

QUORUM SENSING AND ITS DIFFERENT SIGNALS SYSTEMS IN BACTERIA

MUHAMMAD KAMRAN TAJ¹, WEI YUNLIN², ZOHRA SAMREEN³, IMRAN TAJ⁴,
TAJ MUHAMMAD HASSANI⁵ & JI XIU LING⁶

^{1,2,6}Kunming University of Science and Technology, Yunnan, China

³Bolan Medical Hospital, Quetta, Balochistan, Pakistan

⁴Centre for Advanced Studies in Vaccinology and Biotechnology, UoB, Balochistan, Pakistan

⁵Food and Agriculture Organization, Balochistan, Pakistan

ABSTRACT

The chemical signal molecules called autoinducers are produced and released by the quorum sensing bacteria to levels dominating the increasing cell-population density. The attainment of minimal threshold stimulatory concentration of an autoinducer leads to an alteration in gene expression. Both Gram-positive and Gram-negative bacteria are capable of using quorum sensing communication circuits for regulating a diverse array of physiological activities. These activities include symbiosis, competence, virulence, conjugation, antibiotic production, sporulation, motility and biofilm formation. The Gram-negative bacteria use acylated homoserine lactones as autoinducers, while Gram-positive bacteria use processed oligo-peptides to communicate.

In the field of quorum sensing revealed, cell to cell communication via autoinducers both within and between bacterial species. The establishment of enormous data in this field suggests autoinducers acquiring specific responses from host organisms. Despite the difference in chemical signals, signal relay mechanisms and the target genes controlled by the bacterial quorum sensing systems, the ability to communicate with one another allows bacteria to coordinate the gene expression as well as the behaviour of the entire community. This process presumably confers upon the bacteria some of the qualities of higher organisms. The evolution of quorum sensing systems in bacteria thus could have been one of the early steps in the development of multicellularity.

KEYWORDS: Quorum, Sensing, Signals, Different, Systems