1. No.

   2023G003

2. Title

   Influence of Smoking on the Tumor Microenvironment of Primary Liver Cancer and Its Application to Personalized Medicine Using ^{18}F-FDG/PET-CT

3. Period

   2023-2025

4. Summary

   This study aimed to elucidate the biological characteristics of ^{18}F-FDG/PET-positive hepatocellular carcinoma (HCC) and to investigate the impact of smoking on tumor biology and FDG uptake. Comprehensive transcriptomic analyses identified a glycolysis-driven HCC subclass characterized by poor differentiation, enhanced proliferation, PET positivity, and poor prognosis. Furthermore, a logistic regression model integrating clinical, imaging, and pathological features enabled accurate, noninvasive prediction of this subclass.

   Analyses based on the tumor-to-liver ratio (TLR) demonstrated that high FDG uptake was associated with decreased hepatocyte-specific metabolic function and increased glycolysis. In contrast, smoking was significantly associated with reduced FDG uptake, even after adjustment for viral status, tumor stage, and tumor differentiation.

   These findings indicate that FDG-PET reflects the metabolic phenotype of HCC and may serve as a useful imaging biomarker. In addition, smoking may influence PET imaging characteristics and should be considered in the interpretation of FDG-PET. Overall, this study establishes a novel framework for integrating imaging, molecular, and clinical data toward less invasive precision medicine in HCC.