Clinical Microbiology Diagnostic Testing and Antibiotic Resistance
Clinical Scholars Track
UCLA Multi-Campus Infectious Diseases Fellowship Program

Introduction: The clinical microbiology diagnostics and antibiotic resistance concentration is designed for fellows who desire a clinical career with focus on development and assessment of novel diagnostics, including laboratory based and point of care testing. This concentration also provides comprehensive educational and research opportunities focused on antimicrobial resistance, including evaluation of new and emerging antibiotic resistance mechanisms among bacteria, assessment and development of diagnostic tests for the detection of antibiotic resistance and evaluation of the epidemiology of antibiotic resistance.

Faculty Director: Omai Garner PhD D(ABMM)

Objectives: This concentration aims to promote excellence in the following areas:
1. Evaluation of new and emerging technologies for detection of infectious etiologies;
2. Evaluation of impact of diagnostic testing performed near to, or at, the point of care;
3. Evaluation of the emergence of antibiotic resistance in clinically relevant bacterial pathogens;
4. Development of laboratory methods to detect new and emerging resistance among bacteria

Trainees will choose a specific area of interest and develop a project in consultation with the concentration directors. Fellows electing this concentration are also strongly encouraged to work with clinical microbiology laboratory at one of the affiliated hospitals. Skills obtained through this concentration vary by project, but include:

- How to evaluate the performance of diagnostic tests performed by the laboratory, including CMS and/or FDA requirements for the performance of diagnostics tests in U.S. clinical laboratories and/ or point of care locations such as clinics;
- Develop an understanding of FDA clinical trials for the clearance of in vitro diagnostic devices in U.S.;
- Learn to design and implement a new technology assessment;
- Develop an understanding of how to evaluate the clinical impact of novel diagnostic technologies on patient care;
- Develop an understanding of antibiotic resistance mechanisms among bacterial pathogens;
- Develop an understanding of antimicrobial susceptibility testing, including how clinical breakpoints are set, the limitations of reference susceptibility testing, and the advantages and limitations of novel antibiotic susceptibility tests, such as genotyping;
- Learn to evaluate antibiotic susceptibility data to determine trends in the emergence of resistance

Faculty at affiliated institutions:
- UCLA Ronald Reagan Medical Center and Santa Monica Hospital
  - Omai Garner, PhD D(ABMM)
  - Shelley Miller, PhD D(ABMM)
- Cedars-Sinai Medical Center
  - Margie Morgan, PhD D(ABMM)

Resources and Opportunities:
- Clinical microbiology rotation during first year of fellowship;
- Elective time in both first and second years of fellowship devoted to diagnostic testing/antimicrobial resistance (schedule permitting);
- Opportunities to participate in quality improvement activities, including development and implementation of new diagnostic technology;
- Opportunities to participate in FDA clinical trials, or new technology assessment;
- Opportunities to develop antibiotic susceptibility testing methods;
- Over 16 years of cumulative antibiotic susceptibility test data, performed with reference broth microdilution methods, for UCLA patients

Project Examples:
- Evaluation of carbapenem resistance mechanisms in Enterobacteriaceae (Simon Pollett, MD, research article published in J Clin Microbiology 2014);
- Evaluation of antimicrobial susceptibility profiles of unusual bacteria, such as nutritionally variant streptococci (NVS) (Michael Alberti, MD PhD, Research article published in Antimicrob Agents and Chemotherapy 2015);
- Multi-center study of susceptibility test methods for Staphylococcus pseudintermedius (Max Wu, PhD, Research article published in J Clin Microbiology 2015);
- Evaluation of whole genome sequencing as a tool for molecular epidemiology investigations (Shangxin Yang PhD, and Peera Hemarajata, MD PhD, Research article published in Diagn Microbiol Infect Dis 2016);
- Development of novel molecular methods to evaluate antimicrobial resistance in carbapenem-resistant Enterobacteriaceae (Peera Hemarajata, MD PhD, Research article published in Antimicrob Agents Chemother 2015);
- Evaluation of novel point-of-care technologies for infectious diseases diagnostics, such as cellphone-based hand-held readers (B Berg PhD, Research article in ACS Nano 2015);
- Evaluation of new diagnostic technologies, such as mass spectrometry to identify bacteria (Deak PhD Diagn Microbiol Infect Dis 2014)