



**COLLEGE OF ENGINEERING
AND COMPUTER SCIENCE**
FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

Jordan Michael Brennan

for the degree of Doctor of Philosophy (Ph.D.)

“A New Decellularized Matrix for Engineering an Esophageal Cancer Model in a Perfusion Bioreactor”

March 28, 2023, 1-3pm
EW36, OME Conference room 187
777 Glades Road
Boca Raton, FL

DEPARTMENT:

Ocean and Mechanical Engineering

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ABSTRACT OF DISSERTATION

A New Decellularized Matrix for Engineering an Esophageal Cancer Model in a Perfusion Bioreactor

The lack of physiologically relevant human esophageal cancer models has as a result that many esophageal cancer studies are encountering major bottleneck challenges in achieving breakthrough progress. To address the issue, a 3D esophageal tumor tissue model using a biomimetic decellularized esophageal matrix was developed in a customized bioreactor. To obtain a biomimetic esophageal matrix, a detergent-free, rapid decellularization method was developed to decellularize porcine esophagus. The decellularized esophageal matrix (DEM) was characterized and the DEM was incubated with esophageal cancer cell KYSE30 in well plates and the bioreactor. The expression of cancer-related markers of KYSE30 cells was then examined and compared with formalin-fixed, paraffin-embedded (FFPE) esophageal squamous cell carcinoma (ESCC) tissue biospecimens. Results show that the detergent-free decellularization method preserved the esophageal matrix components and effectively removed cell nucleus. KYSE30 cancer cells proliferated well on and inside the DEM. KYSE30 cells cultured on the DEM in the dynamic bioreactor show different cancer marker expressions than those in the static well plate, and also share some similarities to the FFPE-ESCC biospecimens. These findings built a foundation with potential for further study of esophageal cancer behavior in a biomimetic microenvironment using this new esophageal cancer model.

BIOGRAPHICAL SKETCH

Born in Miami, Florida

B.S., Florida Atlantic University, Boca Raton, Florida, 2014

M.S., Florida Atlantic University, Boca Raton, Florida, 2016

CONCERNING PERIOD OF PREPARATION & QUALIFYING EXAMINATION

Time in Preparation: 2018 - 2023

Qualifying Examination Passed: Fall 2020

Published Papers:

Jordan Brennan, Michael L Lu, Yunqing Kang. A New Model of Esophageal Cancers by Using a Detergent Free Decellularized Matrix in a Perfusion Bioreactor. *Bioengineering*; 2023; 10 (1): 96.