

Effects of prenatal stress passed across generations in mice

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Sons of male mice exposed to prenatal stress are more sensitive to stress as adults, according to a study in the August 17 issue of *The Journal of Neuroscience*. These findings suggest experiences in the womb can lead to individual differences in stress response that may be passed across generations.

Tracy Bale, PhD, of the University of Pennsylvania, and colleagues previously found that male mice were sensitive to stress their mothers experienced during pregnancy. In the current study Bale, together with Chris Morgan, also of the University of Pennsylvania, bred those stress-sensitive males with normal [females](#) to see if the heightened stress response could be transmitted to the [next generation](#) of mice. Even though the male offspring had no additional exposure to stress in the womb, they displayed a more pronounced reaction to stress, just like their fathers.

"This study shows that the effects of maternal stress in mice are passed by the sons to the grandsons of the stressed mothers," said Arthur Arnold, PhD, an expert on sex differences in the brain at the University of California, Los Angeles. "Since male mice are not involved in rearing the offspring in the lab setting, the findings suggest that the transmission of the trait from son to grandson is through the son's DNA," added Arnold, who was unaffiliated with the study.

In general, [female mice](#) tend to respond more to stress than do males. However, in the current study, the sons and grandsons of female mice

that were stressed while pregnant showed a [stress response](#) more similar to female mice.

Compared with other male mice, the stress-sensitive grandsons also had smaller testes, as did their fathers, suggesting they were exposed to less [testosterone](#) around birth — a critical period for establishing sex differences in the brain. Additionally, genes involved in brain development were turned on and off in a pattern more similar to female than male mice.

"Together these findings suggest prenatal stress may disrupt masculinization of the developing mouse brain," Bale said. Although such changes did not deter the stress-sensitive male mice from reproducing, the results suggest exposure to [stress](#) during early pregnancy can lead to long-term changes in offspring that can be passed across generations.

Provided by Society for Neuroscience

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