1. No.
   2021G011

2. Title
   Olfactory bulb responses to odor via olfactory and trigeminal nerves and its reactivity to nicotine

3. Period
   2021-2023

4. Summary
   We focused on the possibility that functional decline of nicotinic acetylcholine receptors (nAChRs) is involved in the olfactory loss in old age and in Alzheimer's disease from its early stage. The neural pathway for olfaction includes the olfactory nervous system and the trigeminal nervous system. Regarding the olfactory nervous system, we have already reported the cerebral blood flow response to olfactory stimulation, its nicotine reactivity, and changes in aging. This study investigated the trigeminal olfactory system. In anesthetized adult rats, intranasal trigeminal nerve stimulation increased frontal cortical blood flow but had no effect on olfactory bulb blood flow. Intravenous nicotine administration potentiated the frontal cortical blood flow response induced by trigeminal nerve stimulation. Similar results were also obtained from old rats.

   This study revealed for the first time that olfactory stimuli from different neural pathways in the trigeminal and olfactory nervous systems have different effects on cerebral blood flow. Nicotine potentiated those cerebral blood flow responses via both neural pathways. In old rats, potentiating effect of nicotine is attenuated in the olfactory nervous system, while it is maintained in the trigeminal nervous system.