Diffusion Tensor Imaging (DTI) in the Early Detection of Multiple Sclerosis
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Hand-stitched on linen

Multiple Sclerosis (MS) is a chronic disease that occurs when the immune system attacks nerve fibers and myelin sheathing in the brain and spinal cord. MS is the most common inflammatory demyelinating disorder of the central nervous system, and it is characterized by either a relapsing-remitting or progressive course. Early detection of the disease is critical, as its progression is often rapid. Conventional magnetic resonance imaging (MRI) to detect white matter lesions is not specific to the underlying pathology of MS and lacks sensitivity to microstructural damage in the normal-appearing white matter (NAWM). Diffusion Tensor Imaging (DTI), on the other hand, measures the magnitude and direction of water diffusion within the brain tissues, and it is sensitive to diffuse abnormalities that would otherwise appear unaffected in conventional MRI. Additionally, DTI can detect significant differences on the lesions as well as surrounding regions. Future application of DTI to identify changes in MS lesions may allow for the early detection, treatment, and prognosis of MS.

Information obtained from the diffusion tensor can be visualized by a vibrant color map of the tracts' position, direction (red for right-left, blue for dorsal-ventral, green for anterior-posterior), and anisotropy (as indicated by the tract's brightness). The position, direction, and anisotropy of the tracts are represented by the blending of brightly colored threads throughout the piece. The intricate stitching and branching pattern of white thread highlights DTI's ability to detect microstructural abnormalities in white matter. Although MS is classified as a white matter disease, recent studies have shown MS to also affect regions of gray matter, as indicated by the layering of white stitches over a sheet of gray linen. The edges of the fabric were left raw and torn to resemble the deteriorating nature of the disease.

This piece is dedicated to my Aunt Dell who was diagnosed with MS in 2017. She is an incredible artist, and I am always inspired by her creativity.

References Cited

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