

Characterizing in-utero fetal brain development in non-syndromic isolated structural birth defects associated with impaired or altered proprioception

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The relevance of the input from the periphery for fetal brain development has been widely accepted. Decreased exteroception (deprivation of environmental stimuli) leads to altered patterning of the cerebral cortex. However, in contrast to exteroception, it remains unknown whether and how proprioceptive (stimuli arising within the body) or interoceptive signals (stimuli arising from visceral organs) affect fetal brain development. Impaired or **altered proprioception is associated with several congenital conditions that fall into the category of non-syndromic isolated musculoskeletal structural birth defects of the face or body** (niMSKBDs). Nonetheless, despite an increased risk of neurodevelopmental disabilities and despite being among the leading causes of years of pediatric potential-life-lost whether fetuses with these conditions have abnormal fetal brain development remains a critical knowledge gap. Our overarching hypothesis is that brain development is altered in congenital niMSKBDs. This proposal **aims to identify brain regions that are altered in congenital conditions associated with impaired or altered body awareness sense, i.e., proprioception**. We propose to leverage an existing fetal MRI cohort from the Advanced Maternal-Fetal Care Center at Boston Children's Hospital and to analyze it using state-of-the-art MRI tools to characterize the fetal brain structure. By identifying regions that are altered during development, this project will lay the foundation for the characterization of the neural substrate of impaired neurodevelopmental outcome in this vulnerable clinical population.