

Kyoto Prefectural University of Medicine and SCREEN accelerate precision medicine with multiplex immunohistochemistry in combination with AI image analysis

Kyoto, Japan – February 8, 2021 – Kyoto Prefectural University of Medicine (KPUM) and SCREEN Holdings Co., Ltd. announced the launch of joint initiatives which aim to accelerate precision medicine* by employing multiplex immunohistochemistry coupled with AI image analysis technologies.

These initiatives are based upon the cutting-edge medical research being conducted at KPUM and the highly innovative and diverse technologies for image analysis at SCREEN. Both parties have been collaborating on research in the fields of tumor pathology and on multiplex immunohistochemistry combined with AI image analysis technologies. This collaboration has allowed them to successfully demonstrate detailed immune reactions in histopathological settings by using the tumor specimens of otolaryngology and thoracic surgery. Going forward, they will attempt to expand the research fields, ranging from transplantation pathology to cancer preventive medicine, with the aim of elucidating immunopathology in liver transplantation and developing molecular targeted drugs.

Through the collaboration between KPUM and SCREEN, both founded in Kyoto more than one hundred years ago, it has become possible to develop new research methods that greatly help illuminate the immune reactions in various tumors. With “precision medicine” and “immune response” as keywords, they will promote further innovation of these research technologies and contribute to society by linking basic research to clinical applications, including drug development.

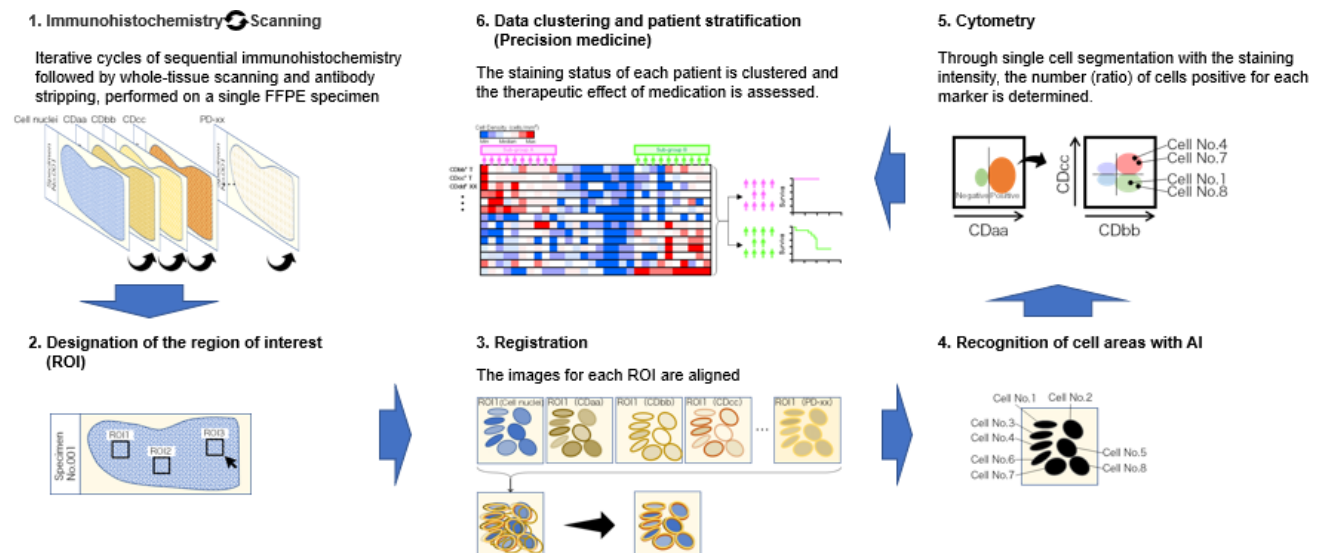
* Precision medicine: Under this concept, all diseases can be classified by the gene variants and the underlying molecular pathomechanisms. The information could help in choosing the optimal therapeutic strategies for each patient.

Multiplex Immunohistochemistry in Combination with AI Image Analysis

This methodology is composed of a combination of multiplex immunohistochemistry and AI image analysis. A single section of formalin-fixed paraffin embedded (FFPE) specimen is sequentially processed for immunohistochemistry using a set of different antibodies, each step being followed by image scanning^[1]. By introducing AI image analysis, all of the immunohistochemical data, including positions, are stored precisely, so that quantitative data on each immune lineage cell in the specific region of interest are obtained, enabling further use for data clustering and patient stratification.

References:[1] Tsujikawa et al., 2017, Cell Reports 19, 203-217.

(Procedures of a multiplex immunohistochemistry coupled with AI analysis are as follows.)



■ **Comments by Kyoko Itoh, Professor & Chair, Department of Pathology and Applied Neurobiology, Kyoto Prefectural University of Medicine, Graduate School of Medical Science**

We have been conducting research with morphological, molecular biological, biochemical and functional analyses by using tissue and cells from humans as well as model animals in order to elucidate the underlying mechanisms of diseases and to develop novel therapeutic strategies that lead to the advancement of clinical medicine. Through collaboration with SCREEN Holdings Co., Ltd., we pioneer new research fields in clinical and basic medicine by combining cutting-edge technologies such as AI and bioinformatics with our histopathological methods.

■ **Comments by Soichi Nadahara, Chief Technology Officer of SCREEN Holdings Co., Ltd.**

SCREEN uses technology that has been cultivated thus far in areas such as the manufacture of electronic equipment to advance business development activities in the new business field of life sciences. Through research and development and business development in precision medicine using this technique, we hope to contribute to developments in the medical field, including cancer treatment, and to regional medical care.

Details of collaboration

- Research Supervisor: Kyoko Itoh, Professor & Chair, Department of Pathology and Applied Neurobiology, Kyoto Prefectural University of Medicine, Graduate School of Medical Science
- Multiplex Immunohistochemistry Basic Technique: Takahiro Tsujikawa, Assistant Professor, Department of Otolaryngology-Head and Neck Surgery, Kyoto Prefectural University of Medicine, Graduate School of Medical Science
- Image Analysis Technology: SCREEN Holdings Co., Ltd.
- Collaborator: Shigeru Hirano, Professor & Chair, Department of Otolaryngology-Head and Neck Surgery, Kyoto Prefectural University of Medicine, Graduate School of Medical Science
- Collaborator: Masayoshi Inoue, Professor & Chair, Division of Thoracic Surgery, Department of Surgery, Kyoto Prefectural University of Medicine, Graduate School of Medical Science
- Collaborator: Eiichi Konishi, Associate Professor, Department of Surgical Pathology, Kyoto Prefectural University of Medicine, Graduate School of Medical Science
- Collaborator: Michihiro Mutoh, Professor & Chair, Department of Molecular-Targeting Prevention, Kyoto Prefectural University of Medicine, Graduate School of Medical Science

Kyoto Prefectural University of Medicine

Kyoto Prefectural University of Medicine was founded in 1872 as a medical school attached to the hospital in prestigious Shoren-in Temple precincts. KPUM will, therefore, celebrate its 150th anniversary in 2022. KPUM not only provides medical and nursing students with the knowledge and skills but also promotes cutting-edge research and advanced medical practice among the faculty and the hospital.

<https://www.kpu-m.ac.jp/>

SCREEN Holdings Co., Ltd.

The SCREEN Group traces its history back to the Ishida Kyokuzan Printing Works, a lithographic printing shop founded in Kyoto in 1868. It holds numerous products that enjoy world-leading market shares in the electronics and printing industries. The company also endeavors to create new businesses with the core technologies that have been cultivated over



many years as its cornerstone. In the life science business, SCREEN has developed high-speed 3D cell scanners and a system for the scanning and analysis of cellular morphologies, providing devices that are capable of rapidly measuring and analyzing the proliferation and morphological changes in cells without the use of test reagents.

<https://www.screen.co.jp/>

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