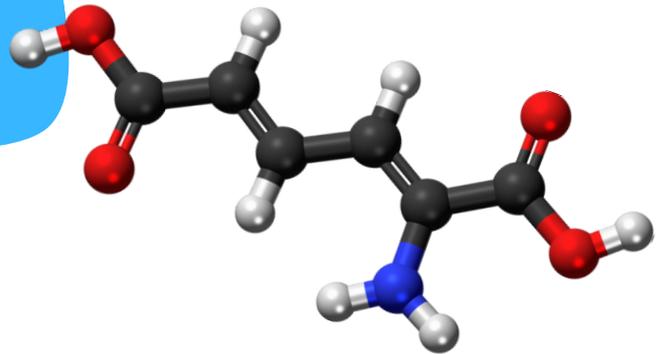


Say Cheese  
for Protein!

NAME: \_\_\_\_\_



## Part 1: Amino Acids and Proteins

- What is the purpose of protein?

The primary role is to build and repair body tissue. Like carbohydrates and fats, it also provides energy (4 calories per gram of protein).

- Protein is composed of chains of **amino acids**.
- Essential vs non-essential amino acids:

### Essential Amino Acids

The body cannot manufacture.

Must be obtained from food.

There are 9 essential amino acids.

Isoleucine, leucine, valine, phenylalanine, tryptophan, histidine, lysine, threonine, and methionine.

### Non-essential Amino Acids

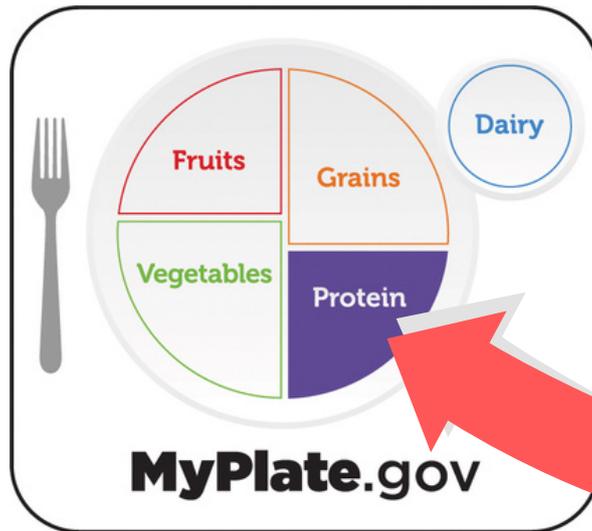
The body can manufacture from the essential amino acids.

There are 11 non-essential amino acids.

Alanine, glycine, proline, tyrosine, aspartic acid, glutamic acid, arginine, serine, cysteine, asparagine, and glutamine.

- Protein food group in MyPlate:

Meat  
Poultry  
Eggs  
Seafood



Nuts  
Beans  
Seeds  
Soy Products

- Other roles of protein:
  - Catalysts
  - Messengers
  - Structural Elements
  - Buffers
  - Fluid balancers
  - Immunoprotectors
  - Transporters
  - ...and more

- How much protein should I consume?

Daily Recommendation* in Ounce-Equivalents (oz-equiv)		
Toddlers	12 to 23 months	2 oz-equiv
Children	2-4 yrs	2 to 5 oz-equiv
	5-8 yrs	3 to 5½ oz-equiv
Girls	9-13 yrs	4 to 6 oz-equiv
	14-18 yrs	5 to 6½ oz-equiv
Boys	9-13 yrs	5 to 6½ oz-equiv
	14-18 yrs	5½ to 7 oz-equiv
Women	19-30 yrs	5 to 6½ oz-equiv
	31-59 yrs	5 to 6 oz-equiv
	60+ yrs	5 to 6 oz-equiv
Men	19-30 yrs	6½ to 7 oz-equiv
	31-59 yrs	6 to 7 oz-equiv
	60+ yrs	5½ to 6½ oz-equiv

- Examples of ounce-equivalents:

1 ounce of lean beef



1 slice of deli meat



1 ounce of tuna



1 egg



1/2 ounce of nuts



1/4 cup cooked beans



## Part 2: Say Cheese for Protein! Mozzarella Cheese Lab

Answer the following questions as you watch the process of making milk into mozzarella cheese.

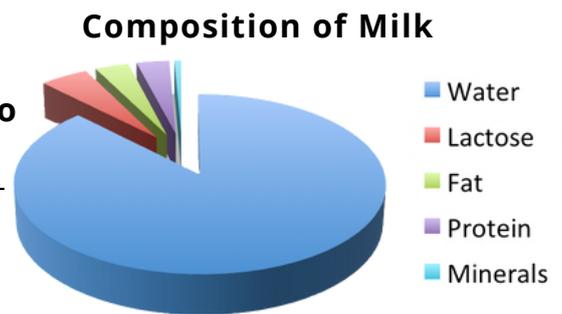
- Why should a healthy snack include protein?

When our body digests protein it supplies a more steady and longer lasting supply of energy to our body than if we were to consume common snack foods made primarily of refined carbohydrates and added sugars.

- Label the foods in the snack boxes below that are from the protein food group.



1. The cheesemaking process uses science to remove all or most of the \_\_\_\_\_ **Water** \_\_\_\_\_ from milk.



2. Why is heating the milk important to the cheesemaking process?

The enzyme, rennet works best at warm temperatures. Heating the milk provides an environment to activate the rennet.

3. What is the purpose of the citric acid and the rennet?

Citric acid decreases the pH of the milk which helps the rennet work faster because it begins changing lactose into lactic acid.

Rennet is the enzyme that changes the structure of casein so it will coagulate together to form curds.

4. Why is the cheese mixture heated in the microwave?

Additional heat and kneading helps release more of the liquid (whey) from the curd.



## Part 3: Complete and Incomplete Proteins

### Complete Proteins:

Contain all 9 essential amino acids

All animal-source foods are complete proteins.

A few plant-source foods are complete proteins.

### Incomplete Proteins:

Plant-based foods that are low in, or missing one or more essential amino acid.

- How can protein needs be met with a vegetarian diet?

If meat is removed from a diet, other animal-source foods such as eggs and dairy products can easily provide a variety of complete proteins.

- How can protein needs be met with a vegan diet?

If meat, milk, and eggs are removed from a diet, it is more challenging, but possible to meet protein requirements. Consuming plant-source complete proteins such as soy products or quinoa along with a variety of complementary proteins can provide the necessary protein for good health.

- What are complementary proteins?

Combining a grain and legume to get all of the essential amino acids.

- What are symptoms of protein deficiency?
  - Stunted growth
  - Lower resistance to disease
  - Unhealthy weight loss
  - Exhaustion
  - More common in underdeveloped countries