NEWS RELEASE
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April 1, 2026
Mitsui Chemicals, Inc.

Mitsui Chemicals, Inc., Jointly Develops World's First Continuous Bile Excretion Device Reproducing Liver Functions

InnoCell™ contributes to new technology that significantly advances drug discovery and liver disease research

Mitsui Chemicals, Inc. (Head Office: Chuo-Ku, Tokyo President: Satoshi Ichimura), in collaboration with the University of Tokyo, Nagoya City University, and Kanazawa University, has developed the world's first device that enables hepatocytes cultured in vitro to continuously excrete bile in the same manner as the liver in vivo, using Mitsui Chemicals' oxygen-permeable InnoCell™ cell culture plate. This device enables efficient collection of bile without imposing a load on hepatocytes as well as highly accurate evaluation of bile components.

This technological innovation is expected to not only improve the accuracy of hepatotoxicity assessment and prediction of drug interactions in the drug discovery process, but also significantly contribute to the elucidation of liver disease mechanisms related to bile excretion.

The liver is an important organ responsible for drug metabolism and excretion of toxic substances, and one of its main functions is the production and excretion of bile. However, conventional extracorporeal evaluation systems have difficulty in reproducing the same environment in which bile continuously flows in a living organism due to structural limitations such as the load on cells and the tendency for bile to remain in the bile canaliculi, which are intercellular channels between liver cells. As a result, biliary excreta cannot be sufficiently collected, which poses a major problem in evaluating biliary metabolism over a long period of time.

Mitsui Chemicals' newly co-developed device has a microchannel structure that enables hepatocytes to continuously excrete bile in the same way as in the body. As a result, biliary excreta can be efficiently collected at a concentration 13.7 times higher than that of conventional devices while reducing the burden on cells. Furthermore, this environment can be stably maintained for a long period of time, making it possible to accurately capture time-dependent changes in biliary metabolism. This device is expected to make a significant contribution to the advancement of liver research, including the evaluation of hepatotoxicity, prediction of drug interactions, and elucidation of liver disease mechanisms, which are currently social issues.

InnoCell™ provides the following benefits:

① Sufficient oxygen supply to hepatocytes
Hepatocytes are characterized by oxygen consumption. InnoCell™ plates use a unique material to supply oxygen from the bottom of the plate, allowing the cells to remain more similar to normal hepatocytes compared to conventional cell culture plates.

② Promotes formation of bile canaliculi
The improved oxygen supply by InnoCell™ plates resulted in more stable formation of bile canaliculi, which is an essential condition for continuous bile excretion.

③ Maximizes device performance
The research team commented that "Without InnoCell™, the performance of the biliary excretion device could not be fully realized." The InnoCell™ plate served as the foundation for the realization of this technology.

■Comment by Toshihiko Omote, CTO and Managing Executive Officer

It is a great honor to have InnoCell™ contribute to the realization of the world's first continuous bile excretion model. Maintaining hepatocyte polarity in a hyperoxic environment is an area where our company's unique technology can be most utilized, and I hope this achievement will lead to dramatic progress in drug discovery and liver disease research.

■Future Development

In collaboration with academia and pharmaceutical companies, including universities in Japan and overseas, Mitsui Chemicals will strengthen the provision of research infrastructure using InnoCell™ in the fields of liver disease research, multi-organ micro physiological systems (MPS), and organoid drug discovery.

■InnoCell™ Product Overview

Features: High oxygen permeability, excellent imaging characteristics, low drug adsorption
Recommended use: Hepatocyte culture, organoid/spheroid culture, toxicity studies
Research achievements: Reproduction of polarity in cultured hepatocytes
(Fundamental Toxicological Sciences 2024)
Special Website:https://jp.mitsuichemicals.com/en/special/innocell/index.htm

For details, please see the attached document.