

# VECELL® 3D Culture Plate

## Preset VECELL®

3D cell culture using high porosity membrane inserts

Description	No. of wells	Cat. No.	Size
Preset VECELL® 12/24 well	24 well plate	VCL-PSVC12-1-EX	1 plate
		VCL-PSVC12-10-EX	10 plates
Preset VECELL® 30/6 well	6 well plate	VCL-PSVC30-1-EX	1 plate
		VCL-PSVC30-10-EX	10 plates

## Hybrid VECELL® H-Plate

3D cell culture on high porosity and gas-permeable membrane

Description	Color	No. of wells	Cat. No.	Size
VECELL® 96 Well H-plate BK	Black	96 well plate	VCL-V96WHPB-1-EX	1 plate
			VCL-V96WHPB-10-EX	10 plates
VECELL® 96 Well H-plate WT	White	96 well plate	VCL-V96WHPWT-1-EX	1 plate
			VCL-V96WHPWT-10-EX	10 plates
VECELL® 24 Well H-plate BK	Black	24 well plate	VCL-V24WHPB-1-EX	1 plate
			VCL-V24WHPB-10-EX	10 plates
VECELL® 6 Well H-plate BK	Black	6 well plate	VCL-V6WHPB-1-EX	1 plate
			VCL-V6WHPB-10-EX	10 plates

## Gas Permeable VECELL® G-Plate

3D cell culture using gas permeable membrane

Description	Color	No. of wells	Cat. No.	Size
VECELL® 384 Well G-plate BK	Black	384 well plate	VCL- V384WGPB-10-EX	10 plates
VECELL® 384 Well G-plate WT	White	384 well plate	VCL- V384WGPWT-10-EX	10 plates
VECELL® 96 Well G-plate BK	Black	96 well plate	VCL- V96WGPB-1-EX	1 plate
			VCL- V96WGPB-10-EX	10 plates
VECELL® 96 Well G-plate WT	White	96 well plate	VCL- V96WGPWT-1-EX	1 plate
			VCL- V96WGPWT-10-EX	10 plates
VECELL® 24 Well G-plate BK	Black	24 well plate	VCL- V24WGPB-1-EX	1 plate
			VCL- V24WGPB-10-EX	10 plates
VECELL® 6 Well G-plate BK	Black	6 well plate	VCL- V6WGPB-1-EX	1 plate
			VCL- V6WGPB-10-EX	10 plates

## VECELL® Plate Films

High performance at affordable price

Description	Cat. No.	Size
VECELL® PROTECT FILM Ver. Aluminium	VCL-VPFA-1-EX	100 sheets
VECELL® PROTECT FILM Ver. Polyester	VCL-VPFP-1-EX	100 sheets
VECELL® SHADING FILM Ver. Black	VCL-VSFB-1-EX	100 sheets

### References for Preset:

- Kubo T, Kuroda Y, Horiuchi S, Kim SR, Sekino Y, Ishida S. (2016): Upregulations of metallothionein gene expressions and tolerance to heavy metal toxicity by three dimensional cultivation of HepG2 cells on VECELL 3-D inserts. *J Toxicol Sci.*, 41(1): 147-53.
- Matsumoto T1, Hattori K, Matsushima A, Tadokoro M, Yagyu T, Kodama M, Sato J, Ohgushi H. (2011): Osteogenic potential of mesenchymal stem cells on expanded polytetrafluoroethylene coated with both a poly-amino-Acid urethane copolymer and collagen. *Tissue Eng Part A*, Jan; 17(1-2): 171-80.
- Kawase T, Okuda K, Kogami H, Nakayama H, Nagata M, Yoshie H. (2010): Osteogenic activity of human periosteal sheets cultured on salmon collagen-coated ePTFE meshes. *J Mater Sci Mater Med.*, Feb; 21(2): 731-9

### References for H-plate:

- Wenjin Xiao, Makoto Kodama, Kikuo Komori, Yasuyuki Sakai. (2014): Oxygen-permeable membrane-based direct oxygenation remarkably enhances functions and gene expressions of rat hepatocytes in both 3D and sandwich cultures. *Biochemical Engineering Journal.*, Volume 91, 15, Pages 99-109

### References for G-plate:

- Xiao W, Perry G, Komori K, Sakai Y. (2015): New physiologically-relevant liver tissue model based on hierarchically cocultured primary rat hepatocytes with liver endothelial cells. *Integr Biol (Camb)*, 7(11): 1412-22.
- Wenjin Xiao, Makoto Kodama, Kikuo Komori, Yasuyuki Sakai. (2014): Oxygen-permeable membrane-based direct oxygenation remarkably enhances functions and gene expressions of rat hepatocytes in both 3D and sandwich cultures. *Biochemical Engineering Journal.*, Volume 91, 15, Pages 99-109

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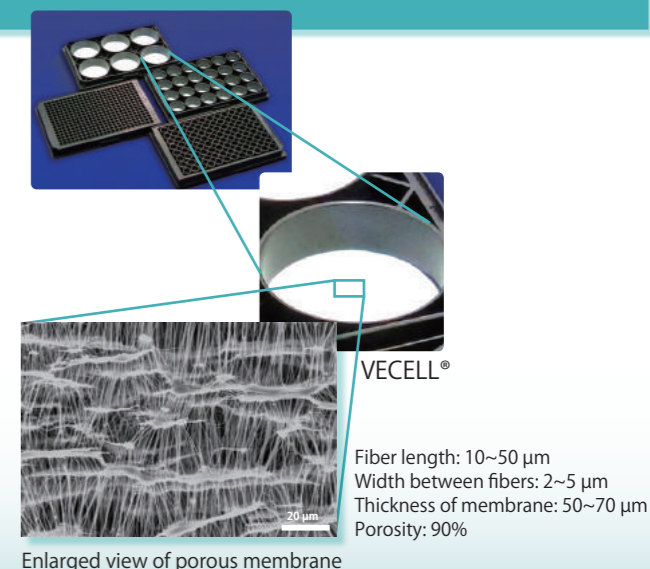
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For 3D cell culture on gas-permeable membrane

# VECELL® 3D Cell Culture Plate

- Keeps spheroidal state of cells
- Suitable for drug discovery screening

The membrane used in VECELL® has porous structure as shown in the right figure. By this structure, you can culture more *in vivo*-like and also, more in monodispersed-like state.



In major 2D culture using plastic plates, amount of oxygen rely on those which dissolved in culture medium, and lack of gas exchange makes cells die.

VECELL® 3D Cell Culture Plate provides environment close to *in vivo* and cells can proliferate naturally. High porosity membrane allows culture medium pass through freely, so each cell is surrounded by culture medium which makes cells keep natural shapes. Unlike cells cultured on plastic dish, they do not form spheroids.

Gas permeable membrane makes exchange of oxygen and carbon dioxide, which makes cells to be cultured for a longtime. During the culture, gaps of cells are filled with ECM and form 3D structure without changing shapes of each cell.

Type	Common plastic dish	Preset	VECELL® H-plate	VECELL® G-plate
Schema				
Insert	-	●	-	-
Porosity	-	●	●	-
Gas-permeability	-	-	●	●
Features	<ul style="list-style-type: none"> <li>• Cells stretch.</li> <li>• Amount of oxygen rely on those which dissolved in culture medium.</li> </ul>	<ul style="list-style-type: none"> <li>• VECELL® Inserts are preset in dishes.</li> <li>• High porosity membrane makes cells keep the original shape.</li> <li>• Suitable for taking pictures of slices of insert membrane.</li> </ul>	<ul style="list-style-type: none"> <li>• Porous membrane makes cells keep the original shape.</li> <li>• Oxygen can be supplied from bottom of the wells.</li> </ul>	<ul style="list-style-type: none"> <li>• Cells gather by themselves and form hemisphere blocks.</li> <li>• Oxygen can be supplied from bottom of the wells.</li> <li>• Suitable for HCA and HCS.</li> </ul>
<ul style="list-style-type: none"> <li>• Possible to culture more <i>in vivo</i>-like</li> <li>• Ready to culture as cell adhesive collagen is coated and sterilized.</li> <li>• Can be observed by phase contrast microscope as the membrane is transparent at wet condition.</li> </ul>				



COSMO BIO Co., LTD.

# VECELL® 3D Culture Plate

## Preset VECELL®

3D cell culture using high porosity membrane inserts



Preset VECELL® 6 well/24 well

\* Lid is attached to each plate.



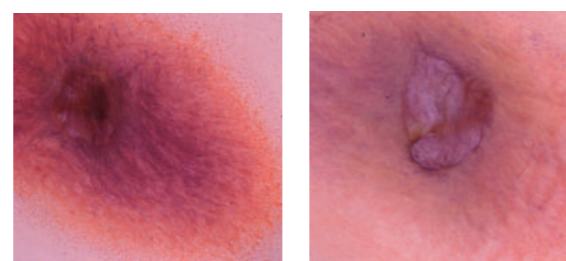
VECELL® insert

### Suitable for tissue culture

Culture of human periodontal ligament tissue

Cell proliferation with high ALP activity was observed on Preset VECELL®. Preset VECELL® with high porosity structure helps growth of tissue to cell proliferation, and maintains high ALP activity.

Tomoyuki Kawase, Niigata University Graduate School of Medical and Dental Sciences

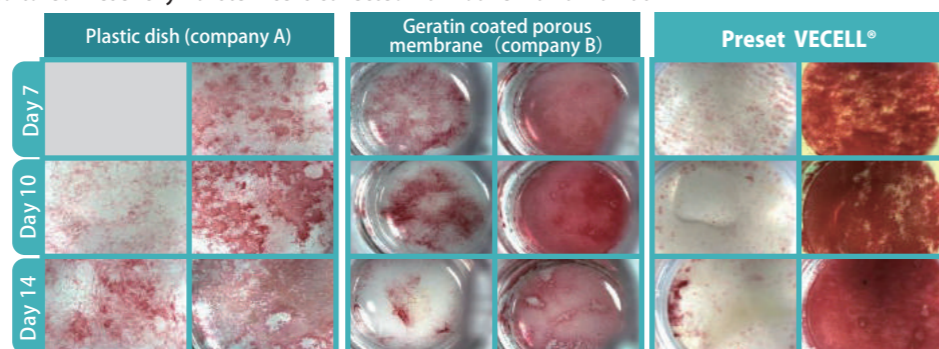


Preset VECELL®

Plastic plate

### in vivo-like reaction in vitro

Cultured mesenchymal stem cells collected from bone marrow of rat

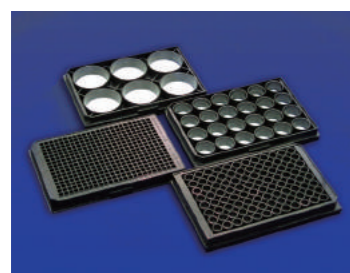


dexamethasone (-) dexamethasone (+) dexamethasone (-) dexamethasone (+) dexamethasone (-) dexamethasone (+)  
Mesenchymal stem cells were collected from bone marrow of rat and cultured on Preset VECELL®, plastic plate and geratin-coated porous membrane respectively and ALP activities were measured. Uniform cell proliferation and high ALP activity was observed on Preset VECELL® with dexamethasone compared to other culture plates.

Hajime Ohgushi, Research Institute for Cell Engineering (RICE), National Institute of Advanced Industrial Science and Technology (AIST).

## Hybrid VECELL® H-Plate

3D cell culture on high porosity and gas-permeable membrane

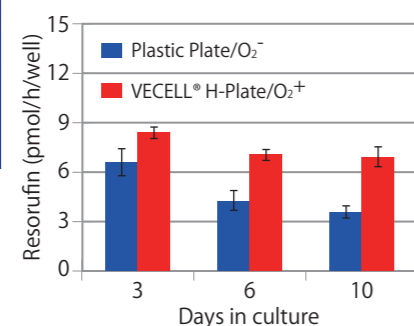


Hybrid VECELL® 6 well/24 well/96 well/384 well

\* Lid is attached to each plate.

### Maintains high CYP activity

Rat hepatocyte

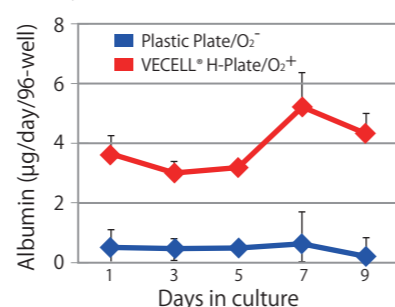


High CYP activity of rat hepatocyte (CYP1A1/2 activity) on VECELL® continued for 10 days. Especially on the 10th day, twice the activity of CYP1A1/2 was detected on VECELL® compared to regular plastic plate.

Yasuyuki Sakai, Institute of Industrial Science, the University of Tokyo.

### Maintains high albumin secretory function

Rat hepatocyte

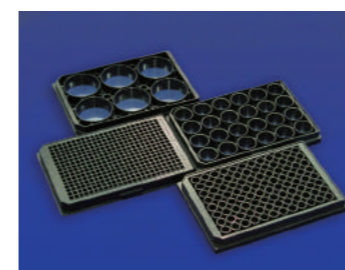


Change over time of albumin secretory function of rat hepatocyte cultured on VECELL® H-Plate and on regular plastic plate were measured. The one on VECELL® maintained high albumin secretory function for 9 days. The result indicates that rat hepatocyte demands oxygen, cells on VECELL® kept original shape, and were supplied nutrients sufficiently.

Yasuyuki Sakai, Institute of Industrial Science, the University of Tokyo.

## Gas Permeable VECELL® G-Plate

3D cell culture using gas permeable membrane

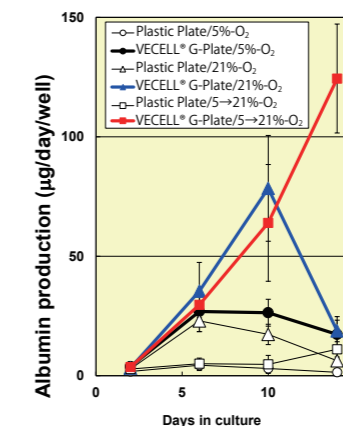


Gas Permeable VECELL® 6 well/24 well/96 well/384 well

\* Lid is attached to each plate.

### Cell activation by oxygen supply

Rat hepatocyte



Albumin production on VECELL® G-Plate was increased after changing the concentration of O<sub>2</sub> from 5% to 21%.

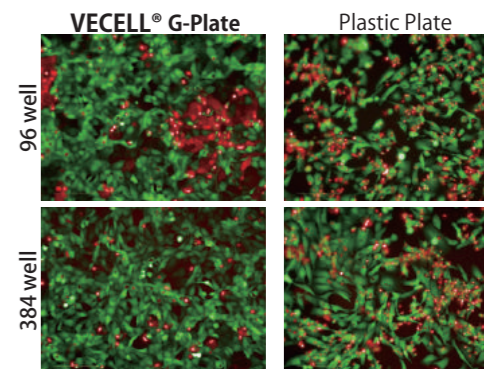
Yasuyuki Sakai, Institute of Industrial Science, the University of Tokyo.

### Fluorescence imaging

HepaRG cells (7th day of culture)

Comparison between Gas Permeable VECELL® Plate (G-Plate) and regular plastic plate

Green : Live cells/calcein AM staining  
Red : Dead cells/propidium iodide (PI) staining



Most cells on VECELL® G-Plate were alive, while those on plastic plate were dead for both 96 well plate and 384 well plate.

Vessel Inc.

## VECELL® Plate Films

High performance at affordable price

### Polyester Film

Suitable as temporary lid for PCR and incubation at ELISA.

Please do not use the wells located on the edge of the plate for PCR.

### Aluminium Film

- For stocking light-sensitive compounds.
- For detecting chemoluminescence.
- By putting this film on the opposite side of the plate for measuring, bubbles can be reduced, because no need of moving cells.

### Black Polyester Film

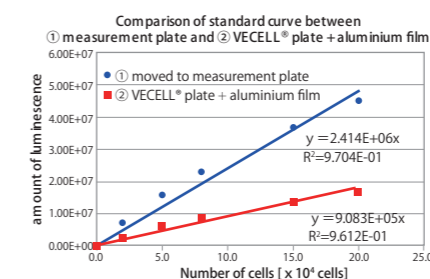
- For fluorometry. Stick this film to amplify signal intensity.



VECELL® Plate Films

Left back: Aluminium Film  
Center: Polyester Film  
Front right: Black Polyester Film

### Emission test of VECELL® Aluminium Film

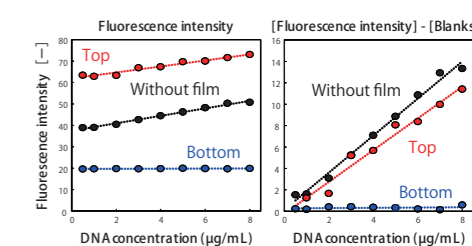
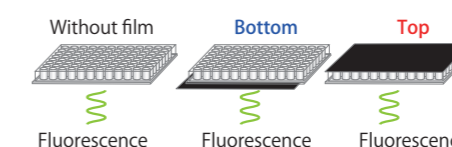


Amount of luminescence regarding ATP were measured by CellTiter-Glo™ Luminescent Cell Viability Assay and compared cell proliferation in ① (moved to measurement plate) and ② (VECELL® white plate + aluminium film). Though the amount of luminescence in ① was 40% of that in ②, standard curve kept straight and the number of cells were the same.

### DNA/DAPI fluorometry using Black Polyester Film

Salmon sperm origin DNA (SIGMA, Cat. no.: 31149-10G-F) was stained by DAPI and fluorescence was measured from bottom. Fluorescence sensitivity (including blanks) rose by black polyester film.

- Condition:
- Without film: 96 well plate without film (Thermo SCIENTIFIC)
  - Bottom: 96 well plate with Black Polyester Film placed under
  - Top: 96 well plate with Black Polyester Film placed above



Kohji Nakazawa, Faculty of Environmental Engineering, The University of Kitakyushu