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# Remote activation of cellular signaling

Electric fields stimulate genetically modified pancreatic  $\beta$  cells to secrete insulin in mice

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## Abstract

Remote modulation of cell signaling has biological ramifications across the cellular, tissue, and organismal levels, with applications as diverse as medicine and biomanufacturing. External approaches to regulating biological processes invariably require genetic manipulation. Platforms with orthogonal means of remotely controlling cell function include optogenetics (1, 2), mechanogenetics (3, 4), and magnetogenetics (5–7). An array of techniques make use of various pathways to control cell signaling and enable in-depth studies of cell processes and the development of therapeutic tools. An external stimulus can control one or more cellular pathways leading to, for example, control of ion channels, temporal production of proteins, or neural circuit modulation. On page 993 of this issue, Krawczyk *et al.* (8) advance the use of electrogenetics, a method that uses electric fields to control cell function, through the development of a wearable device that releases insulin from bioengineered cells and controls blood glucose concentrations in vivo.

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