1. No.
   2021G008

2. Title
   The underlying mechanisms leading to ocular discomfort through corneal nerves and their interactions with acetylcholine receptors and smoking

3. Period
   2021-2023

4. Summary
   In the present study, we tried to elucidate the regulation of sensory nerves by acetylcholine in the intact cornea. Choline acetyltransferase (ChAT), an acetylcholine synthase, is highly expressed in the cornea. Acetylcholine is synthesized in epithelial cells and released in the basal portion of epithelium. The released acetylcholine might act on the α4β2 nicotinic receptors and increase the impulse activities in a part of sensory nerves. Especially, cold-sensitive nerves that detect ocular surface dryness are equipped with cholinergic regulation with high probability. Next, we examined the changes in cholinergic regulation of sensory nerves in dry eye model animals where lacrimal glands are excised. The ChAT expression and distribution were not changed in the cornea of dry eye animals. However, the firing activity of cold-sensitive nerves and blink behavior through nicotinic receptors were facilitated in dry eye model animals. These results suggest that acetylcholine works as a regulator of corneal sensory nerve activity through nicotinic receptors and that the cholinergic regulation might be altered in dry eye disease.