

The Lower White Matter Integrity was Related to Relapse Propensity in Heroin Addicts Under Methadone Maintenance Treatment

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Target audience

The target audience for this abstract includes researchers concerned about the neurobiological reasons behind heroin relapse.

Introduction

Heroin addiction is associated with white matter impairments which may result in cognitive deficits and hence hindered addicts' abilities to engage in and benefit from treatments^[1-3]. The main aim of this study was to assess whether white matter integrity measured at the baseline differed between patients who were subsequent abstinent and those who resumed to heroin use.

Method

48 methadone treated heroin addicts (Male, age 26-45) were included in this study. Images were acquired in a 3.0 T GE Signa Excite HD whole-body MRI system with the ethics committee authorization. After baseline DTI scan (25 gradient orientations, b value = 1,000 s/mm²), a 6 months longitudinal clinical follow-up was used to gather information of heroin use history and MMT status of all participants. According to positive urine screen and/or self-reported heroin use at any time during the follow-up period, 25 participants resumed to heroin use (HR) while 23 others remained abstinent from heroin (HA). TBSS were used for voxel-wise group comparisons (HR vs HA) on fractional anisotropy (FA) map generated from each subject's diffusion tensor imaging scan. In the regions which revealed significant FA differences, the group differences on radial diffusivity (λ_{\perp}) and axial diffusivity (λ_{\parallel}) were also analyzed. Besides, the relationship between DTI indices and the positive urinalysis rate of HRs were analyzed by the Spearman correlation analysis.

Results

Significant lower FA in the HR group were found in six clusters, including the right retrolenticular part of internal capsule, the left posterior limb of internal capsule, bilateral anterior corona radiata, left anterior limb of internal capsule and right external capsule, relative to HA group ($p < 0.05$, corrected by TFCE and FWE) (Fig. 1). Among the six clusters, right retrolenticular part of internal capsule, left posterior limb of internal capsule and right external capsule showed significantly increased λ_{\perp} , but there were no group differences on λ_{\parallel} . The FA and λ_{\parallel} values in left posterior limb of the internal capsule were correlated negatively according to the heroin positive urinalysis rate ($r = -0.89$, $p < 0.001$; $r = -0.88$, $p < 0.001$).

Discussion and Conclusion

The findings demonstrate that future relapsers had a lower white matter integrity compared with subsequent abstinence, and demyelination may be the mainly pathological condition. White matter impairment in areas related to rewards, executive skills, impulse controls and emotional regulations might cause greater risks on resumptions and might contribute to the definition of a neurobiological relapse risk profile. Findings of lower white matter integrity in relapser suggested that strategies for improving whitematter integrity could help to develop a new intervention for the reduction of relapse in heroin addiction.

Reference

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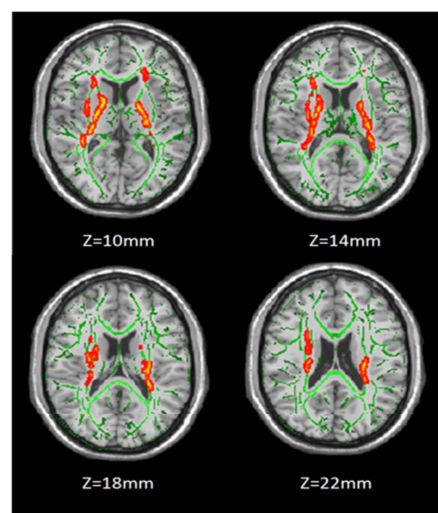


Fig. 1. TBSS analysis of FA between groups. Areas in red are regions where FA was significantly lower ($p < 0.05$, corrected by TFCE) in HR group compared with HA.