** Positively Irresistible: Designing Novel Cationic Amphiphiles to Overcome Bacterial Resistance**

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Quaternary Ammonium Compounds (QACs) are workhorse disinfectants found in many household and commercial cleaning agents. Since their discovery in the early 1900s, industry has relied heavily on their broad effectiveness and cheap costs at the expense of chemical innovation. However, akin to antibiotics, these molecules have also started to lose their efficacy against resistant pathogens, something that has only been further exacerbated by the recent COVID-19 pandemic. Our group, in collaboration with the Minbiole Lab at Villanova University, has actively been pursuing the next generation of cationic amphiphilic disinfectants to thwart antimicrobial resistance. This talk will highlight over a decade’s worth of research that has resulted in the synthesis of >700 novel molecules, an increased understanding of the mechanism of resistance, and most recently, leveraged our in-house structure-activity relationship information to aid in machine learning-based analog design.