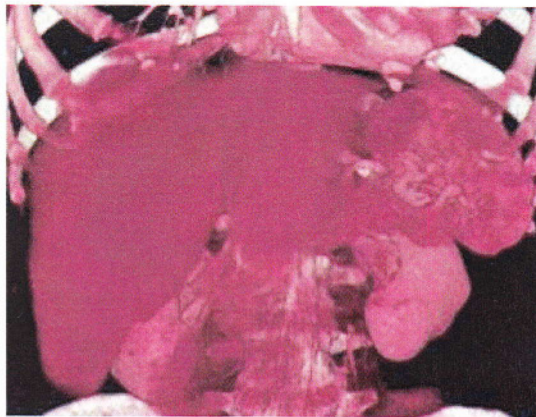


Tiny human liver grown inside mouse's head

11:57 21 June 2012 by [Rob Gilhooly](#), Yokohama
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It may be small, but is it perfectly formed? A tiny human liver, just 5 millimetres in size, has been grown inside a mouse. It remains to be seen whether the organ can replicate all liver functions – and if it will be possible to scale up the tiny structure to useable dimensions.

Hideki Taniguchi and Takanori Takebe at Yokohama City University generated [induced pluripotent stem cells from human skin cells](#), then encouraged them to develop into liver precursor cells. They added two more types of cell – mesenchymal cells, and endothelial cells from umbilical cord blood vessels. Without the aid of any [underlying scaffold](#), the cells "guided themselves" and generated a microstructure almost identical to normal liver tissue, says Takebe.



A full-size human version – try getting that in a mouse head (*Image: Garo/Phanie/Rex Features*)

"We mixed and graded the cells onto the culture dish and they moved to form a cluster," he says. "It was a surprising outcome from what was, to be honest, an accident."

The structure was then transplanted inside the skull of [severe combined immunodeficiency](#) mice, which would not mount an immune response to the tissue. Transplanting the structure here allowed the researchers to make use of the increased blood flow to the brain to encourage growth of the new tissue.

Within just 48 hours, human blood vessels began to form within the tiny liver, along with human proteins. Levels of glycogen and amino acids in the tissue were also the same as those found in human liver.

Obstacles

"It's not yet a perfect liver," says Takebe. "Improvements need to be made, such as the reconstruction of a bile duct." Other big obstacles yet to be overcome include finding a way to scale up the resulting organ, he adds.

The research team presented their research findings at the [International Society for Stem Cell Research](#) annual meeting in Yokohama, Japan, last week, but have yet to publish the work in a peer-reviewed journal.

Yoichi Tagawa at the Tokyo Institute of Technology says that only when the data are received and scrutinised by liver experts will the true value of the research be known. "Hepatologists have a deep interest in real regenerative medicine that can be applied clinically, so they may evaluate [the research] very strictly," he says.

[George Q Daley](#), the director of the stem cell transplantation programme at Children's Hospital Boston, Massachusetts, agrees that questions remain to be answered. "These data encourage us to believe that engineered organoids may one day provide replacement organs," he says. More work remains to be done, though. "The absence of formation of bile ducts is curious, and would need to occur for true liver function."

This article has been edited since it was first posted

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