

Review finds fathers' age, lifestyle associated with birth defects

May 15 2016



Credit: George Hodan/public domain

A growing body of research is revealing associations between birth defects and a father's age, alcohol use and environmental factors, say researchers at Georgetown University Medical Center. They say these defects result from epigenetic alterations that can potentially affect multiple generations.

The study, published in the *American Journal of Stem Cells*, suggest both parents contribute to the health status of their offspring—a common sense conclusion which science is only now beginning to demonstrate, says the study's senior investigator, Joanna Kitlinska, PhD, an associate professor in biochemistry, and molecular and cellular biology.

"We know the nutritional, hormonal and psychological environment provided by the mother permanently alters organ structure, cellular response and gene expression in her offspring," she says.

"But our study shows the same thing to be true with fathers—his lifestyle, and how old he is, can be reflected in molecules that control gene function," she says. "In this way, a father can affect not only his immediate offspring, but future generations as well."

For example, a newborn can be diagnosed with fetal alcohol spectrum disorder (FASD), even though the mother has never consumed alcohol, Kitlinska says. "Up to 75 percent of children with FASD have biological fathers who are alcoholics, suggesting that preconceptual paternal alcohol consumption negatively impacts their offspring."

The report is a review of evidence, human and animal, published to date on the link between fathers and heritable epigenetic programming.

Among the studies reviewed are ones that find:

- Advanced age of a father is correlated with elevated rates of schizophrenia, autism, and [birth defects](#) in his children;
- A limited diet during a father's pre-adolescence has been linked to reduced risk of cardiovascular death in his children and grandchildren;
- Paternal obesity is linked to enlarged fat cells, changes in metabolic regulation, diabetes, obesity and development of brain

cancer;

- Psychosocial stress on the father is linked to defective behavioral traits in his offspring; and
- Paternal alcohol use leads to decreased newborn birth weight, marked reduction in overall brain size and impaired cognitive function.

"This new field of inherited paternal epigenetics needs to be organized into clinically applicable recommendations and lifestyle alternations," Kitlinska says. "And to really understand the epigenetic influences of a child, we need to study the interplay between maternal and paternal effects, as opposed to considering each in isolation."

Provided by Georgetown University Medical Center

Citation: Review finds fathers' age, lifestyle associated with birth defects (2016, May 15)
retrieved 19 April 2024 from
<https://medicalxpress.com/news/2016-05-fathers-age-lifestyle-birth-defects.html>

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