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Research Article

Platelet-Derived Growth Factor (PDGF)-AA Levels in Mothers of Autistic Children

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Abstract

Autism spectrum disorders (ASD) constitute a variety of neurodevelopmental disorders with childhood onset defined clinically by difficulties in socialization, restricted or repetitive behaviors and language delays. Platelet-derived growth factor (PDGF) ligands and receptors are essential proteins that are expressed by both embryonic and mature nervous systems. In this study, we used immune-array technology to measure PDGF-AA levels in mothers of autistic children and neurotypical controls and found that PDGF-AA levels were significantly lower in the maternal group. These low levels may influence PDGF levels and symptom severity in individuals with autism.

Keywords: *Autism Spectrum Disorders (ASD); Platelet-Derived Growth Factor (PDGF); PDGF-AA*

Introduction

Autism spectrum disorders (ASD) constitute a variety of neurodevelopmental disorders defined clinically by difficulties in socialization, restricted or repetitive behaviors, and language delays, with childhood onset. ASD can be accompanied by concomitant symptoms including intellectual disability, catatonia, seizures, attention deficit hyperactivity disorder, and gastrointestinal dysfunction [1].

The platelet-derived growth factor (PDGF) ligands and receptors are essential proteins that are expressed by both embryonic and mature nervous system progenitor, neuron, glial and vascular cells [2].

One of the most consistent findings in autism is an increased brain size during development [3,4]. Children with autism seem to undergo an abnormally accelerated brain growth during development [5,6]. It has been suggested that the formation of neuronal connections or the elimination of inappropriate connections does not proceed in the typical manner. Striking neuropathological findings, such as fewer Purkinje cells, smaller neuronal size and decreased dendritic branches in subjects diagnosed with ASD, have been reported for various brain regions, such as the cerebellum [7,8] the hippocampus and the amygdale [9].

PDGF is increased in children with autism [10,11] and high serum levels of PDGF correlated with the Autism Diagnostic Interview- Revised domain C scores that evaluate stereotyped patterns of behavior [12].

In this study, we used immune-array technology to measure PDGF-AA levels in autistic children, neurotypical control individuals and in mothers of autistic children. We found that PDGF-AA levels were significantly lower in the maternal group.

Methods

Subjects

Plasma PDGF-AA was measured in 27 (20 male mean age 10.6 years) autistic children and 22 age and neurotypical controls (17 male mean age 13.2 years). Subject plasmas were obtained from the Autism Genetic Resource Exchange (AGRE)[1].

This study was approved by the IRB of the Health Research Institute.

Plasma

All plasma was received frozen and immediately placed at -70°C before immunoassay analysis.

Immuno-array assays

Immuno-array assays, as previously described [12] were performed by RayBiotech, Inc, Peachtree Corners, GA. 30092.

Statistics

Statistical analysis was done using T-tests with 95% confidence levels.

Results

In this study, we measured the concentration of PDGF-AA levels in 27 individuals with autism and 15 non-autistic neurotypical controls and 12 Mothers of autistic children using immune-array technology, we found that the maternal PDGF-AA levels (209.9 +/- 67 pg/µl) were significantly lower than the autistic (402.3 +/- 221.7 pg/µl) and control concentrations (394.3 +/- 164.5 pg/µl) ($p = 0.002$) (Figure 1).

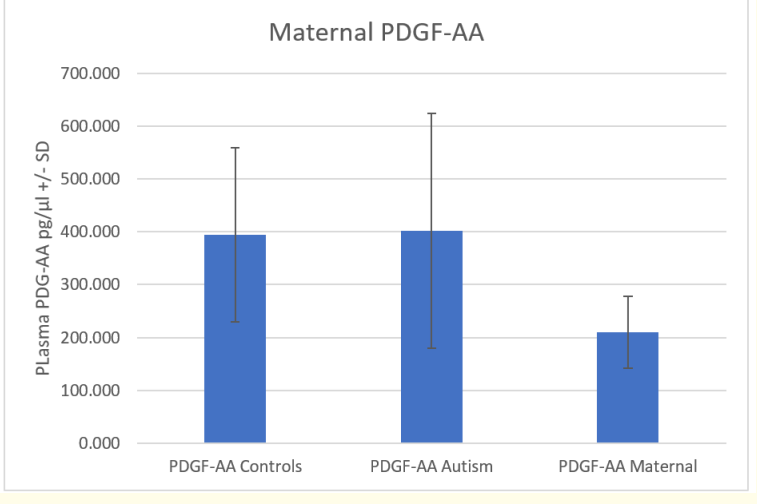

Figure 1: *Maternal PDGF is significantly lower than autistic and control plasma concentrations.*

Discussion

Extensive *in vivo* studies of PDGF and its receptor (PDGFR) genes have shown that PDGF plays an important role in embryogenesis and development of the central nervous system (CNS). In this study we found that Platelet-derived growth factor (PDGF)-AA levels were significantly lower in mothers of autistic children.

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PDGFR plays an important role in cognitive and socioemotional functions [13] and that deficits in this receptor may partly underlie the cognitive and socioemotional deficits observed in schizophrenic and autistic patients.

Serum levels of platelet-derived growth factor are increased in male children with autism [14] and a significant negative association has been found between platelet-derived growth factor (PDGF)-BB and the severity of ASD symptoms [15].

Lower levels of PDGF receptor found in maternal plasma of autistic individuals suggests that maternal receptor levels may predispose their children to low PDGF levels, which, in turn may be associated with elevated symptom severity.

Conclusion

We found significantly lower levels of maternal PDGF-A receptor levels in mothers of autistic children. These low levels may influence PDGF levels and symptom severity in individuals with autism.

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