

First child to receive stem cell trachea transplant doing well after two years

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The follow-up of the procedure, carried out in 2010 at Great Ormond Street Hospital (GOSH), shows that the new organ has strengthened and does not appear to have induced any signs of rejection. The 13-year-old boy who received the transplant continues to breathe normally, has grown 11 cm in height and has returned to school. He does not require any anti-rejection therapy.

Ciaran Finn-Lynch underwent the transplant in March 2010 at GOSH, when his own trachea was removed and replaced by a donor windpipe laced with Ciaran's own [stem cells](#) so it would not be rejected.

The donated trachea was obtained from a deceased adult in [Italy](#) and was stripped of the donor's cells, down to the inert [collagen](#). Ciaran's [bone marrow](#) stem cells were collected at GOSH, isolated at the Royal Free Hospital (RFH) and returned to GOSH the same day, where they were applied to the implanted trachea inside Ciaran's body. Biopsies of epithelial tissues – the lining of the organ - were taken from the patient's removed trachea during surgery and applied as the new graft was implanted in his body, to kick-start the gradual growth of a lining in the transplanted organ.

The graft was injected with additional cytokines – proteins that stimulate cell growth - to support the growth and differentiation of cells within the new [trachea](#). Following the transplant, Ciaran was given further cell growth-inducing compounds known as granulocyte colony-stimulating factors or G-CSF. This is the first attempt to grow stem cells in vivo –

within the body rather than in a laboratory - in a child in an operation of this kind.

The *Lancet* paper calls for more research in a number of areas, to speed up the recovery of structural rigidity within transplanted tracheas and to increase the availability of tracheal scaffolds by boosting the number of organ donors and exploring the use of animal tracheas and synthetic scaffolds.

Martin Birchall, Professor of Laryngology, UCL Ear Institute, and one of the paper's authors, says: "Since the treatment plan for Ciaran was devised in an emergency, we used a novel mix of techniques that have proved successful in treating other conditions. To minimise delays, we bypassed the usual process of growing cells in the laboratory over a period of weeks, and instead opted to grow the cells inside the body, in a similar manner to treatments currently being trialled with patients who have had heart attacks. We need more research on stem cells grown deliberately inside the body, rather than grown first in a laboratory over a long time. This research should help to convert one-off successes such as this into more widely available clinical treatments for thousands of children with severe tracheal problems worldwide."

Ciaran's transplant team was led by Professor Martin Elliott of Great Ormond Street Hospital, and comprised Professor Paolo Macchiarini, now at the Karolinska Institute in Stockholm, Professor Martin Birchall, Professor of Laryngology, University College London, Dr Mark Lowdell, Royal Free Hospital, and Dr Paolo De Coppi of Great Ormond Street Hospital.

More information: [\(12\)60737-5/abstract](http://www.thelancet.com/journals/lan...)

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