# Fighting disease deep inside the brain

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Some 90,000 patients per year are treated for Parkinson's disease, a number that is expected to rise by 25 percent annually. Deep Brain Stimulation (DBS), which consists of electrically stimulating the central or peripheral nervous system, is currently standard practice for treating Parkinson's, but it can involve long, expensive surgeries with dramatic side effects. Miniature, ultra-flexible electrodes developed in Switzerland, however, could be the answer to more successful treatment for this and a host of other health issues.

Today, Professor Philippe Renaud of the École Polytechnique Fédérale de Lausanne (EPFL) in Switzerland reports on soft arrays of miniature electrodes developed in his Microsystems Laboratory that open new possibilities for more accurate and local DBS. At the 2013 Annual Meeting of the American Association for the Advancement of Science (AAAS) in Boston, in a symposium called "Engineering the Nervous System: Solutions to Restore Sight, Hearing, and Mobility," he announces the start of clinical trials and early, yet promising results in patients, and describes new developments in ultra-flexible electronics that can conform to the contours of the brainstem—in the brain itself—for treating other disorders.

At AAAS, Renaud outlines the technology behind these novel electronic interfaces with the nervous system, the associated challenges, and their immense potential to enhance DBS and treat disease, even how ultra flexible electronics could lead to the auditory implants of the future and the restoration of hearing. "Although Deep Brain Stimulation has been used for the past two decades, we see little progress in its clinical

outcomes," Renaud says. "Microelectrodes have the potential to open new therapeutic routes, with more efficiency and fewer side effects through a much better and finer control of electrical activation zones." The preliminary clinical trials related to this research are being done in conjunction with EPFL spin-off company Aleva Neurotherapeutics, the first company in the world to introduce microelectrodes in Deep Brain Stimulation leading to more precise directional stimulation.

Provided by Ecole Polytechnique Federale de Lausanne