MedicalXpress

Nature or nurture? New epigenetic model blurs the line in the debate

July 21 2009

A research report published in the July 2009 issue of the journal *Genetics* complicates the debate over whether nature or nurture plays the most important role in complex diseases such as psychiatric disorders, heart disease, and cancer. In the report, a scientist from the University of California, Berkeley explains how epigenetics (temporary changes in gene function) and gene mutations (permanent, heritable changes in gene structure) contribute to disease risk in a population at a given time and in subsequent generations. This study provides an important theoretical foundation for future public health interventions designed to reduce a population's genetic risk of disease by limiting or eliminating epigenetic changes brought on by the environment.

"This paper calls attention to the potential importance of epigenetic factors that can influence the risk of complex diseases," said Montgomery Slatkin, the researcher who devised the study, and a professor at the University of California, Berkeley's Department of Integrative Biology, "and to the need to identify such factors and determine their rate of gain and loss."

The model described in the report represents a first step in quantifying the effect of epigenetic change on disease risk and recurrence risk. It found that while mutations have the largest effect on disease risk heritability, epigenetic factors play a surprisingly large role in the disease risk that gets passed down through the generations. Several other studies have already suggested that environmental factors, such as a pregnant woman's diet, might lead to epigenetic changes in her offspring, making

it imperative for researchers and public health officials to understand exactly how these epigenetic factors and their causes influence disease risk.

"Almost every article on disease heritability describes 'genetics' as being an important factor in a person's likelihood to contract disease," said Mark Johnston, Editor-in-Chief of the journal *Genetics*. "Indeed that is true, but what is not often explained is that less permanent changes to our DNA also significantly influence our risk for disease. We tend to view disease risk as a tug of war between nature and nurture, but this study shows that nature and nurture are more closely related than we had imagined."

More information: Montgomery Slatkin. Epigenetic Inheritance and the Missing Heritability Problem, *Genetics* 2009 182: 845: www.genetics.org/cgi/content/abstract/182/3/845

Source: Genetics Society of America