Research project and supervisory team

Supervisory Team	Assistant Prof. Dr. Jodi Woan-Fei LAW Prof. Dr. Learn-Han LEE Assistant Prof. Dr. Loh Teng-Hern TAN
Short introduction & description of research project	Preterm birth is a public health concern and a leading cause of neonatal mortality and morbidity worldwide. Global estimates indicate 15 million preterm births annually, giving rise to 5 - 11 % preterm birth rates across different countries, with over half of all preterm births occurring in the Asian region, including China. Emergence of multidrug-resistant (MDR) pathogens in the gut of preterm infants poses an alarming health risk to this vulnerable population. Hence, there is an urgent need to search for new solutions to combat these MDR pathogens. The *Streptomyces* isolated from mangrove environments and the compounds they produce offer tremendous potential for the development of new antibiotics and therapeutic strategies. With further research and development, these newly discovered compounds are expected to become powerful tools in the fight against MDR pathogens. This PhD project explores the discovery of antimicrobial agents from mangrove-derived novel *Streptomyces* species to combat MDR *Klebsiella pneumoniae* isolated from the stools of preterm infants. This research aims to bridge critical knowledge gaps by investigating both the prevalence of MDR *K. pneumoniae* in preterm infant gut microbiome and the antimicrobial potential of *Streptomyces* isolated from unique mangrove ecosystems. The project will integrate microbiological, molecular, genomic, and bioinformatic approaches, including isolation and characterisation of novel bacterial strains, antagonistic assays, chemical profiling, metagenomics, and whole genome sequencing. Advanced analytical techniques such as GC-MS and genome mining tools will be employed to identify bioactive metabolites and biosynthetic gene clusters responsible for antimicrobial activity. This interdisciplinary study is expected to deliver novel insights into pathogen prevalence in vulnerable neonatal populations while uncovering new natural-product-based antimicrobial candidates. The outcomes will contribute to the development of alternative therapeutic strategies against MDR pathogens, addressing the urgent global need for new antibiotics. Ultimately, this project supports innovation in microbial drug discovery and advances efforts to improve neonatal health outcomes and combat antimicrobial resistance.
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