



Laboratory of Medical Microbiology Vaccine and Infectious Disease Institute



***Toward the post antibiotic golden era:
Advancing understanding of antimicrobial resistance and infectious diseases***

WHAT our research focuses on

Antimicrobial resistance (AMR)

- Gram-negative
- Gram-positive



WHY it matters

Among **top 10** global health threats

By **2050**, if AMR is left unchecked:

10 million deaths/year $\approx$ Cancer

GDP loss of 3.8% $\approx$ Global financial crisis in 2008

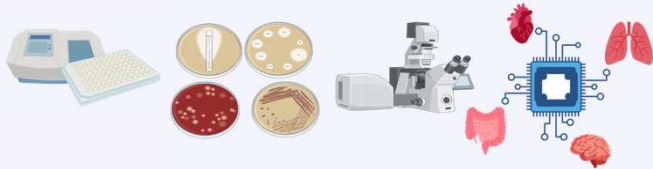


By 2050, the death toll could be a staggering one person every three seconds if AMR is not tackled now.

HOW we do it

Phenotypic functional assays

Biofilm models, evolution experiments, MIC testing and more



Molecular methods and sequencing

Short- and Long-read sequencing, qPCR and more

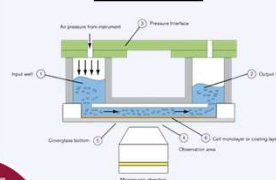
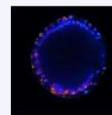


Research line 1: One Health research on infections and antimicrobial resistance

- Monitor **infection causes**, antibiotic use, and **resistance patterns**
- Focus on **bacterial bloodstream infections** and **AMR** in newborns across sub-Saharan Africa
- Examine how bacteria from **newborns and their hospital environments** contribute to infection and resistance spread
- Strengthen infection prevention and antibiotic stewardship

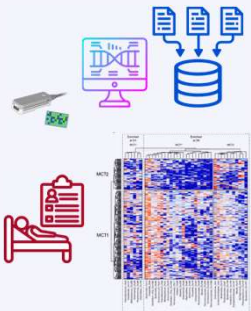


Research line 2: Host-pathogen interactions and microbiome interactions in respiratory infections



- Investigate the **mechanisms** of antagonistic or synergistic **interactions** between host cells, pathogens, and commensal bacteria in respiratory infections (VAP and VAT).
- Focus on ***Pseudomonas aeruginosa***, ***Staphylococcus aureus***, and ***Staphylococcus epidermidis***
- Use genomic sequencing, organ-on-chip systems, and humanized mouse models

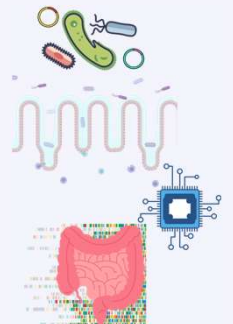
Research line 3: Development of precision and point of care diagnostic assays



- Assess the **impact of antibiotics on the gut microbiome**, predict **dysbiosis risk**, identify pathogens
- Focus on **respiratory tract infection** and **gut dysbiosis**
- Use long-read sequencing and metagenomics for microbiome profiling
- Support **personalized medicine** and **antimicrobial stewardship**

Research line 4: Population biology of bacteria and the spread of antibiotic resistance

- Characterize the **dynamics and drivers of antimicrobial resistance** in healthy and disrupted gut microbiome ecosystems.
- Investigate **colonization resistance**, **dysbiosis**, and **horizontal gene transfer** between commensals and pathogens under antibiotic pressure.
- Focus on **gut microbiome**
- Use organ-on-a-chip model and sequencing



University of Antwerp

Laboratory of Medical Microbiology
Vaccine and Infectious Disease Institute



Prof. dr. Surbhi Malhotra-Kumar
Surbhi.malhotra@uantwerpen.be