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Researcher develops mouse model for studying development of visual cortex

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A day by day log of cortical electric activity in the mouse visual cortex was published in the *Journal of Neuroscience* by George Washington University (GW) researcher Matthew Colonnese, Ph.D. This research is the first to establish a mouse model for human fetal electrographic development. The mouse is an important preclinical model of disease and development; and Colonnese's model will give key information for understanding cortical circuit development in humans.

"It is a major benefit to have a developmental mouse model, since there are so many other mouse models of disease and there is such a large gap in our understanding of the normal progression of the developing cortex," said Colonnese, assistant professor of pharmacology and physiology at the GW School of Medicine and Health Sciences. "Having this mouse model will help us identify critical checkpoints for normal development."

Colonnese and his research team used EEG to track daily changes in brain oscillations, which coordinate neural activities in the central nervous system. The brain oscillations of infants look very different from adults, but if the young oscillations transform to become adult oscillations, or if they are a completely different phenomena, is unknown. One key finding of this research is that slow, spindle-shaped oscillations, similar to those observed in human preterm infants, transform into the rapid oscillations in adults that are associated with visual processing. By contrast, the idling state of the brain engaged during sleep does not emerge until later in development.

"We are trying to provide an atlas for neural development, so that if you see abberent brain activity in the clinic, you know which part of the brain is affected and why, which could form a basis for further treatment," said Colonnese. "This study is the first step to defining which types of patterns first come online, so we can break down the circuitry."

Building on this research, future studies may look at signs of neurodevelopmental disorders, such as epilepsy, autism, or schizophrenia, during development. With this model, any early defects will be better visible.

More information: J. Shen et al. Development of Activity in the Mouse Visual Cortex, *Journal of Neuroscience* (2016). DOI: 10.1523/JNEUROSCI.1903-16.2016

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