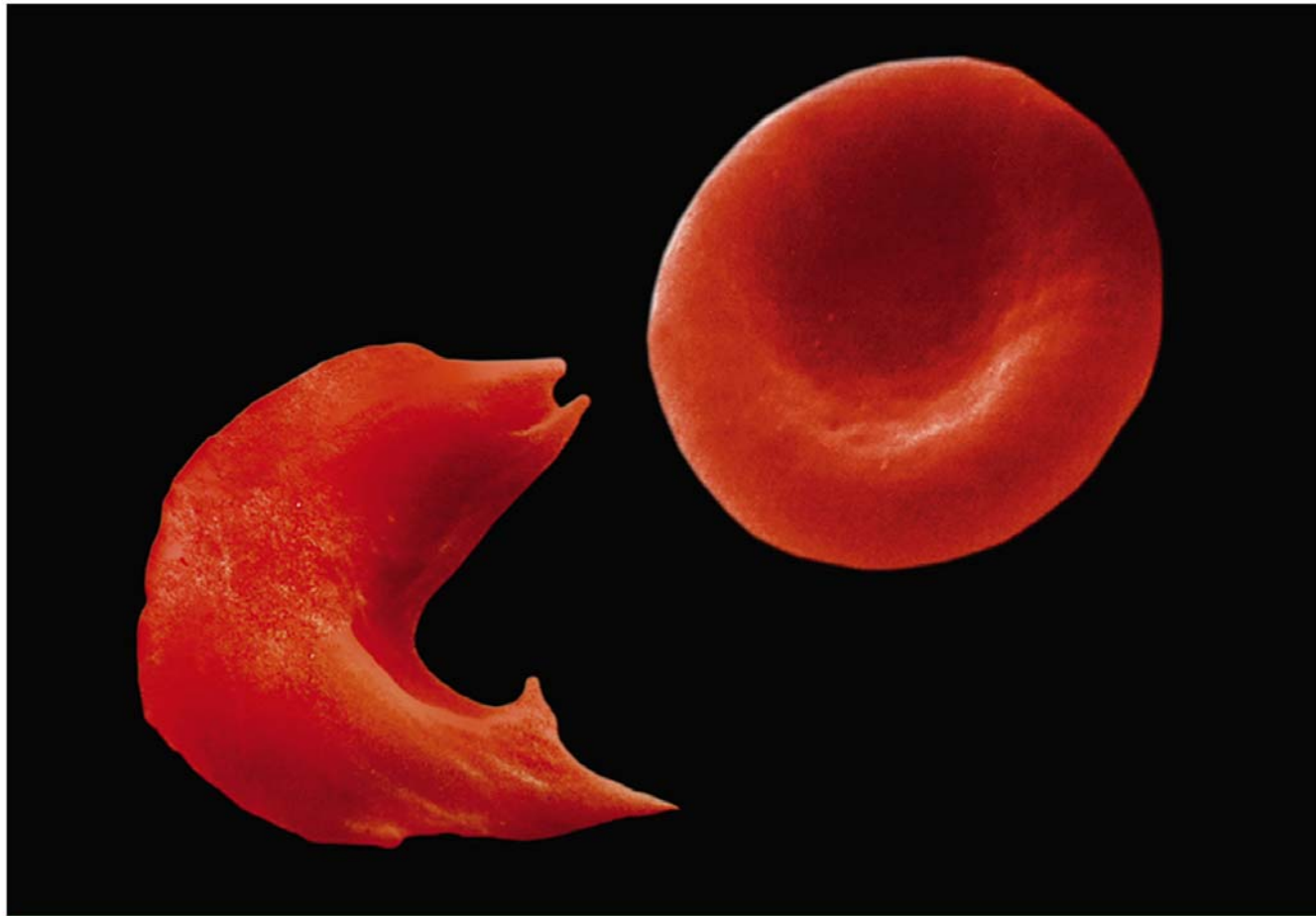
3 Completed functional protein
4

Hemoglobin (cartoon) that carries oxygen!



Sickle-shaped blood cells

Normal red blood cells



© Dr. Stanley Flegler/Visuals Unlimited

What a difference one amino acid can make!

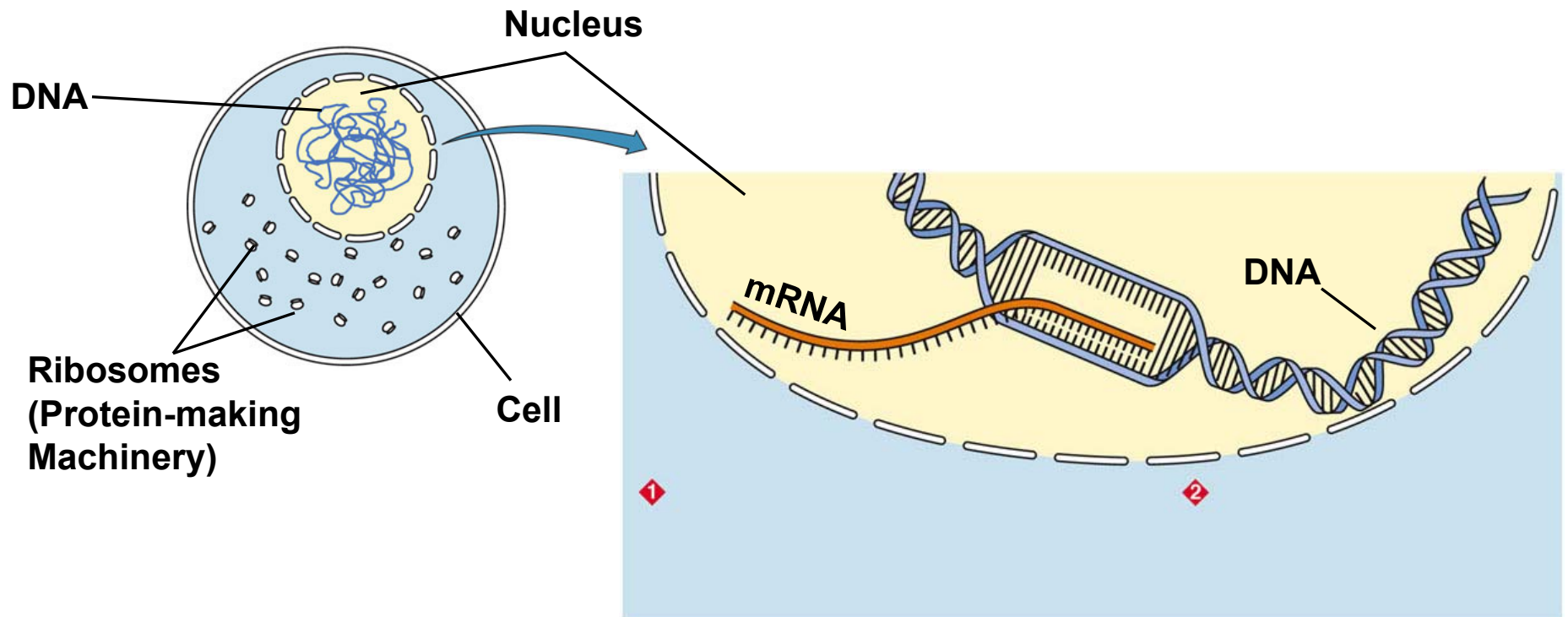
Amino acid sequence of normal hemoglobin:

Val — His — Leu — Thr — Pro — Glu — Glu

Amino acid sequence of sickle-cell hemoglobin:

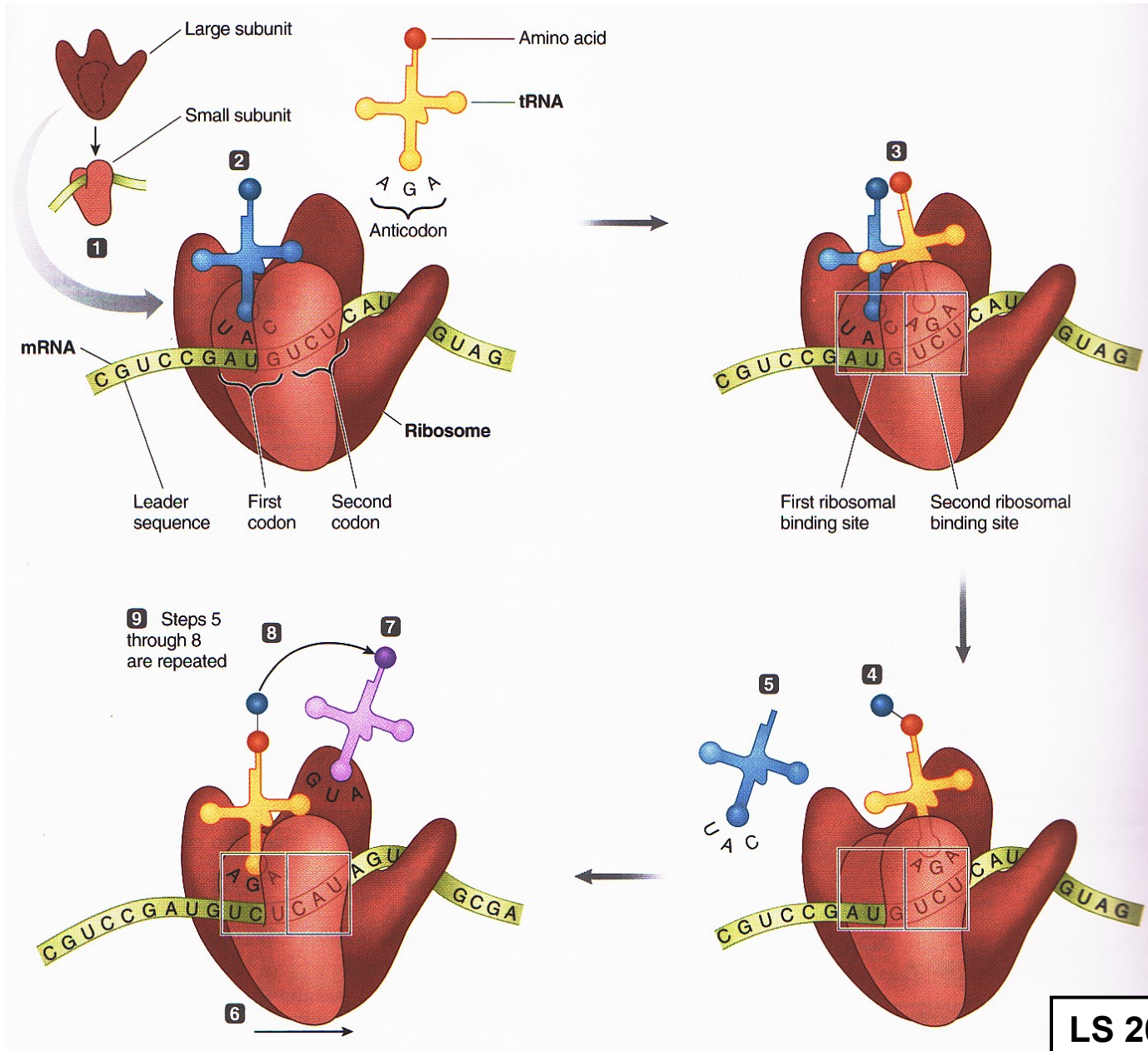
Val — His — Leu — Thr — Pro — Val — Glu



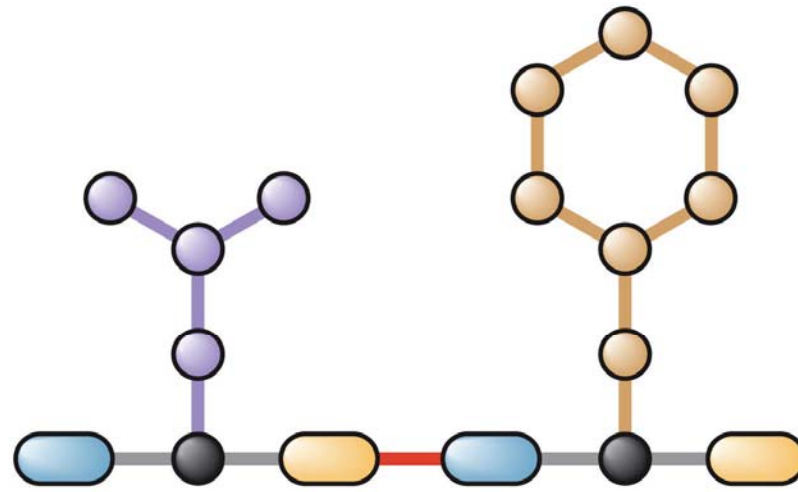


DNA → RNA → Protein

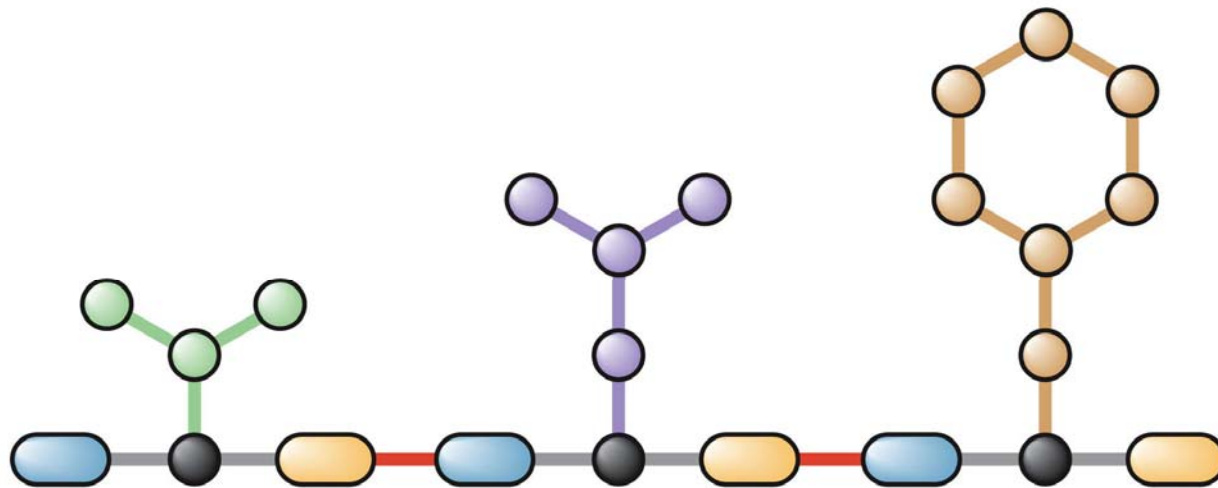
Translation? Ribosomes Make Proteins



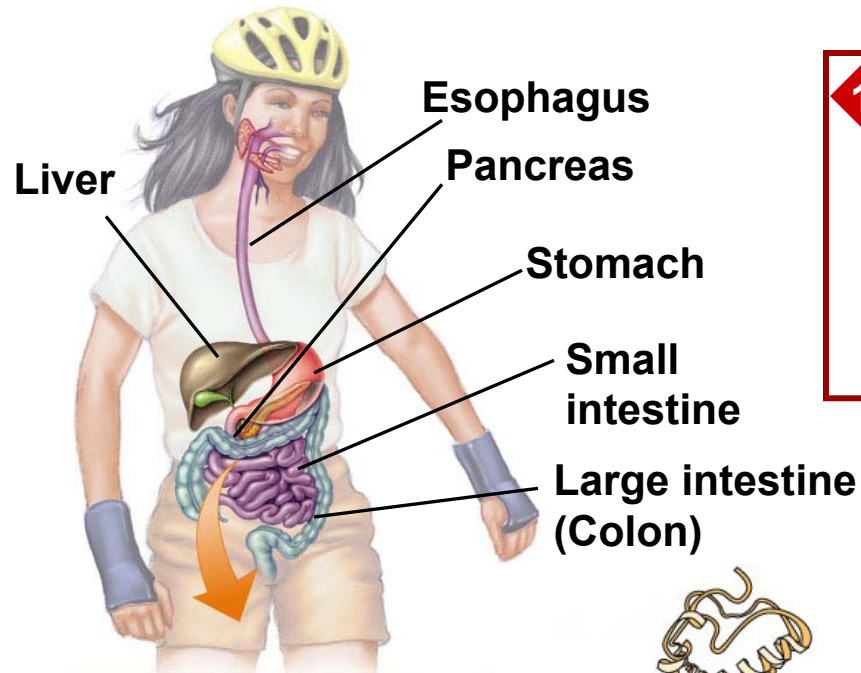
LS 2012 fig C-7



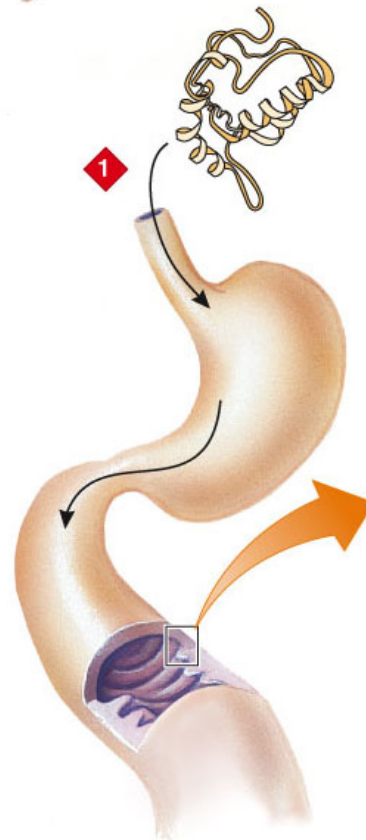
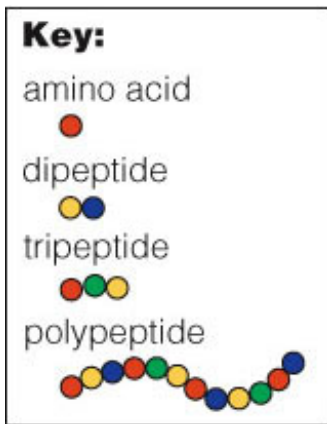
Dipeptide

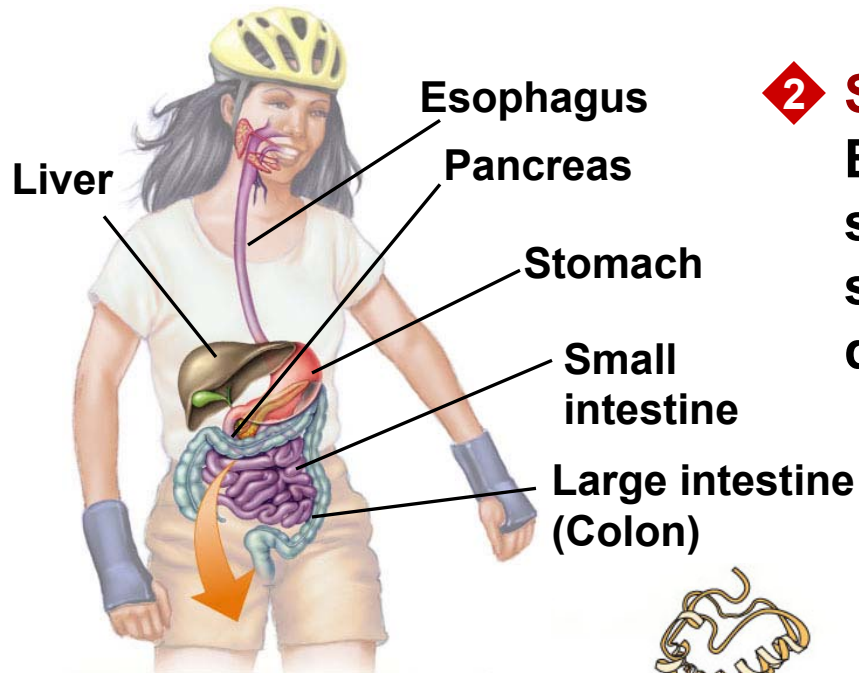


Tripeptide



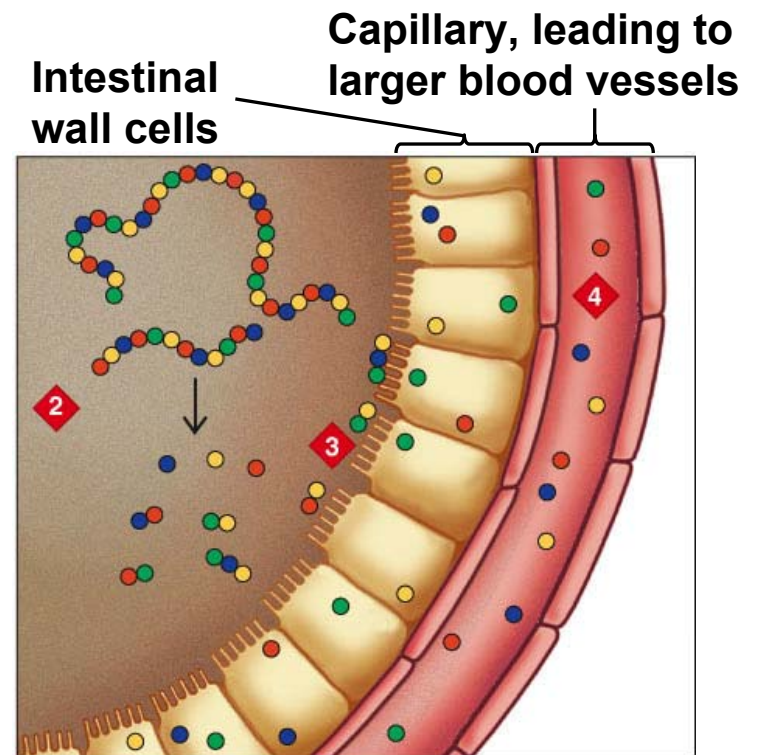
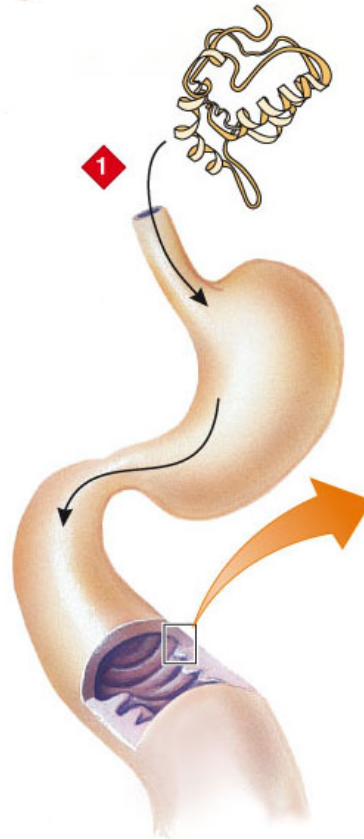
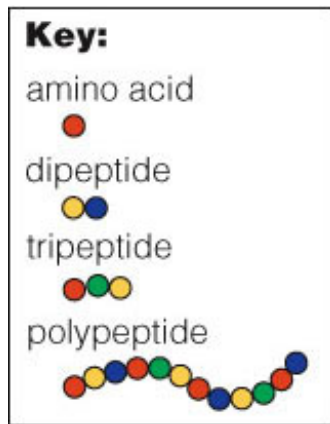
1 Stomach
 Protein in bolus denatured by HCl acid, then protein-specific enzyme snips into polypeptides & amino acids.



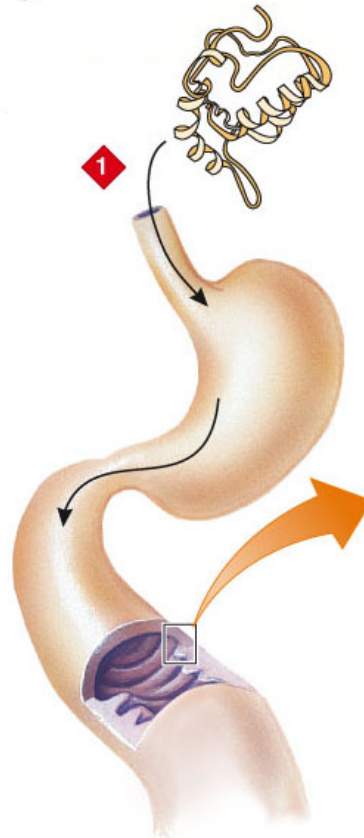
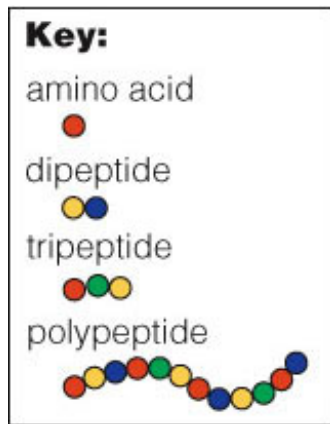
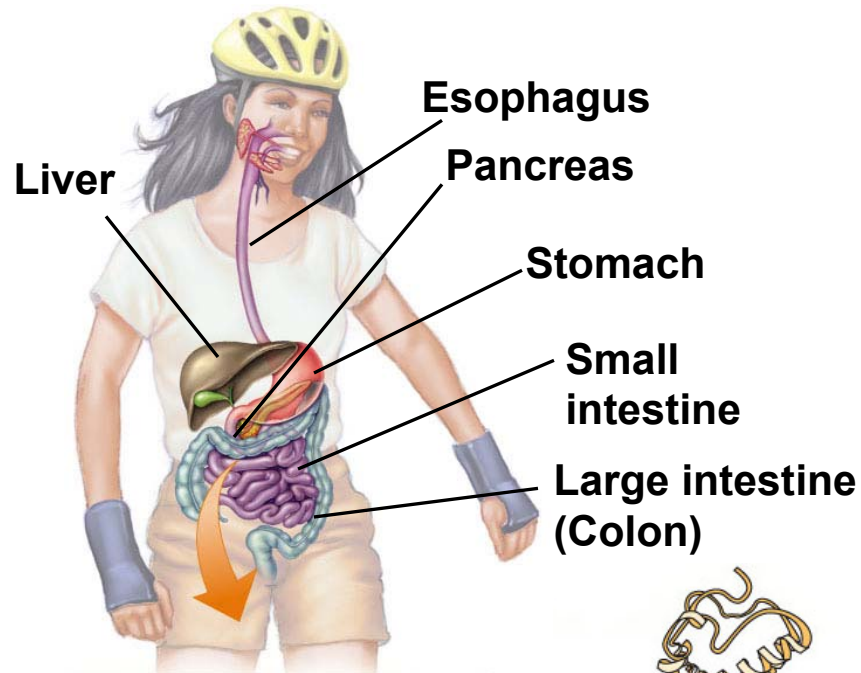


2 Small Intestine

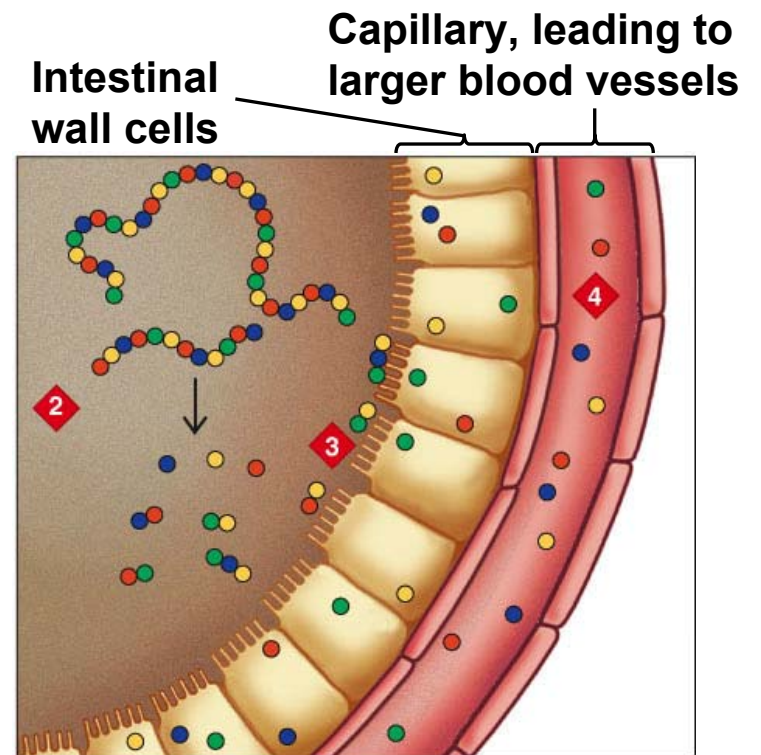
Enzymes from pancreas & small intestine split peptide strands into tripeptides, dipeptides & amino acids.



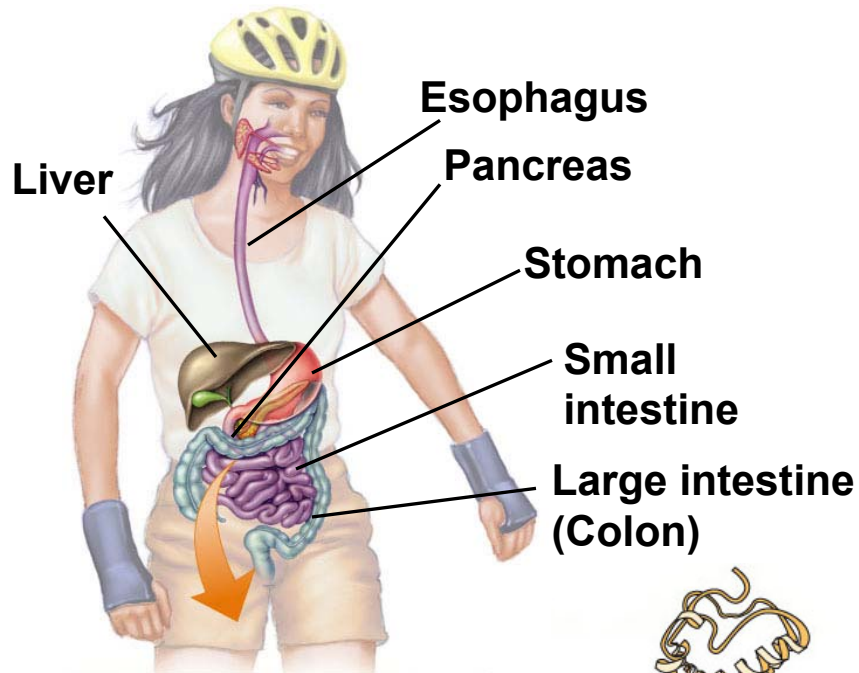
Modified after S&W 2014 fig 6.8 p 207



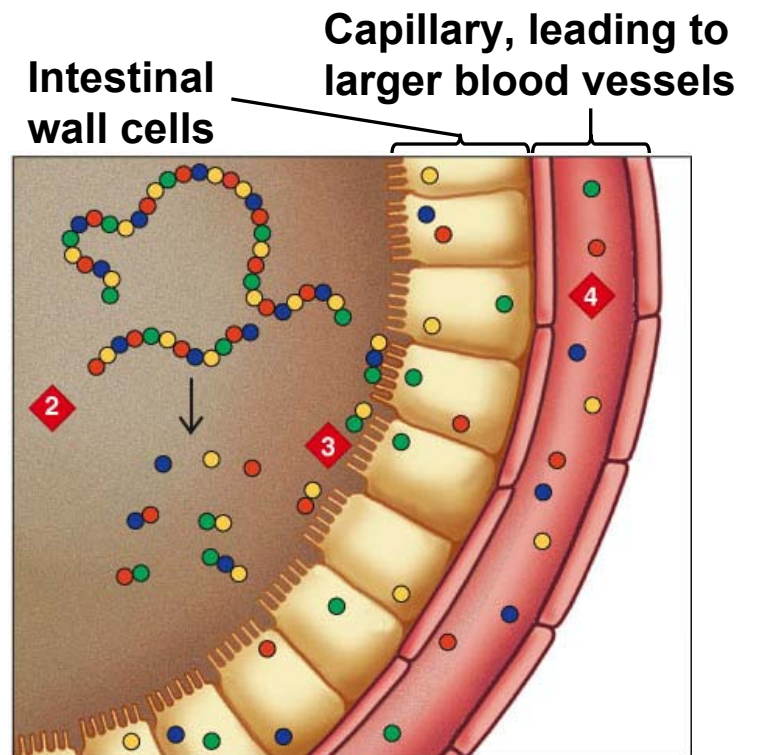
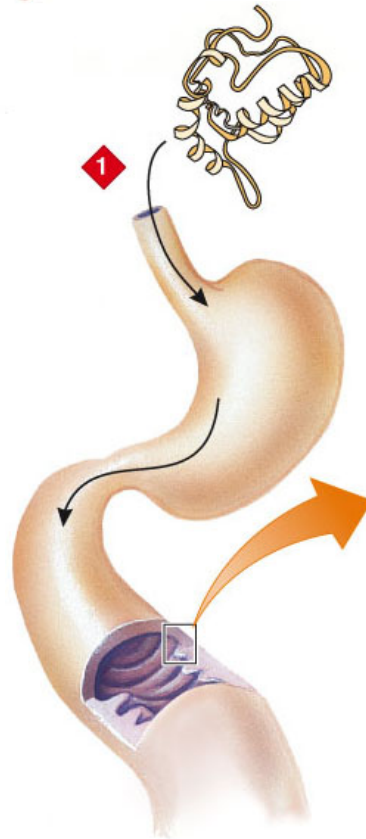
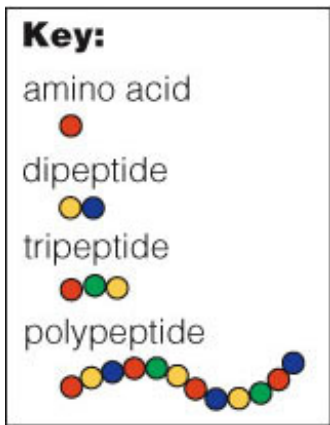
3 Small Intestine
 Enzymes on surface of small intestine's lining & in absorptive cells split tripeptides & dipeptides into amino acids – these are absorbed into blood.



Modified after S&W 2014 fig 6.8 p 207



4 Bloodstream
 Transports amino acids
 to all body cells



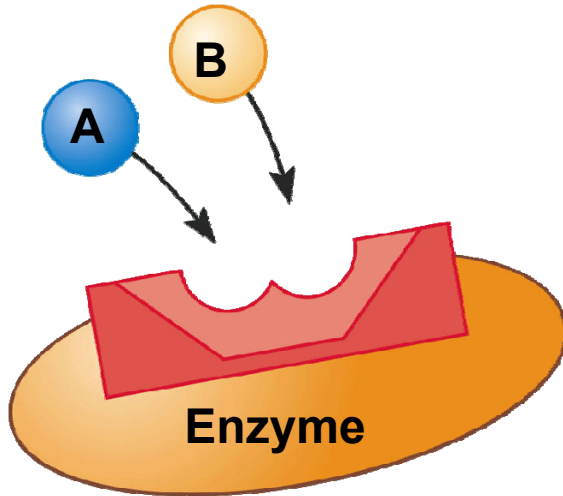
Modified after S&W 2014 fig 6.8 p 207



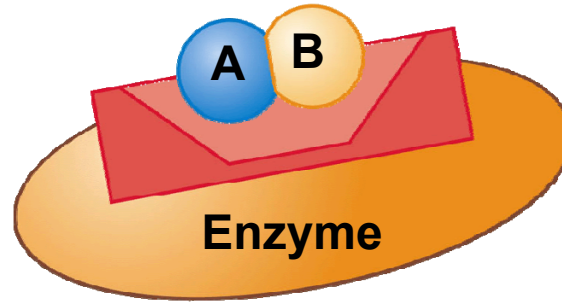
Proteins have multiple functions in the human body!!

1. **Enzymes**, biological catalysts that drive chemical reactions (LDH, CPK, cytochrome oxidase,...).
2. **Hormones**, blood-borne chemical messengers (17- β estradiol, testosterone, thyroid hormone,...)
3. **Carrier molecules** (albumins, hemoglobin, lipoproteins, myoglobin,...).
4. **Blood clotting factors** (thrombin, fibrinogen,...)
5. **Pumps, channels, membrane-bound proteins** (Na⁺-K⁺ ATPase, Ca²⁺, Na⁺, K⁺,...channels)
6. **Buffers** for acid-base balance (hemoglobin,...).
7. **Antibodies**, Y-shaped molecules that tag foreign invaders.
8. **Structural proteins** which give integrity to bones, muscles, tendons, skin & other tissues.
9. **Modifiers of gene expression...**

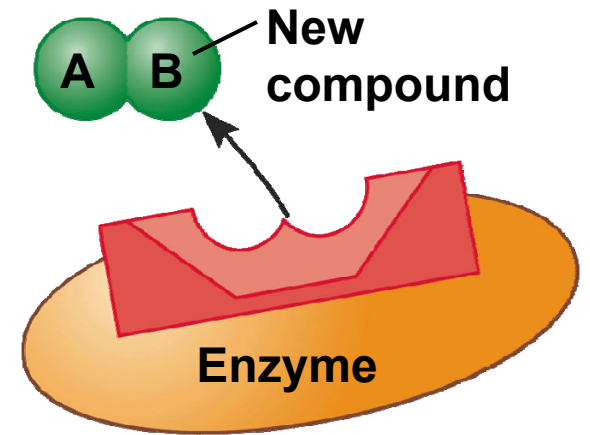
Enzymes are biological catalysts that act like chemical glue or scissors!



Enzyme plus two compounds A and B

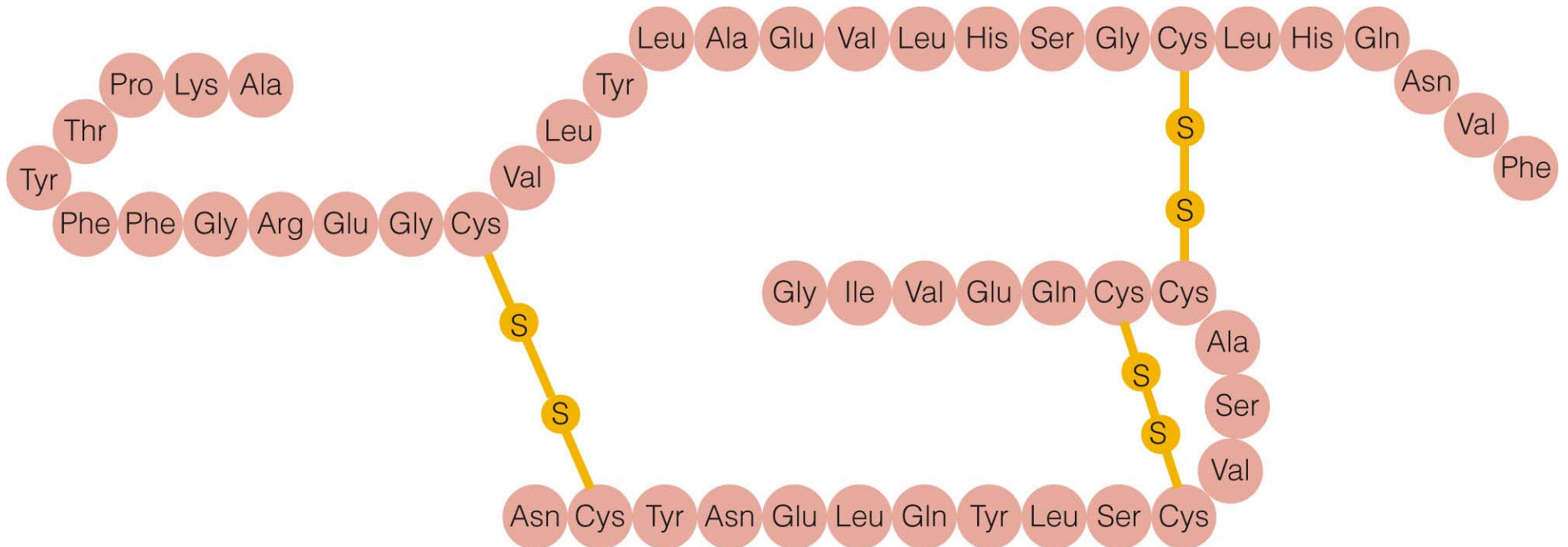


Enzyme complex with A and B



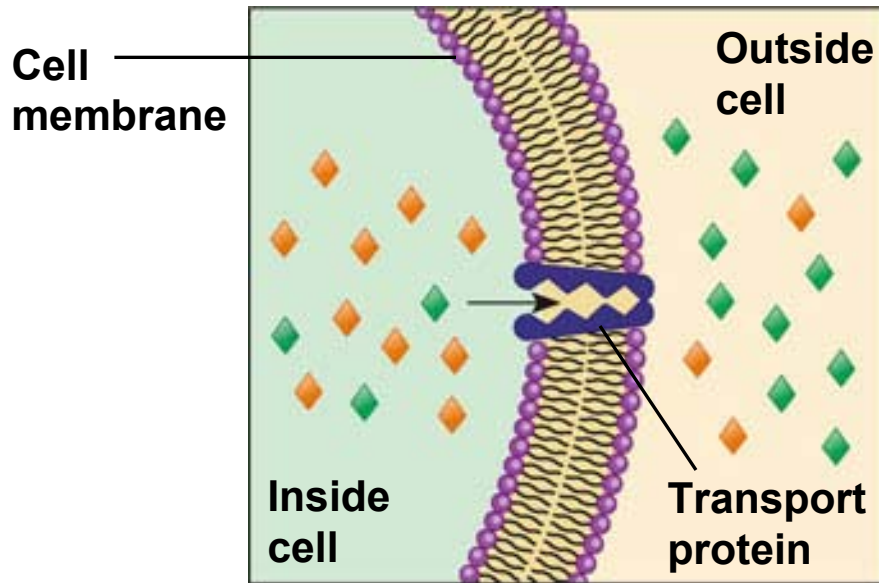
Enzyme plus new compound AB

Insulin Schematic

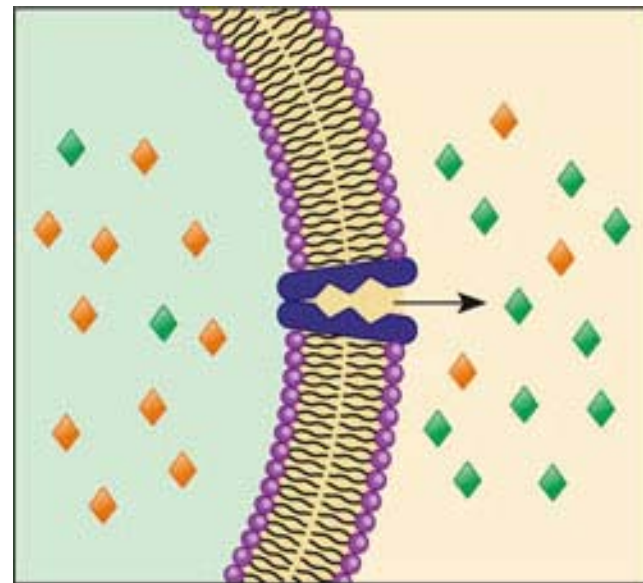


Pitting edema! If proteins leak out of the cardiovascular system, fluid follows!!

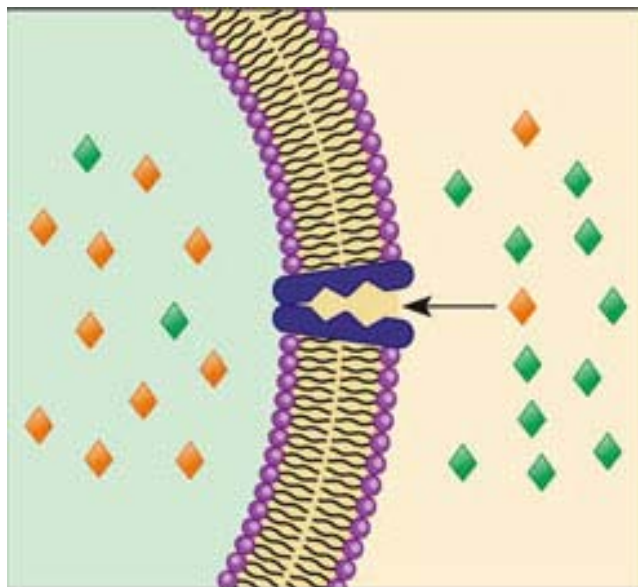




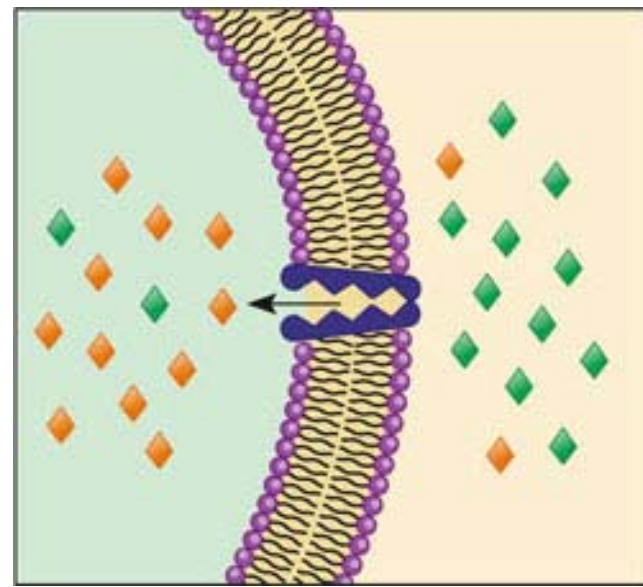
Molecule enters protein from inside cell



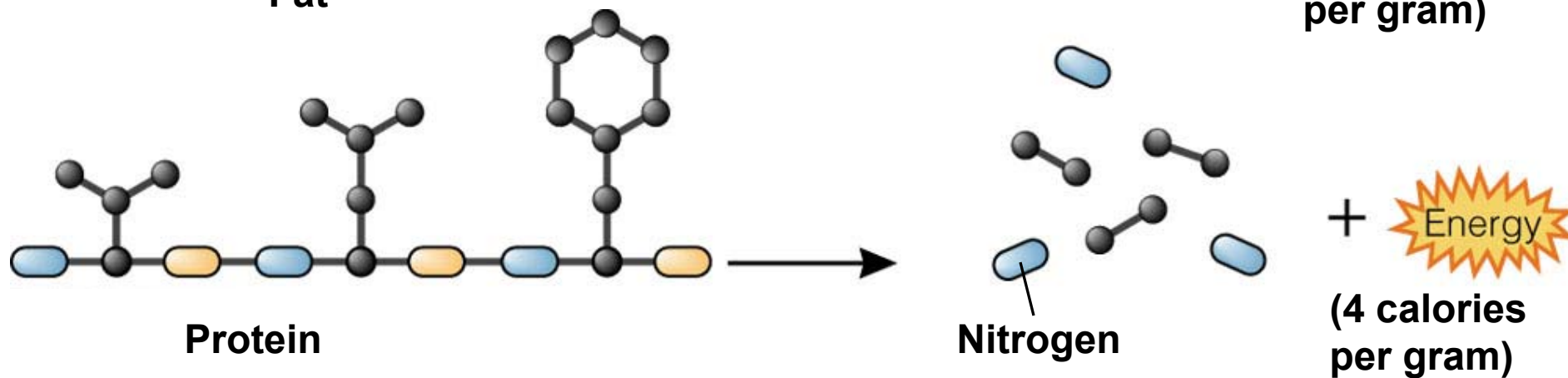
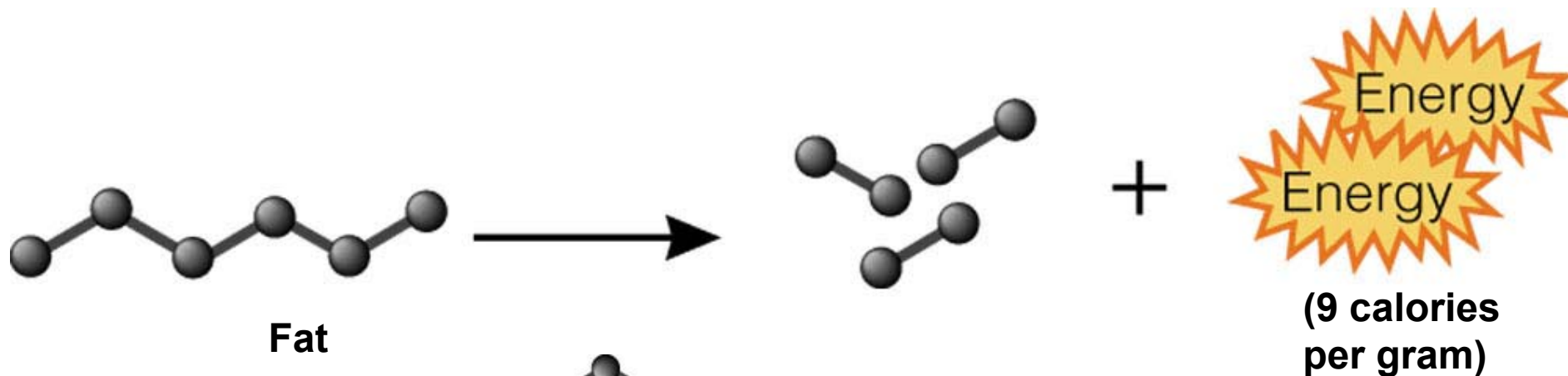
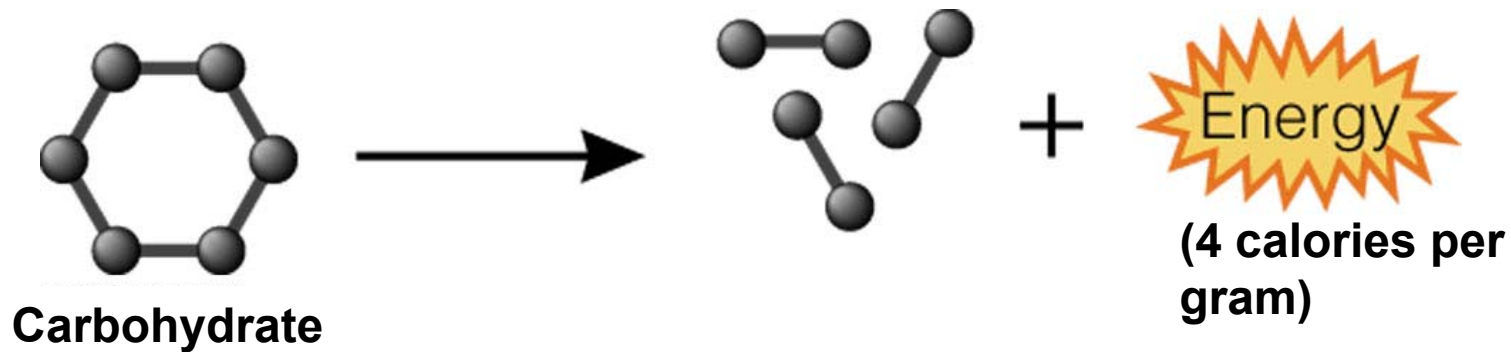
Protein changes shape; molecule exits protein outside the cell.



Molecule enters protein from outside cell.



Molecule enters protein from outside cell.



**TABLE
6-2**

People Most Likely to Be Harmed by Amino Acid Supplements

Growth or altered metabolism makes these people especially likely to be harmed by self-prescribed amino acid supplements:

- All women of childbearing age.
- Pregnant or lactating women.
- Infants, children, and adolescents.
- Elderly people.
- People with inborn errors of metabolism that affect their bodies' handling of amino acids.
- Smokers.
- People on low-protein diets.
- People with chronic or acute mental or physical illnesses.

Calculate your own daily protein requirement

1. Divide your weight in lb by 2.2 to convert to kg

e.g., 150 lb divided by 2.2 = 68.2 kg

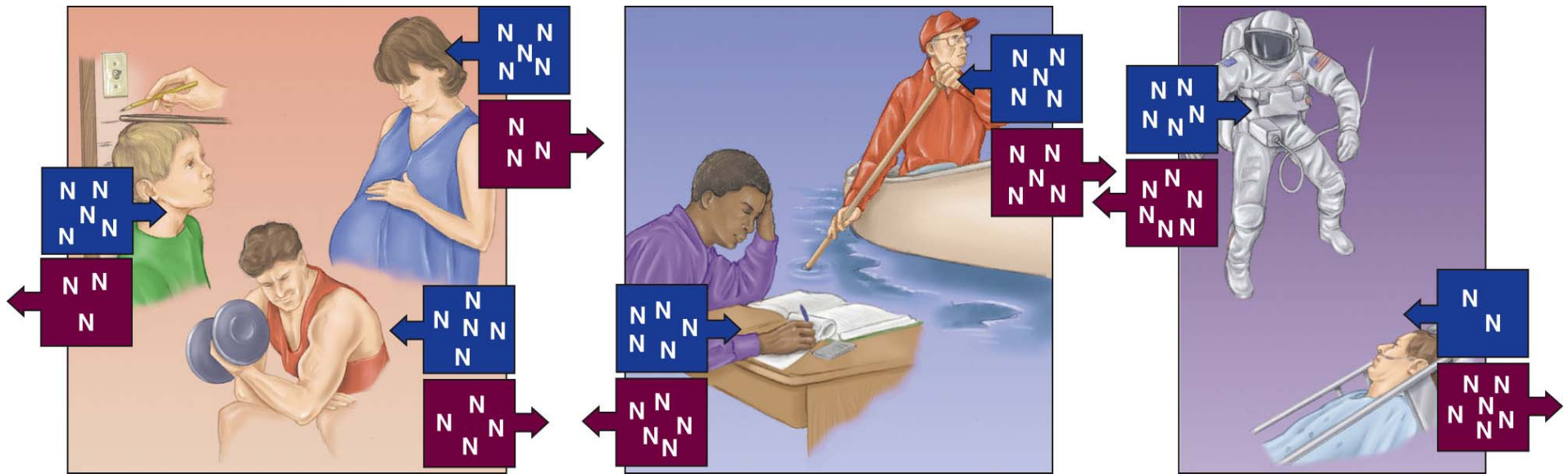
2. Multiply your weight in kg by 0.8 g/kg

e.g., 68.2 kg x 0.8 g/kg = 54.6 g/d

3. Guess how many grams of protein are in a single, medium-sized chicken breast?

58 g which surpasses your daily requirement!

Nitrogen Balance?



Positive Nitrogen Balance

e.g., growing child, person building muscle & pregnant woman—all retaining more nitrogen than excreting.

Nitrogen Equilibrium

e.g., healthy college student, young retiree—are in nitrogen equilibrium.

Negative Nitrogen Balance

e.g., astronaut, surgery patient—losing more nitrogen than taking in.

All essential amino acids are needed to make a protein



All essential amino acids can be consumed by relying upon complementary proteins

	Ile	Lys	Met	Trp
Legumes	✓	✓		
Grains			✓	✓
Together	✓	✓	✓	✓



***Protein-
Energy
Malnutrition
(PEM)
Marasmus***



***Protein-
Energy
Malnutrition
(PEM)
Kwashiokor***



**TABLE
6-4**

Features of Marasmus and Kwashiorkor in Children

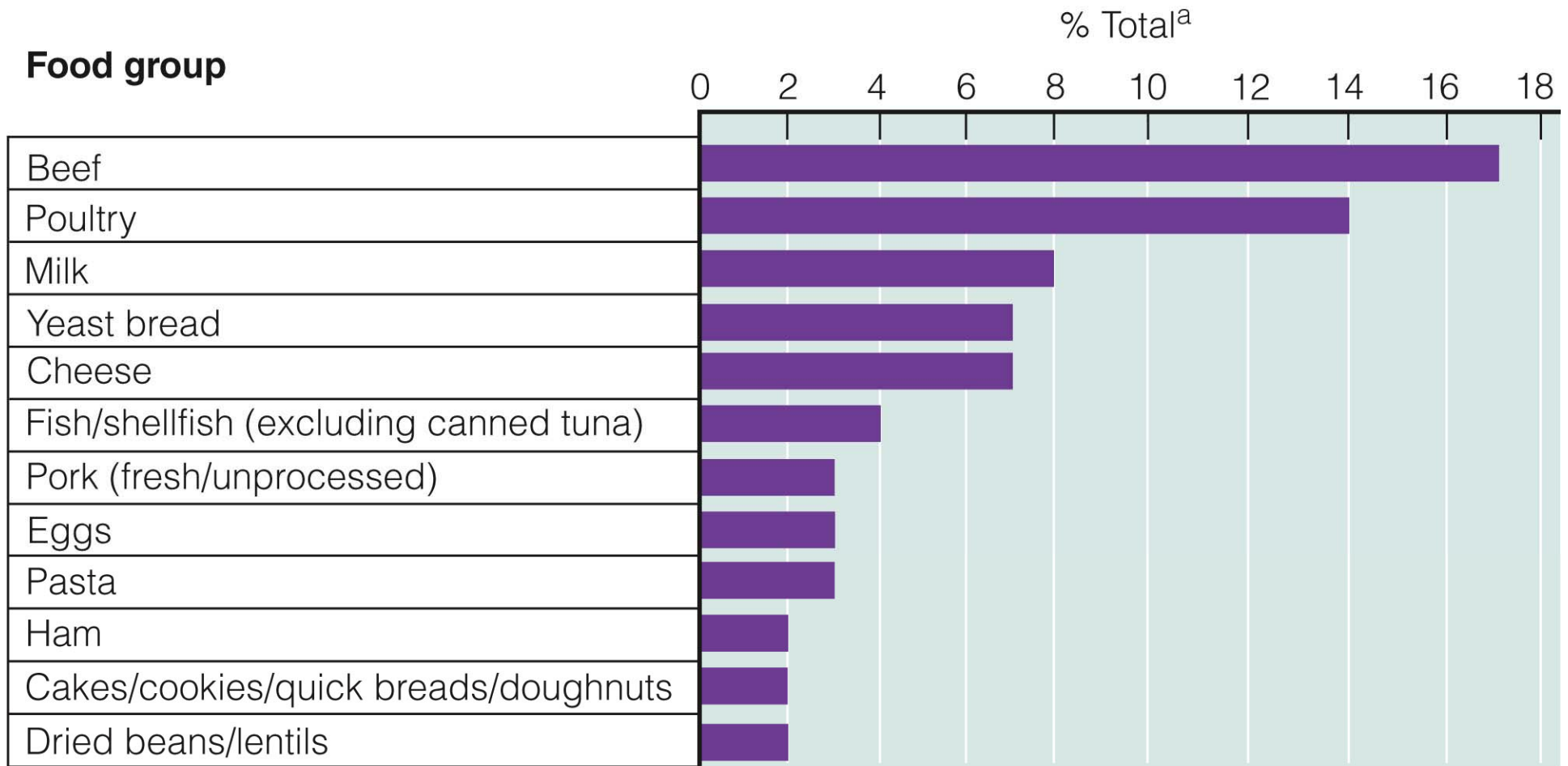
Separating PEM into two classifications oversimplifies the condition, but at the extremes, marasmus and kwashiorkor exhibit marked differences. Marasmus-kwashiorkor mix presents symptoms common to both marasmus and kwashiorkor. In all cases, children are likely to develop diarrhea, infections, and multiple nutrient deficiencies.

Marasmus	Kwashiorkor
Infants and toddlers (less than 2 yr)	Older infants and young children (1 to 3 yr)
Severe deprivation or impaired absorption of protein, energy, vitamins, and minerals	Inadequate protein intake or, more commonly, infections
Develops slowly; chronic PEM	Rapid onset; acute PEM
Severe weight loss	Some weight loss
Severe muscle wasting with fat loss	Some muscle wasting, with retention of some body fat
Growth: <60% weight-for-age	Growth: 60 to 80% weight-for-age
No detectable edema	Edema
No fatty liver	Enlarged, fatty liver
Anxiety, apathy	Apathy, misery, irritability, sadness
Appetite may be normal or impaired	Loss of appetite
Hair is sparse, thin, and dry; easily pulled out	Hair is dry and brittle; easily pulled out; changes color; becomes straight
Skin is dry, thin, and wrinkled	Skin develops lesions



With appropriate nutrition care, children can recover from PEM diseases like kwashiokor!

Top Contributors of Protein in US Diet



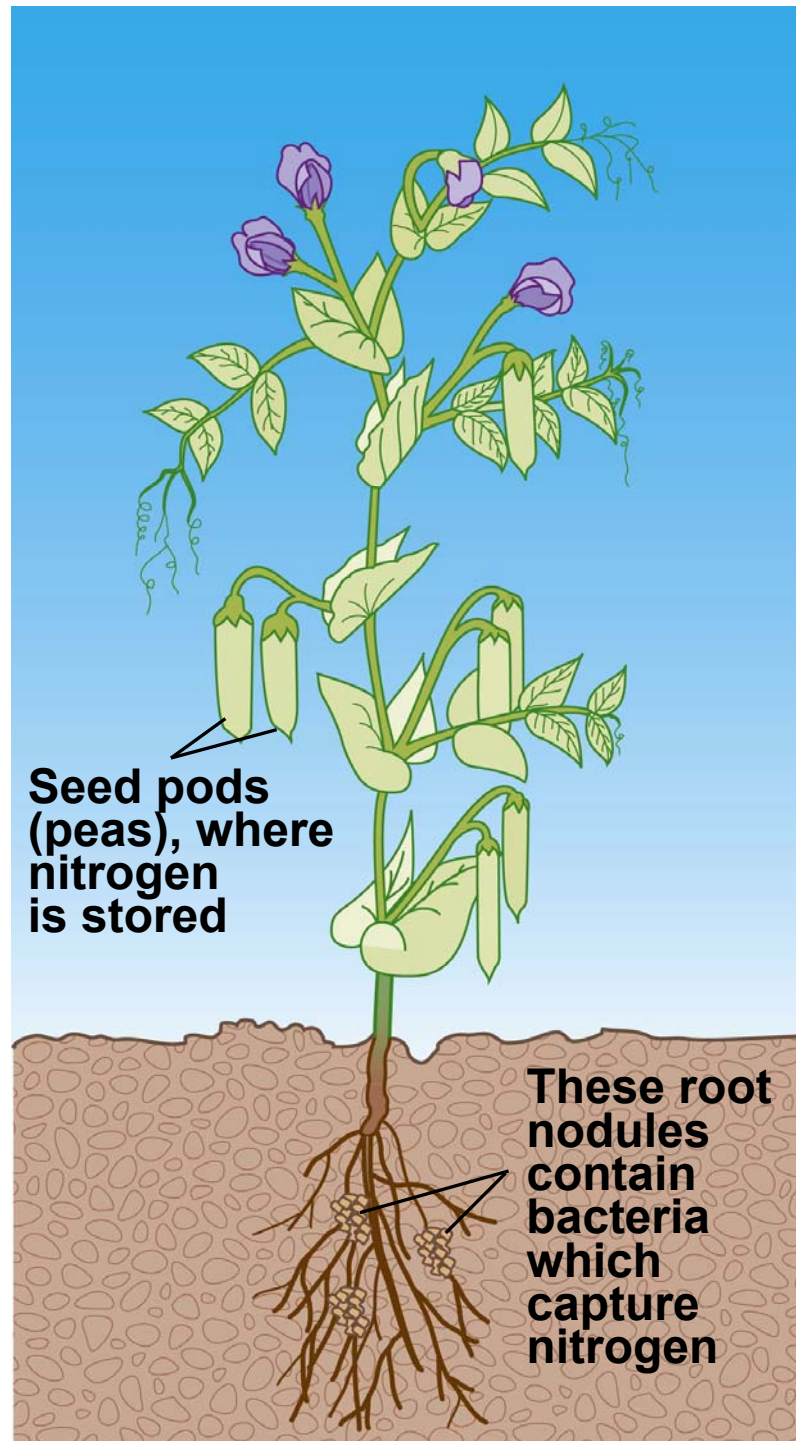
^aRounded values

Gorgeous, Nutrient-Dense Legumes!!





S&W 2011 p 216



**Seed pods
(peas), where
nitrogen
is stored**

**These root
nodules
contain
bacteria
which
capture
nitrogen**



TABLE
C6-1

Terms Used to Describe Vegetarians and Their Diets

Some of the terms below are in common usage, but others are useful only to researchers.

- **fruitarian** includes only raw or dried fruits, seeds, and nuts in the diet.
- **lacto-ovo vegetarian** includes dairy products, eggs, vegetables, grains, legumes, fruits, and nuts; excludes flesh and seafood.
- **lacto-vegetarian** includes dairy products, vegetables, grains, legumes, fruits, and nuts; excludes flesh, seafood, and eggs.
- **macrobiotic diet** a vegan diet composed mostly of whole grains, beans, and certain vegetables; taken to extremes, macrobiotic diets can compromise nutrient status.
- **ovo-vegetarian** includes eggs, vegetables, grains, legumes, fruits, and nuts; excludes flesh, seafood, and milk products.
- **partial vegetarian** a term sometimes used to mean an eating style that includes seafood, poultry, eggs, dairy products, vegetables, grains, legumes, fruits, and nuts; excludes or strictly limits certain meats, such as red meats.
- **pesco-vegetarian** same as partial vegetarian, but eliminates poultry.
- **vegan** includes only food from plant sources: vegetables, grains, legumes, fruits, seeds, and nuts; also called *strict vegetarian*.
- **vegetarian** includes plant-based foods and eliminates some or all animal-derived foods.





My Vegetarian Food Pyramid



Consult your dietitian or physician to determine the amount of water, iodized salt, calcium, vitamin D, and B12 to add to your daily diet.

Nonfat milk

Nutrition Facts		
Serving Size 1 cup (240mL)		
Servings Per Container About 8		
Amount Per Serving		
Calories	80	Calories from Fat 0
% Daily Value*		
Total Fat	0g	0%
Saturated Fat	0g	0%
<i>Trans</i> Fat 0g		
Polyunsaturated Fat	0g	
Monounsaturated Fat	0g	
Cholesterol	5mg	2%
Sodium	100mg	4%
Potassium	380mg	11%
Total Carbohydrate	13g	4%
Dietary Fiber	0g	0%
Sugars	12g	
Protein	8g	
Vitamin A	10%	Vitamin C 0%
Calcium	30%	Iron 0%
Vitamin D	25%	Riboflavin 30%
Vitamin B ₁₂	20%	

Light soy milk

Nutrition Facts		
Serving Size 1 cup (240mL)		
Servings Per Container About 8		
Amount Per Serving		
Calories	70	Calories from Fat 0
% Daily Value*		
Total Fat	0g	0%
Saturated Fat	0g	0%
<i>Trans</i> Fat 0g		
Polyunsaturated Fat	0g	
Monounsaturated Fat	0g	
Cholesterol	0mg	0%
Sodium	120mg	5%
Potassium	300mg	8%
Total Carbohydrate	8g	3%
Dietary Fiber	1g	4%
Sugars	6g	
Protein	6g	
Vitamin A	10%	Vitamin C 0%
Calcium	30%	Iron 6%
Vitamin D	30%	Riboflavin 30%
Vitamin B ₁₂	50%	

Heart & Vessel Health Food Swap Contest # 1

Modify to
ensure heart &
vessel health!



Breakfast

2 eggs scrambled in butter
2 link sausages
1 piece French Vienna toast
1 Tbsp butter
1 Cup = 8 fl oz black coffee

Lunch

Burger King Whopper w/
Lettuce leaf, Tomato 1 med slice,
Onion 2 med slices
Mustard 1 Tbsp
Ketchup 1 Tbsp
Mayonnaise 1 Tbsp
1 large order of French fries
Coca Cola 24 fl oz

Healthy Heart



Healthy You

Heart & Vessel Health Food Swap Contest # 1

Modify to
ensure heart &
vessel health!



Dinner

- 1 pork chop 6 oz w/fat border
- 1 Cup spinach boiled from frozen
- 1 Cup lettuce iceberg
- ½ tomato medium slice
- ½ Cup carrot slices
- 4 cucumber medium slices
- ¼ cup thousand island dressing
- 1 Pillsbury Poppin' Fresh dinner roll
- 1 ½ Cup 2% milk
- 1 piece cake, white cake, chocolate frosting
- ½ Cup chocolate chip icecream, full fat
- 2 Tbsp whipped cream
- 2 Tbsp chocolate fudge sauce

Healthy Heart



Healthy You

Heart & Vessel Health Recipe Swap Contest # 2

Modify to
ensure heart &
vessel health!



Chocolate Chip Cookies

- 2 ¼ cup organic white flour
- 1 tsp salt
- 1 tsp baking soda
- ¾ cup brown sugar
- ¾ cup granulated white sugar
- 2 sticks organic butter
- 2 organic medium brown eggs
- 2 cups organic liqueur chocolate chips
- 1 tsp vanilla

Healthy Heart



Healthy You