

Assessment Questions

How Does the Epigenome Work?

1. Describe the physical state of the genome (tightly wrapped, or relaxed) when genes are inactive.
2. Describe the physical state of the genome when genes are active.

Gene Control

1. Describe the following characteristics when a gene is active:
 - Is the gene tightly or loosely wound around histones?
 - Are there many or few methyl molecules attached to the gene?
 - Are there many or few acetyl molecules attached to the genes associated histones?
 - Are there many or few mRNA transcripts?
2. Describe the following characteristics when a gene is inactive:
 - Is the gene tightly or loosely wound around histones?
 - Are there many or few methyl molecules attached to the gene?
 - Are there many or few acetyl molecules attached to the genes associated histones?
 - Are there many or few mRNA transcripts?

Insights From Identical Twins

1. Often, the physical characteristics of genetically identical twins become increasingly different as they age, even at the molecular level. Explain why this is so. (use the terms "environment" and "epigenome")
2. Name 3-4 environmental factors that influence the epigenome.
3. What is an imprinted gene?

Lick Your Rats

1. Explain how a high-nurturing mother rat shapes her pup's epigenome, and what that pup's response to stress will be.
2. In rats, does licking by the mother activate, or deactivate her pup's GR gene?
3. Explain how cortisol and the GR protein work together in the brain to relax a rat pup. You may draw a diagram.
4. The rat nurturing example shows us how parental behavior can shape the behavior of their offspring on a biochemical level. Relate this to humans and think about the personal and social implications. Record your thoughts.

The Epigenome Learns From Its Experiences

1. True or False. Cell signals play a a role in shaping gene expression only during development.
2. What molecule is primarily responsible for carrying cell signals to DNA?
3. What are the two functions of gene regulatory proteins?
4. Are epigenetic tags passed to daughter cells?

Epigenetics & Inheritance

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Nutrition & The Epigenome

1. Explain how the food we eat affects gene expression.
2. Can the diets of parents affect their offspring's epigenome?

Epigenetics & The Human Brain

1. Explain how the food we eat affects gene expression.
2. Can the diets of parents affect their offspring's epigenome?