1. No.
   2019Y015

2. Title
   Effect of long-term paternal nicotine exposure on behaviors and brain epigenome in offspring

3. Period
   2019-2021

4. Summary

Transgenerational epigenetic inheritance supposedly has evolved to allow organisms to adapt to environmental conditions, such as stresses and chemical compound exposure, and transmit information critical for survival under adverse conditions to their progeny. Previous studies have suggested that paternal smoking history is related to increased risk for attention-deficit/hyperactivity disorder (ADHD) in offspring; however, mechanisms underlying behavioral alternations caused by paternal nicotine exposure are unknown. Therefore, we investigated the effect of paternal nicotine exposure on behavioral and histological alternations in offspring of mice, in which offspring of sires chronically fed nicotine-containing water showed ADHD-like behaviors such as impairments of attentional and cognitive function, impulsivity-like behavior, and social behavior deficit in offspring. Further, paternal exposure of nicotine decreased the number of neurons in the prefrontal cortex layer Ⅳ and hippocampal CA3 region of offspring. Also, we found that chronic nicotine exposure had no effect on the number and size of sperm in sires. These results suggest that paternal nicotine exposures may decrease the number of neurons in the brain in offspring through the alternation of germline epigenome, leading to impair cognitive and attentional function in offspring.