Developing Peptide-Based Tools to Study Cell-Cell Communication in Bacteria

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Quorum sensing is a ubiquitous cell density-based communication mechanism in bacteria that governs many important symbiotic and pathogenic phenotypes. As such, quorum sensing has attracted significant attention as a potential anti-virulence therapeutic target. Many Gram-positive bacterial species utilize peptide pheromones, termed autoinducers, to induce quorum sensing responses and initiate pathogenic phenotypes, such as competence, biofilm formation and virulence factor production. We investigate the molecular mechanisms that drive signal:receptor binding while interrogating the role of quorum sensing in bacterial virulence and the competition between bacterial species. To this end, we develop peptide-based quorum sensing modulators with distinct activity profiles (selective vs. pan-species modulators; inhibitors vs. activators) and utilize them to determine the effects of quorum sensing modulation in cell-based assays and *in vivo*.