Understanding how cells follow electric fields

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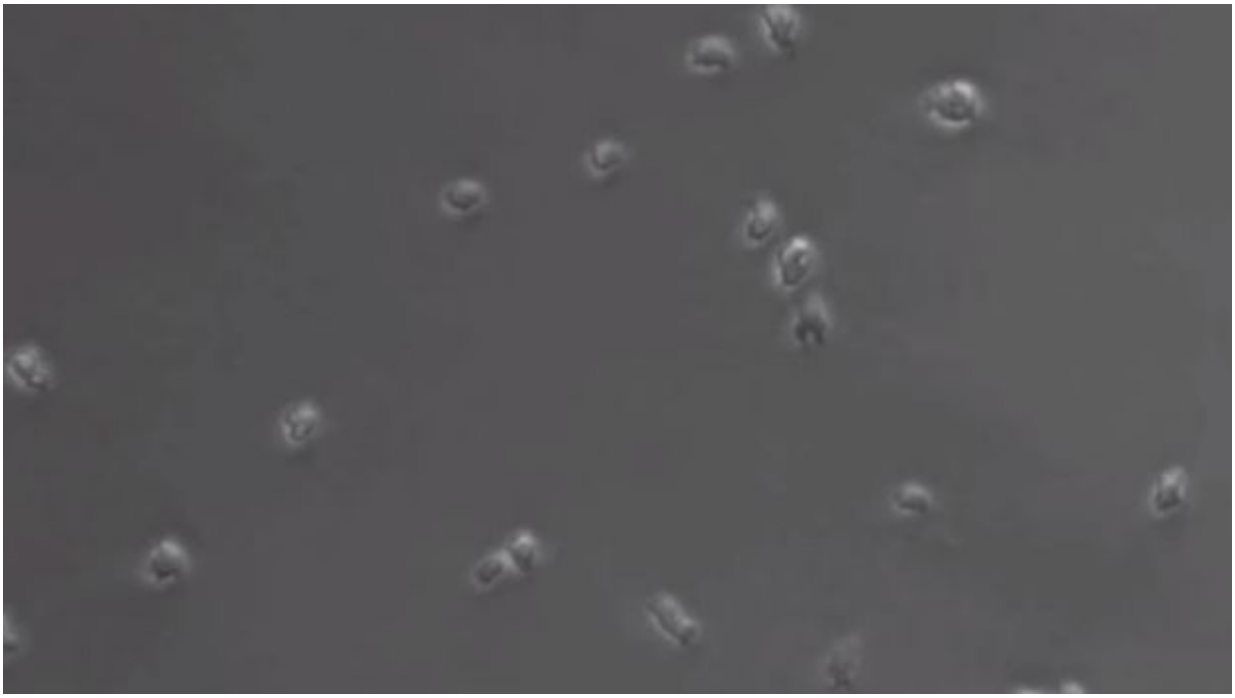

Many living things can respond to electric fields, either moving or using them to detect prey or enemies. Weak electric fields may be important growth and development, and in wound healing: it's known that one of the signals that guides cells into a wound to repair it is a disturbance in the normal electric field between tissues. This ability to move in response to an electric field is called galvanotaxis or electrotaxis.

UC Davis dermatology professor Min Zhao, Peter Devroetes at Johns Hopkins University and colleagues hope to unravel how these responses work, studying both body cells and Dictyostelium discoideum, an amoeba that lives in soil. *Dictyostelium* is unusual because it spends part of its life crawling around as a single-cell amoeba, but occasionally multiple amoebae will come together to form a fruiting body.

In a paper just published in the journal *Science Signaling*, Zhao and colleagues screened *Dictyostelium* for genes that affect electrotaxis. They used special barcoded microplates developed by Tingrui Pan, professor of biomedical engineering at UC Davis to screen hundreds of amoeba strains.

The team identified a number of genes, including one called PiaA, which encodes a critical component of a pathway controlling motility. Other genes associated with electrotaxis in *Dictyostelium* were also linked to the same pathway.

Right now, no one nows how cells detect these very weak electric fields, Zhao said. The screening technique could be used to identify more genes linked to electrotaxis and help researchers piece together exactly how electrical signals are detected and turned into action.

More information: A large-scale screen reveals genes that mediate electrotaxis in Dictyostelium discoideum, *Sci. Signal*., 26 May 2015. Vol. 8, Issue 378, p. ra50, DOI: 10.1126/scisignal.aab0562

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