

Inheritance without a change to DNA sequence

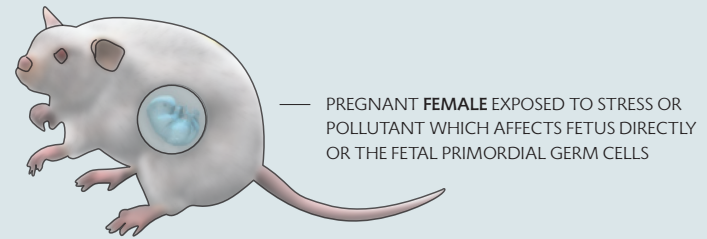
Epigenetics 101

While the DNA in chromosomes (*left*) carries primary genetic information, it is modified by a second layer of molecules called epigenetic “marks.” These marks are usually **methyl**, **acetyl**, or other chemicals which act like switches to control gene expression. Epigenetic marks also control how tightly DNA winds around **histone** beads. The tighter the wrapping, the fewer genes available for activation.

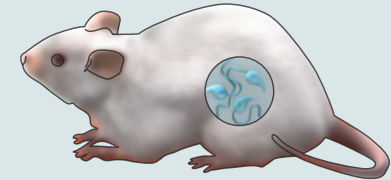
Epigenetic traits can persist for generations

Skinner’s research shows that **exposure to pollutants or stressors** (*right*) can add abnormal epigenetic marks to DNA and these marks can then survive two distinct waves of post-conception reprogramming—a process meant to prevent such persistence. A number of rodent studies suggest the abnormal marks can be passed down for at least five generations along with associated health risks.

SOURCES: NATURE 441 (MAY 11, 2006) “EPIGENETICS: UNFINISHED SYMPHONY,” AND ADAPTED FROM SCIENTIFIC AMERICAN AUGUST 2014 “INHERITANCE OUTSIDE THE GENES”



MALE SPERM CELLS EXPOSED TO STRESS OR POLLUTANT



2ND GEN: MULTIGENERATIONAL EFFECTS CAN BE EXPLAINED BY PARENTS’ DIRECT EXPOSURE TO STRESSORS OR POLLUTANTS



3RD GEN: TRANSGENERATIONAL INHERITANCE FROM GRANDFATHER’S EXPOSURE: GLUCOSE AND INSULIN RESISTANCE HAVE BEEN OBSERVED



4TH GEN: TRANSGENERATIONAL INHERITANCE FROM GREAT-GRANDMOTHER’S EXPOSURE: INFERTILITY, ANXIETY, OBESITY, LOW TESTOSTERONE (♂), AND OVARIAN DISEASE (♀) HAVE BEEN OBSERVED

