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Nanowire Arrays Map Neural Circuits

High resolution method reveals electrical connections in the brain

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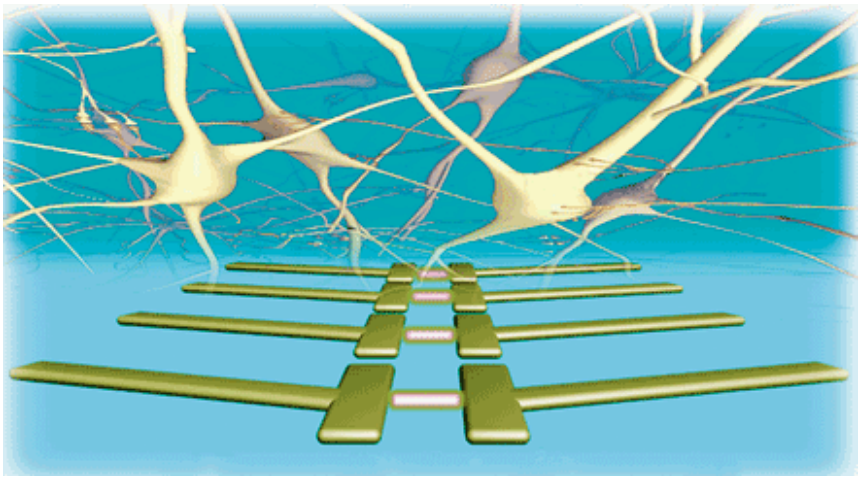

Proc. Natl. Acad. Sci. USA

The nanowire detector array can measure the connectivity between neurons in brain slices.

Mapping the connections between neurons could lead to a better understanding of the brain. Chemist Charles M. Lieber, biologist Venkatesh N. Murthy, and coworkers at Harvard University have used arrays of nanowire field-effect transistors to record electrical signals in fresh rat brain slices with up to 5-μm spatial resolution and sub-millisecond temporal resolution (*Proc. Natl. Acad. Sci. USA,* DOI: 10.1073/pnas.0914737107). Other methods for recording electrical signals in the brain such as multielectrode arrays are typically limited to spatial resolution of 100 μm, because at shorter distances the signals at separate electrodes tend to be correlated. In contrast, the spatial resolutions produced by Lieber and Murthy's method are on the scale of individual neurons. What's more, measurements can be made simultaneously at multiple length scales. Using the nanowire arrays, the team mapped neural connectivity in the olfactory cortex in rat brains. They stimulated the brain slice at eight different spots in a region called the lateral olfactory tract and measured the response at eight nanowire transistors. They could differentiate responses even at transistors located near each other.

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