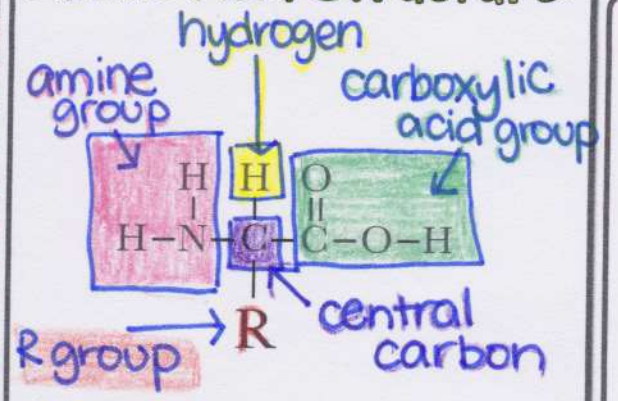
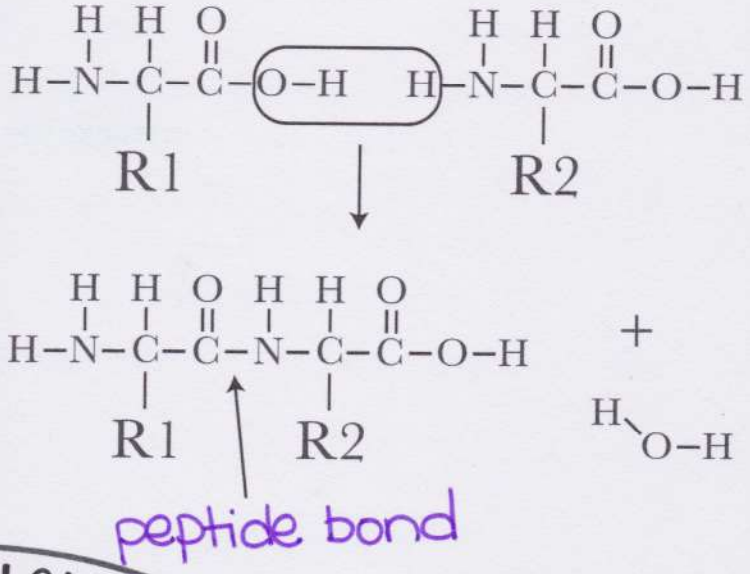
Name: _____

Amino Acid Structure:



- There are 20 main types of amino acids in human cells
- Amino acids all have the same basic structure except they all have different R groups.

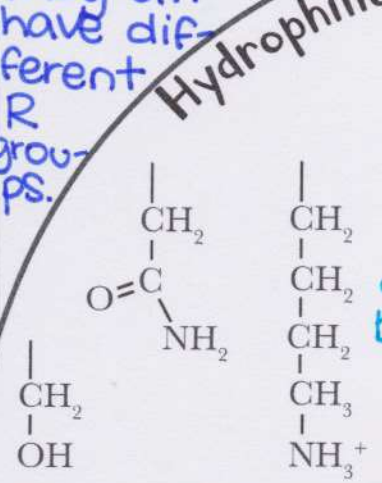
Peptide Bond Formation:



- Amino acids form a chain called a polypeptide.
- Peptides can be very short or long and they fold into unique structures.
- The structure is determined by the sequence of amino acids.

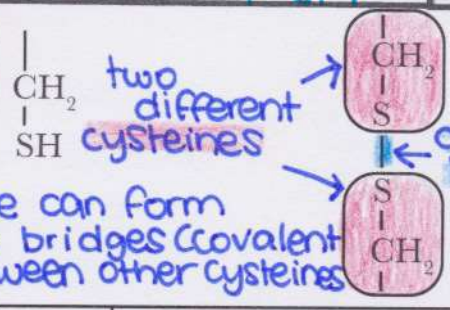
R Groups

Hydrophilic Polar and Charged Examples

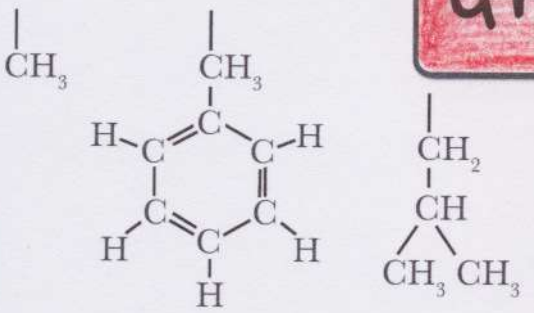


- hydrophilic R groups tend to stick together with either hydrogen bonds or ionic bonds.
- also attracted to water molecules and often are found on the outside of the folded polypeptide

Special Category



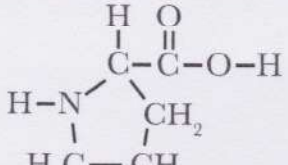
- cysteine can form disulfide bridges (covalent bond) between other cysteines



- hydrophobic R groups tend to stick to each other.
- tend to "hide" away from water molecules in the folded polypeptide

Hydrophobic Examples

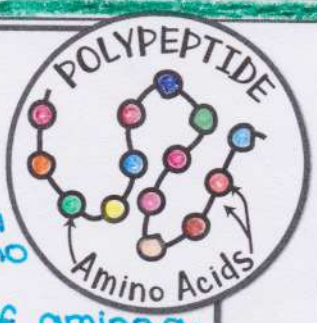
- Glysine is so small it allows the polypeptide section near it to be more flexible.



- Proline (P) is usually found near bends or kinks in the polypeptide

Name: _____

Polypeptides:



- all proteins are made of chains of amino acids called polypeptides
- each polypeptide type has a unique combination of amino acids.
- that unique combination of amino acids are what give the protein its shape and gives the protein the ability to do its unique job in the cell.
- when we eat proteins, our bodies use tiny cellular machines called "digestive enzymes" to break down the polypeptide chains into amino acids.
- our cells use amino acids to build our own cellular proteins.

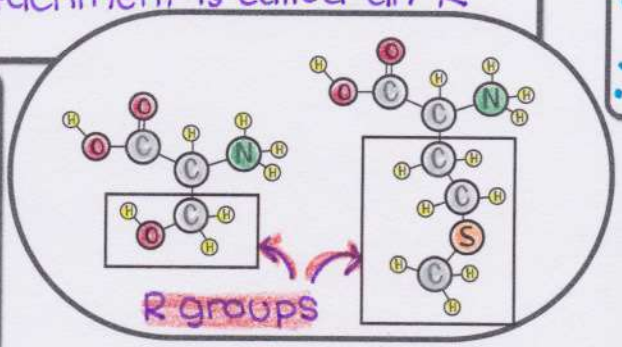
Protein Problems

Food allergies:

- sometimes our immune systems detect and attack specific food proteins.
- doctors don't really know why
- Food allergies (hives, stomach upset and in worst cases, anaphylaxis) are actually the effects your immune system has on your body.

Amino Acids

- There are 20 different kinds of amino acids that can be found in polypeptide chains.
- Each type of amino acid has a different "attachment" to the central part of the amino acid. The attachment is called an R group.



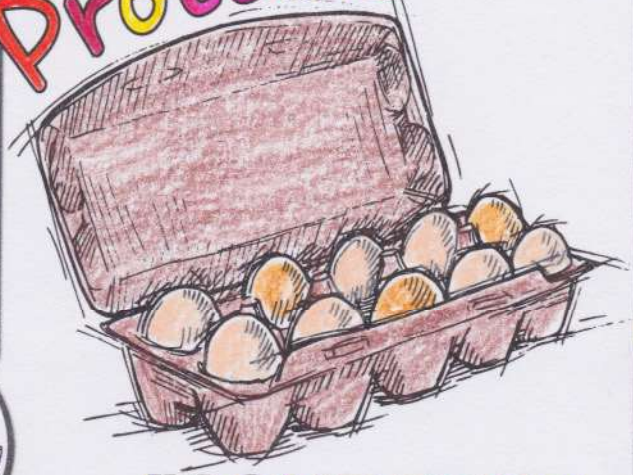
Sources

- meat (Chicken, pork, beef)
- fish/seafood
- dairy products and eggs
- beans, tofu
- grains - wheat, etc.

Essential amino acids

- Some amino acids cannot be built in human cells.
- humans must eat these amino acids.
- Plant proteins are "complete" meaning they have all the essential amino acids
- combinations that have all the essential amino acids in necessary amounts:
  - corn and beans
  - soybeans and rice

Proteins IN OUR FOOD



Nutrition Facts

Serving Size: 1 egg (50g)
Servings Per Container: 12

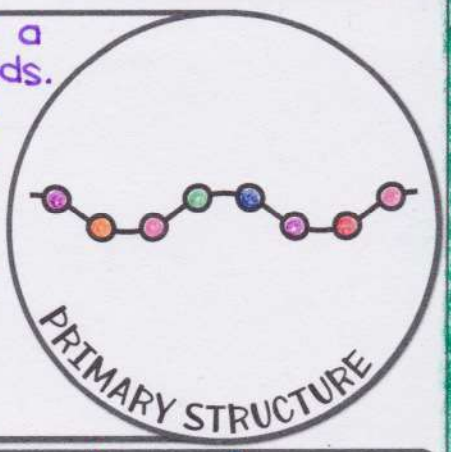
Amount Per Serving	
Calories 70	
Calories from Fat 50	
Calories from Saturated Fat 15	
	% Daily Value*
Total Fat 5g	**6%**
Saturated Fat 1.5g	**8%**
Trans Fat 0g	
Polyunsaturated Fat 3g	
Monounsaturated Fat 0.5g	
Cholesterol 185mg	**62%**
Sodium 70mg	**3%**
Potassium 69mg	**2%**
Total Carbohydrate 0g	**0%**
Dietary Fiber 0g	**0%**
Sugars 0g	
Other Carbohydrate 0g	
Protein 6g	**12%**
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 6%
Thiamin 0%	Riboflavin 15%
Niacin 0%	Folic Acid 0%

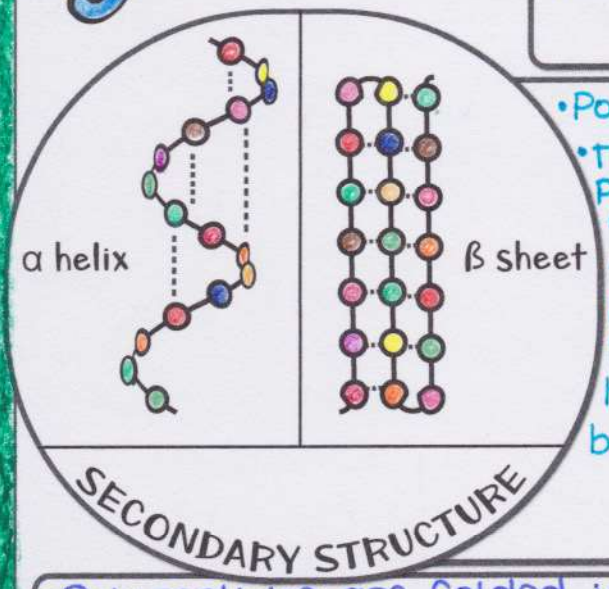
Percent(%) Daily Value are based on a 2,000 calorie diet.

Name: _____

Protein Structure

- each polypeptide has a "sequence" of amino acids.
- the sequence of amino acids is crucial to the polypeptide's function and structure. It determines how it will fold.
- the sequence is called the polypeptide's "primary structure"

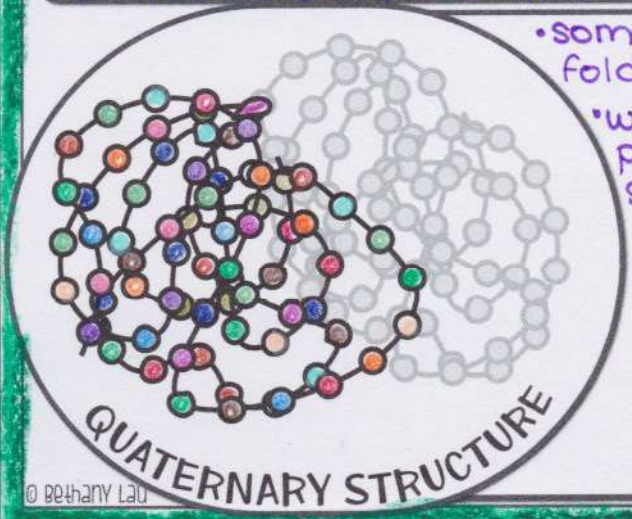




- Polypeptide chains can be "folded"!
- The 3D fold of small sections of a polypeptide is called the polypeptide's "secondary structure."
- The backbone of the polypeptide chain has nitrogens and hydrogens that can hydrogen-bond with nitrogens and hydrogens of other parts of the backbone.

Two common folds or "motifs":
alpha helix
beta sheet

- Polypeptides are folded in more complex ways than sheets and helices - the helices and sheets are often folded together into "globular" shapes or other shapes.
- The 3D shape of a polypeptide is called its "tertiary structure"
- The polypeptides are held together by:
  van der Waals forces, hydrogen bonds
  ionic bonds, covalent bonds (disulfide briges)
  between R groups of amino acids that aren't next to each other



- some proteins are made of more than one folded polypeptide chain
- when proteins have more than one polypeptide, scientists refer to its 3D structure as "quaternary structure"
- The polypeptides are held together by:
  van der Waals forces, hydrogen bonds,
  ionic bonds, covalent bonds
  (disulfide briges)
  between R groups of amino acids
  that aren't