Quorum Sensing and the Language of Bacteria

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Many Gram-negative bacteria produce extracellular acyl-homoserine lactone (HL) signals for use in cell-to-cell communication. This type of signalling was first discovered in a marine bacterium found in luminous organs of certain marine animals. There are homologous systems that control virulence genes in human and plant pathogens. Synthesis of the acyl-HL signals generally involves proteins homologous to the *Vibrio fischeri* LuxI, and response involves proteins homologous to the *V. fischeri* LuxR. Because the acyl-HL signals can permeate cell membranes and are water soluble, they cannot accumulate to critical concentrations unless the bacteria are at a sufficient population density. Studies have allowed the development of models for the mechanism of acyl-HL-dependent gene regulation. One particular acyl-HL is required for differentiation and development of biofilms of the opportunistic human pathogen, *Pseudomonas aeruginosa*. Our understanding of acyl-HL signalling in pathogenic bacteria has led to novel strategies for developing new anti-bacterial pathogen therapies, and novel approaches to new drug discovery. The mechanisms of acyl-HL synthesis and detection will be discussed as will the global nature of quorum sensing in a given bacterial species.