**2017 Chemotherapy PLoS ONE Summary**

**February 2017**

**Publication**

Shnorhavorian M, Schwartz SM, Stansfeld B, Sadler-Riggleman I, Beck D, and Skinner MK (2017) Differential DNA Methylation Regions in Adult Human Sperm following Adolescent Chemotherapy: Potential for Epigenetic Inheritance. PLoS ONE 12(2): e0170085.

**Summary**

The potential that adolescent chemotherapy can impact the epigenetic programming of the germ line to influence later life adult fertility and promote epigenetic inheritance was investigated. Previous studies have demonstrated a number of environmental exposures such as abnormal nutrition and toxicants can promote sperm epigenetic changes that impact offspring. Adult males approximately ten years after pubertal exposure to chemotherapy were compared to adult males with no previous exposure. Sperm were collected to examine differential DNA methylation regions (DMRs) between the exposed and control populations. Gene associations and correlations to genetic mutations (copy number variation) were also investigated. A signature of statistically significant DMRs was identified in the chemotherapy exposed male sperm. The DMRs, termed epimutations, were found in CpG desert regions of primarily 1 kilobase size. Observations indicate adolescent chemotherapy exposure can promote epigenetic alterations that persist in later life. This is the first observation in humans that an early life chemical exposure can permanently reprogram the spermatogenic stem cell epigenome. The germline (i.e. sperm) epimutations identified suggest chemotherapy has the potential to promote epigenetic inheritance to the next generation.