

Difference Between Intracellular and Extracellular Enzymes

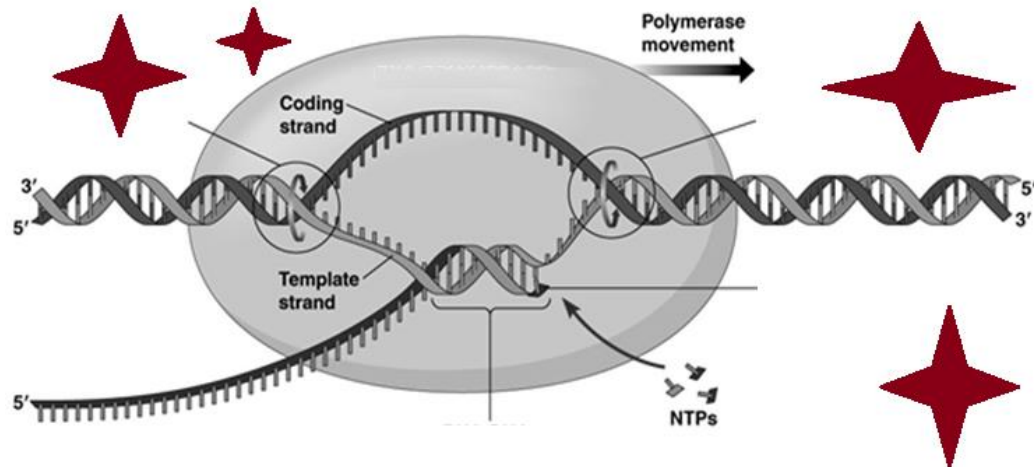
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Key Difference - Intracellular vs Extracellular Enzymes

Enzymes are biological catalysts of biochemical reactions occurring in our bodies. All enzymes are proteins made up of amino acid sequences. Enzymes can enhance or inhibit the chemical reactions by reducing the activation energy of the reactions. Enzymes possess active site for the substrate binding. The interaction of enzyme and substrate is specific and they work on lock and key mechanism. Based on the site of the enzyme works, enzymes are two types; intracellular and extracellular enzymes. Intracellular enzymes are synthesized by the cells and retained within the cell for cellular biochemical reactions. Extracellular enzymes are secreted and function outside the cell. The **key difference** between intracellular and extracellular enzymes is that **intracellular enzymes work inside the cell while extracellular enzymes work outside the cell.**

What are Intracellular Enzymes?

Enzymes that synthesize and function within the cell are known as intracellular enzymes. Intracellular enzymes are found inside the cell. They are used for the biochemical reactions occur within the cell. Hence they are found in the cytoplasm, chloroplast, mitochondria, nucleus etc. These enzymes do not leave the cell. They are retained inside the cell for internal use.



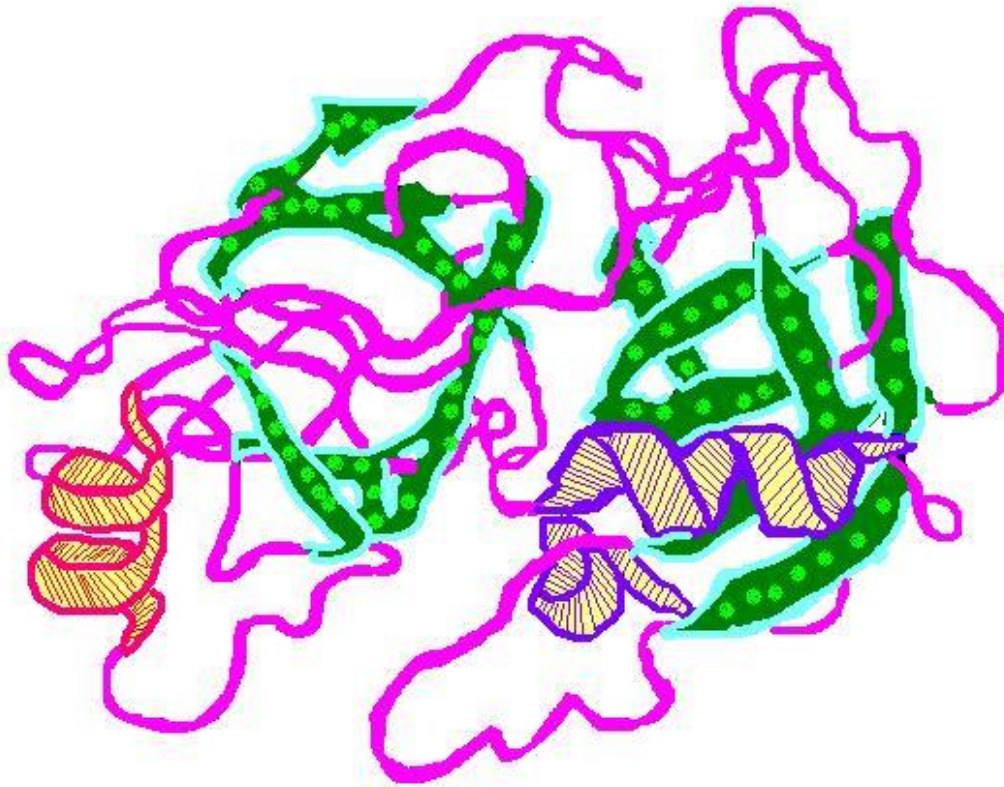
DNA polymerase during translation

Figure 01: Intracellular Enzyme – DNA Polymerase

Organelles such as chloroplast and mitochondria need a lot of enzymes for the important biochemical reactions. Examples of intracellular enzymes are DNA polymerase, RNA polymerase and ATP synthase, enzymes used in respiration (in mitochondria) and photosynthesis (in chloroplast) etc.

What are Extracellular Enzymes?

Enzymes that are secreted to the outside the cell for the external chemical reactions are known as extracellular enzymes. These enzymes catalyze the biochemical reactions occur outside the cell. Digestive enzymes are a type of extracellular enzymes. They are secreted by the specialized cells of the gut. However, they act on food in the digestive system.



Serine Protease
TRYPSIN

Figure 02: Extracellular Enzyme – Trypsin

Examples of extracellular enzymes are [pepsin](#), [trypsin](#), salivary amylase etc.

What are the Similarities Between Intracellular and Extracellular Enzymes?

- Both are enzymes that catalyze chemical reactions.
- Both enzymes work in living organisms.
- Both are [proteins](#).
- Both types of enzymes are found in living organisms.
- Both types of enzymes are biomolecules.

What is the Difference Between Intracellular and Extracellular Enzymes?

Intracellular vs Extracellular Enzymes	
Intracellular enzymes are the enzymes that are synthesized and retained within the cell for the internal cellular use.	Extracellular enzymes are the enzymes that are synthesized by the cell and secreted to the outside for the external use.
Location	
Intracellular enzymes are found inside the cell; in the cytoplasm, nucleus, chloroplast, mitochondria etc.	Extracellular enzymes are found in duodenum, mouth etc.
Activity	
Intracellular enzymes work inside the cell.	Extracellular enzymes work outside the cell.
Examples	
Examples of intracellular enzymes are DNA polymerase, RNA polymerase, and ATP synthetase etc.	Examples of extracellular enzymes are digestive enzymes, salivary amylase, trypsin, lipase etc.

Summary - Intracellular vs Extracellular Enzymes

Enzymes are proteins that act as biochemical catalysts of living organisms. They regulate the speed of the chemical reactions without being consumed by the reaction. Most of the chemical reactions occur with the presence of enzymes. There are two types of enzymes namely intracellular enzymes and extracellular enzymes. Intracellular enzymes are synthesized and remained within the cell for the use of cellular reactions occur inside the cell. Therefore, intracellular enzymes are found in the cytoplasm, chloroplasts, mitochondria, nucleus etc. Extracellular enzymes are secreted by the cell for the use of chemical reactions occur outside the cell (external reactions). So these enzymes are found outside the cell. This is the difference between intracellular and extracellular enzymes.

Reference:

1.The Editors of Encyclopædia Britannica. “Enzyme.” Encyclopædia Britannica, Encyclopædia Britannica, inc., 15 Dec. 2017. [Available here](#)

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