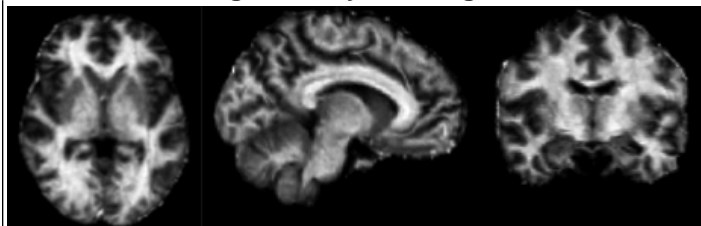


## Introduction

Magnetic resonance imaging (MRI) is emerging as a powerful tool for diagnosis in patients with mild traumatic brain injury (mTBI). We report the preliminary findings from a prospective imaging study using conventional diffusion tensor imaging (DTI) and a new myelin sensitive sequence, mcDESPOT, in athletes sustaining mTBI.

### Figure 1: Myelin Images

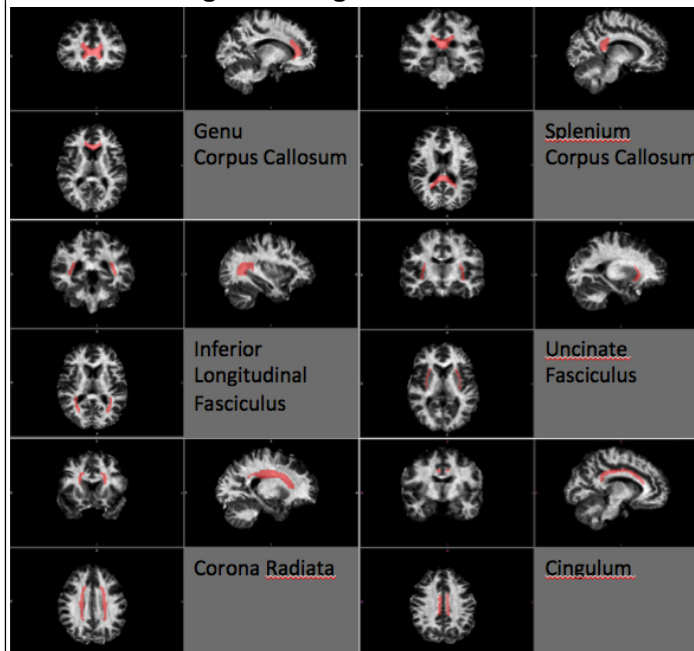


## Myelin Map Images using McDESPOT

## Methods

Prospective consent was obtained from right-handed college athletes. Fourteen (14) athletes with sports-related concussions (GCS 13-15) underwent 3T-MR imaging <72 hours post-injury with T1, T2, SWI, DTI and mcDESPOT sequences. Seven of the 14 athletes had >3-month follow-up DTI MRI and 6/8 had follow-up mcDESPOT with 5 overlapping subjects. DTI region of interest (ROI) analysis was performed in the following regions: splenium and genu of the corpus callosum, bilateral uncinate fasciculi, bilateral inferior longitudinal fasciculi, bilateral cingulum and bilateral corona radiata. These regions are detailed in Figure 2. Changes in myelin content were analyzed in the same ROIs with the mcDESPOT sequence.

### Figure 2: Regions of Interest



Above are the regions of interest analyzed for this study

## Results

Conventional imaging was normal, however, 2/14 subjects had punctate SWI hemorrhages. DTI analysis comparing initial and >3-month follow-up scans demonstrated statistically significant decreased fraction anisotropy (FA) at >3 months in the splenium ( $p=0.02$ ), left uncinate fasciculus ( $p=0.05$ ) and left cingulum ( $p=0.02$ ). McDESPOT analysis of myelin content showed a statistically significant increase in myelin content in the left uncinate fasciculus ( $p=0.02$ ).

### Figure 3

	FA	MWF	myelinT2	singleT1	singleT2
Splenium CC	0.021				
Genu CC			0.008		
Right Uncinate		0.076		0.012	0.050
Left Uncinate	0.048	0.020		0.021	
Right ILF					
Left ILF					
Right Cingulum					
Left Cingulum	0.023				
Right Corona Radiata		0.076			
Left Corona Radiata	0.080				
p-value	= statistically significant decrease				
	= statistically significant increase				
	= trend level decrease				
	= trend level increase				

### DTI and McDESPOT Analysis of ROIs

## Conclusions

DTI findings in this study corroborate other studies by showing decreased FA in specific white matter tracts following mTBI. The mcDESPOT sequence shows increased myelination. Although at first these two seem contradictory, the DTI findings may be due to loss of tract cohesivity, and the mcDESPOT findings may reflect an increase in myelin content due to attempted white matter repair, which may be less organized than in undamaged tissue.

## References

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