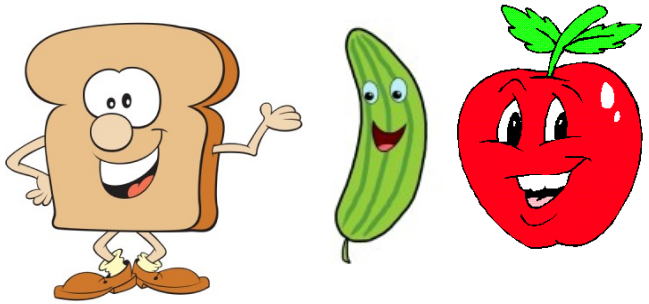
Presentations next session! Hooray!



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*

Monday, November 23, 2015

Nutrition & Pathology

Matt Harvison, *Saturated fat & CVDs*
Kaley Vatalaro, *Plant-based diet & cancer risk*
Mikayla Watson, *Type II diabetes & nutrition*
Hannah Brody, *Dairy-free diet: pros & cons*
Katherine Savin, *Dairy-free diet & weight loss?*
Dani Torrey, *Gluten-free: fad or fact?*
Samantha Haehlens, *Eating disorders in adolescents*

Sports Physiology & Fluid Replacement

Dominique Chapman, *Female athlete triad*
Ryan Sindal, *Best replacement: water or sports drinks?*
Samantha Blatt, *Coconut water: myths vs reality*

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

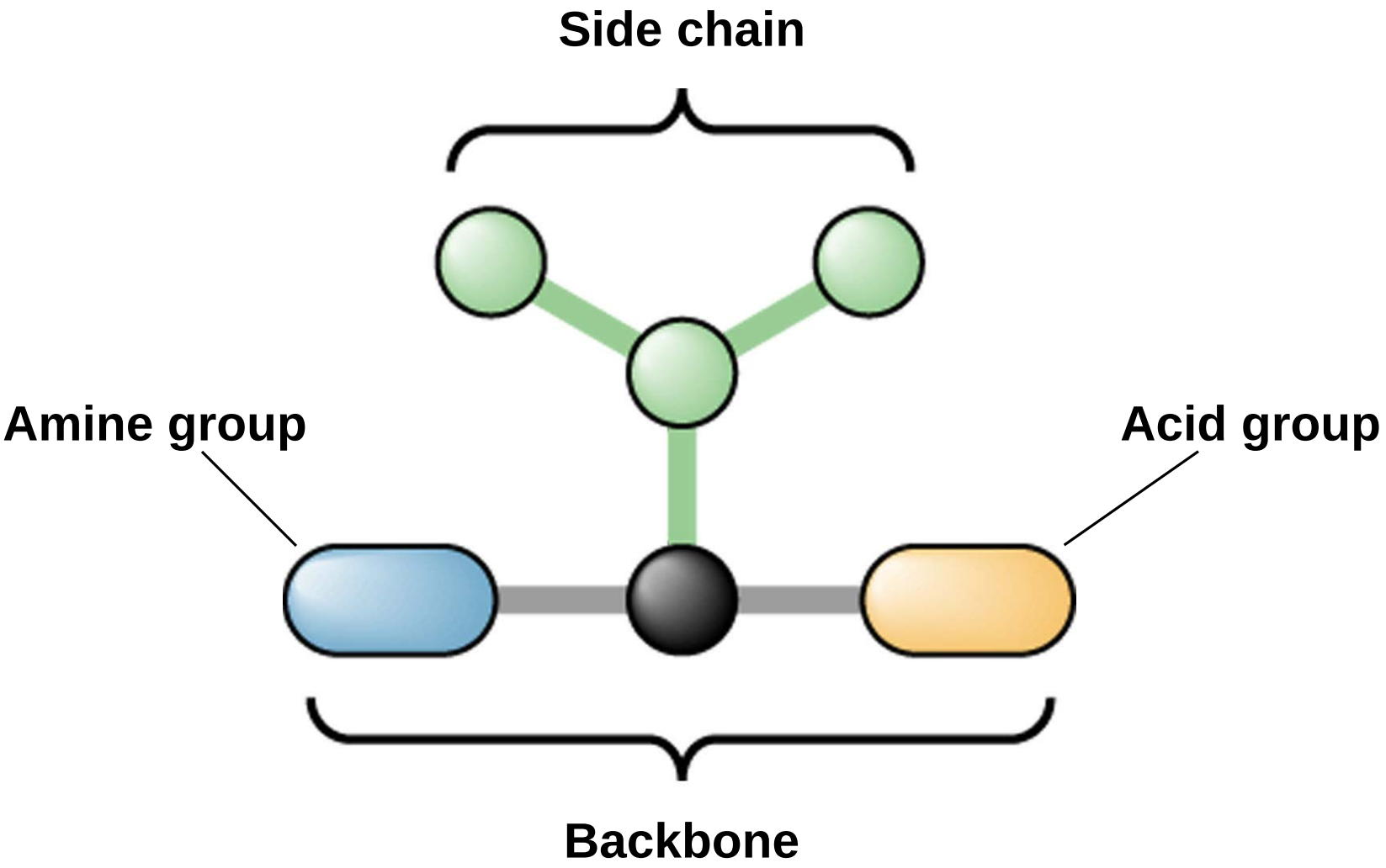
Please feel free to make additional comments below.

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!!

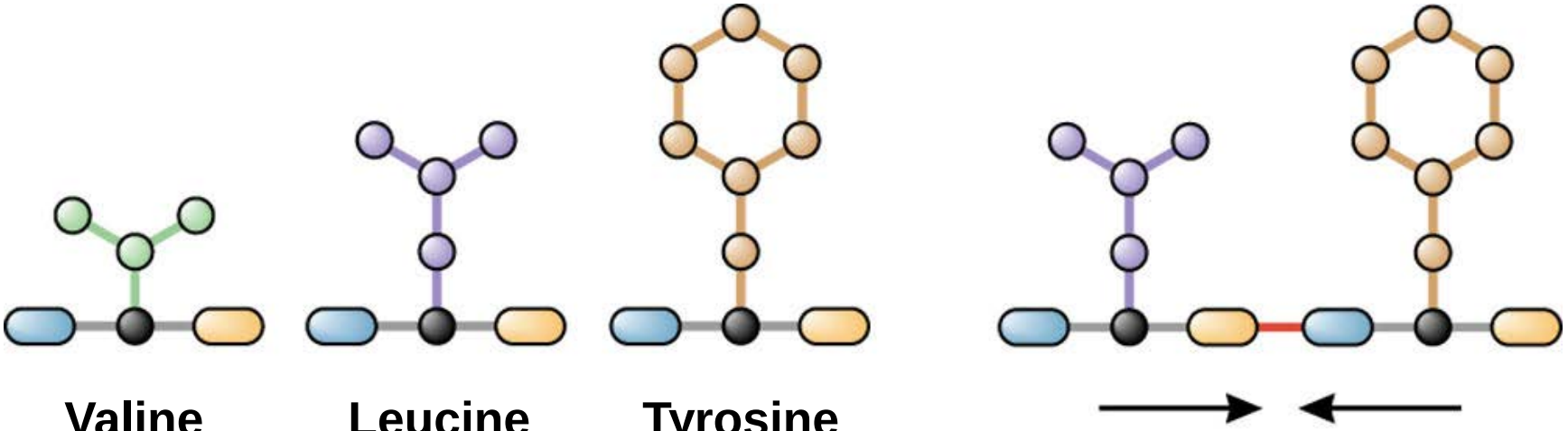
$\sum = 25$

EVALUATOR'S NAME _____

Amino Acid Schematic



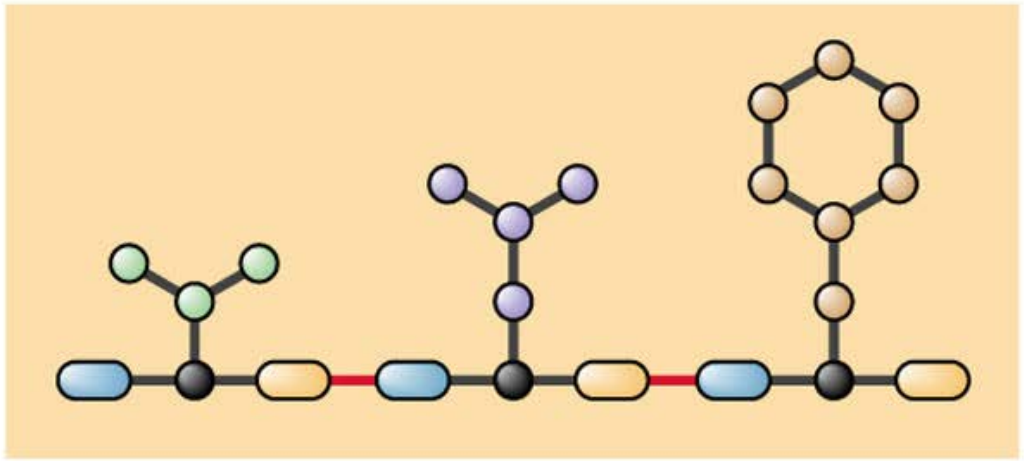
S&W 2014 fig 6-1 p 198



Valine Leucine Tyrosine

Single amino acids with different side chains…

can bond to form…



a strand of amino acids, part of a protein.

S&W 2014 fig 6-2 p 199

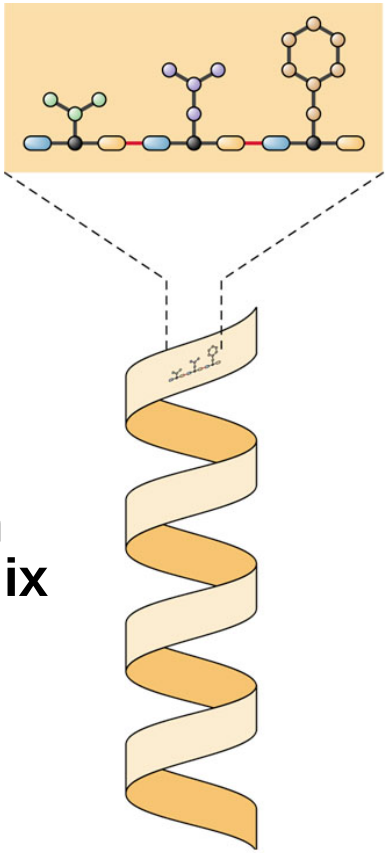
1. 1^0 structure: Amino acids sequence in a chain

Helix (α) or sheet (ß)!

2. 2^0 structure: Amino acids repel or attract & form a special shape

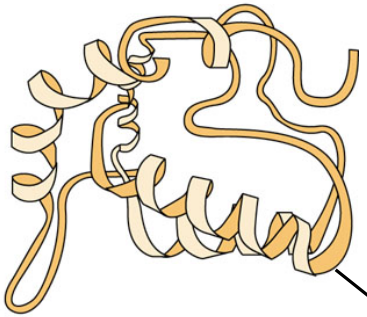
3. 3^0 structure: Special shape folds onto itself so that it's functional

4. 4^0 structure: Once coiled/folded maybe functional or may need to join with other molecules to be fully functional.



1. Amino acid strand

2. Strand coils like a ribbon into an α helix

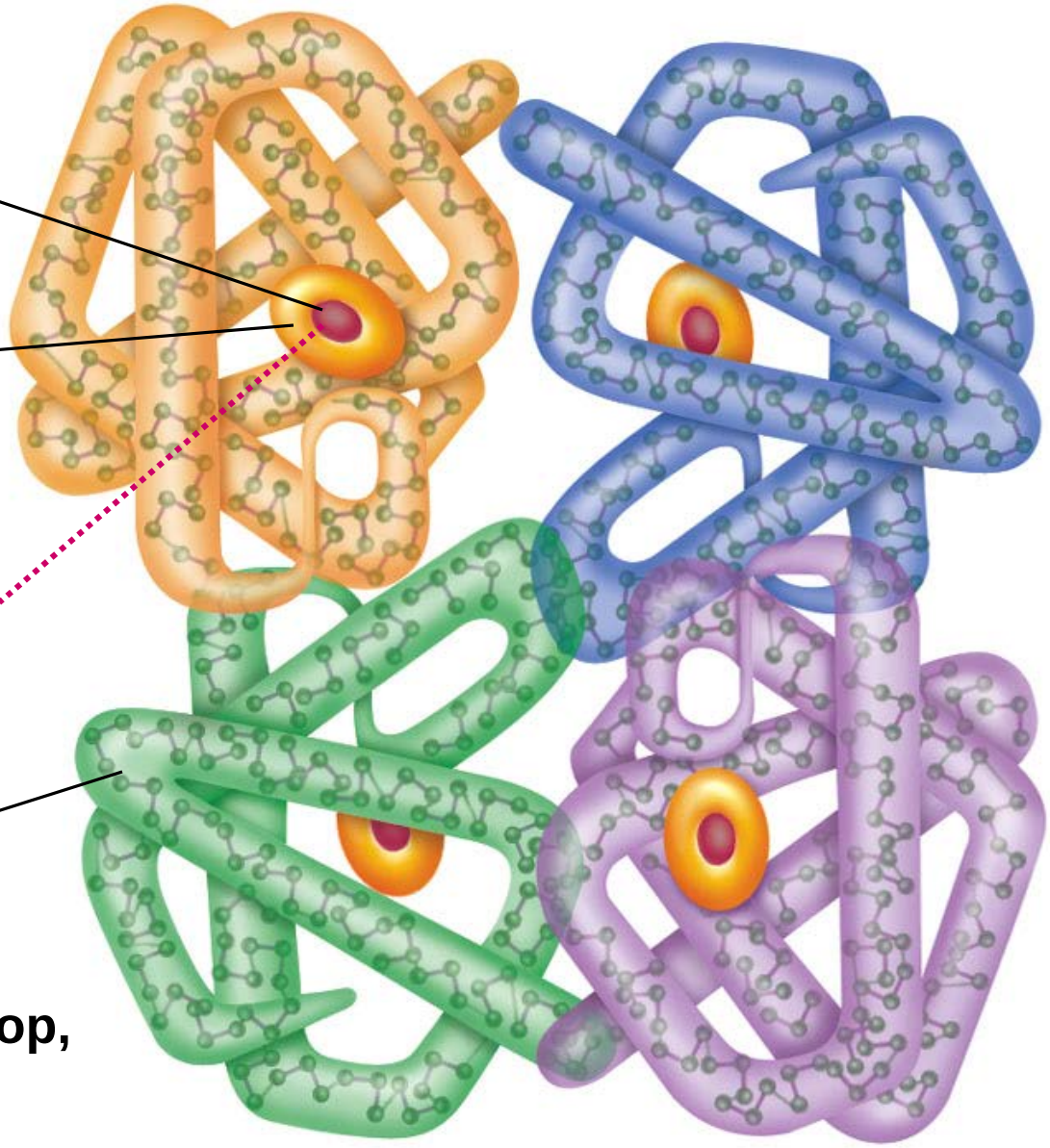


3. Completed functional protein

4.

> S&W 2014 fig 6-3 p 201

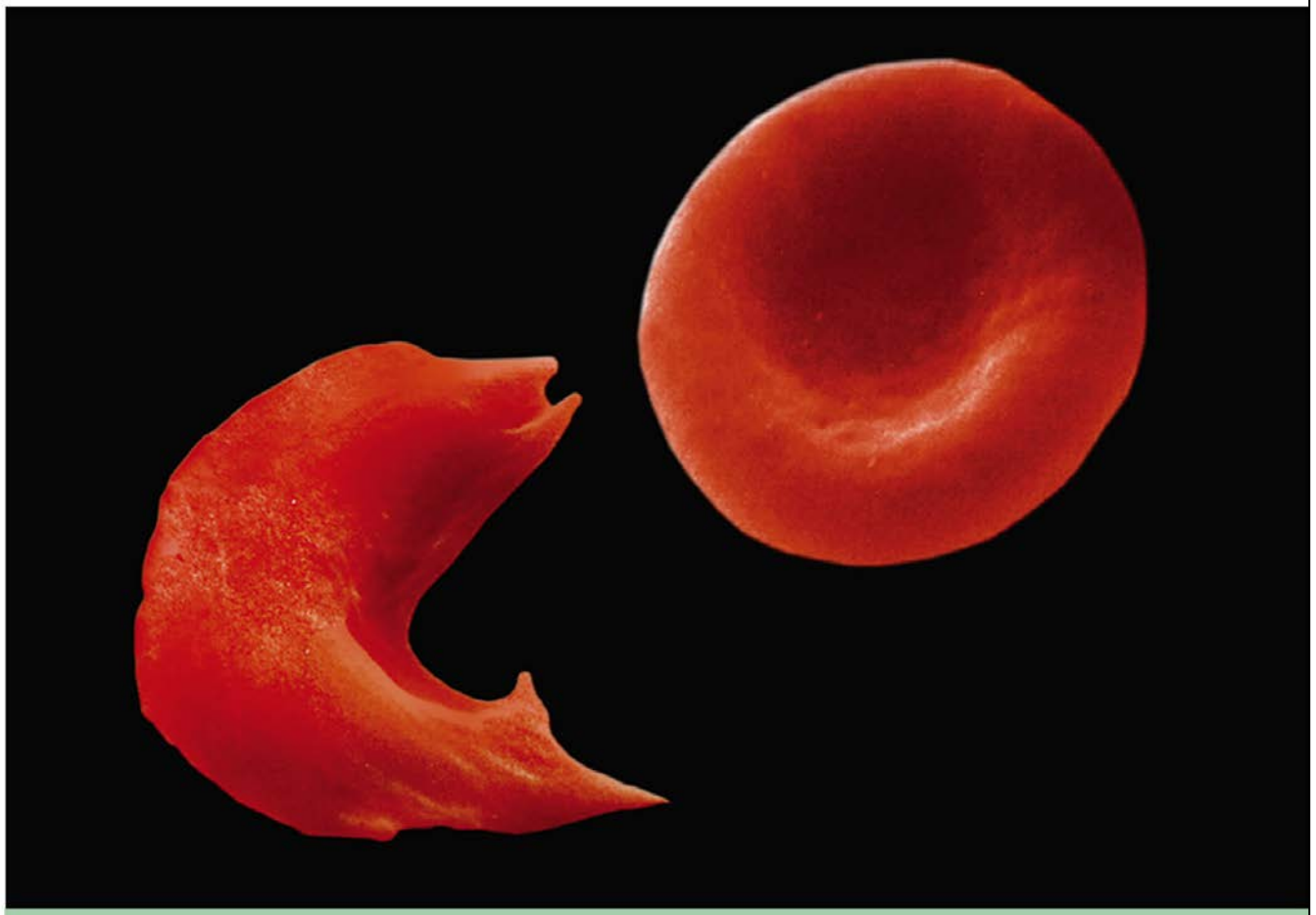
Hemoglobin (cartoon) that carries oxygen!



S&W 2014 fig 6-4 p 202

Sickle-shaped blood cells

Normal red blood cells



What a difference one amino acid can make!

Amino acid sequence of normal hemoglobin:

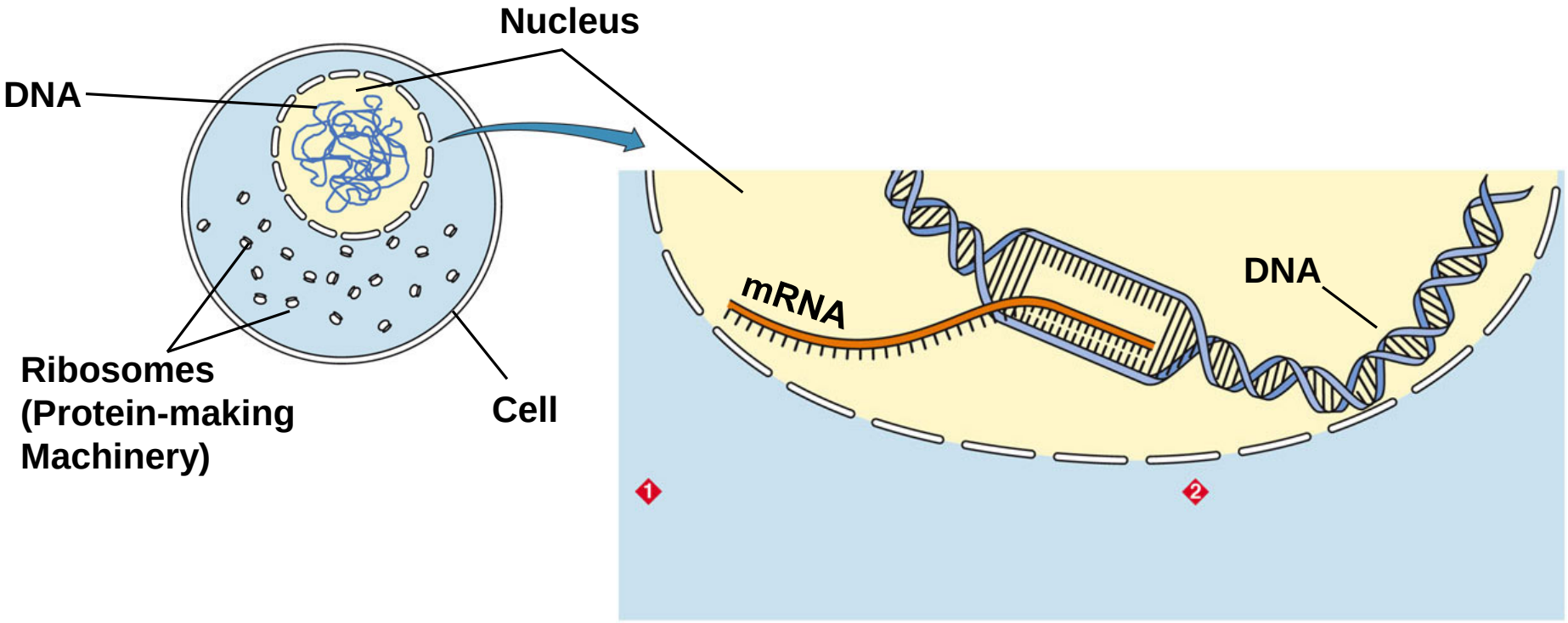
Val–His–Leu–Thr–Pro–Glu–Glu

Amino acid sequence of sickle-cell hemoglobin:

Val–His–Leu–Thr–Pro–Val–Glu

S&W 2014 fig 6-5 p 203

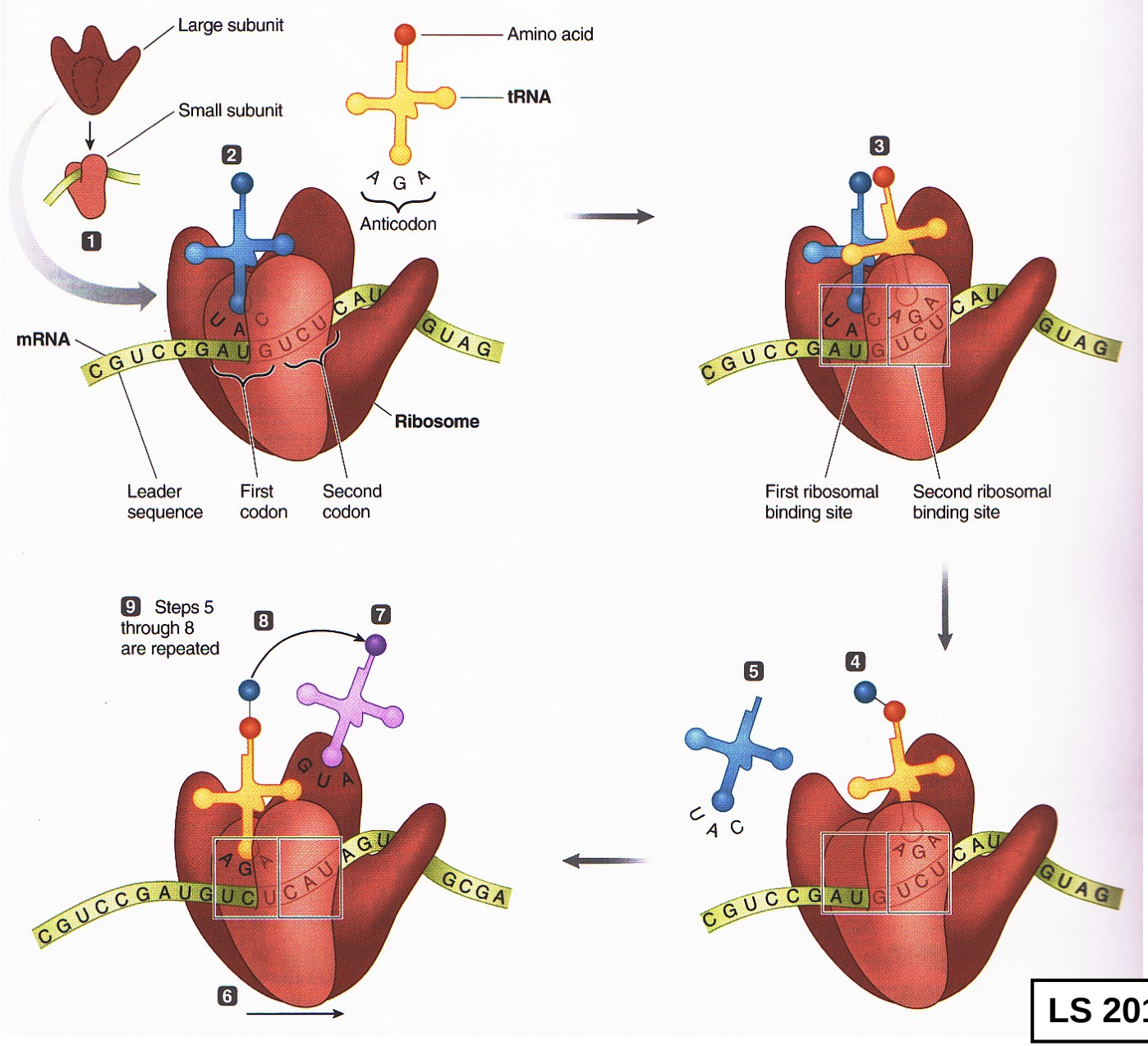

S&W 2014 p 205



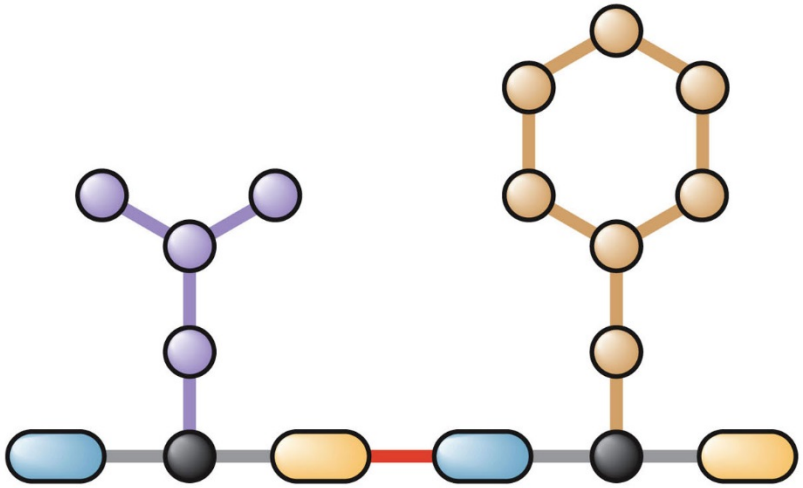
DNA → RNA → Protein

S&W 2014 fig 6.6 p 204

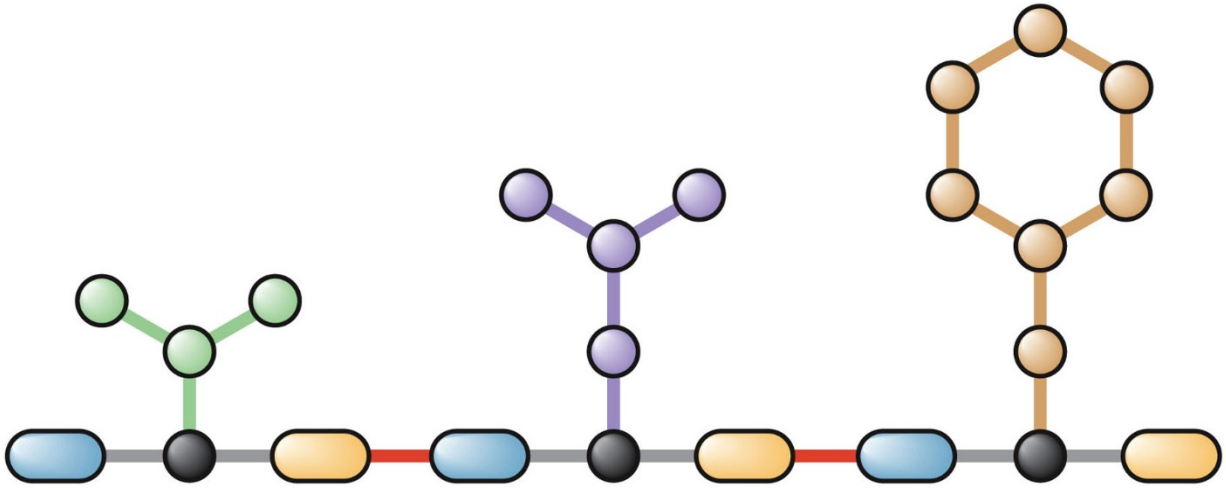
Translation? Ribosomes Make Proteins



LS 2012 fig C-7

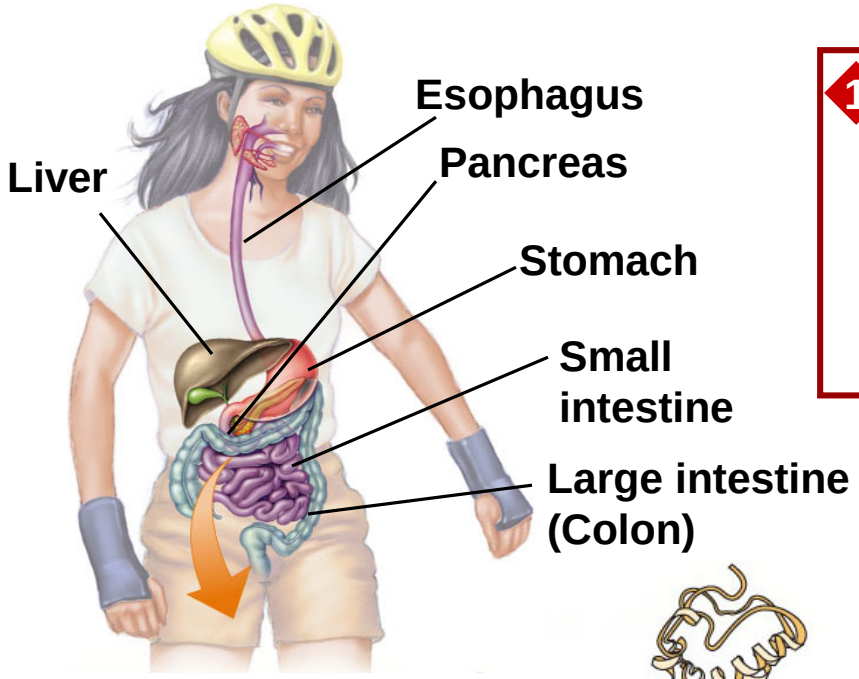


Dipeptide



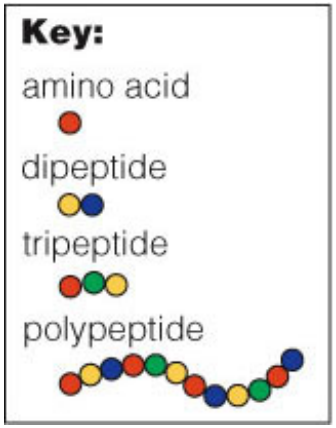
Tripeptide

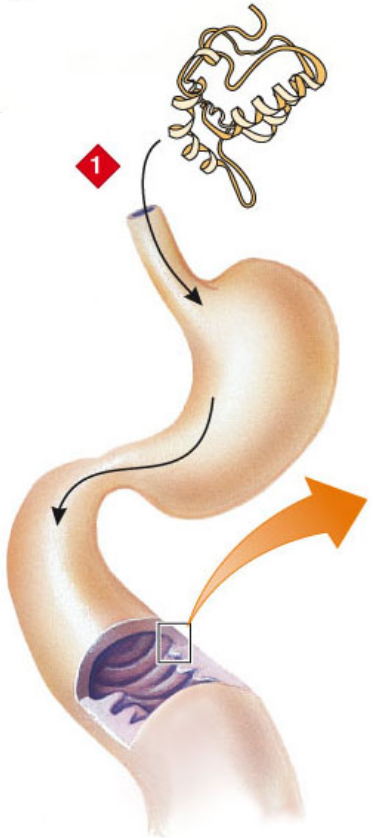
S&W 2014 fig 6-7 p 206



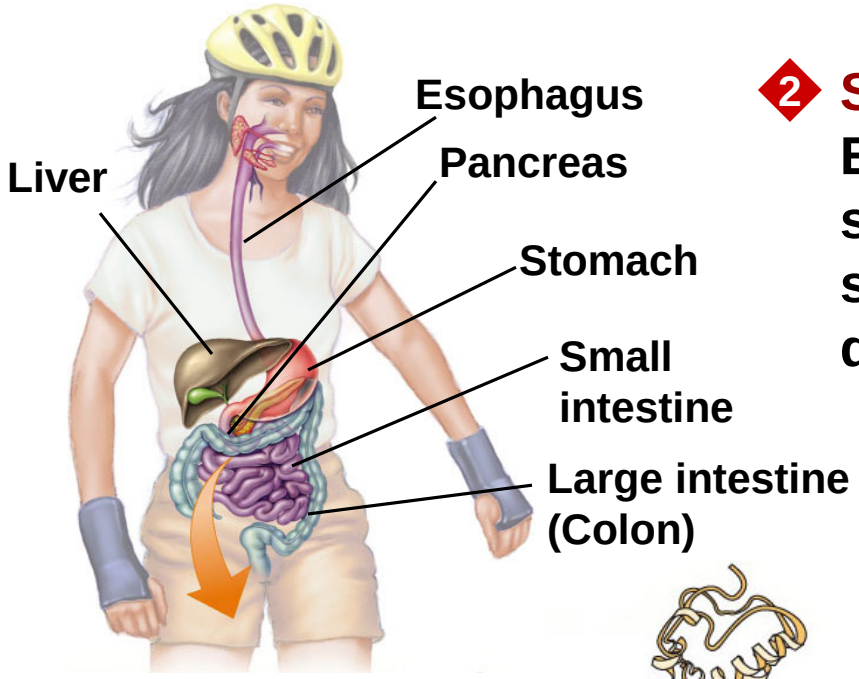
1 *Stomach*

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



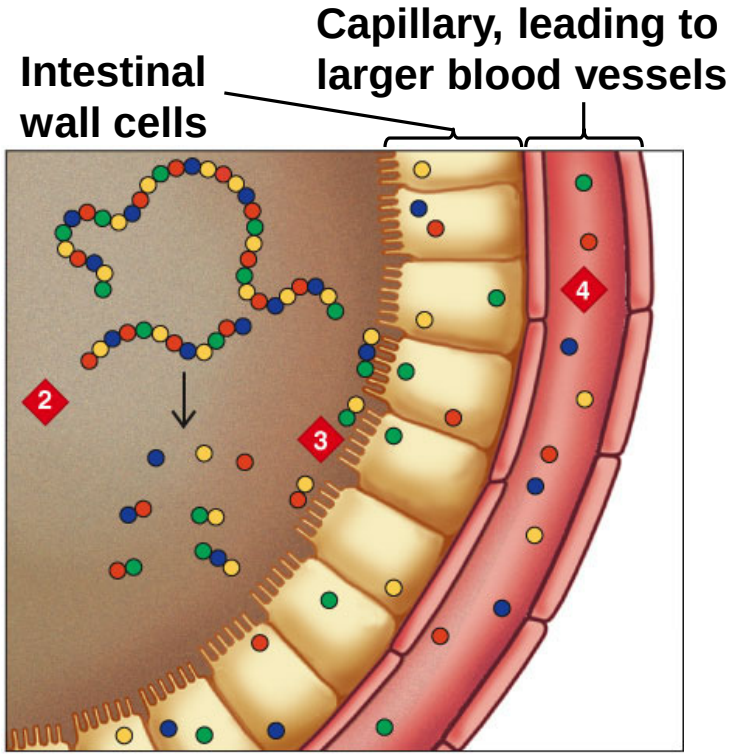


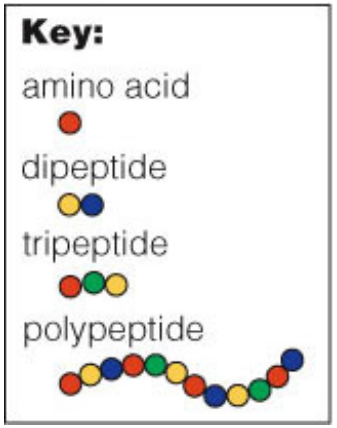
Modified after S&W 2014 fig 6.8 p 207



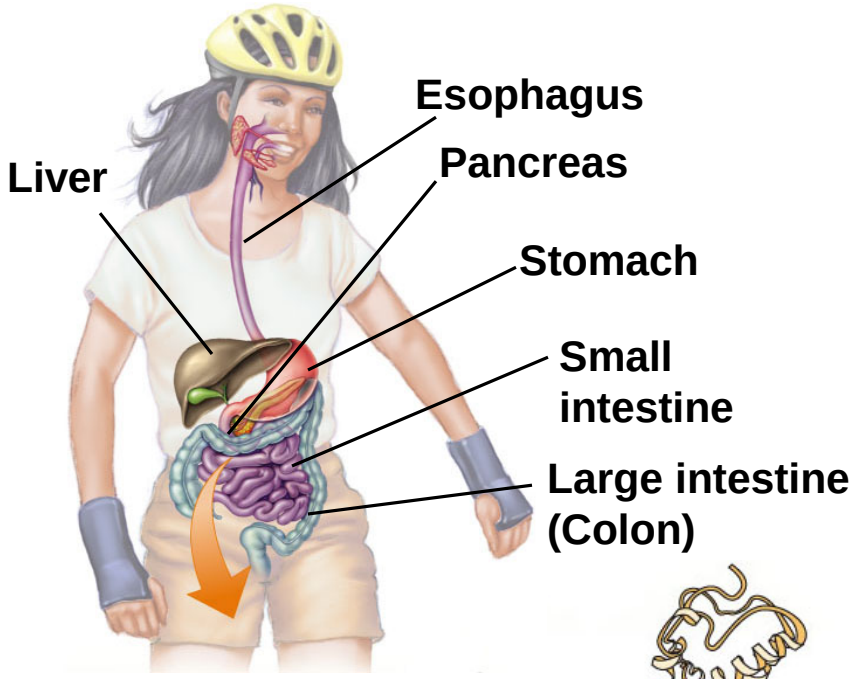
2 Small Intestine

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



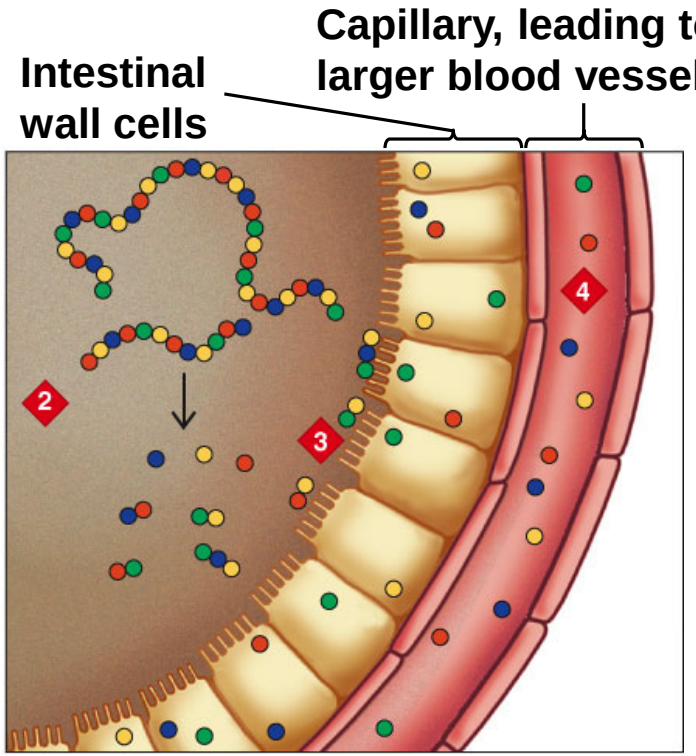


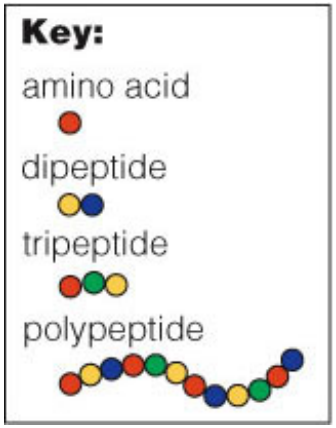
Modified after S&W 2014 fig 6.8 p 207

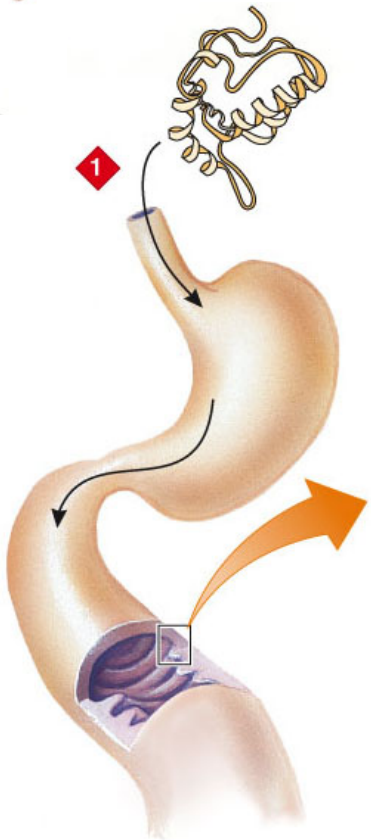


3 Small Intestine

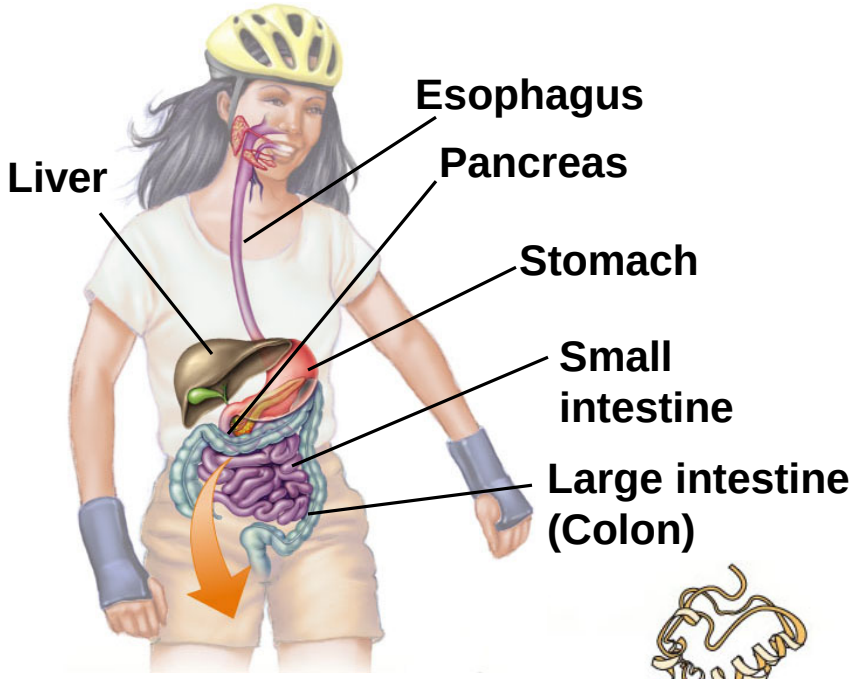
Enzymes on surface of small intestine's lining & in absorptive cells split tripeptides & dipeptides into amino acids – these are absorbed into blood.





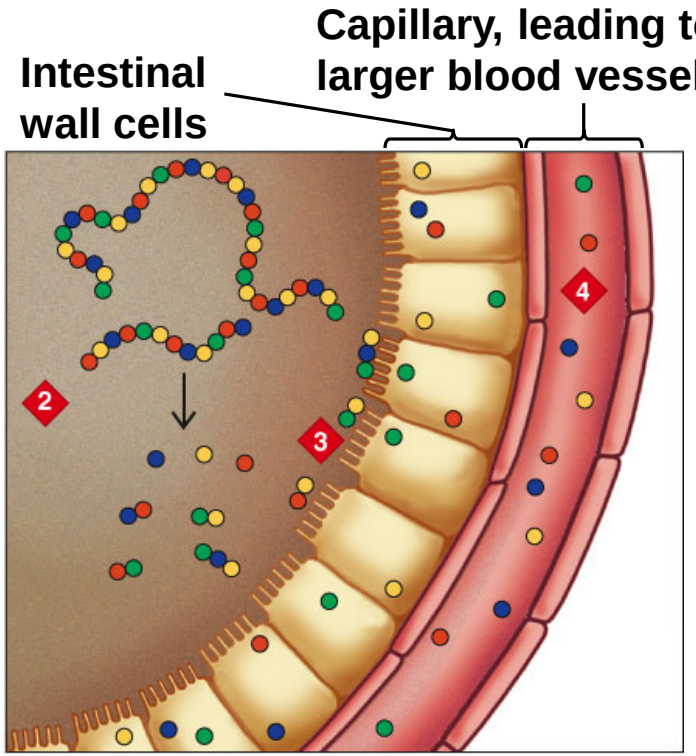


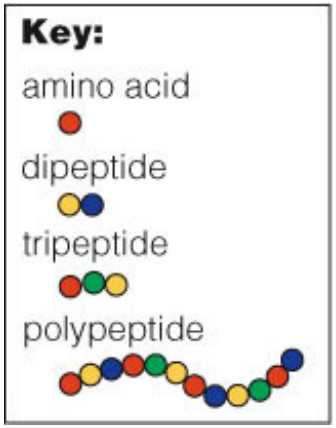
Modified after S&W 2014 fig 6.8 p 207

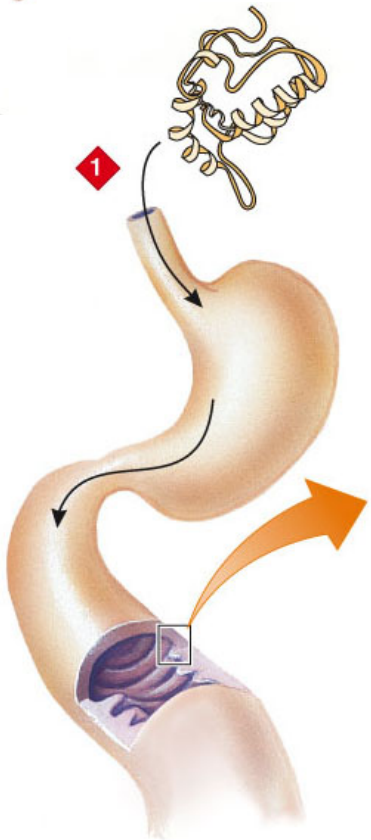


4 Bloodstream

Transports amino acids to all body cells







Modified after S&W 2014 fig 6.8 p 207

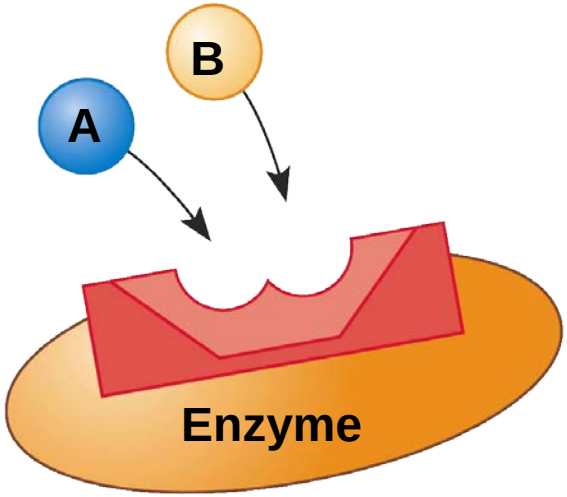
S&W 2014 p 208

Proteins have multiple functions in the human body!!

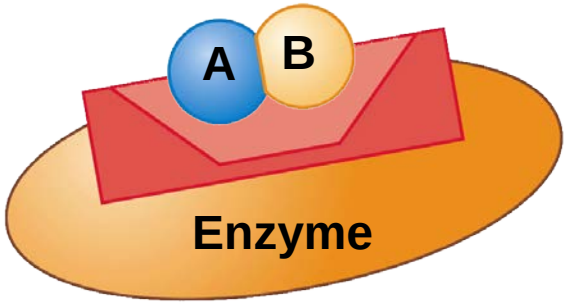
1. ***Enzymes***, biological catalysts that drive chemical reactions (LDH, CPK, cytochrome oxidase,...).
2. ***Hormones***, blood-borne chemical messengers (17-β estradiol, testosterone, thyroid hormone,...)
3. ***Carrier molecules*** (albumins, hemoglobin, lipoproteins, myoglobin,...).
4. ***Blood clotting factors*** (thrombin, fibrinogen,...)
5. ***Pumps, channels, membrane-bound proteins*** (Na^+-K^+ ATPase, Ca^{2+}, 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***...

cf: S&W 2014 tab 6-2 p 212

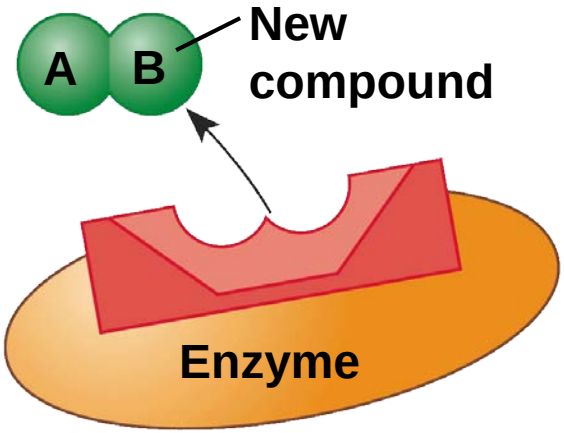
Enzymes are biological catalysts that act like chemical glue or scissors!



Enzyme plus two compounds A and B



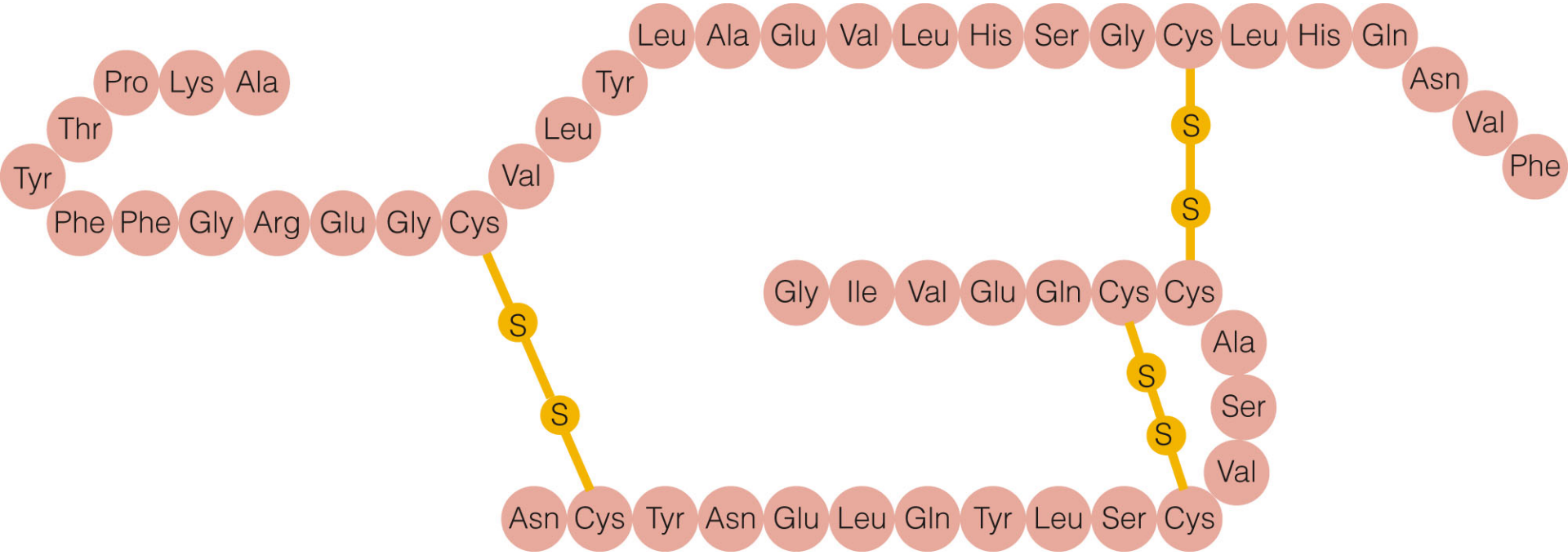
Enzyme complex with A and B



Enzyme plus new compound AB

S&W 2014 fig 6-9 p 209

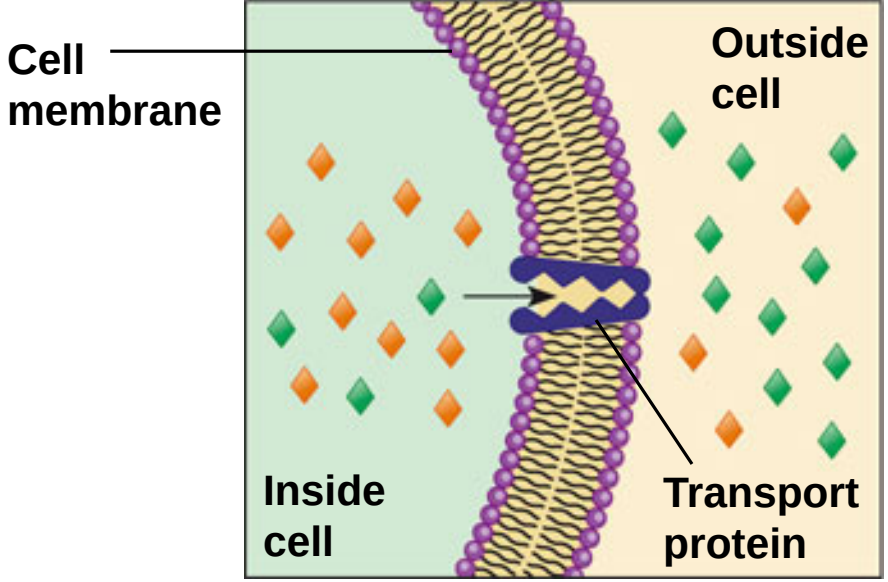
Insulin Schematic



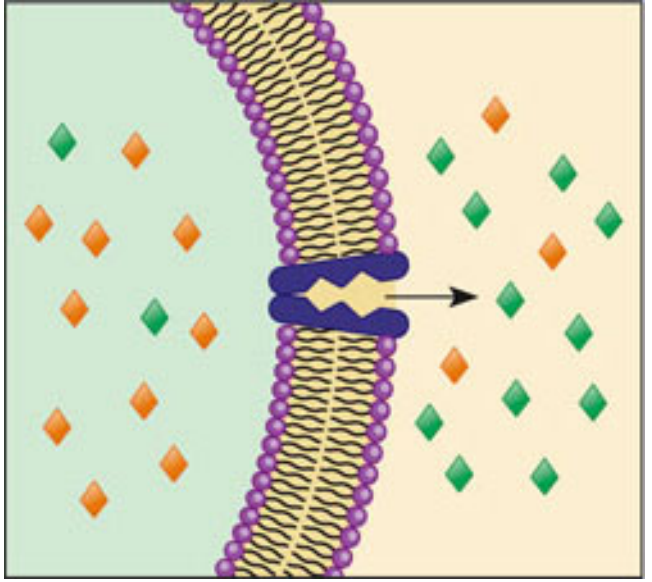
S&W 2014 fig 6-10 p 209

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

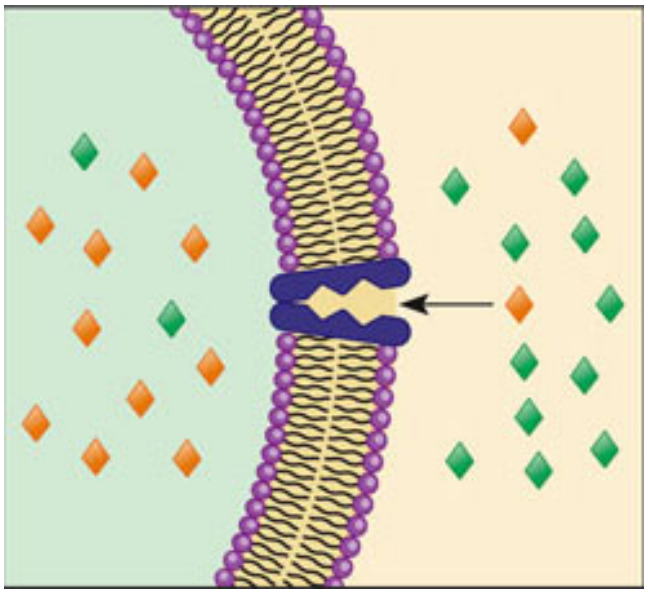
S&W 2014 p 210



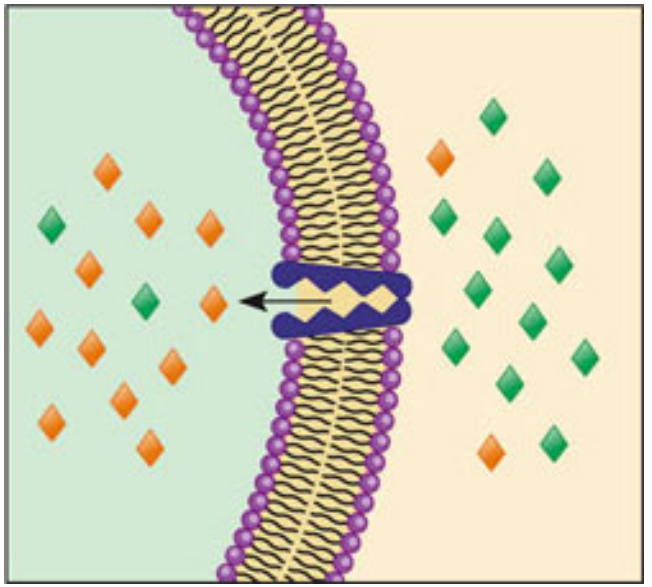
Molecule enters protein from inside cell



Protein changes shape; molecule exits protein outside the cell.

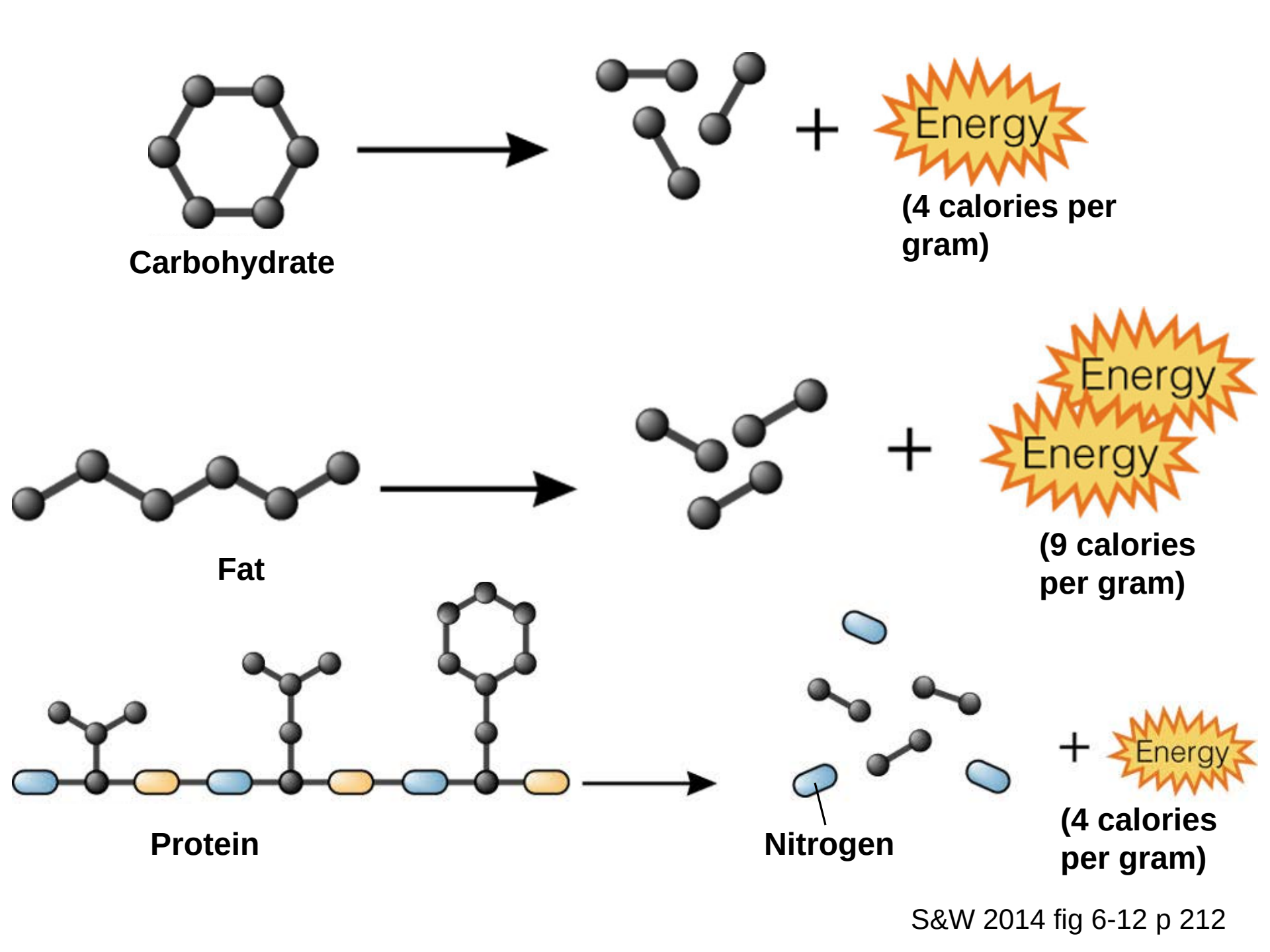


Molecule enters protein from outside cell.



Molecule enters protein from outside cell.

S&W 2014
fig 6-11 p 211



S&W 2014 fig 6-12 p 212

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.

S&W 2011 table 6-2 p 205

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

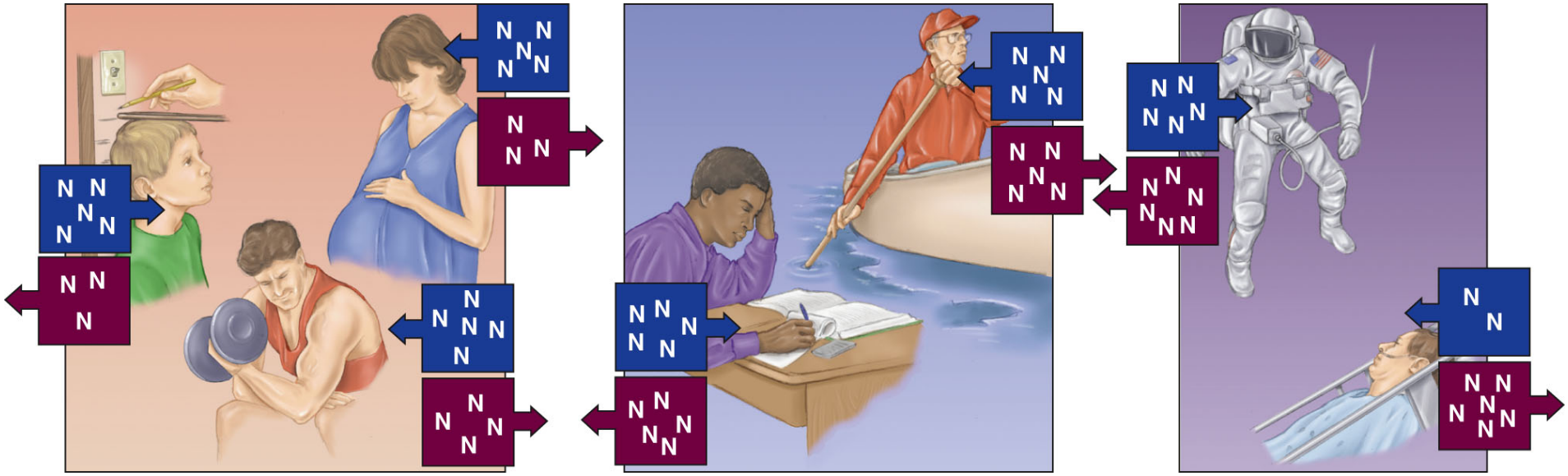
   e.g., 68.2 kg x 0.8 g/kg = 54.6 g/d

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

   58 g which surpasses your daily requirement!

cf: S&W 2014 tab 6-3 p 215

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

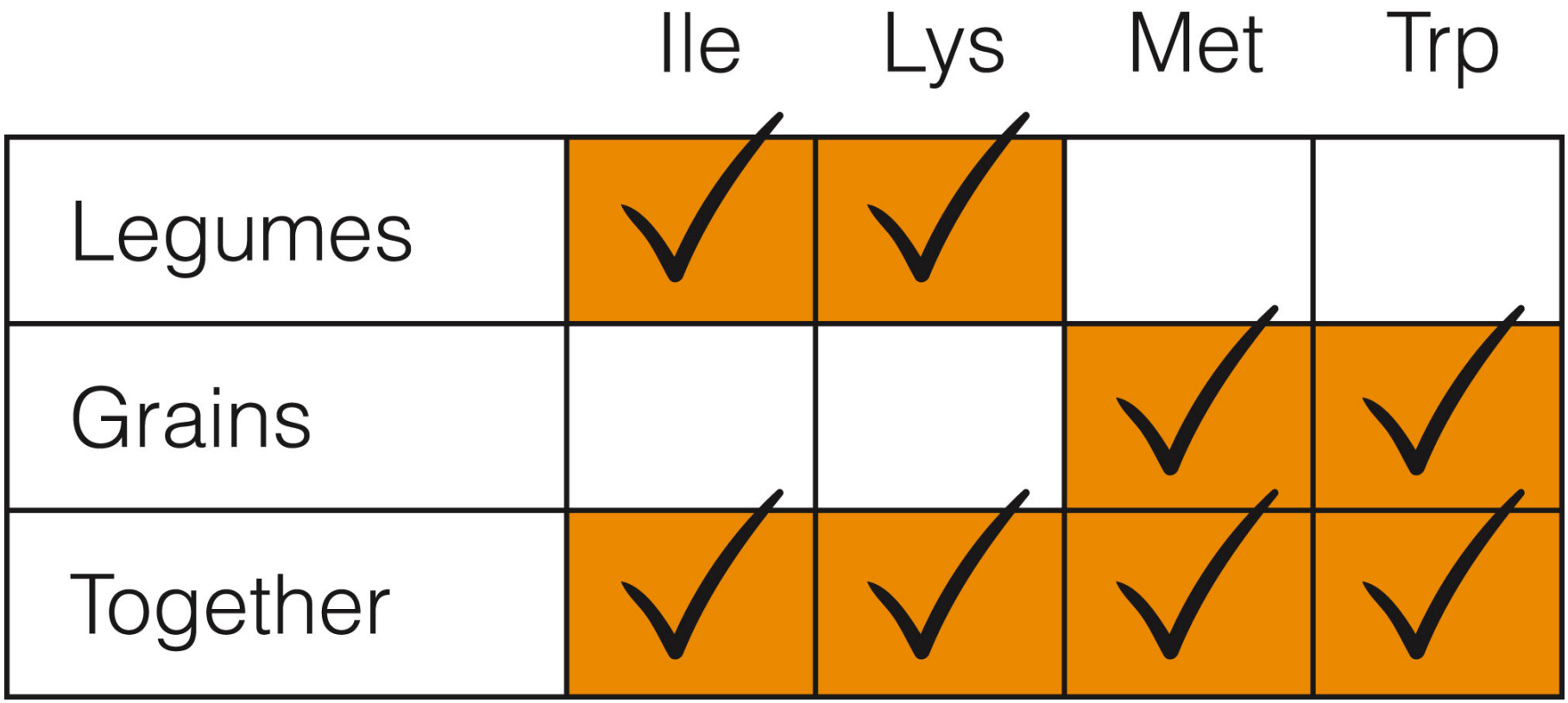
e.g., astronaut, surgery patient—losing more nitrogen than taking in.

> S&W 2014 fig 6-13 p 217

All essential amino acids are needed to make a protein

S&W 2014 p 217

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



S&W 2014 fig 6-15 p 218

S&W 2014
p 218

Protein-Energy Malnutrition (PEM) Marasmus

S&W 2014 p 219

Protein-Energy Malnutrition (PEM) Kwashiokor

S&W 2011 p 211

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.

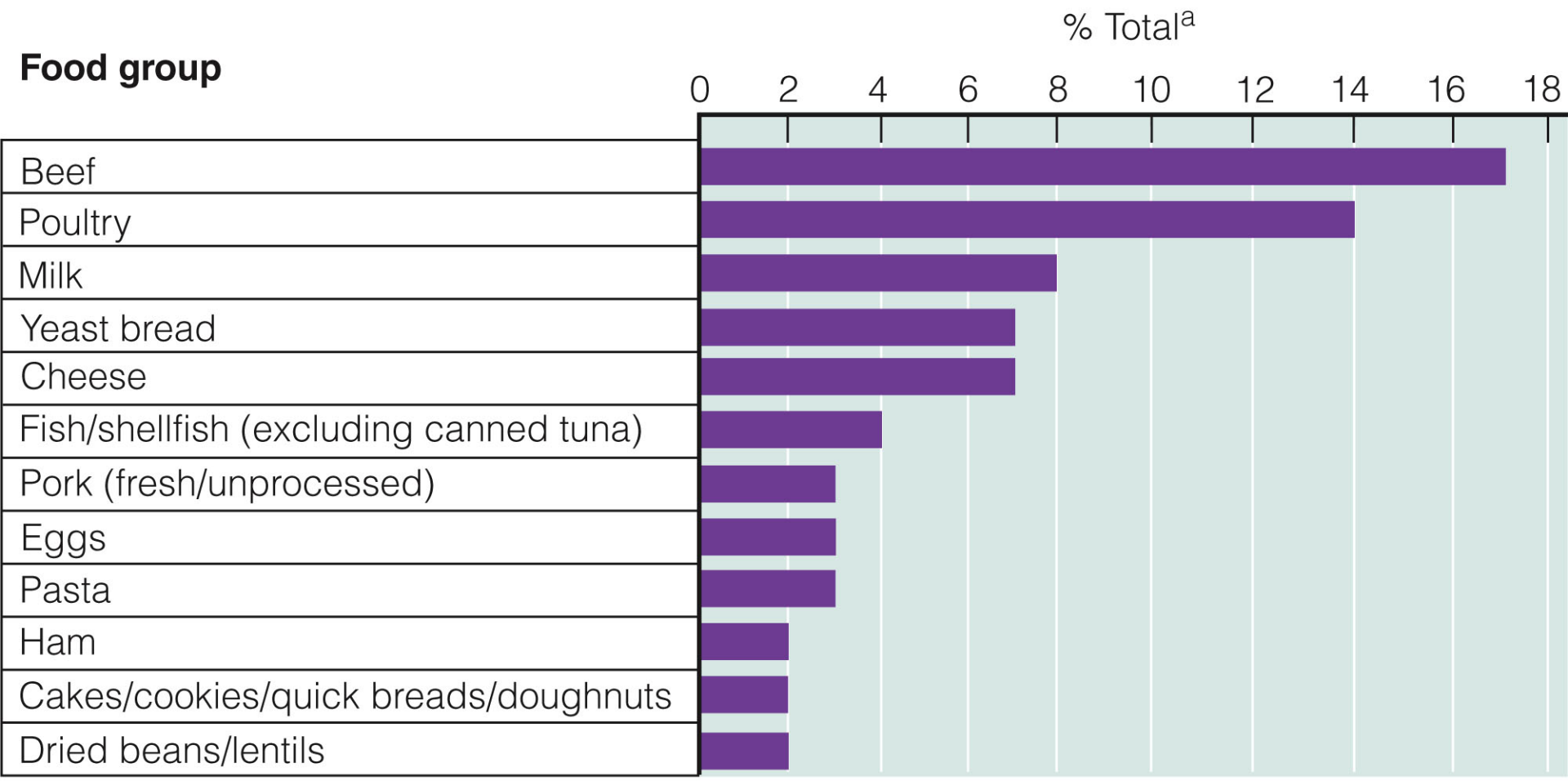
Marasmus	Kwashiorkor
Infants and toddlers (less than 2 yr)	Older infants and young children (1 to 3 yr)
Severe deprivation or impaired absorption of protein, energy, vitamins, and minerals	Inadequate protein intake or, more commonly, infections
Develops slowly; chronic PEM	Rapid onset; acute PEM
Severe 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

S&W 2011 tab 6-4 p 212


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

S&W 2011
p 212

Top Contributors of Protein in US Diet



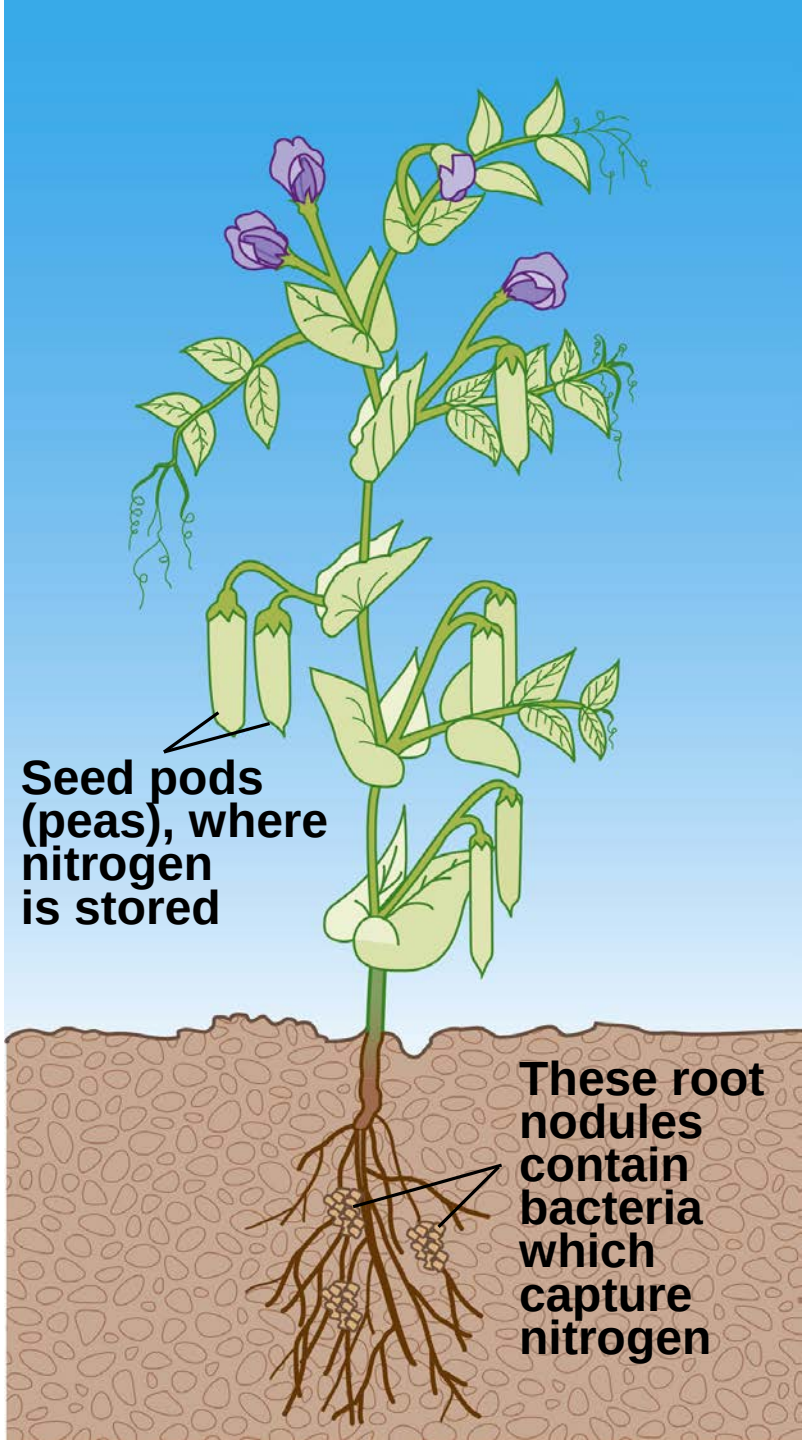
[a]*Rounded values*

S&W 2014 fig 6-17 p 223

Gorgeous, Nutrient-Dense Legumes!!

S&W 2014 p 220


S&W 2011 p 216



S&W 2014 fig 6-18 p 223

S&W 2011 p 219

TABLE C6-1

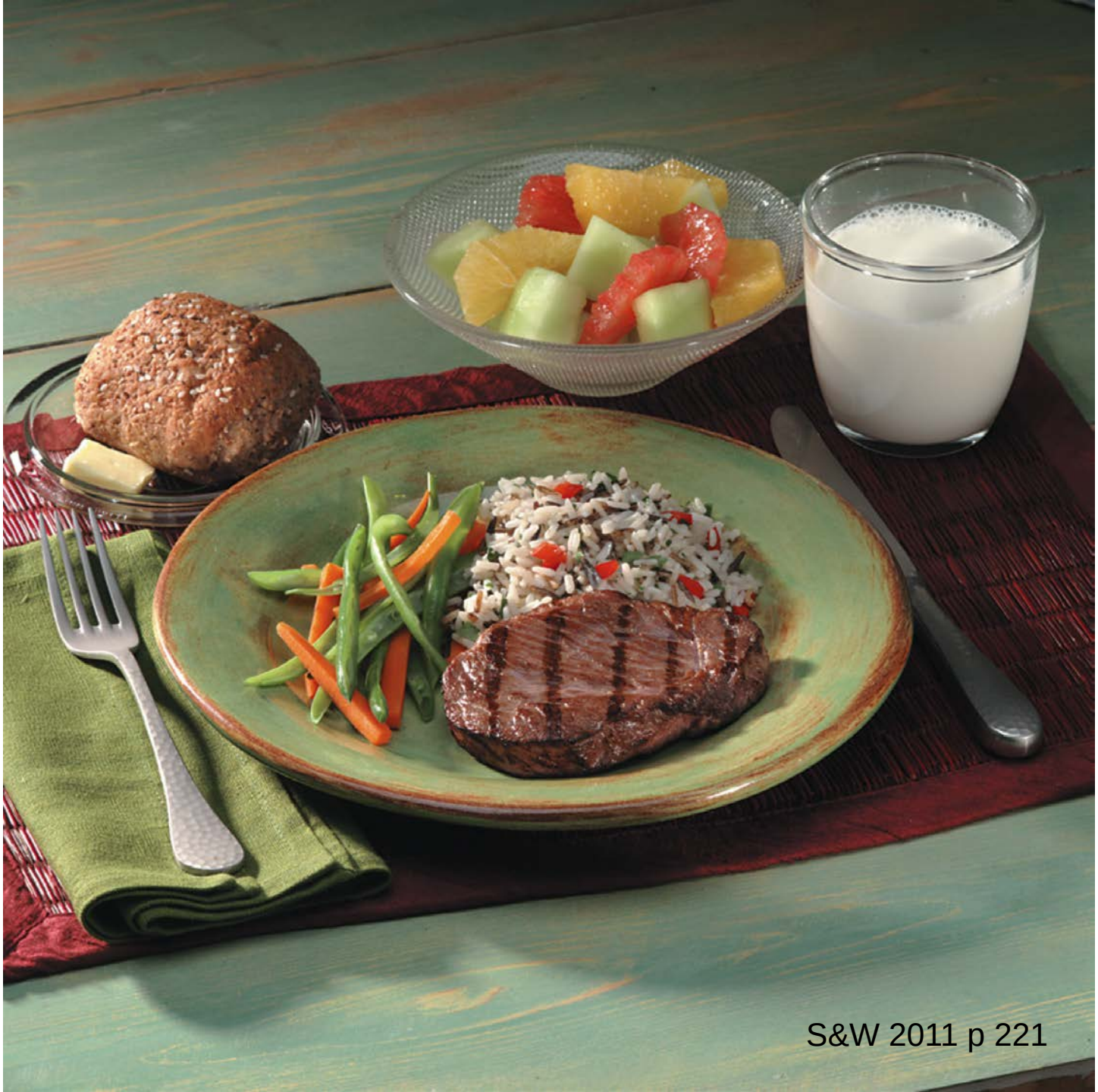
Terms Used to Describe Vegetarians and Their Diets

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.

S& W 2011 tab C6-1 p 219

S&W 2014 p 227

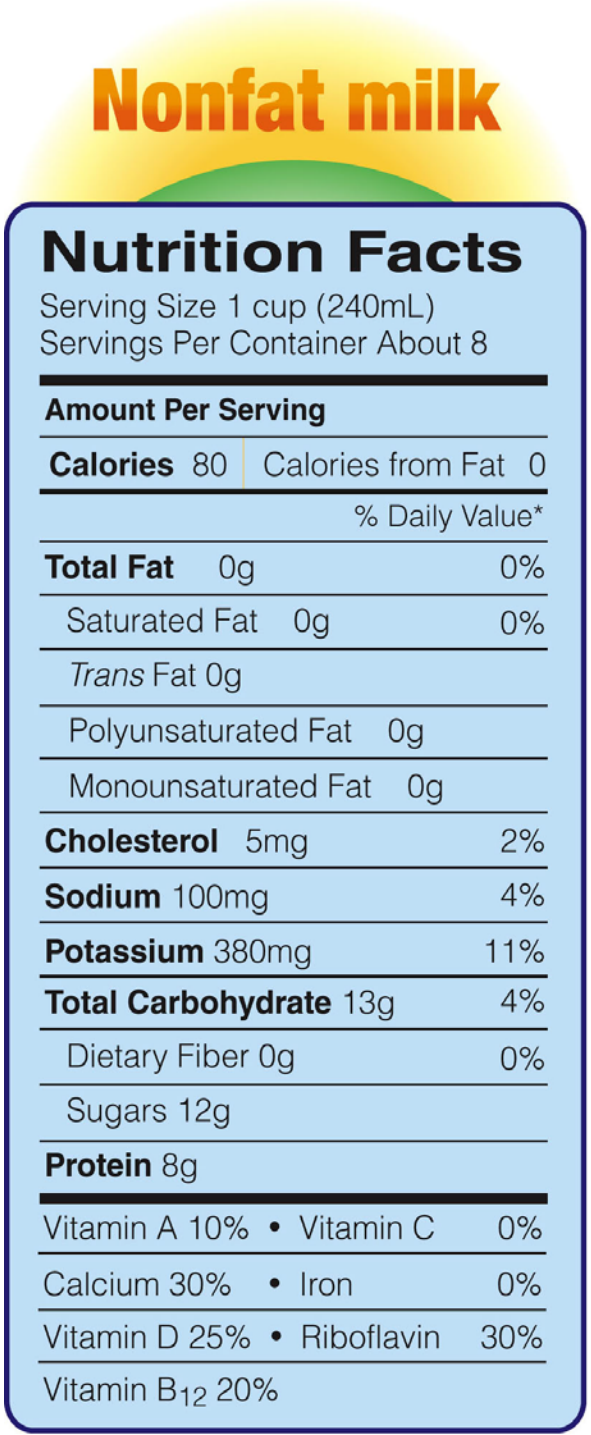


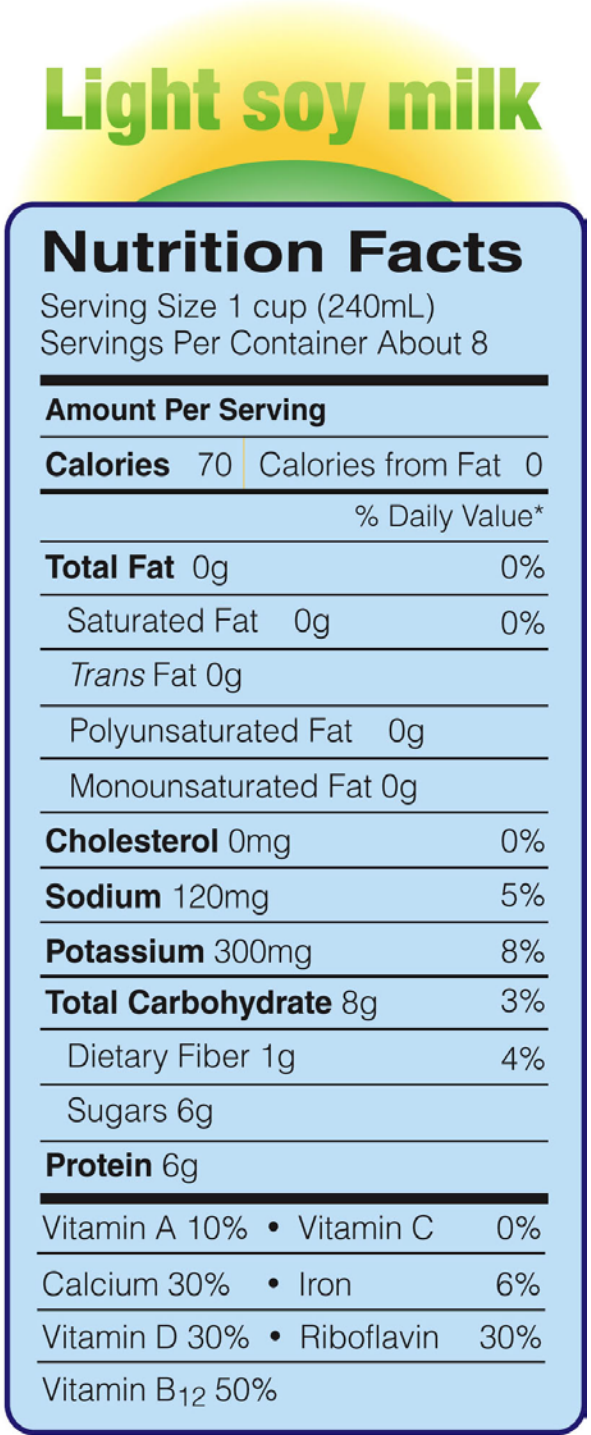
S&W 2011 p 221

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.

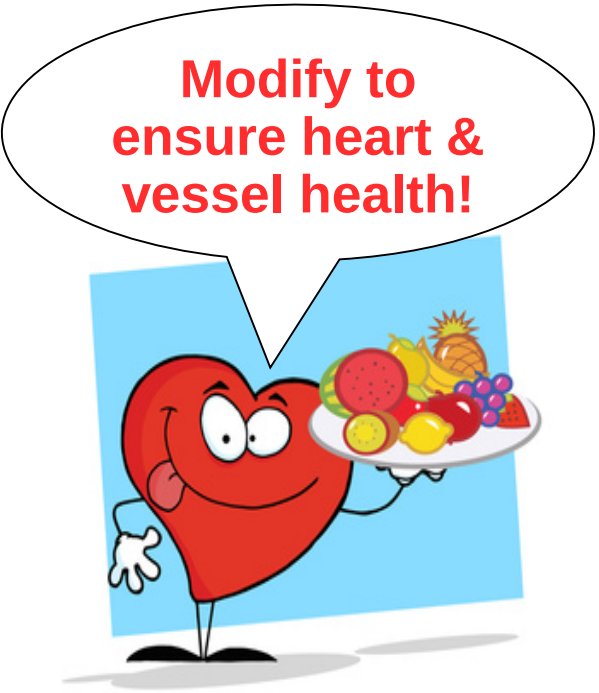
S&W 2011 fig C6-1 p 224





S&W 2011
fig C6-2 p 225

Heart & Vessel Health Food Swap Contest # 1



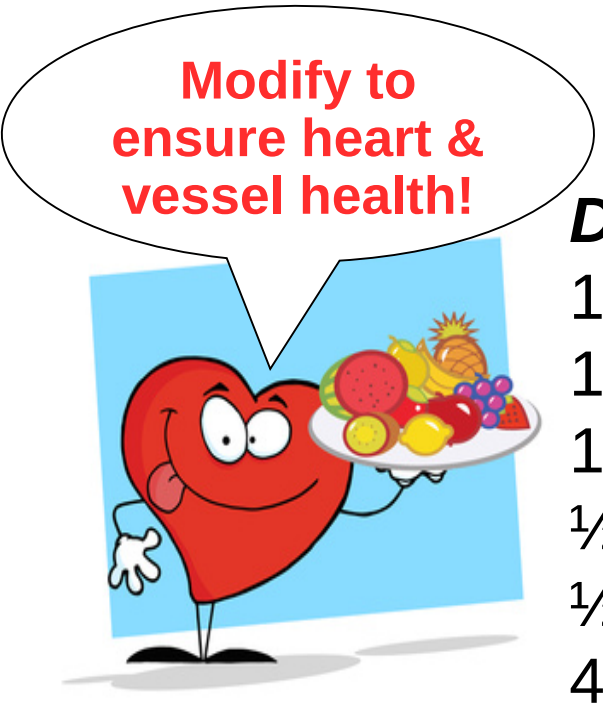
Breakfast

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

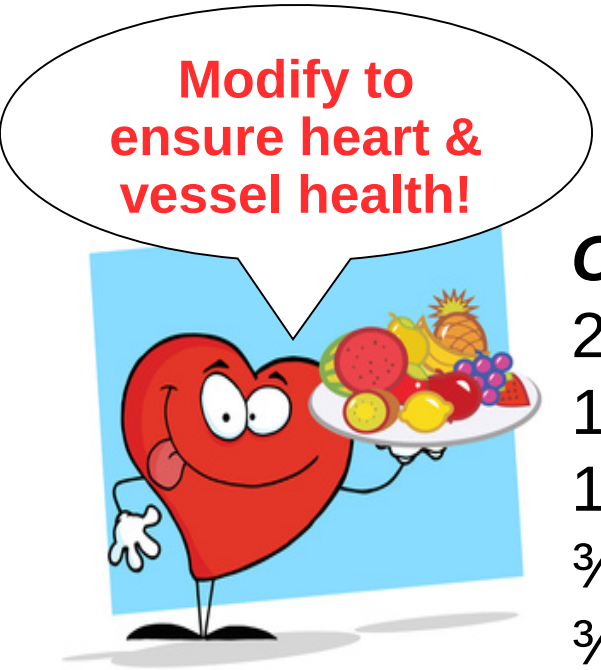
Heart & Vessel Health Food Swap Contest # 1



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

Heart & Vessel Health Recipe Swap Contest # 2



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