

360° implant to treat spinal cord injuries

Thin film, flexible electronics capable of circumferentially interfacing with the spinal cord to restore motion without invasive surgery and to treat injury via electrical stimulation.

The spinal cord is a key organ of the nervous system, which is in charge of carrying information around the body. Every year between 250,000-500,000 people suffer injuries to the spinal cord worldwide. These injuries lead to irreversible problems related to mobility, breathing, bladder and blood pressure control and sexual function. Spinal cord injuries are currently treated with solutions directed to restoring motor function based on dorsal stimulation of the spinal cord through indirect activation of motor neurons.

Technology overview

The circumferential spinal cord device bypasses the spinal cord injury and achieves dorsal, lateral and ventral tract stimulation to restore lost neurological functions. To date, there have been limitations in the techniques and devices attempting to use spinal cord control signals for closed loop recording/stimulation, with coverage of limited areas of the spinal cord. This system can achieve high efficiency motor activation selectivity through novel design and fabrication techniques and the use of a combination of novel materials. This device also uses materials that limit iatrogenic neural injury, which has been a long-standing challenge in the field.

Benefits

- It uses dorsal, lateral and ventral stimulation which is more efficient to activate motor neurons to restore motion



- It can be implanted proximal to injury sites, which is desired for neural recording and decoding of motor impulses to inform spinal cord stimulation to repair injury (closed loops)
- Use of materials that limit iatrogenic neural injury

Applications

- Circumferential spinal cord simulator to bypass spinal cord injuries and restore motion
- Measurement and stimulation of spinal cord to repair injury
- Brain-peripheral nerve bypass device

This is of interest to patients suffering from any spinal cord injuries.

Opportunity

We are looking for a collaborative partner to develop and commercialise the technology. We are keen to explore multiple routes for commercialisation including establishing a company to exploit the technology and licensing to an existing company.

Inventors

Professor George Malliaras

Dr Damiano Barone

Non-PI Inventors:

Dr Alejandro Carnicer-Lombarte

References & Patents

- European patent application number 22386079.2 was filed on the 11th November 2022.
- Flexible Circumferential Bioelectronics to Enable 360-degree Recording and Stimulation of the Spinal Cord