LPIXEL

Company Overview

March 2025

Corporate Information

Name	**LPIXEL Inc.**
Founded	**March 4, 2014**
Headquarters	**Otemachi Bld. 6F, 1-6-1 Otemachi, Chiyoda-ku, Tokyo 100-0004 Japan**
Capital	**100 Million JPY**
CEO	**Tomihisa Kamada, Ph.D.**
Business	**Medical Image AI, development and sales** **Drug Discovery AI, development and sales**
Employees	**69 (As of May 2024)**

Licenses

Registered Medical Device Manufacturer (No. 13BZ201223)
Second-class marketing license for medical devices (No. 13B2X10317)
EN ISO 13485:2016 (Medical Device Quality Management Systems)
ISO/IEC 27001:2013 (Information Security Management Systems)

Patents

1. CARTA: Active learning software for automatic classification of biomedical images (Patent Number 4688954)
2. Image processing device and image processing method (Patent No. 6329651)

Awards

METI J-Startup

Japan Healthcare Business Contest 2017 Excellence Award

Microsoft Innovation Award 2016

2017 Red Herring Global Top 100

IT Japan Award 2020 Special Award

Investors

OLYMPUS

TechMatrix

Canon
CANON MEDICAL

TORAY
Innovation by Chemistry

CYBERDYNE

FUJIFILM

LPIXEL

Life Science x AI Image Analysis

Accelerating biopharmaceutical R&D with AI Image Analysis

Custom AI Image Analysis Solutions

LPIXEL addresses any challenge in life science R&D involving a visual element

1. Solve problems with existing processes that rely on manual visual inspection:

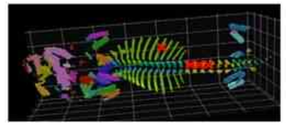
- Labour and time intensity
- Subjectivity and poor reproducibility

2. Develop innovative new research methods:

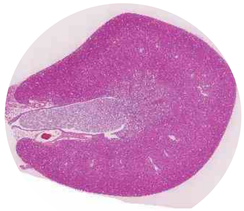
- Extract information and patterns from images in a way *not possible* by humans

Video analysis

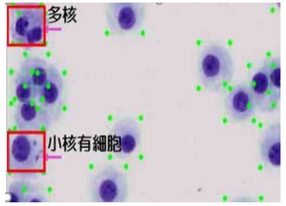
Micro CT



Pathology



Microscopy

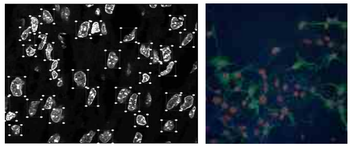


Supporting the Entire Drug Development Value Chain

Virtually any imaging modality or use case supported

Drug Discovery

Phenotypic Drug Screening



Stem cell differentiation assessment

Tissue spatial analysis

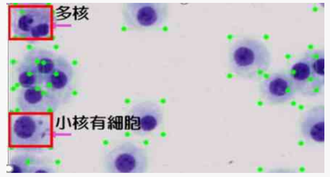
MoA prediction via cell painting

Preclinical Research

Animal Behaviour Analysis

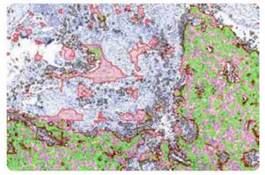
Toxicological pathology

Genotoxicity assessment

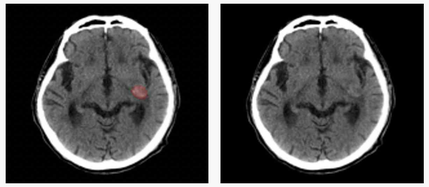


Clinical Trials

Patient stratification (Pathology / radiology)



Drug efficacy evaluation



Manufacturing

Medicine vial QC (Contamination / precipitation)

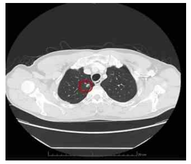
Cell preparation QC

Hardware Integration

Defect inspection AI installed in Toray Engineering's semiconductor wafer optical inspection system INSPECTRA

Post Marketing

Early detection and monitoring of adverse drug events (Skin / Lung)



Early diagnosis of target diseases

Case study 1: Automating the analysis of multicolour immunofluorescent microscopy

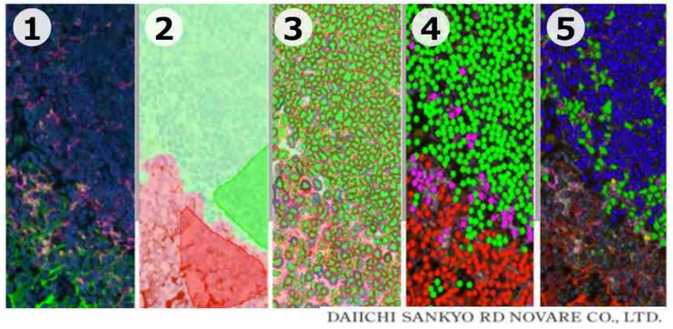
In collaboration with Daiichi Sankyo:

LPIXEL

1. Stain and digitize slide

2. Analyse 7-colour image

Multi-step process:
Performed by a specialist using designated software



DAIICHI SANKYO RD NOVARE CO., LTD.

① 7-colour image (6 cellular markers + nucleus)
② Separate tumour and non-tumour regions
③ Detect each individual cell by cell nucleus recognition
④ Differentiate cell types by markers
⑤ Count each cell of each type

Challenges with existing method:

Labour	Specialist must manually set and verify classification parameters by eye
Subjectivity	Highly dependent on operator skill and experience
Time	Over 10 hours per experiment

Significant decrease in time and labour requirements

AI Image Analysis

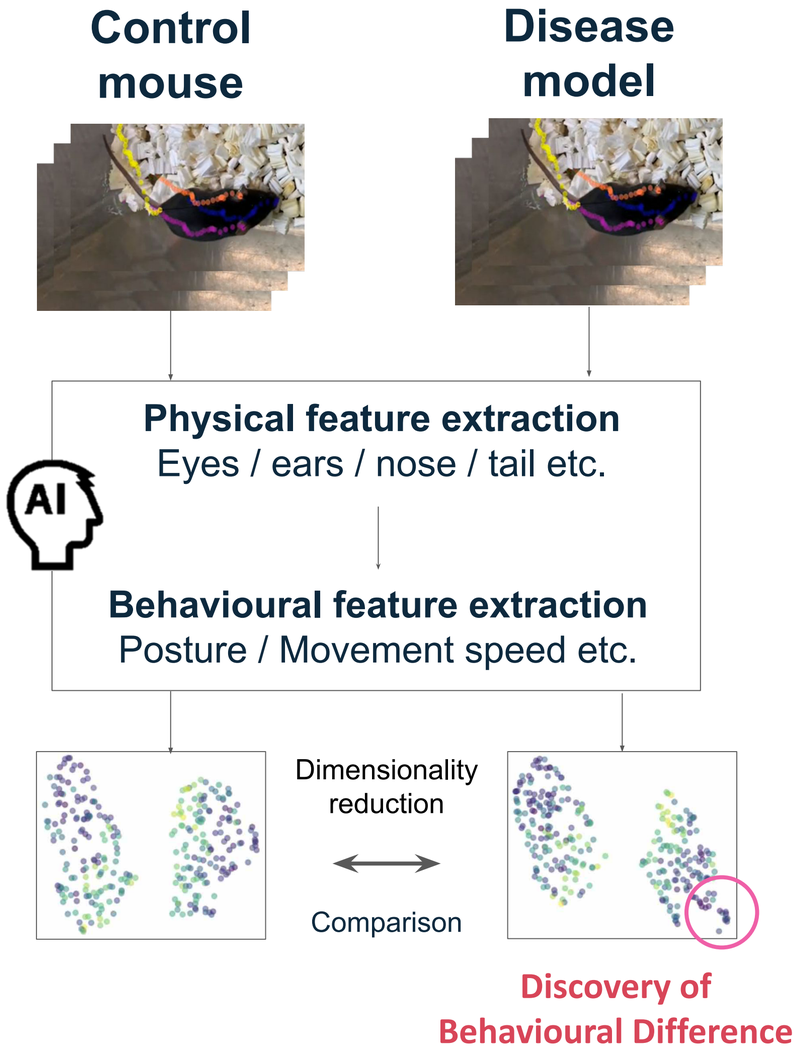
LPIXEL

Labour	**Highly automated**
Subjectivity	**Accuracy better than or equal to expert's judgement**
Time	**1-2 hours per experiment (80-90% Decrease)**

Case study 2: Automatic Animal Behaviour Analysis

Under Development:

AI model to automatically reveal and quantify behavioural differences between healthy and drug treated / disease model animals through video feed analysis



Interim publication featuring basic mice tracking technology:

1 Matsuo, T. et al.* Thiazoline-related innate fear stimuli orchestrate hypothermia and anti-hypoxia via sensory TRPA1 activation. Nat Commun 12, 2074 (2021). https://doi.org/10.1038/s41467-021-22205-0

Over 10 Years of Experience

Over 100 Collaborative Projects:

- DAIICHI SANKYO COMPANY, LIMITED
- Astellas Pharma Inc.
- Shionogi TechnoAdvance Research Co., Ltd.
- Olympus Corporation
- Toray Engineering
- National Center for Child Health and Development
- Many more

Official strategic partner of Daiichi-Sankyo since 2022

Daiichi-Sankyo

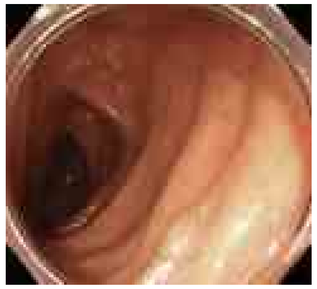
LPIXEL

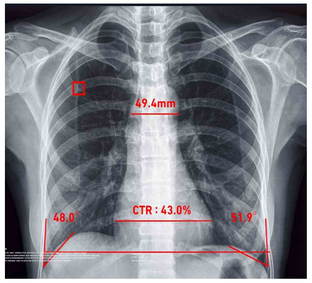
Over 10 Years of Experience

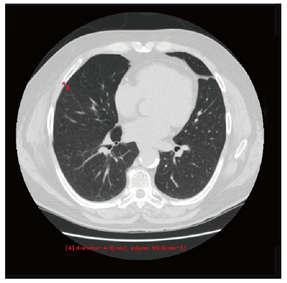
EIRL
PRODUCED BY LPIXEL

Medical Imaging Diagnostic Support

Clinical SaMD Product Lineup







Used by **over 920** medical institutions in Japan*

Over 10 million analyses performed*

*Cumulatively, as of December 2024

Our Strength

A team of dual-trained scientist-engineers.

Our AI/ML engineers are accomplished researchers with a wealth of domain knowledge across the life sciences and can communicate effectively with R&D teams.

We don’t just make tools.

We are part of the scientific process and consult on experimental design and data collection strategies to ensure that anything we develop actually helps you to achieve your research goals.

K.S.

- PhD Pharmaceutical Sciences
- Researcher at the RIKEN Center for Biosystems Dynamics Research (BDR)
- **Special Interest:** Nanoscale localization and dynamics analysis of intracellular mRNA

H.K.

- PhD Pharmaceutical Sciences
- Visiting Researcher, University of Tokyo
- **Special interest:** Neural stem cell differentiation regulation

S.N.

- MSc Aerospace Engineering
- Previously: Nikon Corporation developing customised products for the food industry
- **Special interest:** Satellite image processing

N.S.

- PhD Physics
- Adjunct Associate Professor of AI Medicine at Chiba University. Previously: RIKEN, German Cancer Research Center
- **Special interest:** Clinical particle therapy of moving targets

LPIXEL

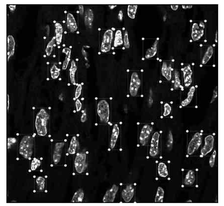
Demonstration

Accelerating Pharmaceutical R&D

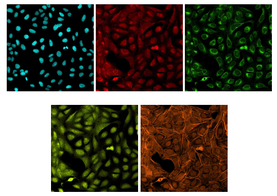
Case Study Collection

Drug Discovery & Preclinical Research

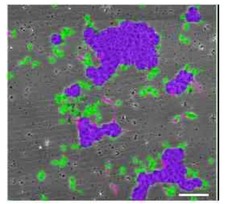
Drug discovery	Preclinical Research	Manufacturing	Clinical Trials	Post Marketing



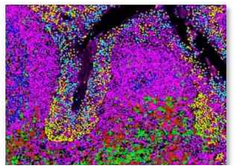
Phenotypic drug screening



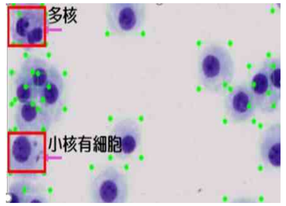
Cell painting assay screening



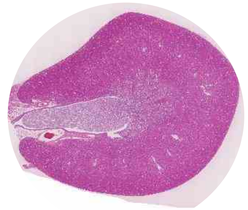
Stem cell differentiation assessment



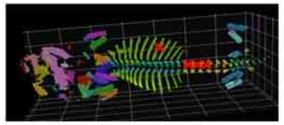
Automation of multicolour immunofluorescence analysis



Genotoxicity (micronuclei) assessment



Tissue toxicity detection from WSI (Toxicological Pathology)



Abnormality detection in teratogenicity studies

Animal tracking and behaviour analysis

Phenotypic Screening

Compound evaluation via cell morphology analysis

Challenge: Evaluation of cellular response to a compound via morphological analysis at the single cell level.

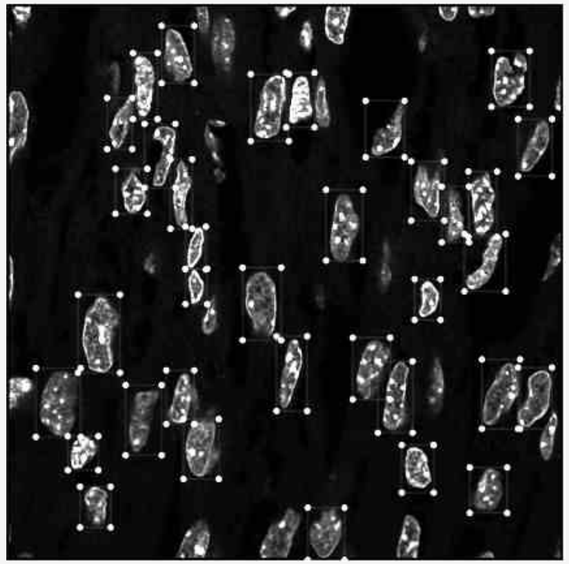
LPIXEL Solution: The morphology of every single cell in a micrograph is analysed automatically:

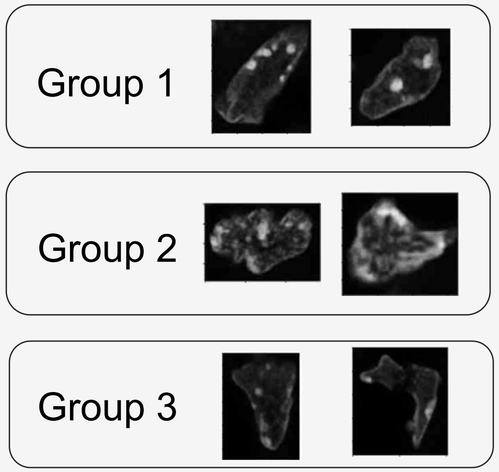
Cells are categorised into phenotypic groups and quantified according to their complex morphological features.

Application: Automatic analysis enables the rapid screening of a vast number of compounds in a short amount of time, facilitating drug candidate selection.

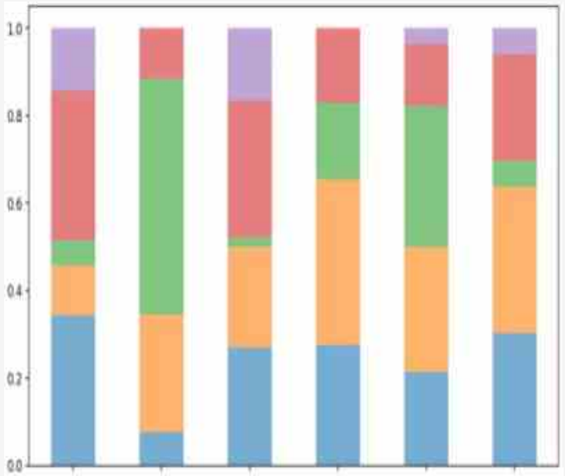
Outcome: Technology developed in collaboration with a major pharmaceutical company and used to screen a library of several hundreds of thousands of compounds.

Drug Discovery | Preclinical Research | Manufacturing | Clinical Trials | Post Marketing





Classification of cells into phenotypic groups



Quantification of cells by group

Nuclear localisation
(ratio)

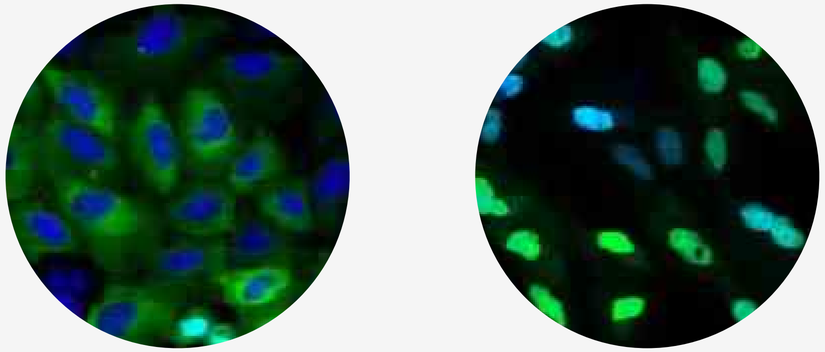
Cellular Dynamics Analysis

Quantification of drug localisation

Challenge: Localisation of proteins / organelles in drug responsiveness analysis is time and labour intensive and suffers from poor reproducibility

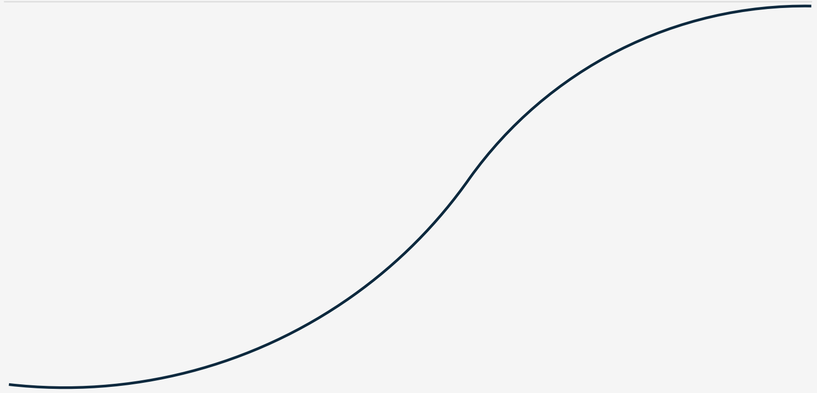
LPIXEL Solution: The localisation of intracellular material is automatically quantified by AI

Outcome: Technology developed in collaboration with a major pharmaceutical company and implemented into drug discovery pipeline



Cytoplasmic localisation

Nuclear localisation



We used image set BBBC013v1 provided by Ilya Ravkin, available from the Broad Bioimage Benchmark Collection [Ljosa et al., Nature Methods, 2012].

Cell Painting Assay Screening

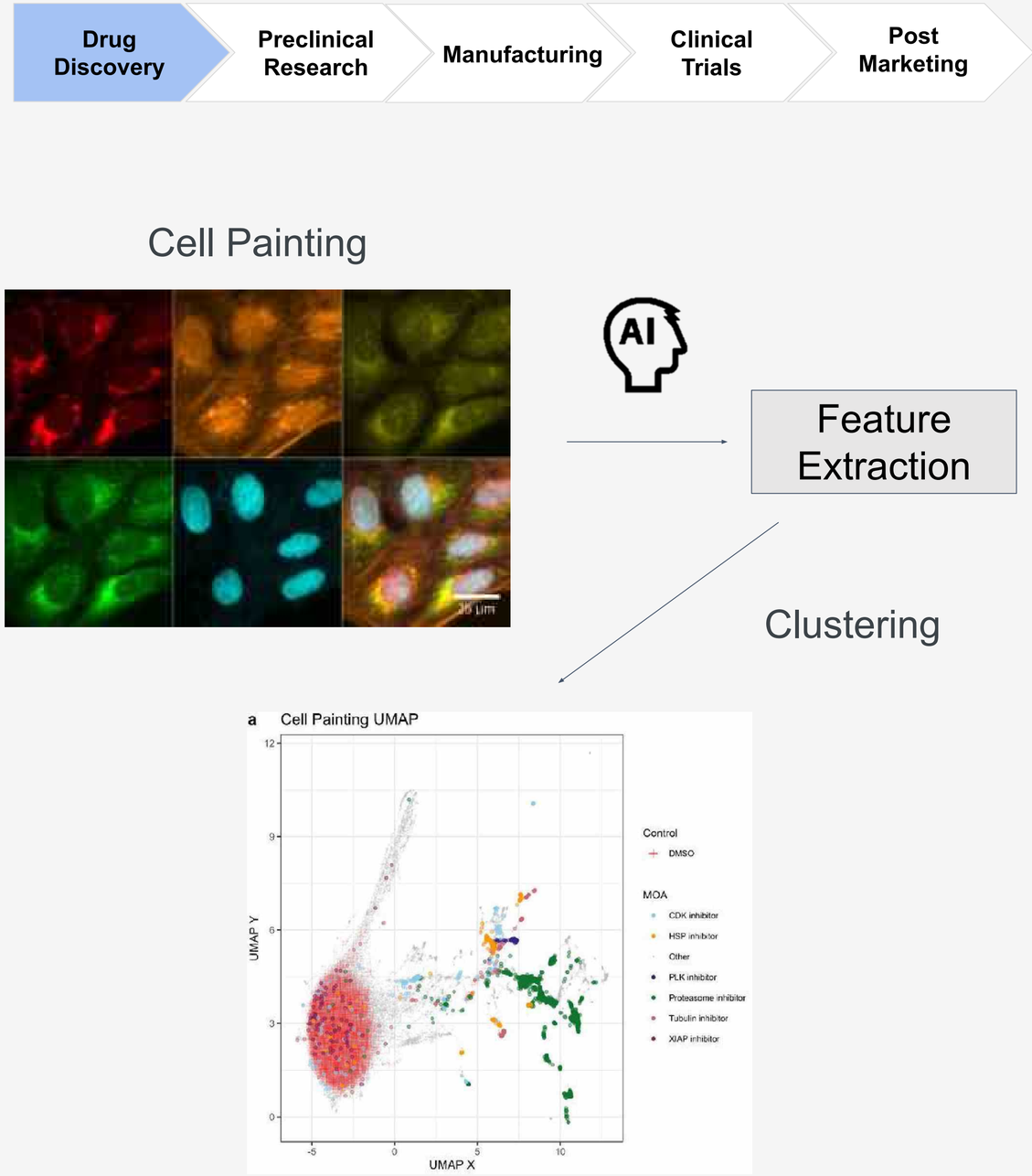
Compound evaluation via cell phenotypic profiling

Challenge: Overcoming limitations of existing drug discovery platforms by enabling high resolution evaluation of cellular response to compounds

LPIXEL Solution: ① Individual cell components and organelles are labelled via multiplex immunofluorescent staining.

② The particular features of each cell are automatically extracted and measured to construct an overall phenotypic profile for every individual cell.

Application: Facilitates high throughput drug candidate screening and novel compound MOA analysis / toxicity prediction



Cimini, B.A., Chandrasekaran, S.N., Kost-Alimova, M. *et al.* Optimizing the Cell Painting assay for image-based profiling. *Nat Protoc* 18, 1981–2013 (2023).
G.P. Way et al., "Morphology and gene expression profiling provide complementary information for mapping cell state", 2021.

Stem Cell Differentiation Assessment

Characterisation of differentiated stem cells
via cell morphology analysis

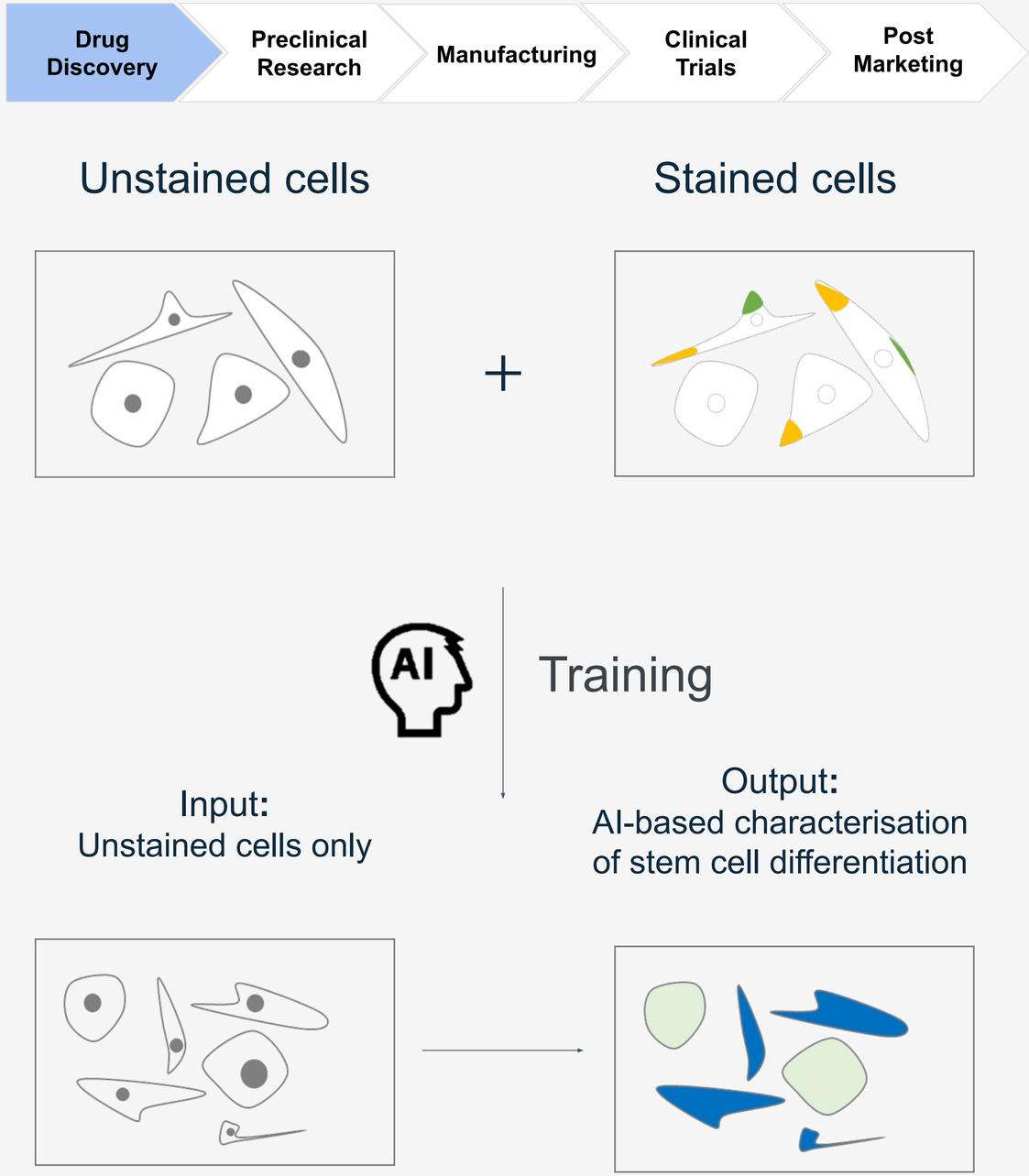
Challenge: Distinguish between different types of mature cells generated through iPSC differentiation whilst alive, without staining.

LPIXEL Solution: An AI model is trained using paired images of differentiated cells before and after they have been stained for markers of differentiation.

The learned AI is then applied to new images of live, unstained cells and is able to accurately characterise them.

Application: Compound screening using disease model cells generated from iPS.

Outcome: Technology developed through collaborative research with a major pharmaceutical company.



Genotoxicity Assessment

Detection of cellular morphological abnormalities in response to drug candidates

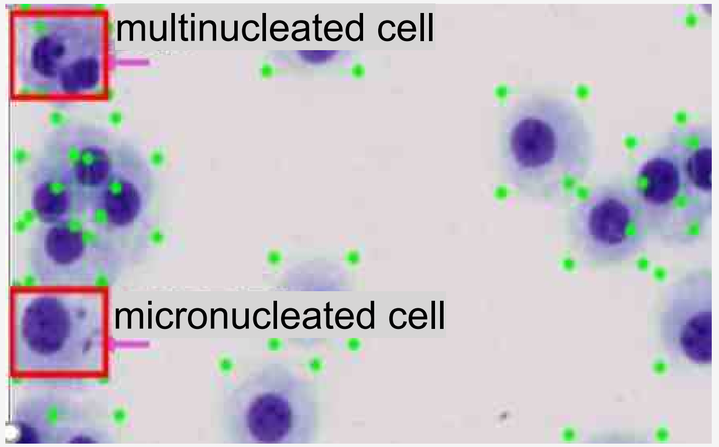
Challenge: The manual, visual evaluation of cell genotoxicity (i.e. presence of nuclear abnormalities) is time and labour intensive and prone to poor reproducibility.

LPIXEL Solution: Automatic detection and enumeration of cells with micronuclei (MN) in a cytology preparation.

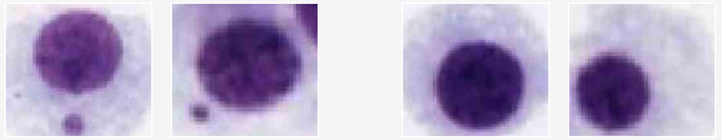
The number of micronucleated cells detected by IMACEL highly correlate with that by visual inspection (r = 0.85. Presented at academic conference November 2020)

Outcome: Officially launched as a genotoxicity analysis service “IMACEL TOX” in December 2021.

Drug Discovery | **Preclinical Research** | Manufacturing | Clinical Trials | Post Marketing

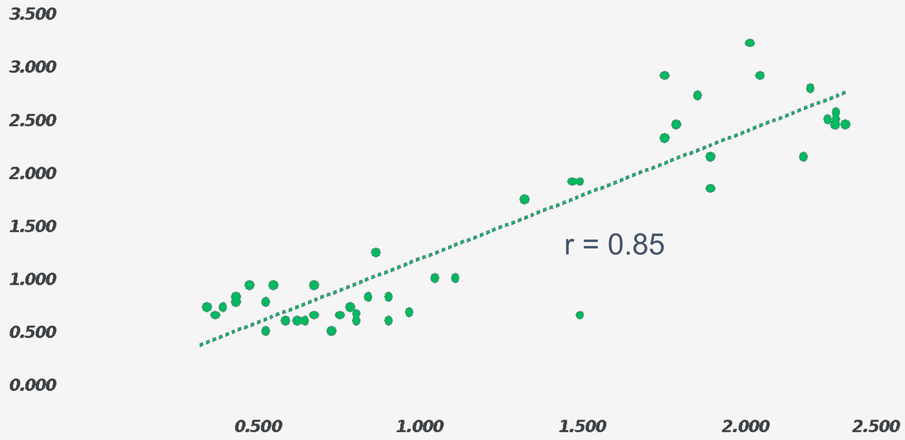


Recognition of nuclear abnormalities



Micronucleated cells | Normal cells

Comparison between automatic and manual detection of micronucleated cells (Representative example)



Pathology

Detection of tissue abnormalities from H&E stained whole slide images (WSI)

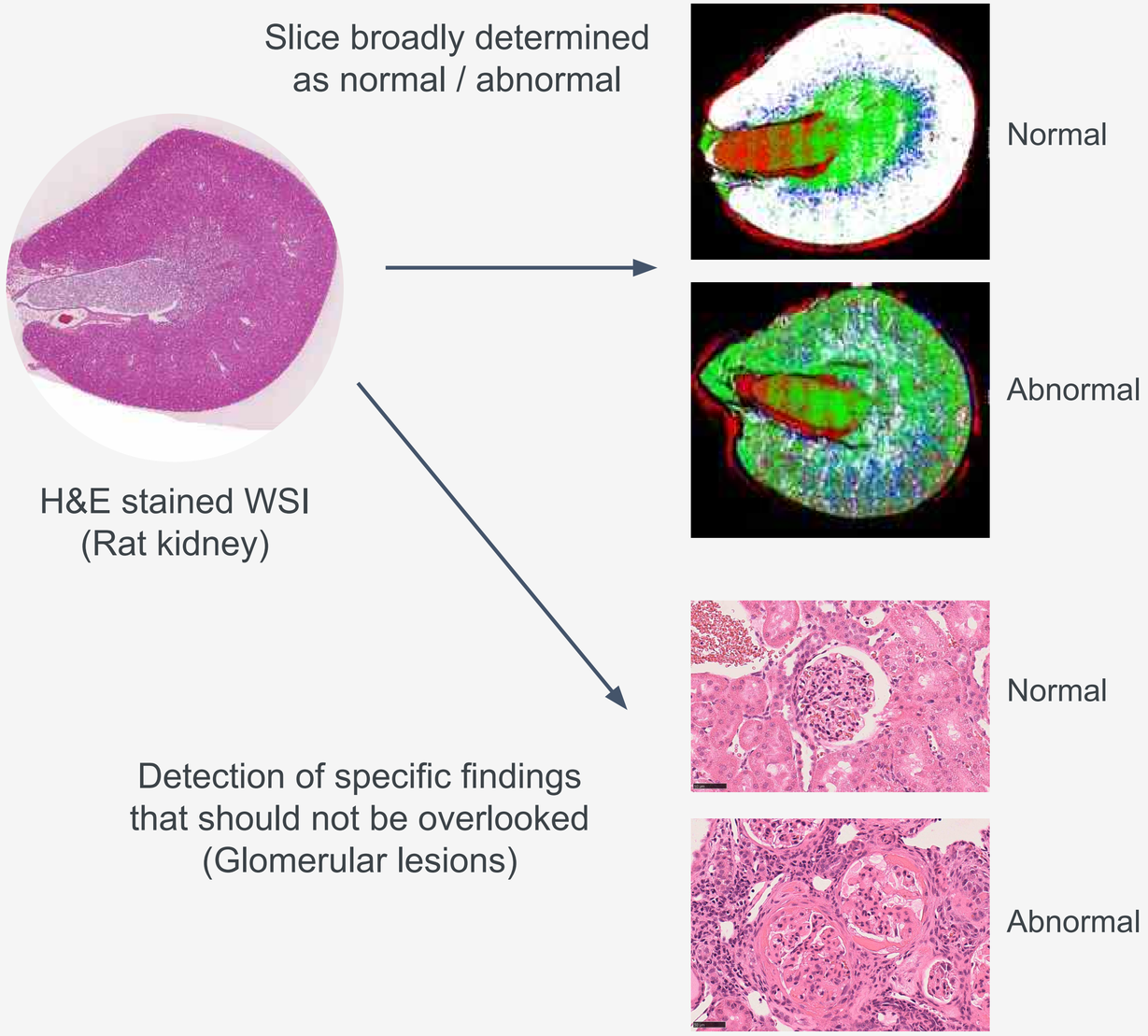
Challenge: In drug toxicity studies, toxicologists currently survey the entire area of every WSI generated from a tissue sample manually by eye. This is time and labour intensive.

LPIXEL Solution: Automatically evaluate WSI and highlight areas with suspected drug-induced toxicity.

Application: Rapid screening of tissue samples for evidence of toxicity

Collaborative research with Daiichi Sankyo presented at the 41st Annual Meeting of the Japanese Society of Toxicologic Pathology 2025

https://lpixel.net/news/information/2025/11414/



Teratogenicity (DART) Evaluation

Evaluation of fetal structures using micro-CT

Challenge: The preparation and visual inspection of fetal samples in teratogenicity studies is highly time and labour intensive

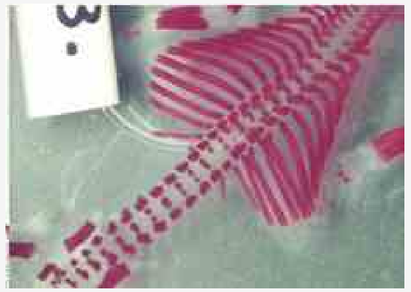
LPIXEL Solution: By applying AI to whole-body micro CT imaging, the fetal rat skeleton is visualised, bones are classified, and skeletal abnormalities are automatically detected

Application: Enables automatic and objective evaluation via imaging, dramatically reducing the workload involved in specimen dissection and staining

Outcome: Results presented at the 2021 IEEE International Conference on Image Processing (ICIP)
https://ieeexplore.ieee.org/document/9506216

Drug Discovery | **Preclinical Research** | Manufacturing | Clinical Trials | Post Marketing

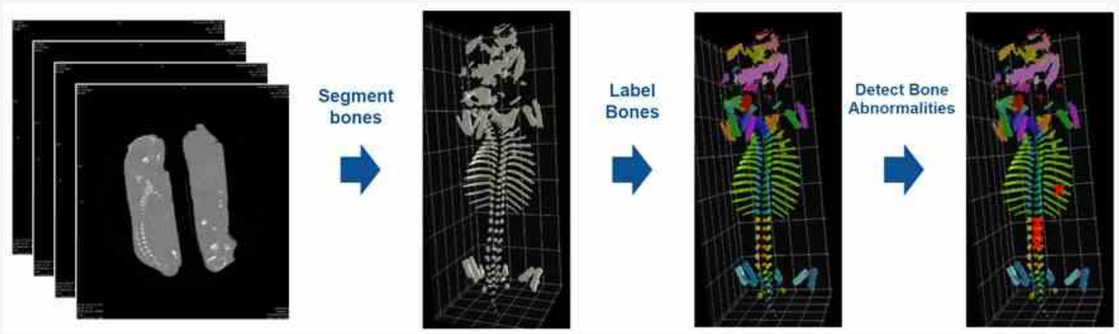
Traditional method (Dissection)



Fetus dissection
↓
Sample preparation
↓
Visual evaluation

Challenges
- Labour and time intensity
- Psychological burden
- Difficult to quantify

AI analysis of micro-CT images



Whole-body imaging via micro CT

Skeleton segmented

Bones labelled

Detection of skeletal abnormalities

Sample compared to training data comprised of normal specimens

Drug Discovery | Preclinical Research | Manufacturing | Clinical Trials | Post Marketing

Animal Behaviour Analysis

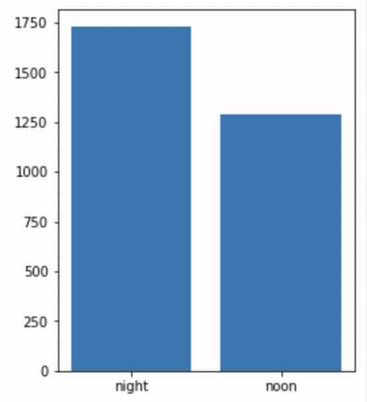
Movement and behaviour tracking and subsequent pattern analysis of laboratory mice via video

Challenge: Manual, visual analysis of the movement and behaviour of live laboratory mice is time and labour intensive and suffers from subjectivity.

LPIXEL Solution: Automatic recognition of physical features of mice (eyes, nose, ears, tail etc.), facilitating movement and behaviour tracking.

Outcome: Mice tracking technology established. Results obtained using this technology published.[1]

Degree of movement per unit time



1 Matsuo, T. et al.* Thiazoline-related innate fear stimuli orchestrate hypothermia and anti-hypoxia via sensory TRPA1 activation. Nat Commun 12, 2074 (2021). https://doi.org/10.1038/s41467-021-22205-0

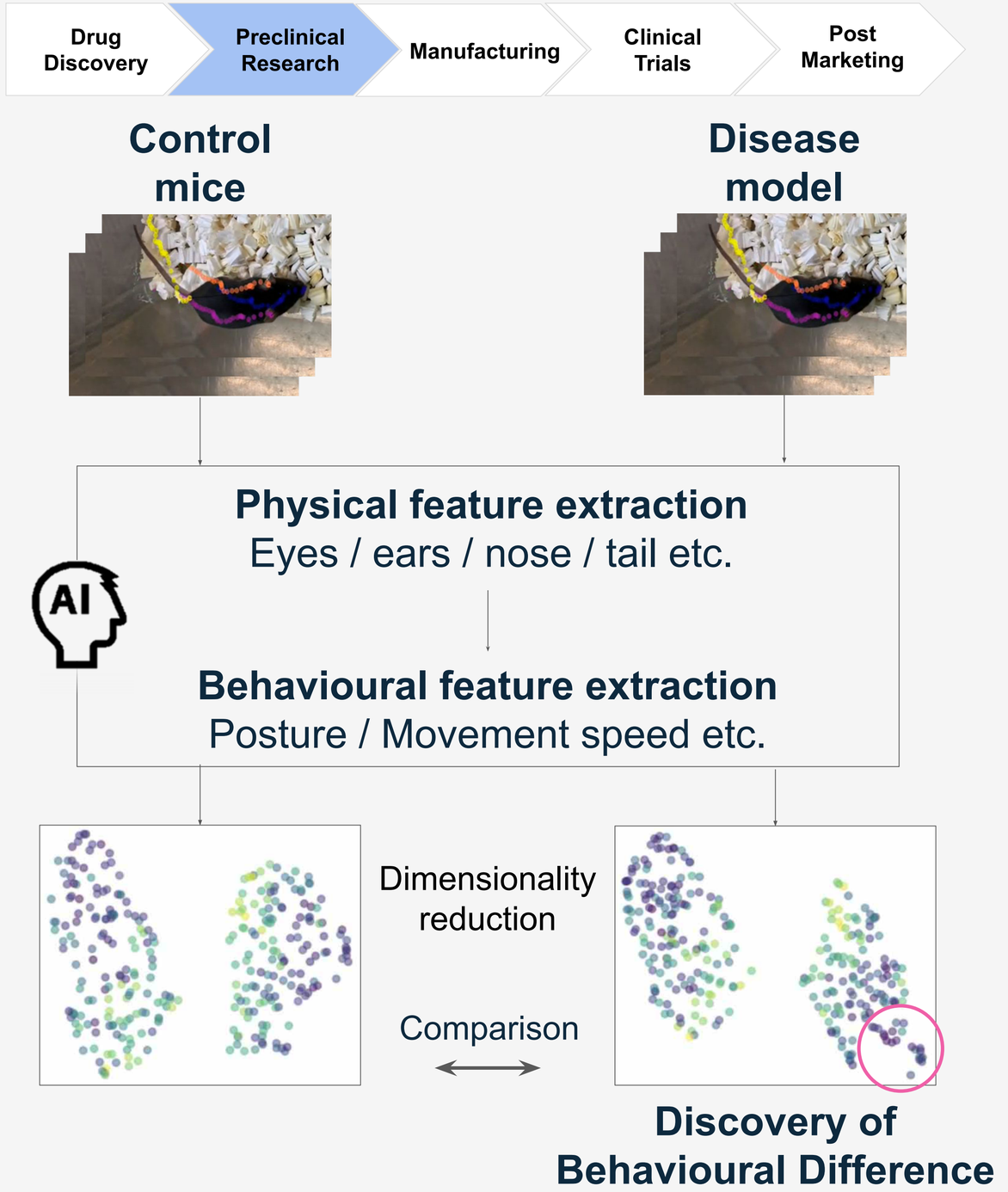
* Kutsuna, Natsumaro - LPIXEL, Inc., R&D Dept.

Animal Behaviour Analysis

Movement and behaviour tracking and subsequent pattern analysis of laboratory mice via video

More Complex Applications:
Automatically reveal and quantify behavioural differences between healthy and disease model mice.

- Detailed behaviour analysis technology currently under development.



Manufacturing & Medicine Formulation

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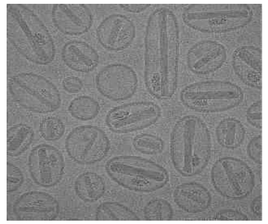
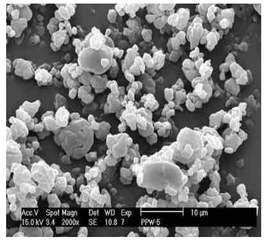
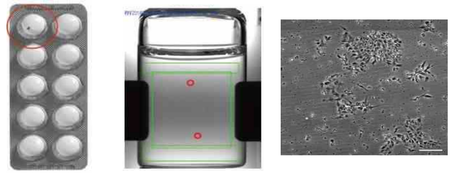
Drug Discovery | Preclinical Research | **Manufacturing** | Clinical Trials | Post Marketing



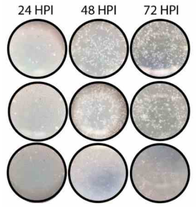
Liposome evaluation



Inter-batch consistency evaluation (Electron Microscopy)



Medicine and cell preparation quality control



Automatic measurement of vaccine viral titres

Application of AI to manufacturing inspection equipment

Liposome Evaluation

Evaluation of liposome characteristics using electron microscopy

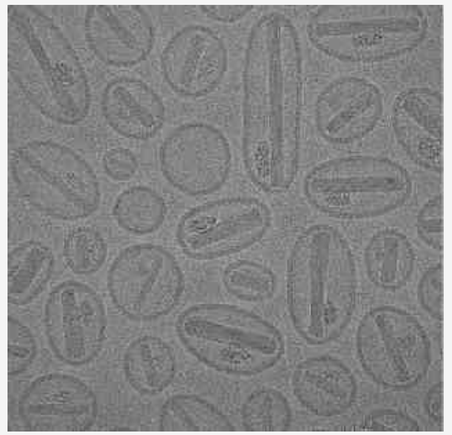
Challenge: Interpretation of electron microscopy images in liposomal research is currently conducted manually by eye.

LPIXEL Solution: Automatic analysis of liposome electron micrographs using AI image segmentation techniques.

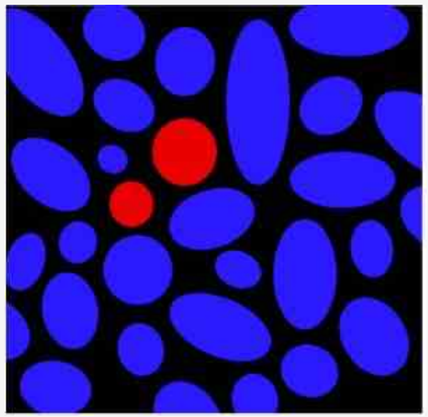
Application: The automatic evaluation of small molecule containing liposomes including:

- Drug presence or absence
- Classification by morphology
- Measurement / calculation of various indices

Electron micrograph



AI segmentation revealing presence / absence of drug



(Image for Illustration Purposes only)

Red: Empty liposomes
Blue: Drug loaded liposomes

Drug Discovery | Preclinical Research | **Manufacturing** | Clinical Trials | Post Marketing

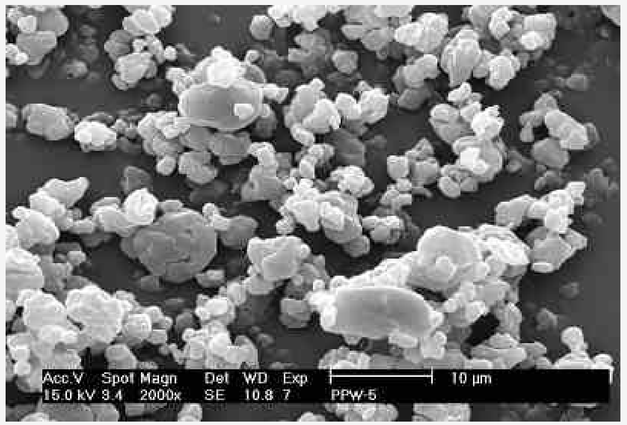
Drug Manufacturing

Evaluation of pharmaceutical inter-batch consistency using scanning electron microscopy (SEM) images

Challenge: Environmental variations in drug formulation conditions may result in differences in fluidity during the mixing process which can impact production.

LPIXEL Solution: Automatically measure drug particle size and aggregation levels from SEM images.

Application: Efficiently evaluate and monitor drug consistency across different formulation conditions.



AI

Particle size and aggregation level measurement

Drug quality evaluation

Quality Control

External Inspection of drug preparations

Challenge: QC performed by technicians through visual inspection is costly and carries the risk of missing critical findings

LPIXEL Solution: AI automatically detects defects in products and quantifies the degree of deviation from the norm

Application: Streamlined quality control processes with reduced time and labor requirements through the automatic detection of:

- Foreign contaminants and physical damage in drug vials
- Anomalies in cell preparations

Detection of foreign body / physical damage etc.

Viral Titer Measurement

Differentiation of infected and non-infected cells by cell morphology analysis

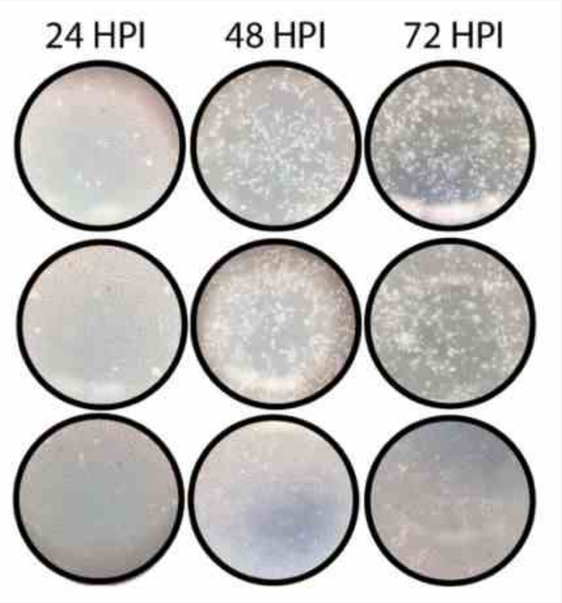
Challenge: Manual, visual determination of viral infection in titre studies is time and labour intensive and prone to poor reproducibility

LPIXEL Solution: Automatically distinguish between infected and non-infected cells via image analysis – recognizing subtle morphological differences.

Outcome: Technology developed in collaboration with Shionogi Techno Advance Research Co., Ltd.

Currently used in infectious diseases drug development research.

Press release:
https://www.shionogi.com/star/jp/ja/news/2022/04/20220414.html



Automatically distinguish between infected and non-infected cells

Hardware Integration

AI installed directly into semiconductor wafer inspection device

Challenge: Manually setting up inspection parameters for QC processes is time and labour intensive.

LPIXEL Solution: AI automatically establishes the appropriate conditions for defect inspection while providing a visualisation of the setting creation process to technicians.

Outcome: Installed in Toray Engineering's semiconductor wafer inspection system INSPECTRA as "AI-ADC (Automatic Defect Classification)"

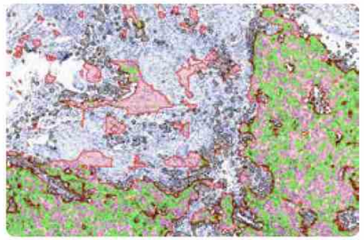
- Reduced the time required to set inspection conditions by 6-fold

Press Release:
https://www.toray-eng.com/news/2021/20210714.html

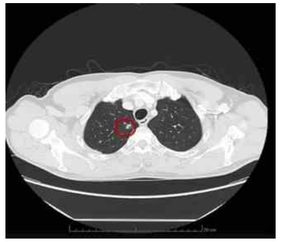
Semiconductor wafer inspection system using LPIXEL's technology

Clinical Trials & Post Marketing

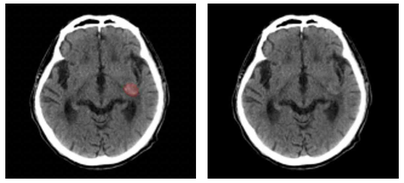
Drug Discovery | Preclinical Research | Manufacturing | **Clinical Trials** | **Post Marketing**



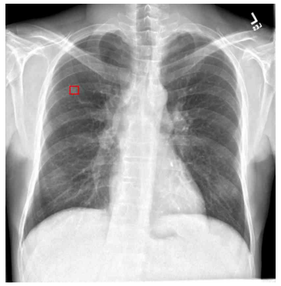
Patient stratification
(pathology / radiology)



Early detection and monitoring of adverse drug events
(Skin / Lung)



Drug efficacy
Evaluation



Early diagnosis of
target diseases

Clinical Radiology Image Interpretation

Detection of early signs of drug-induced interstitial lung disease (ILD) from chest X-ray / CT images

Challenge: Early detection of interstitial lung disease secondary to certain anti-cancer drugs

LPIXEL Solution: Automatic detection of drug-induced ILD on chest CT including at early, pre-symptomatic stages

Application: Early detection and prediction of adverse events to inform therapy administration strategies

Chest CT Analysis

Areas of drug-induced ILD on chest CT images (estimated)

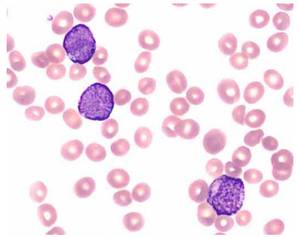
Non Drug Development Projects

Academia

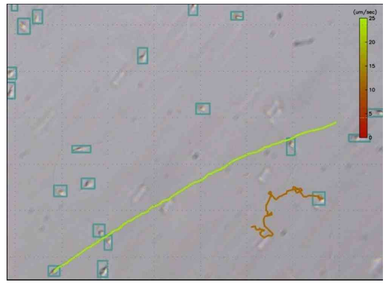
Collaborative Research

SaMD Co-development

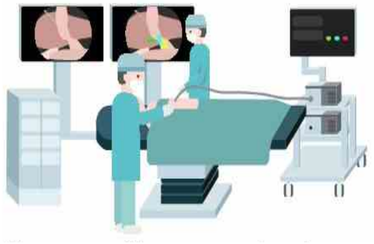
Pharmaceutical Companies /
Medical Device Manufacturers



Bone Marrow Aspirate Analysis



Sperm motility analysis
(Infertility treatment)



Intraoperative Surgical Support
(Laparoscopy video feed)

Collaborative Research with Academia:
Medical Device Development

Bone Marrow Aspirate Analysis

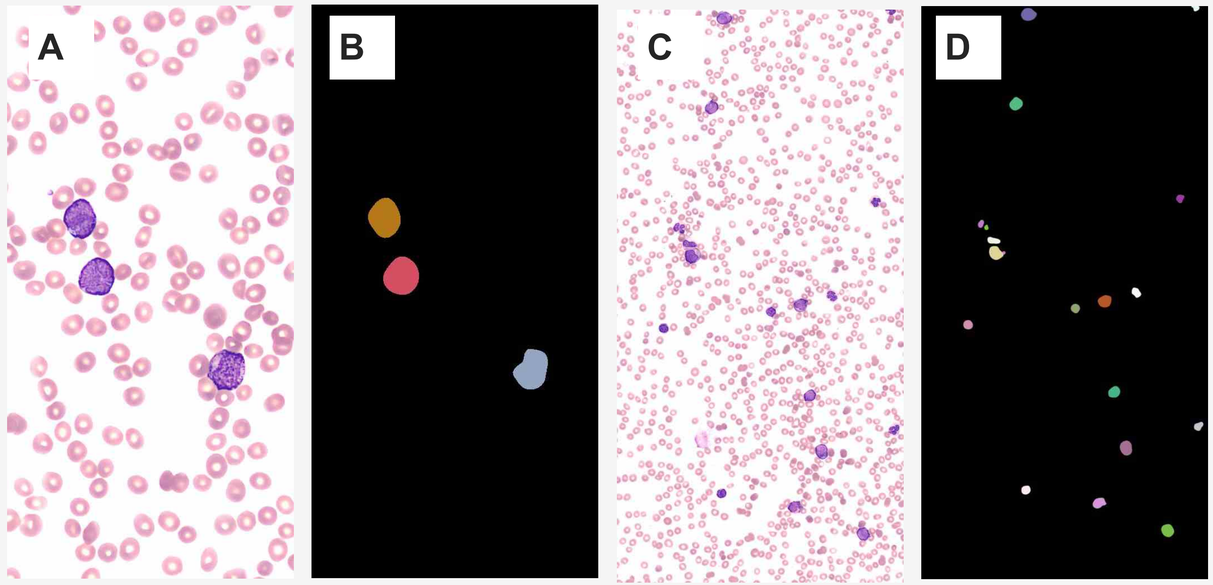
Detection and classification of leukemic cells from bone marrow aspirate whole slide images (WSI)

Challenge: Detection, enumeration and classification of abnormal white blood cells (WBC) on bone marrow aspirate is currently carried out by visual inspection followed by complex molecular testing

LPIXEL Solution: Automatically detect and classify leukaemic cells via morphological analysis

Outcome: Currently undertaking collaborative research with the National Center for Child Health and Development to develop an AI diagnosis support system for paediatric leukaemia

Press release:
https://lpixel.net/news/press-release/2021/10269/



(Image for illustration purposes)

A : Representative blood film showing WBC

B : Using AI to distinguish different types of WBC

C : Low magnification blood film (1/16th total area)

D : Using AI to distinguish different types of WBC

Infertility Treatment

Analysis of sperm motility on video in real time

Challenge: To reduce the workload of embryologists by standardising the sperm selection process during Intracytoplasmic sperm injection (ICSI)

LPIXEL Solution: Identify individual spermatozoa and measure their motility in real time using microscopic video feed

Outcome: Technology demonstrated in clinical trials in conjunction with Olympus

Press release:
https://www.olympus.co.jp/news/2019/nr01447.html

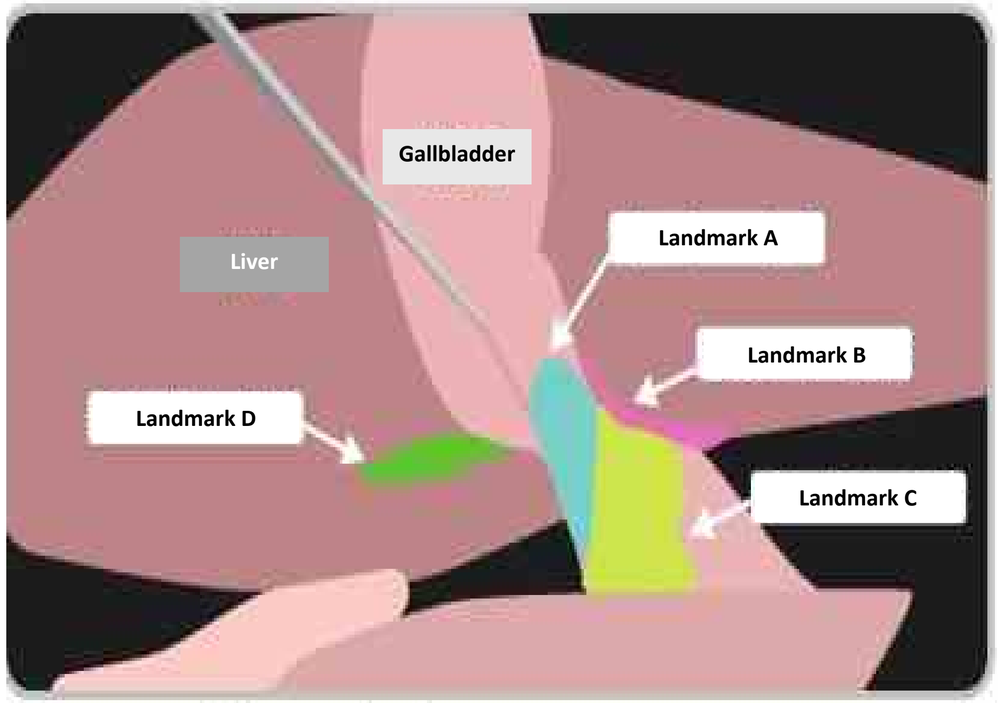
Intraoperative Surgical Support AI

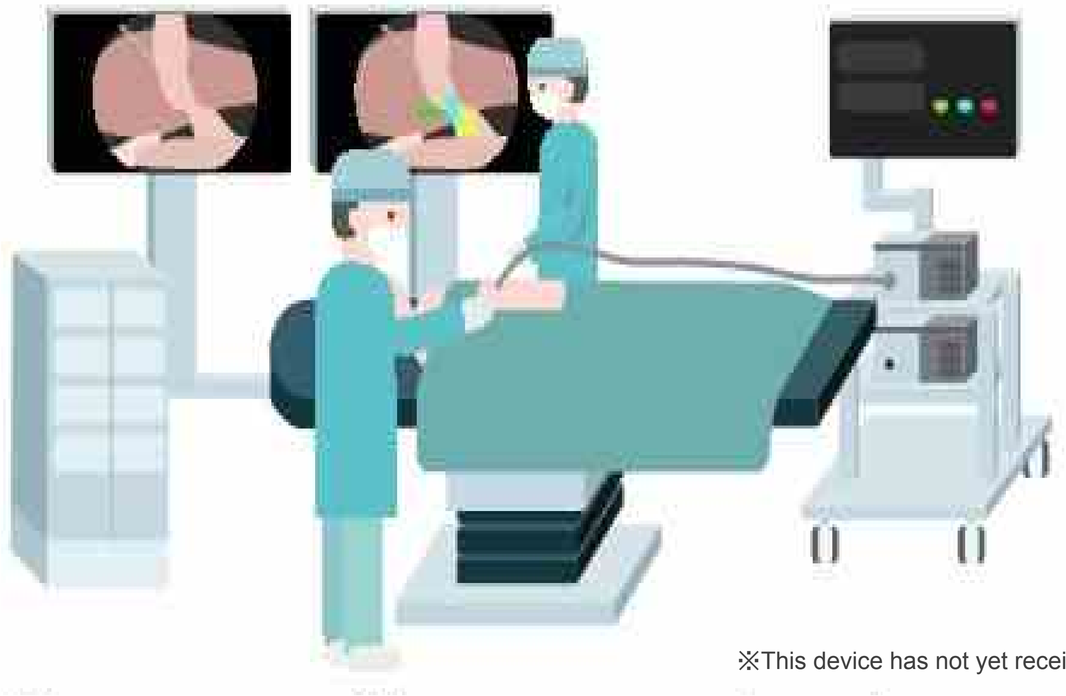
Joint business agreement with OLYMPUS Corporation:

Development of an AI-based intraoperative landmarking guidance system to support laparoscopic cholecystectomy

- LPIXEL: Development Support, regulatory approval acquisition, productization
- OLYMPUS: Marketing

(Planned for release in 2025)





※This device has not yet received regulatory approval

Utilising our experience in CADe / SaMD development (EIRL), LPIXEL is applying AI to the field of medical and surgical treatment

LPIXEL

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