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Claudia Castillo, the beneficiary of a new trachea, built from her own stem cells
Metro

Stem Cells Used to Create a Functional Windpipe

A woman in Colombia received a trachea made from her own cells

An international medical effort succeeded in providing a critically-ill, 30-year-old Colombian woman with a new trachea graft. The new organ was built by Italian and British scientists, while the reconstructive surgery took place in Spain. A 7-cm long portion of trachea was harvested from a deceased patient, cleansed of all its tissue, and then retro-fitted with Claudia Castillo's own stem cells.

The stem cells were harvested from the woman's own spinal cord, and grown in the laboratory at the University of Bristol (UB), in the UK. "Surgeons can now start to see and understand the very real potential for adult stem cells and tissue engineering to radically improve their ability to treat patients. We believe this success has proved that we are on the verge of a new age in surgical care," said UB surgery professor, Martin Birchall, one of the members of the team that grew the cells.

The next step, for the hospital in Barcelona, Spain, was to send the harvested windpipe to University of Padua, in Italy, where a team of researchers, led by Maria Teresa Conconi, used detergents and various enzymes to strip all existing cells from the trachea. After about six weeks, all that was left was a scaffold, strong enough to sustain the implantation of other cells on top of it.

At the same time, Bristol scientists grew the cells in the lab, forcing them to develop as new cartilage cells, the type that can usually be found in the windpipe. When the graft was complete, they sent it to Italy again, but this time at the Polytechnic of Milan. There, a bioreactor "welded" the scaffold and the new cells together, after four days of incubation.

It took from March to June to complete this troublesome task, but, finally, surgeon Paolo Macchiarini, at the Hospital Clinic in Barcelona, managed to pull off the surgery, offering Castillo, who could not use her left lung, a new chance. Now, more than 5 months later, the transplant is holding fine, and her body shows no signs of rejecting the new organ.