

CARNEGIE MELLON UNIVERSITY

BME 2021 SUMMER SEMINAR SERIES

Permanent Respiratory Support with Bioengineered Lungs



PRESENTED BY

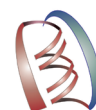
Keith Cook

Professor and
Interim Department Head
Biomedical Engineering
Carnegie Mellon University

SCHEDULE

**Thursday,
June 3, 2021
(9:00AM-10:00AM)**

The Cook Cardiopulmonary Research Lab focuses on the development of artificial and tissue-based lungs that are capable of providing permanent respiratory support for patients with chronic lung disease. These patients experience a gradual decline in respiratory function punctuated by repeated acute exacerbations that lead to a transient, but dangerous, worsening of their disease. Each year, these exacerbations result in 6.9 million ER visits. Even if patients survive the exacerbation, their prognosis is not good. Six months after an exacerbation, only 26% of patients are alive and reporting a good quality of life, and the two-year mortality rate is 43%. The only restorative treatment for these patients is lung transplantation, but less than 2,600 patients receive a transplant annually. Therefore, there is a critical need for a long-term therapy that provides respiratory support, improves quality of life, and reduces mortality. Artificial lungs exist but are intended for short-term support. Current artificial lungs clot and fail over a period of weeks, despite the use of systemic anticoagulation. Systemic anticoagulation must be used sparingly, as it also causes bleeding complications. Both device failure and patient bleeding lead to increased mortality over periods of support as short as one week and thus months to years of support is not currently possible. To overcome this, our lab develops new artificial lung designs, surface coatings, and novel pharmaceutical approaches that, when combined, should allow for safe, permanent respiratory support outside the hospital. Our lab has also begun working on biofabricated, tissue-based lungs that, while still many years off, have the potential for providing an even safer means of long-term support.



**BIOMEDICAL
ENGINEERING**
Carnegie Mellon University