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## Presentation Abstract

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Presentation Title: [Stimulation of  \$\alpha\$ 2 adrenergic receptor in medial prefrontal cortex and basolateral amygdala impair a spatial decision-making task accompanied with differential effects on exploratory behavior](#)

Location: Hall F-J

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Authors: \*S. AMEMIYA, N. KUBOTA, N. UMEYAMA, T. NISHIJIMA, I. KITA;  
Tokyo Metropolitan Univ., Tokyo, Japan

Abstract: Electrophysiological and computational studies have revealed that noradrenergic system originating from locus coeruleus (LC) is crucial in regulation of exploratory state to assess utility and make a decision. It has been reported that higher discharge activity of LC-noradrenergic neurons should enhance exploratory state to assess the utility of options and to search for an optimal behavior in uncertain situation. On the other hand, moderate discharge activity of the LC-noradrenergic neurons should be needed to execute acquired behavior in a current task, showing suppression of exploratory state. However, brain regions involved in the regulation of exploratory state by LC-noradrenergic system is still unclear. To examine the related brain regions, we focused on medial prefrontal cortex (mPFC) and basolateral amygdala (BLA). The mPFC plays a role in flexibility and learning of new task, suggesting enhancement of exploratory state, and the BLA plays a role in determination of preferable choice, suggesting suppression of exploratory state. Therefore, we examined the effects of inhibition of noradrenergic system in either mPFC or BLA on exploratory state in T-maze decision-making task in rats. In the task, an advantage arm has 3 pellets and disadvantage arm has 1 pellet. To evaluate exploratory state, we recorded vicarious trial-and-error behavior (VTE). Noradrenergic transmission was inhibited with local injection of clonidine, the  $\alpha$ 2 noradrenergic autoreceptor agonist, into either mPFC or BLA. The results showed that clonidine injection into mPFC or BLA impaired acquisition of advantageous choice in the task. The drug injection into mPFC inhibited occurrence of VTE which should normally appear in the early phase of the task, whereas the drug injection into

BLA maintained occurrence of VTE throughout the test, and inhibited the normal decrease of VTE in the later phase of the task. These results suggested that noradrenergic system modulates the exploratory state via mPFC and BLA with differential effects on exploratory behavior for optimization of decision-making.

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EXPLORATION

MEDIAL PREFRONTAL CORTEX

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