PEEBEDU.COM

Interactive Biology Education

Student Activity Sheet

Name: _____ Date: _____ Period: _____

Protein Modification Practice

Background

This app allows you to practice applying specific protein modifications and directing proteins to cellular destinations.

Phase 1: ENGAGE (10 minutes)

Getting Started: Open peebedu.com and navigate to Protein Modification and Shipping Visualizer

Initial Exploration:

What five functions can you perform with proteins in this app?

1. _____
2. _____
3. _____
4. _____
5. _____

Pre-Assessment Questions:

What is glycosylation?

_____

What is phosphorylation?

_____

What happens during protein cleavage?

_____

Phase 2: EXPLORE (25 minutes)

Investigation 1: Glycosylation Practice

Use the app to apply glycosylation to different proteins.

How many proteins were you able to modify using glycosylation?

_____

What effect did glycosylation have on protein function?

_____

Where in the cell does glycosylation typically occur?

_____

Investigation 2: Phosphorylation Practice

Use the app to apply phosphorylation to proteins.

How many proteins were you able to modify using phosphorylation?

_____

What effect did phosphorylation have on protein activity?

_____

Is phosphorylation reversible? Explain your answer.

_____

Investigation 3: Protein Cleavage Practice

Use the app to perform protein cleavage.

What happened to the proteins when you performed cleavage?

_____

What is the purpose of protein cleavage?

_____

Investigation 4: Protein Delivery Practice

Practice directing proteins to cell membrane and lysosome destinations.

Were you successful in delivering proteins to the cell membrane?

_____

Were you successful in delivering proteins to lysosomes?

_____

Why is correct protein targeting important for cellular function?

_____

Phase 3: EXPLAIN (10 minutes)

Protein Modification Summary

How would you define glycosylation?

_____

What is the main function of glycosylation?

_____

Where in the cell does glycosylation occur?

_____

How would you define phosphorylation?

_____

What is the main function of phosphorylation?

_____

Is phosphorylation reversible? Explain.

_____

How would you define protein cleavage?

_____

What is the main purpose of protein cleavage?

_____

What do proteins do when they reach the cell membrane?

_____

What do proteins do when they reach lysosomes?

_____

Phase 4: ELABORATE (5 minutes)

Application Questions

Real-World Connections:

Why do you think protein modifications are important for cellular function?

_____

_____

How might errors in protein targeting affect human health?

_____

_____

Practice Scenario:

A protein needs to function at the cell membrane. Which modifications from the app would be most important and why?

_____

_____

Phase 5: EVALUATE (5 minutes)

Assessment Questions

Multiple Choice:

1. Where does glycosylation primarily occur in the cell?
   a. Ribosome b) ER and Golgi c) Nucleus d) Cytoplasm
2. Which statement about phosphorylation is correct?
   a. It is always irreversible b) It is always reversible c) It can be both reversible and irreversible d) It never changes protein function
3. What is protein cleavage used for?
   a. To activate proteins b) To remove signal sequences c) Both a and b d) To destroy proteins

Short Answer:

What are the five protein functions you practiced in the app?

1. _____
2. _____
3. _____
4. _____
5. _____

Critical Thinking:

Why is proper protein targeting essential for cell survival?

_____

_____