

Sexually naive male mice, fathers respond differently to pups

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Sexually naïve male mice respond differently to the chemical signals emitted by newborn pups than males that have mated and lived with pregnant females, according to a study published March 20 in *The Journal of Neuroscience*. The findings may help scientists to better understand the changes that take place in the brains of some mammals during the transition into parenthood.

Sex differences in the behaviors mice display toward newborn pups are well documented. While virgin [female mice](#) routinely provide parental care to pups upon first encounter, sexually naïve males react to pups with aggression, sometimes attacking and killing them. Previous studies have shown that male mice that have mated and lived with pregnant females ("fathers") will display parental behaviors similar to females when

exposed to infants (such as gathering and grooming mice), even when the offspring are not their own.

In order to better understand the brain mechanisms underlying the transition from aggressive to parental behavior, Kashiko Tachikawa, PhD, and colleagues at RIKEN Brain Science Institute in Japan compared cellular activity in the brains of sexually naïve male mice to fathers following exposure to pups. Pup exposure led to greater activation of [nerve cells](#) in the [vomeronasal organ](#) (VNO)—a specialized [sensory organ](#) in the nose that detects pheromones—and connected [brain regions](#) involved in processing emotional information in the sexually naïve male mice compared with fathers.

"The findings suggest that when a [male mouse](#) experiences fatherhood, specific physiological events in the brain compel him to nurture young pups," said Garet Lahvis, PhD, who studies the social behavior of juvenile mice at Oregon Health and Science University and was not involved in the study. "These experiments suggest that the mammalian male brain is not simply hardwired for competition but flexibly wired to nurture," he added.

Additional tests suggested that suppressing the response of the VNO to pup pheromones may influence the behavioral transition from attack to parenting in sexually naïve male mice. When the researchers removed the VNO in those males, they found that they stopped their aggressive behavior and instead displayed parental behaviors toward the pups. Removing the VNO in the fathers had no effect on the parental behaviors displayed toward pups.

"Our study is the first to suggest that the chemical cues received by the vomeronasal organ evoke aggressive behavior toward pups in sexually-naïve male mice but not in fathers," Tachikawa said.

Although she cautioned it is not possible to draw direct parallels to human behavior based on the results of the study, Tachikawa noted that "the findings may someday pave the way toward understanding the brain mechanisms responsible for paternal behavior common to other mammals."

Provided by Society for Neuroscience

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