

Scientists Spur Growth of Implanted Liver Tissue

Lab-grown liver tissue holds promise for extending the lives of patients with liver failure.

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At a Glance

- Researchers developed a way to control the growth of lab-grown liver tissue after it was implanted into mice.
- The technique could one day lead to alternative treatments for people who need organ transplants.

The only permanent solution for organ failure is an organ transplant. Unfortunately, there are many more patients who need a transplant than there are donated organs.

Lab-grown cells could provide a substitute for a donated organ or help patients survive until they can get a transplant. However, batches of organ-like tissue large enough to provide a therapeutic benefit are difficult to grow or assemble in the lab.

An NIH-funded research team, led by Drs. Sangeeta Bhatia of the Massachusetts Institute of Technology and Christopher Chen of Boston University and the Wyss Institute, has developed an approach that overcomes this challenge. The technique lets them implant a small amount of lab-grown tissue into the body and then induce it to grow. The researchers call their technique bioengineered on-demand outgrowth via synthetic biology triggering (BOOST). Results from a proof-of-concept study using human liver tissue were published in [Science Advances](#) on April 17, 2026.

Molecules called growth factors stimulate cell division. The researchers found that certain growth factors could induce isolated human liver cells to divide. But the growth factors could not trigger liver cell replication when the cells were densely packed in 3D cultures containing other cell types, as occurs in actual liver tissue.

A protein called YAP also controls cell growth by turning certain genes on or off. The team found that increasing cell density reduced YAP activity. When the researchers treated 3D lab-grown liver

tissue with a molecule that activates YAP, liver cells replicated more. Adding growth factors along with the YAP activator compounded this effect.

Based on these results, the researchers genetically altered support cells called fibroblasts so they would secrete growth factors when exposed to the antibiotic doxycycline. The scientists also created a set of liver cells that produced an automatically active form of YAP in response to doxycycline.

Doxycycline stimulated much more growth of lab-grown liver tissue in cultures containing both sets of genetically altered cells compared to those with only one type of engineered cell. Once the doxycycline treatment ended, growth of liver tissue returned to normal levels within five days.

The team then implanted this liver tissue into mice and fed them food containing doxycycline. Once again, the tissue grew much more when the implant contained both sets of genetically altered cells rather than only one type.

Unfortunately, in both the lab and animal models, liver cells that replicated more were less productive at performing the normal functions of liver cells. Future work will need to find a way to improve the function of the genetically altered liver cells along with their growth.

If that can be done, the researchers' lab-grown liver tissue holds promise for extending the lives of patients with liver failure. The BOOST approach might also be applied to treat other forms of organ failure.

“Our BOOST strategy lays the foundation for a future when solid organ cell therapies can be controlled non-surgically according to the needs of patients and their physicians,” Bhatia says.

This [research summary](#) was published by the National Institutes of Health on May 19, 2026.