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Research Title:

Lung Microbiota Signatures for Pneumonia Diagnosis using Nanopore MinION

This project aims to derive lung microbiota signatures for rapid pneumonia diagnosis using Nanopore MinION metagenomic sequencing. We have established one of the largest cohorts of critically ill patients with pneumonia, with an extensive biospecimen repository and detailed clinical phenotyping. We have performed real-time sequencing on the Nanopore MinION platform for >200 respiratory samples, associated with extensive metadata including clinical information, outcomes, physiologic parameters, and -omics technologies for host response phenotyping.

The project's outcomes will provide valuable insights into lung microbiota and host response signatures as diagnostic markers for pneumonia. The trainee will develop expertise in analysis of multidimensional multi-omics datasets, leverage machine-learning algorithms to derive diagnostic and prognostic signatures from real-time molecular data that can enable early and accurate detection of pneumonia, facilitating personalized treatment strategies. The developed diagnostic signature can then be tested prospectively in the context of a diagnostic clinical trial, with the potential to lead to improved pneumonia management, better patient outcomes, reduced healthcare costs, and enhanced public health interventions.