1. No.
   2022Y001

2. Title
   Elucidation of Physiological Effects of Cigarette Smoke Gas Phase on Cytoskeleton Changes

3. Period
   2022-2024

4. Summary
   Cigarette smoking is one of the risk factors for infections, although the molecular mechanisms are unknown. The objective of this study is to elucidate the molecular mechanisms for cigarette smoke-induced infections. In 2022, we have reported that gas phase extract of cigarette smoke (CSE) induces changes of actin localization patterns, and inhibition of some macrophages function including phagocytosis and migration. In 2023, we have identified unsaturated carbonyl compounds such as acrolein and methyl vinyl ketone, major cytotoxic factors of cigarette smoke gas phase, as the compounds responsible for actin localization changes and inhibition of macrophages function. In 2024, we have revealed that actin polymerization is required for localization changes of actin by unsaturated carbonyl compounds using actin mutant. We have also revealed that actin interaction partners were changed by treatment with unsaturated carbonyl compounds using immunoprecipitation. In addition, we have identified that the types of cell death induced by CSE and unsaturated carbonyl compounds is PKCβ-dependent ferroptosis in mouse macrophages. We have also identified SLC7A11, a cystine transporter, as a key factor to determine the cell sensitivity to unsaturated carbonyl compounds by using pharmacological and molecular biological strategies.