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**Epigenetics Webquest**

*Read/view the information from each link and answer the questions that follow USING COMPLETE SENTENCES.*

**University of Utah:** *Epigenome at a Glance:* <http://learn.genetics.utah.edu/content/epigenetics/intro/>

1. What is DNA wrapped around?
2. Structurally, what is the epigenome?
3. How does the epigenome function differently for active vs inactive genes?
4. What kinds of factors can influence the epigenome?

**Epigenetics Video:** <http://www.pbs.org/wgbh/nova/body/epigenetics.html>

1. Why don’t identical twins look or act the same or always get the same diseases?
2. How do identical twins form?
3. How are the mice similar? How are they different?
4. How does the binding of chemicals to histones alter gene expression?
5. What is the epigenome?
6. How does the epigenome help tissues differentiate into different tissue types or organ systems?
7. Can your epigenome change? When?
8. How does Jirtle (the researcher) affect the epigenome of the mice to get skinny brown mice?
9. How can this affect humans?
10. What was the point of the Spanish twin study?
11. Which sets of twins are more similar and which are more different? Why is this so?
12. What is the idea of epigenetic therapy?
13. What is the deal with rainbow the calico cat and her clone? Why are they different?

**Gene Control:** [**http://learn.genetics.utah.edu/content/epigenetics/control/**](http://learn.genetics.utah.edu/content/epigenetics/control/)

Signals from the outside world can work through the epigenome to change a cell's gene expression.
In the activity below, you act as the signal. As you turn the control knob, epigenetic tags come and go to change the shape of the gene. Notice what happens to the mRNA and protein levels when you manipulate the epigenetic tags on the gene. Gene, mRNA and protein production are linked. They change together. What happens to the DNA, RNA and protein when the dial is turned “up?”

*Could You Really Do This?*

1. What do you think?
2. Has this been done before?
3. How does gene control affect cancer?

**Lick Your Rats:** [**http://learn.genetics.utah.edu/content/epigenetics/rats/**](http://learn.genetics.utah.edu/content/epigenetics/rats/)

Some mother rats spend a lot of time licking, grooming and nursing their pups. Others seem to ignore their pups. Highly nurtured rat pups tend to grow up to be calm adults, while rat pups who receive little nurturing tend to grow up to be anxious.
It turns out that the difference between a calm and an anxious rat is not genetic - it's epigenetic. The nurturing behavior of a mother rat during the first week of life shapes her pups' epigenomes. And the epigenetic pattern that mom establishes tends to stay put, even after the pups become adults.

1. How can the expression of the GR gene be altered?
2. What happens (genetically and behaviorally) to the baby rat when it is licked a lot?
3. What happens (same as above) to the baby rat when it wasn’t licked very much?
4. How does nurturing affect the DNA?
5. How is the brain of licked vs not licked rats affected by the process?

**Nutrition and the Epigenome:** <http://learn.genetics.utah.edu/content/epigenetics/nutrition/>

1. Why is nutrition studied for its affects on the epigenome?
2. What kinds of foods or nutrients can affect your epigenome?
3. According to this website, how important is the food your mother eats during pregnancy and what you are fed during infancy as it affects your epigenome?
4. Can you father have an impact on your epigenome? What unusual finding does the website say regarding paternal epigenomic affects?
5. How does a bee’s food affect its development?
6. What is nutrigenomics?

**Epigenetics and the Human Brain** [**http://learn.genetics.utah.edu/content/epigenetics/brain/**](http://learn.genetics.utah.edu/content/epigenetics/brain/)

1. *What do you think about this?*