Name: _____ **Date:** _____

Answer Key: Invisible Factories: 8th Grade Cell Architecture Quiz

Signal transduction, protein folding, and energy conversion — harness the power of diagnostic scenarios to analyze how organelle malfunctions disrupt complex biological homeostasis.

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1. A patient is diagnosed with a rare disorder where their white blood cells can engulf bacteria but cannot digest them. Which organelle is likely malfunctioning?

Answer: B) Lysosomes

Lysosomes contain hydrolytic enzymes necessary for intracellular digestion; a failure here prevents the breakdown of captured pathogens.

2. The _____ is a network of membranes responsible for synthesizing phospholipids and detoxifying organic compounds in liver cells.

Answer: C) Smooth ER

The Smooth Endoplasmic Reticulum lacks ribosomes and specializes in lipid synthesis and the detoxification of metabolic byproducts.

3. True or False: The endosymbiotic theory suggests that mitochondria were once independent prokaryotes because they possess their own DNA and double membranes.

Answer: A) True

Mitochondria have circular DNA and double membranes, evidence that they originated from an ancient symbiotic relationship between different cell types.

4. If a cell's Golgi apparatus were destroyed, which of the following immediate consequences would be most critical for a multicellular organism?

Answer: C) Failure to export signaling proteins

The Golgi apparatus modifies, sorts, and packages proteins for secretion; without it, intercellular communication via hormones or enzymes would cease.

5. In the fluid mosaic model, _____ molecules act as 'ID tags' on the cell membrane, allowing the immune system to recognize self versus non-self cells.

Answer: B) Carbohydrate chains

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Glycoproteins and glycolipids (carbohydrate chains) function as cellular markers for recognition and signaling.

6. Which transition represents a high-energy demand scenario where you would expect to see an increase in mitochondrial density within a specific tissue?

Answer: C) Cardiac muscle during chronic aerobic exercise

Mitochondria produce ATP through cellular respiration; tissues with high metabolic activity, like heart muscle, require higher concentrations of these organelles.

7. True or False: Plant cells lack a cytoskeleton because the rigid cellulose cell wall provides all necessary structural support.

Answer: B) False

While plants have cell walls, they still require a cytoskeleton (microtubules/microfilaments) for internal transport, cell division, and organelle positioning.

8. The _____ is a dense region within the nucleus where the components of ribosomes are synthesized and assembled.

Answer: C) Nucleolus

The nucleolus is the specific site for rRNA synthesis and the assembly of ribosomal subunits.

9. If a cell's membrane loses its 'selectively permeable' nature, what is the most likely result regarding homeostasis?

Answer: B) Toxins will diffuse in and vital ions will leak out

Selective permeability is essential to maintain internal chemical concentrations; losing this leads to the equalization of internal and external environments, causing cell death.

10. True or False: Rough Endoplasmic Reticulum is 'rough' because it is studded with lysosomes that help with protein modification.

Answer: B) False

The Rough ER is studded with ribosomes, not lysosomes. Ribosomes are responsible for protein synthesis.