Abstract
Reconstructing an oesophagus through tissue engineering (TE) can be beneficial for patients suffering from a broad spectrum of oesophageal diseases, both congenital and acquired. In the case of ‘long-gap’ oesophageal atresia, where the oesophagus is not properly developed and there is a gap between the proximal and distal parts, primary anastomosis is often not feasible. Regenerative medicine and TE may provide a therapeutic alternative to these patients by combining biomaterials with bona fide stem cells to create a suitable oesophageal replacement.

This study focuses on the reconstruction of the squamous stratified epithelium of a TE oesophagus using human epithelial stem/progenitor cells. The specific objectives are: (i) prospectively isolate human oesophageal epithelial cells (HuOEC), (ii) establish the conditions necessary to expand HuOEC in vitro, while maintaining their capacity to differentiate and stratify, and (iii) reconstitute a fully functional epithelium ex vivo on a decellularised oesophageal scaffold suitable for transplantation into large animal models.

In order to achieve these aims, HuOEC were isolated from paediatric oesophageal biopsies (n=8) and extensively expanded in vitro. Furthermore, they were characterised using immunofluorescence, standard histology and colony forming efficiency assays. After effective decellularisation of rat oesophagi using an established detergent/ enzymatic (DET) protocol, HuOEC were seeded on the luminal surface of the scaffold and cultured ex vivo for up to one week, where cells adhered, migrated and stratified. The results that will be presented include part of the characterisation of cultivated HuOEC and the feasibility of engineering a human oesophageal replacement with mucosal barrier function.