1. No.
   2021G009

2. Title
   Effect of smoking for dopamine neurotransmission in cortex-nucleus accumbens circuit

3. Period
   2021-2023

4. Summary

   Reward and cognitive behaviors are controlled by the cortical- nucleus accumbens neural circuitry. The role of D1 and D2 pathways of the nucleus accumbens in the Attentional Set-Shifting Test was investigated using a reversible neurotransmission blockade specific for the D1 and D2 pathways of the nucleus accumbens. The results revealed that the nucleus accumbens D2 pathway is involved in behavioral flexibility.

   Next, to clarify the effects of nicotine on cognitive behavior in mice and its sex differences, we performed a visual discrimination learning task and its reversal learning task on male and female C57BL/6J mice. Male mice showed no significant effect of nicotine on visual discrimination learning, but showed a nicotine-dependent increase in correct responses in reversal learning. In contrast, female mice showed a nicotine-induced decrease in correct responses in the visual discrimination learning task and its reversal learning task. Therefore, we analyzed molecular mechanisms underlying the effects of nicotine on the visual discrimination and reversal learning tasks in mice and these sex differences. The results suggest that dopamine signaling is involved in the reduction of visual discrimination learning observed in female mice on day 3 of nicotine treatment.