Reduced volume of the nucleus accumbens in heroin addiction.

Abstract:

The neural mechanisms of heroin addiction are still incompletely understood, even though modern neuroimaging techniques offer insights into disease-related changes in vivo. While changes on cortical structure have been reported in heroin addiction, evidence from subcortical areas remains underrepresented. Functional imaging studies revealed that the brain reward system and particularly the nucleus accumbens (NAcc) play a pivotal role in the pathophysiology of drug addiction. The aim of this study was to investigate whether there was a volume difference of the NAcc in heroin addiction in comparison to healthy controls. A further aim was to correlate subcortical volumes with clinical measurements on negative affects in addiction. Thirty heroin-dependent patients under maintenance treatment with diacetylmorphine and twenty healthy controls underwent structural MRI scanning at 3T. Subcortical segmentation analysis was performed using FMRIB's Integrated Registration and Segmentation Tool function of FSL. The State-Trait Anxiety Inventory and the Beck Depression Inventory were used to assess trait anxiety and depressive symptoms, respectively. A decreased volume of the left NAcc was observed in heroin-dependent patients compared to healthy controls.
Depression score was negatively correlated with left NAcc volume in patients, whereas a positive correlation was found between the daily opioid dose and the volume of the right amygdala. This study indicates that there might be structural differences of the NAcc in heroin-dependent patients in comparison with healthy controls. Furthermore, correlations of subcortical structures with negative emotions and opioid doses might be of future relevance for the investigation of heroin addiction.

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