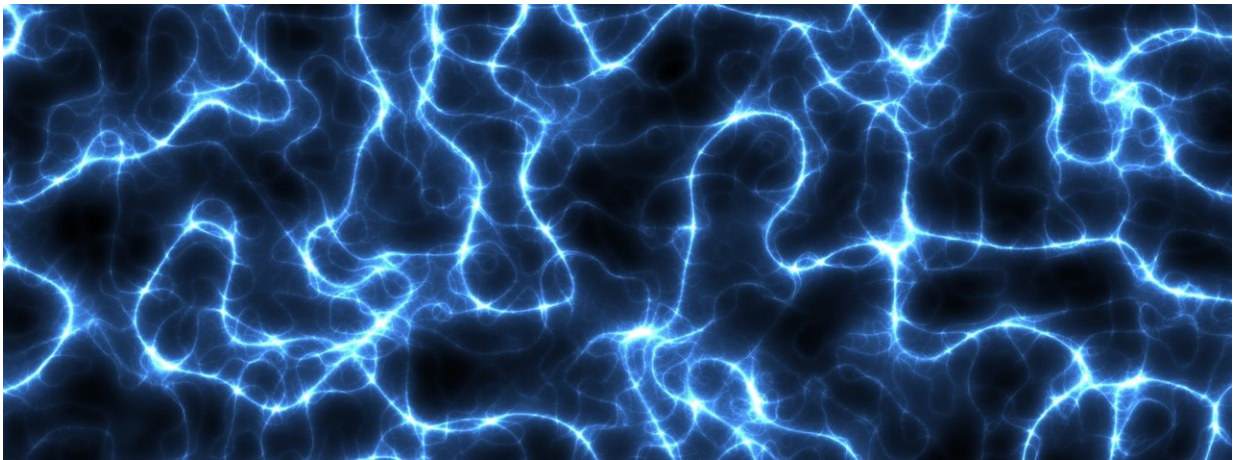


Intestinal bacteria produce electric current from sugar

September 18 2018



Credit: CC0 Public Domain

Intestinal bacteria can create an electric current, according to a new study from Lund University in Sweden. The results are valuable for the development of drugs, but also for the production of bioenergy, for example.

It is already known that bacteria can create an electric current outside their own cell, known as extracellular electron transport. This has been demonstrated and analysed in detail in some bacteria that specialise in the metabolism of metal salts.

A group of researchers has now studied extracellular electron transport in a completely different type of bacterium – the lactic acid bacterium *Enterococcus faecalis*, which can be found in the gastrointestinal tract of both humans and animals.

In the study, the researchers investigated what it takes for electrons from the bacterium to be transported to an electrode. The results from their experiments show that [enterococci](#) placed at an electrode can give rise to an electric current created by the metabolism of the cell. The electrons are released when the bacterium breaks down sugar inside its cell. The actual transmission of electrons to the electrode takes place with the help of what are known as quinone molecules inside the cell membrane.

"Lactic acid bacteria, and many other bacteria, are probably capable of performing electrochemistry", says Lars Hederstedt, microbiology professor at Lund University.

The results in the study also show that a [bacterium](#) in its natural environment, i.e. together with other bacteria and fungi, may have properties that it otherwise lacks. What happens is that two or more types of microorganisms intertwine their metabolic capacity to benefit the growth of one or both of the organisms. According to the study, this form of cooperation between microorganisms, known as syntrophy, may be linked to electron transport between the parties involved.

"Syntrophy provides a metabolic ability that the cells do not have on their own. For example, a certain chemical compound can be effectively broken down in nature only when two different types of bacteria occur together, but not individually", says Lars Hederstedt.

This phenomenon is of medical interest as enterococci are usually found in the intestine of both humans and animals. Some species, such as *Enterococcus faecalis*, give rise to infections that are sometimes difficult

to treat with antibiotics. Furthermore, the metabolism of enterococci is associated with the onset of certain types of colon cancer.

The research is also of interest in other areas. Detailed knowledge of electron transport between [bacteria](#) and electrodes is important in order to design and improve microbial electrochemical systems. These systems have many areas of application apart from drug development, such as fuel cells in bioenergy production, waste water treatment plants and biosensors.

"We believe our results encourage more research into environments with a complex composition of organisms", concludes Lars Hederstedt.

More information: Galina Pankratova et al. Extracellular Electron Transfer by the Gram-Positive Bacterium *Enterococcus faecalis*, *Biochemistry* (2018). [DOI: 10.1021/acs.biochem.8b00600](https://doi.org/10.1021/acs.biochem.8b00600)

Provided by Lund University

Citation: Intestinal bacteria produce electric current from sugar (2018, September 18) retrieved 24 April 2024 from <https://phys.org/news/2018-09-intestinal-bacteria-electric-current-sugar.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.