

## Autism: Etiology, Genes Implications, and Dental Therapies

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### ABSTRACT

Autism is defined as a psychiatric disorder marked by difficulties in communicating, and forming relationships with other people, in developing language, repetitive and limited patterns of behavior and resistance to small changes in familiar surroundings. ASD prevalence is approximately 3 to 6/1000, with a male to female ratio of 4:1. A significantly higher percentage of patients with ASD than unaffected patients were uncooperative and required dental treatment to take place under general anesthesia. 97.0% of the autistic children had gingivitis. They exhibited a higher caries prevalence, poor oral hygiene and extensive unmet needs for dental treatment than non-autistic healthy control group. Oral health program that emphasizes prevention should be considered of particular importance for autistic patients.

**Keywords:** Autistic genes, Gingivitis, Caries, Oral hygiene, General anesthesia

### DEFINITION OF AUTISM

Autism is defined as a psychiatric disorder of childhood. It is marked by difficulties in communicating, and forming relationships with other people, in developing language, repetitive and limited patterns of behavior and resistance to small changes in familiar surroundings. Autism is part of a complex group of disorders called pervasive developmental disorders (PDDs). Other PDD-related disabilities include Asperger's syndrome, childhood disintegrative disorder, Rett syndrome, and developmental disorder not otherwise specified (PDD-NOS). There are approximately 800 autistic genes [1]. About 10% of children with autism have PTEN gene mutations, an important gene regarding therapeutic intervention for autism [2]. Characterized by abnormalities in the brain, the incidence of AD varies between 2-15 per 10 000 births. Males are 4 to 5 times more affected than females, but females are more likely to exhibit more severe mental retardation [3]. Autists have difficulties with language and communication, socialization, and repetitive behaviors. Excessive anxiety is a secondary characteristic of ASD. ASD patients do not have facial anomalies; however, a larger head circumference has been correlated among ASD children younger than two years of age. There is an association between deficits in both verbal abilities and nonverbal intelligence quotient (IQ), associated with ASD as a common disorder but this is not supported in the literature.

### GENE'S IMPLICATIONS

There are approximately 800 autistic genes. The specific genetic etiology is unknown. By autistic spectrum disorders

[ASDs], we mean the wide spectrum of developmental disorders characterized by impairments in 3 domains. Autism genetic research has narrowed the suspected genetic cause to chromosome 15; however, chromosomes 2, 7, 9, and 16 also have been implicated in the genetics of autism [1]. Except for Rett syndrome, attributable to mutations of the methyl-CpG-binding protein 2 gene, the other PDD subtypes are not linked to any particular genetic or non-genetic cause. Diagnosable medical conditions, cytogenetic abnormalities, and single-gene defects account for 10% of cases. There is convincing evidence that "idiopathic" autism is a heritable disorder. Epidemiologic studies report an ASD prevalence of approximately 3 to 6/1000, with a male to female ratio of 4:1. This ratio remains unexplained, male-to-male transmission in a number of families rules out X-linkage as the prevailing mode of inheritance. Data suggest interactions of at least 10 genes in the causation of autism. A putative speech and language region at 7q31-q33 seems most strongly linked to autism, with linkages to multiple other loci under investigation. Abnormalities at the 15q11-q13 locus are fairly frequent, and a "chromosome 15

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phenotype" was described in individuals with chromosome 15 duplications. Variant alleles of the serotonin transporter gene (5-HTT) on 17q11-q12 are more frequent in individuals with autism than in non-autistic populations [1]. About 10% of children with autism have PTEN gene mutations, making this gene an important target regarding therapeutic intervention [2]. New findings suggest that it is a disorder characterized by abnormalities in the brain. PSD95, a synaptic protein is implicated in autism. Postsynaptic density protein-95 (PSD-95) is a major regulator of synaptic maturation by interacting, stabilizing and trafficking N-methyl-D- aspartic acid receptors and  $\alpha$ -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptors to the postsynaptic membrane. PSD-95 is a major component of a large network of proteins within PSD, including ion channels, receptors, adhesion proteins, scaffolding proteins, and signaling molecules that influence glutamatergic transmission. A large network of macromolecules is implicated in autism. Interestingly, these molecules have either direct or indirect interaction with PSD-95 that may alter synaptic structure and activity. A plausible hypothesis is that PSD-95 deficiency is associated with SCZ (schizophrenia), whereas an overabundance of PSD-95 is linked to autism.

#### DENTAL HEALTH AND DENTAL NEEDS

Epidemiologic studies report an ASD prevalence of approximately 3 to 6/1000, with a male to female ratio of 4:1. [3]. Autistic disorders present different degrees of severity, Kanner's syndrome, infantile autism to Asperger syndrome, where the aptitude level is often normal or above normal. The occurrence of autism spectrum disorders, comprising autistic disorder, Asperger syndrome and other autistic conditions may approach 1 % of the school age population. The dental status of each case and control included data on decayed (dentine and enamel caries) and filled surfaces on primary and permanent teeth, oral hygiene, gingivitis with bleeding on probing and occlusal function [4]. They evaluated periodontal status and DMFT and found that institutionalized autistic individuals had a higher frequency and more serious periodontal problems than institutionalized schizophrenics, but exhibited a lower caries rate. In the primary dentition. The patients with AD demonstrated a significantly higher caries rate (dmf) than the controls on initial examination, but at recall examinations, dmf values were comparable. In patients with permanent dentition, both at baseline and recall, DMF scores were not different between the groups. No statistically significant differences were found in the oral hygiene indices. It was also noted a need for oral hygiene instructions and additional training for patients to increase their motor skills to perform more effective cleaning. In summary more authors find caries susceptibility and prevalence of periodontal disease not remarkably different from non-autistic individuals and maybe even lower. In contrast, some reports note that increased caries susceptibility is due to a preference for soft

and sweet food, poorer masticatory abilities, and pouching of food. There is no doubt that prevention of oral disease is of paramount importance and all efforts should be directed to repeated oral hygiene instructions.

#### DENTAL CHARACTERISTICS OF PATIENTS WITH AD

SD patients often have sensory issues that relate to food and toothpaste. The patient may object to the taste or texture of a food or oral product such as a toothpaste or toothbrush, which may result in poor oral hygiene and a subsequent increase in caries and periodontal conditions. Biting others or self-biting is another common behavior. Many ASD patients have a high pain threshold and may have non-painful caries and dental periapical lesions. Since restorative procedures may be difficult even in the highest-functioning ASD patient, an emphasis on preventive dentistry is important. The patient and its family should be made aware of diet control, fluoride rinses, and sealants. Bruxism also is common in ASD patients. Many ASD patients have a high pain threshold and may have non-painful caries and dental periapical lesions. Since restorative procedures may be difficult, an emphasis on preventive dentistry is important. The patient should be made aware of diet control for caries prevention, fluoride rinses, and sealants. Bruxism also is common in ASD patients, a statistically significant association between ASD and dental caries prevalence. A significantly higher percentage of patients with ASD than unaffected patients were uncooperative and required dental treatment to take place under general anesthesia. Caries prevalence and severity in patients with ASD were not associated with institutionalization, presence of seizure disorder or additional diagnosis. There is agreement that patients with AD exhibit tactile and auditory hypersensitivity, and have exaggerated reactions to light and odors. Some authors attribute a strong urge for soft, sticky, and sweet foods to individuals with AD. 97.0% of the autistic children had gingivitis [5]. Children with autism exhibited a higher caries prevalence, poor oral hygiene and extensive unmet needs for dental treatment than non-autistic healthy control group. Oral health program that emphasizes prevention should be considered of particular importance for autistic patients [6].

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