Institut Pasteur Korea
Infectious Disease
Translational Research

Introduction of IPK's Technology Platforms

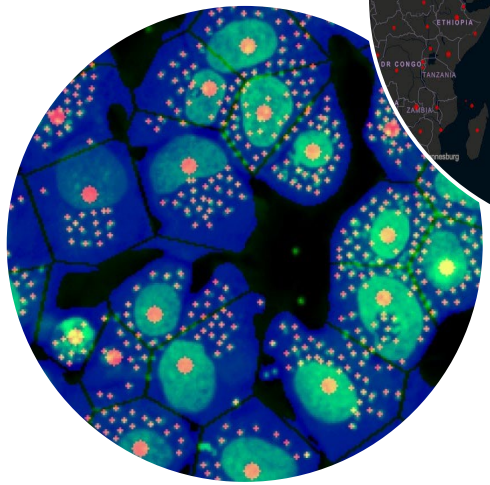
2022 Pasteur Network Annual Meeting

Regis Grailhe, PhD
& David Shum

Institut Pasteur Korea
Infectious Disease
Translational Research

Contents

- Drug screening & facilities
- Protein-protein interaction studies
- Technologies for resource limited environment



1 Target and drug screening facilities & technologies

David Shum,
Head of Screening
Discovery Platform
Seoul, South Korea

IP
IP Morocco
IP Montevideo

Biological Safety Level 3 (One System)
HCS: Epi-Fluorescent w/ Confocal mode >10,000 pts/day
HTS: >20,000 pts/day

BSL3

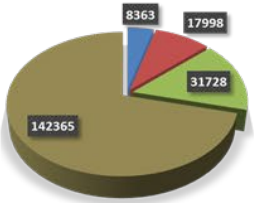
Biological Safety Level 2+ (Three Systems)
HCS: Two Confocal & Epi-Fluorescent >20,000 pts/day
HTS: >25,000 pts/day

BSL2

1 IPK Screening Technologies

Workflow & Access Points

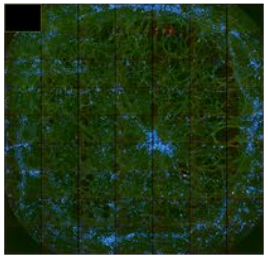
Small Molecule & Natural Products & RNAi Libraries

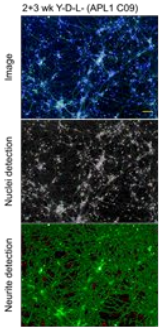


Tools & Automated Technologies

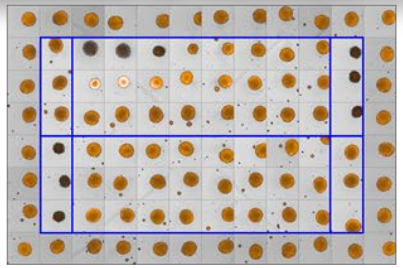
Phenotypic & Target

iPSCs



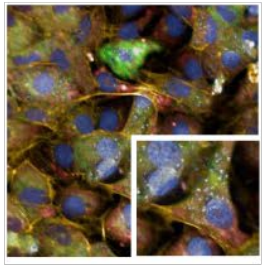


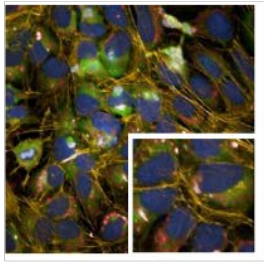
Advanced Cellular Models & Assays



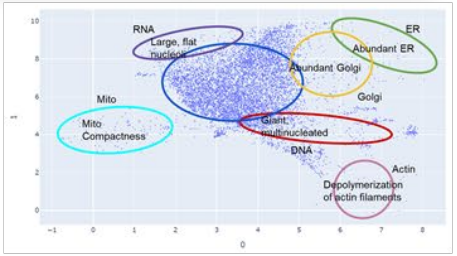
Spheroids & Organoids

Cell Painting & Omics





Ai-driven Analysis & Target ID

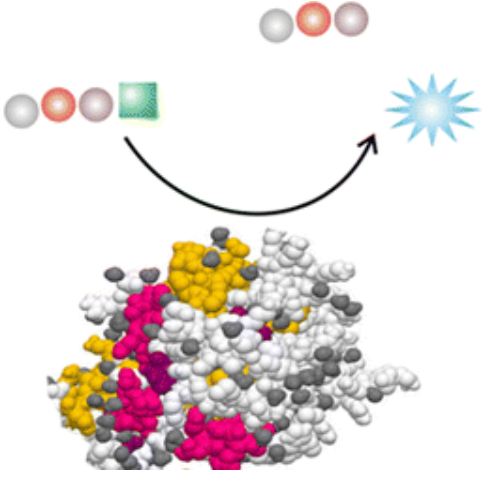


Model Prediction

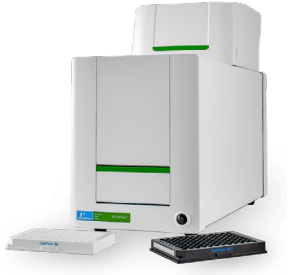
Drug discovery pipeline

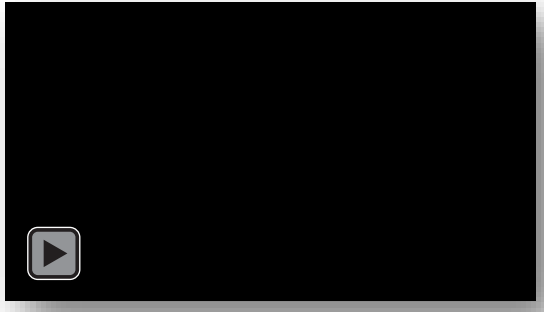
1 HTS technology: target-based

Biochemical model



Multimodal plate reader platforms

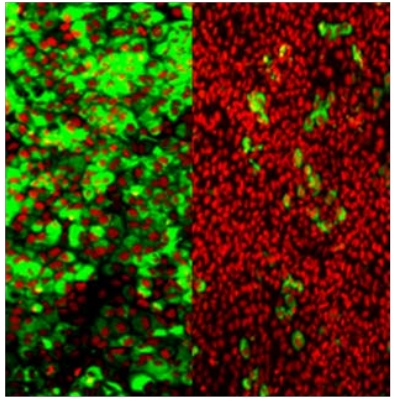




1 – known target essential for disease pathogenesis
2 – suitable for HTS
3 – capture single & multiple data point
4 – rapid analysis

1 HCS technology: image based cell-based
Phenotypic-based

Cellular disease model

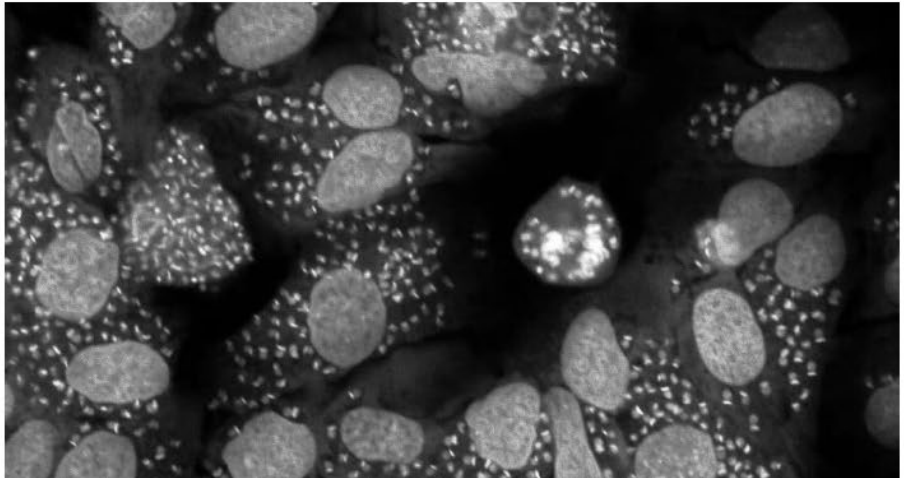


Phenotypic screening
Automated microscopy platforms

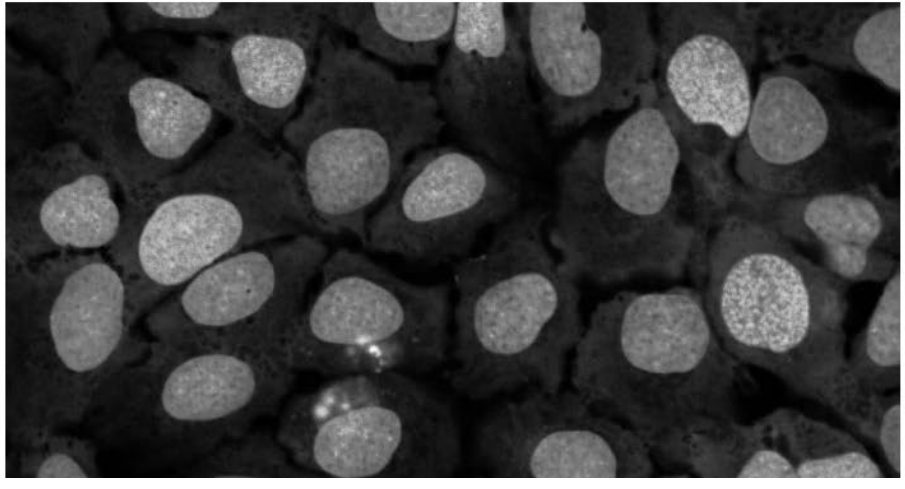
1 – relevant models as close to physiological condition
2 – capture many types of parameters
3 – more information = High content

1 Image-based Profiling: Cell Painting

Parasite infected cell

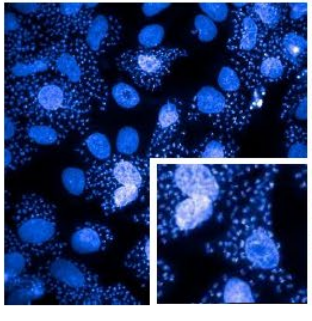


Non-infected cell

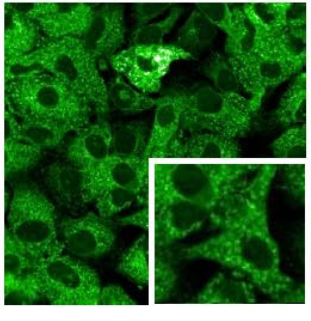


Parasite infected cell

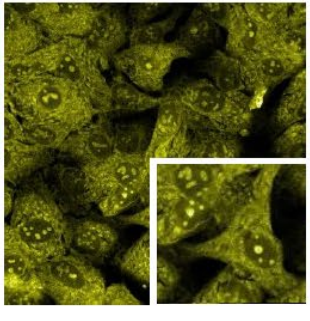
Hoechst33342
DNA (Nuclear stain)



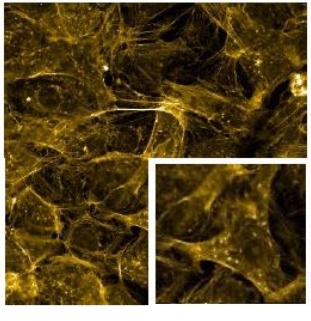
Fluor488
ER (Concanavalin A)



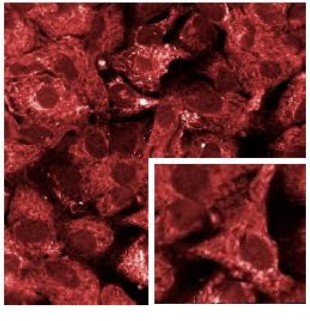
Fluor512
RNA (Nucleic acid stain)



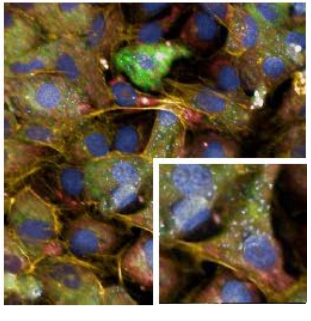
Fluor568
Actin (Phalloidin)



Fluor641
Mitochondria (MT stain)

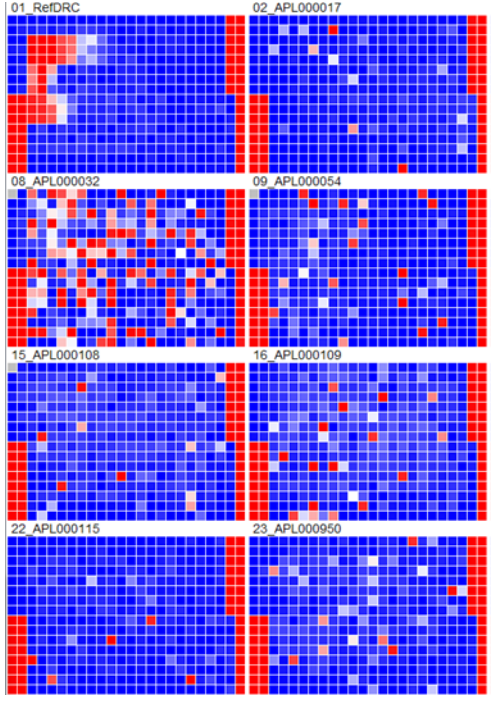


Overlay

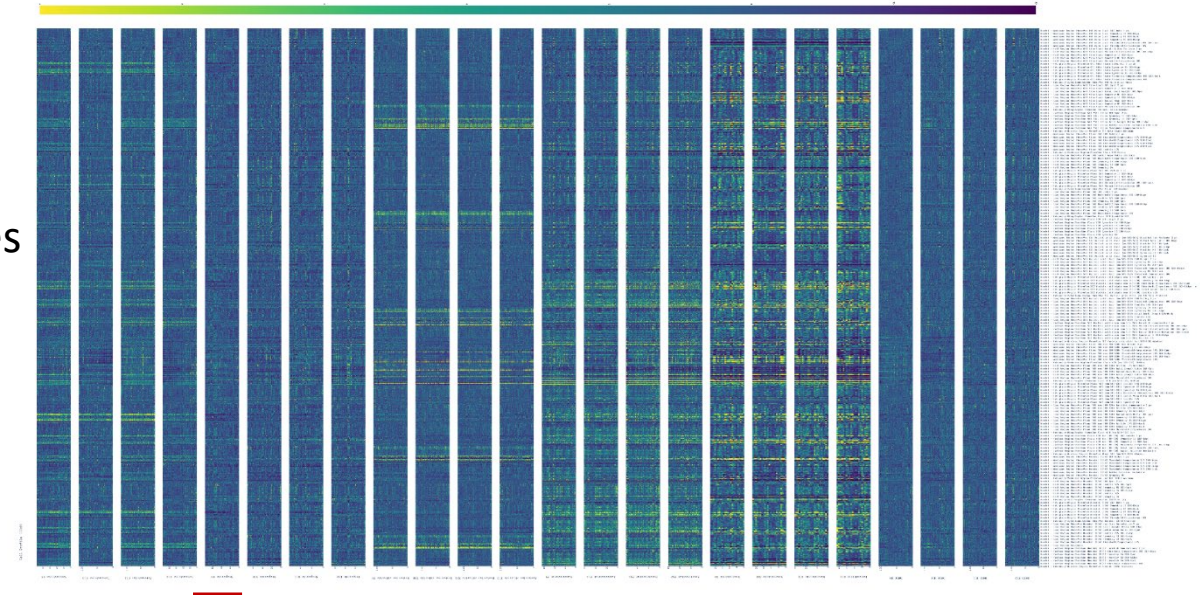


1 Activity Profiling: MOA & Target Deconvolution

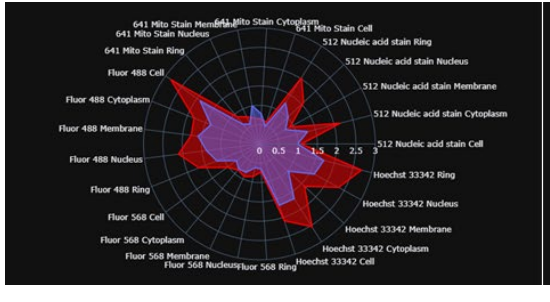
1 Feature

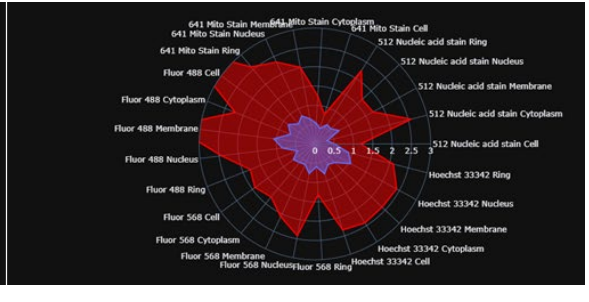


~100 Features



Robust features (blue Low, Red High)





1 Libraries: starting points of discovery

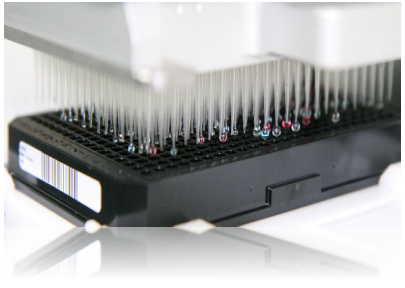
Compound management

Drug: Chemical Libraries

- 200,000 small molecules
- 200,000 natural products

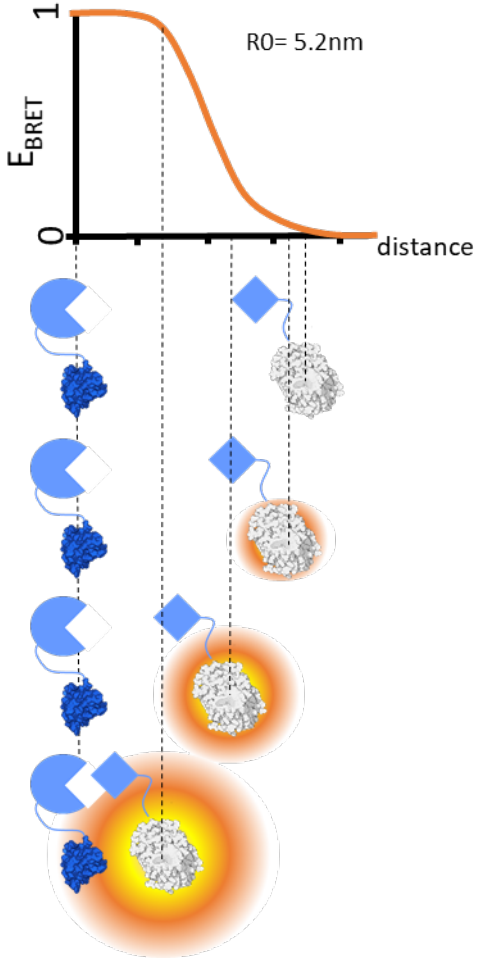
Target: high-throughput knockdown

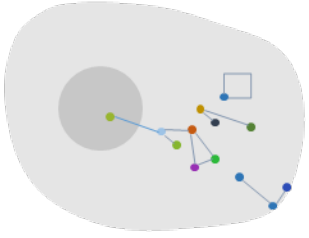
- Arrayed siRNA library
- Arrayed lentivirus shRNA libraries



2 Screening technologies

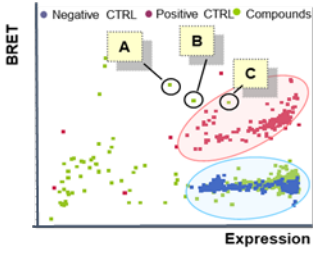
Protein-protein interaction (BRET)





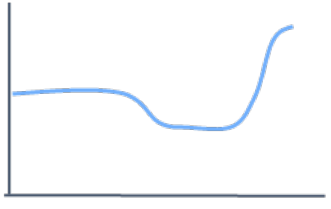
Study protein network

- Study the full combinatory of interaction of a subset of proteins at the cellular level.
- Determine the precise interaction location at sub-cellular level.



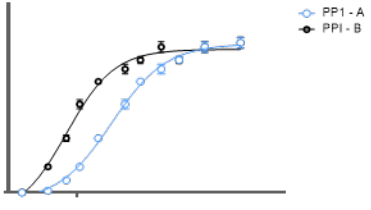
Drug Screening

- Screening for PPI drug modulators.



Fast kinetics (10Hz)

- Study the kinetic of interaction (ms, hour, or day scale).



Compare PPI relative affinity

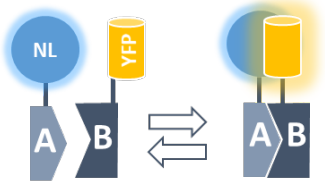
- Determine the affinity of your protein against targets in living cells.
- Study effect of mutations.

2 Protein-protein interaction screening

Live cell PPI (BRET)

Dr **Regis Grailhe**,
Head of Technology Development Platform
Seoul, South Korea

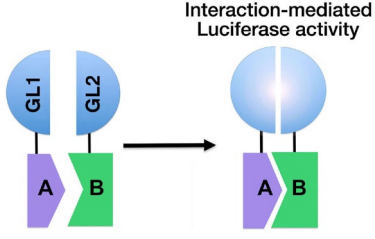
BRET nanoluciferase assay



- → ***Live virus-host interaction characterization (Kinetics)***
- → ***Relative affinity (BRET50)***
- → ***Subcellular PPI imaging***

Dr Caroline Demeret,
Head of Molecular Genetics of RNA viruses
Paris, France

Split nanoluciferase assay



- → ***HTS capabilities***
- → ***Intensity map of interactions***
- → ***Comparative*** *virus-host interaction profiling*

Acknowledgements

IPK Biology Teams

Translational Teams – SDP, MC (Inhee Choi) & TDP

Institut Pasteur Korea
Infectious Disease
Translational Research

Thank You

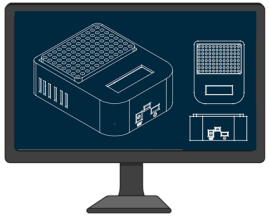
siRNA and drug screening
Contact: david.shum@ip-korea.org

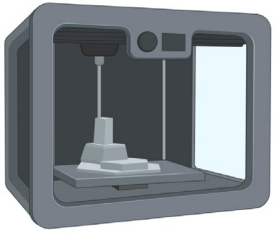
Protein-protein interaction and low cost diagnostic
Contact: regis.Grailhe@ip-korea.org

For Research
For Health
For Our Future

3 Developing technologies for resource limited environment

Design and making diagnostic tools





Step 1: **Contact** regis.Grailhe@ip-korea.org

Step 2: **Discussion** (Skype, Microsoft Team, Zoom)

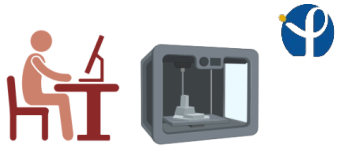
Step 3: **Design**

Step 4: **Making and validation**

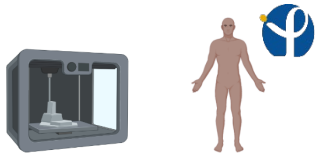
Step 5: **Data tansfered by Email**

3 Developing technologies for resource limited environment

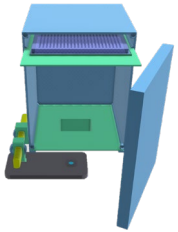
Hardware development



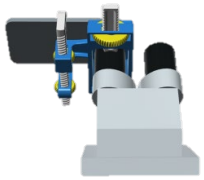
Dr **Regis Grailhe**,
Head of Technology Development Platform
Seoul, South Korea



Dr **Lawrence Ayong**,
Head for the Malaria Research Laboratory
Yaounde, Cameroon



Imager*
bioluminescence



Smartphone microscope adapter

LAMP (12V)
Loop mediated isothermal amplification

*doi.org/10.1021/acssensors.2c00457