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THE CONTRIBUTIONS OF LANGUAGE PATHWAYS IN WHITE MATTER TO LINGUISTIC AND COGNITIVE PROCESSING AFTER MILD TRAUMATIC BRAIN INJURY

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ABSTRACT

Research on patients with mild traumatic brain injury (mTBI) has reported that discourse-level impairments are associated with decreased global cognitive functioning. The global cognitive disorganization potentially emerges from poor connectivity across nodes comprising dispersed cortical networks. A likely source of this functional disconnectivity in mTBI is a post-trauma deterioration in the white matter integrity. In mTBI patients and matched controls, we used diffusion tensor tractography (DTI) to compare the integrity of inter-hemispheric commissural, limbic, and association fibers. Relative to controls, patients showed lower fractional anisotropy (FA) and higher mean diffusivity (MD) values in a majority of tracts. Decreases in fiber count, volume and density suggest a large-scale white matter deterioration not restricted to language tracts. FA of several tracts correlated with performance of a language judgment task. These suggest that the abnormalities in the integrity of inter- and intra-hemispheric tracts are related to linguistic deficits in these patients.

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轻微创伤性脑伤后
大脑语言路径于白质之语言与认知处理的影响

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摘要
先前轻微创伤性脑伤研究指出，病患交谈时的语用障碍与大脑全面的认知功能降低有关。脑损后之语言障碍显示因不良神经网路连结和无法信息同步而引发的全脑性认知功能组织紊乱。创伤后产生的功能连结断裂的可能源头是大规模白质的结构性退化。本研究以扩散张量造影比较轻度脑损病患和对照组跨脑半球纤维、合缝纤维、边缘纤维以及结合性神经纤维的结构完整度。在上述大多数的神经纤维束当中，病患的扩散方向系数均较健康人低，而扩散量系数较健康人高。此外，多处纤维数量、体积和密度的大幅降低也显示白质退化不只限于语言相关路径（例如：弓状和钩状神经束）。与此同时，许多神经纤维束的扩散方向系数与语言判断表现也呈现相关性。因此，同侧脑半球以及跨脑半球的白质纤维束（不限于语言相关纤维束）之完整度与病患语言障碍息息相关。

关键词
扩散张量造影　**创**伤性脑伤　**白**质　**语**言处理　**神**经纤维束