Biophoton Communication: Can Cells Talk Using Light?
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Biophoton Communication: Can Cells Talk Using Light?

A growing body of evidence suggests that the molecular machinery of life emits and absorb photons. Now one biologist has evidence that this light is a new form of cellular communication.

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One of the more curious backwaters of biology is the study of biophotons: optical or ultraviolet photons emitted by living cells in a way that is distinct from conventional bioluminescence.

Nobody is quite sure how cells produce biophotons but the latest thinking is that various molecular processes can emit photons and that these are transported to the cell surface by energy carying excitons. A similar process carries the energy from photons across giant protein matrices during photosynthesis.

Whatever the mechanism, a growing number of biologists are convinced that when you switch off the lights, cells are bathed in the pale fireworks of a biophoton display.

This is not a bright phenomena. Biophotons are usually produced at the rate of dozens per second per square centimetre of cell culture.

That's not many. And it's why the notion that biophoton activity is actually a form of cellular communication is somewhat controversial.

Today, Sergey Mayburov at the Lebedev Institute of Physics in Moscow adds some extra evidence to the debate.

Mayburov has spent many hours in the dark watching fish eggs and recording the patterns of biophotons that these cells emit.

The question he aims to answer is whether the stream of photons has any discernible structure that would qualify it as a form of communication.

The answer is that is does, he says. Biophoton streams consist of short quasiperiodic bursts, which he says are remarkably similar to those used to send binary data over a noisy channel. That might help explain how cells can detect such low levels of radiation in a noisy environment.

If he's right, then this could help to explain a number of interesting phenomenon that some biologists attribute to biophoton communication.

In several experiments, biophotons from a growing plant seem to increase the rate of cell division in other plants by 30 per cent. That's a growth rate that is significantly higher than is possible with ordinary light that is several orders of magnitude more intense.

Other experiments have shown that the biophotons from growing eggs can encourage the growth of other eggs of a similar age. However, the biophotons from mature eggs can hinder and disrupt the growth of younger eggs at a different stage of development. In some cases, biophotons from older eggs seem to stop the growth of immature eggs entirely.

Mayburov's work won't end the controversy; not by any means. There are still many outstanding questions. One important problem is to better understand the cellular mechanisms at work–how the molecular machinery inside cells produces photons and how it might be influenced by them. Another is to understand the kind of evolutionary pressures that are at work here–how has this ability come about?

Clearly, there's more work to be done here.

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