1. No.
   2023G013

2. Title
   Effects of Smoking on Hematopoietic Stem Cell Dysfunction and Cardiovascular Diseases

3. Period
   2023-2025

4. Summary

   In this study, we investigated how tobacco smoke alters hematopoietic stem and progenitor cells and leads to the acquisition of a phenotype associated with the progression of cardiovascular disease.

   Mice exposed to heated tobacco smoke for 8 weeks showed a significant increase in neutrophil-lineage cells and a significant decrease in B-cell-lineage cells. On the other hand, the effects on gene expression in long-term hematopoietic stem cells were minimal, suggesting that the effects of heated tobacco smoke manifest at the level of short-term hematopoietic stem cells or hematopoietic progenitor cells and beyond.

   In experiments using tobacco smoke extracts (CSE), CSE derived from heated tobacco products from 2 companies did not induce significant changes in gene expression, whereas CSE derived from conventional cigarettes induced gene expression changes in hematopoietic stem and progenitor cells, including the interferon pathway activation and downregulation of IRF4 and IRF8.

   These changes were suggested to cause an increase in activated neutrophils as an acute effect and hematopoietic stem cell exhaustion as a chronic effect, collectively contributing to the exacerbation of cardiovascular disease. A key finding of this study is that even exposure to heated tobacco products, which are generally considered to pose fewer health risks, was shown to impact the differentiation of various lineages of bone marrow cells.