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101 Biochemistry

Small Talk: Cell-to-Cell Communication in Bacteria

Research in the Bassler Laboratory

Bacteria communicate with one another via the production, detection, and response to secreted signal molecules called autoinducers. This communication process is called quorum sensing and it allows bacteria to synchronize behavior on a population-wide scale. Bacterial behaviors controlled by quorum sensing are typically ones that are unproductive when undertaken by an individual bacterium acting alone but become effective when undertaken in unison by the group. For example, quorum sensing controls virulence, sporulation, and the exchange of DNA. Thus, quorum sensing is a mechanism that allows bacteria to function as multicellular organisms. New research shows that bacteria integrate information from multiple autoinducers, some of which are used exclusively for intra-species communication while one autoinducer, called AI-2, appears to be a universal signal enabling inter-species communication. Our recent studies combining genetics and bioinformatics show that multiple small regulatory RNAs act at the hearts of quorum sensing cascades, and function as ultrasensitive regulatory switches controlling the transition into and out of quorum-sensing mode. Current research is focused on the development of novel anti-bacterial therapies aimed at interfering with quorum sensing. Such therapies could be used to control bacterial pathogenicity.

References

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