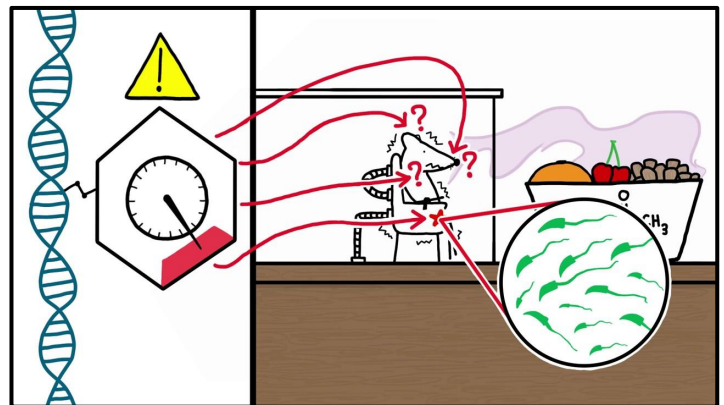


Epigenetics

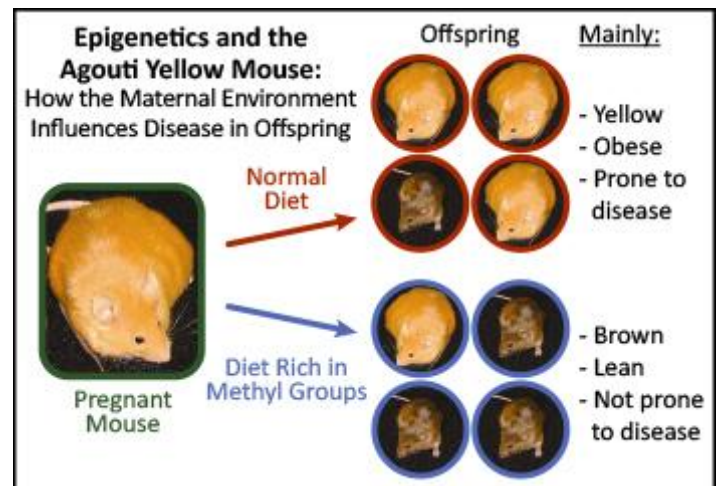


Epi means outside or on top of. Genetics are fixed, gene expression is moderated (turned on or off, up or down) by the impact of experiences and environment - controllable factors.

In one experiment, when researchers paired the sweet smell of **acetophenone** (smells like oranges and cherries) with a painful electric shock, rats learned to fear the smell even when not shocked. The rat's offspring, having never been exposed to the smell, were also afraid of it. This is a result of epigenetic tags, or "switches" being turned on or off, up or down. One place this happened was in the rat's sperm cells - resulting in pre-conditioning for their children.

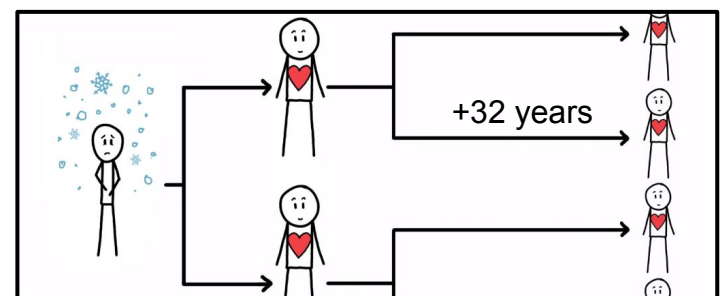


In another experiment, yellow **Agouti mice** - a type of mouse that is yellow, obese and prone to heart disease, diabetes, and cancer, were fed a special diet during pregnancy. Their offspring were born lean, brown and no longer prone to disease.



Epigenetic drugs are being tested on **addiction**. Scientist Moshe Szyf has found that after one treatment, rats are no longer addicted to drugs - even if they are exposed to the same environment in which they became addicted before.

Epigenetics is tough to experiment with in humans but in one historic incident, nature conspired to experiment for us. In Overkalix, Sweden, boys who survived winter **famine** had sons and grandsons who were extremely resistant to disease - living an average of 32 years longer than boys who did not survive famine.



Epigenetics provides our fixed genome with a dynamic capacity to react to the world. This is why healthy relationships with caring adults matter. The interactions with caring adults "evolve" the genetic expression of genes to be adaptive in different environments. Children with healthy intergenerational connections can not only endure adversity and survive, they can grow stronger through it.

Caring adults have the power to alter the trajectory of children by interacting with them in ways that develop their sense of belonging and significance. This trajectory becomes part of the scaffolding that their entire life is built upon.