AP BIO INSTA-REVIEW

TOPIC 4.1

Cell Communication

IST-3.A.1

Cells communicate with one another through direct contact with other cells or from a distance via chemical signaling–

a. Cells communicate by cell-to-cell contact.

IST-3.B.1

Cells communicate over short distances by using local regulators that target cells in the vicinity of the signal-emitting cell–

a. Signals released by one cell type can travel long distances to target cells of another cell

AP BIO INSTA-REVIEW

TOPIC 4.1

What extracellular component aids in direct cell-cell communication?

A. Cell Wall

B. Cytoskeleton

C. Glycolipid

D. Secretory vesicle

AP BIO INSTA-REVIEW

TOPIC 4.1

What extracellular component aids in direct cell-cell communication?

C. Glycolipid

Glycolipids are short carbohydrates attached to lipid molecules. These are used for cell to cell communication. The sugar component will bind to an active site on a receptor protein of another cell to communicate.

AP BIO INSTA-REVIEW

TOPIC 4.1

Signaling where ligand binds to nearby cell...?

A. Autocrine

B. Hormonal

C. Paracrine

D. Synaptic

AP BIO INSTA-REVIEW

TOPIC 4.1

Signaling where ligand binds to nearby cell...?

C. Paracrine

Paracrine signaling refers to a local signaling where the signaling molecule is released from a nearby cell then binds to a receptor on the target cell.

AP BIO INSTA-REVIEW

TOPIC 4.1

Signal that binds to the secreting cell...?

A. Autocrine

B. Hormone

C. Paracrine

D. Synaptic

AP BIO INSTA-REVIEW

TOPIC 4.1

Signal that binds to the secreting cell...?

A. Autocrine

The prefix "auto" means self, so autocrine will bind to the same cell. The secreting cell is also the target cell. The signaling molecule is released from the cell then binds to a receptor on that same cell.

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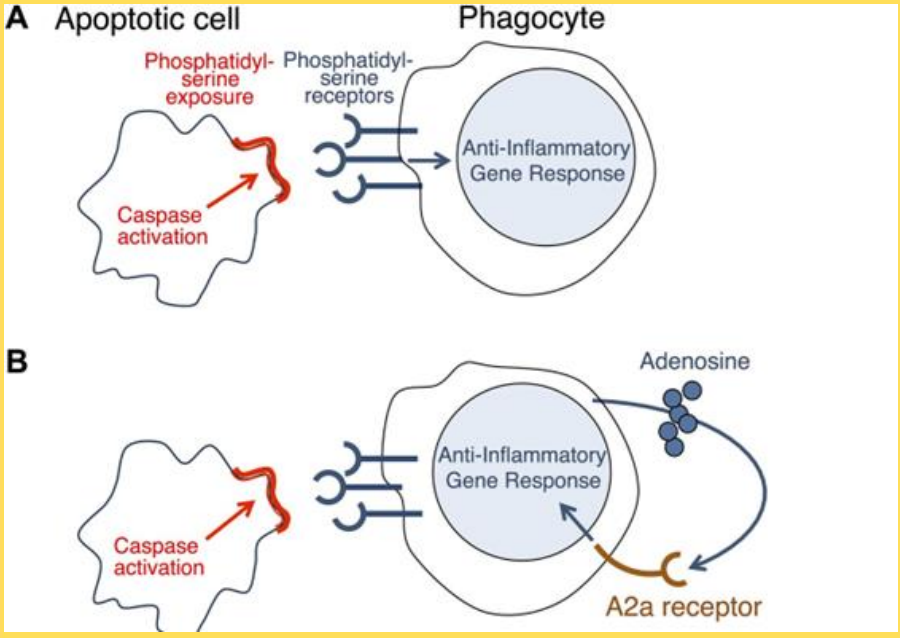
TOPIC 4.1



What type of signaling is shown?

A. Autocrine

B. Hormone

C. Paracrine

D. Synaptic

AP BIO INSTA-REVIEW

TOPIC 4.1

What type of signaling is shown?

A. Autocrine

In autocrine signaling, the secreting cell is also the target cell. As you see in the image, the cell secretes the signaling molecule then it binds to a receptor on the membrane.

AP BIO INSTA-REVIEW

TOPIC 4.1

Describe the pathway of signaling molecule released from the cell.

AP BIO INSTA-REVIEW

TOPIC 4.1

Describe the pathway of signaling molecule released from the cell.

> Protein synthesized in Rough ER

> Protein modified in Golgi bodies

> Secretory vesicle fuses with plasma membrane

> Signaling molecule released by exocytosis

AP BIO INSTA-REVIEW

TOPIC 4.1

Signaling by cell to cell contact like a Helper T cell binding to an antigen presenting cell. Which describes the type of signaling?

A. Direct signaling

B. Local signaling

C. Long Distance signaling

D. Synaptic signaling

AP BIO INSTA-REVIEW

TOPIC 4.1

Signaling by cell to cell contact like a Helper T cell binding to an antigen presenting cell. Which describes the type of signaling?

A. Direct signaling

The antigen presenting cell has the antigen bound to a MHC on the membrane. The white blood cell receptor will bind to the antigen. This is a direct contact between the two cells hence "direct signaling".

AP BIO INSTA-REVIEW

TOPIC 4.1

In autocrine signaling, which cell released the signal?

A. A nearby cell

B. An endocrine cell

C. The brain cell

D. The same cell

AP BIO INSTA-REVIEW

TOPIC 4.1

In autocrine signaling, which cell released the signal?

D. The same cell

In autocrine signaling, the secreting cell is also the target cell. The prefix "auto" means self so the signaling molecule will be released then bound to the same cell.

AP BIO INSTA-REVIEW

TOPIC 4.1

In endocrine signaling, what cell released the signal?

A. A nearby cell

B. An endocrine cell

C. The brain cell

D. The same cell

AP BIO INSTA-REVIEW

TOPIC 4.1

In endocrine signaling, what cell released the signal?

B. An endocrine cell

Endocrine signaling is a long distance signaling. An endocrine cell will release the signaling molecule into the blood stream which will carry the signaling molecule to the target cell.

AP BIO INSTA-REVIEW

TOPIC 4.1

In paracrine signaling, which cell released the signal?

A. A nearby cell

B. An endocrine cell

C. The brain cell

D. The same cell

AP BIO INSTA-REVIEW

TOPIC 4.1

In paracrine signaling, which cell released the signal?

A. A nearby cell

Paracrine signaling refers to a local signaling where the signaling molecule is released from a nearby cell then binds to a receptor on the target cell.

AP BIO INSTA-REVIEW

TOPIC 4.1

Where is the receptor for a steroid hormone?

A. Intracellular

B. Membrane Bound

AP BIO INSTA-REVIEW

TOPIC 4.1

Where is the receptor for a steroid hormone?

A. Intracellular

Steroids are nonpolar due to their carbon ring structures. The plasma membrane is also nonpolar. The steroid is able to pass directly through the membrane so the receptor needs to be on the inside of the cell (intracellular)

AP BIO INSTA-REVIEW

TOPIC 4.1

Where is the receptor for a protein hormone?

A. Intracellular

B. Membrane Bound

AP BIO INSTA-REVIEW

TOPIC 4.1

Where is the receptor for a protein hormone?

B. Membrane Bound

Proteins are polar due to their polar R groups (and the folding of nonpolar R groups to the interior). The plasma membrane is nonpolar. The protein is unable to pass through the membrane so the receptor must be on the membrane (membrane bound).

AP BIO INSTA-REVIEW

TOPIC 4.1

Why do we see a difference in the location between the two receptors?

AP BIO INSTA-REVIEW

TOPIC 4.1

Why do we see a difference in the location between the two receptors?

Steroids are nonpolar, which allows them to pass through the membrane. Since the ligand is able to cross the membrane, the receptor needs to be intracellular.

Proteins are polar, which inhibits their passage across the membrane without assistance. This means the receptor would sit on the membrane.

AP BIO INSTA-REVIEW

TOPIC 4.1

Ligands are specific to type of cell they bind to.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 4.1

Ligands are specific to type of cell they bind to.

A. True

Ligands are signaling molecules. The active site on the receptor will bind to the ligand. Only the target cell(s) has the receptor that binds to the ligand.

AP BIO INSTA-REVIEW

TOPIC 4.1

What must a cell have in order for correct ligand to bind?

AP BIO INSTA-REVIEW

TOPIC 4.1

What must a cell have in order for correct ligand to bind?

Receptor that binds to the ligand.

Each cell has different receptors. If the receptor binds to the ligand, then it will cause a response in the cell.

AP BIO INSTA-REVIEW

TOPIC 4.1

Which organelle responsible for the endocrine signal?

A. Golgi Bodies

B. Lysosome

C. Rough ER

D. Smooth ER

AP BIO INSTA-REVIEW

TOPIC 4.1

Which organelle responsible for the endocrine signal?

C. Rough ER

Rough ER has ribosomes on its membrane. These ribosomes are responsible for protein synthesis, so the rough ER is responsible for secreted proteins.

AP BIO INSTA-REVIEW

TOPIC 4.2

Introduction to Signal Transduction

IST-3.C.1

Signal transduction pathways link signal reception with cellular responses.

IST-3.C.2

Many signal transduction pathways include protein modification and phosphorylation

AP BIO INSTA-REVIEW

TOPIC 4.2

Introduction to Signal Transduction

IST-3.D.1

Signaling begins with the recognition of a chemical messenger—a ligand—by a receptor protein in a target cell—

a. The ligand-binding domain of a receptor recognizes a specific chemical messenger, which can be a peptide, a small chemical, or protein, in a specific one-to-one relationship.

b. G protein-coupled receptors are an example of a receptor protein in eukaryotes.

AP BIO INSTA-REVIEW

TOPIC 4.2

Introduction to Signal Transduction

IST-3.D.2

Signaling cascades relay signals from receptors to cell targets, often amplifying the incoming signals, resulting in the appropriate responses by the cell, which could include cell growth, secretion of molecules, or gene expression–

a. After the ligand binds, the intracellular domain of a receptor protein changes shape, initiating transduction of the signal.

AP BIO INSTA-REVIEW

TOPIC 4.2

Introduction to Signal Transduction

IST-3.D.2

Signaling cascades relay signals from receptors to cell targets, often amplifying the incoming signals, resulting in the appropriate responses by the cell, which could include cell growth, secretion of molecules, or gene expression–

b. Second messengers (such as cyclic AMP) are molecules that relay and amplify the intracellular signal.

AP BIO INSTA-REVIEW

TOPIC 4.2

Introduction to Signal Transduction

IST-3.D.2

Signaling cascades relay signals from receptors to cell targets, often amplifying the incoming signals, resulting in the appropriate responses by the cell, which could include cell growth, secretion of molecules, or gene expression–

c. Binding of ligand-to-ligand-gated channels can cause the channel to open or close

AP BIO INSTA-REVIEW

TOPIC 4.2

What is the first step of signal transduction?

A. Reception
B. Response
C. Transduction

AP BIO INSTA-REVIEW

TOPIC 4.2

What is the first step of signal transduction?

A. Reception

The first step of the signal transduction pathway is reception. This occurs when the ligand binds to the receptor which leads to a confirmational shape change.

AP BIO INSTA-REVIEW

TOPIC 4.2

What occurs during the step of reception?

AP BIO INSTA-REVIEW

TOPIC 4.2

What occurs during the step of reception?

The signaling molecule binds to the receptor.

The receptor undergoes a conformational change (changes shape).

AP BIO INSTA-REVIEW

TOPIC 4.2

What is the signaling molecule called?

A. Activator

B. Enhancer

C. Ligand

D. Repressor

AP BIO INSTA-REVIEW

TOPIC 4.2

What is the signaling molecule called?

C. Ligand

The signaling molecule is called a ligand. These terms can be used interchangeably.

AP BIO INSTA-REVIEW

TOPIC

4.2

How does the polarity of the ligand affect the location of the receptor?

AP BIO INSTA-REVIEW

TOPIC 4.2

How does the polarity of the ligand affect the location of the receptor?

If the ligand is polar – the receptor will be membrane bound. Polar substances are unable to pass through the membrane.

If the ligand is nonpolar – the receptor will be intracellular. Nonpolar substances are able to pass through the membrane (so the receptor must be inside).

AP BIO INSTA-REVIEW

TOPIC 4.2

The ligand travels through the signal transduction path.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 4.2

The ligand travels through the signal transduction path.

B. False

The ligand binds to the receptor which leads to a confirmational shape change. The message is passed along not the signal through the process of transduction.

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TOPIC 4.2

What is the function of transduction?

AP BIO INSTA-REVIEW

TOPIC 4.2

What is the function of transduction?

To bring the message to its location for response

To amplify the signal/message

To regulate the signal

AP BIO INSTA-REVIEW

TOPIC 4.2

All cells respond to the same ligand with the same response.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 4.2

All cells respond to the same ligand with the same response.

B. False

Every cell is different, so every cell will have different relay proteins leading to a different response from cells.

AP BIO INSTA-REVIEW

TOPIC 4.2

What happens during a phosphorylation cascade?

AP BIO INSTA-REVIEW

TOPIC 4.2

What happens during a phosphorylation cascade?

Protein kinase will phosphorylate (add a phosphate to) a relay protein

This activated relay protein will phosphorylate the next relay until the signal reaches the response.

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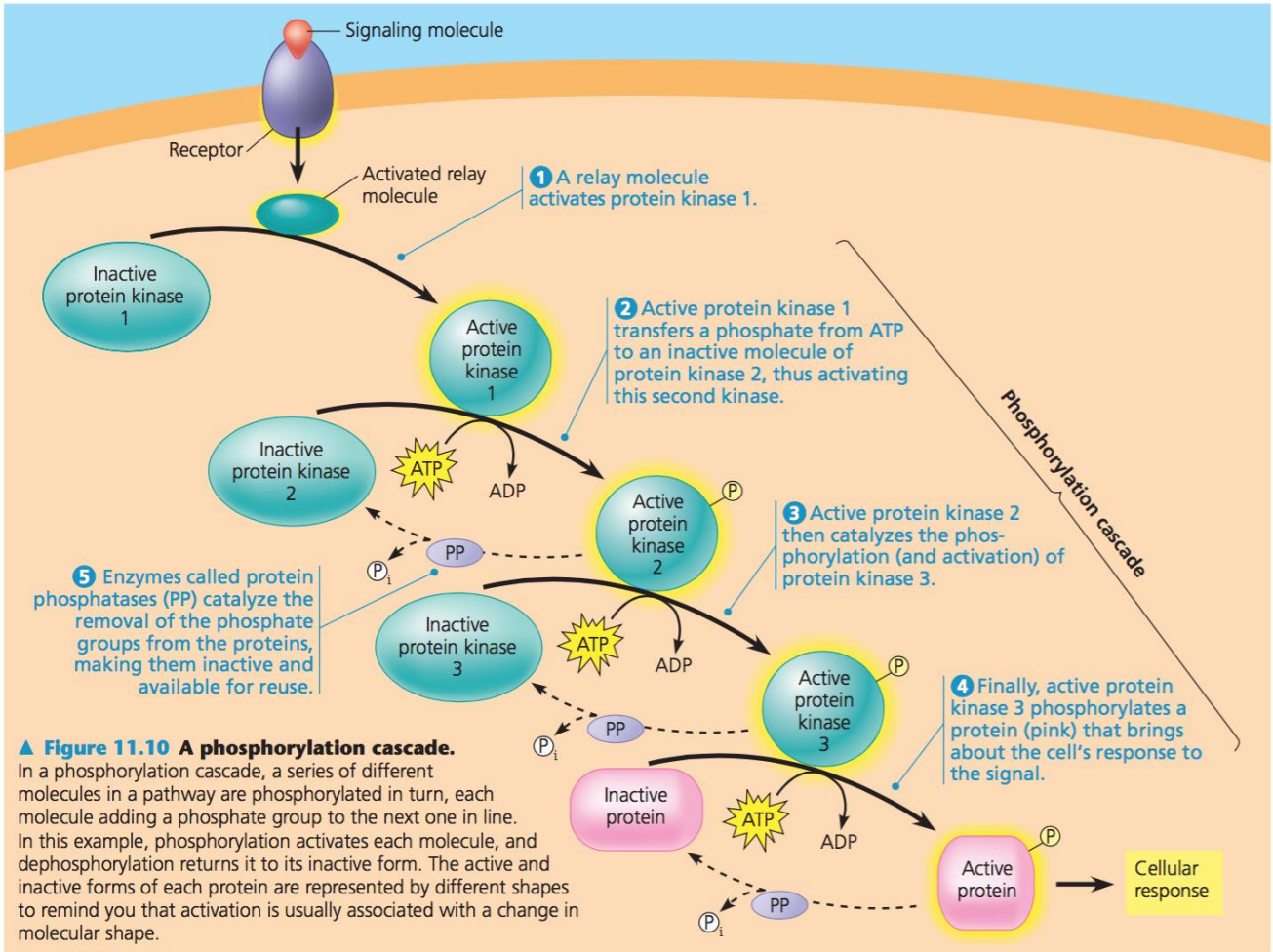
TOPIC 4.2

What happens during a phosphorylation cascade?



▲ **Figure 11.10 A phosphorylation cascade.** In a phosphorylation cascade, a series of different molecules in a pathway are phosphorylated in turn, each molecule adding a phosphate group to the next one in line. In this example, phosphorylation activates each molecule, and dephosphorylation returns it to its inactive form. The active and inactive forms of each protein are represented by different shapes to remind you that activation is usually associated with a change in molecular shape.

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TOPIC

4.2

Identify some possible responses.

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TOPIC 4.2

Identify some possible responses.

Cell growth

Secretion of molecules

Gene expression

Apoptosis

AP BIO INSTA-REVIEW

TOPIC 4.2

Which is a secondary messenger?

A. ATP

B. Ca^{2+}

C. Hormone

D. Ligand

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TOPIC 4.2

Which is a secondary messenger?

B. Ca^{2+}

Secondary messengers are small molecules that will move within the cell to transfer a signal. Traditionally, we discuss cAMP and Ca^{2+}. These molecules will bind to another receptor as part of the transduction pathway,

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TOPIC 4.2

What happens if the receptor is a ligand gated receptor?

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TOPIC 4.2

What happens if the receptor is a ligand gated receptor?

Conformational change opens the gate and allows for the specific ions for that channel to flow down their concentration gradient.

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TOPIC 4.2

What are the three steps in signal transduction pathway?

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TOPIC 4.2

What are the three steps in signal transduction pathway?

Reception
Transduction
Response

AP BIO INSTA-REVIEW

TOPIC 4.2

What is the signaling molecule & where does it bind?

A. Ligand; Enzyme

B. Ligand; Receptor

C. Substrate; Enzyme

D. Substrate; Receptor

AP BIO INSTA-REVIEW

TOPIC 4.2

What is the signaling molecule & where does it bind?

B. Ligand; Receptor

Signaling molecules are called ligands. They will bind to receptors on the membrane or in the target cell. This is part of the reception step of signal transduction pathways.

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TOPIC 4.2

How are phosphorylation cascades activated and deactivated?

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TOPIC 4.2

How are phosphorylation cascades activated and deactivated?

Once activated, protein kinase will phosphorylate the relay molecule to "prime it to do work".

To turn off the pathway, the protein phosphatase will remove the phosphates from the relay molecules.

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TOPIC 4.2

Which of the following act as secondary messengers?

A. ATP and Ca^{2+}

B. Ca^{2+} and cAMP

C. cAMP and ligand

D. Ligand and ATP

AP BIO INSTA-REVIEW

TOPIC 4.2

Which of the following act as secondary messengers?

B. Ca^{2+} and cAMP

Secondary messengers are small molecules that will move within the cell to transfer a signal. Traditionally, we discuss cAMP and Ca^{2+}. These molecules will bind to another receptor as part of the transduction pathway,

AP BIO INSTA-REVIEW

TOPIC 4.2

Different cells respond to the signal in the same way.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 4.2

Different cells respond to the signal in the same way.

B. False

Each cell has a different receptor and a different transduction pathway which leads to a different response.

AP BIO INSTA-REVIEW

TOPIC

4.2

What happens when the ligand binds to the receptor?

AP BIO INSTA-REVIEW

TOPIC 4.2

What happens when the ligand binds to the receptor?

The receptor is a protein, so when the ligand binds this leads to a confirmational shape change. This shape change is the first step of transduction.

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TOPIC 4.2

Muscle contraction occurs when the calcium binds in the muscular cells. Where is the calcium stored in the muscle cells?

A. Lysosome

B. Nucleus

C. Smooth ER

D. Vacuole

AP BIO INSTA-REVIEW

TOPIC 4.2

Muscle contraction occurs when the calcium binds in the muscular cells. Where is the calcium stored in the muscle cells?

C. Smooth ER

The smooth ER has a couple different functions including:

> Detoxification

> Synthesis of Lipids

> Storage of Ca^{2+} ions

AP BIO INSTA-REVIEW

TOPIC 4.2

Calcium is stored in the smooth ER and allows for muscular contractions. How is calcium released from the smooth ER?

A. Active transport

B. Gated ion channel

C. Ion channel

D. Simple diffusion

AP BIO INSTA-REVIEW

TOPIC 4.2

Calcium is stored in the smooth ER and allows for muscular contractions. How is calcium released from the smooth ER?

B. Gated ion channel

In this pathway, a secondary messenger binds to the ligand gated ion channel. Once this binds, the receptor protein has a confirmational shape change which leads to opening of the ion channel allowing the Ca^{2+} to flow down their gradient.

AP BIO INSTA-REVIEW

TOPIC 4.3

Introduction to Signal Transduction

IST-3.E.1

Signal transduction pathways influence how the cell responds to its environment.

IST-3.F.1

Signal transduction may result in changes in gene expression and cell function, which may alter phenotype or result in programmed cell death (apoptosis).

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TOPIC 4.3

What are possible responses from a signal transduction pathway?

AP BIO INSTA-REVIEW

TOPIC 4.3

What are possible responses from a signal transduction pathway?

> Changes in gene expression

> Changes in cell function

> Results in change in phenotype

> Results in apoptosis

AP BIO INSTA-REVIEW

TOPIC 4.3

Describe the function of a transcription factor (& how it changes gene expression)

AP BIO INSTA-REVIEW

TOPIC 4.3

Describe the function of a transcription factor (& how it changes gene expression)

Transcription factors bind to the DNA to assist with the binding of RNA polymerase

If the transcription factor binds, the rate of transcription increases as RNA polymerase binds more frequently/more stable binding

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TOPIC 4.3

What is apoptosis?

What occurs?

AP BIO INSTA-REVIEW

TOPIC 4.3

What is apoptosis?
What occurs?

Programmed cell death

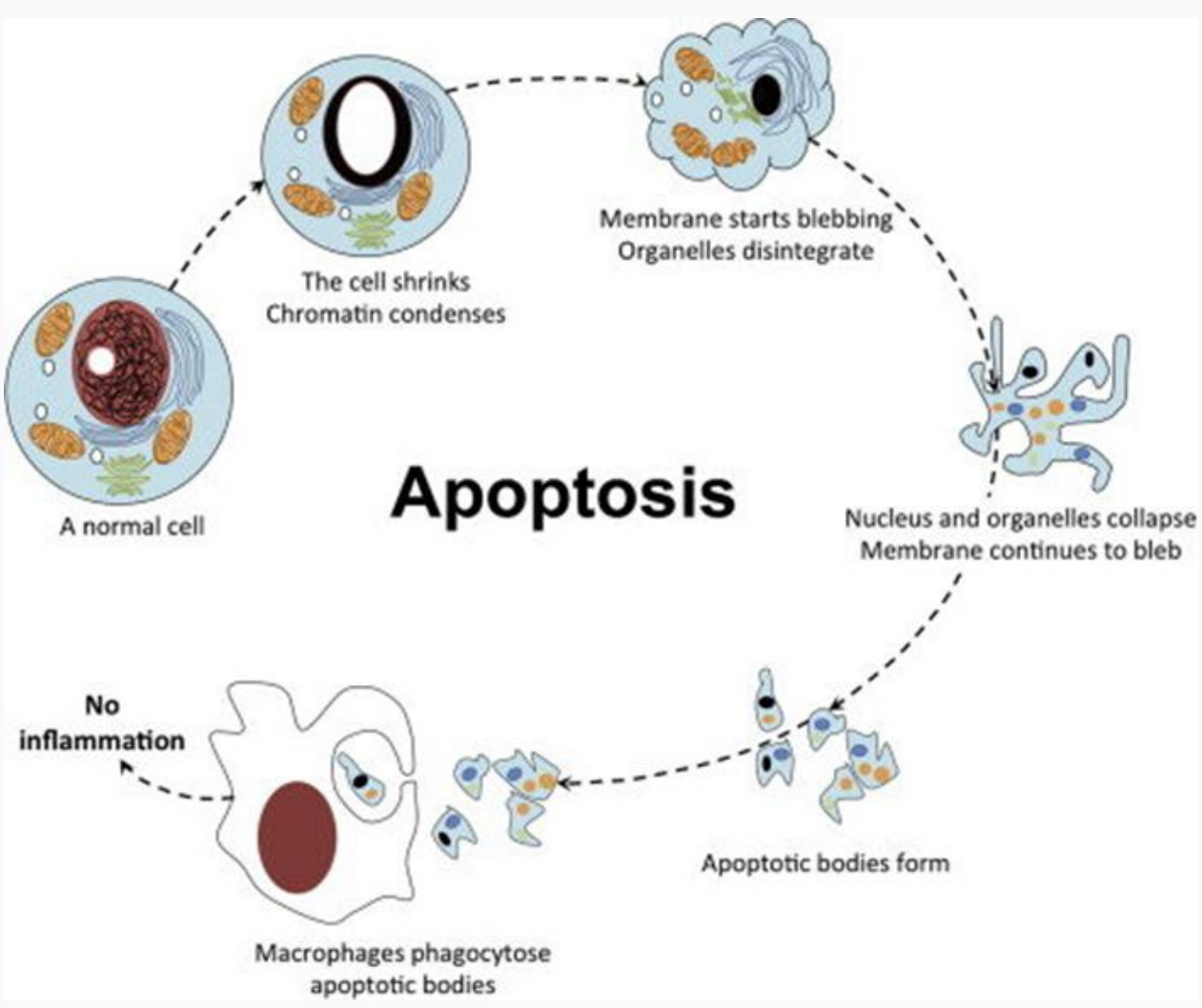
This is a process of the cell digesting from the inside out. There is a major error in the cell or the cell is infected so to protect the organism the cells go through the process to rid of themselves. Also, this could occur due to development. The spaces between our fingers results from apoptosis.

AP BIO INSTA-REVIEW

TOPIC 4.3

What is apoptosis?

What occurs?



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TOPIC
4.3

What is apoptosis?

A. Cell undergoing cellular division

B. Endocrine cell secreting proteins

C. Programmed cell death

D. Synthesis of ATP without glucose

AP BIO INSTA-REVIEW

TOPIC 4.3

What is apoptosis?

C. Programmed cell death

Apopotosis is programmed cell death. The cell will activate nucleases and proteases which will break down nucleic acids and proteins, respectively. This forms blebs which will be consumed and broken down by macrophages.

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TOPIC

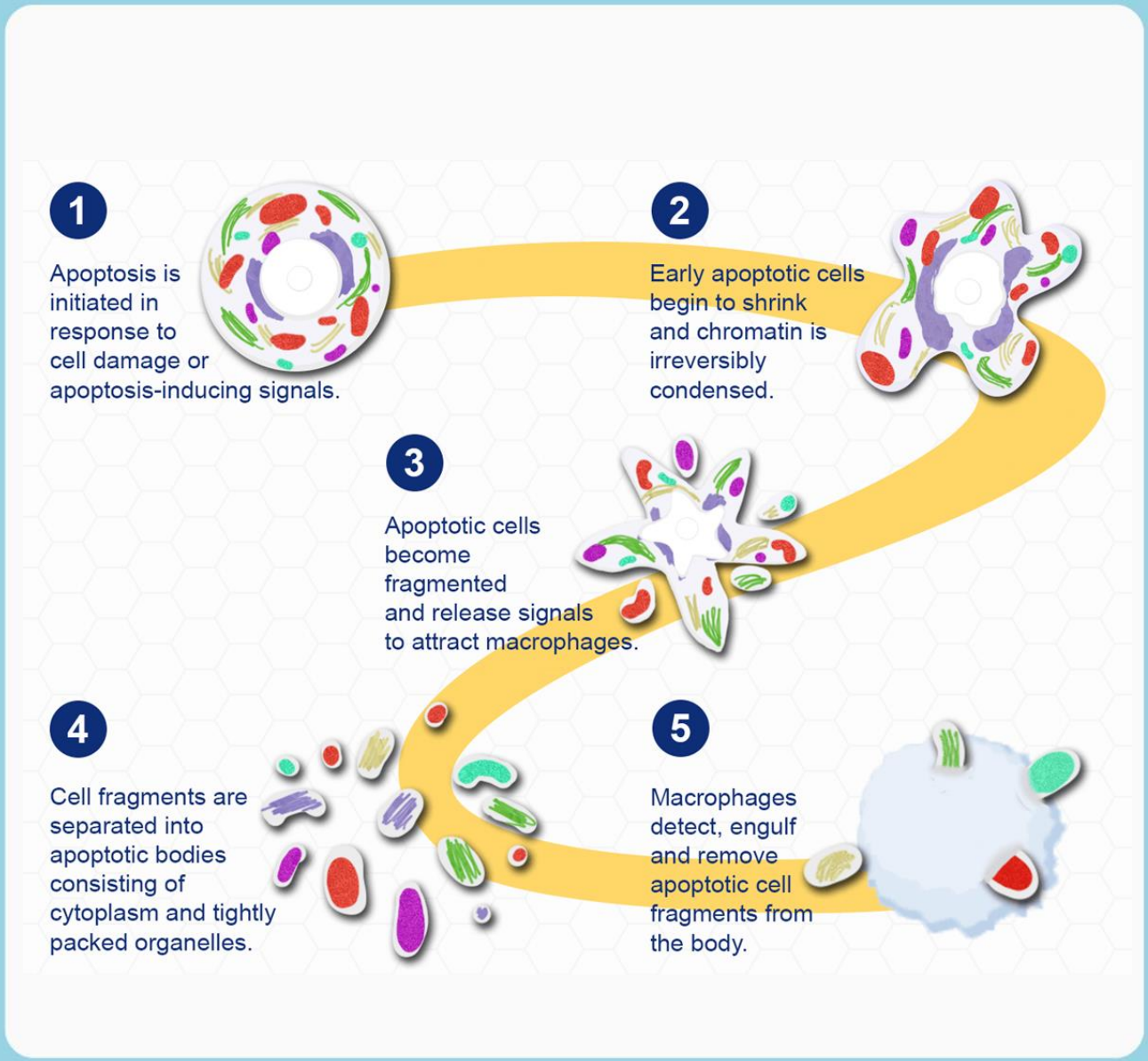
4.3

What happens during apoptosis?

AP BIO INSTA-REVIEW

TOPIC 4.3

What happens during apoptosis?



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TOPIC 4.3

Binds to turn on or off gene expression

A. DNA polymerase

B. Promoter

C. RNA polymerase

D. Transcription factor

AP BIO INSTA-REVIEW

TOPIC 4.3

Binds to turn on or off gene expression

D. Transcription factor

Transcription factors will bind to the DNA to simulate or inhibit RNA polymerase binding to form the transcription initiation complex. Overall, transcription factors will regulate gene expression.

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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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TOPIC 4.4

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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TOPIC

4.4

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

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TOPIC 4.4

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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TOPIC 4.4

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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TOPIC 4.4

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?

AP BIO INSTA-REVIEW

TOPIC 4.4

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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TOPIC 4.4

How does a noncompetitive inhibitor inhibit substrate binding?

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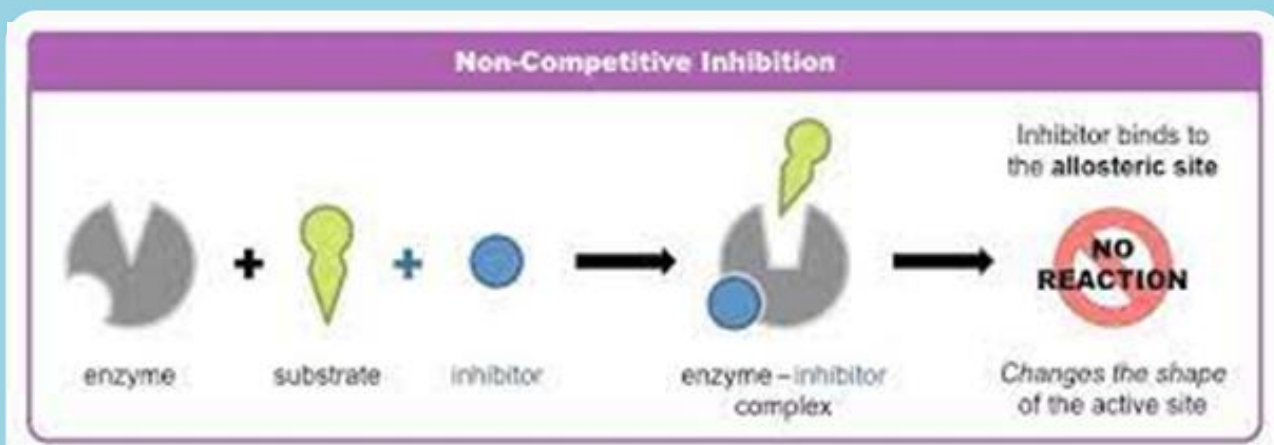
TOPIC 4.4

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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TOPIC

4.4

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

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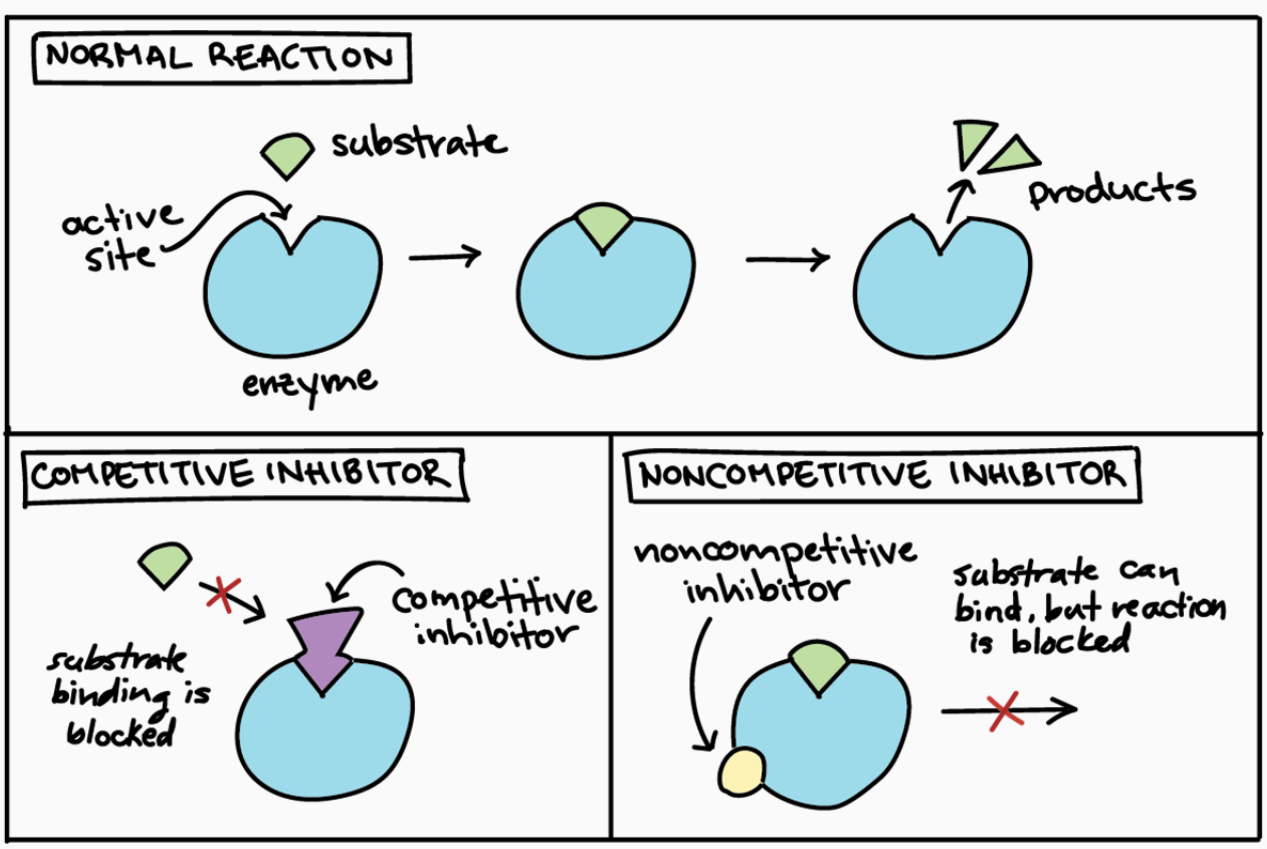
TOPIC 4.4

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



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TOPIC 4.4

Which cells will respond to a signaling molecule?

AP BIO INSTA-REVIEW

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.

AP BIO INSTA-REVIEW

TOPIC 4.4

A change in the receptor can affect the responses of cell

A. True

B. False

AP BIO INSTA-REVIEW

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.

AP BIO INSTA-REVIEW

TOPIC

4.4

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

AP BIO INSTA-REVIEW

TOPIC 4.4

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.

AP BIO INSTA-REVIEW

TOPIC 4.4

A mutation in a relay molecule can affect the response.

A. True

B. False

AP BIO INSTA-REVIEW

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.

AP BIO INSTA-REVIEW

TOPIC 4.5

Feedback

ENE-3.A.1

Organisms use feedback mechanisms to maintain their internal environments and respond to internal and external environmental changes.

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TOPIC 4.5

Feedback

ENE-3.B.1

Negative feedback mechanisms maintain homeostasis for a particular condition by regulating physiological processes. If a system is perturbed, negative feedback mechanisms return the system back to its target set point. These processes operate at the molecular and cellular levels.

AP BIO INSTA-REVIEW

TOPIC 4.5

Feedback

ENE-3.C.1

Positive feedback mechanisms amplify responses and processes in biological organisms. The variable initiating the response is moved farther away from the initial set point. Amplification occurs when the stimulus is further activated, which, in turn, initiates an additional response that produces system change.

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TOPIC 4.5

Why is negative feedback essential for cell?

A. Synthesizes ATP for cell

B. Increases cellular communication

C. Saves wasteful use of materials and energy

D. To cause response

AP BIO INSTA-REVIEW

TOPIC 4.5

Why is negative feedback essential for cell?

C. Saves wasteful use of materials and energy

Negative feedback involves the product inhibiting or slowing down the process.

For example, the trp operon is responsible for synthesizing trp. If trp is present, it would waste energy and resources to synthesize it. So, the trp will bind to a repressor to activate it. This activation causes the repressor to bind to the operator to inhibit transcription.

AP BIO INSTA-REVIEW

TOPIC 4.5

Oxytocin is released to initiate contractions, the force of the baby on the cervix leads to release of oxytocin, which causes more contractions. What type of feedback is described?

A. Negative

B. Positive

AP BIO INSTA-REVIEW

TOPIC 4.5

Oxytocin is released to initiate contractions, the force of the baby on the cervix leads to release of oxytocin, which causes more contractions. What type of feedback is described?

B. Positive

Positive feedback involves the product activating or increasing the process.

For example, the oxytocin is released from the pathway. The oxytocin then increases the process that leads to more oxytocin to be released.

AP BIO INSTA-REVIEW

TOPIC

4.5

Describe positive feedback

AP BIO INSTA-REVIEW

TOPIC 4.5

Describe positive feedback

The product is used to amplify the response.

In the previous example, the product (oxytocin) leads to an increase in contractions which pushes the babies' head harder on the cervix so more oxytocin is released.

AP BIO INSTA-REVIEW

TOPIC

4.5

Most feedback is...

A. Negative

B. Positive

AP BIO INSTA-REVIEW

TOPIC 4.5

Most feedback is...

A. Negative

Most of the processes in the cell involve negative feedback. This is part of homeostasis. The body is trying to regulate and maintain normal conditions for the organism.

AP BIO INSTA-REVIEW

TOPIC 4.5

Blood glucose level is high, pancreas releases insulin. The insulin causes the cells to take up blood sugar so the sugar level decreases. Which type of feedback is described above?

A. Negative

B. Positive

AP BIO INSTA-REVIEW

TOPIC 4.5

Blood glucose level is high, pancreas releases insulin. The insulin causes the cells to take up blood sugar so the sugar level decreases. Which type of feedback is described above?

A. Negative

The release of insulin is due to a high blood glucose level. The release of the insulin will stimulate cells to take up the glucose which will reduce the blood glucose level.

AP BIO INSTA-REVIEW

TOPIC 4.5

Trp operon only makes tryptophan when trp is absent from the environment. Which type of feedback is described?

A. Negative

B. Positive

AP BIO INSTA-REVIEW

TOPIC 4.5

Trp operon only makes tryptophan when trp is absent from the environment. Which type of feedback is described?

A. Negative

The trp operon is responsible for synthesizing trp. If trp is present, it would waste energy and resources to synthesize it. So, the trp will bind to a repressor to activate it. This activation causes the repressor to bind to the operator to inhibit transcription.

AP BIO INSTA-REVIEW

TOPIC 4.5

Lac operon is only synthesized the materials to break down lactose in the presence of lactose. What type of feedback is described?

A. Negative

B. Positive

AP BIO INSTA-REVIEW

TOPIC 4.5

Lac operon is only synthesized the materials to break down lactose in the presence of lactose. What type of feedback is described?

A. Negative

The lac operon is responsible for breaking down lactose. If lac is not present, it would waste energy and resources to make the enzymes to break it down. So, the lac will bind to a repressor to inactive it. This inactivation causes the repressor to no longer bind to the operator to activate transcription.

AP BIO INSTA-REVIEW

TOPIC 4.5

When a fruit ripens it releases ethylene. Ethylene causes fruit to ripen so more ethylene is released. What type of feedback is described?

A. Negative

B. Positive

AP BIO INSTA-REVIEW

TOPIC 4.5

When a fruit ripens it releases ethylene. Ethylene causes fruit to ripen so more ethylene is released. What type of feedback is described?

B. Positive

Ripe fruit release ethylene. The ethylene causes the fruit to ripen more, which causes more ethylene to be released. The ethylene concentration is building up.

AP BIO INSTA-REVIEW

TOPIC

4.5

What is the difference between positive and negative feedback?

AP BIO INSTA-REVIEW

TOPIC 4.5

What is the difference between positive and negative feedback?

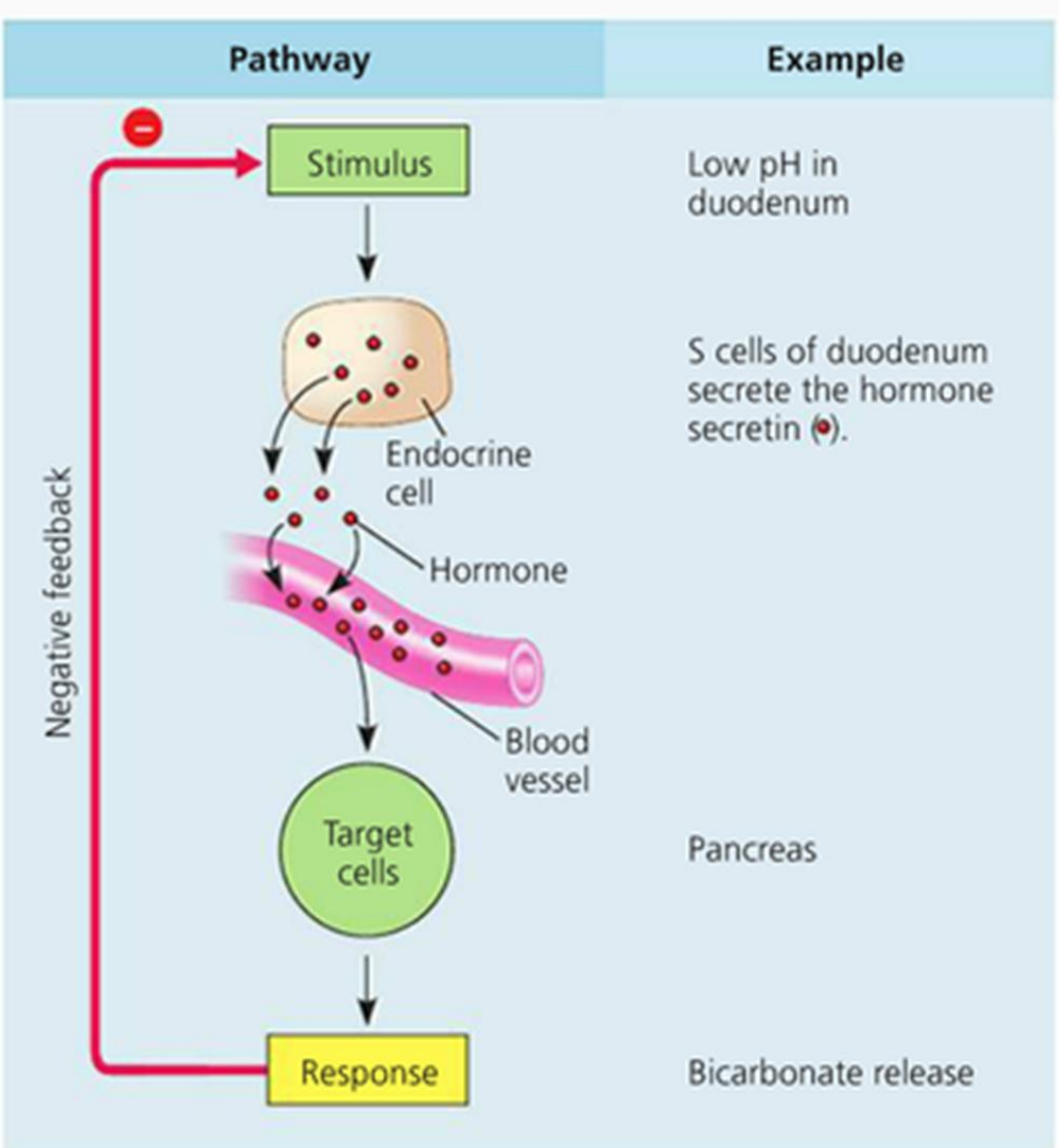
Positive feedback results in an amplification. The product stimulates the pathway.

Negative feedback results in regulation back to homeostasis. The product inhibits the pathway.

AP BIO INSTA-REVIEW

TOPIC 4.5

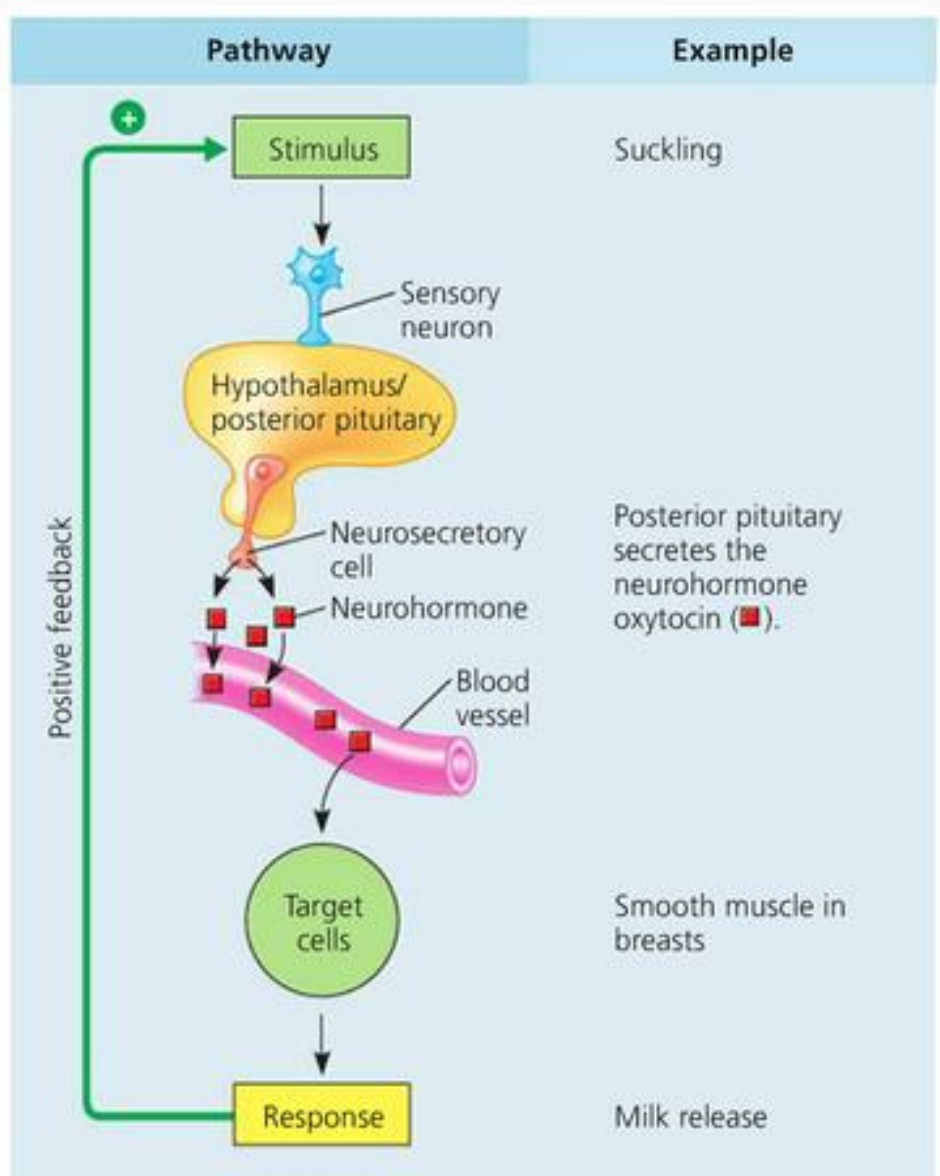
Example of Negative Feedback



AP BIO INSTA-REVIEW

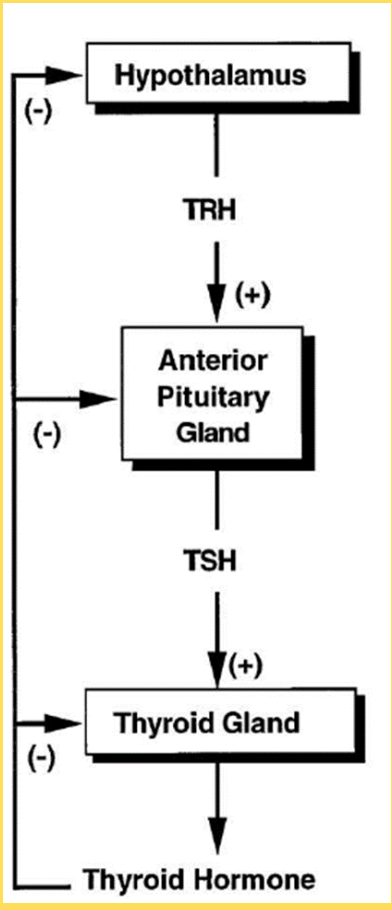
TOPIC 4.5

Example of Positive Feedback



AP BIO INSTA-REVIEW

TOPIC 4.5



Predict what would happen with overactive pituitary in diagram.

A. Thyroid hormone levels decrease

B. Thyroid hormone levels increase

C. Thyroid hormone levels stay the same

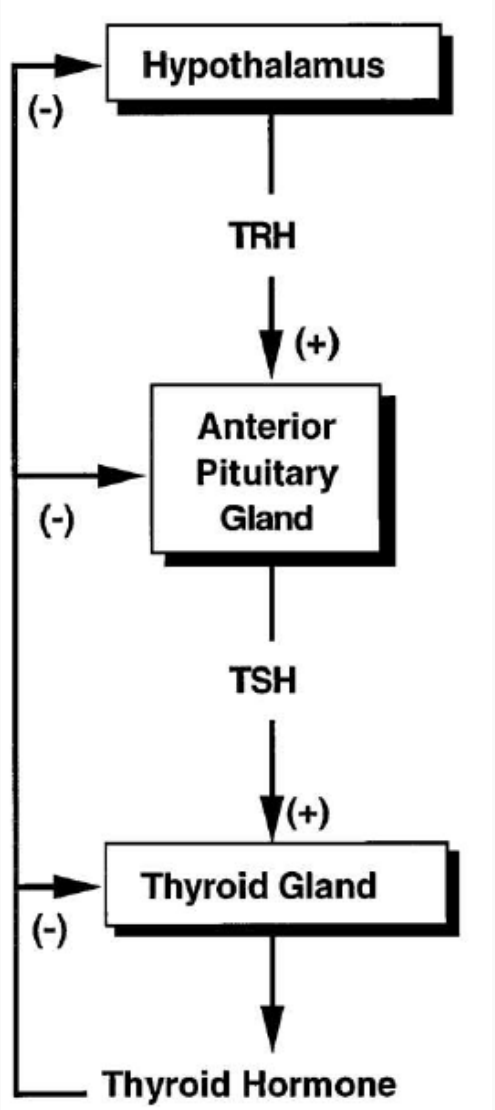
AP BIO INSTA-REVIEW

TOPIC 4.5

Predict what would happen with overactive pituitary in diagram.

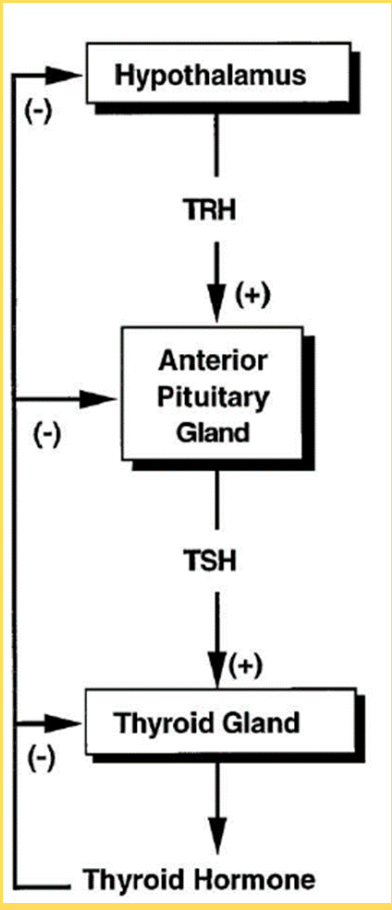
B. Thyroid hormone levels increase

The pituitary will release TSH which will cause the Thyroid Gland to release the thyroid hormone. This means that an overactive pituitary will lead to an increase in thyroid hormone levels.



AP BIO INSTA-REVIEW

TOPIC 4.5



Predict what would happen if overactive pituitary with TSH release.

A. TRH levels decrease

B. TRH levels increase

C. TRH levels stay the same

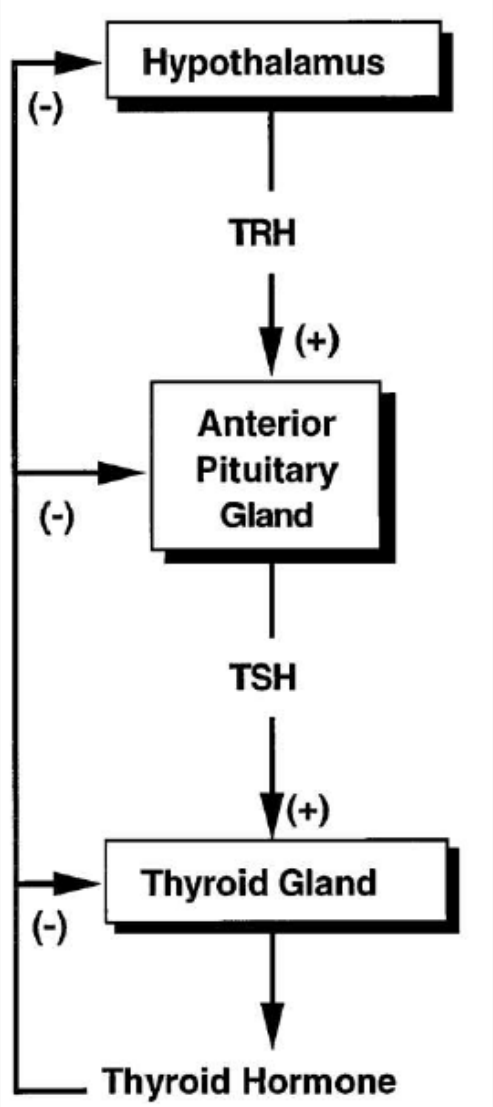
AP BIO INSTA-REVIEW

TOPIC 4.5

Predict what would happen if overactive pituitary with TSH release.

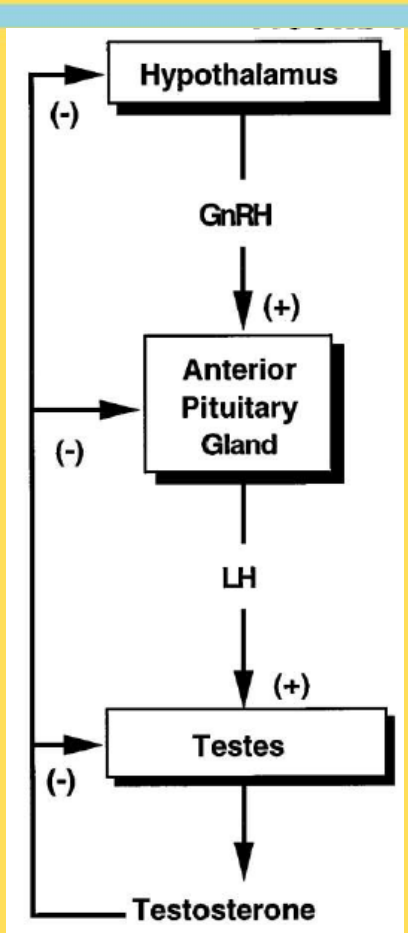
A. TRH levels decrease

The pituitary will release TSH which will cause the Thyroid Gland to release the thyroid hormone. The thyroid hormone has a negative feedback with the hypothalamus. The hypothalamus releases the TRH. If there is an increase in TSH and thyroid hormone, there is a decrease in TRH levels.



AP BIO INSTA-REVIEW

TOPIC 4.5



If you injected testosterone, what organ would decrease in mass?

A. Hypothalamus

B. Pituitary

C. Testes

D. All of the above

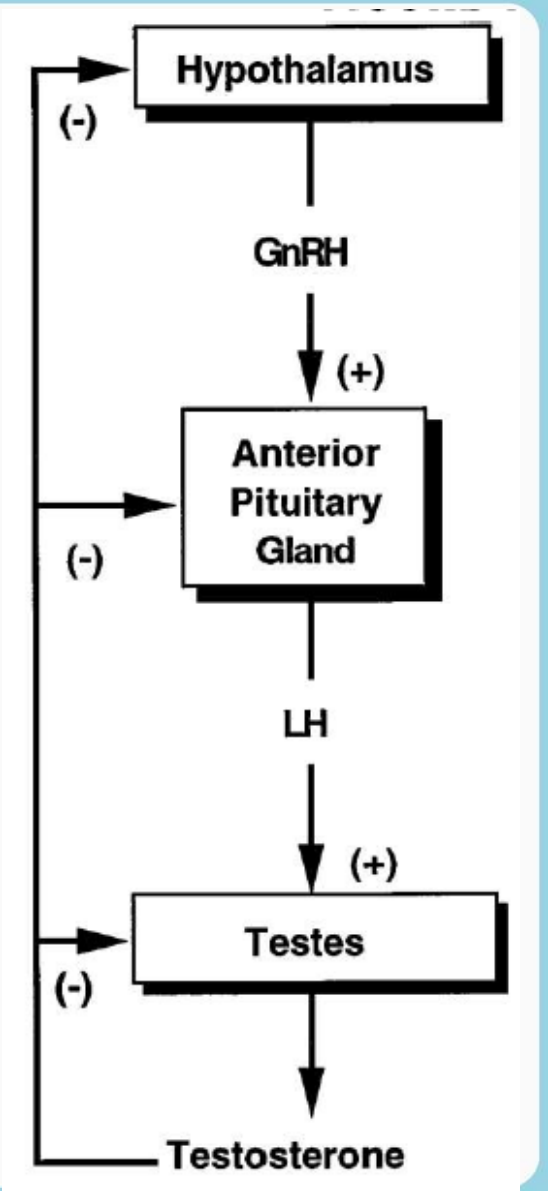
AP BIO INSTA-REVIEW

TOPIC 4.5

If you injected testosterone, what organ would decrease in mass?

D. All of the above (Hypothalamus, Pituitary, & Testes)

The testosterone has a negative feedback look with the hypothalamus, anterior pituitary, and testes. If there is an increase in testosterone, it will decrease the testes, anterior pituitary, and hypothalamus



AP BIO INSTA-REVIEW

TOPIC 4.5

Thinking about feedback loops, how does the body regulate temperature?

AP BIO INSTA-REVIEW

TOPIC 4.5

Thinking about feedback loops, how does the body regulate temperature?

Thermoreceptors determine the temperature is less than normal body temperature activating vasoconstriction and shivering/goosebumps.

Thermoreceptors determine the temperature is higher than normal body temperature activating vasodilation and sweating (evaporative cooling).

AP BIO INSTA-REVIEW

TOPIC 4.6

Cell Cycle

IST-1.B.1

In eukaryotes, cells divide and transmit genetic information via two highly regulated processes.

AP BIO INSTA-REVIEW

TOPIC 4.6

Cell Cycle

IST-1.B.2

The cell cycle is a highly regulated series of events for the growth and reproduction of cells—

a. The cell cycle consists of sequential stages of interphase (G_1, S, G_2), mitosis, and cytokinesis.

b. A cell can enter a stage (G_0) where it no longer divides, but it can reenter the cell cycle in response to appropriate cues. Nondividing cells may exit the cell cycle or be held at a particular stage in the cell cycle.

AP BIO INSTA-REVIEW

TOPIC 4.6

Cell Cycle

IST-1.C.1

Mitosis is a process that ensures the transfer of a complete genome from a parent cell to two genetically identical daughter cells–

a. Mitosis plays a role in growth, tissue repair, and asexual reproduction.
b. Mitosis alternates with interphase in the cell cycle.
c. Mitosis occurs in a sequential series of steps (prophase, metaphase, anaphase, telophase)

AP BIO INSTA-REVIEW

TOPIC 4.6

What are the three phases of the cell cycle?

AP BIO INSTA-REVIEW

TOPIC 4.6

What are the three phases of the cell cycle?

Interphase

Mitosis

Cytokinesis

Note:

Interphase is BEFORE mitosis and cytokinesis is AFTER mitosis

AP BIO INSTA-REVIEW

TOPIC

4.6

Which phase of interphase does the cell grow?

A. G_1

B. S

C. G_2

D. All of them

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase of interphase does the cell grow?

D. All of them (G_1, S, G_2)

Interphase is the phase that takes place before mitosis. During this phase, the cell will grow and, specifically through S phase, the DNA will be replicated (synthesized).

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase of interphase does DNA replication occur?

A. G_1

B. S

C. G_2

D. All of them

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase of interphase does DNA replication occur?

B. S

The S phase is part of interphase. During that phase of interphase, the DNA is synthesized. A copy of DNA is made so each cell will recieve an equal amount of DNA (and identical)

AP BIO INSTA-REVIEW

TOPIC

4.6

Mitosis divides...

A. Chromosomes

B. Cytoplasm

C. Nucleus

D. Organelles

AP BIO INSTA-REVIEW

TOPIC 4.6

Mitosis divides...

C. Nucleus

Mitosis is nuclear division. This involves the separation of the chromosomes which results in two nuclei. Cytokinesis is the division of the cytoplasm which results in two cells.

AP BIO INSTA-REVIEW

TOPIC 4.6

Cytokinesis divides...

A. Chromosomes

B. Cytoplasm

C. Nucleus

D. Organelles

AP BIO INSTA-REVIEW

TOPIC 4.6

Cytokinesis divides...

B. Cytoplasm

Cytokinesis is the division of the cytoplasm which results in two cells. Mitosis is nuclear division. This involves the separation of the chromosomes which results in two nuclei.

AP BIO INSTA-REVIEW

TOPIC 4.6

A cell can undergo mitosis and not cytokinesis

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 4.6

A cell can undergo mitosis and not cytokinesis

A. True

This causes a cell to be multinucleated. An example of a cell that is multinucleated are skeletal muscle cells.

AP BIO INSTA-REVIEW

TOPIC 4.6

What is the result of mitosis without cytokinesis? Example.

AP BIO INSTA-REVIEW

TOPIC 4.6

What is the result of mitosis without cytokinesis? Example.

The cell will be multinucleated (so the cell will have multiple nuclei)

Ex: muscle cells

AP BIO INSTA-REVIEW

TOPIC

4.6

If the cell doesn't get the go ahead at G_1 checkpoint what happens?

AP BIO INSTA-REVIEW

TOPIC 4.6

If the cell doesn't get the go ahead at G_1 checkpoint what happens?

The cell enters a non-dividing state called G_0.

AP BIO INSTA-REVIEW

TOPIC 4.6

Identify an example of a cell in G_0.

AP BIO INSTA-REVIEW

TOPIC 4.6

Identify an example of a cell in G_0.

Neurons

Muscles

Liver

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase involves sister chromatids on middle plate?

A. Anaphase

B. Metaphase

C. Prophase

D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase involves sister chromatids on middle plate?

B. Metaphase

Metaphase is when the sister chromatids align on the metaphase plate in the middle of the cell. The tug-of-war between microtubules allows for the chromatids to align in this format to ensure that cells get equal chromosomes.

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase involves sister chromatids pairing?

A. Anaphase

B. Metaphase

C. Prophase

D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase involves sister chromatids pairing?

C. Prophase

Prophase is when the cell is preparing to divide. The chromatin condenses, sister chromatids pair up, and mitotic spindles move to opposite poles.

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase involves single chromatids moving to poles?

A. Anaphase

B. Metaphase

C. Prophase

D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase involves single chromatids moving to poles?

A. Anaphase

Anaphase involves the sister chromatids moving apart to opposite poles. The microtubules are attached to each centromere and shorten which "reels" the chromosomes to the poles.

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase involves nuclear envelope forming?

A. Anaphase

B. Metaphase

C. Prophase

D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase involves nuclear envelope forming?

D. Telophase

Telophase forms the two new nuclei. This is when the new nuclear envelope is forming around the chromosomes that have separated to opposite poles. The chromosomes decondense to form chromatin.

AP BIO INSTA-REVIEW

TOPIC

4.6

Cancer treatment involves chemotherapy with drugs that inhibit microtubules from depolymerizing. Which phase would the cell be stopped in?

A. Anaphase

B. Metaphase

C. Prophase

D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Cancer treatment involves chemotherapy with drugs that inhibit microtubules from depolymerizing. Which phase would the cell be stopped in?

B. Metaphase

Metaphase is the phase where the sister chromatids are bound to microtubules on the metaphase plate while anaphase is the depolymerizing of the microtubules to pull them to the opposite poles.

AP BIO INSTA-REVIEW

TOPIC 4.6

How does the parent and daughter cell compare in mitosis?

AP BIO INSTA-REVIEW

TOPIC 4.6

How does the parent and daughter cell compare in mitosis?

Parent cell AND daughter cells are diploid ($2N$)

Parent cell AND daughter cells are genetically identical

AP BIO INSTA-REVIEW

TOPIC

4.6

How many rounds of replication of DNA before mitosis?

A. 0

B. 1

C. 2

D. 3

AP BIO INSTA-REVIEW

TOPIC 4.6

How many rounds of replication of DNA before mitosis?

B. 1

The daughter cells need to be identical. In order to create two identical cells from one cell, you need to <u>replicate the DNA once</u> then divide the cell once.

AP BIO INSTA-REVIEW

TOPIC

4.6

How many rounds of division in mitosis?

A. 0

B. 1

C. 2

D. 3

AP BIO INSTA-REVIEW

TOPIC 4.6

How many rounds of division in mitosis?

B. 1

The daughter cells need to be identical. In order to create two identical cells from one cell, you need to replicate the DNA once then divide the cell once.

AP BIO INSTA-REVIEW

TOPIC 4.6

Independent Assortment?

A. Does NOT occur

B. Does occur

AP BIO INSTA-REVIEW

TOPIC 4.6

Independent Assortment?

A. Does NOT occur

Independent assortment involves the homologous chromosomes aligning on the metaphase plate. This leads to genetic diversity as the maternal and paternal chromosomes will segregate into different cells. Since mitosis involves sister chromatids which are identical, then independent assortment does not occur.

AP BIO INSTA-REVIEW

TOPIC

4.6

Crossing Over?

A. Does NOT occur

B. Does occur

AP BIO INSTA-REVIEW

TOPIC 4.6

Crossing Over?

A. Does NOT occur

Crossing over involves nonsister chromatids exchanging genetic information. Mitosis involves sister chromatids so crossing over does not occur.

AP BIO INSTA-REVIEW

TOPIC

4.6

Which phase of interphase is responsible for DNA replication?

A. G_1

B. G_2

C. M

D. S

AP BIO INSTA-REVIEW

TOPIC 4.6

Which phase of interphase is responsible for DNA replication?

D. S

DNA replication involves synthesizing a new DNA strand. This takes place during interphase, specifically the S phase.

AP BIO INSTA-REVIEW

TOPIC 4.6

Which of the following is not part of interphase?

A. G_1

B. G_2

C. M

D. S

AP BIO INSTA-REVIEW

TOPIC 4.6

Which of the following is not part of interphase?

C. M

Interphase is the phase preceding the mitotic phase (M). The cell is preparing to divide by growing, replicating its DNA, and synthesizing organelles. The three phases are G_1, S, and G_2.

AP BIO INSTA-REVIEW

TOPIC

4.6

The cell grows through all three phases of interphase.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 4.6

The cell grows through all three phases of interphase.

A. True

As the cell prepares to divide, the cell will grow through all of the phases of interphase.

AP BIO INSTA-REVIEW

TOPIC

4.6

Interphase occurs ____ mitosis in the cell cycle.

A. After

B. Before

C. During

AP BIO INSTA-REVIEW

TOPIC 4.6

Interphase occurs ____ mitosis in the cell cycle.

B. Before

Interphase is the longest phase and it precedes mitosis. During interphase, the cell prepares to divide by growing and replicating chromosomes. This must take place prior to nuclear or cellular division.

AP BIO INSTA-REVIEW

TOPIC

4.6

Cytokinesis occurs ____ mitosis in the cell cycle

A. After

B. Before

C. During

AP BIO INSTA-REVIEW

TOPIC 4.6

Cytokinesis occurs _____ mitosis in the cell cycle

A. After

Mitosis is the division of the nucleus and cytokinesis is division of the cytoplasm. The cell must divide the nucleus prior to dividing the cell or the resulting daughter cell will not have a nucleus. Cytokinesis must take place after mitosis.

AP BIO INSTA-REVIEW

TOPIC

4.6

Identify the four phases of mitosis

AP BIO INSTA-REVIEW

TOPIC 4.6

Identify the four phases of mitosis

> Prophase

> Metaphase

> Anaphase

> Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Phase of mitosis that chromosomes condense and pair

A. Anaphase
B. Metaphase
C. Prophase
D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Phase of mitosis that chromosomes condense and pair

C. Prophase

Prophase is when the cell is preparing to divide. The chromatin condenses, sister chromatids pair up, and mitotic spindles move to opposite poles.

AP BIO INSTA-REVIEW

TOPIC 4.6

Phase of mitosis when sister chromatids are pulled to opposite poles.

A. Anaphase
B. Metaphase
C. Prophase
D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Phase of mitosis when sister chromatids are pulled to opposite poles.

A. Anaphase

Anaphase involves the sister chromatids moving apart to opposite poles. The microtubules are attached to each centromere and shorten which "reels" the chromosomes to the poles.

AP BIO INSTA-REVIEW

TOPIC 4.6

Phase of mitosis when sister chromatids align on plate in middle of the cell

A. Anaphase
B. Metaphase
C. Prophase
D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Phase of mitosis when sister chromatids align on plate in middle of the cell

B. Metaphase

Metaphase is when the sister chromatids align on the metaphase plate in the middle of the cell. The tug-of-war between microtubules allows for the chromatids to align in this format to ensure that cells get equal chromosomes.

AP BIO INSTA-REVIEW

TOPIC 4.6

Phase of mitosis when two nuclear envelopes form.

A. Anaphase

B. Metaphase

C. Prophase

D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Phase of mitosis when two nuclear envelopes form.

D. Telophase

Telophase forms the two new nuclei. This is when the new nuclear envelope is forming around the chromosomes that have separated to opposite poles. The chromosomes decondense to form chromatin.

AP BIO INSTA-REVIEW

TOPIC 4.6

Microtubules unable to depolymerize would stop the cell cycle in what phase?

A. Anaphase
B. Metaphase
C. Prophase
D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.6

Microtubules unable to depolymerize would stop the cell cycle in what phase?

B. Metaphase

Metaphase is when the sister chromatids align on the metaphase plate in the middle of the cell. The tug-of-war between microtubules allows for the chromatids to align in this format to ensure that cells get equal chromosomes.

AP BIO INSTA-REVIEW

TOPIC 4.7

Regulation of Cell Cycle

IST-1.D.1

A number of internal controls or checkpoints regulate progression through the cycle.

IST-1.D.2

Interactions between cyclins and cyclin-dependent kinases control the cell cycle.

IST-1.E.1

Disruptions to the cell cycle may result in cancer and/or programmed cell death (apoptosis).

AP BIO INSTA-REVIEW

TOPIC 4.7

Which checkpoint determines whether the cell will divide?

A. G_1

B. S

C. G_2

D. M

AP BIO INSTA-REVIEW

TOPIC 4.7

Which checkpoint determines whether the cell will divide?

A. G_1

The G_1 checkpoint occurs in the G_1 phase. This is the go-ahead signal. If a cell passes this checkpoint, it will usually complete cell division.

AP BIO INSTA-REVIEW

TOPIC 4.7

Which checkpoint inhibits nondisjunction?

A. G_1

B. S

C. G_2

D. M

AP BIO INSTA-REVIEW

TOPIC 4.7

Which checkpoint inhibits nondisjunction?

D. M

Nondisjunction is the process where sister chromatids or homologous chromosomes do not segregate to opposite poles. The M checkpoint ensures that all chromatids/chromosomes are attached to a microtubule for anaphase.

AP BIO INSTA-REVIEW

TOPIC 4.7

Which checkpoint verifies DNA has "no errors" and replicated?

A. G_1

B. S

C. G_2

D. M

AP BIO INSTA-REVIEW

TOPIC 4.7

Which checkpoint verifies DNA has "no errors" and replicated?

C. G_2

The G_2 checkpoint occurs prior to mitosis. This will ensure the DNA has copied with "no errors" and the cell is large enough for division.

AP BIO INSTA-REVIEW

TOPIC 4.7

What is the function of a kinase?

AP BIO INSTA-REVIEW

TOPIC 4.7

What is the function of a kinase?

Kinase is an enzyme that adds phosphate

Protein kinase is responsible for the phosphorylation cascade in transduction

Cyclin dependent kinase will phosphorylate proteins needs for cell division

AP BIO INSTA-REVIEW

TOPIC 4.7

Describe the association between cyclin and CdK.

AP BIO INSTA-REVIEW

TOPIC 4.7

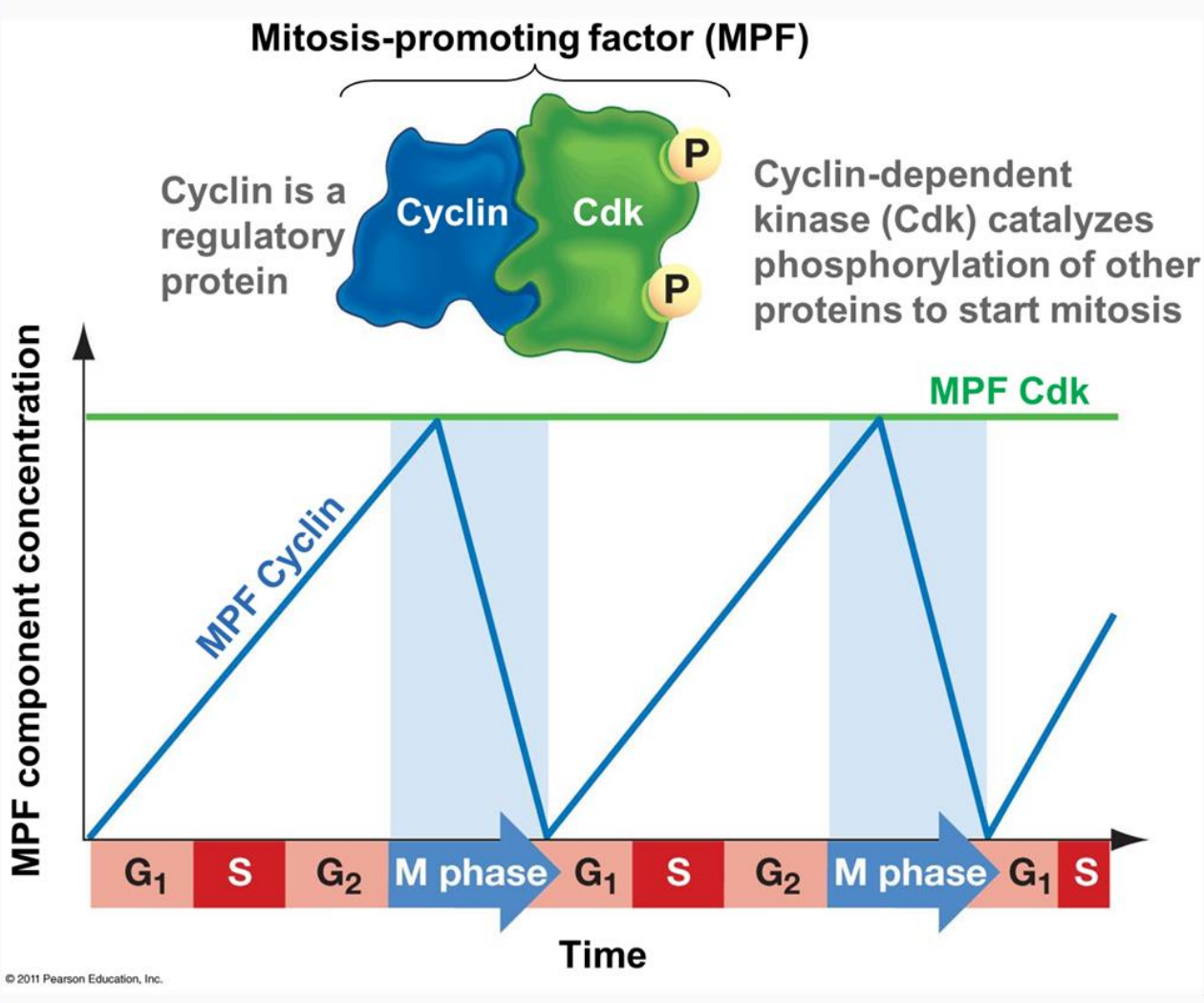
Describe the association between cyclin and CdK.

Cyclin is produced during interphase. CdK is maintained at high levels in the cell. When the cyclin level reaches a certain amount, it will activate the CdK and allow for the progression into the M phase. This specific CdK is called MPF. Maturation Promoting Factor (but let's just call it mitosis promoting factor since you need it to enter mitosis)

AP BIO INSTA-REVIEW

TOPIC 4.7

Describe the association between cyclin and CdK.



AP BIO INSTA-REVIEW

TOPIC 4.7

What happens if the cell incorrectly bypasses a checkpoint?

AP BIO INSTA-REVIEW

TOPIC 4.7

What happens if the cell incorrectly bypasses a checkpoint?

> Cancer

> Apoptosis

AP BIO INSTA-REVIEW

TOPIC 4.7

What phase is the M checkpoint located in?

A. Anaphase

B. Metaphase

C. Prophase

D. Telophase

AP BIO INSTA-REVIEW

TOPIC 4.7

What phase is the M checkpoint located in?

B. Metaphase

The M checkpoint is during metaphase when the sister chromatids are on the metaphase plate. This will check to ensure all microtubules are attached to chromatids to ensure equal division of chromosomes.

AP BIO INSTA-REVIEW

TOPIC 4.7

How does the level of cyclin and CdK vary during cell cycle?

A. Cyclin increases, CdK remains the same

B. Cyclin decreases, CdK remains the same

C. Cyclin remains the same, CdK levels increase

D. Cyclin remains the same, CdK levels decrease

AP BIO INSTA-REVIEW

TOPIC 4.7

How does the level of cyclin and CdK vary during cell cycle?

A. Cyclin increases, CdK remains the same

CdK is the cyclin dependent kinase. This enzyme will remain at a constant level throughout the cell cycle. The cyclin will build up through interphase. Once it reaches the optimal level, the enzyme will be activated.

AP BIO INSTA-REVIEW

TOPIC 4.7

Proto-oncogenes can mutate into oncogenes

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 4.7

Proto-oncogenes can mutate into oncogenes

A. True

Proto-oncogenes are normal cell division genes. When the proto-oncogene is mutated, it will cause the normal growth to be overactivated thus causes an increase in cell divison with causes abnormal cell growth.

AP BIO INSTA-REVIEW

TOPIC 4.7

If the cell doesn't get the go ahead signal in G_1, where does it go?

A. G_0

B. G_1

C. G_2

D. S

AP BIO INSTA-REVIEW

TOPIC 4.7

If the cell doesn't get the go ahead signal in G_1, where does it go?

A. G_0

If the cell does not get the signal at G_0, they will exit the cell cycle. Example cells include: nerve, muscle, or liver cells

AP BIO INSTA-REVIEW

TOPIC 4.7

What is the function of a proto-oncogene?

AP BIO INSTA-REVIEW

TOPIC 4.7

What is the function of a proto-oncogene?

This is a gene that makes a normal cell cycle protein. There are many proto-oncogenes. Each one is responsible for making a protein involved in cell growth, division, and other processes. There is nothing "bad" about this gene, unit it becomes overactivated/mutated causing the normal protein to be overproduced increasing the amount of cell cycle the cell undergoes.

AP BIO INSTA-REVIEW

TOPIC 4.7

What is the function of a tumor-suppressor gene?

AP BIO INSTA-REVIEW

TOPIC 4.7

What is the function of a tumor-suppressor gene?

This is a gene that makes protein that inhibits the cell cycle. Again, this gene is perfectly fine until it becomes mutated. Once mutated, it might not make the protein that halts or inhibits the cell cycle.

There are three types:
Telling cells to slow down and stop dividing
Repairing damage to cellular DNA that results from dividing and could lead to cancer
Causing damaged cells to start a process called programmed cell death, or apoptosis.

AP BIO INSTA-REVIEW

TOPIC 4.7

What is the function of the M checkpoint?

A. Check DNA is completed replication

B. Check DNA is undamaged

C. Check chromosomes are attached to kinetochores

D. Check cell should undergo division

AP BIO INSTA-REVIEW

TOPIC 4.7

What is the function of the M checkpoint?

C. Check chromosomes are attached to kinetochores

The M checkpoint is during metaphase when the sister chromatids are on the metaphase plate. This will check to ensure all microtubules are attached to chromatids to ensure equal division of chromosomes.

AP BIO INSTA-REVIEW

TOPIC 4.7

What could result if the cell bypasses the M checkpoint?

A. Crossing over

B. Independent assortment

C. Nondisjunction

D. Random fertilization

AP BIO INSTA-REVIEW

TOPIC 4.7

What could result if the cell bypasses the M checkpoint?

C. Nondisjunction

The M checkpoint is during metaphase when the sister chromatids are on the metaphase plate. This will check to ensure all microtubules are attached to chromatids to ensure equal division of chromosomes. If this phase is bypassed, the sister chromatids might not segregate to opposite cells.

AP BIO INSTA-REVIEW

TOPIC 4.7

What stimulates progression from the G_2 checkpoint?

A. Crossing over complete

B. Cyclin level rises to specific level to bind with CdKs

C. Independent assortment complete

D. Microtubules attached at all kinetochores (chromosomes)

AP BIO INSTA-REVIEW

TOPIC 4.7

What stimulates progression from the G_2 checkpoint?

B. Cyclin level rises to specific level to bind with CdKs

The G_2 checkpoint occurs prior to mitosis. This will ensure the DNA has copied with "no errors" and the cell is large enough for division. As the cell goes through interphase, the cyclin level will rise while the CdK level stays the same.