1. No.
   2017G045

2. Title
   Elucidation of the molecular mechanism on visual function disorders by smoking

3. Period
   2017-2021

4. Summary
   Tobacco smoke (TS) induce damages in visual function. Our purposes are elucidation for the molecular mechanism of effects of TS on the function of ocular tissues and lacrimal gland.
   The rats were placed in an experimental smoking chamber for exposure to TS. TS exposure was performed for 3 hours per day for 1 to 5 days. After TS exposure, corneal fluorescein score, which is index of corneal damage and tear volume were measured under anesthesia, and ocular tissues and lacrimal glands were removed for using real time RT-PCR, immunohistochemical analysis, and metabolome analysis. Corneal fluorescein score significantly increased, and tear volume significantly decreased by 5 days TS exposure. TS exposure also induced oxidative stress in cornea, lens, retina, and lacrimal gland. TS exposure was possible to induce dysfunction in retina. Metabolome analysis showed that TS exposure affected metabolism in cornea, retina, and lacrimal gland.
   Ascorbic acid responds acute oxidative stress i*n vivo*. Many mammals including rats can synthesize ascorbic acid, but human cannot synthesize it. Since guinea pig cannot also synthesize ascorbic acid, we try to use the guinea pig as a new smoker model. 3 days TS exposure induced increase of corneal fluorescein score, decrease of tear secretion, and reduction of serum ascorbic acid concentration. Expression of CYP1A1 increased in lung, cornea, retina, and lacrimal gland. 8-OHdG in lacrimal glands was also induced by TS exposure. The guinea pig can be a new smoker model similar to human compared with rat.