EDITORIAL

Bioprinting science

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Accepted into Scopus last December, IJB has now been officially indexed in Scopus document databases with a total of 57 publications being listed. The CiteScore of IJB is expected to be available later this year according to Elsevier. Coupled with successful indexing in Web of Science since 2017, IJB is doubling its visibility and impact to the bioprinting research community.

Currently, the natural biological development is the only known path that arrives at a mature organism or a mature component of an organism. Bioprinting, rooted slightly more on belief than evidence, is envisioned to be a shortcut or alternate pathway to replace natural biological development. Unfortunately, as of now even its current state of the art is not working as intended due some challenges. Common challenges are the lack of vascularisation or lack of resolution for recapitulating microenvironment. However, as pointed out by Professor Shoufeng Yang (KU Leuven, Belgium) during a technical seminar at Singapore Centre for 3D Printing, even an isolated human organ, which comprises all the original cells, compositions, vascularisation and architecture, cannot be maintained alive for long term easily due to the limitation of current science and technology. Supply of vascularisation and sophistication in architecture of bioprinting are necessary but not sufficient.

So, is bioprinting the envisioned shortcut? The discovery of induced pluripotent stem cells (iPSCs) might shed some light on this issue. In this process, a differentiated cell can go sideways to become another differentiated cell directly, without going back to the stem cell state to re-differentiate. This is a perfect working shortcut, because it breaks the conventionally conceived only natural path by the discovery of a new natural path. For the first time, the secret of shortcut at cell level has been unlocked.

What about at tissue and organ level? Perhaps we need a discovery of another new natural path, similar to the discovery of iPSCs, but at tissue and organ level. Undoubtally, bioprinting is not a pathway already existing in nature, which partly explains why it is not working as intended now. However, bioprinting is a hybrid of man-made and natural processes. The man-made component (i.e. 3D printing) has achieved advanced development, but its natural component remains almost blank. We need a new discovery of a natural path that could unlock the secret of rapid tissue transformation. It may be termed in general as bioprinting science. Perhaps, one day we could induce a rapidly growing tumour to go sideways to become a normal tissue or organ.

This issue of IJB includes four reviews, five research articles and one perspective. First, Choudhury *et al*. present a current landscape of commercial bioprinters[1], followed by Ng *et al*. reporting on the status of bioprinted artificial blood vessels[2]. Shuai *et al*. review postprinting physical stimulations and in particular they focus on osteogenesis-inducing mechanisms for bone tissue engineering[3]. Separately, Tan *et al*. provide an overview of current materials and machines for food printing[4]. In research, Arab *et al*. report novel ultrashort self-assembling peptide bioinks for 3D culture of muscle myoblast cells[5]. Han *et al*. present design and fabrication of optimised vascular network by stereolithography for skin tissue engineering[6]. Shuai *et al*. report a multi-scale porous scaffold fabricated by a combination of additive manufacturing and chemical etching process[7]. Mandt *et al*. present the fabrication of placental barrier structures within a microfluidic device by using two-photon polymerisation[8]. Interestingly, Rodriguez-Salvador *et al*. report a keyword network mapping analysis which uncovers some research trends in 3D bioprinting[9]. Finally, Lee *et al*. provide their perspective on the classification and terminology of cell-compatible bioprinting processes. Standardisation of terminology will be an important baseline for further scientific development of bioprinting[10].

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