

ABSTRACT SUBMISSION FORM

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SEX + GENDER

Exploring the role of sex and gender on health research



CHR D 2020: Abstract Submission Form

Submitter Name

Michelle Guimond

Email

michelleguimond246@yahoo.ca

Title

Design of parts and methods to simplify the production and handling of 3D bioprinted tissues

Background

Cell culture is frequently used for biomedical research, but poorly replicates in vivo pathologies. 3D bioprinted tissue promises to better replicate health and disease states, providing superior models for developing treatments. However, these models are difficult to produce and maintain, and typically require complicated bioreactors, making bioprinted tissue models inaccessible to many researchers.

Objective

Design a manufacturing process that simplifies the production and handling of 3D bioprinted tissues.

Methods

Parts were designed in CAD software to facilitate transferring 3D bioprinted tissues onto a simple holder structure: 1) a 'cover' surface onto which tissues are bioprinted; 2) a 'holder' with posts to mate with gaps in the bioprinted tissue; 3) a 'shim' to guide holder placement and tissue transfer. The parts were 3D printed in polyethylene terephthalate (PET) and polycarbonate, tested for dimensional accuracy, and revised where necessary. Holders were sterilised with combinations of boiling, ethanol and UV exposure, and sterility was tested by incubating with culture media and observing for contaminants by pH drop and microscopy.

Results

The cover, shim and holder designs were successfully implemented and mounted to the bioprinter. Mock tissues printed on the cover could be transferred onto holders by placing the holder over the tissue, inverting the assembly, and sliding the tissue to the side. Covers and shims produced with PET had superior dimensional accuracy and mechanical properties, making PET the preferred material for these parts. Holders that were not boiled became contaminated by bacteria, necessitating that holders be produced with polycarbonate due to its superior temperature resistance.

Conclusion

We created a PET cover and shim, and a polycarbonate holder for manufacturing 3d bioprinted tissues. Collectively, the design and methods simplify tissue production and handling, and reduce the need for complicated bioreactors. These developments will greatly improve the accessibility of 3D bioprinted models for disease research.

Theme:

Basic Science

Do you have a table/figure to upload?

No

Are you willing to participate in Goodbear's Den?

Yes

Presenter Status:

Undergraduate Students

What was your role in the project?

Design

Authors

Name	Email	Role	Profession
Michelle Guimond	michelleguimond246@yahoo.ca	Presenting Author	Undergraduate student
Sanjana Syeda	syedas@myumanitoba.ca	Co Author	Graduate
Jeffery Osagie	osagiej3@myumanitoba.ca	Co Author	Graduate
Emily Turner-Brannen	ETurner-Brannen@chrim.ca	Co Author	Technician
Adrian West	adrian.west@umanitoba.ca	Co Author	Assitant Professor