

Bacterial communication considered for medical applications

August 29 2014, by Geoff Vivian



These she then inspected for bioluminescence, which is an indicator of quorum sensing. Credit: Kris Williams

A local microbiologist has been working on an alternative to antibiotics, which tend to encourage resistant bacterial strains to develop over time.

Rather than attempting to destroy [harmful bacteria](#), UWA expert Dr Jamie Lindthorne focussed her PhD study on a phenomenon known as

quorum sensing inhibition.

"Quorum sensing is a communication process that bacteria use to talk to each other, to make sure that they time the production of specific compounds together," she says.

She gave the example of a single bacterium present inside a human body—it is unlikely to emit any harmful toxins unless it detects a chemical emitted by its fellow bacteria, called an "auto inducer".

"If it's on its own and starts producing a toxin then the body can now turn attack against it, so it gets overwhelmed rather quickly," she says.

"They wait until there's a lot of them together to actually make an effect."

Certain other organisms, such as those present in soil, have been found to emit chemicals of their own that inhibit quorum sensing—a phenomenon she calls quorum quenching.

"Quorum quenching is any method that inhibits quorum sensing," she says.

"Normally it's through degradation of the auto inducer, but it can be blocking receptors on the bacterial cell surface or anything like that."

Dr Lindthorne was interested in finding marine and river micro-organisms with quorum quenching capabilities.

She says bacteria producing quorum quenching compounds are usually identified after collecting bacterial samples, which they culture, before purifying and testing each isolate—but she wanted to find a quicker method.

Taking water samples from several locations in the Swan River and Cockburn Sound, she spread a diluted portion of each sample over agar plates which she cultured to produce mature [bacterial colonies](#).

Before attempting to identify any of these bacteria, she tested their quorum quenching properties on *Vibrio harveyi*, a bacterial strain first isolated from the surface of a sea mullet.

Dr Lindthorne then carefully spread distilled water, inoculated with *V. harveyi*, over the plates with a sterilised air brush.

These she then inspected for bioluminescence, which is an indicator of [quorum sensing](#).

Several colonies showed a lack of bioluminescence, which she interpreted as a sign of their quorum quenching property.

She removed these colonies, re-cultured them, and ran genetic analyses to ascertain their genus.

While she is presently working in another area of microbiology, she says further research would have enormous potential for medical, agricultural and industrial applications.

More information: "A Direct Pre-screen for Marine Bacteria Producing Compounds Inhibiting Quorum Sensing Reveals Diverse Planktonic Bacteria that are Bioactive." Linthorne JS, Chang BJ, Flematti GR, Ghisalberti EL, Sutton DC. *Mar Biotechnol* (NY). 2014 Aug 1. [Epub ahead of print]. www.ncbi.nlm.nih.gov/pubmed/25082352

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