

# Treatment Length Effects of Methadone Maintenance on Brain fMRI Response to Cue-elicited Craving in Former Heroin Addicts

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## TARGET AUDIENCE

Those whose fields lie in the neuronal mechanism of substance dependence development and treatment for it, especially in as herion addiction.

## PURPOSE

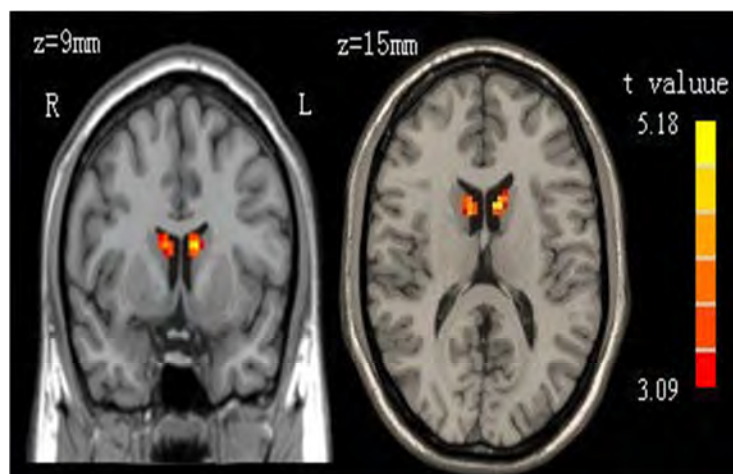
Currently methadone maintenance treatment ( MMT ) remains the most effective therapy for managing heroin and other opiate addiction. The long-term MMT helps to reduce the relapse rate of heroin addicts and the latter is related to the environment-induced drug craving. We used functional magnetic resonance imaging to investigate the neural basis of the length effects of long-term MMT on brain response to heroin-related cues in former heroin-dependent individuals.

## Methods

Fifteen patients ( duration of MMT  $\leq 1$  year, Group A ), fifteen drug use history matched patients ( duration of MMT 2-3 years, Group B ) and 17 healthy controls were included. An event-related drug-cue-reactivity paradigm was employed, while changes in blood oxygen level-dependent ( BOLD ) signals were acquired by fMRI. For each participant, the subjective craving for heroin was assessed before and shortly after the MRI scan. Correlation analyses were performed between cue-induced BOLD signal intensity and heroin use history and methadone use history among all of the patients.

## Results

The self-reported heroin craving score demonstrated no significant difference between Group A and B. Group A showed a significant greater MMT length related brain activity in the bilateral caudate related to Group B. While performing the cue-induced craving task. Under the condition that the heroin use history was controlled, the cue induced BOLD signal intensity in the bilateral caudate was negatively correlated with MMT duration and total methadone consumption. When MMT history was controlled, the drug-related activity intensity in right caudate had a positive correlation with heroin daily dosage.



## Discussion

The caudate nucleus plays an important role in the brain's reward circuits<sup>1</sup>, also the caudate nucleus is associated with craving<sup>2</sup>. In this study long-term MMT could reduce the caudate nucleus reactivity in reward processing, which may prevent cue-induced heroin craving, verifying a methadone use associated reduced reaction in the caudate nucleus.

## Conclusion

Long-term MMT may improve the brain craving response by regulating the impaired function of caudate nucleus. Therefore, we hope this finding could contribute to further MMT therapeutic strategy making, especially in managing methadone treatment length.

Fig. 2 Group differences of drug cue induced brain activation between group A and group B

(group A-group B) at a given threshold (cluster size>12,  $p<0.005$ ,  $T>3.0905$  (or  $T<-3.0905$ ), Alphasim corrected)

## References

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- 2.Sinha R, Lacadie C, Skudlarski P, et al. Neural activity associated with stress-induced cocaine craving: a functional magnetic resonance imaging study.[J]. Psychopharmacology (Berl), 2005, 183 (2): 171-180.