

# REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHB-25-14

## Advancing Microphysiological Systems for Holistic Warfighter Assessment

**PROJECT DESCRIPTION:** This study pioneers the development of diverse organ-on-a-chip (OOC) platforms within microphysiological systems (MPS) to comprehensively evaluate Warfighter responses to environmental and operational stresses. Goals will be to successfully expose a range of stressors to the OOC models, thereby allowing for a tremendous amount of data collection (sequencing, imaging, etc). This data will be integrated so that stress-induced molecular signatures can be uncovered.

**LEARNING OBJECTIVE:** This project will lead to an enhanced skill set including cell culture techniques, advanced organ-on-chip capabilities, microscopy, and molecular techniques (ELISA, qPCR, NGS, etc). Additionally, the participant will hone their data analysis skills.

**ACADEMIC LEVEL:** Bachelors, Masters, PhD

**DISCIPLINE NEEDED:**

- Biomedical Engineering
- Biology

**RESEARCH LOCATION:** Wright-Patterson AFB Dayton, OH

**RESEARCH ADVISER:** Mark Nelson, PhD  
Biomedical Engineering, The Ohio State University



Currently, Dr. Nelson is a Research Biomedical Engineer at the Air Force Research Laboratory (AFRL), and an Associate Professor in the Department of Pharmacology and Toxicology in the Biomedical Sciences Program at Wright State University. As part of AFRL's 711th Human Performance Wing, he is the Air and Space Biosciences Division's Biosystems Lead. His laboratory's ongoing research develops and utilizes organ-on-a-chip technology to emulate environmental and physiological exposure conditions relevant to the United States Air Force. Leaning on his extensive biomaterials and tissue engineering background, his team develops dynamic microfluidic and biomimetic in vitro tissue models considering the microstructure, mechanics, and substrate characteristics of the tissue.

*Photo courtesy of Air Force Research Laboratory*