



# Serotonergic and Cholinergic Systems Dysfunction in Autism Spectrum Disorders



**Behzad Saberi\***

*Medical Research, Esfahan, Iran*

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**\*Corresponding author:** Behzad Saberi, Medical Research, Esfahan, Iran

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## Mini Review

Serotonin is synthesized from tryptophan which is an essential amino acid. Tryptophan hydroxylase will hydroxylate tryptophan into 5-hydroxytryptophan and then aromatic L-amino acid decarboxylase will decarboxylate it into 5-hydroxytryptamine or serotonin. Adult brain's function and plasticity would be modulated by serotonin. Also developing brain's target regions maturation and serotonergic outgrowth regulation would be done by serotonin. Based on positron emission tomography studies, in the patients with autism, 5-hydroxytryptamine synthesis related normal brain developmental peak cannot be seen. In about one-third of the autism cases, the whole blood serotonin levels are elevated which can result in abnormalities in the cellular immunity. Also, in the patients with autism, platelets, whole blood and cortical 5-HT<sub>2</sub> receptors binding may be decreased. In the patients with autism, the serotonin levels regulation may be done by ITGB3 gene. Also, serotonin transporter gene SLC6A4 promoter region's polymorphisms can have association with autism.

Choline acetyltransferase action results in acetylcholine synthesis from choline and acetyl-CoA. Muscarinic and nicotinic receptors are two kinds of acetylcholine receptors. Basal forebrain cholinergic neurons deficits can result in cognitive deficits like learning and attention problems in the patients with autism [1-7].

There are various dysfunctions in some neurotransmitters and their relations with the receptors in the autism spectrum

disorders which trying to understand such neuropathological deficits could result in finding novel treatment options for the patients with autism.

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