1. No.
   2019G011

2. Title
   Pharmacological analysis of edothelial dysfunction induced by gas phase extract of cigarette smoke: comparison between burned cigarette and heated tobacco

3. Period
   2019-2021

4. Summary
   The purpose of this study is to establish a method for preparing nicotine- and tar-free cigarette smoke extract (CSE) derived from heated tobacco products (HTPs) and a combustion cigarette, and to elucidate the mechanism of vascular endothelial dysfunction caused by CSE.
   In 2019, we developed semiautomated smoking system to prepare CSE of HTPs and a combustion cigarette, and demonstrated that an increase in the temperature during smoking leads to (i) an increase in the generation of the particulate phase and carbonyl compounds and (ii) enhancement of the cytotoxicity of mainstream smoke.
   In 2020, we succeeded in preparing carbonyl compound-free CSE by passing mainstream smoke through a Cambridge filter and a Carboxen-572 cartridge, and elucidated that the carbonyl compound in the mainstream smoke causes the inactivation of the endothelial nitric oxide synthase.
   In 2021, we employed an analytical vaping machine LM5E (Borgwaldt KC GmbH) adapted to ISO 20768, and established a new system for preparing CSE using the device. We found that intracellular iron ions are involved in vascular endothelial cell injury caused by CSE.