Researchers develop network to study bacterial communication

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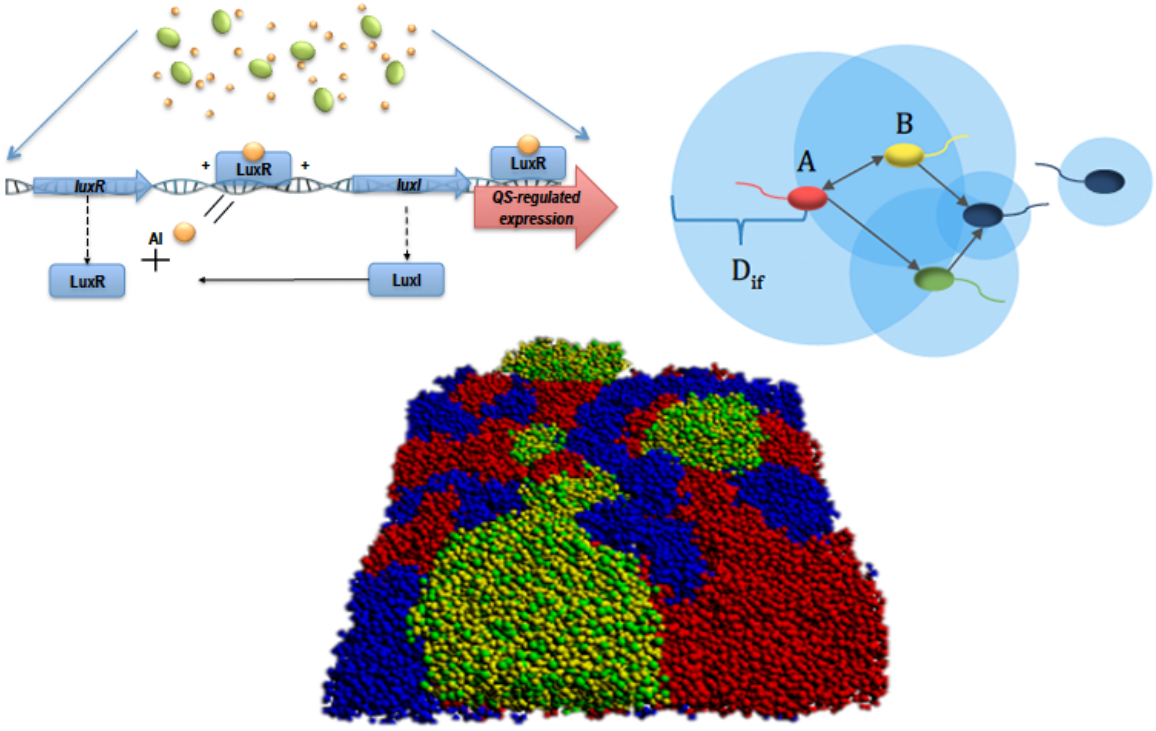

Credit: Carnegie Mellon University Electrical and Computer Engineering

Antibiotics have worked to save many people's lives from bacterial infection. But as more and more antibiotics are prescribed and used, bacteria are becoming resistant to antibiotic treatments, leaving the case open for researchers find a way to decrease this resistance.

Radu Marculescu, professor of electrical and computer engineering at Carnegie Mellon University, Luisa Hiller, professor of biological sciences, and other researchers from electrical and computer engineering have recently published a paper investigating the way that bacteria communicate with each other and how interrupting this communication could lead to decreased drug resistance.

The researchers have built a dynamic network that captures bacteria communications and interactions. Bacteria communicate through quorum sensing, a basic communication mechanism among bacteria that allows them to exchange information (in the form of molecules) and coordinate their actions and attacks on hosts.

The framework allows researchers to quantify cell-to-cell interaction and biofilm dynamics to study how quorum sensing inhibitors may disrupt these communications. By analyzing the network and its properties, they are able to infer properties of the biofilm that have biological relevance and can lead to a deeper understanding of pathogens virulence.

"The ultimate contribution of our work is that it brings a computational perspective to a fundamental problem in biology and allows experimentalists to test new hypotheses," said Marculescu. "The 'network' approach we take brings computer engineers together with experimentalists thus paving the way towards precision medicine."

The paper is titled, "In Silico Evaluation of the Impacts of Quorum Sensing Inhibition (QSI) on Strain Competition and Development of QSI Resistance," and was published in *Scientific Reports*.

More information: Guopeng Wei et al. In Silico Evaluation of the Impacts of Quorum Sensing Inhibition (QSI) on Strain Competition and Development of QSI Resistance, *Scientific Reports* (2016). DOI: 10.1038/srep35136

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