

# New peptide communication factor enabling bacteria to 'talk to each other' discovered

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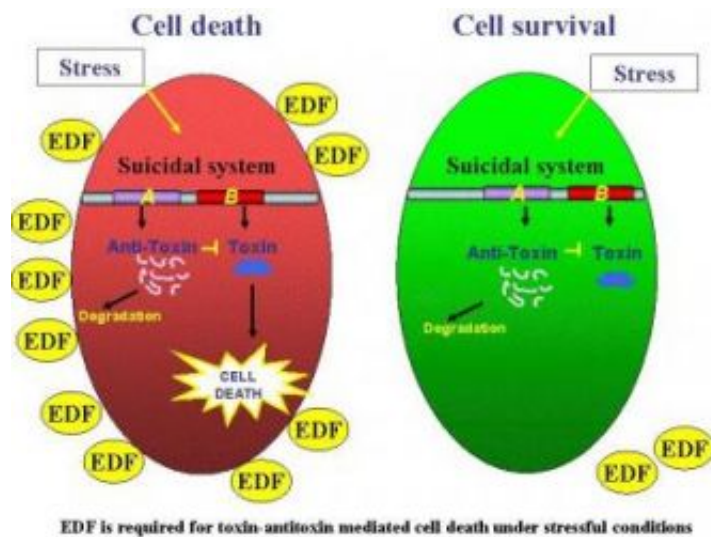


Illustration shows how bacteria under stress (left) dies when exposed to EDF. Credit: The Hebrew University of Jerusalem

Discovery by Hebrew University of Jerusalem researchers of a new communication factor that enables bacteria to “talk to each other” and causes their death could have significant consequences leading to development of a new class of antibiotic medications.

Bacteria are traditionally considered unicellular organisms. However, increasing experimental evidence indicates that bacteria seldom behave as isolated organisms. Instead, they are members of a community in which the isolated organisms communicate among themselves, thereby

manifesting some multi-cellular behaviors.

In an article published Friday (Oct. 26) in the journal *Science*, the Hebrew University scientists describe the new communication factor they have discovered that is produced by the intestinal bacteria *Escherichia coli*. The new factor is secreted by the bacteria and serves as a communication signal between single bacterial cells.

The research was carried out by a group headed by Prof. Hanna Engelberg-Kulka of the Department of Molecular Biology at the Hebrew University –Hadassah Medical School. It includes Ph.D. student Ilana Kolodkin-Gal , and a previous Ph.D. student, Dr Ronen Hazan. In addition, the research included Dr Ariel Gaathon from the Facilities Unit of the Medical School.

The communication factor formed by *Escherichia coli* enables the activation of a built-in “suicide module” which is located on the bacterial chromosome and is responsible for bacterial cell death under stressful conditions. Therefore, the new factor has been designated EDF (Extra-cellular Death Factor).

While suicidal cell death is counterproductive for the individual bacterial cell, it becomes effective for the bacterial community as a whole by the simultaneous action of a group of cells that are signaled by EDF. Under stressful conditions in which the EDF is activated, a major sub-population within the bacterial culture dies, allowing the survival of the population as a whole.

Understanding how the EDF functions may provide a lead for a new and more efficient class of antibiotics that specifically trigger bacterial cell death in the intestine bacteria *Escherichia coli* and probably in many other bacteria, including those pathogens that also carry the “suicide module.”

The discovered communication factor is a novel biological molecule, noted Prof Engelberg-Kulka. It is a peptide (a very small protein) that is produced by the bacteria. The chemical characterization of the new communication factor was particularly difficult for the researchers because of two main reasons: it is present in the bacterial culture in minute amounts, and the factor decomposes under the conditions that are routinely used during standard chemical characterization methods. Therefore, it was necessary to develop a new specific method. The research has also identified several bacterial genes that are involved in the generation of the communication factor, said Prof. Engelberg-Kulka.

Source: The Hebrew University of Jerusalem

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