AP BIO INSTA-REVIEW

TOPIC 4.4

Changes in Signal Transduction Pathways

IST-3.G.1

Changes in signal transduction pathways can alter cellular response–

a. Mutations in any domain of the receptor protein or in any component of the signaling pathway may affect the downstream components by altering the subsequent transduction of the signal.

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Changes in Signal Transduction Pathways

IST-3.G.2

Chemicals that interfere with any component of the signaling pathway may activate or inhibit the pathway.

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If there is a mutation in the receptor protein, predict what will happen to cell?

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If there is a mutation in the receptor protein, predict what will happen to cell?

Three possible answer (and this could happen on an FRQ)

> Increased Ability: the new shape could increase binding of the substrate to increase efficiency

> Decreased Ability: the new shape could decrease binding or inhibit binding into of the substrate to decrease efficiency

> No Change: the substrate is still able to bind to the active site and no difference is observed

If they want you to give a specific answer, they would give you a diagram, information, or graph that could interpret to state more conclusively which one it would be.

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Inhibitor that binds to the active site inhibiting substrate

A. Allosteric Inhibitor

B. Competitive Inhibitor

C. Noncompetitive Inhibitor

D. Repressor Inhibitor

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Inhibitor that binds to the active site inhibiting substrate

B. Competitive Inhibitor

If the inhibitor is binding to the same site, it is competing for the active site. Due to this competition, this is called a competitive inhibitor.

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TOPIC

4.4

How do you overcome a competitive inhibitor?

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How do you overcome a competitive inhibitor?

Increase the substrate concentration

The process is about which molecule is more likely to bind to the active site. If you have twice as many substrates as inhibitors, there is a higher probability that the substrate will bind to the active site.

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How does a noncompetitive inhibitor inhibit substrate binding?

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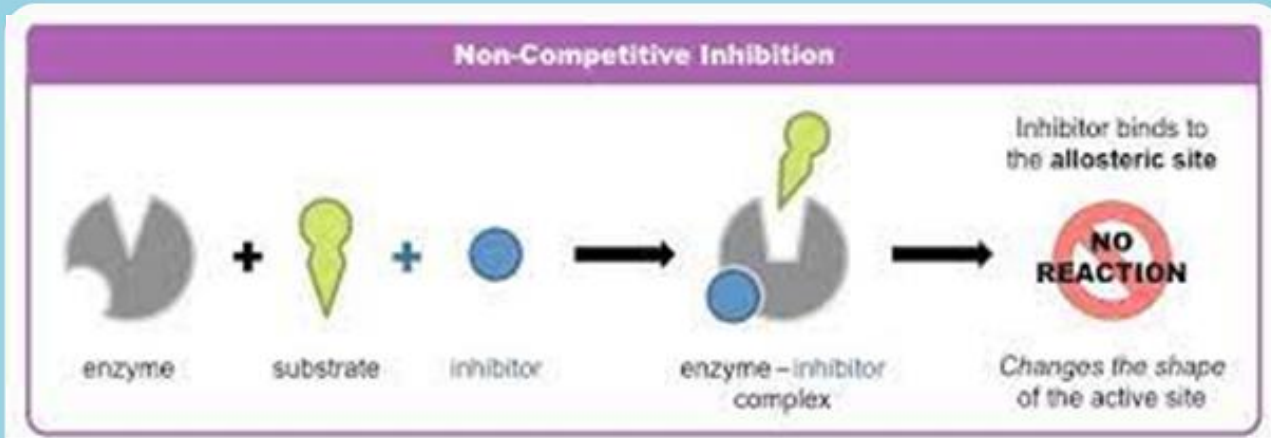
How does a noncompetitive inhibitor inhibit substrate binding?



Binds to a separate location on the enzyme (allosteric site) which leads to a shape change. This shape change inhibits the ability for the substrate to bind to the active site.

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Diagram how a substrate binds normally, in competitive inhibition, and noncompetitive inhibition.

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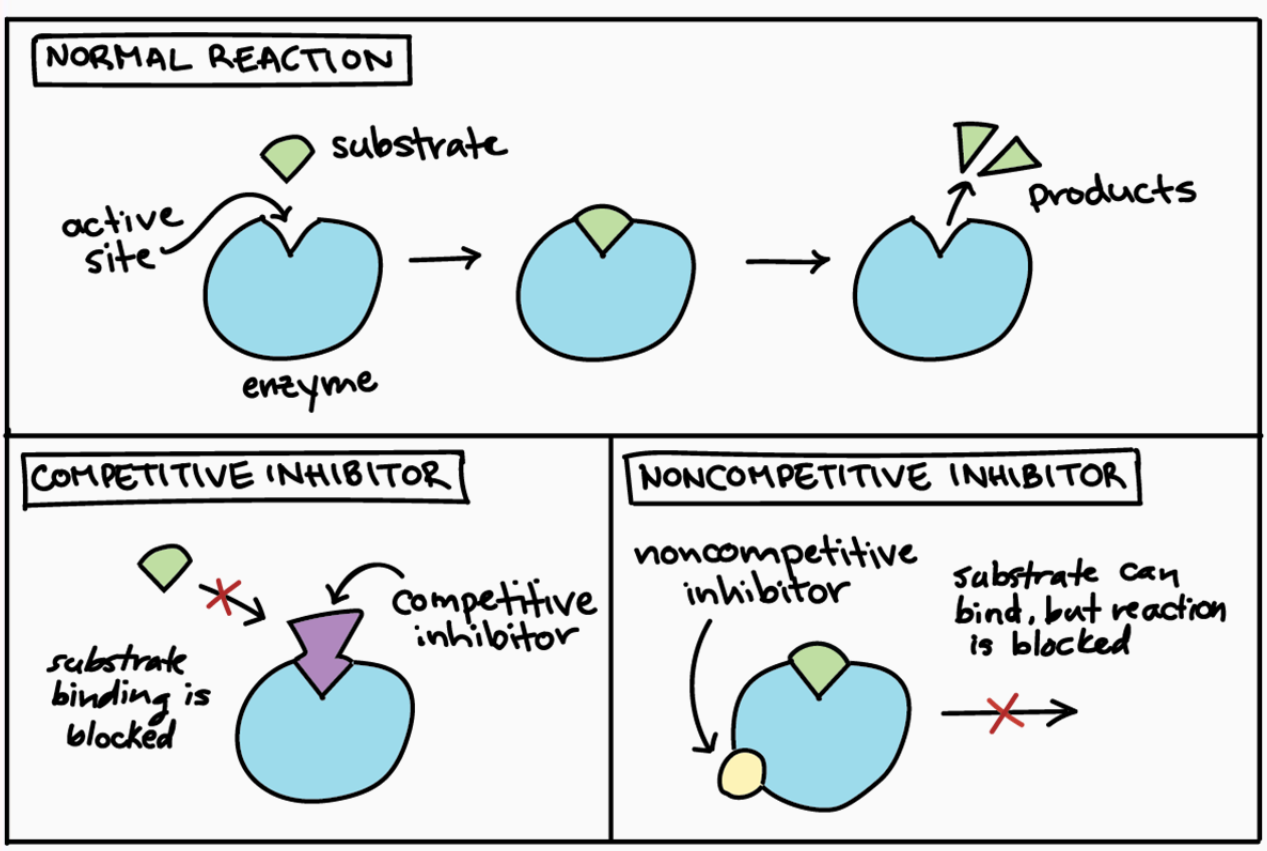
TOPIC 4.4

Diagram how a substrate binds normally, in competitive inhibition, and noncompetitive inhibition.



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4.4

Which cells will respond to a signaling molecule?

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TOPIC 4.4

Which cells will respond to a signaling molecule?

Cells with a receptor to bind to signaling molecule

If it has a receptor that will bind with the signaling molecule, then it will be able to have a response. If the signaling molecule does not bind, there will be no response from the cell.

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A change in the receptor can affect the responses of cell

A. True

B. False

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TOPIC 4.4

A change in the receptor can affect the responses of cell

A. True

If the receptor changes shape, then the ligand or substrate might not be able to bind to the active site. This can affect the transduction and response of the signaling molecule.

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4.4

How does a change in the receptor affect the response of the cell?

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How does a change in the receptor affect the response of the cell?

A change in the receptor can lead to decrease in binding. This would decrease the response to the signal.

A change in the receptor can lead to a different ligand binding. This might lead to a different response to the signal.

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A mutation in a relay molecule can affect the response.

A. True

B. False

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TOPIC 4.4

A mutation in a relay molecule can affect the response.

A. True

If one of the relay molecules has a mutation, then the signal will not be transduced correctly which will lead to a different response.