

Autism Spectrum Disorder - Neurological and Behavioral differences

The word "autism" is composed of two parts, "aut" and "ism." The prefix of the word is "aut," which comes from the Greek word "autós," meaning "**self**." The suffix "ism," also from Greek, implies a **state of being** or condition

The early symptoms of autism suggest that the brain systems that support social and language learning are not developing normally. Specifically the **social brain network** which consists of:

- Prefrontal cortex (social cognition, inhibition of inappropriate responses, planned behavior)
- Superior Temporal Sulcus (biological motion and eye gaze)
- Amygdala (emotional recognition / assigning emotional value)
- Fusiform Gyrus (Face perception)

Flexibility in response to the social behavior of others is specifically a function of the ventro-medial prefrontal cortex. When this system is not functioning properly, a person may become less attuned to the needs of others and more **perseverative** on the need of the self.

Why is this important? The typical developing brain:

- 1) By 3 months infant brains are sensitive to joint attention
- 2) By 4 months infants brains respond differently to emotional eye gaze
- 3) By 6 months Infants brains respond differently to familiar vs unfamiliar faces
- 4) By 7 months infants a different electrical pattern to different facial emotions
- 5) By 8 months infants can predict adults' goal oriented actions.
- 6) Conclusion - from birth infants are sensitive to social and emotional stimuli. Social stimuli and Automatic attenuation of social stimuli are basic properties of the human brain

What do we know about differences in the brain?

- Some research suggests that the process of thinning (pruning or cell reduction) out the dense network of neurons generated during development contributes to poor connectivity overall
- Genes that regulate the excitatory and inhibitory balance of neural networks increase risk of autism
- Accelerated head circumference (Courchesne 2007) (cell reduction theory / inflammation theory)
- Decreased Purkinje neurons in the cerebellum (inhibit the excitatory neurons)
- mirror neurons which involve several brain areas
- Increase serotonin at the synapse - abnormal synapse can impact brain function and overt behavior.
- Brain imaging studies suggesting that the Social Brain System is not coordinated