



EEI-ELEAT - Environmental Exposure Index for the Early Life Exposure Assessment Tool

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Abstract / MSc thesis project proposal

Autism Spectrum Disorder (ASD) is a common neurodevelopmental disorder characterized by a highly heterogeneous clinical presentation. Multiple genetic factors explain 10-20% of ASD etiology. Recent heritability estimates indicate a substantial effect of environmental factors, and early exposure to toxicants with potentially disruptive effects in neurodevelopment has been implicated in ASD. Given the high clinical and genetic heterogeneity in ASD, it is hypothesized that gene-environment interactions may modulate the complex ASD phenotype, possibly at different timings and in variable measures⁶. Epidemiological studies implicate socio-economic factors, medical history, lifestyle, and chemical toxicants in higher risk of developing ASD. However, the means, timing and direct effects on ASD remain unclear for most factors, and there are many inconsistent findings due to methodological differences in clinical evaluation and case ascertainment, assessment of timing and dose of exposure, and to small sample sizes.

To understand this complex picture, additional research is needed using exposure-based measures, to improve our understanding of the links between environmental exposure and neurodevelopmental disease and allow us to better characterize the impairments of ASD children.

To increase the potential to compare studies and allow adequate sample sizes to appropriately assess rare exposures and interactions, the Early Life Exposures Assessment Tool (ELEAT) was developed by a team of investigators from the University of California, and We have previously translated the ELEAT into Portuguese and adapted and piloted it to be culturally appropriate for assessing environmental exposures in Portuguese studies of neurodevelopmental disorders.

The present work will develop a quantitative tool to explore the important question about how environmental factors play a role in ASD etiology. The objective is therefore to expand the utility of the ELEAT by developing a quantifiable exposure score derived from the questionnaire, facilitating the interpretation of results, the comparison between datasets and the analysis of gene-environmental interactions. Additionally, we will explore the correlations of the ELEAT derived scores with levels of specific toxicants measured in neonatal dried blood spots, by mass spectrometry (LC-MS). Through this correlation by calculating the Kappa coefficient of agreement, we expect to understand if the exposures reported in the ELEAT are reflected in the concentrations measured by LC-MS, in the blood spots, that is, if children for which mothers report high exposure to a toxicant also have higher given concentrations of that same toxicant in the neonatal dried blood spots.

This work seeks to improve and quantify exposure levels, contributing to the understanding of environmental factors that modulate ASD risk.