LPIXEL

CORPORATE BROCHURE

New Values from Life's Discoveries

LPIXEL hones its expertise in the life sciences and image analysis technologies, congregating data from the medical, pharmaceutical and agricultural sectors to shape the coming future.

LPIXEL will serve as a hub for open innovation, expand its expertise acquired from the world of research, provide a prosperous future and deliver revolutionary products. With this belief in mind, LPIXEL is on a continuous journey to make the world a happier place for everyone.

LIFE SCIENCE

All humans are given the chance to explore and cultivate the life science forest, using advanced information technology as their weapon. However, it is up to the individual to face or leave this chance. LPIXEL will seize this opportunity to uncover new possibilities and deliver innovative ideas and inventions that can make the world a better place.

IMAGING

The volume, complexity and diversity of bio-images all have posed significant challenges for researchers working in the life sciences. LPIXEL aims to solve these challenges by honing its knowledge accumulated throughout the years of experience conducting research in the bio-imaging field. LPIXEL has managed to create an impressive track record by using unique algorithms, machine learning and other cutting-edge technologies. This unique combination of image analytics and life sciences enables LPIXEL to innovate and bring excitement to the world in a way that no other company can.

Company Name	LPIXEL Inc.		
Foundation	March 4, 2014		
Headquarters	Tokyo, Japan	**Branch Office**	Boston, US
Capital	2.07 Billion JPY (includes capital reserves)		
Investors	CANON MEDICAL SYSTEMS CORPORATION, CYBERDYNE INC, FUJIFILM Corporation, JAFCO Co., Ltd., Mistletoe Inc., Olympus Corporation, SBI Investment, TECHMATRIX CORPORATION, TomyK, Toray Engineering Co., Ltd.,		
Awards	J-Startup, RED HERRING Global, SWITCH		
Employees	60 (pharmacists, and researchers)		

Certifications	Manufacturing businesses for medical devices (License No. 13BZ201106) Second-class marketing business for medical devices (License No. 27B2X90001)
Patents	CARTA: Active learning software for automatic classification of biomedical images Region segmentation image generation method, region segmentation image generation device, and computer program Image processing apparatus and image processing method

Investors

Canon
CANON MEDICAL
CYBERDYNE
FUJIFILM
OLYMPUS
TechMatrix
TORAY
Toray Engineering Co.,Ltd.

* LISTED IN ALPHABETICAL ORDER

For Doctors and Medical Practitioners

For Researchers

EIRL
NEXT MEDICAL VISION

PRODUCT 001

Another set of powerful eyes to support future medical diagnosis.

EIRL is the next medical image diagnostic support technology to catalyze the coming generation of medical diagnosis. Together with the constant advancements in modalities, comes the challenges for doctors to interpret an exponentially large number of images for diagnosis. EIRL aims to provide an accurate, accelerated and streamlined solution for medical diagnosis by analyzing a variety of information required for diagnosis. EIRL will be the closest partner to all doctors, and serve as another powerful set of eyes to provide top quality medical care. To all doctors around the world, EIRL.

SOLUTION 01

Improve Diagnostic Accuracy

The algorithms aim to keep the number of overlooked lesions to a minimum by flagging certain features in the images and providing feedback to the doctor.

SOLUTION 02

Enhance Efficiency

The technology can drastically improve the quality and efficiency of doctors and promote the improvement of patient satisfaction.

SOLUTION 03

Generate New Diagnostic Standards

Harness the power of AI and give rise to innovative methods to help doctors solve problems and generate new values.

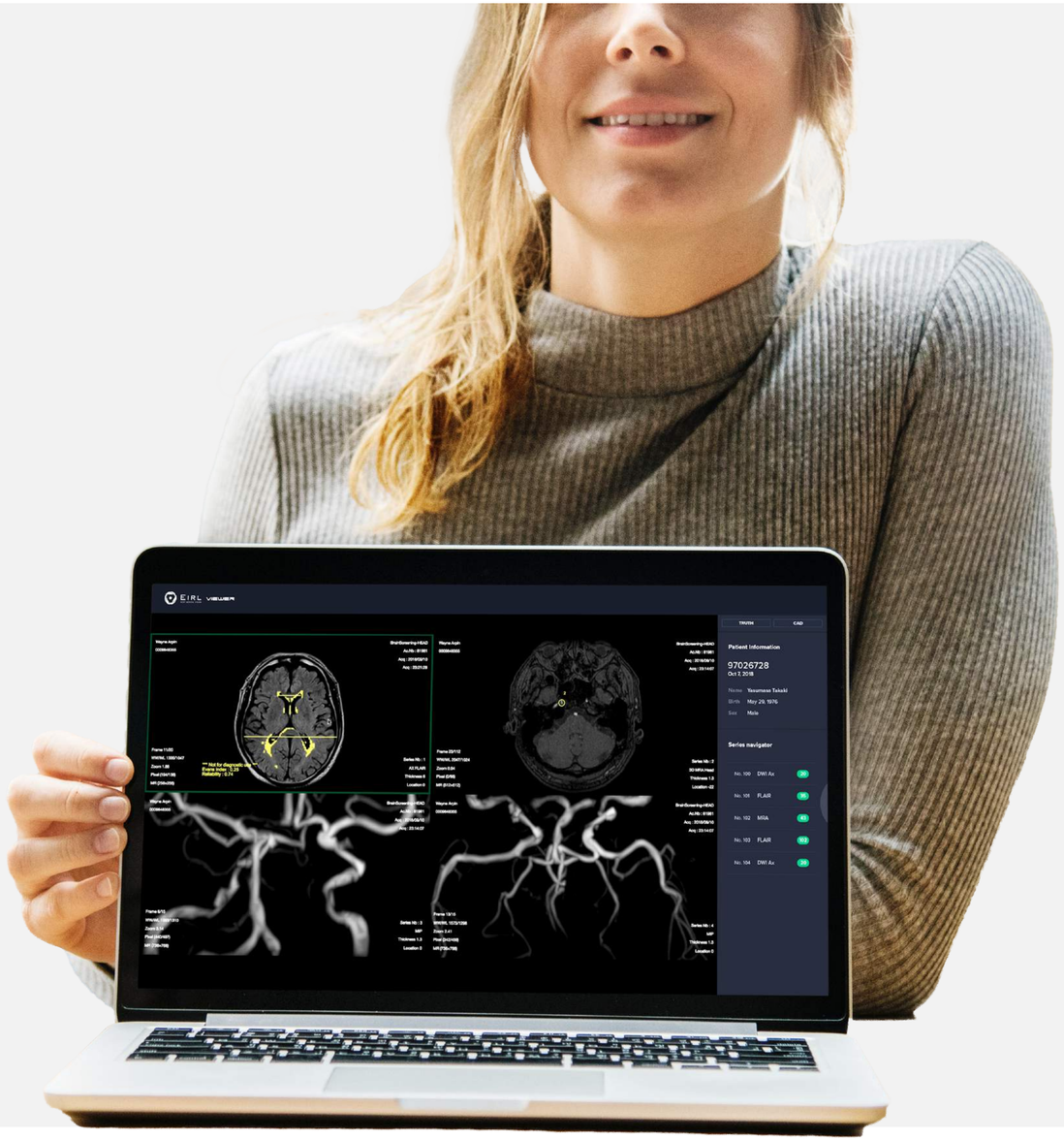
Healthcare Business

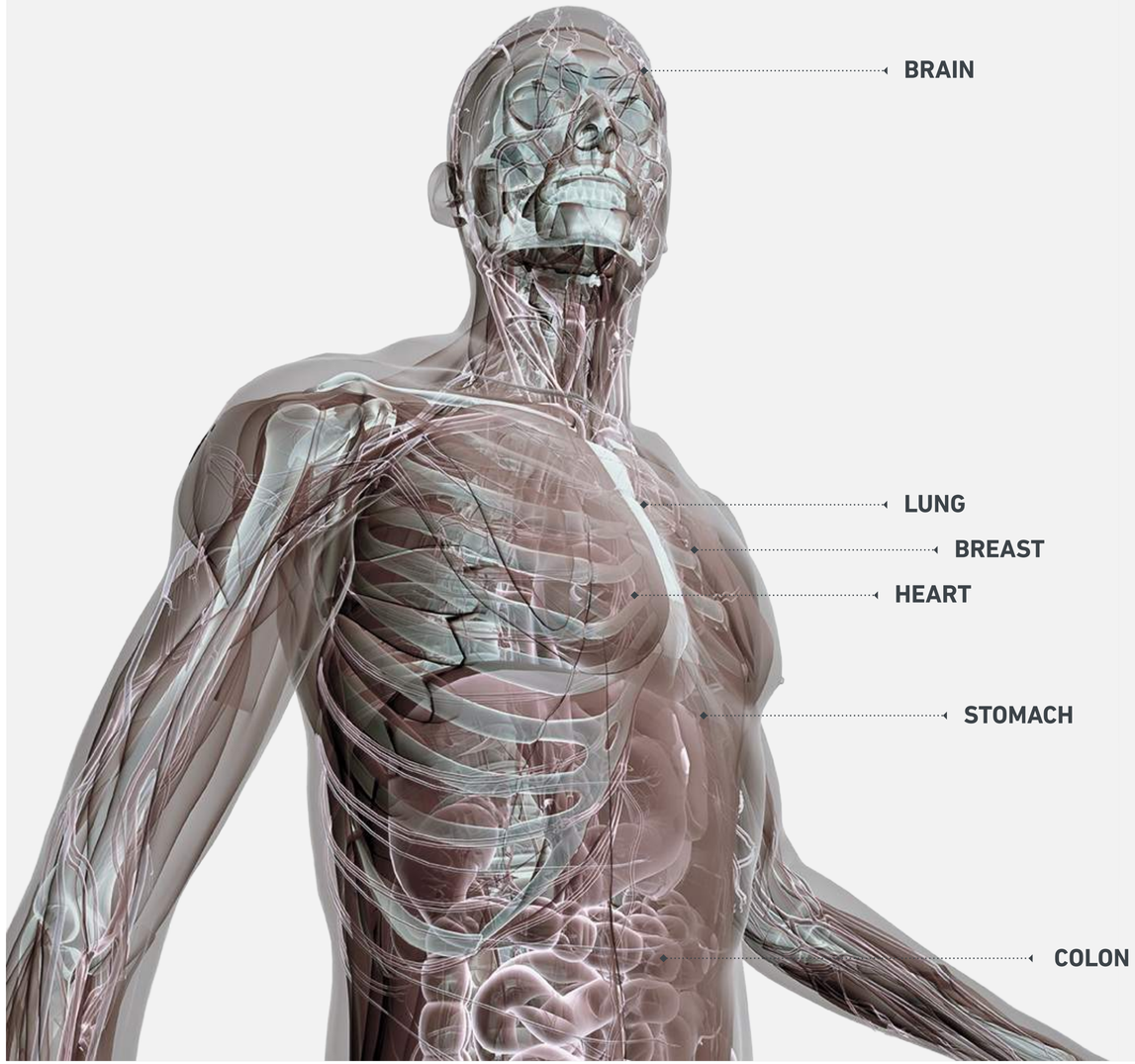
LPIXEL has secured the Japanese Pre-Market Certification for the analysis software for brain MRI, in accordance with the Pharmaceutical and Medical Device Act (PMD Act).

Length and angle measurement

Volume measurement

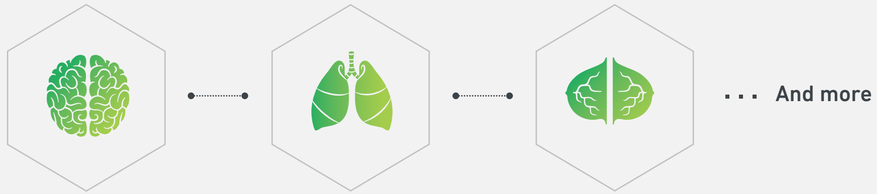
・・・ And more

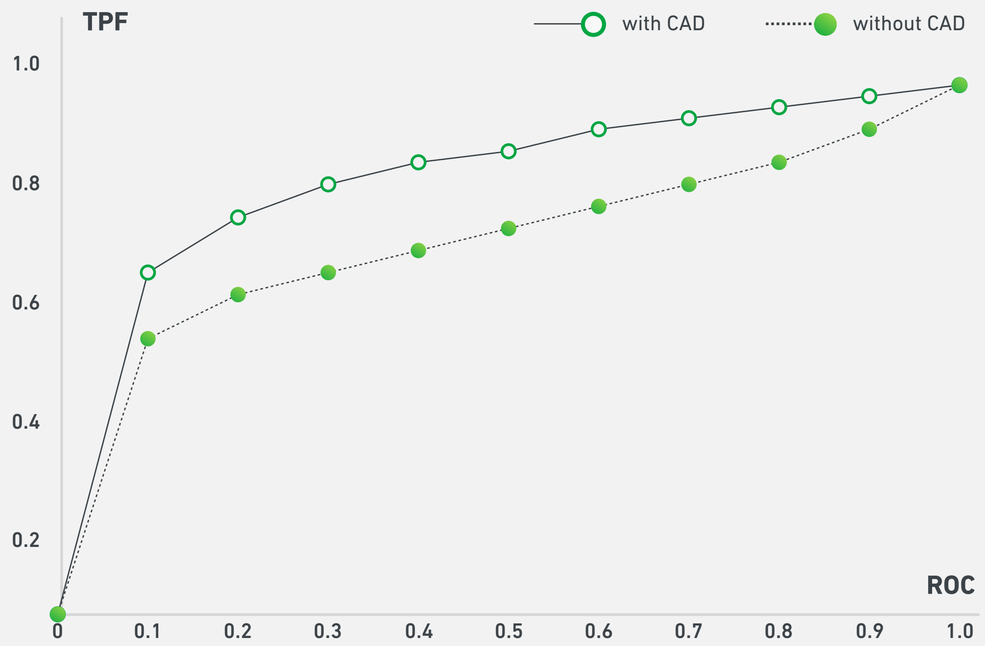




Research and Development

LPIXEL has established joint research collaborations with a number of medical institutions, such as the University of Tokyo and the National Cancer Center Japan. Research topics include brain aneurysms, colon cancer, and breast cancer, all of which are topics that are of high interest to many doctors.





01. BRAIN ANEURYSM DETECTION

Sensitivity on 683 Aneurysms

"Deep learning for MR angiography: automated detection of cerebral aneurysms"
Ueda D et al. Radiology 2018.

CAD Sensitivity
91% → 93%

CAD Improved detection
4.8% → 13%

Reader experiment with 20 radiologists on 100 examinations

Non-specialists
79.4% → 85.5%

Board-certified Radiologists
91.0% → 92.6%

Presented at: The 77th Annual Meeting of the Japan Radiological Society **Supported by**: Osaka City University Graduate School of Medicine and Faculty of Medicine Department of Diagnostic and Interventional Radiology

	DATA SET	CAD Sensitivity	CAD Positive predictive value
DETECTION	3,229 images extracted randomly from the database	**98%**	**91.2%**
DETECTION	105 still images including only flat and diminutive lesions	**93.7%**	**96.7%**
CLASSIFICATION	281 non-magnified still images of the lesions	**90.7%**	-

02. COLONIC LESION DETECTION AND CLASSIFICATION

Detection
CAD Sensitivity **98%**

Classification
CAD Sensitivity **91%**

As of May 2018. the system achieved a sensitivity of 98% and a positive predictive value of 91.2% for the detection of colonic lesions, even for the detection of "difficult lesions," which are flat or diminutive.

AMED
国立研究開発法人 日本医療研究開発機構
Japan Agency for Medical Research and Development

東京慈恵会医科大学

Presented at: The 95th Congress of the Japan Gastroenterological Endoscopy Society, Digestive Disease Week **Supported by**: Jikei University School of Medicine

Achievements

We recently partnered with renowned healthcare companies to accelerate our market penetration, both in Japan and globally.

Our academic partners are prestigious universities with whom we develop and validate the core of the EIRL technology.

Canon
CANON MEDICAL

FUJIFILM

OLYMPUS®

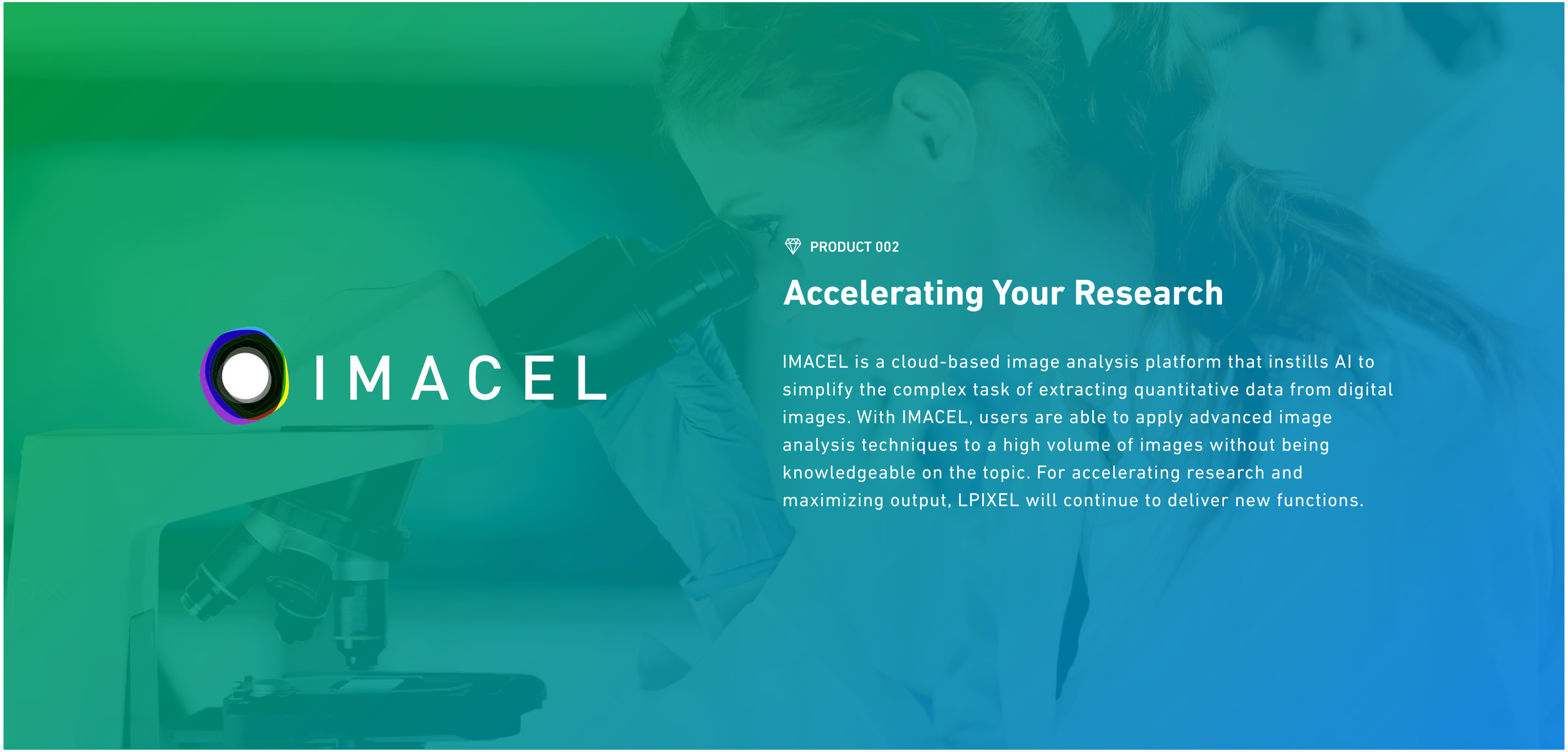
* LISTED IN ALPHABETICAL ORDER

国立研究開発法人 国立がん研究センター
National Cancer Center Japan

公立大学法人
大阪市立大学
OSAKA CITY UNIVERSITY

東京慈恵会医科大学

東大病院
The University of Tokyo Hospital



IMACEL

PRODUCT 002

Accelerating Your Research

IMACEL is a cloud-based image analysis platform that instills AI to simplify the complex task of extracting quantitative data from digital images. With IMACEL, users are able to apply advanced image analysis techniques to a high volume of images without being knowledgeable on the topic. For accelerating research and maximizing output, LPIXEL will continue to deliver new functions.

SOLUTION 01

Simplified Processing

The GUI library eliminates the need for coding, making it possible to develop the desired image processing program.

SOLUTION 02

Easy Customization

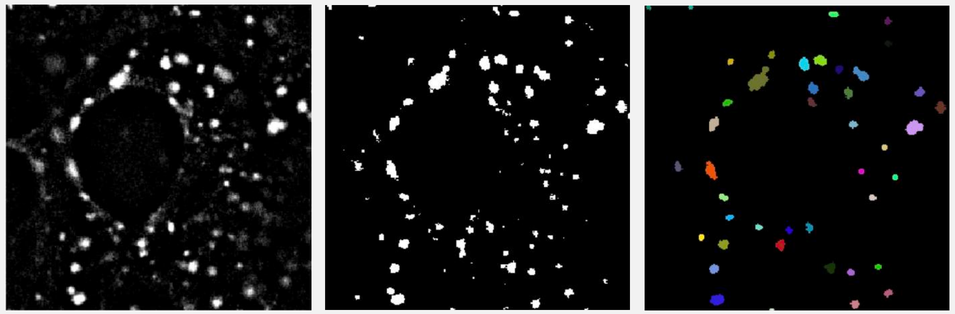
Users can select from a series of combinable image processing modules that fit their image analysis needs.

SOLUTION 03

Advanced Analysis

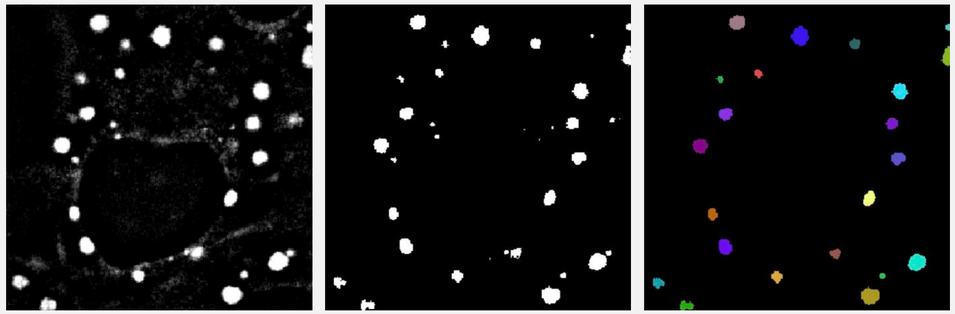
Analysis that was not possible with conventional methods of image analysis is made possible with the power of machine learning.

Stress induced for 15 minutes



Original Image | Binarized Image | Segmentation of SGs

Stress induced for 60 minutes



Original Image | Binarized Image | Segmentation of SGs

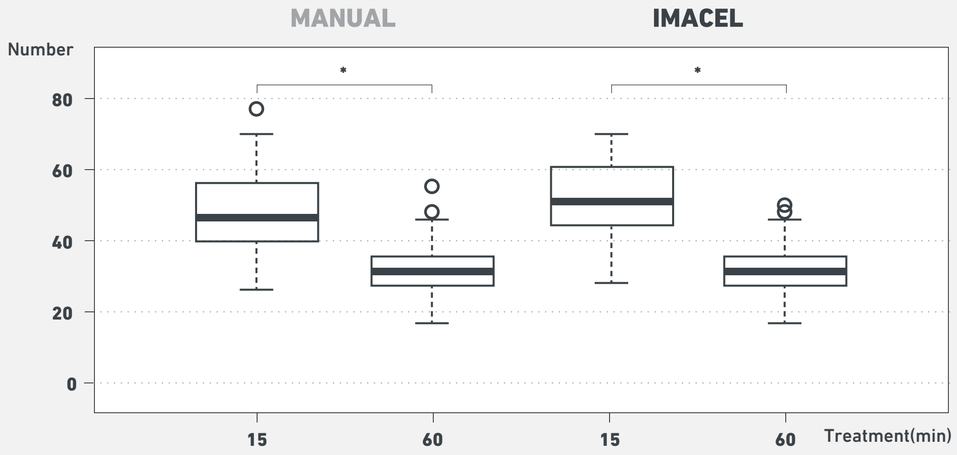
01. QUANTITATIVE ANALYSIS OF ORGANELLE MORPHOLOGY

CELLS COS7 cells

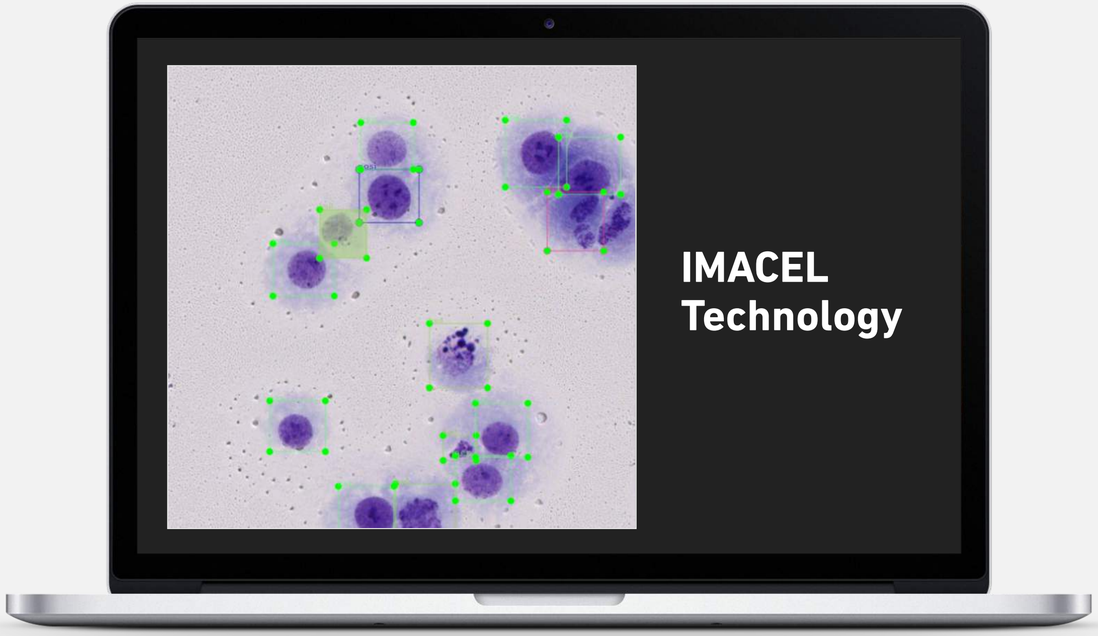
LABELING METHOD Immunofluorescence staining

PURPOSE Counting and morphological analysis of stress granules

IMACEL achieved high throughput quantitative analysis of stress granules with expert-level accuracy.

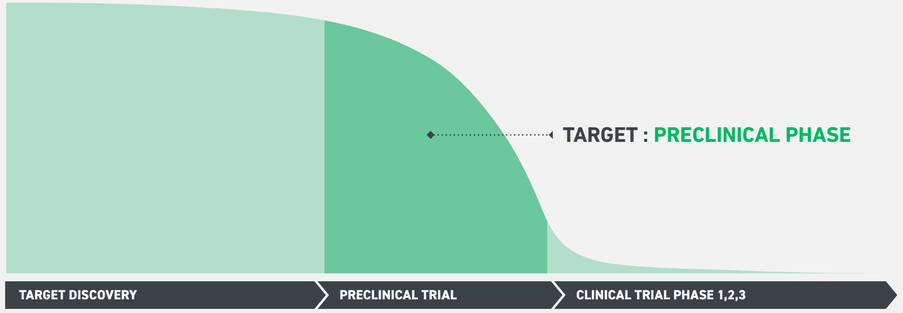


PLoS ONE 14(2): e0212619 (2019)



02. AN AUTOMATIC DETECTION TECHNIQUE OF MICONUCLEUI TEST USING DEEP LEARNING

With conventional methods, cells that have micronuclei are detected visually. LPIXEL's technology can automatically detect and quantify not only cells with or without micronuclei, but also multinuclear cells and mitotic cells.



Presented at: Japanese Environmental Mutagen Society・Mammalian Mutagenicity Study Group

ImaChek

PRODUCT 003

Bringing Clarity to Research

ImaChek is a novel solution designed to detect images suspected of duplication and manipulation prior to submitting papers for publication. ImaChek will help to minimize the risks associated with image manipulation, enhance the quality of research, and protect the integrity of research.

SOLUTION 01

Enhance and Maintain the Quality of Research

Images can be checked prior to submission to keep risks related to misconduct to a minimum and maintain the quality of research.

SOLUTION 02

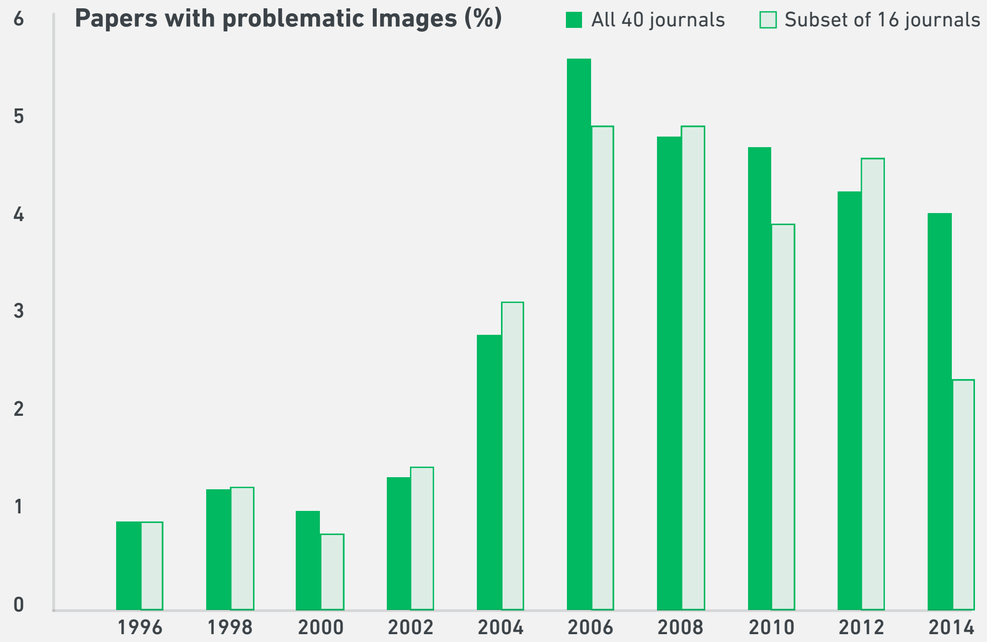
Protect the Reputation of Institutions

Allegations of research misconduct are costly and damage the reputation of the institution. Images can be checked in advance to prevent the onset of research misconduct.

SOLUTION 03

Reduce Checking Time for Faster Publication

Automating the image checking process helps to increase the speed and efficiency for publication.

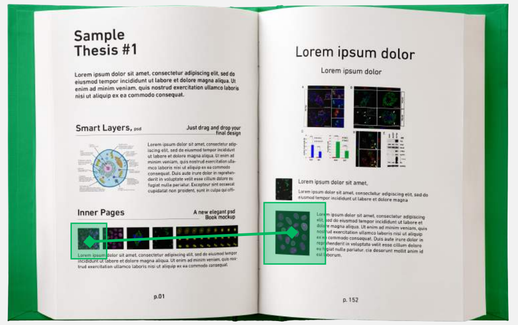


01. DUPLICATION DETECTION

Nature News released in 2016 reported that the frequency of using duplicated images in one paper has doubled during and around the year 2000 (*1). This may be caused by the digitalization of images and the accessibility to image processing software. Moreover, it has been reported that image duplication has been found in 4.3% of papers on average, while other journals reported rates as high as 12% (*2).

ImaChek Technology
Bringing Clarity to Research

ImaChek's AI assists with the auto-detection of images that have been reused in the same article.

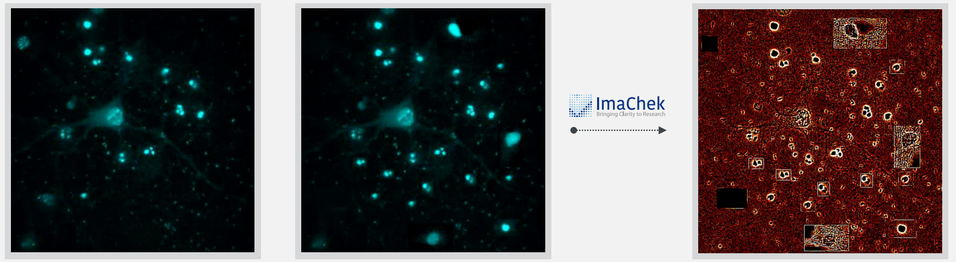


*1 Problematic images found in 4% of biomedical papers Monya Baker Nature News, Apr 22, 2016; DOI:10.1038/nature.2016.19802

*2 The Prevalence of Inappropriate Image Duplication in Biomedical Research Publications Elisabeth M. Bik, Arturo Casadevall, Ferric C. Fang mBio Jun 2016, 7 (3) e00809-16; DOI: 10.1128/mBio.00809-16

02. MANIPULATION DETECTION

For the first time in the world, the Journal of Cell Biology instituted a series of guidelines regarding the acceptable standards for image processing in 2004 (*1). Since then, many journals have devised submission guidelines for acceptable standards for image integrity. In addition to intentional alterations, such as splicing, it is important to avoid unintended image fabrication caused by excessive contrast adjustments. As a part of our educational activities, a handbook has been compiled to summarize the appropriate practices for processing images (*2).



Original Image **Manipulated Image** **Manipulation detected**

***1** What's in a picture? The temptation of image manipulation Mike Rossner, Kenneth M. YamadaThe Journal of Cell Biology Jul 2004, 166 (1) 11-15; DOI: 10.1083/jcb.200406019

***2** Handbook Published by AMED
https://www.amed.go.jp/content/000033949.pdf

NATIONAL PROJECTS

LPIXEL brings its knowledge and expertise in advanced technology to the following projects to promote the development of scientific innovation in our society.

経済産業省
Ministry of Economy, Trade and Industry

Ministry of Economy, Trade and Industry | Strategic Core Technology Advancement Program

Pathology Diagnosis Support System that uses Artificial Intelligence and Three-Dimensional Structure Information of Living Tissues

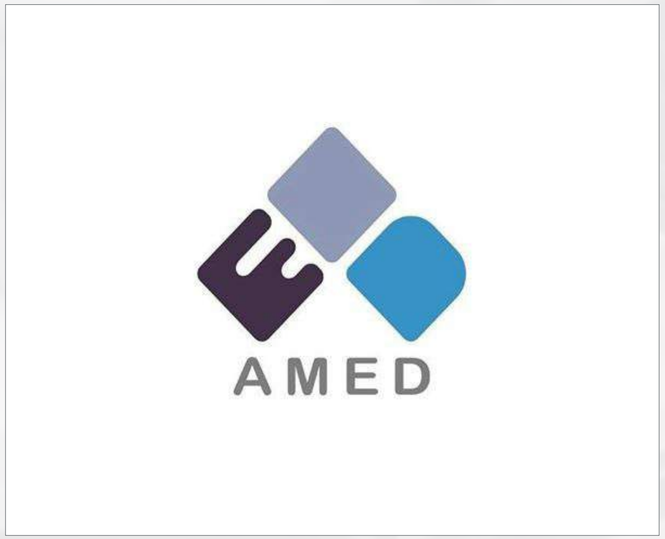
LPIXEL was selected to take part in the Strategic Core Technology Advancement Program, a project led by the Ministry of Economy, Trade and Industry. Together with TCK Co., Ltd., LPixel is developing a system that utilizes laser ablation technology that will rapidly conduct a three-dimensional structural analysis of living tissues at nano-resolution.

Japan Science and Technology Agency |
Constructing models to Confer Environmental Robustness by Developing Multi-omics Technology of Polyploid Species

Constructing models to Confer Environmental Robustness by Developing Multi-omics Technology of Polyploid Species

LPIXEL together with Kihara Institute for Biological Research, National Institute of Advanced Industrial Science and Technology (AIST) and the University of Zurich, was selected to participate in CREST, a funding program by Japan Science and Technology Agency (JST). Our project is focused on constructing models to confer environmental robustness by developing multi-omics technology of polyploid species.

JST CREST encourages researches that trigger the reformation of social and economic structures.



Ministry of Health, Labor and Welfare | Practical Research for Innovative Cancer Control

AI-Assisted Colonoscopy to Minimize Deaths Related to Colorectal Cancer

This research is funded by the Japan Agency for Medical Research and Development. LPIXEL is a joint research partner to the Jikei University School of Medicine.

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