

**Introduction**

Conventional MRI imaging only provides limited information about the structure and integrity of the spinal cord. We describe a multiparametric quantitative MRI protocol for microstructure analysis of the spinal cord to determine the precise degree of injury to the spine in the setting of degenerative cervical myelopathy (DCM) as well as traumatic spinal cord injury.

**Methods**

40 healthy controls and 58 DCM patients have so far been studied. Each patient underwent a battery of clinical assessments including mJOA, ISNCSCI, QuickDASH, GRASSP-M and GaitRITE followed by MRI acquisitions using our protocol in a 3T GE clinical scanner. The multi-parametric protocol combines MRI techniques including conventional MRI, Diffusion tensor imaging (DTI), fractional anisotropy (FA), Magnetization transfer (MTR), T2\*WI. Image analysis is done using the Spinal Cord Toolbox (SCT) v.3.0.

**Results**

Study of healthy subjects identifies an alarming rate of asymptomatic spinal cord compression. 10 measures of tissue injury were identified that provides diagnosis (AUC=95.4%) and correlates with disability (mJOA) in a linear regression model (R2=0.55) Longitudinal study (ongoing) of DCM patients correlates qMRI findings with clinical assessment and suggest mJOA underestimates progression.

**Conclusions**

Established a reliable, clinically feasible qMRI protocol that can be used for diagnosis, detection of subclinical tissue injury and can be potentially be use for prediction of outcomes in DCM.

**Learning Objectives**

By Conclusion of this session, participants should be able to:

- 1) Have basic understanding of advanced quantitative MRI techniques such as DTI, MT, T2\* WI
- 2) Understand the concept of a multi-parametric MRI protocol
- 3) Appreciate diagnostic, biomarker and predictive utility of QMRI in spinal cord injury and degenerative cervical myelopathy