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Publication

Rebecca Tracey, Mohan Manikkam, Carlos Guerrero-Bosagna, & Michael K. Skinner (2012) Hydrocarbon (Jet Fuel JP-8) Induces Epigenetic Transgenerational Inheritance of Adult-Onset Disease and Sperm Epimutations. *Reproductive Toxicology* 36: 104-16.

Summary

Environmental compounds have been shown to promote epigenetic transgenerational inheritance of disease. The current study was designed to determine if a hydrocarbon mixture involving jet fuel (JP-8) promotes epigenetic transgenerational inheritance of disease. Gestating F0 generation female rats were transiently exposed during the fetal gonadal development period. The direct exposure F1 generation had an increased incidence of kidney abnormalities in both females and males, prostate and pubertal abnormalities in males, and primordial follicle loss and polycystic ovarian disease in females. The first transgenerational generation is the F3 generation, and the jet fuel lineage had an increased incidence of primordial follicle loss and polycystic ovarian disease in females, and obesity in both females and males. Analysis of the jet fuel lineage F3 generation sperm epigenome identified 33 differential DNA methylation regions, termed epimutations. Observations demonstrate hydrocarbons can promote epigenetic transgenerational inheritance of disease and sperm epimutations, potential biomarkers for ancestral exposures.

Highlights

- First observation that a hydrocarbon mixture (Jet Fuel JP8) promotes epigenetic transgenerational inheritance of disease.
- Ancestral environmental exposures promoted transgenerational sperm epimutations.
- Suggestion ancestral hydrocarbon exposures may be part of the etiology of ovarian disease and obesity.
- Provides additional support for the ability of environmental toxicants to promote epigenetic transgenerational inheritance of disease.