Doctors Make New Vein With Girl's Own Stem Cells

Maria Cheng, AP

For the first time doctors have successfully transplanted a vein grown with a patient's own stem cells, another example of scientists producing human body parts in the lab. In this case, the patient was a 10-year-old girl in Sweden who was suffering from a severe vein blockage to her liver. Last March, the girl's doctors decided to make her a new blood vessel to bypass the blocked vein instead of using one of her own or considering a liver transplant.

They took a 9-centimeter (3-½") section of vein from a deceased donor, which was stripped of all its cells, leaving just a hollow tube. Using stem cells from the girl's bone marrow, scientists grew millions of cells to cover the vein, a process that took about two weeks. The new blood vessel was then transplanted into the patient. Because the procedure used her own cells, the girl did not have to take any drugs to stop her immune system from attacking the new vein, as is usually the case in transplants involving donor tissue.

"This is the future for tissue engineering, where we can make tailor-made organs for patients," said Suchitra Sumitran-Holgersson of the University of Gothenburg, one of the study's authors. She and colleagues published the results of their work online Thursday in the British medical journal *Lancet*. The work was paid for by the Swedish government. The science is still preliminary and one year after the vein was transplanted, it needed to be replaced with another lab-grown vein when doctors noticed the blood flow had dropped. Experts from University College London raised questions in an accompanying commentary about how cost-effective the procedure might be, citing "acute pressures" on health systems that might make these treatments impractical for many patients.

Sumitran-Holgersson estimated the cost at between $6,000 and $10,000. Similar methods have already been used to make new windpipes and urethras for patients. Doctors in Poland have also made blood vessels grown from donated skin cells for dialysis patients. Patients with the girl's condition are usually treated with a vein transplant from their own leg, a donated vein, or a liver transplant. Those options can be complicated in children and using a donated vein or liver also requires taking anti-rejection medicines. Since her first transplant, the girl has grown 6 centimeters (2.4 inches) and gained weight. Her parents say she is much more focused, articulate and physically active, Sumitran-Holgersson said. The girl was not identified.

"She was always tired and hardly went to school before," Sumitran-Holgersson said.

"Last week, her father said she did somersaults for the first time." Other experts predicted it should soon be possible for doctors to build things like blood vessels and arteries for patients. "For simple structures like veins, this technology is definitely feasible," said Dr. Anthony Atala, director of the Institute for Regenerative Medicine at Wake Forest Baptist Medical Center. He was not part of the *Lancet* study. "This is a strategy that shows blood vessels can be engineered and then used anywhere in the body."

Atala said lab-made veins could be used for conditions including dialysis and heart surgery. However, he said patients who get such veins need to be followed for years to make sure there aren't any serious side effects or complications. Dr. Laura Niklason, vice-chair of anesthesiology and biomedical engineering at Yale University, said it might be more challenging to replace arteries elsewhere in the body, including near the heart, where the blood pressure is higher and the structure would be under more strain.

However, she said getting organs made in laboratories was no longer science fiction. While producing complicated things like kidneys, lungs and livers might take a bit longer, other body parts — like engineered skin and cartilage — are already widely available. There are several experiments under way for blood vessels, similar to the *Lancet* study. "This type of thing is not 20 years away," Niklason said, estimating that more patients might get lab-made vessels in about five years.

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