

Mature liver cells may be better than stem cells for liver cell transplantation therapy

June 4 2012

After carrying out a study comparing the repopulation efficiency of immature hepatic stem/progenitor cells and mature hepatocytes transplanted into liver-injured rats, a research team from Sapporo, Japan concluded that mature hepatocytes offered better repopulation efficiency than stem/progenitor cells.

Until day 14 post-transplantation, the growth of the stem/progenitor cells was faster than the mature hepatocytes, but after two weeks most of the stem/progenitor cells had died. However, the mature hepatocytes continued to survive and proliferate one year after their implantation.

The study is published in [Cell Transplantation](#) (21:1), now freely available on-line at <http://www.ingentaconnect.com/content/cog/ct/>.

"Cell-based therapies as an alternative to [liver transplantation](#) to treat [liver disease](#) have shown promise," said study corresponding author Dr. Toshihiro Mitaka of the Cancer Research Institute of the Sapporo Medical University School of Medicine, Sapporo, Japan. "However, the repopulation efficiency of two candidate cell sources - hepatic progenitor/stem cells and mature hepatocytes - had not been comprehensively assessed and questions concerning the efficiency of each needed to be resolved."

The researchers noted that the shortage of cell sources and the difficulties of [cryopreservation](#) have limited the [clinical application](#) of cell based therapies. Stem or progenitor cells have been considered

candidate cells because they can expand in vitro and can be cryopreserved for a long time.

However, after transplantation into liver injured rats, the researchers found that stem/progenitor cells did not survive well and most of the transplanted cells had disappeared within two months. In contrast, the mature hepatocytes gradually repopulated the rat livers and continued doing so past one year.

The researchers noted that the sizes of the hepatocytes were not uniform.

"Unexpectedly, the small hepatocytes repopulated significantly less well than the larger ones," explained Dr. Mitaka. "We also found that serial transplantation did not enhance nor diminish the repopulation capacity of the cells to any significant degree."

The researchers concluded that because the stem/progenitor cells had died much earlier than the mature hepatocytes, most were immediately excluded from the host livers, reducing their potential impact on liver generation.

"Further experiments are required to clarify the mechanism by which this might occur," concluded the authors.

"This study suggests that mature hepatocytes may be a better treatment option than [stem cells](#)" said Dr. Stephen Strom of the Karolinska Institute, Sweden and section editor for *Cell Transplantation*. "However, determining the factors that allow for the survival and continued growth of the stem/progenitor and mature hepatocytes could be relevant for future improvements of hepatocyte transplantation in the clinic".

More information: Ichinohe, N.; Kon, J.; Sasaki, K.; Nakamura, Y.; Ooe H.; Tanimizu, N.; Mitaka, T. Growth ability and repopulation

efficiency of transplanted hepatic stem cells, progenitor cells, and mature hepatocytes in retrorsine-treated rat livers. *Cell Transplant.* 21(1):11-22; 2012.

Provided by Cell Transplantation Center of Excellence for Aging and Brain Repair

Citation: Mature liver cells may be better than stem cells for liver cell transplantation therapy (2012, June 4) retrieved 27 April 2024 from <https://medicalxpress.com/news/2012-06-mature-liver-cells-stem-cell.html>

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