Proceedings of *Autism Challenges and Solutions XII International Research and Practice Conference*, ABU-DHABI UAE, 27-30th April 2024. Published and Indexed by Emirates Scholar Center for Research and Studies.

Validation of plasma protein glycation and oxidation biomarkers for the diagnosis of autism

Professor Naila Rabbani

N.rabbani@qu.edu.qa

College of Medicine, QU Health, Qatar University

ARTICLE INFO

Doi: 10.54878/bthff139

KEYWORDS

Autism Spectrum Disorder (ASD), behavior-based, plasma protein glycation, mechanistic

HOW TO CITE

Validation of plasma protein glycation and oxidation biomarkers for the diagnosis of autism. (2024). *Autism Challenges and Solutions*, *2*(1). https://doi.org/10.54878/bthff139

ABSTRACT

Autism Spectrum Disorder (ASD) is a common neurodevelopmental disorder in children. It is currently diagnosed by behavior-based assessments made by observation and interview. In 2018 we reported a discovery study of a blood biomarker diagnostic test for ASD based on a combination of four plasma protein glycation and oxidation adducts. The test had 88% accuracy in children 5 - 12 years old. Herein, we present an international multicenter clinical validation study (N = 478) with application of similar biomarkers to a wider age range of 1.5 - 12 years old children. Three hundred and eleven children with ASD (247 male, 64 females; age 5.2 ± 3.0 years) and 167 children with typical development (94 male, 73 female; 4.9 ± 2.4 years) were recruited for this study at Sidra Medicine and Hamad Medical Corporation hospitals, Qatar, and Hospital Regional Universitario de Málaga, Spain. For subjects 5 - 12 years old, the diagnostic algorithm with features, advanced glycation endproducts (AGEs) - Nε-carboxymethyl-lysine (CML), Nω-carboxymethylarginine (CMA) and 3-deoxyglucosone-derived hydroimidazolone (3DG-H), and oxidative damage marker, o,o'-dityrosine (DT), age and gender had accuracy 83% (CI 79 - 89%), sensitivity 94% (CI 90 - 98%), specificity 67% (CI 57 - 76%) and area-under-the-curve of receiver operating characteristic plot (AUROC) 0.87 (CI 0.84 - 0.90). Inclusion of addition plasma protein glycation and oxidation adducts increased the specificity to 74%. An algorithm with 12 plasma protein glycation and oxidation adduct features was optimum for children of 1.5 - 12 years old: accuracy 74% (CI 70 - 79%), sensitivity 75% (CI 63 - 87%), specificity 74% (CI 58 - 90%) and AUROC 0.79 (CI 0.74 - 0.84). We conclude that ASD diagnosis may be supported using an algorithm with features of plasma protein CML, CMA, 3DG-H and DT in 5 - 12 years-old children, and an algorithm with additional features applicable for ASD screening in younger children. ASD severity, as assessed by ADOS-2 score, correlated positively with plasma protein glycation adducts derived from methylglyoxal, hydroimidazolone MG-H1 and Nε(1-carboxyethyl) lysine (CEL). The successful validation herein may indicate that the algorithm modifiable features are mechanistic risk markers linking ASD to increased lipid peroxidation, neuronal plasticity and proteotoxic stress.