Theme: Pre-clinical Research and Mechanisms of Disease

Social Stimulus Encoding in Neurodevelopmental Disorders Using Mouse Models

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Abstract:
Deficits in social interaction and communication characterize neurodevelopmental disorders such as autism spectrum disorder (ASD); however, the neural foundations of these impairments are not fully understood. This study explored the neural circuitry involved in social stimulus encoding using genetically modified mouse models of neurofibromatosis type 1 (NF1) that mimic the aspects of these disorders. Specifically, a social-visual conditioning paradigm was implemented to assess social encoding in the visual cortex in the NF1 mice. Through iterative behavioural setups optimised for effective social reward conditioning, results suggest increased accuracy and reward-associated choices in relation to signatures of successful stimulus encoding in V1. Electrophysiological recordings using a 16-channel silicon probe revealed differential responses across cortical layers, with layer 2/3 showing faster responses to familiar social stimuli compared with novel ones ($p = 0.043$). Although small sample sizes limit the conclusiveness of these findings regarding the effect of NF1 mutation, the data suggest promising insights into the neural of social encoding. This integrative approach, which combines behavioural assays and electrophysiology, provides new perspectives on the neural mechanisms underlying social impairments in neurodevelopmental disorders. These findings could inform future therapeutic strategies and underscore the value of mouse models in studying complex neurological conditions.

Keywords: neural encoding, autism spectrum disorder, neurofibromatosis type 1, electrophysiology