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Brain implants : hope, but vigilance [1]
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As an extension of the development in medicine of technical solutions to overcome the temporary or permanent organic or functional deficiencies, research is ongoing in particular to treat or relieve patients with neurological diseases.
Among these avenues of research, neuronal activity, collected either by microelectrodes implanted in the brain or by electrodes placed at the surface of the skull, is used to control various external devices such as a wheelchair, a robotic arm or an exoskeleton (1). In 2020, the French National Academy of Medicine and Academy of Technologies underlined the rapid development of this research and the associated hopes for patients (2).
The main goal of current research is to multiply the number of neurons connected by as many fibers to a microprocessor to record and stimulate brain activity to treat neurological diseases such as Alzheimer's disease, Parkinson's disease or epilepsy, or to study neuronal activity for research purposes.

The scientific activity deployed in this field has strongly increased, from less than around ten publications per year in the 1980s, to more than one thousand publications in 2021 (3), recent work reporting the possibility of recording electrical activity of thousands of different neurons in several regions of the brain (4-6).

To this mainly academic research, is added that of biotech companies including Synchron, Neuralink, Precision Medicine or Paradromics, to name only the best known. After authorization from the competent authorities, several have started implantations in humans. Synchron (in the United States in 2021, then in Australia on 4 patients in 2022) was the first. Neuralink, having received its authorization on May 26, 2023, has opened a registry allowing potential patients to register (7). This company also boasts conclusive experiments with primates. Generally speaking, these companies highlight, without always publishing them in international reviews with reading committee, technological advances (robot insertion, increased number of microelectrodes, miniaturization, simplification of the deep brain stimulation system), which could result in a better recording of neuronal activity and, from there, more efficient control signals for devices.

While the vast majority of companies investing in this area apparently aim to develop brain implants for strictly medical uses, some players, such as

Neuralink, don't hide their ambitions to equip humans with implants that can increase their intellectual capacities (memory, calculation, motivation, creativity, telepathy, etc.), thus creating a class of "augmented" human beings.

This quest for transhumanism carries very significant risks, such as creating two new categories of human beings, one whose behavior, prefigured by that of many current social media users, could remain under the control of the company responsible for the implant, establishing a new form of slavery (8-10), the other, having superior intellectual capacities allowing him to dominate the unequipped population.

In view of the announcements of the implementation, in humans, of new brain implants generation, the French National Academy of Medicine wishes to emphasize:

- the need for public authorities to support this promising area of research which brings hopes for many patients suffering in particular from neurological conditions;

- the importance of scientific publications supporting the results obtained, including in animals and the need to be vigilant and lucid face to the announcements made to the press by biotechnology companies;

- the need for health insurance organizations to cover the costs of effective and safe equipment for patients, but high cost;

- the opportunity for an international meeting during which doctors, scientists and politicians would debate a moratorium on the use of brain implants intended to increase the intellectual capacities of human beings outside the context of diseases, like the one held at Asilomar in 1975 on genetic recombinations (8), and the adoption of strict rules on the use of data generated by these implants.

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[1] Communiqué from the Academy's Rapid Communication Platform.

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