Tuberculosis (TB) and malaria are severe, life-threatening infectious diseases that torture millions of people every year. Both diseases are caused by microorganisms: *Mycobacterium tuberculosis* (Mtb) causes TB and *Plasmodium falciparum* causes malaria. Due to the unavailability of new antibiotics and the increasing emergence of drug-resistant strains of these organisms, there is an urgent demand for novel drug therapies. We try to find new drug candidates that would effectively and efficiently kill Mtb and *Plasmodium falciparum*. The isoprene unit, made of 5-carbons, is used and made by all living cells. Halting isoprene production leads to cell death in Mtb and *P. falciparum*. 1-Deoxy-D-xylulose-5-phosphate reductoisomerase (Dxr) is a crucial enzyme in the nonmevalonate pathway to make isoprenes. This pathway is found in many pathogenic organisms including Mtb and *P. falciparum*, but not humans. Thus, Dxr inhibitors may be promising therapeutic candidates with low human toxicity. It has long been known that fosmidomycin is a potent inhibitor of Dxr. Unfortunately, fosmidomycin is not effective against Mtb and has failed in clinical trials against malaria. We synthesized and evaluated fosmidomycin analogs as improved Dxr inhibitors that act as potent antimicrobial agents, which shed light on its SAR and the potential of Dxr inhibitors becoming antimicrobial drug candidates.

Jack received his BS degree in Pharmaceutical Science from Sun Yat-sen University, in Guangzhou, Guangdong, studying the design and synthesis of Alzheimer's disease agents. His current research in the group of Prof. Cynthia Dowd focuses on developing MEPicides as novel drug candidates against tuberculosis and malaria via Dxr inhibition.