

## **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