The Neural Link Between Post Stroke Depression, Cognitive Functioning and Stroke Recovery: A Longitudinal Study

Aleksandra EE Van Hummela,b, Lena KL Oestreichb,c, Paul Wrightd, Michael J O’Sullivanc,d,e

Background

In addition to their shared white matter regions, increased post-stroke depression (PSD) is associated with decreased cognitive functioning (CF)1, both of which hinder the recovery of stroke1. Recent studies have found relationships between the fractional anisotropy (FA) of white matter regions and recovery of particular functions post-stroke2,3,4. Whether this can be found for cognitive functioning, and if PSD is similarly associated with this relationship is unknown but could prove to be invaluable for preventative and rehabilitation strategies for the third of stroke survivors that suffer from PSD.

Method

53 stroke patients and 32 healthy controls underwent 3T structural and diffusion MRI. The anterior cingulum bundle (Fig. 1), a key white matter tract in both PSD and CF was reconstructed using deterministic tractography. FA was derived as a measure of microstructural organization. Participants underwent several measurements of CF within three months and at one-year post-stroke.

Results

Decreased FA of the anterior cingulum bundle, increased depression severity and lower years of education were all associated with worse cognitive recovery. Together they predicted 27.8% of the variance in the change in scores between initial assessment and follow up for the free and cued selective reminding test (FCRT) and 20.9% of the variance for the digit span backwards test (DSB) (Fig. 2).

Conclusion

FA of the anterior cingulum bundle is a promising predictor of cognitive recovery post-stroke, especially when considered together with PSD and demographic factors. Further research could prove to be invaluable in the creation of preventative and rehabilitation strategies for stroke patients.