Early intervention effective in treating neurodevelopmental disorders

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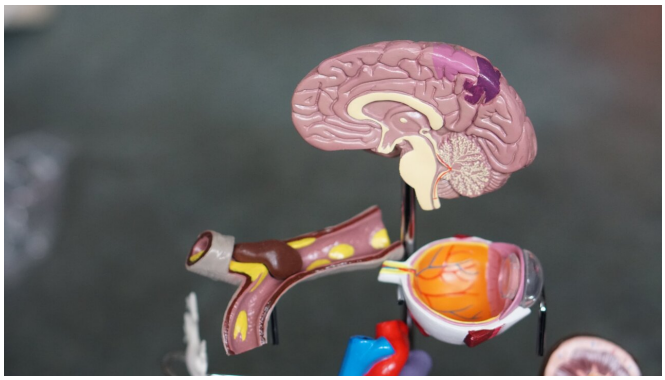

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A new study suggests that therapeutic interventions to treat neurodevelopmental disorders may be more effective if done during the early stages of brain development.

"In order to stop the progression of neurodevelopmental disorders, it is important to identify how and when brain circuits are changing during development. Our study identifies when circuits are altered in addition to how brain circuits are corrected," said the study's senior author Molly Huntsman, Ph.D., associate professor at the University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences located on the University of Colorado Anschutz Medical Campus.

The study, published in *The Journal of Neuroscience*, looks at Fragile X Syndrome (FXS), a pervasive neurodevelopmental disorder and a common cause of intellectual disability, autism and anxiety disorders.

"Currently, there are no approved or effective therapies targeting specific pathophysiology underlying the clinical manifestations of FXS," Huntsman said. "We're hoping to provide answers for when and how to treat FXS to help with therapeutic options eventually."

The CU Skaggs School of Pharmacy researchers identified potential causal circuit-level changes during a critical period of brain development susceptible to therapeutic intervention. They focused on the amygdala—the brain region where fear and anxiety are processed.

Using a mouse model of FXS, they identified a critical period of increased circuit plasticity occurring in early brain development. They showed that fear-learning emerges in in the brain during these periods of increased plasticity. At the same time, they demonstrated that early intervention ameliorates it.

The results suggest that critical period plasticity in the amygdala is increased and may be shifted to earlier developmental timepoints. This could cause a "maladaptive" form of plasticity and yet one that can be treated with therapeutic intervention at key developmental time points.

Age at the time of treatment, the study said, is important because early pharmacological intervention was shown effective in reducing fear-learning in the mouse model.

"This is highly significant and addresses a critical barrier for understanding how circuits develop in a mouse model of autism and intellectual disability and even more important for therapeutic intervention-directed treatment options," Huntsman said.

The researchers said future clinical trials should focus on human critical periods of development.

More information: Matthew N. Svalina et al, Basolateral amygdala hyperexcitability is associated with precocious developmental emergence of fear-learning in Fragile X Syndrome,

The Journal of Neuroscience (2022). DOI: 10.1523/JNEUROSCI.1776-21.2022