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What is Diffusion Tensor Imaging (DTI)?

DTI is a specialised imaging technique that uses MRI technology to investigate the movement of water within tissues of interest. By applying a magnetic field, the movement (“diffusivity”) of water molecules can be visualised in vivo. The diffusion of water is influenced by the cellular structure of the surrounding tissues, and measures such as fractional anisotropy (FA) were derived as an approximate measurement for the freedom of movement. In areas of high structural coherence such as white matter, FA is highest, indicating that water is moving in relatively fixed directions. It is lower in grey matter, and close to zero in cerebrospinal fluid, indicating that water is moving freely. Consequently, changes in FA values are interpreted to be representing alterations in the structural integrity of the regional white matter.

What is the evidence for DTI?

Compared to controls, moderate quality evidence finds white matter reductions in people with schizophrenia in the anterior commissure, corpus callosum, fornix, internal capsule, bilateral arcuate fasciculus, bilateral cingulum, bilateral cortico-ponto-cerebellum tract, bilateral cortico-spinal tract, bilateral inferior fronto-occipital fasciculus, bilateral inferior longitudinal fasciculus, bilateral inferior cerebellar penduculus, bilateral optic radiation, bilateral anterior and posterior segment of the arcuate fasciculus, bilateral superior longitudinal fasciculus 1, 2 and 3, bilateral superior cerebellar penduculus, and bilateral uncinate fasciculus. There was reduced white matter in the left, but not the right, arcuate fasciculus in people with schizophrenia who are experiencing auditory hallucinations.

Moderate quality evidence finds similar decreases in white matter integrity in people with schizophrenia and people with bipolar disorder in the genu of the corpus callosum extending to anterior thalamic radiation/cingulum fibres/inferior fronto-occipital fasciculus, and in left posterior cingulum fibres.

Moderate to high quality evidence found decreased whole brain white matter was associated with a small decrease in positive and general symptoms, and a small increase in negative symptoms. Review authors state these relationships could be explained by older age, which was associated with decreased whole brain white matter. This is because older age has been associated with less severe positive symptoms and more prominent negative symptoms.

High quality evidence found similar reductions in white matter in the genu, but not splenium, of the corpus callosum of male and female patients compared to controls. Although not significant, the reductions were slightly larger in females than in males.

For more information see the technical table



NeuRA

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NeuRA (Neuroscience Research Australia) is one of the largest independent medical and clinical research institutes in Australia and an international leader in neurological research.

Diseases of the brain and nervous system pose the greatest health, economic and social burden of any disease group because they are chronic, debilitating and have no known cures.

Medical research is the cornerstone of efforts to advance the health and wellbeing of families and the community. Our dedicated scientists are focussed on transforming their research into significant and practical benefits for all patients.

While we hope you find this information useful, it is always important to discuss any questions about schizophrenia or its treatment with your doctor or other health care provider.

HOW YOUR SUPPORT HELPS

We are able to make significant advances due to the generosity of countless people. Your donation allows us to continue to work towards transforming lives. For information on how you can support our research, phone **1300 888 019** or make a secure donation at neura.edu.au/donate/schizophrenia.

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