OPEN ACCESS
Freely Available Online

Journal of 3D Printing and Applications
ISSN NO: 2831-8846

Editorial DOI : 10.14302/issn.2831-8846.j3dpa-18-1991

Coupling of 3D Bio-printing with Organ-on-a-chip Technology Creates New Possibility for Biomimicry

Yong Luo[1,*]

[1]Dalian University of Technology, China

3D bio-printing offers orderly arrangements of cells and extracellular matrix analogs, as well as those of other biomaterials, in a three-dimensional space with additive manufacturing (AM) methodology [1]. The printed biological structure mimics the real one of organs, and is assumed to have similar functions of the real organ. 3D bio-printing is now widely used in tissue engineering, regenerative medicine and drug screening applications. Some bio-printed artificial organs even function better than the real ones. For example, Manu and colleagues generated a bionic ear exhibiting enhanced auditory sensing for radio frequency reception [2]. 3D bio-printing industry is also growing up rapidly. Successful companies include 3 Dynamic System(UK), Biobots(USA), Seraph Robotics (USA), Regenovo(China), Zhongke Xinray(China), Regemat 3D(Spain), Organovo(USA), Advanced Solutions(USA), Envision Tec(Germany), Bio 3D Technologies(Singapore), and RegenHu(Switzerland).

Bioprinting can automate and program the deposition of biomaterials and cells spatially. However, vascularization of artificial organs and reproduction of local hydrodynamics are two major limitations to the wide applications of 3D bio-printing. Organ-on-a-chip is a biomimetic system that uses micromachining technique to create the primary functional tests that can simulate human organs on microfluidic chips[3]. It is able to accurately control a number of system parameters, such as chemical concentration gradient and fluidic shear force, but also to build cell graphic culture, tissue-tissue interface and organ-organ interactions, which simulates the complex structure of human organs, microenvironment and physiological function.

Combining 3D bioprinting with organ-on-a-chip means new possibility of biomimicry. Organ-on-a-chip technology enables precise fluidic control around 3D bioprinted cell model. The microchannels in the organ-on-a-chip serve as blood vessels to deliver nutrients and oxygen to the artificial organs. The only obstacle

Corresponding Author: Yong Luo, Dalian University of Technology, China. Email: yluo@dlut.edu.cn

Received: Feb 09, 2018 **Accepted:** Feb 09, 2018 **Published:** Feb 13, 2018

is the mismatch of the sizes of 3D bio-printed organs and organ-on-a-chip. As a matter of fact, this issue can be addressed by shrinking the 3D bioprinted organs and enlarging the organ-on-a-chip. Khademhosseini Ali is a pioneer that couples 3D bioprinting and organ-on-a-chip. He fabricated a liver-on-a-chip with 3D bio-printed hepatic spheroids, and used this chip to assess the hepatic toxicity of acetaminophen[4].

"Journal of 3D printing and applications" encourages the submission of papers focusing on the integration of organ-on-a-chip and 3D bioprinting. Any form of papers are welcomed, including review, original research article, perspective, short communications, etc.

Reference

1. Waeljumah, A; Wajid, U.M.; Zhang, X.L.; Yang, G. Bioprinting and its applications in tissue engineering and regenerative medicine, International journal of biological macromolecules, 107, 261-275
2. Mannoor, MS; Jiang, ZW; James, T, et al. 3D printed bionic ears, Nano letters, 2013, 13 (6), 2634-2639
3. Skardal, A; Shupe, T; Atala, A. Organoid-on-a-chip and body-on-a-chip systems for drug screening and disease modeling, Drug discovery today, 2016, 21 (9), 1399-1411
4. Bhise, NS; Manoharan, V; Massa, S, et al. A liver-on-a-chip platform with bioprinted hepatic spheroids, Biofabrication, 2016, 8(1), 014101