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CAMBRIDGE HEALTHTECH INSTITUTE'S SECOND ANNUAL

FAST Functional Analysis & Screening Technologies CONGRESS

NOVEMBER 17-19, 2014 | HYATT BOSTON HARBOR | BOSTON, MA

Dinner Short Courses*

SUNDAY EVENING, NOVEMBER 16
6:00-9:00 PM

(SC2) Exploring 3D Printing, Bioinks and Scaffolds

The promise of 3D bioprinting to create human tissues layer by layer is immense, ranging from basic biological research to drug development and testing, and ultimately to replacement organs. However, organ and tissue structures vary in complexity, and printing with living cells to create tissues is much more complicated than printing 3D objects in plastic.

Topics to be covered:

- 3D Printer Platforms: Inkjet vs. Pressurized Printing
- 3D Modeling (CAT Scans, Laser Scans and CAD)
- Scaffold Selection
- Cell Source Selection
- Bioinks
- Vascularization

This dinner course is designed for biological researchers who are interested in learning more about 3D printing and applying it to building a living tissue or organ of their choice.

Instructors:

Future Medical Applications in 3D Printing: Clinical Benefits, Regulatory Issues and Manufacturing Challenges

Michael Drues, Ph.D., President, Vascular Sciences
What are the future medical applications in 3D printing? Can we print actual medical devices and permanent implants? Can we print drugs and living tissue? What are technical and regulatory challenges, and what's holding us back?

Multimaterial 3D Bioprinting

David Kolesky, Research Scientist, Jennifer Lewis Laboratory, School of Engineering and Applied Sciences and Wyss Institute for Biologically Inspired Engineering, Harvard University
To vastly expand the application of 3D bioprinted tissue constructs, one must be able to integrate cells, structural and vascular components concurrently and with precision. Using a custom-designed bioprinter, we are creating 3D multimaterial, cell-laden architectures with embedded vascular networks. I will describe the printing platform and our enabling ink designs as well as characterization of printed 3D cells and microstructures.

The Organovo 3D Bioprinting Platform: Changing the Shape of Medical Research and Practice

Deborah G. Nguyen, Director, R&D, Tissue Applications, Organovo, Inc.
The high failure rate among clinical-stage therapies underscores the need for improved in vitro models. A common platform to produce both preclinical and therapeutic tissues would be immensely attractive. Organovo's 3D Bioprinting platform generates microscale tissues that mimic human tissue architecture and function without exogenous biomaterial scaffolds. We will explore how medical research and practice challenges are being addressed by this novel technology platform.

2D Printing to 3D Tissue Fabrication via Multilayer Stacking of Biopapers

Russell Kirk Pirlo, Ph.D., Research Biologist, Chemistry, U.S. Naval Research Laboratory
There are several two-dimensional cell and biofactor printing technologies available today. Stacking and/or multilayer printing allows these technologies to be used to create three-dimensional tissue constructs. I discuss the general challenges and considerations in selecting and designing cell-ink and scaffold materials as well a method for inter-layer registration of individually addressed substrates. Detailed reference to our own Biological Laser Printing and Biopaper technologies will be used as an illustrative case study.

For additional information, www.linkedin.com/in/michaeldrues,
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