

## Autism Spectrum Disorders

Welcome to **Neuroscience Pearls**: A publication from the UW Medicine Neurosciences Institute. Our goal is to provide useful information pertinent to your practice. Here we bring you key points related to autism spectrum disorders and management.

**Richard G. Ellenbogen, MD, FACS**, Professor and Chairman, Department of Neurological Surgery

**Bruce R. Ransom, MD, PhD**, Professor and Chair, Department of Neurology,

Adjunct Professor, Department of Physiology and Biophysics

**Gary Stobbe, MD**, Clinical Assistant Professor, Departments of Neurology and Psychiatry

**Autism Spectrum Disorder (ASD)** is a neurodevelopmental condition defined by deficits in social communication and restricted, repetitive behaviors and interests. Improved recognition of this common condition has led to earlier intervention and treatment and often excellent outcomes. Despite much improvement in awareness, many individuals with ASD continue to struggle with related symptoms into adulthood. Identifying factors that negatively impact outcome can often lead to identifying options available to assist in effective treatment.

**DEFINING AUTISM SPECTRUM DISORDERS (ASD)**

ASD is defined by patterns of atypical neurodevelopment seen in early childhood (**see Figure 1**). Deficits are seen in social and emotional reciprocity (such as lack of sharing or poor back-and-forth conversation), nonverbal communication (such as eye contact or facial expression), and the development and maintenance of relationships. These deficits are seen in conjunction with restrictive, repetitive patterns of behaviors and interests. (1) Behaviors such as repetitive motor movements (also known as stereotypies), rigid adherence to patterned routines, restricted and fixated interests, and unusual interest or sensitivity to sensory stimuli are required for an ASD diagnosis. The severity of the social communication deficits and atypical behaviors and interests varies considerably, and this severity does influence overall outcome.

**EPIDEMIOLOGY AND ETIOLOGY**

Current CDC estimates of ASD prevalence are 1 in 68 (**see Figure 2**). This dramatic increase compared to 1 in 5,000 in the 1970's is explained at least in part by expansion of diagnostic criteria and improved public recognition and awareness. ASD has consistently affected more boys than girls, with an average male:female ratio greater than 4:1.

Most cases of ASD are idiopathic with a complex inheritable pattern explained by polygenic and possibly epigenetic/environmental influences. Childhood vaccination as a risk factor in ASD diagnosis has been extensively studied and no association has been discovered. As many as 10-20% of ASD cases are "syndromic" with an underlying identifiable genetic (e.g. Fragile X, Down's, chromosomal micro-duplications or -deletions) or acquired (e.g. herpes encephalitis, traumatic brain injury, anoxic injury) basis.

**WORK-UP**

Evaluation at the time of diagnosis should include referral to a specialist familiar with the condition. In Washington State, this will typically be a neurologist, psychiatrist, psychologist, or developmental pediatrician. Hearing tests should always be considered for individuals with speech delay. The diagnosis of ASD is made clinically utilizing DSM-5 criteria and is sometimes complemented by neuropsychological assessment tools such as IQ measurements and autism-specific testing (most commonly the Autism Diagnostic Observational Schedule, or ADOS).

Additional testing such as genetic testing, neuroimaging, metabolic testing, and electrophysiologic testing is considered for individual cases, especially if syndromic ASD is considered. Symptoms that would point toward an underlying syndrome include gross motor delay, intellectual disability, multi-organ symptoms, early onset seizures, and recurrent regression of developmental skills.

**OUTCOME TRAJECTORIES**

Just as broad as the spectrum of autism itself, the outcomes of ASD vary from individuals that improve and essentially no longer meet criteria for ASD (so called "optimal outcome" group) to individuals that remain severely impacted and require lifelong 24/7 support. Most individuals, regardless of severity, make developmental progress. What is notable is that progress can continue well into adulthood. For some individuals, rate of progress escalates as self-awareness grows and as motivation to participate in events outside their very restricted interests begins to occur.

**DSM-5 Criteria for Autism Spectrum Disorder**

Currently, or by history, must meet criteria A, B, C, and D

**A. Persistent deficits in social communication and social interaction across contexts, not accounted for by general developmental delays, and manifest by all 3 of the following:**

1. Deficits in social-emotional reciprocity
2. Deficits in nonverbal communicative behaviors used for social interaction
3. Deficits in developing and maintaining relationships

**B. Restricted, repetitive patterns of behavior, interests, or activities as manifested by at least two of the following:**

1. Stereotyped or repetitive speech, motor movements, or use of objects
2. Excessive adherence to routines, ritualized patterns of verbal or nonverbal behavior, or excessive resistance to change
3. Highly restricted, fixated interests that are abnormal in intensity or focus
4. Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of environment;

**C. Symptoms must be present in early childhood (but may not become fully manifest until social demands exceed limited capacities)**

**D. Symptoms together limit and impair everyday functioning.**

**Figure 2**

Prevalence of Autism Spectrum Disorder (ASD) in 8-year Olds (2010)		
		About 1 in every "x" children
	Overall	1 in 68
Sex	Boys	1 in 42
	Girls	1 in 189
Race	White	1 in 63
	Black	1 in 81
	Asian/Pacific Islander	1 in 81
	Hispanic	1 in 93

Data courtesy of CDC

Factors influencing outcome extend beyond the severity of the core autism features. Albeit core deficits are quite influential, intellectual disability can be seen as possibly the most influential factor. Mental health comorbidities, including anxiety, depression, and ADHD, can significantly impact outcome, especially if untreated. Individuals with "high-functioning" ASD are especially susceptible to anxiety, possibly due to better self-awareness or increased social expectations. Other factors to consider include co-occurring medical conditions such as epilepsy (seen in 15-20%) and sleep disorder, adaptive skills, and "access to services." Unfortunately, factors such as geographic location and insurance coverage can have a dramatic impact on outcome. (see Figure 3).

**TREATMENT**

ASD is very treatable. The focus of treatment is directed toward "hands on" therapies designed to increase pro-social behavior while also reducing hyper-focused interests and repetitive behav-

iors. The method with the most empirical evidence is a behaviorally-based therapy called Applied Behavioral Analysis (ABA). Mounting evidence led to recent judicial rulings in Washington State approving ABA as a medical treatment, which has significantly increased the access to this often expensive 1 on 1 treatment.

Even before beginning ABA, critical progress can occur through a combination of special education, speech therapy, and often occupational therapy. Special education programs vary considerably between school districts. Special ed programs typically continue to serve individuals with ASD to age 21. The focus often shifts to life skills and job skills for those that remain more significantly impacted.

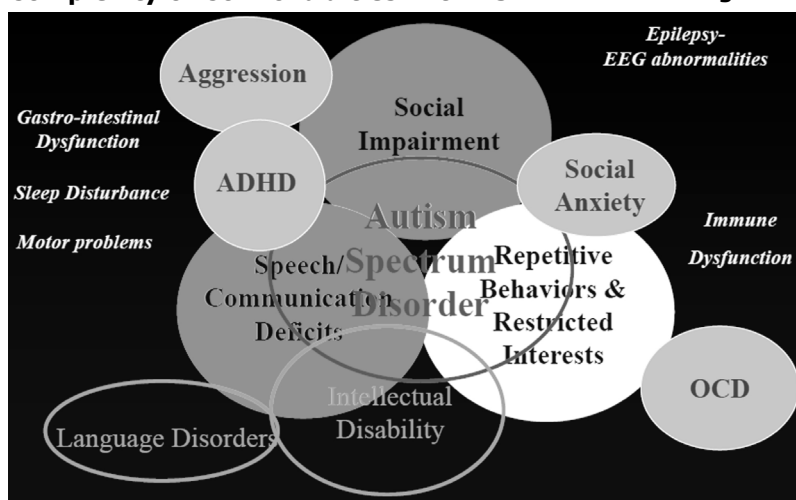
Currently, no pharmacological treatments have been shown to improve core social communication deficits in ASD. Risperidone and aripiprazole have been FDA-approved to treat ASD children with disruptive and aberrant behaviors. Psychopharmacology is commonly used, however, to treat co-occurring mental health conditions. Over 50% of all teens and adults with ASD are on at least one psychoactive medication.

**CLINICAL PEARLS**

- Recent evidence in longitudinal studies of aging in ASD suggest an increased risk for early heart disease as well as stage III and IV cancer. This preliminary data supports the importance of general medical health screening, especially in individuals with limited communication skills. (2)
- Recent evidence also supports the benefit of employment in adults with ASD. Individuals with jobs tend to continue to learn and improve in their ASD behaviors compared to individuals without jobs. (2)
- Conclusive evidence refutes the claim that childhood immunization causes, or increases the risk of ASD.

**Complexity of Co-Morbidities with ASD**

**Figure 3**



Dr. Stobbe is a faculty member at the UW Medicine Multiple Sclerosis Center and is Director of the UW Medicine Adult Autism Clinic.

**ESSENTIAL CITATIONS**

- 1) **American Psychiatric Association** (2013). Diagnostic and Statistical Manual of Mental Disorders (Fifth ed.). Arlington, VA: American Psychiatric Publishing.
- 2) **Mailick, M. Autism Spectrum Disorders: Adult Development and Contextual Influences.** International Meeting for Autism Research, 2014, Atlanta, GA. Keynote address. <http://www.autismspeaks.org/science/science-news/supporting-adolescents-and-adults-autism-critical-life-transitions>

**Figure 1. Kaufmann, W. DSM-5: The New Diagnostic Criteria for Autism Spectrum Disorders.** Autism Consortium Symposium, 2012, Boston, MA. <http://www.autismconsortium.org/symposium-files/WalterKaufmannAC2012Symposium.pdf>

**Figure 2. National Institute of Mental Health.** Prevalence of Autism Spectrum Disorder in 8 year olds (2010). [http://www.nimh.nih.gov/statistics/1AUT\\_CHILD.shtml](http://www.nimh.nih.gov/statistics/1AUT_CHILD.shtml)

**Figure 3. Kaufmann, W. DSM-5: The New Diagnostic Criteria for Autism Spectrum Disorders.** Autism Consortium Symposium, 2012, Boston, MA. <http://www.autismconsortium.org/symposium-files/WalterKaufmannAC2012Symposium.pdf>

