Neural correlates of chronic dysarthria associated with TBI sustained in childhood

A. Morgan, L. Pigdon, A.Connelly, F. Liegeois

The neural bases of dysarthria associated with brain injury in childhood remain elusive, making it difficult to prognosticate about cases at risk for this disorder. This MRI study compared children with chronic dysarthria after TBI sustained in childhood (TBI +, n=17) with two groups matched for age and sex (typically developing controls, TD; children without dysarthria following TBI, TBI-). A 3D T1-weighted scan and single DWI data set was acquired (3T MRI scanner) for each participant. Tractography using a probabilistic algorithm was performed from spherical seed regions within the precentral gyrus white matter, to track the hand-related corticospinal (control) tract, the dorsal CBT (originating ventrally to the hand) and the ventral CBT (originating ventrally to the dorsal CBT). ROI analyses indicated that chronic dysarthria after traumatic brain injury in childhood is associated with damage along the primary motor tracts relative to age-matched peers in both hemispheres, and in the left hemisphere at the brainstem level. Tractography approach revealed that diffusion and anisotropy indices within the left dorsal CBT were the best predictors of the presence of dysarthria after TBI. We therefore provide converging evidence indicating that intact integrity of the left dorsal CBT is crucial to the normal execution of speech longterm after acquired injury. Examining the diffusion characteristics of the CBT may offer a promising way of improving prognosis for speech functions in people with brain injury.