1. No.
   2019Y008

2. Title
   Relation analysis of post-transplant Pneumocystis pneumonia and smoking

3. Period
   2019-2021

4. Summary
   The study over the entire grant period allowed us to identify a specific protein ("protein X") as a marker in blood for PCP after allogeneic transplantation and to position its abundance as a predictive (or early diagnostic) biomarker for the development of PCP. Contrary to initial expectations, no nicotine-related substances were included. For this patterning analysis, an automated machine learning method using artificial intelligence (AI) was used to eliminate arbitrariness on the part of the researcher and analyze a huge amount of information in a short time.

   Originally, we planned to complete this process in two years and conduct a prospective study based on the obtained data in the final year, but due to the COVID-19 pandemic, we were unable to do so within the study period. In the future, we will conduct a separate study as a prospective intervention study to see if we can improve the prognosis and quality of life of patients with PCP.

   We consider it a great achievement that we were able to propose a candidate substance that may become a new biomarker for PCP, which has been difficult to predict its onset according to conventional knowledge.