

## 1.15 Amino Acids and Proteins

Amino acids are organic molecules **(two atoms joined together)** used by living organisms to make proteins, which consists out of carbon, hydrogen, oxygen, and nitrogen. There are twenty different kinds of amino acids that combine to make proteins in human bodies from food. Proteins are long chains of amino acids and provide functions for the human body survival. Proteins are made inside cells therefore when a cell produces a protein it is called protein synthesis **(cell makes protein)**. The instructions for how to make a protein are held in DNA molecules inside the cell nucleus **(stores the cell genetic information)**. There are two processes in making a protein known as transcription and translation. The first step in making a protein known as transcription meaning when the cell makes a copy of the DNA. The copy of DNA is known as RNA, since it uses a different type of nucleic acid (DNA) called **ribonucleic acid (RNA)**. The RNA **(cell makes copy of DNA)** is used in the next step, which is called translation process. The RNA is translated into a sequence of amino acids **(organic molecules)** that creates the protein. This process of making the new protein from the RNA instructions in the ribosome **(things cell needs to function)**, which is found inside the cell. The following steps take place in the ribosome. The RNA moves to the ribosome known as the **messenger RNA (mRNA)** and attaches itself to the ribosome. The ribosome figures out where to start on the mRNA by finding a specific three letter start sequence known as codon. The ribosome then moves down the strand of mRNA where every three letters represents another amino acid molecule and the ribosome builds a string of amino acids based on the codes in the mRNA **(RNA moves to ribosome)**. Once the ribosome detects the stop code, it ends the translation process **(RNA is converted into a sequence of amino acids)** meaning the protein is complete. The two-step process is shown in the Fig. 4 below:

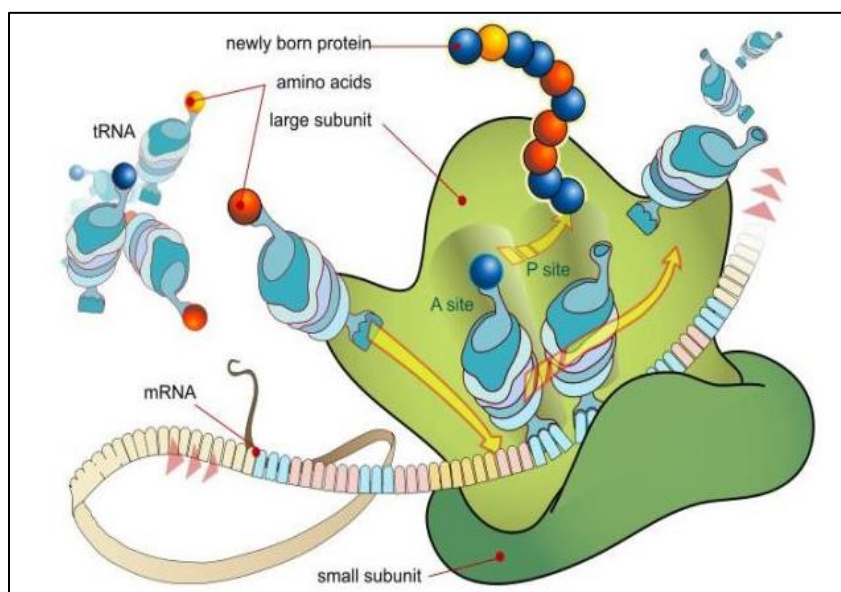


Fig. 4

There are many different types of proteins in our bodies such as defensive proteins, which help protect us from diseases. Also, transport proteins that carry essential nutrients around our bodies an example would be hemoglobin **(carries oxygen in red blood cells)**. Finally, catalysts **(substance which increases the rate of a chemical reaction)** proteins, like enzymes **(strings of amino acids)** act as catalysts to assist in chemical reactions by helping to break up and digesting food so it can be used by cells. A specific RNA **(copy of DNA)** called **transfer RNA (tRNA)** moves the amino acids **(organic molecules)** to the ribosome **(things cell requires to function)** and the bonds that link the amino acids in a protein together are known as peptide bonds. The arrangement and type of different amino acids along the protein strand determines the functionality of the protein.

## 1.16 Self-Checked Questions for Amino Acids and Proteins Sub-Section

1. What is an Amino Acid?
2. How many kinds of Amino Acids exist in the human body?
3. What are proteins?
4. What does protein synthesis mean?
5. What are the two processes that make protein?
6. What is the name of a copy of a DNA known as?
7. What is the name for when RNA moves to the ribosome?
8. What kind of protein is hemoglobin?
9. What are peptide bonds?