NEW CELL CULTURE STANDARD

Invigorating the world through cell culture

InnoCell™

What is InnoCell™ ?

InnoCell™ is a next-generation cell culture product family developed highlighting the specialized characteristics of Mitsui Chemicals' functional materials.

Invigorating the world through cell culture

Mitsui Chemicals has continually sought out earth's unique resources.
By combining leading edge technology and innovative ideas,
Mitsui Chemicals has created valuable materials.

We evaluated how our unique materials can further contribute to
the greater societal good and to bring joy to our customers
in the way only Mitsui Chemicals can.

Our next challenge is to bring innovation to the life sciences
by harnessing the power of chemistry.

Mitsui Chemicals will continue to provide innovative solutions
for cell culture to researchers and all who wait
for advancements in the world.

What kind of future will proliferate through advances in cell culture?

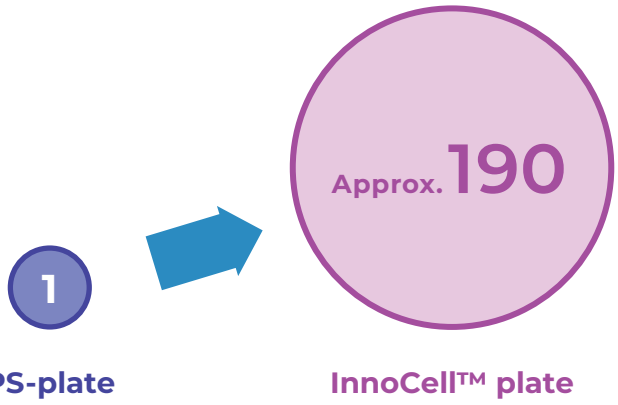
Invigorating the world through cell culture.

Oxygen Permeability Control

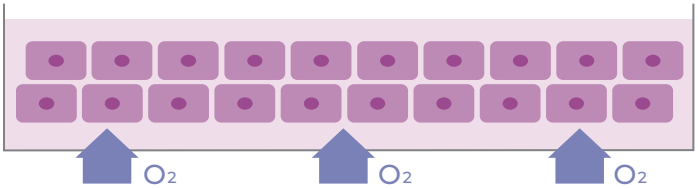
Mitsui Chemicals' original material × Precision processing technology

• Data obtained by Mitsui Chemicals

Relative Comparison of Oxygen Permeability



Efficient oxygen supply from the culture bottom



Conditions

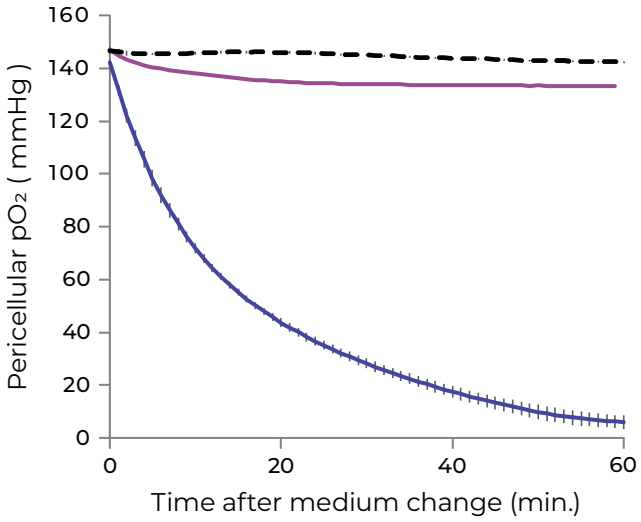
[Plate type] InnoCell™ plate FP series (flat bottom)

Utilizing Mitsui Chemicals' original material × precision processing technology, InnoCell™ plate can supply approximately 190 times more oxygen to cells compared to conventional polystyrene plates.

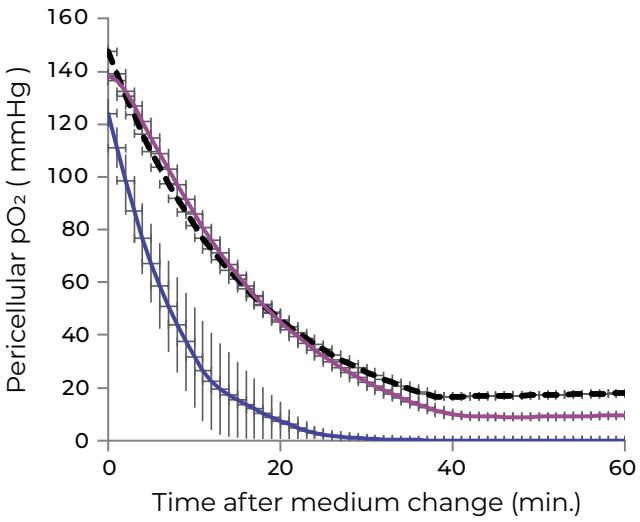
Changes in oxygen concentration near cells

• Data obtained by Mitsui Chemicals

20% O_2 concentration in incubator



3% O_2 concentration in incubator



■ PS-plate ■ InnoCell™ plate ■ Medium only (without cells)

Conditions

[Cell] Frozen rat hepatocytes
[Number of seedings] 1.0×10^5 cells / cm^2
[Culture period] 1 day
[Plate type] InnoCell™ plate FP series (flat bottom)
Collagen-coated (C type)

InnoCell™ plate can precisely reflect the setting oxygen concentration of the incubator.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

Oxygen Permeability Control 2

High-density culture of frozen rat hepatocytes

• Data obtained by Mitsui Chemicals

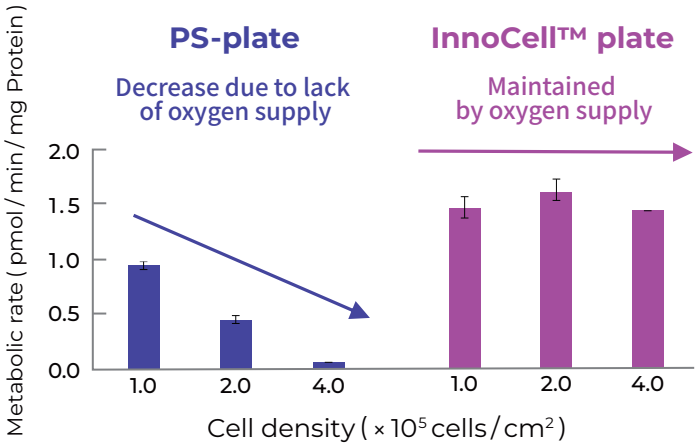
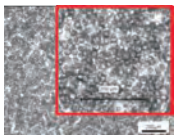
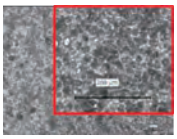


Image (4.0 × 10⁵ cells / cm²)



PS-plate



InnoCell™ plate

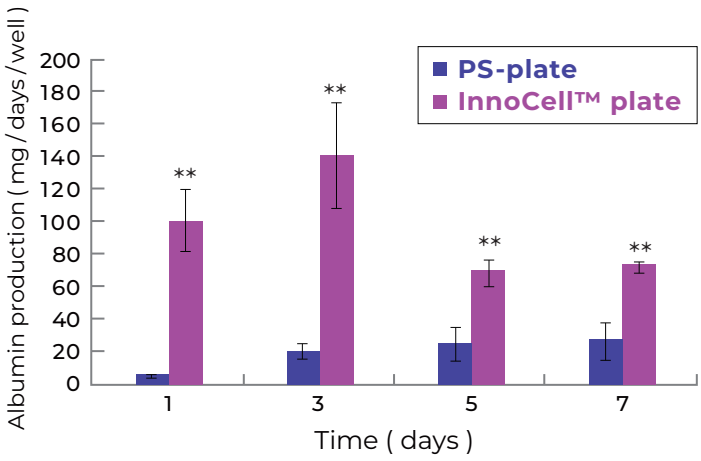
Conditions

[Cell] Frozen rat hepatocytes
[Culture period] 1 day
[Plate type] InnoCell™ plate FP series (flat bottom)
Collagen-coated (C type)

InnoCell™ plate can be cultured hepatocyte at high density while maintaining metabolic activity.

Culture of primary rat hepatocytes

• Data provided by Dr. Sakai, Dr. Nishikawa, The University of Tokyo
• Reference: Accurate Evaluation of Hepatocyte Metabolisms on a Noble Oxygen-Permeable Material With Low Sorption Characteristics. *Front. Toxicol.*, 4: 810478, (2022).



Conditions

[Cell] Primary rat hepatocytes
[Seeding density] 1.0 × 10⁵ cells / cm²
[Plate type] InnoCell™ plate FP series (flat bottom)
Collagen-coated (C type)
[Incubator oxygen concentration]
PS-plate : 20%　InnoCell™ : 10%

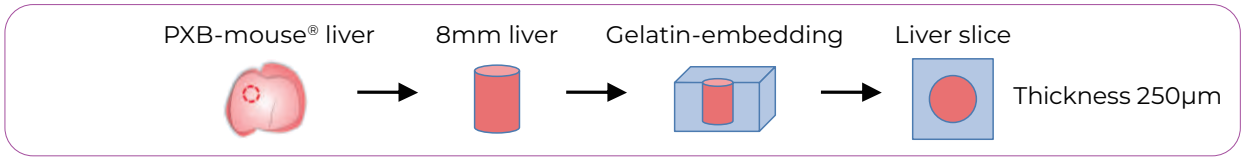
InnoCell™ plate enables primary rat hepatocytes to maintain a high albumin production capacity for an extended period of time.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

Oxygen Permeability Control 3

Culture of PXB-mouse® liver slices

• Data provided by PhoenixBio Co., Ltd.



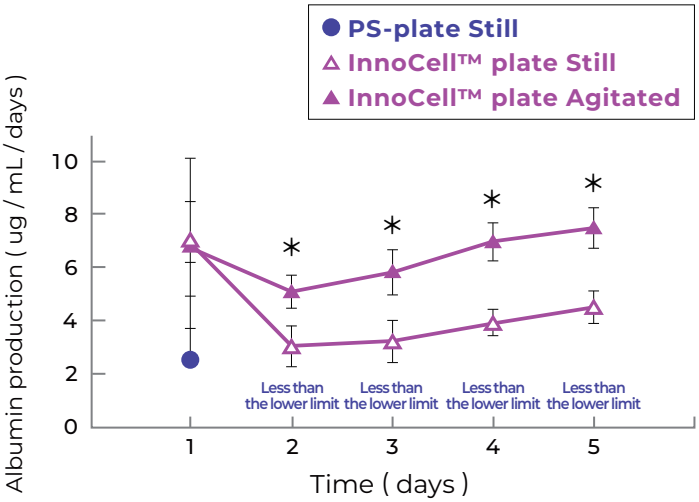
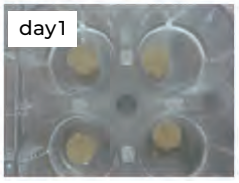


Image of liver slice in the plate



Conditions

[Slice] PXB-mouse® liver
[Plate type] InnoCell™ plate FP series (flat bottom)
Non-treated (N type)

InnoCell™ plate even enables liver slices to maintain a high albumin production capacity for an extended period of time.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

Low drug adsorption

Drug adsorption to the culture substrate

• Data provided by Dr. Arakawa, Kanazawa University

Drug	log P	clinicalC$_{max}$ (μM)	Residual rate after 24 hours (%Theoretical value) Drug concentration 100nM			
			PS-plate	FEP-plate	PDMS-plate	InnoCell™ plate
Aripiprazole	5.21	0.067	64.2±0.4	54.7±1.2	26.3±0.9	69.9±2.2
Alectinib	5.59	1.4	72.9±1.8	53.7±2.8	45.1±0.8	70.3±2.9
Sorafenib	4.12	17	73.0±1.7	56.4±2.5	59.2±0.4	68.0±3.4
Gefitinib	4.02	0.86	82.9±3.4	69.8±4.3	39.6±2.3	94.0±4.8
Pazopanib	3.59	132	86.7±2.1	59.5±1.8	82.1±2.1	87.8±0.6
Sunitinib	3.24	0.18	95.8±1.9	64.9±1.8	29.0±2.0	97.0±3.5
Ciprofloxacin	0.28	6.73	62.2±5.4	67.7±12.1	59.6±6.7	69.4±13.0

Conditions

[Plate type] InnoCell™ plate FP series (flat bottom)
Non-treated (N type)
[Measurement]
Liquid chromatograph-mass spectrometer (LC-MS / MS)

Drug adsorption to InnoCell™ plate is low. It can be utilized in toxicity studies, as well as drug efficacy / pharmacology studies during the drug discovery phase.

Drug adsorption to the culture substrate

• Data provided by Dr. Sakai, Dr. Nishikawa, The University of Tokyo
• Reference : Accurate Evaluation of Hepatocyte Metabolisms on a Noble Oxygen-Permeable Material With Low Sorption Characteristics. *Front. Toxicol.*, 4: 810478, (2022).

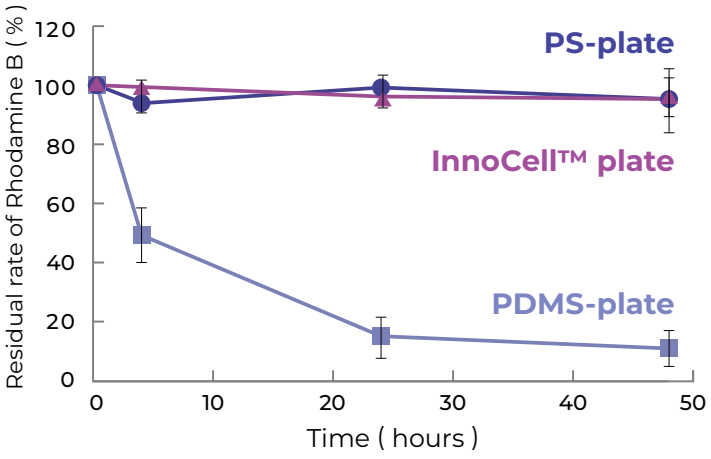
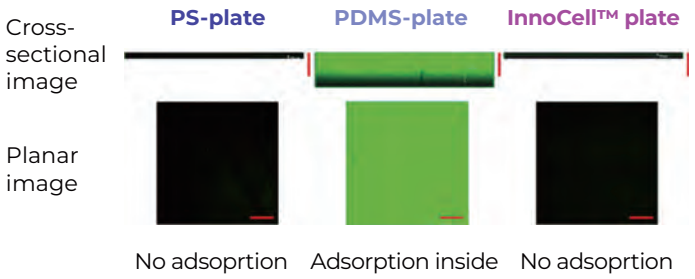


Image after 48 hours (Confocal microscope, 200μm from the bottom)

Rhodamine B



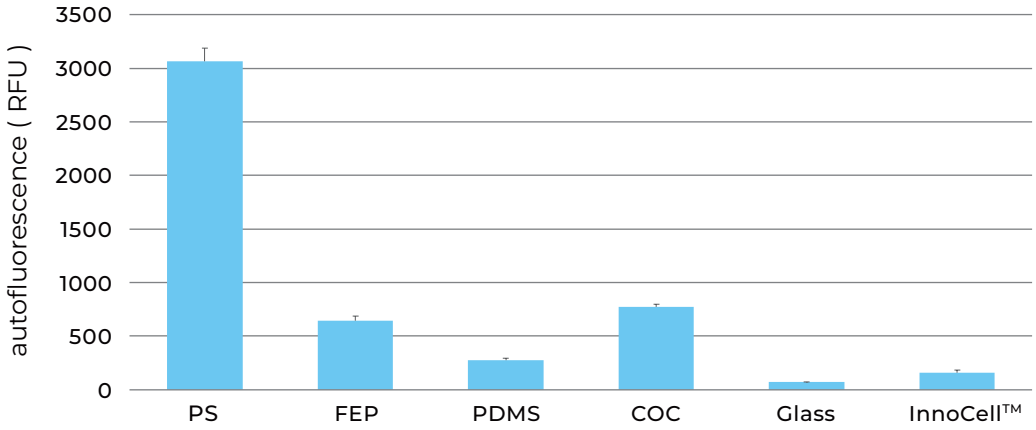
InnoCell™ plate is designed for and verified to have low drug adsorption into the culture substrate.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

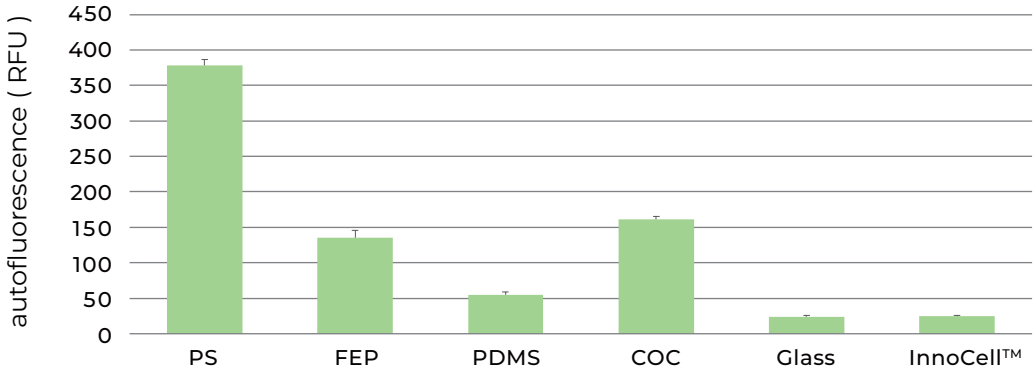
• Data obtained by Mitsui Chemicals

Low Autofluorescence

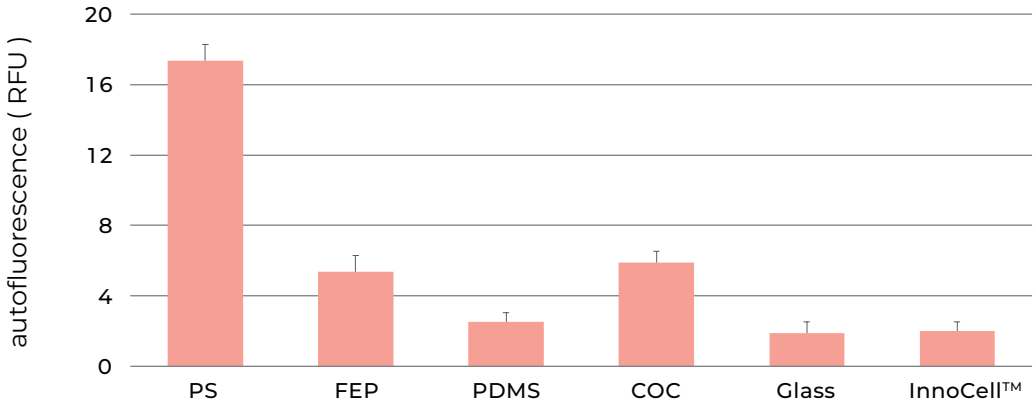
Blue fluorescence (Ex360nm / Em460nm)



Green fluorescence (Ex470nm / Em525nm)



Red fluorescence (Ex560nm / Em630nm)



Conditions

[Plate type] InnoCell™ plate FP series (flat bottom)
Non-treated (N type)
[Measurement] Measured by Infinite® 200PRO M Plex

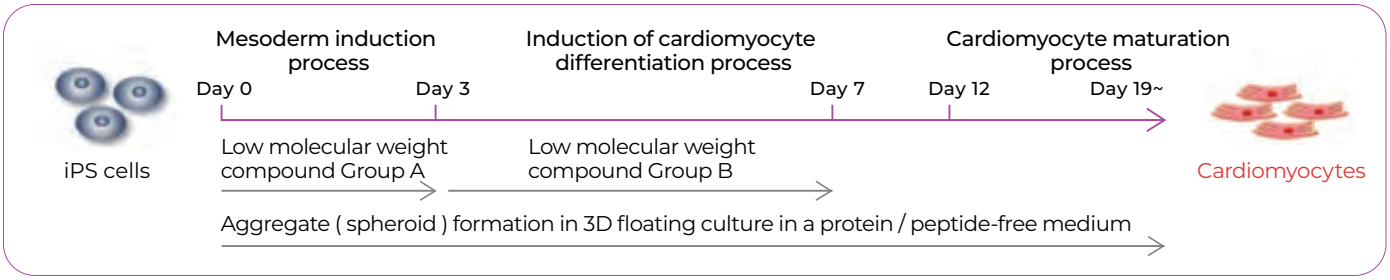
InnoCell™ plate has low autofluorescence at various wavelengths and even shows the values close to those of glass plates, which are known as an excellent material for fluorescence observation.

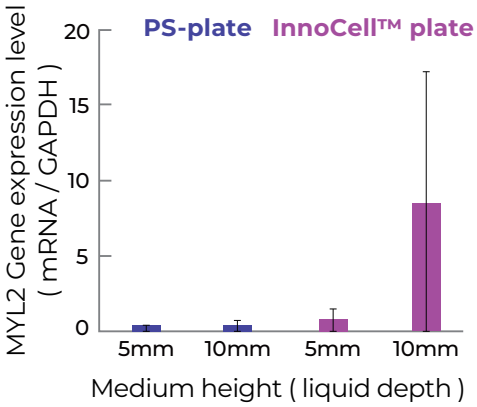
[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

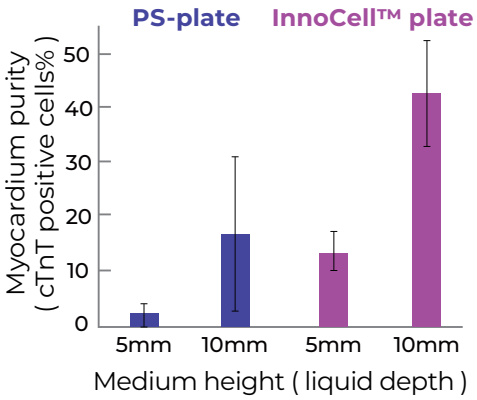
Stem Cell Research

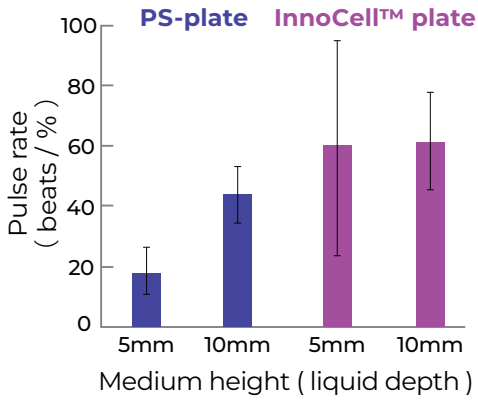
Examples of Induction of cardiomyocytes differentiation from iPS cells and myocardial pharmacological response

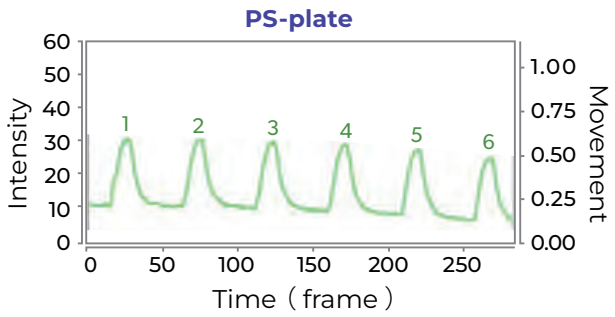
• Data provided by Myoridge Co. Ltd.

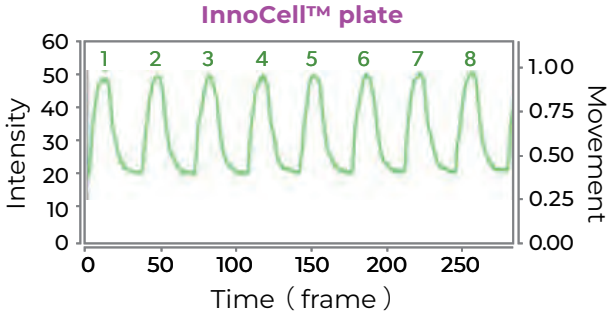




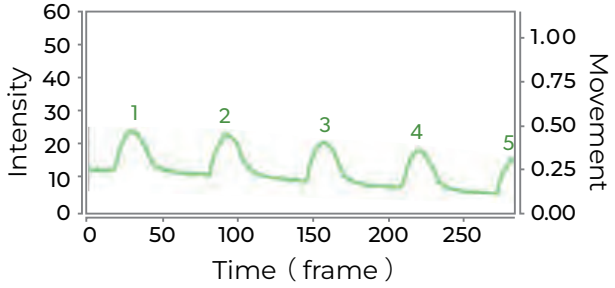


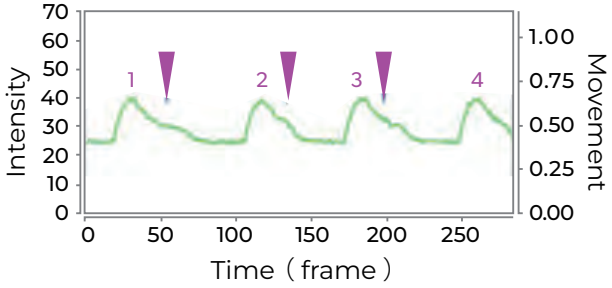






1μM Bepridil





Conditions

[Plate Type] InnoCell™ plate FP series (flat bottom)
Treated (P type)

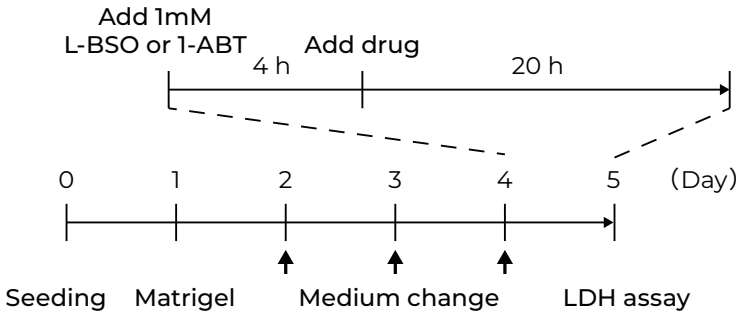
InnoCell™ plate yields highly matured cardiomyocytes. Using iPS-derived cardiomyocyte culture, Bepridil-induced QT prolongation was observed in InnoCell™.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

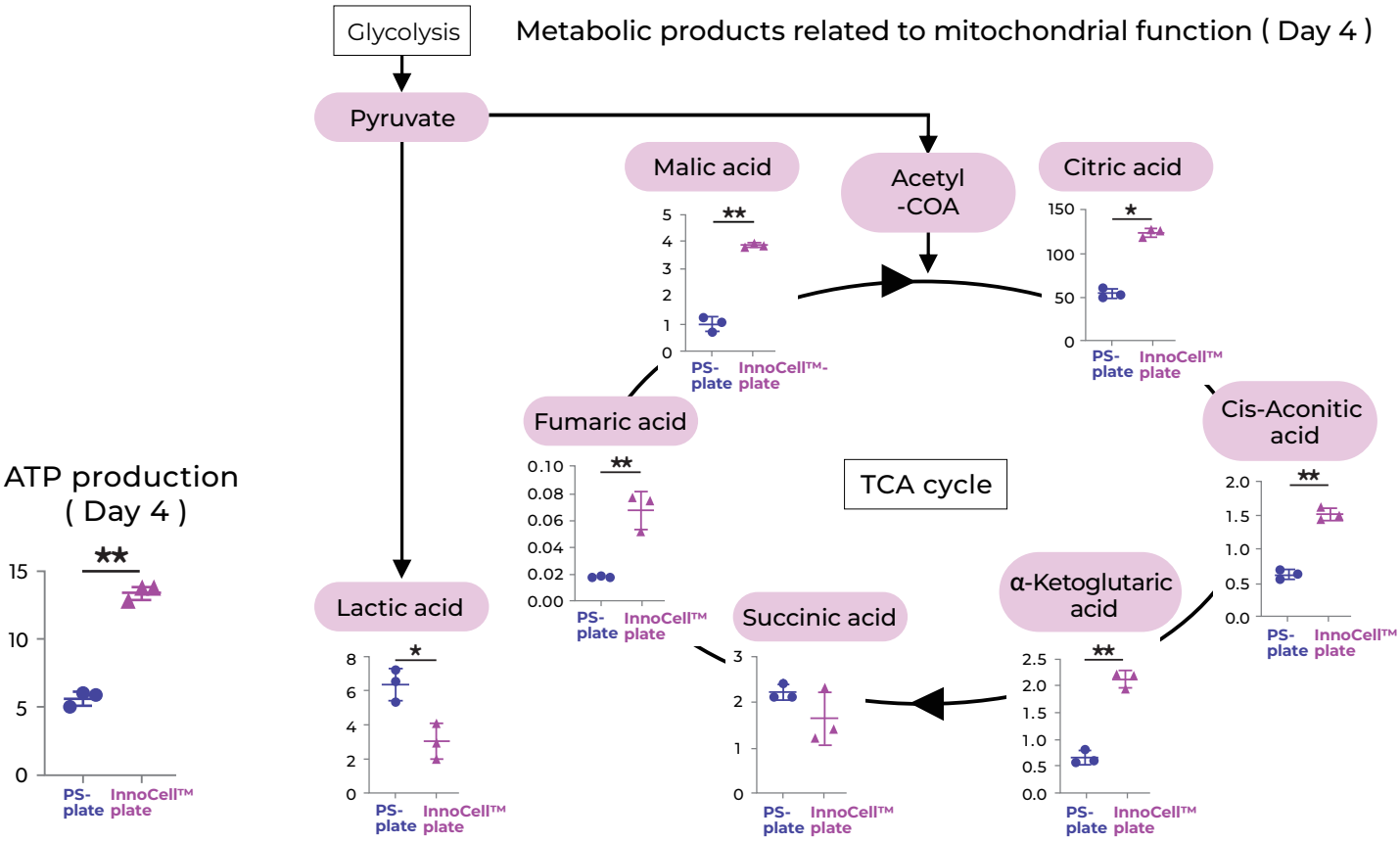
Drug Discovery Research

Example assay using primary rat hepatocytes (1/2)

• Data provided by Dr. Takemura, Chiba University
• Reference : New in vitro screening system to detect drug-induced liver injury using a culture plate with low drug sorption and high oxygen permeability. *Drug Metabolism and Pharmacokinetics*, 52: 100511, (2023).



- L-BSO
  : GSH synthesis inhibitor
- 1-ABT
  : Nonspecific CYP enzyme inhibitor



Conditions

[Cell] Rat Primary Hepatocyte Cells
[Seeding density] 1.25 × 10^5 cells / cm^2
[Plate type] InnoCell™ plate FP series (flat bottom)
Collagen-coated (C type)

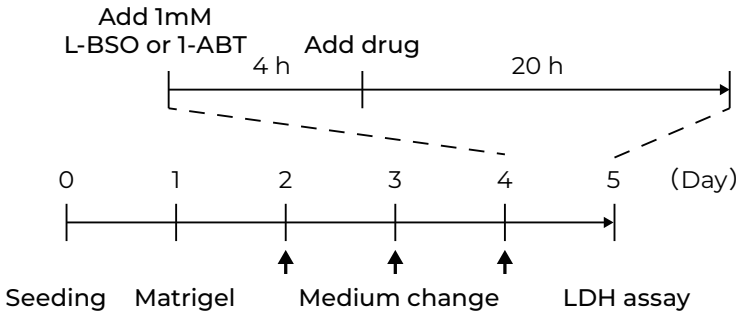
InnoCell™ plate has been shown to shift energy production of rat hepatocytes from the glycolytic system to the TCA cycle.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

Drug Discovery Research 2

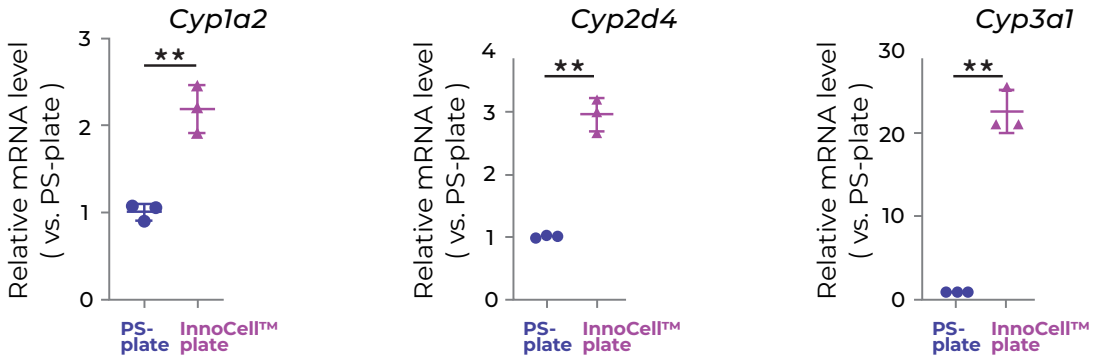
Example assay using primary rat hepatocytes (2/2)

• Data provided by Dr. Takemura, Chiba University
• Reference : New in vitro screening system to detect drug-induced liver injury using a culture plate with low drug sorption and high oxygen permeability. *Drug Metabolism and Pharmacokinetics*, 52: 100511, (2023).

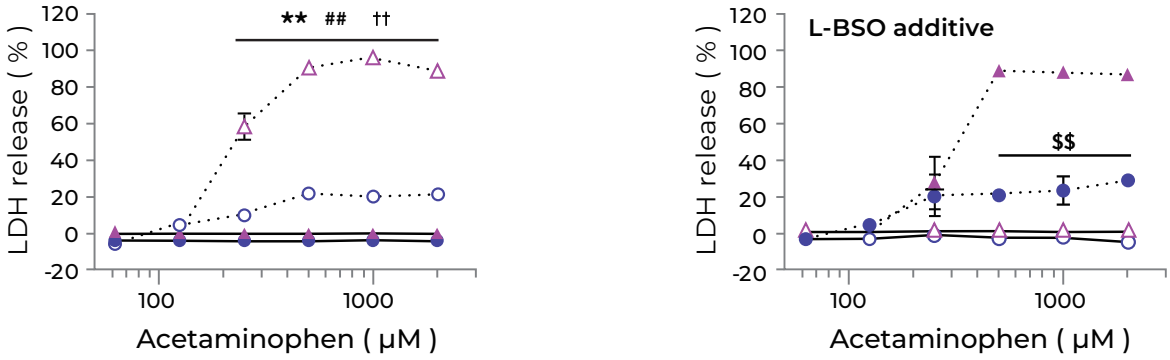


- L-BSO
  : GSH synthesis inhibitor
- 1-ABT
  : Nonspecific CYP enzyme inhibitor

CYP gene expression (Day 4)



Hepatocellular damage (Acetaminophen)



L-BSO not added : ● PS-plate | ▲ InnoCell™ plate
L-BSO Added : ○ PS-plate | △ InnoCell™ plate

1-ABT not added : ● PS-plate | ▲ InnoCell™ plate
1-ABT Added : ○ PS-plate | △ InnoCell™ plate

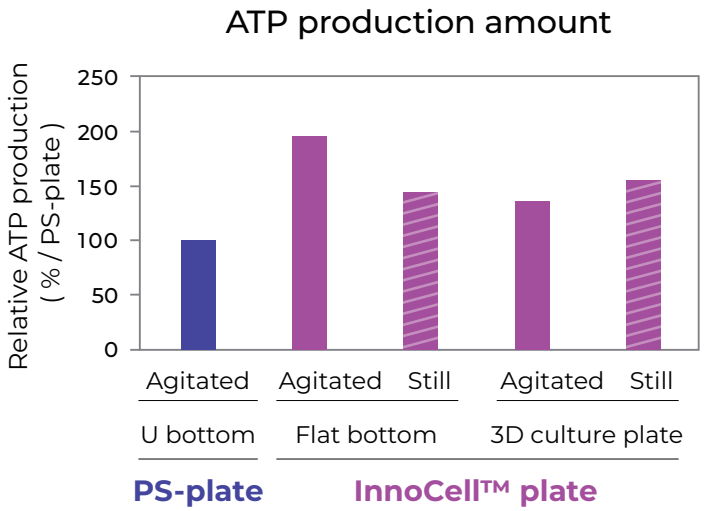
Using InnoCell™ plate, hepatocellular cytotoxicity due to acetaminophen was increased in the presence of L-BSO and attenuated by adding 1-ABT. Hepatocellular cytotoxicity caused by reactive metabolites may be detected with high sensitivity.

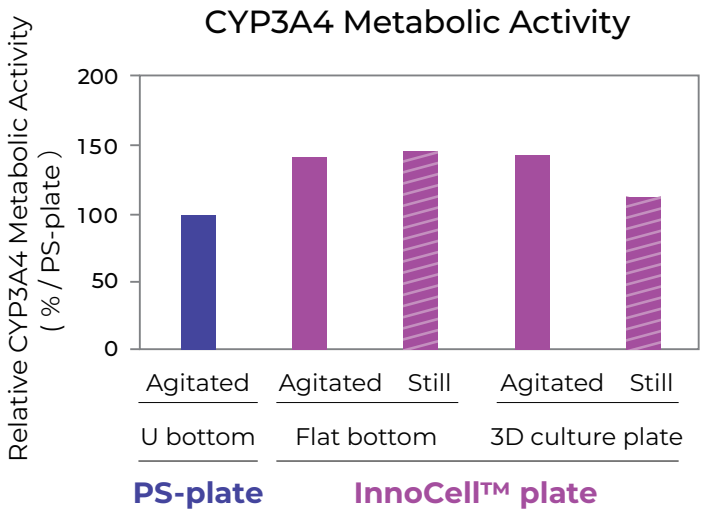
[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

Drug Discovery Research 3

Example assay using human 3D liver buds

・Data provided by Cyfuse Biomedical K.K.





Conditions

[Cell] Same company Human 3D liver buds
[Culture period] 6 days
[Plate type]
・InnoCell™ plate FP series (flat bottom)
Non-treated (N type)
・InnoCell™ plate 3D series
3D culture plate

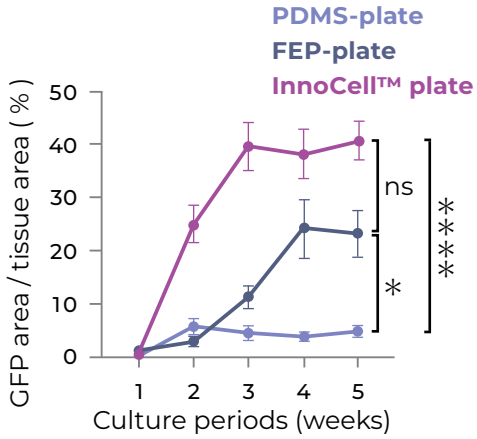
InnoCell™ plate maintains higher ATP production and CYP3A4 metabolism in human 3D liver buds.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

Additional Data

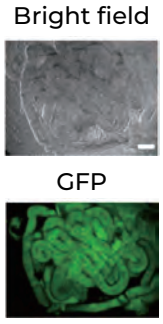
Culture of mouse testis tissue

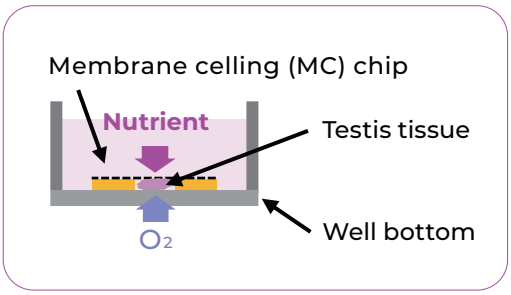
• Development of the membrane ceiling method for in vitro spermatogenesis. *Scientific Reports*, 15: 625, (2025).



InnoCell™ plate
Image (5 weeks)

Scale bar : 100μm (White)





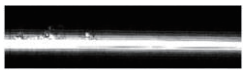
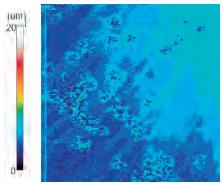
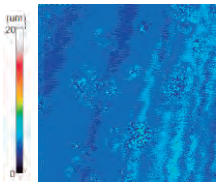
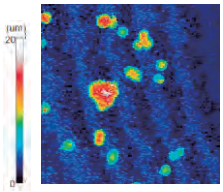
Conditions

[Tissue] GFP-tagged Acrosomes and RFP-tagged nuclei mice testis tissue
[Culture period] 5 weeks
[Plate type] InnoCell™ plate FP series (flat bottom) non-treated (N type)

InnoCell™ plate supports testis tissue culture and improves Acr-GFP expression compared with conventional oxygen-permeable plates.

Cell3iMager Estier Analysis

• Data provided by SCREEN Holdings Co., Ltd.

	Manufacturer A (PS-plate)	Manufacturer B (PS-plate)	InnoCell™ plate
Cross-sectional image of interface (saturation)			
Measurement of thickness of single layer culture			

Conditions

[Equipment] Cell3iMager Estier
[Technology] Optical coherence tomography (OCT)
[Cell] MCF7
[Coat] iMatrix 511
[Culture period] 5 hours
[Plate type] InnoCell™ plate FP series (flat bottom) Non-treated (N type)

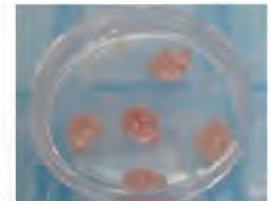
InnoCell™ plate enables clear viewing of the cell shapes in flat-surface culture using OCT imaging.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

Additional Data 2

FDSS / µCELL Kinetic Plate Imager Analysis

• Data provided by HAMAMATSU PHOTONICS K.K.

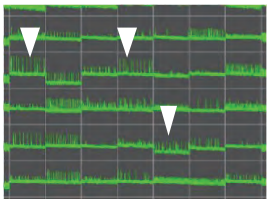


Rat cerebral cortex

+

Ca^{2+} dye

InnoCell™ plate



Ca^{2+} oscillation

Conditions

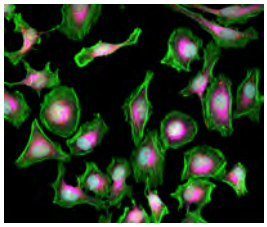
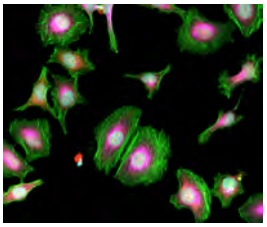
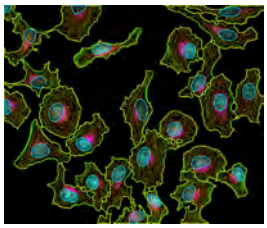
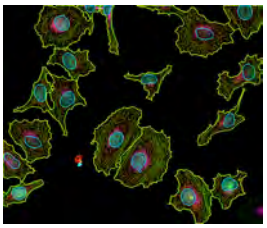
[Equipment] FDSS / µCELL Kinetic Plate Imager
[Tissue] Rat cerebral cortex
[Culture period] 15 days
[Plate type] InnoCell™ plate FP series (flat bottom)
Non-treated (N type)

InnoCell™ plate enables good Ca^{2+} oscillations in tissue culture of rat cerebral cortex.

CellVoyager CQ1 Analysis

• Data provided by Yokogawa Electric Corporation

Image by confocal microscope (× 40 objective lens)

	PS-plate	InnoCell™ plate	
Superimposed image			Nucleus : Hoechst 33342 (Cyan) Actin : Alexa Fluor 488 phalloidin (Green) Mitochondria : MitoTrackerRed CMXRos (Red) Tubulin : Alexa Fluor 647 (Magenta)
Analyzed image			Nucleus : Outline Light blue Cell body : Outline Yellowish-green Actin : Orange

Conditions

[Equipment] CellVoyager CQ1
[Analysis] CellPathfinder
[Cell] pkt1
[Plate type] InnoCell™ plate FP series (flat bottom)
Collagen-coated (C type)

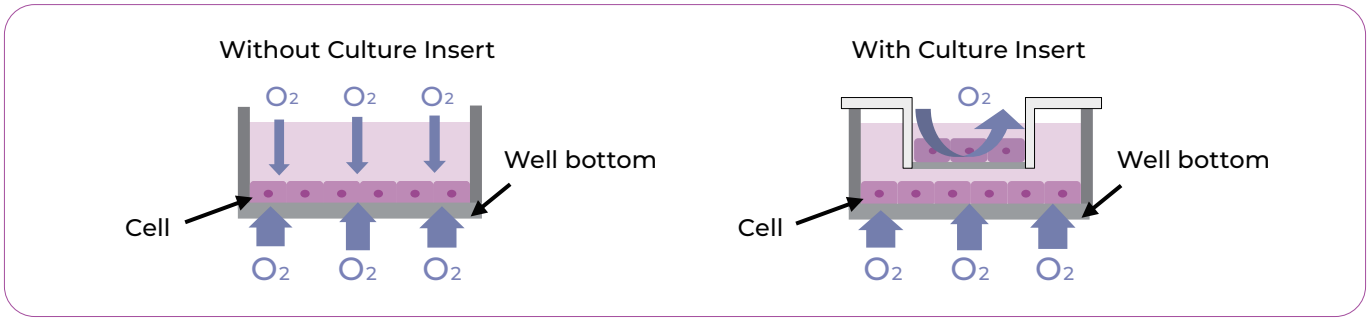
When using InnoCell™ plate in conjunction with the CellVoyager CQ1, high-definition confocal microscope images can be obtained for analysis.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

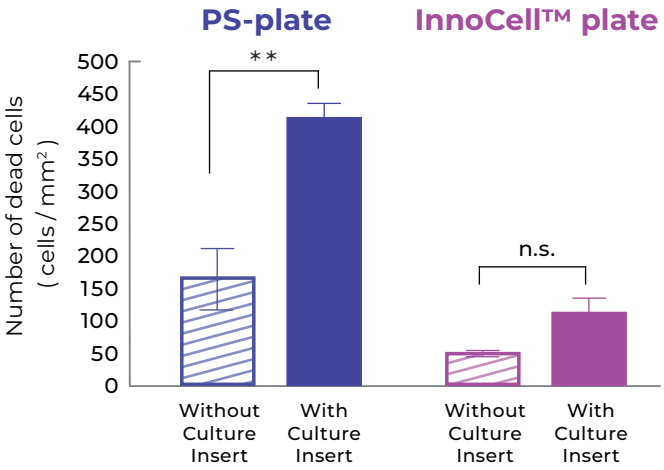
Additional Data 3

InnoCell™ plate Co-Culture System

・Enhanced Functionally of Human Hepatocytes using the Oxygen Permeable Culture Plate for Optimized Oxygen Supply in Co-culture Systems with Culture Inserts. *AATEX*, 29(2): 64-74, (2024).



Cell viability

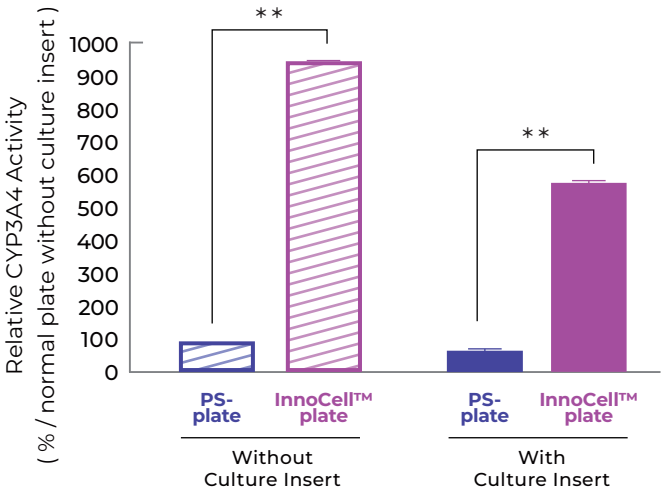


Conditions

[Cell] HepG2 cells
[Culture period] 3 days
[Plate type] InnoCell™ plate FP series (flat bottom)
Collagen-coated (C type)

InnoCell™ plate stably supplies oxygen to cells at the bottom of wells even when using culture insert.

CYP3A4 metabolic activity



Conditions

[Cell] Hepa SH™ cells
[Culture period] 7 days
[Plate type] InnoCell™ plate FP series (flat bottom)
Collagen-coated (C type)

InnoCell™ plate maintains higher drug metabolism enzyme activity even if the culture insert is installed.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

Additional Data 4

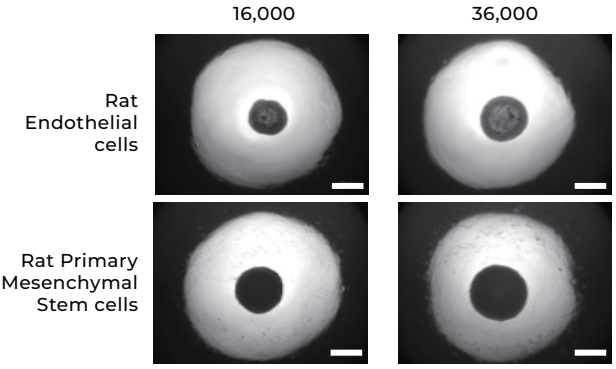
Spheroid formation and function using InnoCell™ 3D culture plate

・Data provided by Komatsu Laboratory, University of California, San Francisco (UCSF)

Spheroid Formation

InnoCell™ 3D culture plate

Cell seeding density [cells / well]



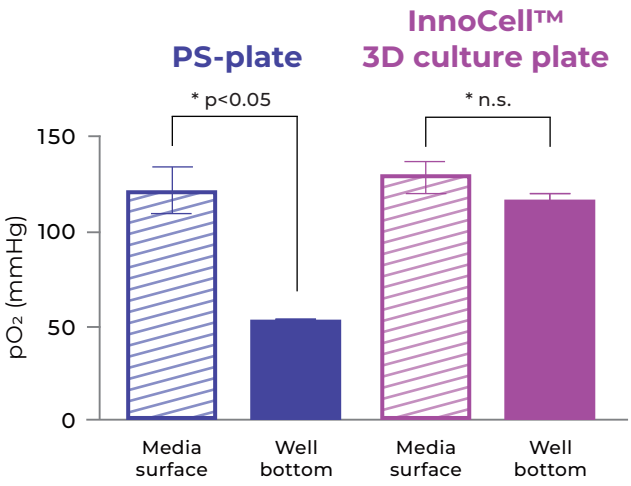
Scale bar : 500μm (White)

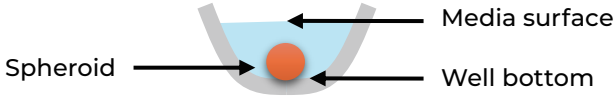
Conditions

[Culture period] 2 days
[Plate type] InnoCell™ plate 3D series 3D culture plate

InnoCell™ plate is applicable to for spheroid formation even with a higher cell seeding density.

Oxygen partial pressure in a medium





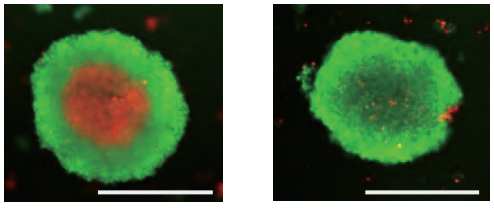
Conditions

[Cell] Rat INS-1 cells
[Culture period] 2 days
[Plate type] InnoCell™ plate 3D series 3D culture plate

InnoCell™ plate mitigates the oxygen gradient within the well, providing uniformly oxygenated conditions for spheroids at the bottom.

Spheroid viability

PS-plate **InnoCell™ 3D culture plate**



LIVE cells (Green) / DEAD cells (Red)
Scale bar : 300μm (White)

Conditions

[Cell] Rat INS-1 cells
[Culture period] 2 days
[Plate type] InnoCell™ plate 3D series 3D culture plate

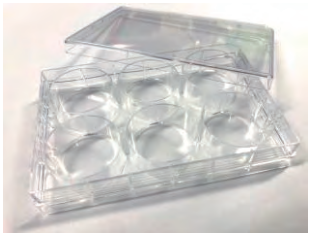
InnoCell™ plate improves spheroid viability, with suppression of central necrosis in large spheroids.

[Abbreviation] ・PS : Polystyrene ・FEP : Fluorinated Ethylene Propylene copolymer ・PDMS : Poly (dimethylsiloxane) ・COC : Cyclic Olefin Copolymer

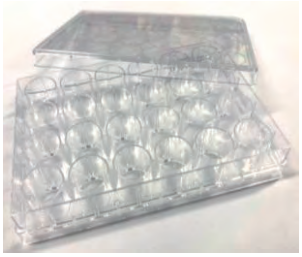
Product Lineup

InnoCell™ plate FP series (flat bottom)

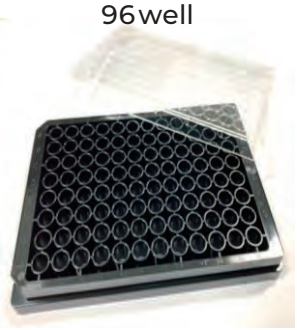
6well



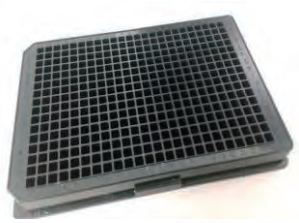
24well



96well



384well



＊A black case is used for 96 well and 384 well (transparent bottom).

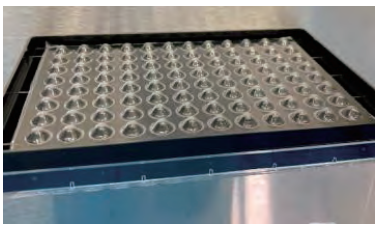
Culture surface	Description
Non-treated (N type)	Suitable for culturing non-adhesive cells and spheroids / organoids, etc. Can be stored at room temperature.
Treated (P type)	The surface of the base material has undergone hydrophilic treatment. Suitable for coating various scaffolding materials. Can be stored at room temperature.
Collagen-coated (C type)	The surface of the base material has undergone hydrophilic treatment. It is coated with Type I pig tendon-derived collagen. Can be stored at room temperature.

InnoCell™ plate FW series (gas barrier film)

The InnoCell™ FW series is treated with a release film with low oxygen permeability.
The gas barrier film can be peeled off and used as InnoCell™ FP series.

InnoCell™ plate 3D series

Spheroids and organoids can be cultured while retaining the oxygen permeability of bottom.



Inquiry regarding Products and Techniques

MITSUI CHEMICALS, INC.
Cell Culture Solution Department, New Business Incubation Center
2-2-1 Yaesu, Chuo-ku, Tokyo 104-0028, Japan, Tokyo Midtown Yaesu, Yaesu Central Tower
Email : InnoCell@mitsuichemicals.com

List of Products

InnoCell™ plate FP series (flat bottom)

Product No.	Product description	Quantity	Package	Remarks
FP0006N	non-treated 6 well	5	1	
FP0006P	treated 6 well	5	1	Under Development
FP0006C	collagen-coated 6 well	5	1	
FP0024N	non-treated 24 well	5	1	
FP0024P	treated 24 well	5	1	Under Development
FP0024C	collagen-coated 24 well	5	1	
FP0096N	non-treated 96 well	5	1	
FP0096P	treated 96 well	5	1	Under Development
FP0096C	collagen-coated 96 well	5	1	
FP0384N	non-treated 384 well	5	1	Under Development
FP0384P	treated 384 well	5	1	Under Development
FP0384C	collagen-coated 384 well	5	1	Under Development

InnoCell™ plate FW series (gas barrier film) (Under Development)

Please send an inquiry for the products of interest.

InnoCell™ plate 3D series

Product No.	Product Name	Quantity	Package	Remarks
HD0096H	3D culture plate ultra-low attachment 96well	5	1	Under Development

Important Points for all products

• This product is for experimental and research use only. Not to be used for diagnosis, treatment, or direct use on human body.
• The culture bottom of this product consists of a thin film. Please be aware that damage to the bottom may occur when using a pipette tip or sharp item.
• Although thorough attention has been paid to ensure the quality of the product, please check for scratches and tears before use.
• Please do not conduct any product analysis for any purpose other than research.
• The values and images used in application is an example. Mitsui Chemicals is unable to guarantee the values and performance under any conditions.

Important Points for the products under development

• As this product is in the development stages, Mitsui Chemicals is unable to offer assurances regarding quality, intellectual property protection, or guarantees against potential third party patent infringement claims.
• Please note that prior notification to Mitsui Chemicals is necessary before filing any patent applications pertaining to this product.

Inquiries

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Mitsui Chemicals

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