

Fetal stress disrupts the way genes are transmitted

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If you think stress is killing you, you may be right, but what you don't know is that stress might have harmed your health even before you were born. In a new report appearing in the August 2013 issue of *The FASEB Journal*, Harvard researchers find that epigenetic disruptions, which are associated with chronic disease later in life, are already common at birth. Possibly, these aberrations result from stressors in the intrauterine environment (e.g. maternal smoking, maternal diet, or high levels of endocrine-disrupting chemicals). This finding supports the belief that seeds of disease are sown before birth, increasing the importance of optimal prenatal care.

"This study may help us understand whether [epigenetic mechanisms](#) contribute to chronic [disease susceptibility](#) already prior to birth," said Karin Michels, Sc.D., Ph.D., study author from Harvard Medical School in Boston, Mass. "We are currently exploring which stressors during prenatal life may contribute to these epigenetic disruptions."

To make this discovery, Michels and colleagues examined the expression pattern of imprinted genes important for growth and development. Researchers analyzed the parental expression pattern in the cord blood and placenta of more than 100 infants and followed up this analysis with methylation and expression studies. The results lent credence to the emerging theme that susceptibility to disease may indeed originate in utero. Additionally, this research showed that a high degree of disruption occurred during the imprinting of a gene called IGF2, which was expressed from both alleles in the cord blood of 22 percent of study

subjects. Loss of imprinting of IGF2 has been associated with several cancers, including Wilms Tumor, colorectal and [breast cancer](#) and childhood disorders such as Beckwith-Wiedemann Syndrome.

"For a long time, doctors have considered fetal stress as a symptom of serious familial disease," said Gerald Weissmann, M.D., Editor-in-Chief of *The FASEB Journal*. "Now, we see that fetal stress is in and of itself a long-term risk factor for chronic disease: it changes the way we inherit genes from our parents."

More information: Rebecca C. Rancourt, Holly R. Harris, Ludovic Barault, and Karin B. Michels. The prevalence of loss of imprinting of H19 and IGF2 at birth. *FASEB J* August 2013 27:3335-3343; [doi:10.1096/fj.12-225284](https://doi.org/10.1096/fj.12-225284)

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