Medical Xpress

Differences in brain development between males and females may hold clues to mental health disorders

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Many mental health disorders, such as autism and schizophrenia, produce changes in social behavior or interactions. The frequency and/or severity of these disorders is substantially greater in boys than girls, but the biological basis for this difference between the two sexes is unknown.

Researchers at the University of Maryland School of Medicine have discovered differences in the development of the amygdala region of the brain – which is critical to the expression of emotional and social behaviors – in animal models that may help to explain why some mental health disorders are more prevalent among boys. They also found a surprising variable – a difference between males and females in the level of endocannabinoid, a natural substance in the brain that affected their behavior, specifically how they played.

The study results have been published online this month in the *Proceedings of the National Academy of Sciences*.

Margaret M. McCarthy, Ph.D., the senior author and a professor of physiology and psychiatry at the University of Maryland School of Medicine, says, "Our findings help us to better understand the differences in brain development between males and females that may eventually provide the biologic basis for why some mental health conditions are more prevalent in males. We need to determine if these

neural differences in the developing brain that we've seen in rats may cause similar behavioral effects in human babies."

Dr. McCarthy and her colleagues found that female rats have about 30 to 50 percent more glial cells in the amygdala region of the temporal lobe of the brain than their male litter mates. They also found that the females had lower amounts of endocannabinoids, which have been dubbed the brain's own marijuana because they activate cannabinoid receptors that are also stimulated by THC, the main psychoactive ingredient of cannabis.

Researchers also found that the female rats also played 30 to 40 percent less than male rats. However, when these newborn female rats were given a cannabis-like compound to stimulate their natural endocannabinoid system, their glial cell production decreased and they displayed increased play behavior later as juveniles. In fact, the level of play exhibited by females treated with a cannabis-like compound was very similar to levels in male rats, the researchers found. Yet exposure to this cannabis-like compound did not appear to have any discernible effect on newborn male rats.

Dr. McCarthy, who is also associate dean for Graduate Studies and interim chair of the Department of Pharmacology & Experimental Therapeutics, notes, "We have never before seen a sex difference such as this in the developing brain involving cell proliferation in females that is regulated by endocannabinoids."

E. Albert Reece, M.D., Ph.D., M.B.A., vice president of medical affairs at the University of Maryland and dean of the University of Maryland School of Medicine, says, "The results of this study provide important clues to brain differences between males and females and may increase our knowledge about how these differences may affect both normal and aberrant brain development, thereby enhancing our understanding of

many mental health disorders."

Provided by University of Maryland Medical Center