

## Alterations in White Matter Development in Adolescents with Autistic Spectrum Conditions and Their Siblings

D. Lisiecka<sup>1</sup>, R. Holt<sup>2</sup>, R. Tait<sup>3</sup>, M. Ford<sup>4</sup>, M.C. Lai<sup>2</sup>, L.R. Chura<sup>2</sup>, S. Baron-Cohen<sup>2</sup>, M. Spencer<sup>2</sup>, J.

Suckling<sup>1</sup>

<sup>1</sup>Department of Psychiatry, Brain Mapping Unit, Cambridge, United Kingdom ; <sup>2</sup>Department of Psychiatry, Autism Research Centre, Cambridge, United Kingdom ; <sup>3</sup>Department of Psychiatry, Behavioural and Clinical Neuroscience Institute, Cambridge, United Kingdom ; <sup>4</sup>Department of Physics, Graduate, Cambridge, United Kingdom

---

White matter development during adolescents is crucial for a mature integration of neural networks in the brain. Autism spectrum condition (ASC), characterized by social and communication difficulties and rigid behaviour may interact with white matter development observed during adolescence. Changes in white matter development may link autistic symptoms to its genetic underpinnings and explain a 10-fold increase in susceptibility to ASC among siblings of individuals with ASC.

We used diffusion tensor imaging to study an association between age and white matter integrity measures, fractional anisotropy (FA) and mean diffusivity (MD), in adolescents with ASC, their siblings and age-matched healthy controls. Diffusion-weighted data were acquired with 64-direction protocol with 3mm slices and TR of 6600ms and tract-based spatial statistics analysis was performed.

The control subjects showed robust signs of increase in white matter integrity correlated with age. In contrast, individuals with ASC showed significantly lower negative correlation between MD and age in a broad area centred in the right superior longitudinal fasciculus (rSLF). When the three eigenvalues constituting a tensor ellipsoid were considered separately, siblings of individuals with ASC showed a diminished negative correlation between the second eigenvalue and age also centred in the rSLF.

Adolescents with ASC and their siblings experience alterations in white matter development in comparison to age-matched healthy controls, which are similar in direction yet different in scale for the two affected groups. The alterations are observed in the area associated with flexibility of behaviour and may explain both symptoms of ASC and increased susceptibility to ASC.