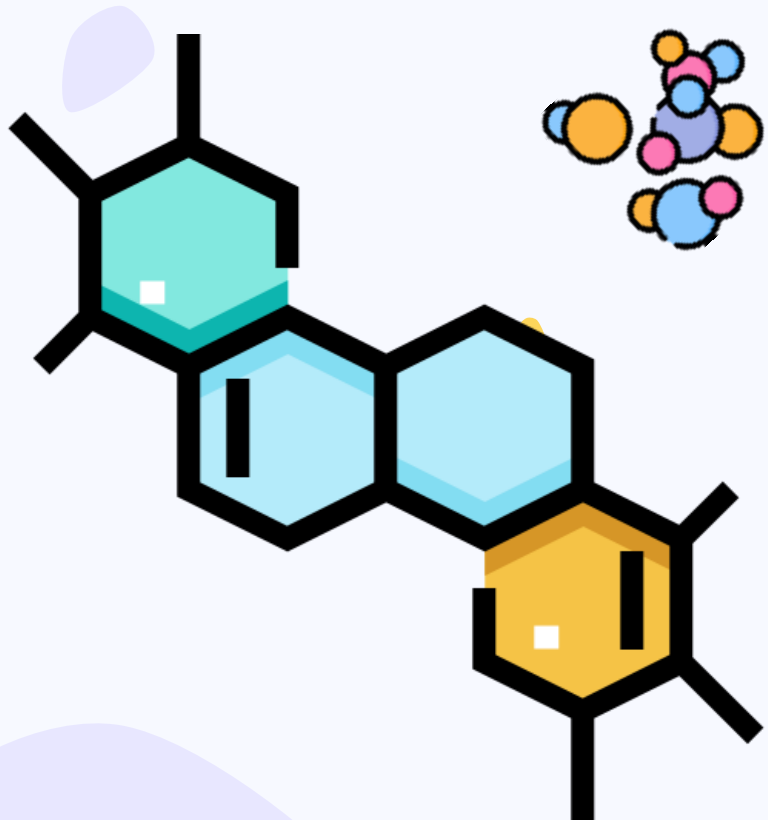
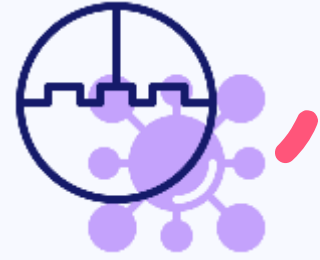




Libyan International Medical University



Enzymes



First Year
PharmD

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In this presentation we will be talking about

01

Define Enzymes

02

Explain Mechanism of Action

03

Describe Structure of Enzyme

07

Explain The Pharmaceutical and Medical Importance

04

Explain Classification and specificity of Enzymes

05

List Types and Explain Kinetics Reaction of Enzymes

06

Describe Activation and Inhibition

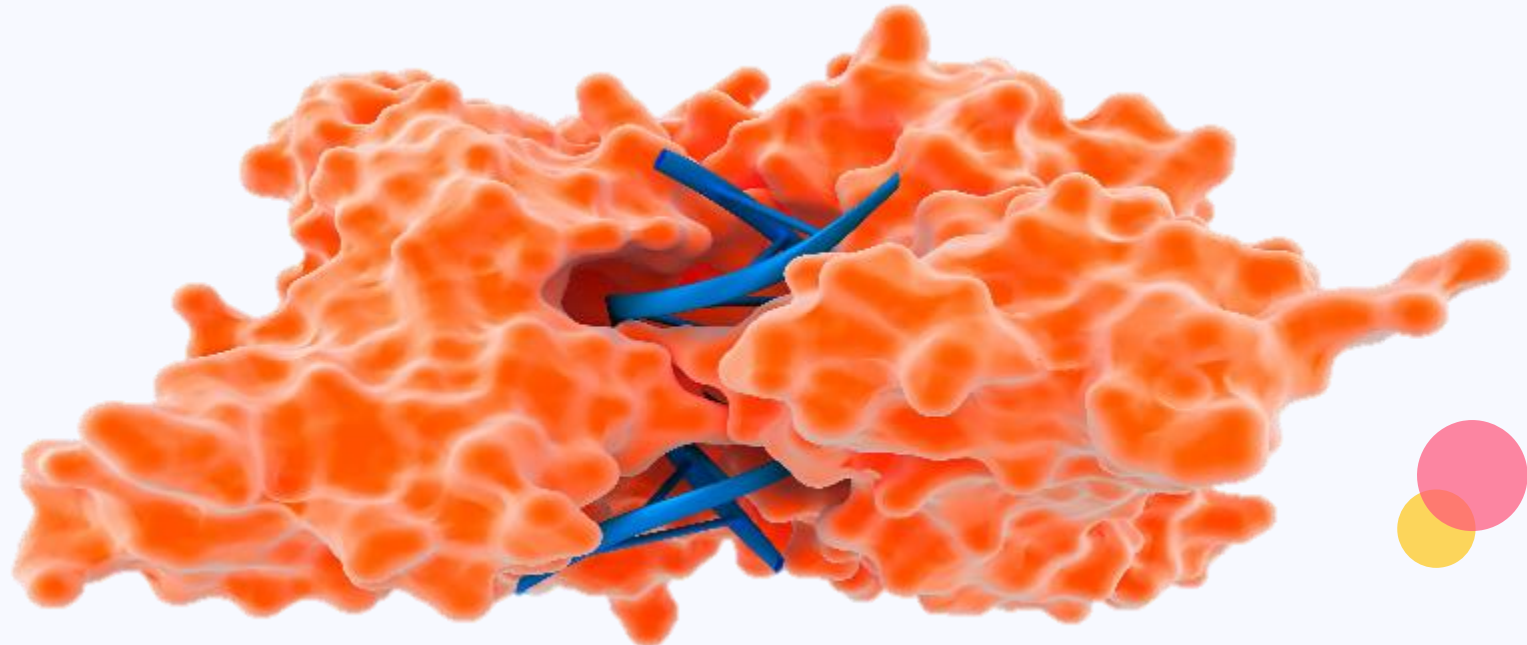


01

What's Enzymes

What's Enzymes?

Enzyme, a substance that acts as a catalyst in living organisms, regulating the rate at which chemical reactions proceed without itself being altered in the process.



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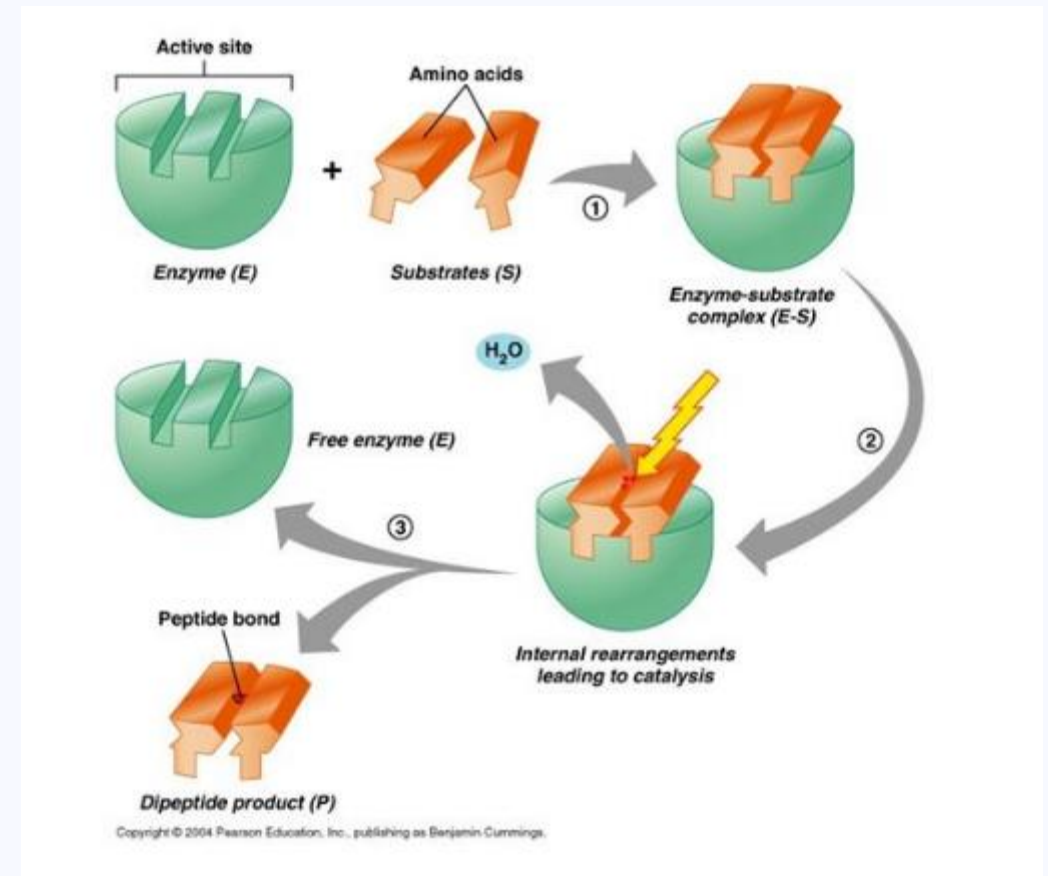
02

Mechanism of Action

Mechanism of Action

The enzyme, catalyzed chemical

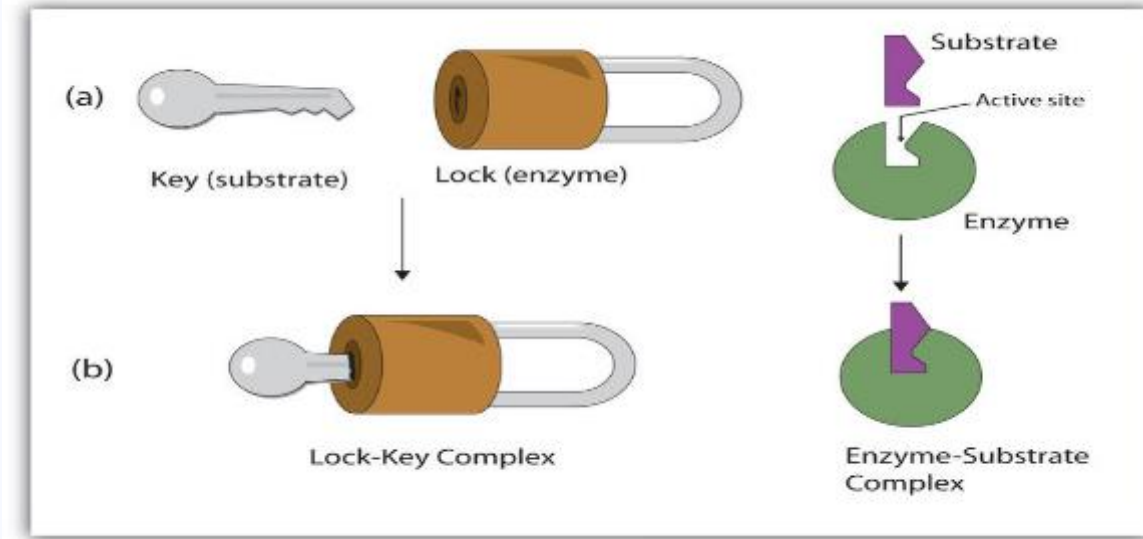
Reactions proceed in Two Steps.



Mechanism Of Action Theories

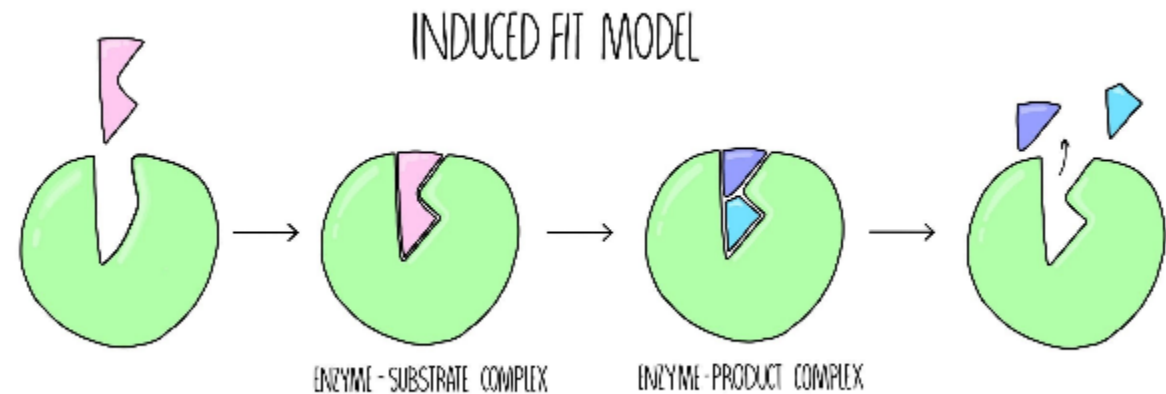
Lock and Key Theory

the active site of an enzyme is precisely shaped to hold specific substrates.



The induced-fit model

the active site and substrate don't fit perfectly together; instead, they both alter their shape to connect



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03

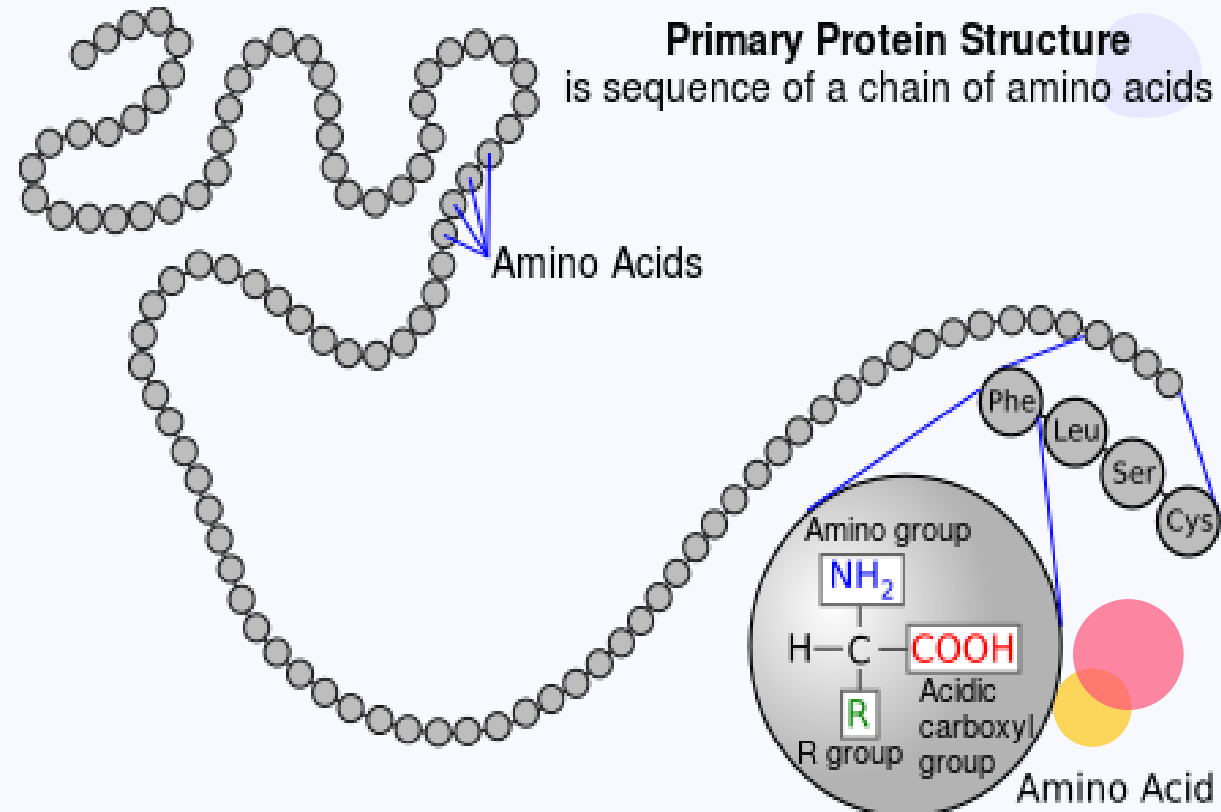
Structure of Enzyme

Structure of Enzyme

Enzymes are proteins comprised of amino acids linked together in one or more polypeptide chains.

Basic Three Enzyme Structure :

- Primary structure.
- Secondary structure.
- Tertiary structure





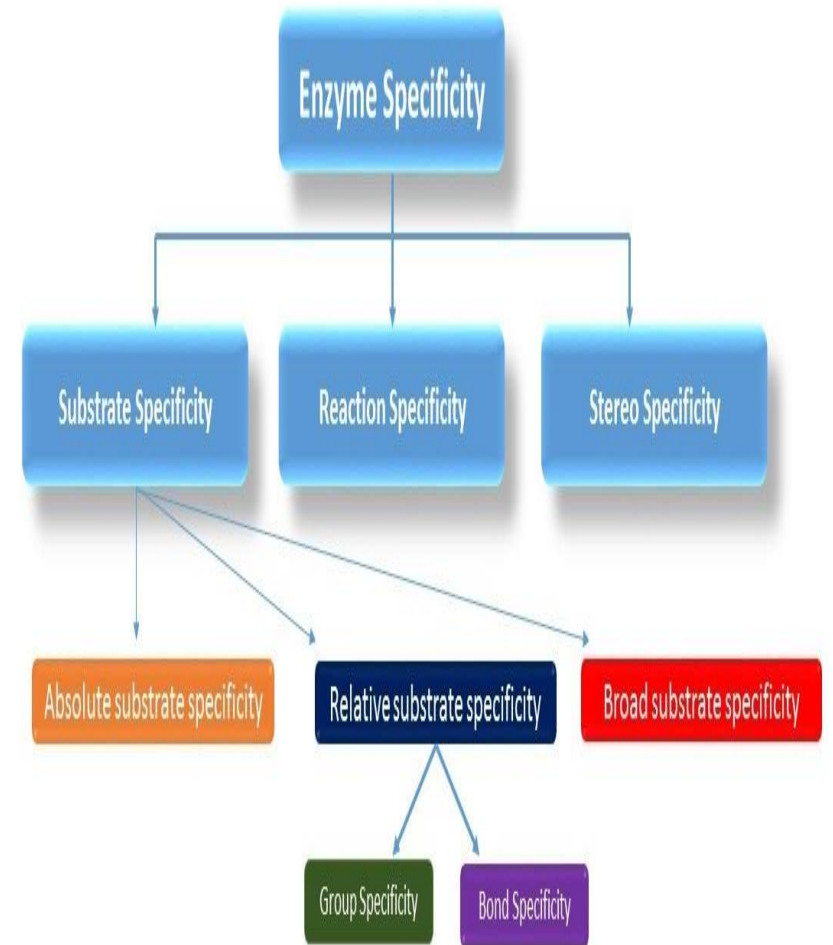
04

Classification and specificity of Enzymes

Class	Reaction type
1 Oxidoreductases	<p>○ = Reduction equivalent</p> <p>$A_{red} + B_{ox} \rightleftharpoons A_{ox} + B_{red}$</p>
2 Transferases	<p>$A-B + C \rightleftharpoons A + B-C$</p>
3 Hydrolases	<p>$A-B + H_2O \rightleftharpoons A-H + B-OH$</p>
4 Lyases ("synthases")	<p>$A + B \rightleftharpoons A-B$</p>
5 Isomerases	<p>$A \rightleftharpoons Iso-A$</p>
6 Ligases ("synthetases")	<p>$A + B + XTP \rightleftharpoons A-B + XDP$</p> <p>X = A, G, U, C</p>

Enzymes Specificity

- **Absolute Specificity** Some enzymes are absolutely specific. For example, hydrolysis of urea to ammonia and carbon dioxide is catalyzed by urease.
- **Bond Specificity** Most of the proteolytic enzymes are showing group (bond) specificity. For example, trypsin.
- **Group Specificity** One enzyme can catalyse the same reaction on a group of structurally similar compounds.
- **Stereospecificity** Human enzymes are specific for L-amino acids and D-carbohydrates. Fumarase will hydrate fumaric





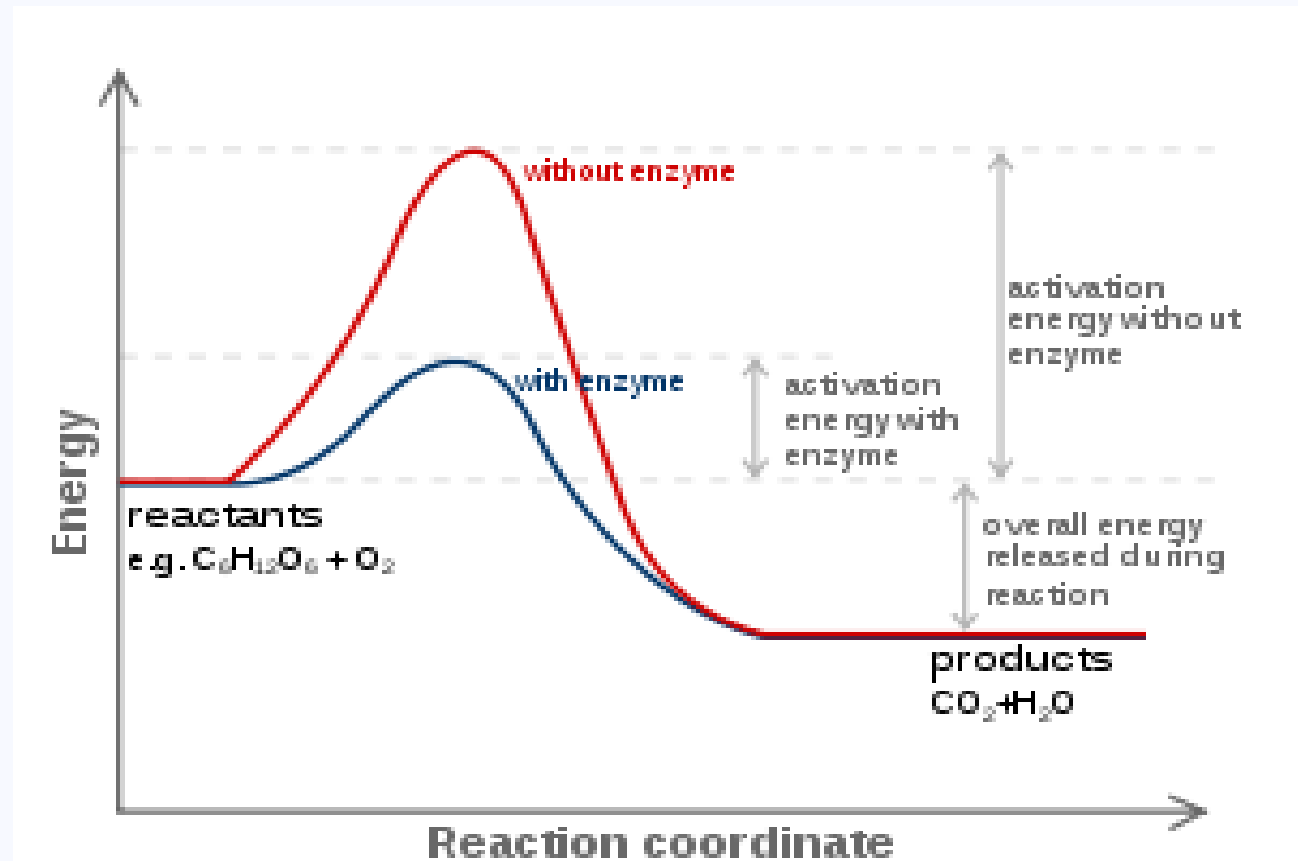
05

Types and Kinetics

Enzyme	Secreted by	Function
Salivary Amylase (Ptyalin)	Salivary Glands	Converts starch to maltose
Renin	Stomach	Converts milk proteins to peptides
Pepsin	Stomach	Converts other proteins to peptides
Gastric Amylase	Stomach	Converts starch to maltose
Gastric Lipase	Stomach	Converts butter fat into fatty acids and glycerol
Trypsin	Pancreas	Converts proteins to peptides
Chymotrypsin	Pancreas	Converts proteins to peptides
Steapsin (Pancreatic Lipase)	Pancreas	Converts fats into fatty acids and glycerol
Carboxypolypeptidase	Pancreas	Converts peptides into amino acid.
Pancreatic Amylase	Pancreas	Converts starch to maltose

The Kinetics Reaction of Enzymes

Enzyme kinetics is the study of the chemical reactions that are catalyzed by enzymes. In enzyme kinetics, the reaction rate is measured and the effects of varying the conditions of the reaction are investigated.



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06

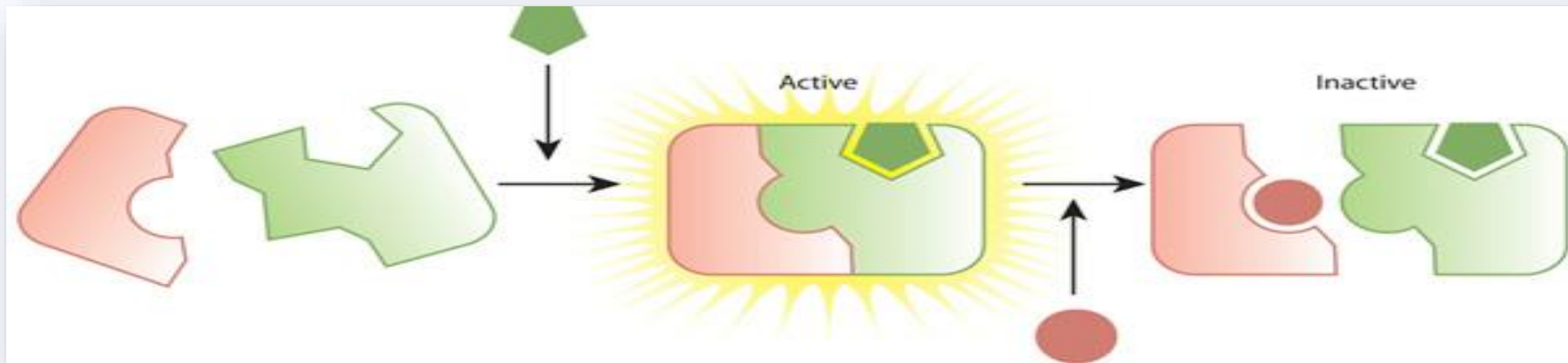
Activation and Inhibition

Activation and Inhibition

The rate of an enzymatic reaction may be changed by a moderator.

Usually, the effect is to reduce the rate, and this is called **inhibition**.

Sometimes the rate of enzyme reaction is raised, and this is called **activation**



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07

The pharmaceutical and Medical Importance of Enzyme

Pharmaceutical Importance

- Group protection.
- Esterification.
- Transesterification.



Medical Importance

- Provide insight into the disease process by diagnosis.
- Prognosis and assessment of response therapy.

Summary

- Enzymes are substances that act as a catalyst which processed in two steps. There are two theories, Lock and key theory and another is the induced fit model
- There are 3 basic structures of enzymes namely Primary, Secondary and tertiary structures.
- Enzyme specificity describes how restrictive the enzyme is in its choice of substrate which can be classified as Absolute, Bond, Group and stereospecificity.
- There are several types of enzymes which are secreted by different parts of our body. Some of these enzymes are also important in pharmaceuticals and many medicines.

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Thank You

