“Development of Cationic Amphiphilic Polyproline Helices and Coiled-Coil Assemblies for Biological Applications.”

Abstract:
The rise of antimicrobial resistance has contributed to a global health crisis. Many current antibiotics are announced as unviable, and the addition of some bacteria to invade the cell further challenges and limits these current drugs. The Chmielewski group has previously shown that cationic amphiphilic polyproline helices (CAPHs) act as dual agents displaying both cell-penetration and antibiotic activity. To further increase these dual properties, stereochemical modifications were used to synthesize new amino acids and new CAPH peptides. In this presentation, I will discuss the outcomes of these modifications, including cell penetration, subcellular localization, and antibacterial efficacy.

Moreover, considering new interest in biomaterials for drug formulation and delivery, coiled-coil assemblies have emerged as promising candidates. Characterized by facile synthesis, low toxicity, and biocompatibility, coiled-coil assemblies hold a significant potential for drug encapsulation and cellular delivery. Herein, I will discuss the development of a novel nanoscale metal-mediated coiled-coil assembly with tunable assembly properties, presenting a compelling platform for drug encapsulation and targeted cell delivery, thereby addressing critical challenges in modern pharmaceutical science.