1. No.
   2021Y018

2. Title
   Investigation of the molecular pathology of corneal injury induced by cigarette smoke extract and heated tobacco products

3. Period
   2021-2023

4. Summary
   Cigarette smoke is one of the risk factors for several eye diseases including dry eye syndrome and age-related macular degeneration. These days, heated tobacco devices are widely used as an alternative to cigarette smoking and the aerosols produced by them still contain toxic chemicals like unsaturated carbonyl compounds such as acrolein. To investigate the mechanisms underlying the ocular injuries induced by smoking, we investigated the effects of cigarette smoke extract (CSE), heated tobacco products (HTPs), and one of their components, acrolein, on human corneal epithelium cell line and retinal cell lines. We found that CSE affects the intracellular iron dynamics, actin cytoskeleton, and selective autophagy. Interestingly, HTPs affected these pathways in a manner similar to CSE. Acrolein, a common component of cigarette smoke and heated tobacco aerosol, was found to induce cytotoxicity as well. These effects were suppressed by iron chelators and antioxidants, suggesting that chemicals and food ingredients with these effects may function to reduce the risk of eye disease caused by smoking.