

Success and Challenges in Biofabrication

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Abstract

Biofabrication as a scientific/engineering term is now 16 years old. In this period it has rapidly progressed from being seen as a topic for Science Fiction to now a method for the production of proto- or *in vitro* model tissues for tissue-on-a-chip applications. Indeed there are several commercial organizations that have developed and market commercial Bioprinters. However, despite these not inconsiderable advances, the original target of printed cell-laden implants or tissue patches have still not been realized.

This talk will present a review of the key advances that have occurred over the recent past and identify the key challenge of the dimensions of practical printed tissue models. It is well known that the diffusion limit in 3D culture of cells limits spheroid size to a few hundred μm and that the capillaries in healthy tissue have a diameter of 5 – 10 μm and are typically spaced around 50 μm . However, current additive manufacturing routes that are in widespread use in biofabrication have a resolution $> 100 \mu\text{m}$. New approaches to producing high resolution vascular structures and models for angiogenesis will be reviewed.

Biography

Professor Derby's research focusses on the use of a range of printing methods compatible with the delivery of cells for applications in regenerative medicine and organ-on-a-chip development. This has been developed by interdisciplinary university work, international multi-institute collaborations and collaboration with industry. In 2004 he hosted, in Manchester, the First International Workshop in Biofabrication and has been active in the field since then. Prof. Derby has authored > 300 peer-reviewed journal publications. His work has been funded through a range of agencies including EPSRC, BBSRC and MRC from Research Councils UK, the Wellcome Trust, British Heart Foundation, Innovate UK, the European Commission and the Office of Naval research (USA)

