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Diffusion Tensor Imaging: MRI Looks at Brain Wiring

Diffusion Tensor Imaging (DTI) is an advanced type of MRI scan that looks for breaks in the neuronal cell *axons* that make up the brain's *white matter* tracts.

Axons carry the electrical signals that let neurons communicate. Together they constitute the brain's white matter which connects all of the various areas of the brain (cortical, subcortical, brain stem, cerebellum, spinal cord).

Axonal injury is caused by shearing forces resulting from rotation forces and rapid acceleration and deceleration of the brain due to a traumatic event.

DTI is very sensitive to any breaks in the microstructure of the white matter. It measures the health of white matter tracts by calculating the *diffusivity* of water along the axons. It is thus able to detect abnormalities that do not show up on standard MRI scans.

The test is considered a specialized test and doesn't replace the current imaging approach. It works best when focussed on one area of the brain at a time. It is generally ordered by a Neurologist who is looking at a specific condition or set of conditions. Not all MRI centres are able to do this test.

From the patients' perspective the test is like any other MRI scan. The patient lies comfortably in the MRI scanner while images are taken. The test is performed on a 3 Tesla MRI unit which is a high field strength and provides exceptional image quality. The data is then interpreted by a *Neuroradiologist* who analyzes it using advanced algorithms.

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