1. No.
   2021G013

2. Title
   The effect of reactive nitric oxide species induced by smoking on the endogenous antioxidant system in blood circulation

3. Period
   2021-2023

4. Summary
   Many studies have already demonstrated that the induction and progression of lung damage and cardiovascular disease caused by oxidative stress associated with smoking, including reactive oxygen species, nitric oxide. Here, we investigated the defense mechanisms against oxidative stress from the perspective of supersulfides, which has been attracting attention in recent years. Previously, we had already found that albumin contains a large amount of active sulfur in human serum, so we focused on the active sulfur contained in albumin and analyzed the effects caused by oxidative stress such as smoking. In the first year, we revealed that supersulfides decreased in the blood of smokers. Also, we carefully evaluated the amount of active sulfur in human kidney cells when exposed to nicotine. Interestingly, we found that although an oxidized form of polysulfide decreased, the reduced form of polysulfide increased temporarily. In the second year, we got some interesting findings that the reduced form of polysulfide levels temporarily increased, and at that time, the antioxidant capacity increased when albumin was treated with various oxidizing agents from *in vitro* experiments. In the last year, we demonstrated this phenomenon with good reproducibility in rhabdomyolysis-induced acute kidney injury model mice and could elucidate part of the biological defense mechanism against supersulfides *in vivo.*