Antibiotics are a cornerstone of modern medicine and over the last century have significantly decreased mortality worldwide. Unfortunately, resistance to these "magic bullets" has become one of the greatest threats to human health that the world faces, and in the coming decades, if proactive solutions are not found to prevent widespread antibiotic resistance, it is estimated that by 2050 ~10 million people per year will die of infections. The World Health Organization (WHO) has urged all government sectors and society to act on antimicrobial resistance (AMR). On 27 February 2017, multidrug-resistant K. pneumoniae, P. aeruginosa and A. baumannii were identified by WHO as the highest priority pathogens, which require urgent attention for the discovery of novel antibiotics. Over the last decade, ‘old’ polymyxins are increasingly used as the last defence against these Gram-negative ‘superbugs’. My research in the systems pharmacology of polymyxins and drug discovery has made a significant contribution to the global commitment to combat antibiotic resistance in Gram-negative pathogens.

Research Projects
As no new antibiotics will be available for Gram-negative ‘superbugs’ in the near future, it is crucial to optimise the clinical use of polymyxins and develop novel, safer polymyxins. My major research programs are:

1. Optimising clinical use of polymyxins and their synergistic combinations using pharmacokinetics/pharmacodynamics/toxicodynamics (PK/PD/TD) and systems pharmacology
3. Development of virtual bacterial cells using systems pharmacology and computational biology
4. Discovery of new-generation polymyxins against multidrug-resistant P. aeruginosa, A. baumannii and K. pneumoniae

Selected significant publications: