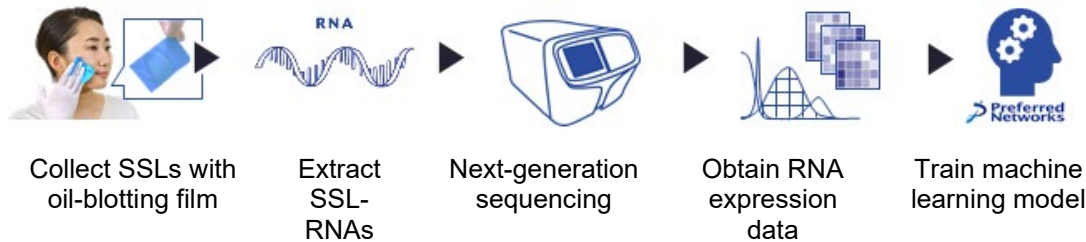# Juntendo, Kao and PFN Discover Skin Surface Lipids-RNA Patterns Specific to Patients with Parkinson's Disease

Joint study shows potential for novel diagnostic method using sebum RNAs and machine learning

TOKYO - September 21, 2021 - The joint research team of Shinji Saiki, associate professor, and Nobutaka Hattori, professor, at Department of Neurology of Juntendo University's Graduate School of Medicine, Biological Science Research Laboratory of Kao Corporation and Preferred Networks, Inc. (PFN) has discovered that patients with Parkinson's disease exhibit a specific ribonucleic acid (RNA) pattern in their skin surface lipids (SSL), which are mostly composed of sebum. The research also showed that machine learning with the RNAs in SSL (SSL-RNA) data will potentially be a new non-invasive way to diagnose Parkinson's disease and facilitate early detection of the disease.

The paper on this research, titled *Non-invasive diagnostic tool for Parkinson's disease by sebum RNA transcriptome profile with machine learning*, has been published in Scientific Reports at: https://doi.org/10.1038/s41598-021-98423-9

| Collect SSLs with oil-blotting film | Extract SSL-RNAs | Next-generation sequencing | Obtain RNA expression data | Train machine learning model |

In the joint study, the research team collected facial SSLs with oil-blotting films from Parkinson's disease patients and healthy controls for comparison. The RNAs were extracted from these SSLs and sequenced using a next-generation sequencer. Analysis of the SSL-RNA expression data identified different patterns between patients with Parkinson's disease and healthy controls. The research team also trained the machine learning model with the obtained SSL-RNA data, which efficiently distinguished the Parkinson's disease patients from healthy controls with high accuracy.

The research team will continue its research on sebum RNA analysis with machine learning as a non-invasive diagnostic method for similar diseases while validating the findings in Parkinson's disease.

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About Juntendo University
Juntendo was originally founded in 1838 as a Dutch School of Medicine at a time when Western medical education was not yet embedded as a normal part of Japanese society. With the creation of Juntendo, the founders hoped to create a place where people could come together with the shared goal of helping society through the powers of medical education and practices. Their aspirations led to the establishment of Juntendo Hospital, the first private hospital in Japan. Through the years the institution's experience and perspective as an institution of higher education and a place of clinical practice has enabled Juntendo University to play an integral role in the shaping of Japanese medical education and practices. Along the way the focus of the

institution has also expanded, now consisting of six undergraduate programs and three graduate programs, the university specializes in the fields of health science, health and sports science, nursing health care and sciences, and international liberal arts, as well as medicine. Today, Juntendo University continues to pursue innovative approaches to international level education and research with the goal of applying the results to society. https://www.juntendo.ac.jp/english/

About Kao

Kao creates high-value-added products that enrich the lives of consumers around the world. Through its portfolio of over 20 leading brands such as Attack, Bioré, Goldwell, Jergens, John Frieda, Kanebo, Laurier, Merries and Molton Brown, Kao is part of the everyday lives of people in Asia, Oceania, North America and Europe. Combined with its chemical division, which contributes to a wide range of industries, Kao generates about 1,400 billion yen in annual sales. Kao employs about 33,000 people worldwide and has 130 years of history in innovation. Please visit the Kao Group website for updated information. https://www.kao.com/global/en/

About Preferred Networks

Preferred Networks (PFN) was established in March 2014 with the goal to develop practical, real-world applications of deep learning, robotics and other latest technologies. PFN is currently focused on three priority areas – transportation systems, manufacturing and bio-healthcare – and also exploring the use of deep learning in personal robots, plant optimization, materials discovery, sports analytics and entertainment. In 2015, PFN developed Chainer™, the open-source deep learning framework. PFN's MN-3 supercomputer, which is equipped with the MN-Core™ processor dedicated for deep learning, topped the Green500 list in June 2020 and June 2021. https://www.preferred.jp/en/

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