



Associate Professors Ho Han Kiat (left) and Giorgia Pastorin from NUS were the lead researchers behind the hydrogel structure for the liver-like cells. PHOTO: NATIONAL UNIVERSITY OF SINGAPORE

# Special surface ‘tricks’ stem cells to become liver-like cells

## NUS team’s hydrogel mimics liver surface to get stem cells to closely resemble those of organ

Jose Hong

Liver disease can slowly eat away at one’s life, and growing liver cells to replace diseased tissue comes with the risk of rejection.

But scientists here have found a way to grow cells that seems to be safer and more efficient than current methods.

Liver cells are one of more than 200 types of cells in the human body and they all come from stem cells. Scientists can grow new and healthy tissues from stem cells, but the process is far from simple.

“To coax stem cells into the right destiny, you require the right physical and chemical environment,” said Associate Professor Ho Han Kiat from the National University of Singapore. For example, how stem cells will develop depends on whether they are suspended or stirred, and what types of chemical signals they are subjected to, said Prof Ho, who is from the department of pharmacy.

In previous research, his team realised that the hardness of the surface on which stem cells settled influenced how they developed. “We discovered the stiffness and roughness (needed to develop) a healthy liver, and customised a hydrogel to achieve that right sort of consistency,” Prof Ho said.

“The stem cells are ‘tricked’ into believing that they are touching liver cells, so they will replicate to

become liver-like cells.”

He added: “Other scientists do not look into recreating a surface environment that is more like a normal liver. They tend to look for only surfaces that stem cells can stick to and grow.”

His results so far are impressive. For example, his cells can metabolise three times more substances than those grown using conventional methods. They also produce five times more albumin, a protein exclusively made by livers. In that sense, they resemble actual liver cells more closely and are thus less likely to be rejected by the human body.

Prof Ho said although his goal of making whole livers is still far away, one can do several things with his cells. For example, new drugs can be tested on them to watch for negative reactions.

Senior consultant Lee Guan Huei from the division of gastroenterology and hepatology at National University Health System said: “For many advanced liver diseases, liver transplantation has been the established, life-saving therapy for decades, but the lack of sufficient liver donors still limits the number of patients who can benefit from it.”

Dr Lee, who was not involved in the study, said: “The liver-like cells need to be further tested to determine if they can carry out all the immensely complicated functions... normally done by mature liver cells. Nevertheless, this excellent work in regenerative medicine is an exciting step forward, which we liver specialists will be watching closely.”

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