Photos: Rolf Graham, Roger Lundholm The persons in the picture are unrelated to the text.

Fighting brain diseases with ground-breaking technology

As the population in the West lives longer, it suffers increasingly from brain diseases. This means that the need for effective treatment methods is constantly growing. With the help of new technology, researchers at Lund University hope to be able to develop effective methods, with no side-effects, for the treatment and cure of severe conditions such as chronic pain, Parkinson's, Alzheimer's, depression and epilepsy.

SEARCHING FOR INCREASED UNDERSTANDING

In spite of rapid advances within the neurosciences, surprisingly little is known about how the brain works in the conscious, freely mobile individual. There are major gaps in knowledge with regard to fundamental brain functions, such as how the experience of pain occurs in the brain of a person who is awake, how the brain plans and executes motor function and how memory is impressed and retrieved. The same applies to the understanding of how activity in the nerve cells of the brain interacts in the case of chronic pain, depression and sleep disorders, and how the brain's network and functions change in the case of neurodegenerative diseases such as Parkinson's and Alzheimer's.

IMPLANTABLE ELECTRODES

In order to increase our knowledge of how the brain functions, thereby enabling the prediction of pharmacological effects on the nervous system, for example, there is a great need to develop implantable electronic technology enabling the registration of nerve cell activity over a long period of time in a freely mobile, awake individual. For the technology to be usable, it must be bio-friendly, i.e. it must not cause changes and reorganisation of the nerve cells/nerve cell circuits being studied. Nor must it worsen the condition of the tissue in a person suffering from a degenerative disease or chronic pain, for example.

The Neuronano Research Centre, NRC, at Lund University is the only one in the world to have developed and patented implantable, ultrathin electrodes – with a diameter of less than one tenth of a hair's breadth – which are so soft and flexible that they can accompany the movements of the brain without moving in relation to the nerve cells. The electrodes have a minimal effect on brain tissue and very high signal quality over a long period of time. The project paves the way for a revolution in the understanding of how the brain functions, and the new technology is predicted to contribute to dramatically improved methods for stimulation treatment of neurological conditions. At the same time, the project has the potential to reverse the decline in the Swedish pharmaceutical and medical technology industry. NRC is one part of Lund University's traditionally strong and broad research within neurology and brain diseases. "A donation is potentially crucial to the achievement of these ambitious goals and we welcome a long-term and creative interaction between researchers and donors", says Jens Schouenborg, professor and coordinator at NRC.

FUNDING NEEDS

In order to achieve a real breakthrough, two investments are crucial: prototype production and data analysis. Prototype production: engineers assisting with the development of rational and standardised production of brain electrodes. Prototype production SEK 3 million per year

Data analysis: Programmers to automate the analysis of the large amounts of data obtained from each electrode implant. Programmers SEK 2 million per year

Statisticians to process the collected data, and analyse how we can best exploit the large amounts of data provided. Statisticians SEK 1 million per year

All donations are welcome, whether large or small. Together we can work for a better world.

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