

# Plastic products and jet fuel exposures raising incidences of 'epigenetic transgenerational inheritance'

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Washington State University researchers have lengthened their list of environmental toxicants that can negatively affect as many as three generations of an exposed animal's offspring.

Writing in the online journal [PLOS ONE](#), scientists led by [molecular biologist](#) Michael Skinner document reproductive disease and obesity in the descendants of rats exposed to the plasticizer bisphenol-A, or BPA, as well DEHP and DBP, plastic compounds known as phthalates.

In a separate article in the journal [Reproductive Toxicology](#), they report the first observation of cross-generation disease from a widely used hydrocarbon mixture the military refers to as JP8.

Both studies are the first of their kind to see obesity stemming from the process of "epigenetic transgenerational inheritance." While the animals are inheriting traits conveyed by their parents' [DNA sequences](#), they are also having [epigenetic inheritance](#) with some genes turned on and off. Skinner's lab in the past year has documented these epigenetic effects from a host of environmental toxicants, including plastics, pesticides, fungicide, dioxin and hydrocarbons.

The recent *PLOS ONE* study found "significant increases" in disease and abnormalities in the first and third generations of both male and female descendants of animals exposed to plastics. The first generation, whose

mother had been directly exposed during gestation, had increased kidney and prostate diseases. The third generation had pubertal abnormalities, testis disease, ovarian disease and obesity.

The study also identified nearly 200 epigenetic [molecular markers](#) for exposure and transgenerational disease. The markers could lead to the development of a diagnostic tool and new therapies.

The *Reproductive Toxicology* study exposed [female rats](#) to the hydrocarbon mixture as their fetuses' gonads were developing. The first generation of offspring had increased kidney and prostate abnormalities and ovarian disease. The third generation had increased losses of primordial follicles, the precursors to eggs, polycystic ovarian disease and obesity.

The study, said Skinner, "provides additional support for the possibility that environmental toxicants can promote the epigenetic transgenerational inheritance of disease."

"Your great-grandmothers exposures during pregnancy may cause disease in you, while you had no exposure," he said. "This is a non-genetic form of inheritance not involving DNA sequence, but environmental impacts on DNA chemical modifications. This is the first set of studies to show the epigenetic transgenerational inheritance of disease such as obesity, which suggests ancestral exposures may be a component of the disease development."

Provided by Washington State University

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