

BIOMARKERS IN THE BRAIN AFTER MTBI: A MULTIMODAL MRI STUDY

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Background

- Each year > 25.000 people suffer a mild traumatic brain injury (mTBI) in Denmark
- 5 to 15 % have post-concussion symptoms (PCS) for more than 3 months after mTBI
- PCS involve physical, cognitive and emotional complaints (figure 1)
- There is a need for clinical and biological biomarkers to detect subjects in risk of more chronic PCS.
- Advanced MRI methods might provide a sensitive biomarker after mTBI.

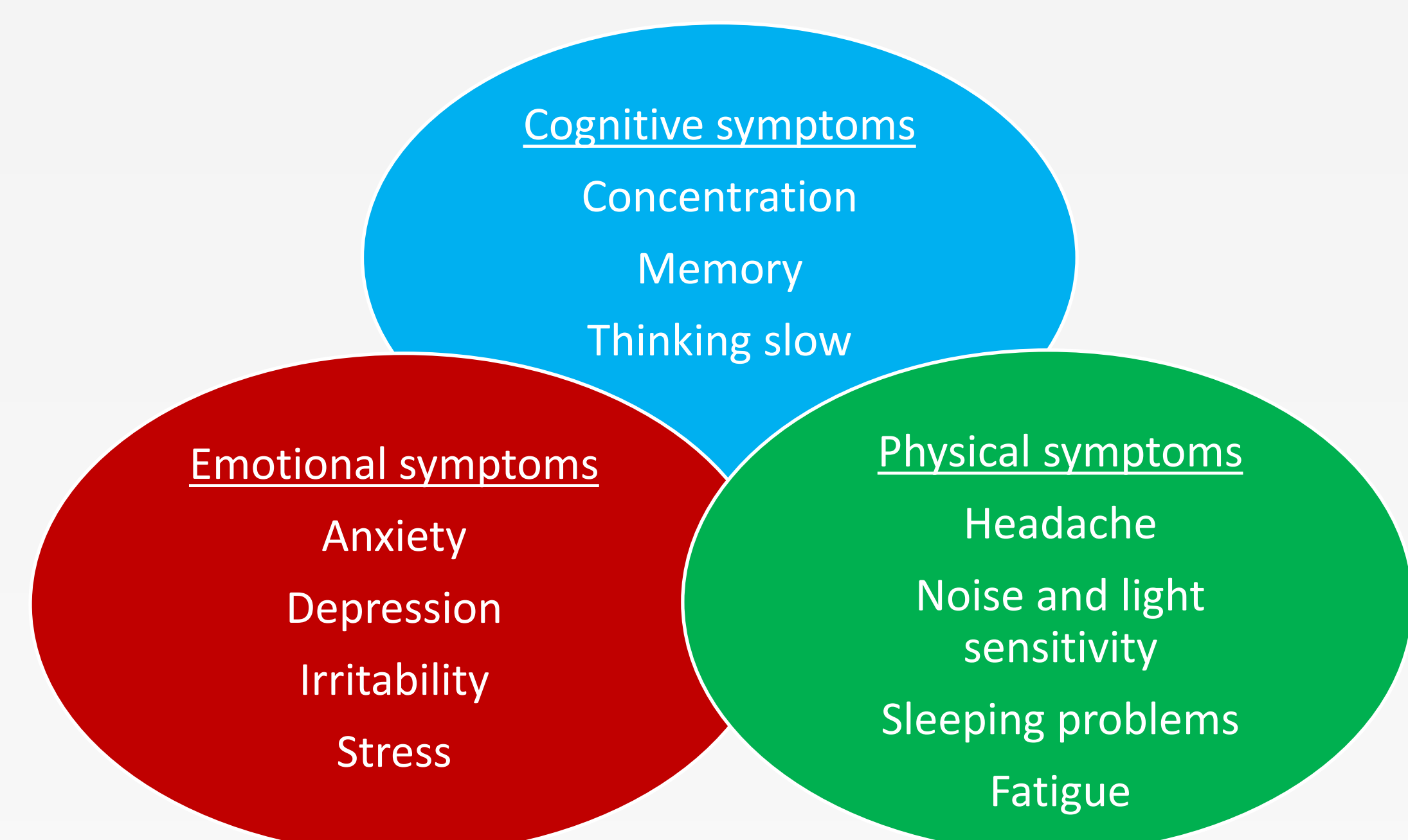


Figure 1: Post-concussion symptoms

Aim

- Examine microstructural changes in the thalamus and corpus callosum (figure 2) after mTBI using a novel diffusion-based MRI technique
- Examine correlation between brain microstructure as measured by MRI and PCS

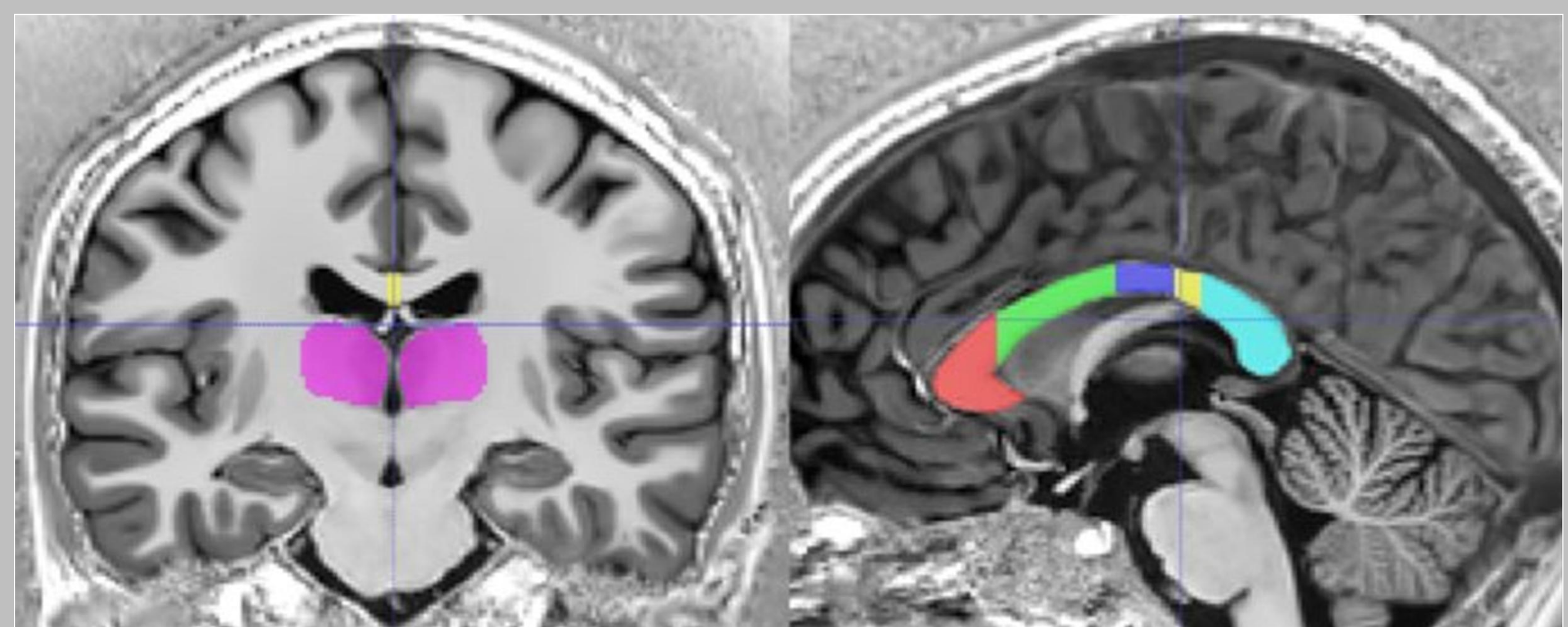


Figure 2: Segmentation of thalamus and corpus callosum

Method

- 35 subjects with mTBI and 35 healthy controls will be scanned on a clinical 3T MRI scanner
- mTBI subjects are scanned within 14 days after mTBI and again 3 months later
- A multimodal scan protocol will be used including normal clinical scans and a more research based part with e.g. Diffusion Kurtosis Imaging (figure 3, Hansen et al. MRM 69: 1754–1760 (2013).
- PCS are measured using Rivermead post-concussion questionnaire (RPQ).

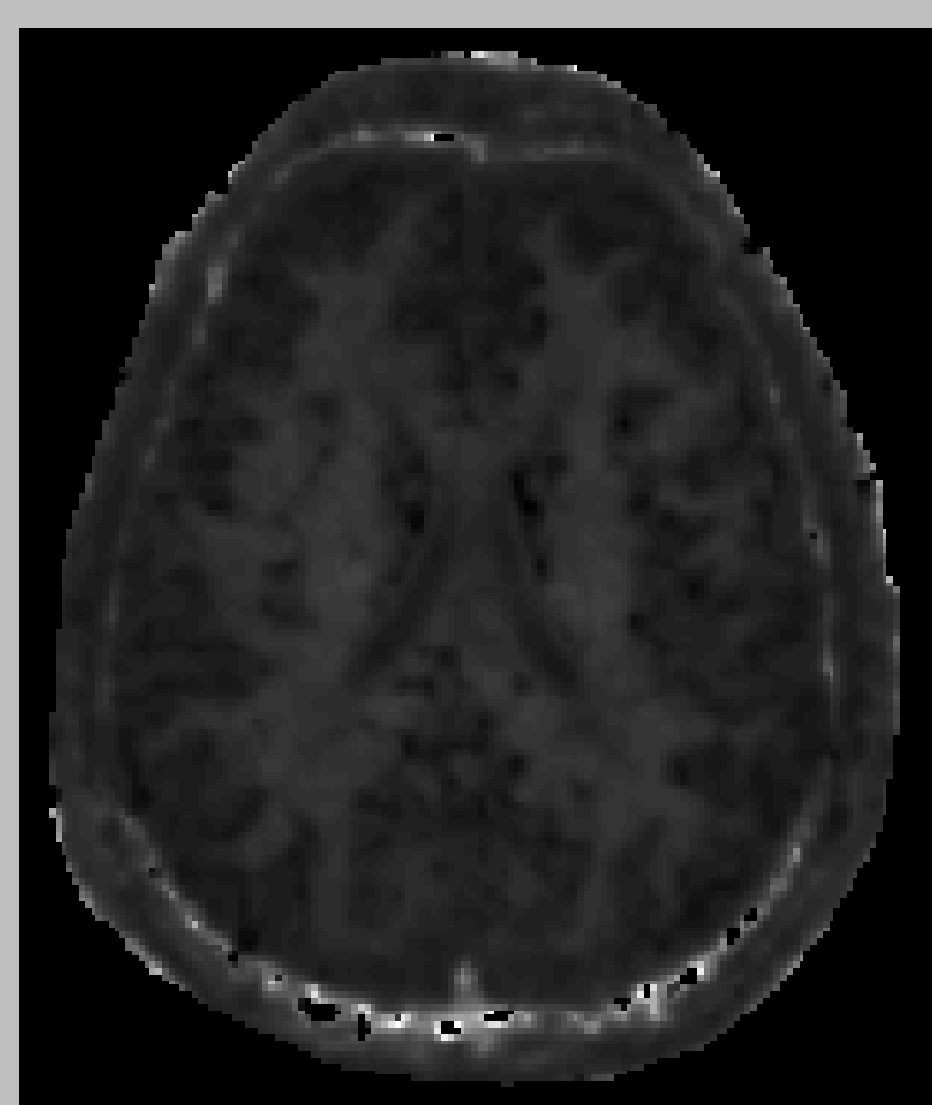


Figure 3: Mean kurtosis map

Results

The study is ongoing. Ten subjects with mTBI have been included so far. Preliminary results of mean kurtosis and RPQ in corpus callosum shows a trend towards a negative correlation ($p=0.13$), indicating that PCS might be associated with microstructural changes in the brain (figure 4).

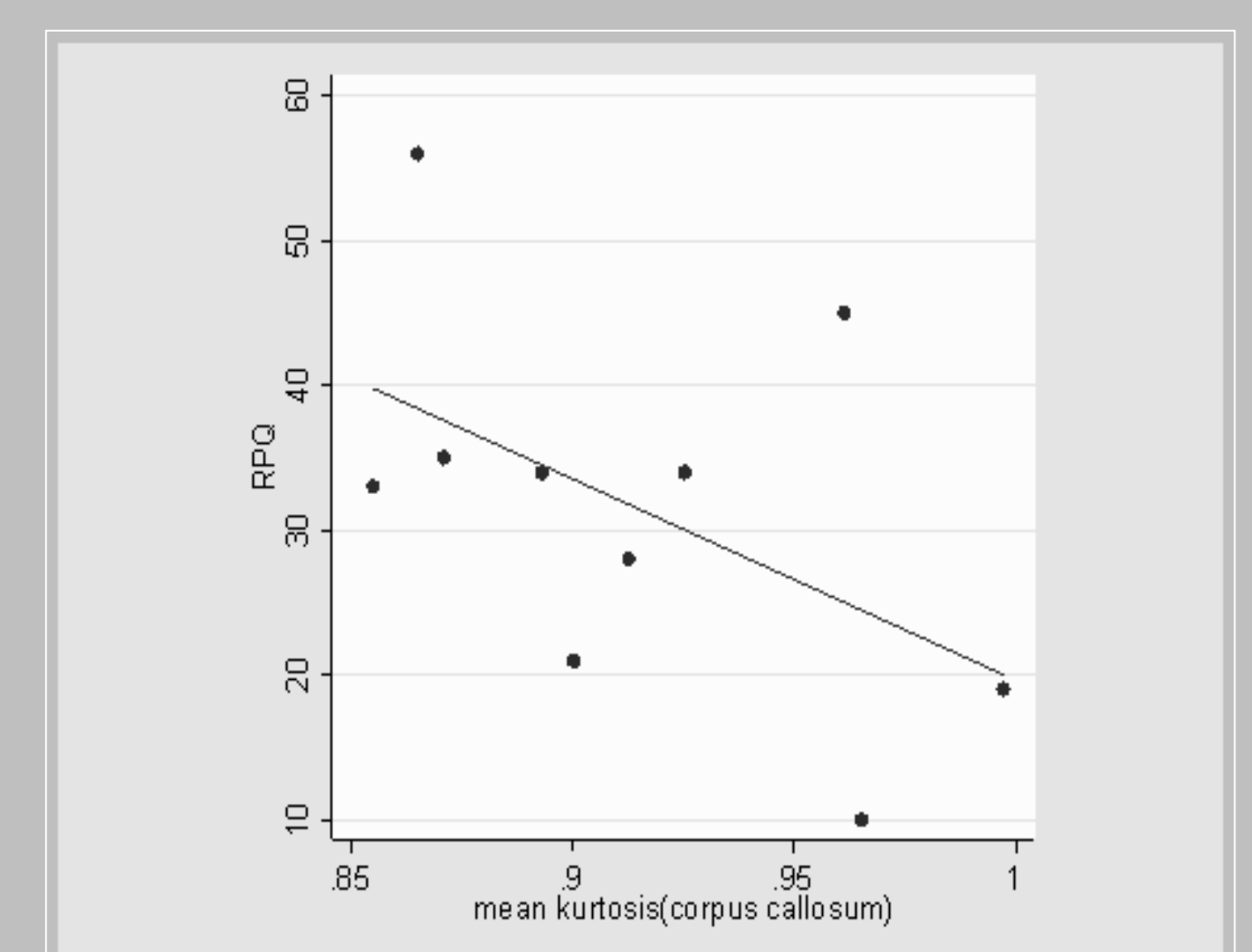
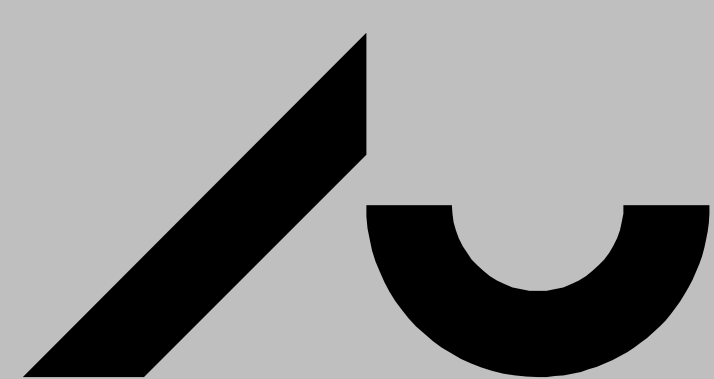


Figure 4: Symptoms (RPQ) versus MRI-values

Perspectives

This study will add more knowledge of possible structural changes in the brain after mTBI. Preliminary results indicate that diffusion kurtosis imaging could potentially be a useful predictor of clinical outcome after mTBI and serve as a biomarker in guiding treatment decisions and advising patients.



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