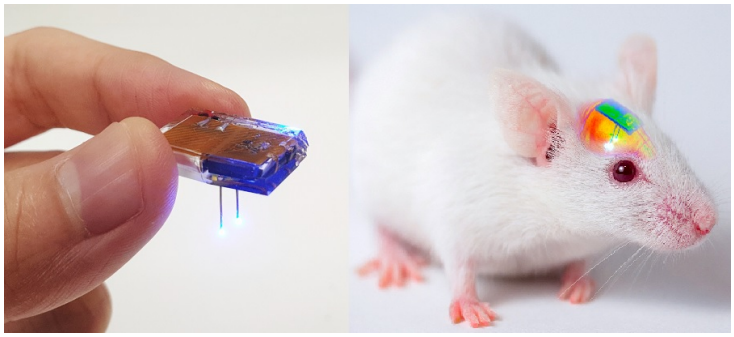
BioSpectrum
the business of Bio & Health Sciences
ASIA EDITION

Korea invents soft brain implant for treating neuro diseases

01 April 2021 | News

Hopes to uncover and treat psychiatric disorders and neurodegenerative diseases such as addiction, depression, and Parkinson's



Researchers have invented a smartphone-controlled soft-brain implant that can be recharged wirelessly from outside the body. It enables long-term neural circuit manipulation without the need for periodic disruptive surgeries to replace the battery of the implant. Scientists believe this technology can help uncover and treat psychiatric disorders and neurodegenerative diseases such as addiction, depression, and Parkinson's.

A group of researchers at the Korea Advanced Institute of Science & Technology (KAIST) and collaborators in Korea have engineered a tiny brain implant that can be wirelessly recharged from outside the body to control brain circuits for long periods of time without battery replacement.

The device is constructed of ultra-soft and bio-compliant polymers to help provide long-term compatibility with tissue. Geared with micrometer-sized LEDs (equivalent to the size of a grain of salt) mounted on ultrathin probes (the thickness of a human hair), it can wirelessly manipulate target neurons in the deep brain using light.

This study, led by Professor Jae-Woong Jeong, is a step forward from the wireless head-mounted implant neural device he developed in 2019. That previous version could indefinitely deliver multiple drugs and light stimulation treatment wirelessly by using a smartphone. For more, Manipulating Brain Cells by Smartphone.

For the new upgraded version, the research team came up with a fully implantable, soft optoelectronic system that can be remotely and selectively controlled by a smartphone. This research was published in January 2021 in Nature Communications.

The new wireless charging technology addresses the limitations of current brain implants. Wireless implantable device technologies have recently become popular as alternatives to conventional tethered implants, because they help minimize stress and inflammation in freely-moving animals during brain studies, which in turn enhance the lifetime of the devices.

However, such devices require either intermittent surgeries to replace discharged batteries, or special and bulky wireless power setups, which limit experimental options as well as the scalability of animal experiments.

"This powerful device eliminates the need for additional painful surgeries to replace an exhausted battery in the implant, allowing seamless chronic neuromodulation," said Professor Jeong. "We believe that the same basic technology can be

applied to various types of implants, including deep brain stimulators, and cardiac and gastric pacemakers, to reduce the burden on patients for long-term use within the body.”

***Image Caption**: Optical image of a wirelessly rechargeable, soft optoelectronic system held with fingers. The device is emitting blue light from its bilateral probes.*