

APPLY NOW! Master thesis in Clinical Microbiology

Our research group at the **Institute of Medical Microbiology (IMM) of University of Zurich** is searching for a **Master student in the MNF faculty at the University of Zurich** to conduct a project aimed at investigating the phenotypic detection of quinolone resistance in *Enterobacterales*.

In the **diagnostic lab** of the **IMM** we perform **translational research** to understand the **molecular mechanisms** responsible for the emergence of **antimicrobial resistance** in bacteria and to develop **rapid diagnostic methods** to improve patient care and to prevent the spread of antimicrobial resistance. We have access to clinical samples and, if required, patient data. We use state-of-the-arts methods of the diagnostic lab (bacterial identification, antimicrobial susceptibility testing, etc.) and we work closely with the various research groups of the IMM, with which we have diverse ongoing collaborations.

The master project:

Background: Quinolones are ones of the most widely used antibiotics worldwide, due to their broad range activity, great efficacy, and pharmacokinetic/pharmacodynamic properties. Currently they are employed to treat a broad range of bacterial infections caused by both Gram-negative and Gram-positive organisms. However, due to complacent use, resistance to this antibiotic class has steadily increased across various species. Resistance primarily results from mutations in the DNA gyrase genes (*gyrA* and *gyrB*) and/or topoisomerase IV genes (*parC* and *parE*). Mutations in genes that regulate the expression of outer membrane proteins (Omp) or the efflux pumps can additionally play a role in quinolone resistance, albeit to a lesser degree. Plasmid-mediated quinolone resistance also represents an emerging clinical problem that in general cause low-level resistance.

Goals: The major goal of the project is to develop and verify a diagnostic phenotype-based algorithm for detection of quinolone-resistance mechanisms in Enterobacterales from disc diffusion (DD) and E-test susceptibility values of classic and novel β -lactam antibiotics. The aim is to publish the results in a peer-reviewed journal.

Methods: Antimicrobial susceptibility testing (AST) by DD and E-test with several quinolones will be performed on more than 500 Enterobacterales clinical isolates. The isolates will be grouped by phenotype-based resistotypes, sequenced by whole genome sequencing, and grouped by genotype-based resistotypes. Based on phenotype- and genotype-based resistotypes a diagnostic algorithm to infer quinolone mechanisms from AST values will be developed.

Professional and personal skills:

- Experience with R programming (desired but not mandatory) for statistical analysis.
- Excellent organizational and documentation skills.
- Ability to work independently in a bacteriology lab.
- High-level of self-motivation with a proactive, collaborative personality.

What we offer:

- The possibility of being part of innovative science and technology to address some of society's most challenging healthcare issues – antimicrobial resistance.
- Laboratories with state-of-the-art equipment (MALDI-TOF MS, sequencing systems, etc.).
- Flexible working hours.
- Enjoy working in strict contact with experienced medical microbiologists, technicians, and bioinformaticians of the diagnostic lab.

Are you interested?

To apply, please send us your updated CV and motivation letter to Dr. Stefano Mancini (Thesis mentor, email: smancini@imm.uzh.ch) and Prof. Adrian Egli (Institute director, email: aegli@imm.uzh.ch).

Location: Institute for Medical Microbiology, Gloriastrasse 28/30, 8006 Zurich