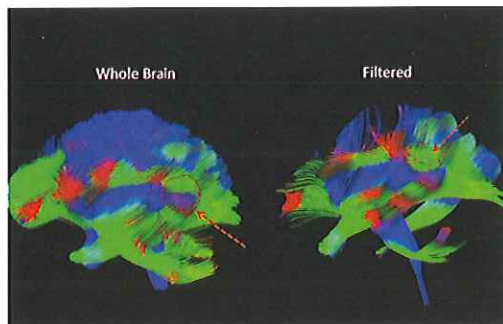


The Promise and Potential of DTI in Neurology

BY PAUL LATOUR

New research continues to advance the powerful potential of diffusion-tensor imaging (DTI) in brain research and brain mapping, ensuring the technology's place on the path to precision medicine.



DTI creates a color-coded image of the brain that establishes functional network resection boundaries around the tumor. Fiber tracking can provide better 3-D understanding of tumor borders (→) on eloquent white matter bundles.
Image courtesy of John L. Ulmer, MD.

“These results suggest that individualized quantitative analysis of DTI in the setting of mild traumatic brain injury (MTBI) might ultimately aid in MTBI prognostication.”

MICHAEL L. LIPTON, MD, PHD

“The role of neuroimaging in determining prognosis in concussion patients remains an area of huge interest and growth,” said Michael L. Lipton, MD, PhD, associate director of the Gruss Magnetic Resonance Research Center and director of radiology research and MRI at Albert Einstein College of Medicine and Montefiore Medical Center in the Bronx, New York.

“Our approach to individualized analysis of DTI and its enhancement of outcome prediction should be seen as a significant step toward realization of precision imaging (that is, precision medicine application of quantitative radiology methods to make patient-centered diagnostic inferences),” Dr. Lipton added.

Unlike standard imaging techniques, DTI can uncover the underlying pathology for traumatic brain injury (TBI) and mild traumatic brain injury (MTBI). Between 15 percent and 30 percent of people suffering MTBI - or concussion - will have continued problems resulting from such an injury, a group often referred to as the “miserable minority,” Dr. Lipton said.

“The biggest conundrum in TBI research and clinical care is who is going to recover and who is part of that miserable minority,” Dr. Lipton said. “We’d like to know who they are up front rather than waiting it out for the effects to present.”

DTI Could Aid Mild Traumatic Brain Injury Prognosis

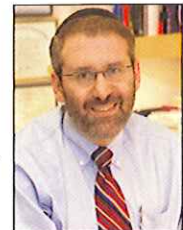
Two recent studies presented by Dr. Lipton and colleagues at RSNA 2015 show the potential role DTI could play in helping people most at risk for persistent, long-term problems that result from head injuries.

DTI abnormalities around the time of injury are significantly related to long-term outcomes, said Sara B. Rosenbaum, MD, a second-year radiology resident at Albert Einstein College of Medicine and Montefiore Medical Center who presented one of the studies at RSNA 2015.

“Prospective identification of those at risk may allow for improved patient management and inform treatment trials,” Dr. Rosenbaum said.

The researchers recruited 31 MTBI patients from a local emergency center as well as 40 healthy volunteers. DTI at 3 Tesla (3T) was performed within two weeks of injury and cognition was tested at one year post-injury.

Subjects were classified based on the presence or absence of abnormally high radial diffusivity (RD) within two weeks of injury in brain regions commonly affected by TBI (left frontal, right frontal, left temporal, right temporal and corpus callosum). T-tests compared cognitive outcomes between subjects with or without abnormally high RD in each region.



Lipton



Rosenbaum