Infant acetylcholine, dopamine, and melatonin dysregulation: Neonatal biomarkers and causal factors for ASD and ADHD phenotypes

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Abstract

Autism spectrum disorders (ASD) and ADHD are common neurodevelopmental disorders that benefit from early intervention but currently suffer from late detection and diagnosis: neurochemical dysregulations are extant already at birth but clinical phenotypes are not distinguishable until preschool-age or later. The vast heterogeneity between subjects’ phenotypes relates to the interaction between multiple unknown factors, making research on factor causality insurmountable. To unlock this situation we pose the hypothesis that atypical pupillary light responses from rods, cones, and the recently discovered ipRGC system reflect early acetylcholine, melatonin, and dopamine dysregulation that are sufficient but not necessary factors for developing ASD and/or ADHD disorders. Current technology allows non-invasive cost-efficient assessment already from the first postnatal month. The benefits of the current proposal are: identification of clinical subgroups based on the cause rather than phenotypes; facilitation of research on other causal factors; neonatal prediction of later diagnoses; and guidance for targeted therapeutical intervention.