Neurodevelopmental Disorders: Autism and ADHD

Autism and ADHD are neurodevelopmental disorders that arise when nervous system development is disrupted.

LEARNING OBJECTIVE

• Distinguish between the neurodevelopmental disorders of autism and ADHD

KEY POINTS

• Disturbances in the development of the nervous system, genetic or environmental, may lead to neurodevelopmental diseases.

• Individuals affected by autism are believed to have one of many different mutations in genes required for the disease to cause disruptions in the nervous system that are generally observed; however, studies on specifics are still inconclusive.

• In ADHD, a strong genetic component may contribute to the disorder; however, no definitive links have been found.

• Individuals with ADHD may experience other psychological or neurological disorders in addition to their ADHD symptoms; this experience of having more than one disorder is termed comorbidity.

• The cause of both autism and ADHD are unknown and cures are unavailable; however, treatments to alleviate symptoms are accessible.

TERMS

• comorbidity
  the presence of one or more disorders (or diseases) in addition to a primary disease or disorder

• rett syndrome
  a neurodevelopmental disorder of the grey matter of the brain that almost exclusively affects females, but has also been found in male patients

• fragile X syndrome
  a particular, genetic syndrome, caused by the excessive repetition of a particular trinucleotide

• attention deficit hyperactivity disorder
  a developmental disorder in which a person has a persistent pattern of impulsiveness and inattention, with or without a component of hyperactivity

• autism
  disorder observed in early childhood with symptoms of abnormal self-absorption, characterized
by lack of response to other humans and a limited ability or disinclination to communicate and socialize

- neurodevelopmental disorder
  a disorder of brain function that affects emotion, learning ability and memory that unfolds as the individual grows

**Neurodevelopmental Disorders**

Neurodevelopmental disorders occur when the development of the nervous system is disturbed. There are several different classes of neurodevelopmental disorders. Some, like Down Syndrome, cause intellectual deficits, while others specifically affect communication, learning, or the motor system. Some disorders, such as autism spectrum disorder and attention deficit/hyperactivity disorder, have complex symptoms.

**Autism**

Autism spectrum disorder (ASD, sometimes just "autism") is a neurodevelopmental disorder in which severity differs from person to person. Estimates for the prevalence of the disorder have changed rapidly in the past few decades. Current estimates suggest that one in 88 children will develop the disorder. ASD is four times more prevalent in males than females.

A characteristic symptom of ASD is impaired social skills. Children with autism may have difficulty making and maintaining eye contact and reading social cues. They also may have problems feeling empathy for others. Other symptoms of ASD include repetitive motor behaviors (such as rocking back and forth), preoccupation with specific subjects, strict adherence to certain rituals, and unusual language use. Up to 30 percent of patients with ASD develop epilepsy. Patients with some forms of the disorder (e.g., Fragile X syndrome) also have intellectual disability. Because it is a spectrum disorder, other ASD patients are very functional and have good-to-excellent language skills. Many of these patients do not feel that they suffer from a disorder and instead just believe that they process information differently.

Except for some well-characterized, clearly-genetic forms of autism (e.g., Fragile X and Rett Syndrome), the causes of ASD are largely unknown. Variants of several genes correlate with the presence of ASD, but for any given patient, many different mutations in different genes may be required for the disease to develop. At a general level, ASD is thought to be a disease of "incorrect" wiring. Accordingly, brains of some ASD patients lack the same level of synaptic pruning that occurs in non-affected people. There has been some unsubstantiated controversy linking vaccinations and autism. In the 1990s, a research paper linked autism to a common vaccine given to children. This paper was retracted when it was discovered that the author falsified data; follow-up studies showed no connection between vaccines and autism.

Treatment for autism usually combines behavioral therapies and interventions, along with medications to treat other disorders common to people with autism (depression, anxiety, obsessive compulsive...
disorder). Although early interventions can help mitigate the effects of the disease, there is currently no cure for ASD.

**Attention Deficit Hyperactivity Disorder (ADHD)**

Approximately three to five percent of children and adults are affected by attention deficit/hyperactivity disorder (ADHD). Like ASD, ADHD is more prevalent in males than females. Symptoms of the disorder include inattention (lack of focus), executive functioning difficulties, impulsivity, and hyperactivity beyond what is characteristic of the normal developmental stage. Some patients do not have the hyperactive component of symptoms and are diagnosed with a subtype of ADHD: attention deficit disorder (ADD). Many people with ADHD also show comorbidity: they develop secondary disorders in addition to ADHD. Examples include depression or obsessive compulsive disorder (OCD).

![Comorbidity with ADHD diagram]

Comorbidity with ADHD

Many people with ADHD have one or more other psychological or neurological disorders.

The cause of ADHD is unknown, although research points to a delay and dysfunction in the development of the prefrontal cortex and disturbances in neurotransmission. According to some twin studies, the disorder has a strong genetic component. There are several candidate genes that may contribute to the disorder, but no definitive links have been discovered. Environmental factors, including exposure to certain pesticides, may also contribute to the development of ADHD in some patients. Treatment for ADHD often involves behavioral therapies and the prescription of stimulant medications, which, paradoxically, cause a calming effect in these patients.