# A Novel Paper Sensor as a Diagnostic Test for Multiple Sclerosis

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Multiple sclerosis (MS) is the most common auto immune disorder of the central nervous system with a wide range of signs and symptoms. Demyelination of myelin sheath over the axon occurs, which disrupts ability of parts of the nervous system to communicate. About 2.5 million people around the world were found to have MS in 2013. One of the fundamental issues with diagnosis of multiple sclerosis is the absence of one definite test. Multiple sclerosis is typically diagnosed based on the presenting signs and symptoms, in combination with supporting medical imaging and laboratory testing. The objective of this research is to develop a novel paper sensor which is cost effective and accurately screens MS. Galactosylceramide (GalC) is the most typical lipid present in myelin. As a result of demyelination, myelin degrades into its components which elevate the level of GalC in blood. It was hypothesized that detection of GalC in blood using anti-GalC antibody will give an accurate test for MS. In this study, GalC was concentrated and quantified with enzyme-linked immunosorbent assay (ELISA). Then, anti-GalC antibody was dispersed onto single walled carbon-nanotubes which were further coated on filter paper strips. Cell media spiked with varying amounts of GalC was applied to the paper biosensor and change in conductivity with respect to a control sample was measured to determine the range of GalC detection and stability of the paper sensor; which in turn acts as a definitive diagnostic test for Multiple Sclerosis.

**Awards Won:**

Fourth Award of $500