The human brain is one of the most extraordinary machines in the universe. It begins from a single cell. That cell divides, and then divides again, setting off a chain of exponential growth. Approximately three weeks later, the first neural cells appear.

Over the next 9 months, the brain continues to grow at a staggering pace (an average of ~250,000 neurons/minute!). By birth, the brain will have $10^{11}$ neurons and, by the age of three, each of these neurons will form about 7,000 synaptic connections. For the rest of development, much of the work is about pruning.

In the midst of all of this complexity, it is no surprise that things can go differently. Many psychiatric illnesses first appear in childhood. At the risk of stating the obvious, a critical point to remember is that children are not mini-adults – everything needs to be interpreted within the context of normal neurodevelopment.

With that in mind, today’s materials are all about the kiddos! Use our self-study resources to learn about some of the most common neurodevelopmental disorders of childhood. Then join us at 2PM for a live progressive case conference where we will dig into a case on autism!

**Self-study Resources**

Brief clinical commentaries introducing core basic neuroscience for some of the most common childhood disorders:
• **Found in Translation: Autism Genetics and the Quest for Its Rosetta Stone** – Autism Spectrum Disorders are among the most common conditions in child psychiatry. Check out this piece for a historical perspective on the condition and to see how modern neuroscience is redefining our approach to diagnosis and treatment. (Note: we’ll continue this discussion at 2PM in the live session.)

• **Shifting Focus: From Group Patterns to Individual Neurobiological Differences in Attention-Deficit/Hyperactivity Disorder** – With anywhere from 6 to 18 symptoms, there may be as many ways to reach a diagnosis of ADHD as there are synapses in the brain! What’s really going on here that leads to such heterogeneous clinical pictures? This piece uses research from functional neuroimaging to break down the different brain pathways associated with various ADHD symptoms.

• **A Fragile Balance: Dendritic Spines, Learning, and Memory** – One of the most interesting recent stories in translational neuroscience was the discovery of how changes in dendritic spine function may cause Fragile X syndrome. Check out this piece for some renewed hope and inspiration from an exciting area of research!

Expert interviews:

• **Childhood ADHD** – Have you ever wondered why stimulants work for ADHD symptoms? In this expert video, Dr. Philip Shaw explains the theory behind current treatments and gives us a succinct summary of neuroscience findings in childhood ADHD.

• **Genetics, Neurodevelopment, & Child Psychiatry** – Dr. Stacy Drury discusses research into how early childhood interventions can make a long-term impact in children, from the cellular to the behavioral level.

Additional multimedia:

• **“Far from the Tree”** – If you didn’t already watch this on day 4, check out this TSIRC for an intro to the role of rare variants in child psychiatry

• **“Solving the Mystery of Autism Spectrum Disorder”** - Now that we have identified genetic variants associated with autism, how can we use this knowledge to understand the pathophysiology of ASD? In this TSIRC, Dr. Pattabiraman (with the help of the underpants gnomes) provides us clues!

• Still curious about the underlying brain circuits associated with ADHD symptoms? Check out our course, **From Circuit to Symptoms: Understanding the ADHD Brain**, for a series of videos and other resources.
Progressive Case Conference: Autism Spectrum Disorder – This course will give you the chance to integrate neuroscience content into the clinical management of an evolving, real-world clinical scenario through a series of breakout exercises and group discussions.

Please use the following Zoom link to work with the NNCI Faculty:
https://zoom.us/j/946600745

Formative Assessment Questions
At the end of Day 8, you should be able to:

● Describe the genetic basis of Autism Spectrum Disorders. What constitutes the standard of care workup?
● Describe the neurobiological pathways thought to play a role in symptoms associated with ADHD.
● What is the core pathophysiological finding seen in individuals with Fragile X syndrome?