

First Time Ever, Patient Gets A New Trachea Made From A Synthetic Scaffold Seeded With His Own Stem Cells

In a recent breakthrough, the first successful transplantation of a synthetic tissue engineered windpipe was performed on a patient suffering from late stage tracheal cancer on June 9th 2011, at the Karolinska University Hospital in Huddinge, Stockholm, by professor Paolo Macchiarini and his colleagues.

Professor Macchiarini, who works at the of Karolinska University Hospital and Karolinska Institutet, led an international team including professor Alexander Seifalian from the UCL (University College London, UK) and Harvard Bioscience (Boston, USA).

Professor Alexander designed and built the nanocomposite tracheal scaffold, and Harvard Bioscience produced a specifically designed bioreactor used to seed the scaffold with the patient's own stem cells. Prior to transplantation, the cells were grown on the scaffold inside the bioreactor for two days. The patient was not put on any immunosuppressive drugs as the trachea was regenerated using the patient's own cells and the body did not show any signs of rejection.

Although the patient had been treated with maximum radiation therapy possible, the tumor had still reached approximately 6 cm in length and was extending to the main bronchus. The tumor had almost completely blocked the trachea and a transplant was necessary.

Due to non-availability of an acceptable windpipe donor, the transplantation of the synthetic tissue engineered trachea was performed as a last resort. The patient had been referred by professor Tomas Gudbjartsson of Landspítali University Hospital (Reykjavik, Iceland) who was also part of the surgical team.

The success of this case of regenerative medicine has opened up numerous therapeutic possibilities for patients with tracheal cancer or similar conditions. On all previous occasions when Professor Macchiarini performed successful transplants of tissue engineered tracheas, the tissue was taken from a donor and then reseeded with the patient's own stem cells.

Using the procedure that was followed in this surgery, there is no need for the patients to wait for a suitable donor as their own stem cells will be used to engineer windpipes with synthetic scaffolds. This is a significant benefit over the current procedure as an early surgery can translate into a greater chance of cure.

Tissue engineered synthetic trachea transplant also has potential to be of great value for children requiring a windpipe transplant, considering the fact that fewer such donors are available compared to adult donors.

Source: Karolinska University Hospital July 11th, 2011