**Ghost In Your Genes**

Since they are *genetically* identical, why aren’t identical twins completely identical? Why can they be even less identical as they age? This video explores some recent advances in the new field of **epigenetics** – how our genes interact with our environment, and how some changes due to those interactions can affect later generations. Do your best to answer these questions during the video. Check answers after the video with your partner.

1. Before the Human Genome Project read the sequence of the entire human genome, scientists thought we had around 100,000 genes? About how many do we really have?
2. How similar is the chimpanzee’s genome to ours?
3. What does seem to control which syndrome (a group of related conditions) that the child ended up with if they had that chromosomal change?
4. In the story about the agouti gene, what effect does the methyl molecule tags have?
5. All our cells have the same genes, so why aren’t all our cells identical?
6. What happened when the fat yellow agouti mice were fed a diet containing good sources of the methyl tags?
7. Why is the scientist Manel Esteller studying identical twins?
8. When Szyf and Meany injected rats with a drug that removes epigenetic marks, how did the rat’s ability to handle stress change?
9. In traditional chemotherapy (a chemical way of treating cancer) drugs are used that are targeted to kill cancer cells. What is different about the experimental treatment for MDS (a cancer of blood and bone marrow)?
10. According to Walter Kaufmann, what seems to be the biological cause of autism?
11. What did Olaf Bygren find out when studying the connection between health and poor nutrition?
12. According to Bygren and Pembrey, what environmental factor in a grandfather could increase the likelihood of diabetes in a grandson?
13. Also according to their work, when does the environmental imprinting happen in men and in women?
14. How does Skinner show that this may be due to epigenetic effects?
15. What do Skinner’s results mean for humans?
16. What would be the benefits from mapping the human epigenome?