

## Involvement of hippocampal alpha2A-adrenoceptors in impulsive-like behaviors induced by Intermittent sleep deprivation in mice

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Attention deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity. In this study, we investigated whether intermittent sleep deprivation (SD) caused changes in impulsive-like behaviors and expression levels of alpha2A-adrenoceptors (alpha2A-R) in the hippocampus (HP) and frontal cortex of mice using an elevated plus maze (EPM) test. Mice were deprived of REM sleep intermittently by using the platform method (20 h/day) for 3 days. The % of time spent in the open arm (TOA) and alpha2A-R expression in HP were significantly increased and decreased, respectively, by SD. The increase in the % of TOA was significantly improved by oxymetazoline (OXY, an alpha2A-R agonist), methylphenidate, and atomoxetine, which are clinically used to treat ADHD symptoms. Moreover, these positive effects of OXY were attenuated by yohimbine a selective alpha2-R antagonist and BRL44408 a selective alpha2A-R antagonist. These results suggest that the increase in the % of TOA induced by SD may serve as a model of the impulsivity-like behavior in ADHD. Furthermore, the SD eliciting impulsive behaviors may be linked to alpha2A-R signaling, and as indicated by a decrease in alpha2A-R, particularly in the mouse HP of mice.