AP BIO INSTA-REVIEW

TOPIC 2.2

Cell Structure & Function

SYI-1.E.1

Organelles and subcellular structures, and the interactions among them, support cellular function–

a. Endoplasmic reticulum provides mechanical support, carries out protein synthesis on membrane-bound ribosomes, and plays a role in intracellular transport.

b. Mitochondrial double membrane provides compartments for different metabolic reactions.

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TOPIC 2.2

Cell Structure & Function

SYI-1.E.1

Organelles and subcellular structures, and the interactions among them, support cellular function–

c. Lysosomes contain hydrolytic enzymes, which are important in intracellular digestion, the recycling of a cell's organic materials, and programmed cell death (apoptosis).

d. Vacuoles have many roles, including storage and release of macromolecules and cellular waste products. In plants, it aids in retention of water for turgor pressure.

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TOPIC 2.2

Cell Structure & Function

SYI-1.F.1

The folding of the inner membrane increases the surface area, which allows for more ATP to be synthesized.

SYI-1.F.2

Within the chloroplast are thylakoids and the stroma.

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TOPIC 2.2

Cell Structure & Function

SYI-1.F.3

The thylakoids are organized in stacks, called grana.

SYI-1.F.4

Membranes contain chlorophyll pigments and electron transport proteins that comprise the photosystems.

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Cell Structure & Function

SYI-1.F.5

The light-dependent reactions of photosynthesis occur in the grana.

SYI-1.F.6

The stroma is the fluid within the inner chloroplast membrane and outside of the thylakoid.

SYI-1.F.7

The carbon fixation (Calvin-Benson cycle) reactions of photosynthesis occur in the stroma.

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TOPIC 2.2

Cell Structure & Function

SYI-1.F.8

The Krebs cycle (citric acid cycle) reactions occur in the matrix of the mitochondria.

SYI-1.F.9

Electron transport and ATP synthesis occur on the inner mitochondrial membrane.

AP BIO INSTA-REVIEW

TOPIC 2.2

Where does carbon fixation occur?

A. Cristae
B. Matrix
C. Stroma
D. Thylakoid

AP BIO INSTA-REVIEW

TOPIC 2.2

Where does carbon fixation occur?

C. Stroma

Carbon fixation takes place in the chloroplast, specifically in the stroma of the chloroplast. This is the cytosol of the chloroplast. The carbon fixation step is involved in the Calvin Cycle.

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TOPIC 2.2

Where does the cellular ATP synthesis occur?

A. Cristae

B. Matrix

C. Stroma

D. Thylakoid

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TOPIC 2.2

Where does the cellular ATP synthesis occur?

A. Cristae

Don't get tricked by this question. This question mentions the "cellular ATP" which means the ATP for the cellular processes. These ATP molecules are synthesized during cellular respiration (hence the mitochondrial cristae).

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TOPIC 2.2

Where does the ATP for G3P synthesis occur?

A. Cristae

B. Matrix

C. Stroma

D. Thylakoid

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TOPIC 2.2

Where does the ATP for G3P synthesis occur?

D. Thylakoid

The light reactions are responsible for the synthesize of ATP and NADPH to be used as reactants in the Calvin cycle, where G3P is synthesized. The light reactions take place in the thylakoid membrane of the chloroplast.

AP BIO INSTA-REVIEW

TOPIC 2.2

Where does the Krebs Cycle take place?

A. Cristae

B. Matrix

C. Stroma

D. Thylakoid

AP BIO INSTA-REVIEW

TOPIC 2.2

Where does the Krebs Cycle take place?

B. Matrix

The Krebs Cycle is the second step of cellular respiration. Recall: cellular respiration involves the mitochondria and the Krebs cycle specifically involves the Mitochondrial Matrix.

AP BIO INSTA-REVIEW

TOPIC

2.2

What is the function of the electron transport chain and where is it?

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TOPIC 2.2

What is the function of the electron transport chain and where is it?

Electron transport chain (ETC) takes place in the mitochondrial cristae AND thylakoid membrane (and technically prokaryotes plasma membrane). It functions to generate a protein gradient for ATP synthesis.

Note: ETC alone does not generate any ATP, it produces a gradient that will provide the potential energy needed for ATP synthesis

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TOPIC

2.2

What is the function of hydrolytic enzymes?

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TOPIC 2.2

What is the function of hydrolytic enzymes?

Hydrolytic enzymes are important for hydrolysis. The breaking of a water molecule to break a bond. We see this when we discuss breaking polymers into monomers.

Hydrolytic enzymes are found in the lysosome. They function to break down macromolecules so:

- intracellular digestion (white blood cells engulf prokaryotes and they need to be broken down. Phagocytosis involves engulfing "food"
- recycling cell material: misinformed proteins, nonfunctional organelles, etc.
- apoptosis: programmed cell death

AP BIO INSTA-REVIEW

TOPIC

2.2

The cristae is highly folded, what is the significance?

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TOPIC 2.2

The cristae is highly folded, what is the significance?

Increased surface area

More surface area means more sites for ETC and chemiosmosis to synthesize ATP.

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TOPIC 2.2

Where is chlorophyll found?

A. Cristae

B. Matrix

C. Stroma

D. Thylakoid

AP BIO INSTA-REVIEW

TOPIC 2.2

Where is chlorophyll found?

D. Thylakoid

Chlorophyll is a green pigment found in plant cells, specifically found in the chloroplast. This pigment is responsible for absorbing the solar energy in the light reactions which take place in the thylakoid membrane.

AP BIO INSTA-REVIEW

TOPIC 2.2

What is the stroma comparable with?

A. Cytosol

B. Endoplasmic Reticulum

C. Golgi Bodies

D. Lysosome

AP BIO INSTA-REVIEW

TOPIC 2.2

What is the stroma comparable with?

A. Cytosol

The chloroplast is believed to be a prokaryote based on the endosymbiotic theory. So, the gel substance on the inside of the organelle would be similar to the cytosol of the prokaryote

AP BIO INSTA-REVIEW

TOPIC 2.2

Which organelle is responsible for apoptosis?

A. Endoplasmic Reticulum

B. Golgi Bodies

C. Lysosomes

D. Mitochondria

AP BIO INSTA-REVIEW

TOPIC 2.2

Which organelle is responsible for apoptosis?

C. Lysosomes

Apoptosis is programmed cell death. This process involves the cell digesting from the interior to the exterior. The organelle responsible for digestion is the lysosome.

AP BIO INSTA-REVIEW

TOPIC

2.2

How does an increased surface area increase efficiency of rough ER?

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TOPIC 2.2

How does an increased surface area increase efficiency of rough ER?

Rough ER is responsible for synthesis of membrane proteins or proteins for secretion. An increased surface area allows for more locations for the ribosomes to bind (and more locations for protein synthesis).

AP BIO INSTA-REVIEW

TOPIC 2.2

Which of the following aids in the turgor pressure in plants?

A. Chloroplast

B. Mitochondria

C. Nucleus

D. Vacuole

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TOPIC 2.2

Which of the following aids in the turgor pressure in plants?

D. Vacuole

Turgor pressure results from the water storage in the central vacuole when the plant is in a hypotonic environment. This allows the plant cell to be firm.

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TOPIC

2.2

What is turgor pressure?

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TOPIC 2.2

What is turgor pressure?

Turgor pressure is the pressure from the cell wall from being "overfilled". We will discuss more later, but when the plant cell is placed in an hypotonic solution, the cell wall will take up water. This water that moves into the cell will be stored in the central vacuole. As it continues to fill, the overfilled central vacuole pushed cytosol against the cell wall which pushes back. This is why the plant cell doesn't lyse in a hypotonic environment.

AP BIO INSTA-REVIEW

TOPIC

2.2

Where are photosystems located?

A. Cristae

B. Matrix

C. Stroma

D. Thylakoid

AP BIO INSTA-REVIEW

TOPIC 2.2

Where are photosystems located?

D. Thylakoid

Photosystems are a component of the light reactions. They are found in the reaction center complexes. The light reactions take place in the thylakoid membrane of the chloroplast.

AP BIO INSTA-REVIEW

TOPIC

2.2

What is a photosystem?

AP BIO INSTA-REVIEW

TOPIC 2.2

What is a photosystem?

A photosystem is the light capturing component of the chloroplast. The thylakoid is composed of little sacs. The membrane of it has the photosystem. The photosystem is responsible for the energy absorbing part of the photosynthesis. The light energy is captured and stored in the form of high energy electrons and ATP.

AP BIO INSTA-REVIEW

TOPIC 2.2

What process takes place on the inner mitochondrial membrane?

A. Glycolysis

B. Krebs Cycle

C. Oxidative Phosphorylation

AP BIO INSTA-REVIEW

TOPIC 2.2

What process takes place on the inner mitochondrial membrane?

C. Oxidative Phosphorylation

The mitochondria is responsible for the link reaction plus second and third steps of cellular respiration. The inner membrane (called the cristae) is the site of oxidative phosphorylation. The ETC generates a proton gradient which is used to synthesize ATP by ATP synthase.

AP BIO INSTA-REVIEW

TOPIC 2.2

Where do the light dependent reactions take place?

A. Cristae

B. Matrix

C. Stroma

D. Thylakoid

AP BIO INSTA-REVIEW

TOPIC 2.2

Where do the light dependent reactions take place?

D. Thylakoid

The light dependent reactions are the light reactions in photosynthesis. Photosynthesis takes place in chloroplast. Specifically, the light reactions take place in the thylakoid membrane.

AP BIO INSTA-REVIEW

TOPIC

2.2

Where does the light independent process take place?

A. Cristae

B. Matrix

C. Stroma

D. Thylakoid

AP BIO INSTA-REVIEW

TOPIC 2.2

Where does the light independent process take place?

C. Stroma

The light independent reactions are the Calvin cycle. These reactions will take place in photosynthesis, specifically in the chloroplast. The Calvin cycle takes place in the stroma of the chloroplast.

AP BIO INSTA-REVIEW

TOPIC 2.2

What are the roles of the Rough ER?

A. Intracellular transport

B. Mechanical support

C. Protein synthesis

D. All of the above

AP BIO INSTA-REVIEW

TOPIC 2.2

What are the roles of the Rough ER?

D. All of the above

intracellular transport

mechanical support

protein synthesis

The Rough ER has multiple functions including:

- **Compartmentalization**
- **Intracellular Transport**
- **Mechanical Support**
- **Protein Synthesis**

AP BIO INSTA-REVIEW

TOPIC 2.2

What is the function of double membrane in mitochondria?

A. Provides more surface area

B. Provides compartments for metabolic processes

C. Provides more ATP to the cell

D. Provides more volume to decrease SA:V ratios

AP BIO INSTA-REVIEW

TOPIC 2.2

What is the function of double membrane in mitochondria?

B. Provides compartments for metabolic processes

The mitochondria has a double membrane due to the endosymbiotic theory (inner membrane is the membrane of the prokaryote and outer membrane is the host membrane when it went through the phagocytosis. The space between the two membranes is used by the last step of cellular respiration (oxidative phosphorylation) to generate a protein gradient that is used to synthesize ATP.

AP BIO INSTA-REVIEW

TOPIC

2.2

Describe apoptosis

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TOPIC 2.2

Describe apoptosis

Programmed cell death

Cell receives an autocrine signal which leads to nucleases and proteases to be active breaking down the nucleic acids and proteins in the cell. The cell is engulfed by a macrophage then digested in their lysosome.

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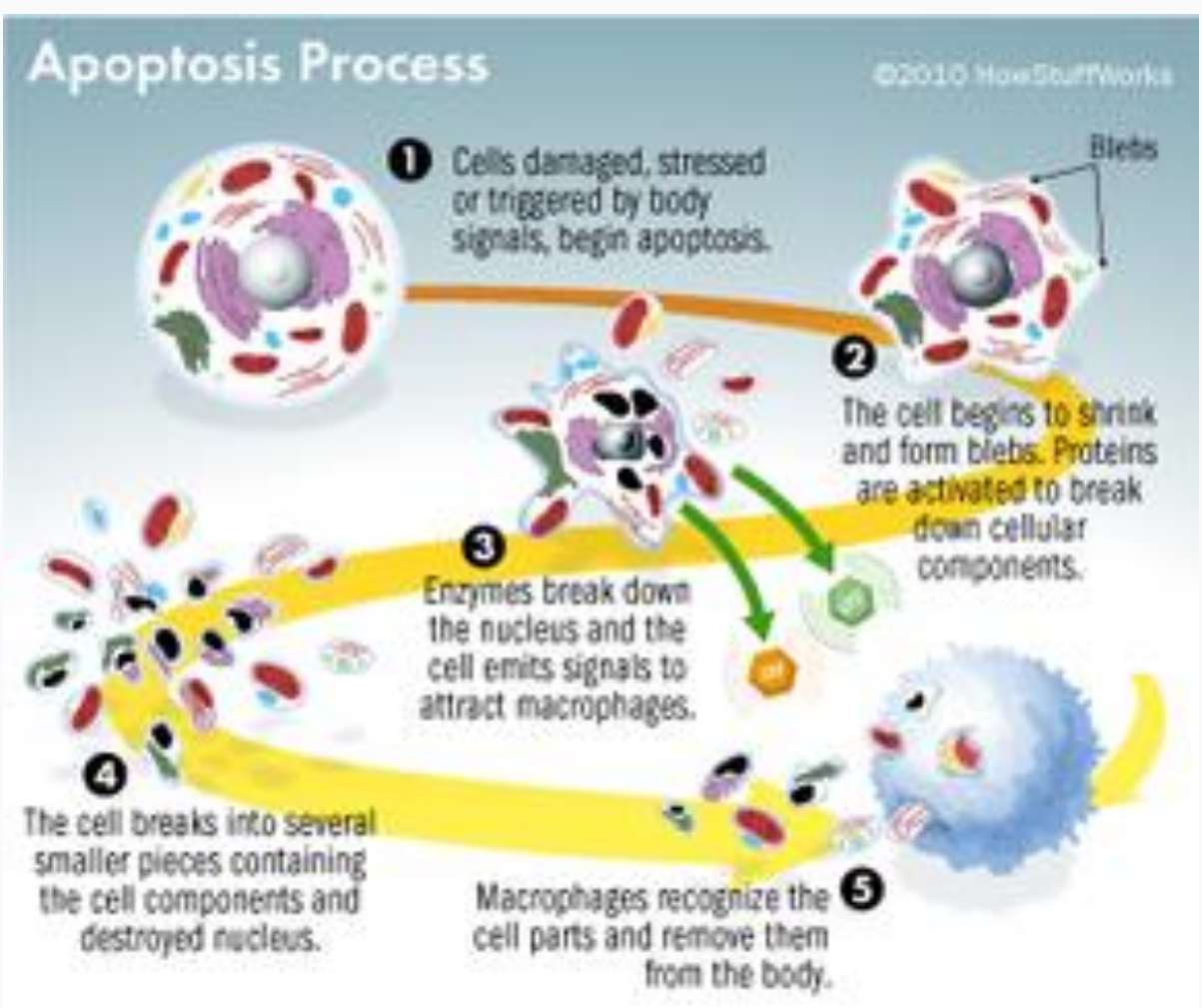
TOPIC

2.2

Describe apoptosis



AP BIO INSTA-REVIEW

TOPIC 2.2

How are thylakoids organized?

A. Small sacs of hydrolytic enzymes

B. Small sacs free floating in the cytosol

C. Small sacs organized in stacks called grana

D. Small sacs with ribosomes attached to nucleus

AP BIO INSTA-REVIEW

TOPIC 2.2

How are thylakoids organized?

C. Small sacs organized in stacks called grana

The thylakoid is the membranous sacs within the chloroplast which allows for the light reactions to take place. In order to increase surface area, they are organized as small sacs in stacks called grana.

AP BIO INSTA-REVIEW

TOPIC 2.2

Where is ATP synthesized in plant cells?

A. Plasma membrane

B. Chloroplast

C. Mitochondria

D. Chloroplast & Mitochondria

AP BIO INSTA-REVIEW

TOPIC 2.2

Where is ATP synthesized in plant cells?

D. Chloroplast & Mitochondria

ATP is synthesized in the mitochondria (cellular ATP) and the chloroplast (ATP used in the Calvin cycle). Both processes use a proton gradient and ATP synthase to synthesize ATP.