The role of serotonin overexposure in the etiology of autism

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Statement of the Problem: Autism spectrum disorder (ASD) is a highly prevalent developmental disorder. One out of 68 children of less than 8 years old is affected; however, the etiology of its pathophysiology is still unknown. Elevated blood levels of serotonin (5HT) were identified in 25-35% of autistic patients. Serotonin is a major player in multiple brain developmental processes. Previous studies showed that 5HT dysregulation had an influence on the etiology of ASD; however, the exact mechanism of 5HT effect is still unclear. Recent studies demonstrated that dysregulated 5HT levels may lead to changes in the transcriptional levels of many genes. Our focus in this study was to investigate the expression levels of previously documented ASD candidate genes in cultured neuronal tissue when 5HT levels are upregulated.

Methodology &amp: Theoretical Orientation: We differentiated mouse embryonic stem cells to neuronal tissue and exposed them to different concentrations of serotonin. After that, we measured gene expression levels by PCR arrays that were costumed to contain the most common genes associated with autism.

Findings: When applying several concentrations of serotonin during neuronal differentiation, the expression levels of apolipoprotein E (apoe), catenin delta 2 (Ctnnd2), amyloid beta precursor protein binding (Apbb1), glial fibrillary acidic protein (Gfap), Neuroligin 1 (Nlgn 1), notch 2 (Notch gene homolog 2), pleiotrophin (Ptn), solute carrier family 38, member 1 (Slc38a1), tenascin R (Tnr), and NIMA (never in mitosis gene-a, Nek3) decreased while the expression of ATPase type 10 A (Atp10a) and neurofilament heavy peptide (Nefh) increased.

Conclusion &amp Significance: Serotonin treatment influenced neuronal differentiation. The detected changes in gene expression may provide an insight into the pathophysiological role of hyperserotonemia in ASD. Serotonin treatment at other time points during differentiation will be performed to determine the developmental aspect affected by these genes.

Biography

Diala Abu-Hassan is an expert in pluripotent stem cells who differentiated them to neuronal tissue to evaluate the effect of upregulated serotonin on neuronal development and, thereby on the development of autism. She collaborated with Dr. Loai Alzghoul as an expert in autism research. They utilized cell culture technique in addition to custom made PCR arrays in which they selected genes involved in neuronal development.

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