

Identifying Early Neurobiological Risk Markers for Autism Spectrum Disorder in the First Year of Life

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Autism spectrum disorder (ASD) is the fastest growing neurodevelopmental disorder, with core impairments in social, cognitive and communicative development. Recent studies have found that the behavioral symptoms typically emerge during the second year of life, with declines in social engagement, vocalization, communication and affect regulation. One exciting new direction for research on ASD focuses on potential early signs of neurological and cognitive risk during the first year of life, before the onset of behavioral symptoms. This line of research focuses on infants who have an older sibling diagnosed with ASD who are at higher genetic risk for the disorder (about 1 in 5 of these infants will later be diagnosed with ASD).

In this presentation I will provide an overview of the research in this area, focusing on a collaborative study currently underway at BU and Harvard Medical School/Children's Hospital Boston (PIs: Helen Tager-Flusberg and Charles A. Nelson). To date, we have collected data from about 220 children, about half this sample are at high risk for ASD (HRA group), and half at low risk (LRC group), defined as having an older sibling but no family history of ASD or related neurodevelopmental disorders. Data are collected in the laboratory when the infants are 3, 6, 9, 12, 18, 24, and 36 months old, and outcomes are assessed at the 24 and 36 month visits. We collect standardized test and diagnostic behavioral measures, experimental eye-tracking electrophysiological, and functional near-infrared spectroscopy measures in response to social/face and language paradigms.

Our findings demonstrate that the HRA group differs significantly from the LRC group during the first year of life, particularly on our neurobiological measures. Significant differences have been found in EEG, and in brain asymmetry measures, particularly for speech and language processing. There are also group differences in measures of connectivity to both faces and language. Longitudinal analyses demonstrate striking group differences in the developmental trajectories of these neurobiological indices of risk. Discussion will focus on those findings that distinguish high from low risk groups and measures that distinguish those infants who go on to have an ASD diagnosis by the time they reach 24 or 35 months of age.