

FOR IMMEDIATE RELEASE

5th April 2010

Hitachi, Ltd.

Successful culturing of 3D Hepatocyte Spheroids Using Nanopillar cell Culturing Sheets

- Opened a Way to Realize a Drug Screening Having a Good Correlation
with Human Clinical Trials -

Tokyo, Japan, 5th April 2010 --- Hitachi, Ltd. (NYSE : HIT/TSE : 6501 hereafter Hitachi) today announced the successful culturing of three-dimensional hepatocyte tissue (hereafter, spheroids) using cell culturing sheets with uniformly arranged microscopic pillars (hereafter, nanopillar sheet), with the cooperation of Professor Tabata Yasuhiko at the Institute for Frontier Medical Science, Kyoto University. The three-dimensional spheroids cultured on the nano pillar sheet were found to have a morphology more closely resembling natural liver tissue than hepatocytes cultured using the conventional two-dimensional culture dishes. It is expected that in the future, these results will find application in the drug screening process in the development of new pharmaceutical drugs.

In pharmaceutical drug development, the efficacy and side-effects of a candidate drug is evaluated in a screening process which involves, firstly, non-clinical tests using animals, followed by clinical tests on humans. As there are cases, however, where the candidate drug may pass the non-clinical test but fail the clinical test, there is growing interest in being able to conduct drug screening on cultured human tissue at an early stage in pharmaceutical drug development.

In order to effectively use human cells in vitro drug screening, the cultured tissue needs to be structurally and functionally similar to natural tissue. It has been confirmed that three-dimensionally cultivated spheroids are more similar structurally and functionally to natural tissue than that cultured using the conventional two-dimensional method which produces a two-dimensional monolayer morphology.

In response to this need, Hitachi began to study culturing of spheroids, and successfully cultured hepatocyte spheroids using nanopillar sheets. The features of the technology developed are as below:

(1) Development of the nanopillar cell culturing sheet

The nanopillar sheet is a sheet with regularly and uniformly arranged high microscopic projections (nanopillars). The nanopillar sheet was manufactured using semiconductor microfabrication technology to create the silicon mould used as the template for printing the pillar pattern on a polystyrene film using nanoimprinting technology.

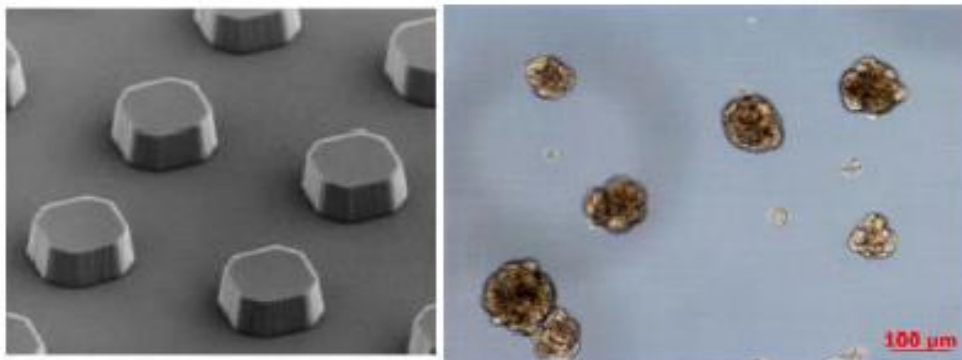
(2) Culturing hepatocyte spheroids

To culture spheroids with a morphology similar to that of natural tissue, hepatocyte spheroids were cultured using nanopillar sheets developed to stimulate the spontaneous adhesion and migration of cells. Several types of nanopillar sheets were tested, and it was found that spheroids were most efficiently cultured when nanopillars with a diameter of 2.0 μm and a pitch of 4.0 μm between pillar centers were used.

When the spheroids cultured with this technology were compared to the tissue cultured using the conventional two-dimensional method, it was found that the cultured spheroids more closely resembled natural liver tissue and that the expression of hepatic function related genes was higher. Further, bile excretion^{*1} function was preserved in the spheroids. As a result, it is expected that spheroids will be able to contribute to drug screening at the early stages of pharmaceutical drug development.

These results were presented at the 9th General Meeting of the Japanese Society for Regenerative Medicine which was held from 18th to 19th March 2010.

*1 Bile excretion: Drugs are metabolized in the liver and excreted as bile in the bile duct. Measuring the amount and composition of bile excreted is extremely important in pharmaceutical drug development, to study the effectiveness or toxicity of a candidate drug, predict side-effects, etc.



Left: Magnified photograph of nanopillars developed
Right: Photograph of spheroids cultured on the nanopillar sheet

■ About Hitachi, Ltd.

Hitachi, Ltd., (NYSE:HIT / TSE:6501), headquartered in Tokyo, Japan, is a leading global electronics company with approximately 360,000 employees worldwide. Fiscal 2009 (ended March 31, 2010) consolidated revenues totaled 8,968 billion yen (\$96.4 billion). Hitachi will focus more than ever on the Social Innovation Business, which includes information and telecommunication systems, power systems, environmental, industrial and transportation systems, and social and urban systems, as well as the sophisticated materials and key devices that support them. For more information on Hitachi, please visit the company's website at <http://www.hitachi.com>.

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