



# ORGANOPIUS

*The new paradigm creator for animal-free, human-relevant organoid-chip evaluation*

Chapter

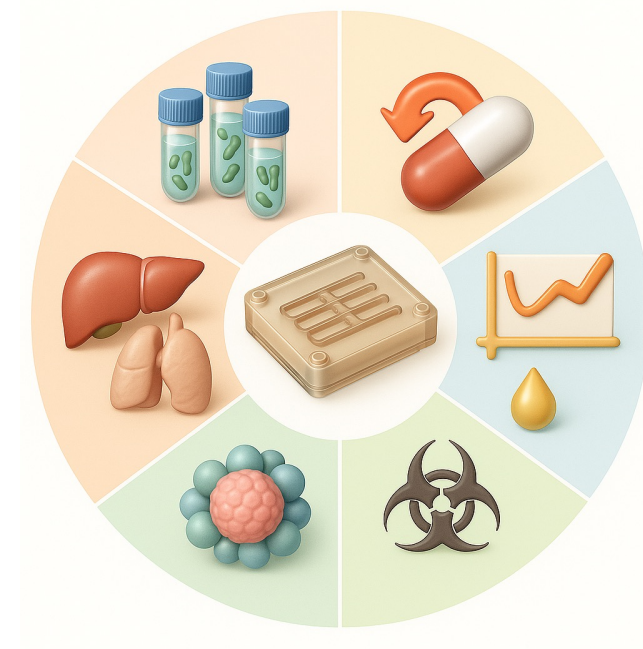
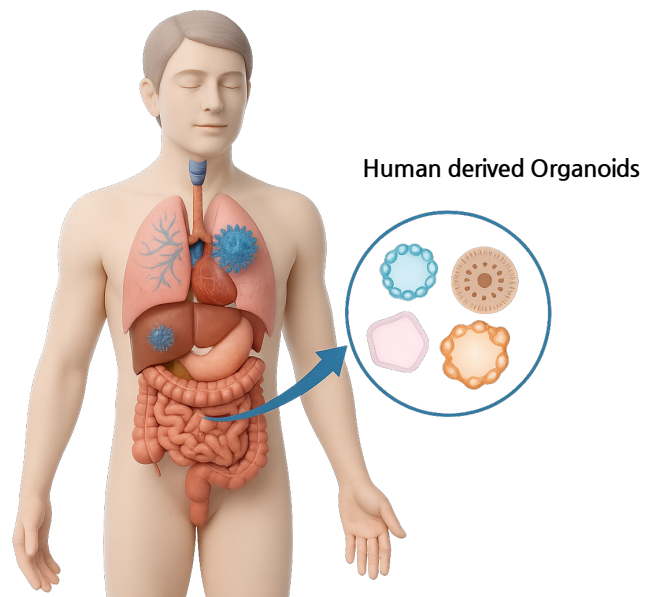
# 01 | Platform Technology



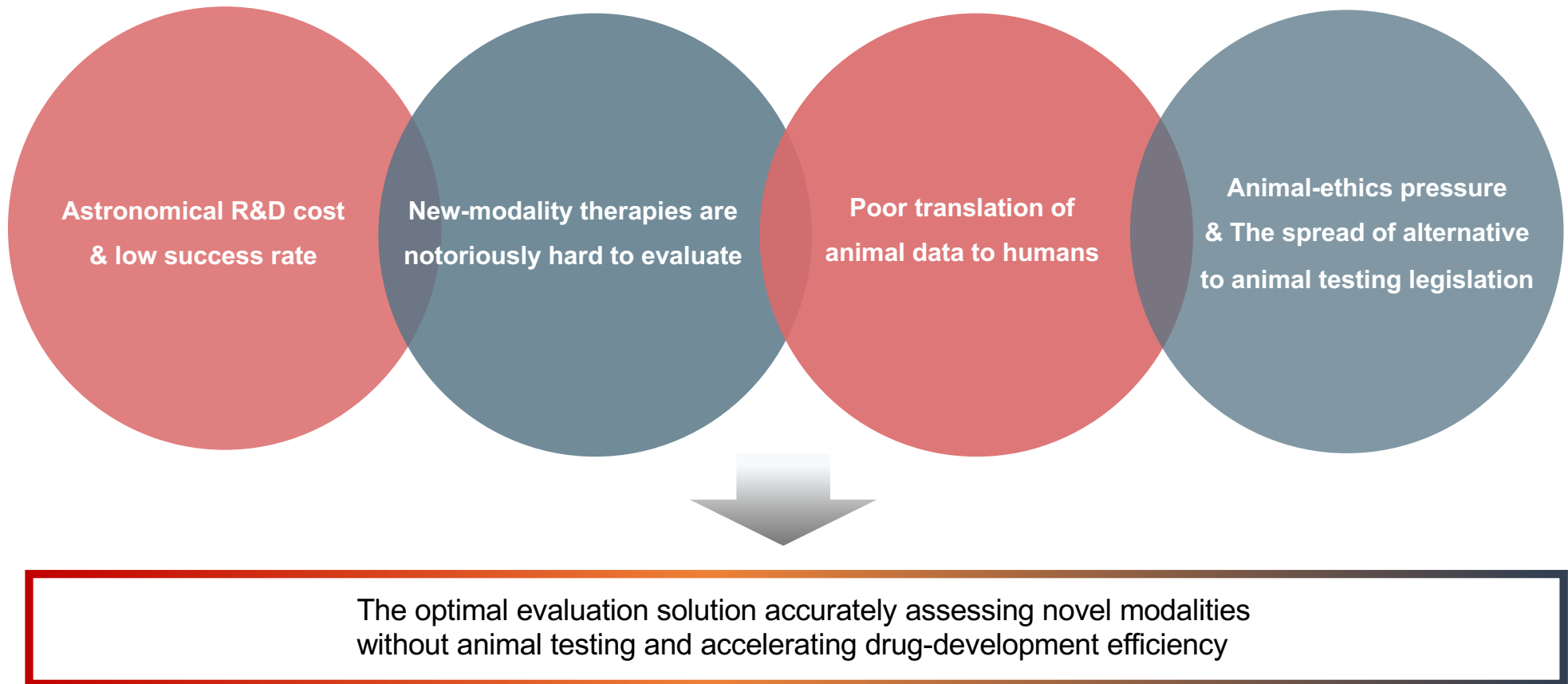
Organoids

Organoid-chip

### Construction & Functional Verification of Biopsy-Derived, Cell / Structure / Function-Specific Organoid-Chip



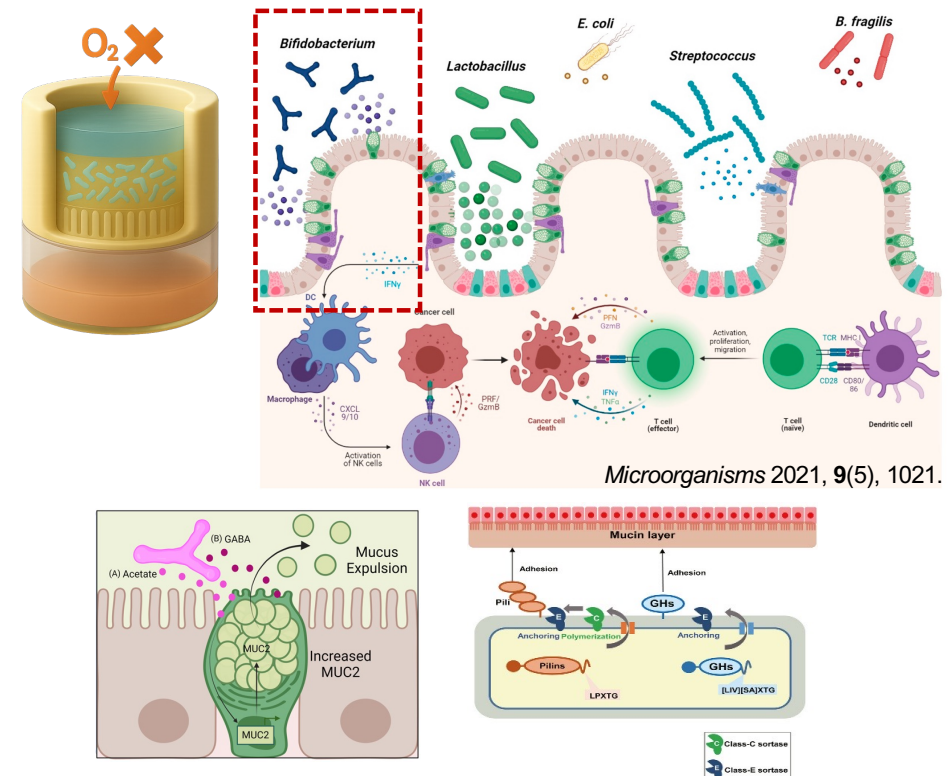
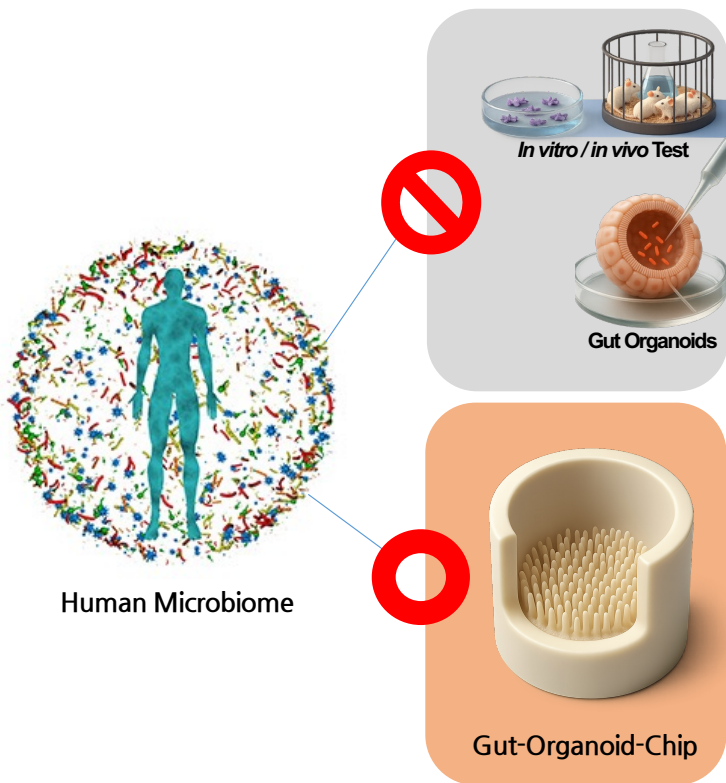
ORGANOPlus delivers an animal-free, human-relevant evaluation platform





Limitations of Conventional Probiotic Discovery

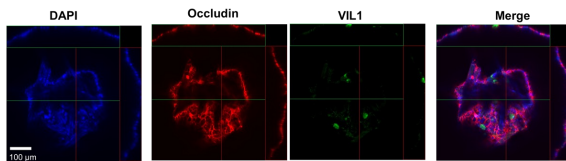
Molecular Mechanisms in a Villus-Specific Organoid-Chip



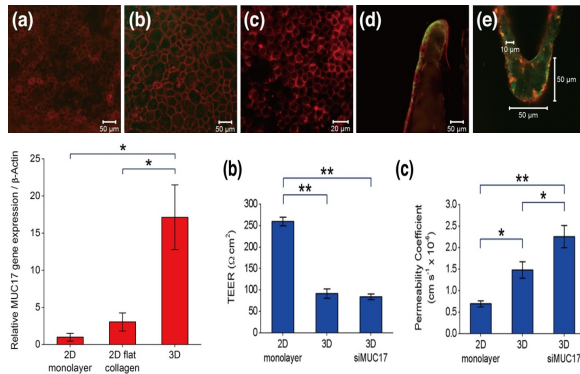
Microorganisms 2021, 9(5), 1021.

*Bifidobacterium* binds to mucin through sortase-dependent pili. Ishikawa et al. (2021) iScience, 21, 103363.

## Establishing human intestinal structural specificity

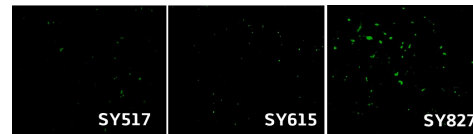
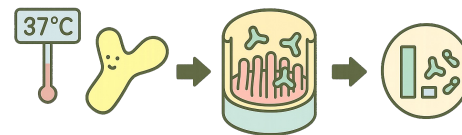


*B. adolescentis* enhances epithelial barrier integrity by increasing the expression of occluding and Villin 1 (VIL1).



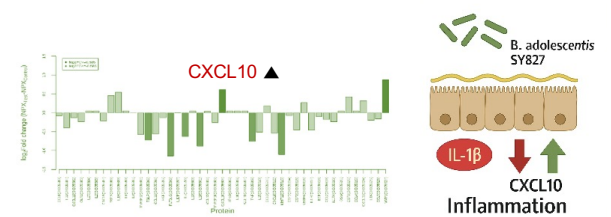
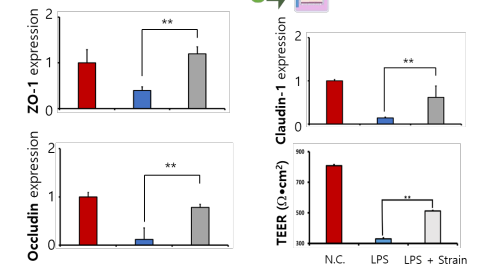
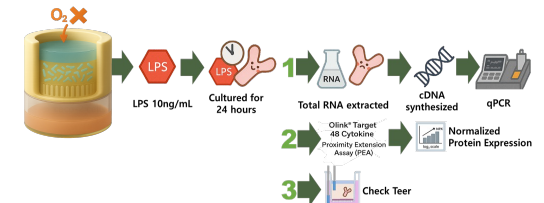
Microfluidic gut-on-a-chip with three-dimensional villi structure. *Biomedical microdevices* 19 (2), 37, 2017

## Facilitates bacterial adhesion-rate analysis



	SY827 생균수	Cell 생존률
Standard method	8.3	94.8
Simple oil method	96.1	88.7
Organoid-Chip	92.0	92.8

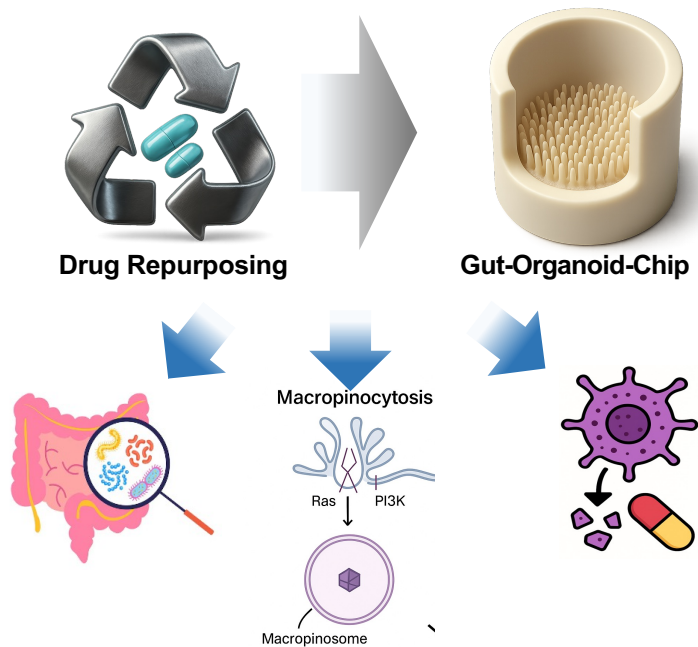
## Molecular mechanism-of-action analysis



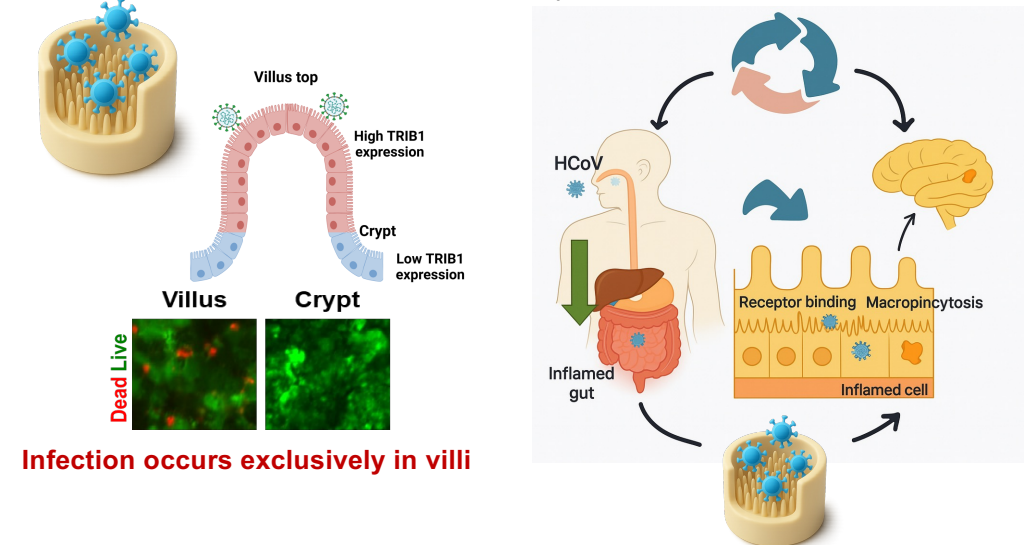
SY827 helps maintain mucosal homeostasis in inflammatory conditions

Disease-specific model

Recapitulating intestinal characteristics



Pathology of enteric human coronavirus infection and associated research platforms

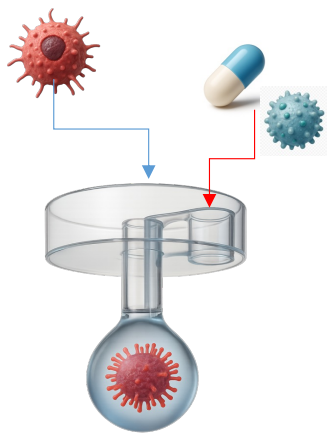


Infection occurs exclusively in villi



## Multi-inlet hanging drop (MSG) Platform

Cancer organoids enable efficient validation of anticancer therapies



### Competitive Advantage

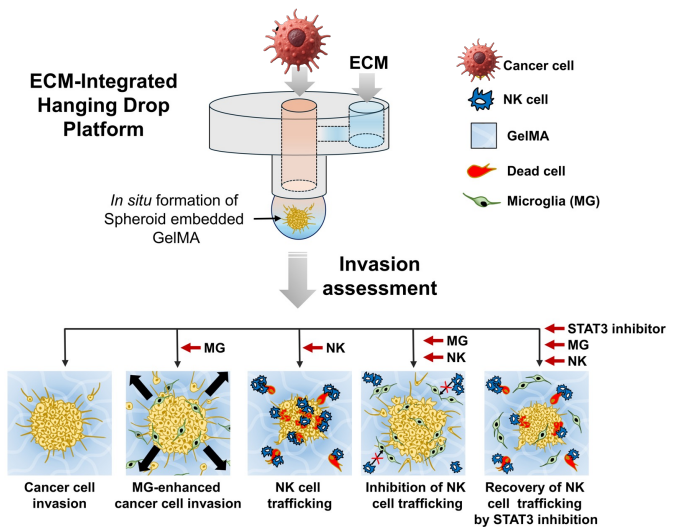
Uniform spheroid formation  
Multiplexed injection control  
Optimized for high-throughput and high-efficiency screening

### Strategic Significance

Large-scale screening  
Mechanisms, drug penetration, and combination therapies  
Strong competitiveness in cost, speed, and automation

### Scalable Use Cases

Mechanism-of-action verification for anticancer drugs  
Assessment of drug penetration, resistance, and toxicity  
Preclinical evaluation of immuno-oncology therapeutics  
PK-PD (pharmacokinetic–pharmacodynamic) simulation



Chapter

# 02 | Investment Highlights

The new paradigm creates an organoid-chip solution that finally delivers precise evaluation for human-microbiome therapeutics where conventional assays fail

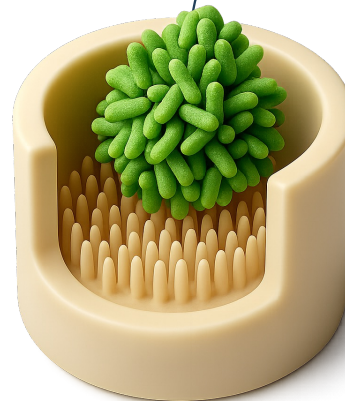
Rising gut disorders and the rapid advancement of the functional-food sector are fueling demand for sophisticated intestinal models



Prof. Sejong Oh  
Chonnam Univ.



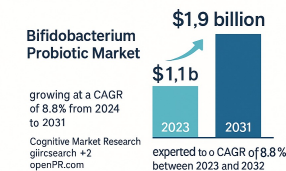
- In-house strain bank
- Metabolomics analysis databank
- Spheroid-based gut organoids
- Efficacy evaluation and MoA studies for the target indication



### Live-Biotherapeutic Product Evaluation Solution

Companies are focused on discovering novel strains and rigorously validating their efficacy

#### Global Market Overview

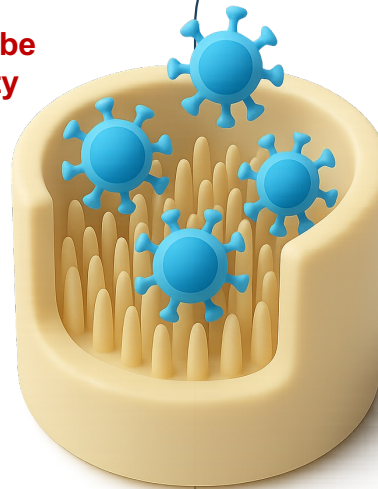


- The human-microbiome therapeutics market is forecast to **USD 3.2 billion by 2034. 31.1 % CAGR**
- **Bifidobacterium** probiotic, used to treat gastrointestinal disorders, enhance immune function, anticancer benefits
- Bifidobacterium is a strict anaerobe, cultivation hurdles can be overcome



**Drug repurposing represents a high-growth business segment for pharmaceutical companies, offering superior risk-adjusted returns as an R&D strategy.**

**The 97 % attrition in oncology pipelines can be transformed into a new-purpose opportunity**



### Disease-Model Evaluation Solution

**Organoid-chip platforms equipped with virus specific infection models make rigorous drug repurposing screens feasible**



**Collaborative project with Institute for Basic Science (IBS)**

- *In vivo* efficacy testing in ferret models
- SARS-CoV-2 infection assays using human lung organoids

### A Highly Scalable Organoid-Chip Platform Converging anti-cancer Drug Discovery, Precision Medicine, Companion Diagnostics, and Functional Nutrition

#### Oncology Therapeutic Evaluation Solution

- ✓ MoA verification for anticancer drugs
- ✓ Assessment of drug penetration, resistance, and toxicity
- ✓ Preclinical evaluation of immuno-oncology therapeutics
- ✓ PK-PD simulation

Collaborative project with  
Prof. Sun-Ha Baek  
(Seoul National Uni. Hospital)

Collaborative project with  
Prof. Jung-Eon Lee  
(Samsung Medical Center)



the dabom  
Cancer exosomes  
Analyst 2024

MxT Biotech  
MICROFLUIDICS X THERAPY  
Aram Jung  
Gene transfection on CAR-T

NA Vaccine Institute  
NAVI  
Dong Ho Kim  
Cancer vaccine

#### Companion-Animal Precision Evaluation Solution

- ✓ **Animal-Derived Organoid Chips** in Companion-Animal Cancer Diagnostics
- ✓ Cancer is the leading cause of death in 47 % of dogs and 32 % of cats
- ✓ The **pet-oncology diagnostics** segment already exceeds USD 2 billion and is expanding at ~8 % CAGR



By integrating **GenesisEGO**

**Organoid-chip platform**, AI-powered companion-animal healthcare ecosystem complete with advanced interpretive analytics

By fusing organoid-on-chip technology with strategic AI modeling, accurately predict clinical trial outcomes eliminating the need for animal testing

AI-enhanced PBPK modeling  
using organoid-chip data

**1. Clinic-Grade Predictive Accuracy**

Organoid-on-chip experiments now correlate with Phase I/II read-outs at **>90% concordance**

**2. AI-Enhanced PBPK Modeling**

Real-time chip data feed a machine-learning PK-PD engine that simulates human ADME providing dose-selection guidance regulators accept as *in-silico* evidence.

**3. Genomic Toxicology & Biomarker Discovery**

Chip-derived drug-response transcripts are mined to flag off-target toxicity signatures and identify companion-diagnostic biomarkers—laying the groundwork for personalized regimens.



**Seong-Pil Han, M.D., Ph.D.**  
Professor, College of Medicine,  
The Catholic University of Korea



Absorption & Toxicity Prediction Solution

- ✓ **Absorption Clarity** — Organoid- Chip to PBPK modelling predicts human tissue exposure **months before first-in-human**.
- ✓ **Mechanism-linked Toxicity** — Genomic and functional biomarkers pinpoint off-target pathways; enables rational back-up chemistry.
- ✓ **Regulatory Advantage** — Package delivers NAM-compliant human data, aligning with FDA & EMA push to reduce animals.

*the leading causes of clinical attrition, poor absorption and hidden toxicity into solvable, data-driven steps, giving pharma a faster, safer path to approval while slashing R&D waste*



Chapter

# 03 | Company Overview

# Overview

ORGANOPlus

## COMPANY OVERVIEW

Company Name	<b>ORGANOPlus Co., Ltd.</b>
CEO	Shin Jaeyoung (Ph.D.)
Date Incorporated	2025.6.10
Equity Capital	100 million won(KRW)
Employees	4
Business Area	<ul style="list-style-type: none"><li>• <b>Organoid-on-a-Chip Platform</b> – Preclinical human microphysiology testing</li><li>• <b>Gut-on-a-Chip Efficacy Suite</b> – Microbiome and probiotic efficacy validation</li><li>• <b>AI-PBPK / ADME-T Engine</b> – AI-powered pharmacokinetic and toxicity prediction</li></ul>
Website	organoplus.kr
Headquarters	Suite 85216, 2066 Seobu-ro, Jangan-gu, Suwon-si, Gyeonggi-do, 16419, Republic of Korea

## VISION



## MISION





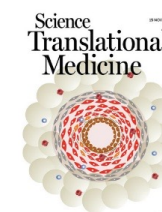
**Shin Jaeyoung | PhD, CEO**

*Globally recognized expert in translational oncology, organoid-based modeling, and precision medicine*

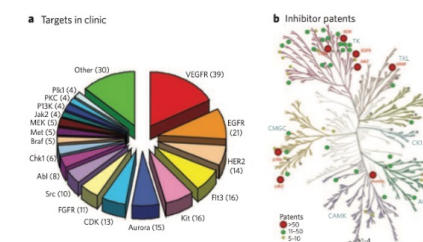
- **Ph.D. in Biomedical Sciences** from the Max Planck Institute for Heart and Lung Research in Germany, Molecular mechanisms of early tumorigenesis and cardiac development.
- **Postdoctoral research** at the University Medical Center Mainz, exploring protein signaling networks and kinase pathways involved in cancer progression.
- **Project Leader** at MERCK (Darmstadt, Germany), MOA elucidation, biomarker identification, and early clinical development strategies.
- **Professor** at the Center for Translational Medicine, St. Anne's University Hospital Brno in the Czech Republic, Patient-derived 3D organoids to model therapeutic responses and advance precision oncology. led **ERC-funded research**
- **Director**, PharmCADD, led R&D in AI-based drug discovery
- **Director of R&D** at AtoGen, leading projects in microbiome therapeutics (LBPs), and functional material screening.

## ACCOMPLISHMENT

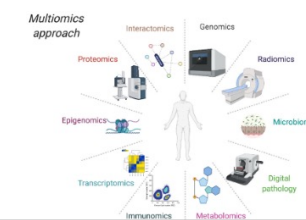
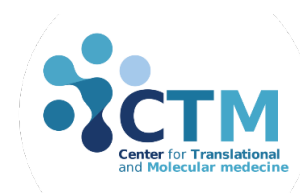
- **Elucidated the early-stage mechanisms of tumorigenesis research at MPI, Germany**



- **Led Kinome-based discovery of novel immuno-oncology targets at MERCK Germany**



- **Professor of Translational Research in Precision Medicine**





# About CSO

ORGANOPlus



Park Sungsu | PhD, CSO

Professor, Mechanical Engineering, Sungkyunkwan University

## Education

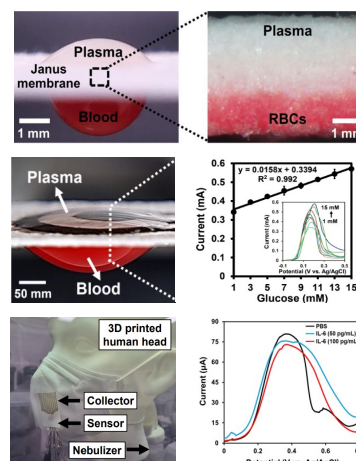
- Ph.D. Food Science, Cornell University
- M.Sc. Food Science, Cornell University
- B.Sc. Microbiology, Pusan National University

## Experience

- **CEO**, HanginBio, Ltd. / CSO, ORGANOPlus Co., Ltd.
- **Professor**, School of Mechanical Engineering, Sungkyunkwan University
- Full Professor, Dept. of Chemistry and Nano Sciences, Ewha Womans University
- **Visiting Professor & Co-Principal Investigator**, Mechanobiology Institute(MBI), National University of Singapore
- **Assistant Professor**, Division of Nano Sciences, Ewha Womans University
- Post-doc, Dept. of Physics, Princeton University
- Post-doc, Dept. of Bioengineering, Cornell University
- Post-doc, Dept. of Biological Information, Tokyo Institute of Technology

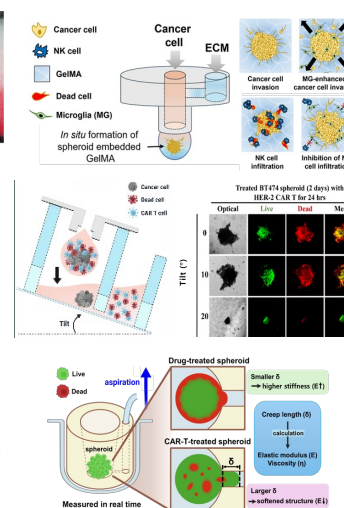
## CURRENT WORKS

### 3D porous membrane



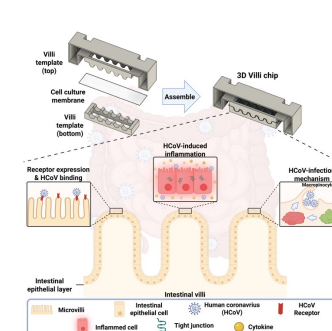
- Non-powered blood plasma separation
- Porous electrode for POCT
- Smart mask for real-time disease monitoring

### Tumor-on-a-chip



- 3D TIME model in MSG
- 3D Hanging spheroid plate
- Spheroid elongation assay

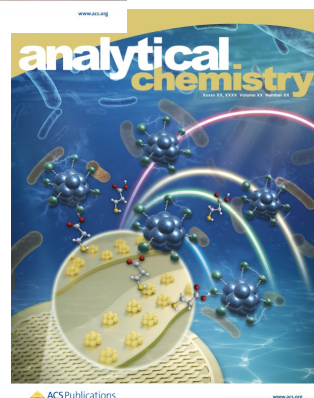
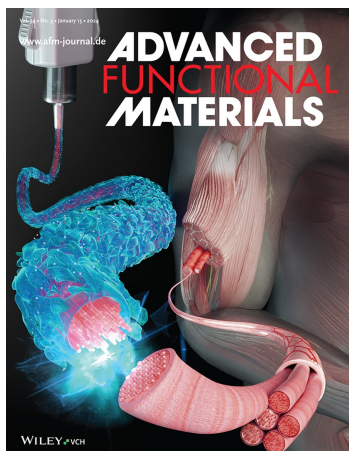
### Organ-on-a-chip



- Recapitulating intestinal HCoV infection with human villi-on-chip.
- Investigating HCoV infection pathology in human gut.
- Infection mechanism & Antiviral discovery.

# Key Publications

## Representative Publications



## Virus-Focused Gut-on-Chip Publications

No	Title	Journal	Year
1	Integration of Nanobiosensors into Organ-on-Chip Systems for Monitoring Viral Infections	<i>Nano Converg</i>	2024
2	Mechanisms of Plasma Ozone and UV-C Sterilization of SARS-CoV-2 Explored through Atomic Force Microscopy	<i>ACS Appl. Mater. Interfaces</i>	2024
3	Potential of bioprinted intestine-on-chip models in advancing understanding of human coronavirus infections and drug screening	<i>Int. J. Bioprinting</i>	2024
4	3D Printed Fluidic Swab for COVID-19 Testing with Improved Diagnostic Yield and User Comfort	<i>Nano Converg</i>	2023
5	Mobile Efficient Diagnostics of Infectious Diseases via On-Chip RT-qPCR: MEDIC-PCR	<i>Adv. Sci.</i>	2023
6	Organ-on-a-Chip for Studying Gut-Brain Interaction Mediated by Extracellular Vesicles in the Gut Microenvironment	<i>Int. J. Mol. Sci</i>	2021
7	Gut-Kidney Axis on Chip for Studying Effects of Antibiotics on Risk of Hemolytic Uremic Syndrome by Shiga Toxin-Producing <i>Escherichia coli</i>	<i>Toxins</i>	2021
8	Fast and Easy Disinfection of Coronavirus-Contaminated Face Masks Using Ozone Gas Produced by a Dielectric Barrier Discharge Plasma Generator	<i>Environ. Sci. Technol. Lett.</i>	2021
9	Integrated Microfluidic Preconcentration and Nucleic Amplification System for Detection of Influenza a Virus H1N1 in Saliva	<i>Micromachines</i>	2020
10	Three-dimensional in vitro gut model on a villi-shaped collagen scaffold.	<i>Biochip J.</i>	2017
11	Microfluidic gut-on-a-chip with three-dimensional villi structure	<i>Biomed. Microdevices</i>	2017
12	A microfluidic cell culture device ( $\mu$ FCCD) to culture epithelial cells with physiological and morphological properties that mimic those of the human intestine	<i>Biomed. Microdevices</i>	2015
13	Three-dimensional intestinal villi epithelium enhances protection of human intestinal cells from bacterial infection by inducing mucin expression	<i>Integr. Biol</i>	2014



ORGANOPlus