Functional engineered oesophagus could pave way for clinical trials

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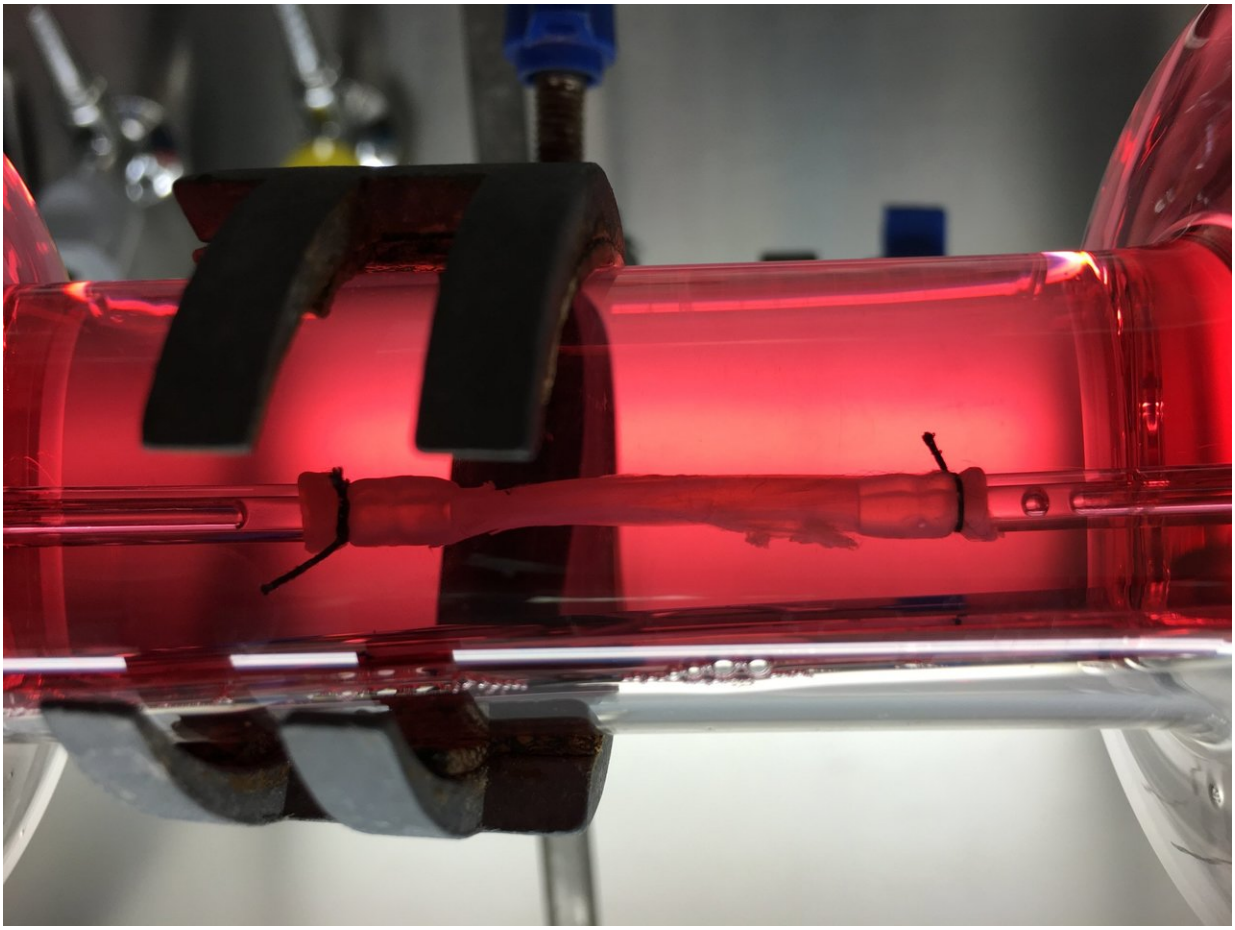

Credit: University College London

The world's first functional oesophagus engineered from stem cells has

been grown and successfully transplanted into mice, as part of a pioneering new study led by UCL.

It is hoped this research, carried out by UCL Great Ormond Street Institute of Child Health (ICH), in collaboration with Great Ormond Street Hospital (GOSH) and the Francis Crick Institute, could pave the way for clinical trials of lab-grown food pipes for children with congenital and acquired gut conditions.

In the study, published in *Nature Communications*, researchers used a rat oesophagus "scaffold" and human gut cells to grow engineered tubes of oesophagus. These were implanted into mice and within a week the engineered tissue developed its own blood supply, which is important for a healthy gut that can squeeze down food

Co-lead author, Professor Paulo De Coppi, who is Head of Stem Cells and Regenerative Medicine at ICH and also a Consultant at GOSH, said: "This is a major step forward for regenerative medicine, bringing us ever closer to treatment that goes beyond repairing damaged tissue and offers the possibility of rejection-free organs and tissues for transplant.

"At GOSH we see a large number of referrals for some of the most complex and rare defects of the gut and though the outlook for children is good, the condition and treatments have long-term implications."

He added: "We're really excited about these promising preclinical findings. However, lots more research lies ahead before we can safely and effectively translate this approach to humans."

Future clinical trials could assists the one in 3,000 babies, who are born with a life-changing defect of the gut in the UK each year.

Study co-lead author Dr. Paola Bonfanti, who is Research Associate at

ICH and Group Leader at The Francis Crick Institute, said: "This is the first time that such a complicated organ has been grown in the lab.

"Not only is the gut tube shaped, but as it also consists of several different layers of cells, which means we had to use a multi-step approach to develop a piece of oesophagus which resembles and works the same as a normal one. It's truly a promising step forward for children and even adults with oesophageal conditions."

Although still in its pre-clinical stage, research into tissue engineering such as this could lead to a new standard of care for patients with complex physical conditions especially in the case of children with damaged organs. The method avoids the need for a donated organ, which are often in short supply for the paediatric population and significantly lowers the risk of organ rejection.

More information: Luca Urbani et al. Multi-stage bioengineering of a layered oesophagus with in vitro expanded muscle and epithelial adult progenitors, *Nature Communications* (2018). DOI: 10.1038/s41467-018-06385-w

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