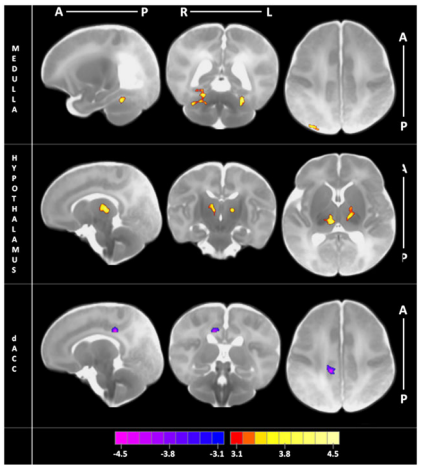
This Week in The Journal

Exploring Neural Mechanisms for Developmental Language Disorder

Anni Nora, Oona Rinkinen, Hanna Renvall, Elisabet Service, Eva Arkkila et al.

(see article e2048232024)

Developmental language disorder (DLD) impairs language comprehension and language-oriented self-expression. Herein, Nora et al. investigated the mechanisms through which this symptomology occurs. They used a combined millisecond scale magnetoencephalography (MEG) and machine learning model approach to explore the role of disrupted cortical tracking of speech in DLD. Children were exposed to common spoken words such as dog, car, and hammer and sounds corresponding to these words like barking, a car engine, and hammering. The authors found that, while cortical activation related to speech was initially comparable in children with DLD and children with typical language development, cortical representation of speech was impeded in DLD children over longer latencies. In other words, cortical tracking of speech was normal initially during testing but was impaired at syllable-level latency, which suggests that the maintenance of cortical memory traces across each word was impaired in children with DLD. These findings shed light on how identifying words and learning new ones is disrupted in those with language development issues.



These representative fMRI scans depict associations between fetal heart rate variability during the second trimester and newborn bilateral medulla, hypothalamus, and dACC connectivity. See Pollatou et al. for more details.

Visualizing the Association between Fetal Heart Rate and Brain Development

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(see article e2363232024)

The body physiology of mammalian organisms depends on proper autonomic nervous system functioning. As this system develops, fetal heart rate variability increases while heart rate decreases. Thus, these measures serve as helpful representations of autonomic nervous system development and may be predictive of its ability to regulate body physiology. While fetal heart rate variability and heart rate are associated with child language ability and certain motor behaviors in toddlers, their relationship to the post-birth development of brain regions that are involved in autonomic and behavioral regulation like the brainstem, hypothalamus, and dorsal anterior cingulate cortex (dACC) are unexplored. Pollatou et al. investigated this knowledge gap in this issue. They assessed fetal heart rate variability and heart rate in 60 pregnant individuals using a fetal actocardiograph. Post birth, infants underwent an fMRI scan. The authors found that these heart rate indices are strongly associated with infant brainstem, hypothalamus, and dACC connectivity. These findings are an important first step in understanding the neural basis of autonomic and behavioral regulatory development post birth and will be informative for future studies.

This Week in The Journal was written by Paige McKeon
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