Dynamic Co-culture System (Vascular Wall Cell Co-Culture)

MK2000

MK2000 has been discontinued.

CO-CULTURE FLOW SYSTEM ALLOWS CIRCULATION EVEN SMALL CULTURE MEDIA.

"In Vitro" flow system allows culture, under similar conditions to live organs, with a filtering culture cup. The culture cup is partitioned with the filter into upper and lower parts where about 10cc culture solution can circulate individually for a long time. This new culture system enables researcher to analyze the initial stage of arteriosclerosis lesions, to induce the gene expression of other vascular diseases, and to examine the permeability of new drugs into vascular endothelial cells, because this system simulates possible physical stimulus being given to the live organs such as the flow to the vascular endothelial cells, the hypoxia to the smooth muscles, etc.

■ Features

- While co-culturing both vascular endothelial and smooth muscle cells in a filtering culture cup, the environmental stimulus can be provided with them.
- Environmental stimulus similar to live organs is given to various kinds of cells, and then respective gene, and protein linked with them are analyzed at molecular scale routinely.
- Saves the culture media and shortens the time of collection and refinery of target samples, as only a little quantity of culture solution is circulated.
- Filtering culture cups are available on the market, and possible to co-culture previously, which allows you to obtain the good repeatability by handling and seeding cells easily.

■ Usages

- Analysis of gene expression (Human vascular endothelial cells) in all respects caused by the combined stimulus of flow, Oxygen concentration gradient and Low-density lipoprotein (LDL)
- Analysis of anti-inflammation's symptoms caused by flow stress (Human vascular endothelial cells, vascular endothelial cells of transcription factors knockout mouse)

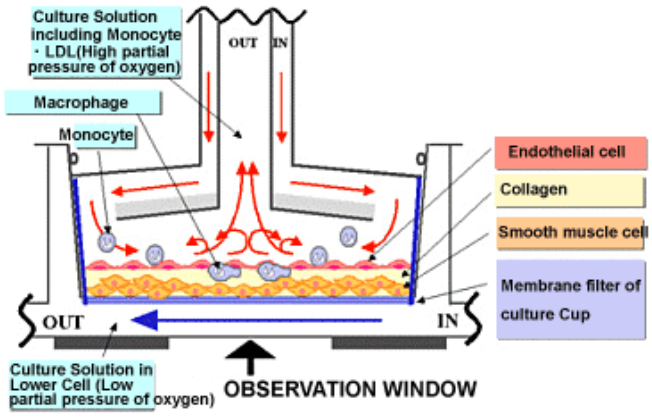
■ Reference Article

[Effect on Endothelial Cell Gene Expression of Shear Stress, Oxygen Concentration, and Low-Density Lipoprotein as Studied by a Novel Flow Cell Culture System]
Free Radic Biol Med. 2004 Sep 1;37(5):682-94.

■ Functions Structures

- The culture cell of this system is divided into upper and lower cells by the partition of a permeable PET membrane.
- A cell culture insert for 6-well plates manufactured by BD is used as the filtering culture cup.
- The cells of membrane can be exposed with the physical power of flow generated by the circulation of 10cc of culture solution.
- As Nitrogen gas can be replaced with the air of the culture cell, an oxygen concentration gradient is performed by the circulation of culture solution having a very low dissolved oxygen concentration--its partial pressure of oxygen is about 2 to 5 %.
- An observation window is provided for an inverted or a co-focus microscope.
- A diaphragm pump with the minimum differential pressure maintains the culture solutions of upper and lower cup well-balanced for a long time--the operation is available overnight without an operator present.
- Possible of monitoring the partial pressure of dissolved oxygen.
- The drug injection or the sampling after the drug injection is available via a drug sampling port.
- All contaminated parts can be autoclaved.

[SECTION OF CULTURE CELL CASETTE]



- Type of cells in a culture cell depends on R&D.
- A filtering culture cup, cell preparation and seeding cell--are not included in the system.
- When the low oxygen concentration is desired in operation, an optional incubator and the gases exchange system are necessary.

■ **Specifications**

Structure	Size (mm)
Controller-Flow Controller, Display of Dissolved Oxygen	80 (W) x 340 (D) x 200 (H)
Co-Culture Cell Unit (Diaphragm Pump, Solution Tank, Culture Cell Cassette)	60 (W) x 250 (D) x 170 (H)

Movies in Operation (Movie No.1 Zooming up, Movie No.2 Autoclave)

Wondows Media Player		**Quick Time**	
Movie No.1	**Movie No.2**	**Movie No.1**	**Movie No.2**
If you do not have Windows Media Player, you can download from here--free of charge.		If you do not have Quick Time, you can download from here--free of charge.	

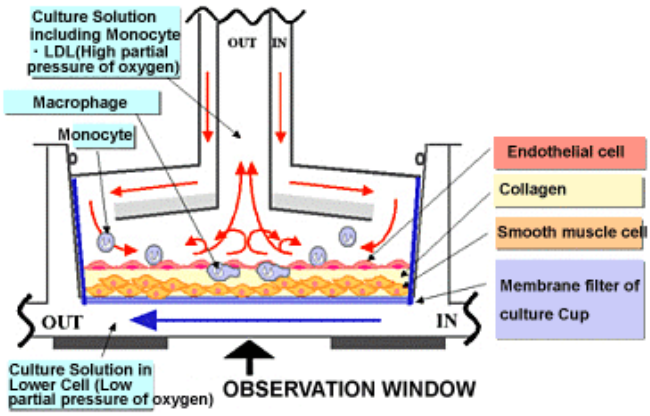
Outside view of Co-Culture Cell Unit

Outside view of Co-Culture Cell Unit

1. Culture cell cassette
2. Solution tank
3. Diaphragm Pump

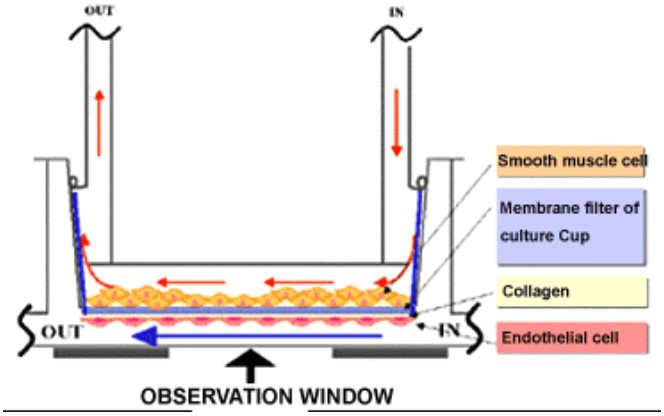
Design Sample of Culture Cell Cassette--customized design is possible.

1) Branched Culture Cell Cassette



- Low shear stress (about 0.2 to 2 dynes/cm2)
- Seeding cells in the filtering culture cup
- Long keeping the oxygen low concentration gradient

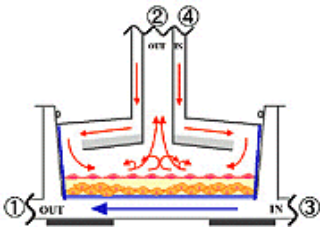
2) Straight Culture Cell Cassette



- High shear stress (about 5 to 15 dynes/cm^2)
- Seeding cells at outside of filter is to be loaded high shear stress

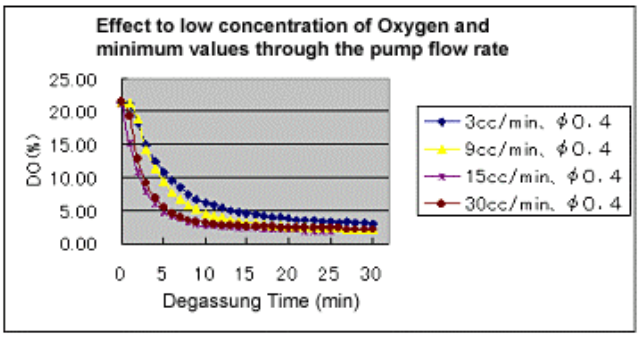
Hypoxia and Specifications

The air in the culture cell was replaced with Nitrogen gas so as not to generate any gases inside while the culture solution containing serum was circulated--for each 15ml of upper and lower chambers.
The measuring points of DO are shown in the left sketch. Hypoxic condition (2-5%) appeared in some 10 minutes.



<Measurement Examples>

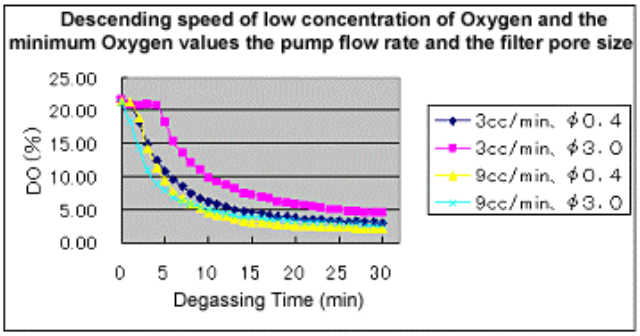
1) Tendency of descent velocity of low concentration of Oxygen and minimum values through the pump flow rate (cc/min)



Pump flow rate: 3-30 cc/min
Filter pore size: 0.4 micro meter dia.
N2 flow rate:50 cc/min
Measuring point: (1)

The maximum descent velocity of low concentration of Oxygen is 15cc/min.

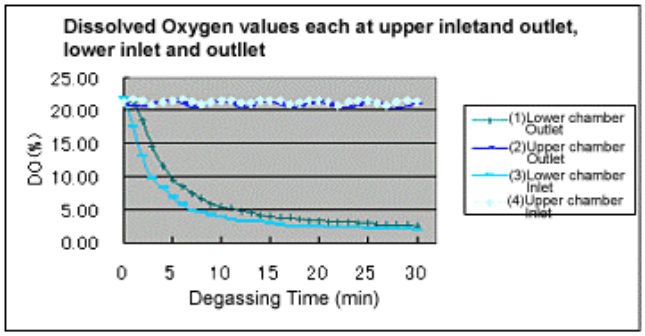
2) Effectiveness of descending speed of low concentration of Oxygen and the minimum Oxygen values through the pump flow rate and the filter pore size



Pump flow rate: 3, 9 cc/min
Filter pore size: 0.4, 3.0 micro meter dia.
N2 flow rate:50 cc/min
Measuring point: (1)

In case that the large flow rate is set, there is a tendency that the larger pore size of filter, the lesser effective exchange rate of DO.

3) Dissolved Oxygen values each at upper inlet and outlet, lower inlet and outlet



Pump flow rate: 3 cc/min
Filter pore size: 0.4, micro meter dia.
N2 flow rate:50 cc/min
Measuring point: (1) to (4)

The performance of an oxygen concentration gradient in about 30 min is confirmed.

■ Ancillary Accessories

The following accessories are optional at extra charge.

1. CO_2 incubator
2. Gas cylinders
3. When the low oxygen concentration is desired in operation, an optional incubator and the gas exchange system are necessary, although they are not shown in the photos.
4. The system does NOT include vascular wall cells. Please contact us regarding the method of culture.

■ Prices

Main Body		
Model	**Price**	
Dynamic Coculture System (Vascular Wall Cell Co-Culture) MK2000	The customized types are available. It depends upon the requirements of the customers. Specific inquires welcome .	
Consumables		
Available cell in market	**Quantity per package (ea)**	**Price (¥)**
Cell culture insert (6-well type 0.45μm) Manufactured by BD (Nippon Becton Dickinson)	48	¥25,200 (Cell culture insert only: ¥24,000)

NOTE:
The specifications and the appearance subject to change without previous notification. The customized systems also are possible according to the customer demands, on a case by case basis.