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Canada Research Chair in Epigenetics, Reproduction and Development **Dr Sarah Kimmins** discusses her groundbreaking work into epigenetics and how it is informing new theories about the importance of parental health and nutrition



**What is the overarching aim of your work?**

One of the most prevalent beliefs in society with regard to health is that disease is largely dependent on the DNA you inherit from your parents. However, it has become increasingly clear that health is also influenced by the environment. Our research focus is on understanding how a parent's environment, including diet and obesity, influence the health and development of his/her offspring. Your lifestyle choices and exposure to certain foods, stresses, exercise and toxicants all have an enormous impact on whether or not you will contract a disease. In recent years we have found that the impact of the environment on health has extended beyond the individual's health to span generations. This means that the lifestyle choices a parent makes and the toxic environmental exposures they encounter have the possibility to impact their children, and possibly even their grandchildren.

**Can you explain what is meant by the term epigenetics?**

It is commonly believed that inheritance is entirely dependent on DNA alone. However, in addition to DNA there is another layer of heritable information known as the epigenome. The epigenetic information is directly associated with DNA and controls

how it is used to impact gene expression. Epigenetics includes biochemical information in the form of DNA methylation at specific regions of the genome and also includes proteins known as histones, which influence the organisation of the DNA and its access to genes by the transcriptional machinery. Epigenetic factors work in concert to influence the stability of the chromosomes and control levels of gene expression.

**How is epigenetics involved in inheritance and disease?**

The epigenome is passed from generation to generation, in a process called epigenetic inheritance. Remarkably, the epigenome has a memory and contains information about





