



A fully-implantable wireless brain machine interface for functional restoration



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Background

Physical disability due to not only various neurological diseases and spinal cord injuries but also aging enlarges dissociation between biological and healthy lifetime. In globally progressing unprecedented ageing society, increased caregiver burden due to deteriorated physical function in elderly people seriously affects world economy. Demand for keeping disabled people in or returning them to social life is increasing. Brain-machine interfaces (BMIs) enable these disabled people to manipulate various devices just by imagining.

Innovative Project

Overview

- Our fully implantable BMI system records and decodes accurate brain activity, and enables disabled people to manipulate communication assistive devices and robot arms.
- The implantable BMI helps disabled people free from nursing care and to return to society, by manipulating communication assistive devices and robot arms by their selves.
- The implantable BMI may prolong healthy lifetime of elderly people as well as young and middle-aged disabled people with spinal cord injury.

Innovation

- Rehabilitation and caregiving are standard methods to help physical disability. However, efficiency of rehabilitation is limited and caregiving causes economic loss due to caregiving burden.
- Our BMI system accurately records brain activity using a fully-implantable device with high density intracranial electrodes, and precisely extract movement information from brain activity using artificial intelligence.

Impact

- The implantable BMI may prolong healthy lifetime of elderly people by 5–10 years and that of young and middle-aged disabled people with spinal cord injury by tens of years.
- Besides, the implantable BMI technology may promote reduction of caregiving burden and social activity of disabled people

Scope

- Extent of the indication of the implantable BMI will enlarge up to majority of the aged people and young and middle-aged disabled people, as the performance of the implantable BMI increases.

Projects Updates & Status

- A pivotal trial of communication control in patients with ALS using our implantable BMI system will be performed for three years from early 2022, and obtain medical approval regarding communication control. Presently institutional reviews of the trial are ongoing.
- We established a start-up company (JiMED Co., Ltd) aiming at manufacture and sales of the implantable BMI system.

Next Steps & Future Directions

- The next step is finer manipulation of robotic arms and wheel chairs.
- We finally aim at direct body control using assistive suits and implantable functional electrical stimulation.

