

## **MR characterization of Autism Spectrum Disorders**

Y. Shah<sup>1</sup>, and S. J. Peltier<sup>1</sup>

<sup>1</sup>University of Michigan, Ann Arbor, MI, United States

### **Purpose**

Autism Spectrum Disorders (ASD) are associated with a history of atypical social development characterized by impaired communication, and the presence of repetitive or highly circumscribed behaviors and interests [1]. Early neurological models of the social deficits in ASDs emphasized the presence of localized dysfunction within the social cognition network, with particular focus on the prefrontal cortex, temporal lobe, and the limbic lobe [2], while recent research findings have pointed to the likelihood that autism and related disorders arise due to disruptions in the maturation of neural connections or pathways, especially fronto-limbic connections [3-9].

This review will present the MR characterization of Autism Spectrums Disorders as a disconnection syndrome, including functional and structural findings, with an emphasis on those that relate to core deficits of ASD.

### **Outline**

Autism background

- language impairments, social deficits, repetitive behavior,

MR findings

- Functional MRI
  - o Results from tasks related to core deficits
  - o Resting-state functional connectivity
- Structural MRI
  - o Volumetric findings
  - o Diffusion tensor imaging (structural connectivity)

### **Summary**

Understanding the functional and structural deficits of subjects with ASD using MRI gives us a clearer picture of the neurobiology and effects of autism, and raises the possibility of using imaging methods to diagnose or quantify severity of Autism Spectrum Disorders.

### **References**

- [1] American Psychiatric Association, (1994). Diagnostic and Statistical Manual, 4th ed. Washington DC: American Psychiatric Press
- [2] K. Pelphrey, (2004). "Neuroanatomical substrates of social cognition dysfunction in autism," in *Mental Retardation and Developmental Disabilities Research Reviews*, 10, pp. 259-271
- [3] J. Bachevalier, (2006). "The orbitofrontal-amygdala circuit and self-regulation of social-emotional behavior in autism", *Neurosci Biobehav Rev.* 2006;30(1):97-117
- [4] M. Belmonte, (2004). "Autism and abnormal development of brain connectivity", *J Neurosci.* 2004 Oct 20;24(42):9228-31
- [5] E. Courchesne, (2005). "Brain overgrowth in autism", *Int J Dev Neurosci.* 2005 Apr-May;23(2-3):153-70
- [6] C. Frith, (2004). "Is autism a disconnection disorder?", *Lancet Neurol.* 2004 Oct;3(10):577
- [7] E. Welchew, (2005). "Functional disconnectivity of the medial temporal lobe in Asperger's syndrome," in *Biological Psychiatry*, 57, pp. 991-998
- [8] V.L. Cherkassky, (2006). "Functional connectivity in a baseline resting-state network in autism," in *NeuroReport*, 17, pp. 1687-1690
- [9] C.S. Monk, (2009). "Abnormalities of Intrinsic Functional Connectivity in Autism Spectrum Disorders," in *NeuroImage*, 47, pp. 764-77