

SURFING THE RESEARCH WAVE



By: Billanna (Billie) Hwang, DHsc
Research Scientist



Dr. Michael Mulligan

A little over eight years ago, Dr. [Michael Mulligan](#), Professor & Chief, Division of Cardiothoracic Surgery, and Billanna (Billie) Hwang, DHsc, Research Scientist, embarked on a journey focused on investigating the complex host immune responses and development of therapeutics in the field of lung transplantation—an area that has been underserved in the research arena. Both wanted to focus on the importance of translational research, merging preclinical benchwork with clinical outcomes. With their leadership, [Drs.](#)

[Mulligan and Hwang's work](#) has impacted the field of lung transplant by redefining the “classical” understanding of transplant immunology through identification of a novel class of immune mediators called exosomes. Characterization of exosomes to create profiles and correlating to adverse clinical outcomes posttransplant has started to provide new understanding in many areas including donor selection, primary graft dysfunction (PGD), and acute and chronic rejection processes. Along with these studies, the lab has also been able to lead the way in other novel projects investigating the role of exosomes in a variety of diseases including cystic fibrosis and idiopathic pulmonary fibrosis (IPF), and in other solid organ transplants. In addition to their own research, Drs. Mulligan and Hwang created a network of clinicians looking to collaborate on translational research projects. These studies included work with Dr. [Farhood Farjah](#), Endowed Chair in Lung Cancer Research, Division of Cardiothoracic Surgery, in identifying novel biomarkers in non-small cell lung cancer, Dr. [David Mathes](#), Professor and Chief of the Division of Plastic and Reconstructive Surgery, University of Colorado Anschutz Medical Campus, in investigating the role of exosomes in a vascularized composite allotransplantation model, and Dr. [Aaron Cheng](#), Associate Professor, Division of Cardiothoracic Surgery, and in acute kidney injury after lung transplantation.



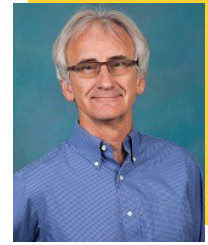
Dr. Farhood Farjah



Dr. David Mathes



Dr. Aaron Cheng



Dr. James Bryers

Another novel collaboration that Drs. Mulligan and Hwang started five years ago was the development of a “satellite” lab with Dr. [James Bryers](#), Professor, Department of BioEngineering. This collaboration is focused on addressing the need to develop therapeutic technologies that could be used in transplant to understand the host response to these biomaterials. Currently, studies have focused on the use of porous templated scaffolds (PTS) and the ability to change the host response towards an anti-inflammatory/regenerative process at the cellular and exosome levels.

In addition to being the pioneers in exosome immunology, Drs. Mulligan and Hwang identified a lack of access to clinical biospecimens for research in lung transplantation and plans to develop an infrastructure were started in 2018. In 2019, the University of Washington Lung Transplant Biorepository (LTB) centralized repository was started and housing biospecimens from patients including serum, cells, exosomes, and explants at various time points throughout a transplant. The overall success of this endeavor was achieved through strong leadership in coordinating a network of collaborating teams within the UW DOS including the pulmonary department, donor procurement, nurses, and research groups. Because of the continued success, the UW LTB was recently used as a template for the development of a future national lung transplant biorepository, which both Drs. Mulligan and Hwang will possibly be leading in 2022. Drs. Mulligan and Hwang could not have done these studies without the amazing support of their research staff and clinical teams, and are extremely excited about the impact these studies will have in their respective fields.