DEPARTMENT OF INTERNAL MEDICINE
COLLEGE OF MEDICINE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2026

PROJECT TITLE: **Neutrophil heterogeneity and the mechanics of alveolar injury in PjP**

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Project Description

This research project is focused on the immunopathogenesis of Pneumocystis pneumonia (PjP), a life-threatening disease caused by the opportunistic fungal pathogen Pneumocystis. The primary emphasis is on how the diverse defense responses of neutrophils lead to the accidental breakdown of pulmonary structural integrity. During PjP infection, the lung is subjected to a vigorous influx of neutrophils that execute potent antimicrobial strategies, ranging from high-intensity inflammatory signaling to terminal death processes such as NETosis and pyroptosis. However, these neutrophil-derived defense mechanisms often act indiscriminately, inflicting significant collateral damage on the host lung tissue. The project aims to determine the specific molecular pathways through which neutrophil activation during PjP induces epithelial cell injury and loss of barrier integrity required for proper gas exchange.