NeuroTREMOR

Research that is helping

to alleviate the problems arising from human limb tremors

NeuroTREMOR concept

NeuroTREMOR studied a novel concept for the study, assessment, and suppression of upper limb tremor. The system takes the form of a neuroprosthesis that attenuates the tremor through implantable neuromodulation. NeuroTREMOR performed the most advanced to date recordings of the central and peripheral nervous systems and the biomechanics of the affected limb in tremor patients. This allowed the development of the first non-invasive way of supporting tremor diagnosis based on the behavior of individual motor units in tremor, and of accessing the tremulous component of movement. NeuroTREMOR platform also use information from MRI to support clinicians in the differential diagnosis of tremors from Parkinson and Essential tremor.
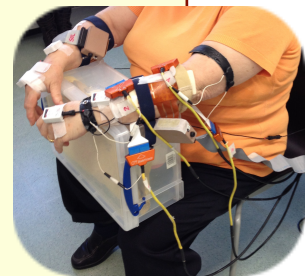

The most common movement disorder experienced as human beings become older is tremors. In fact, around 65 per cent of the population with tremors are likely to struggle with difficulties in performing daily activities. Whilst tremors themselves are not life-threatening, some of the resulting functional disabilities and social inconveniences can be very distressing for the elderly. Currently, the most common way to manage tremors is through either medication, surgery or deep brain stimulation. The problem is that for nearly one quarter of all patients these treatments are ineffective.

TREMOR SUPPRESSION

NeuroTREMOR developed and implemented functional prototypes of a neuroprothesis to evaluate tremor suppression through neuromodulation of tremor mechanisms. These prototypes incorporated the implantable electrodes, the sensors that interface with the user and the control electronics, with their corresponding software. Up to 27 users suffering from different

types of tremor participated in a series of proof of concept sessions.

The final outcome is that the novel strategies for tremor suppression defined in NeuroTREMOR has the potential to compensate tremors but further validation is required.

SUPPORT ON TREMOR DIAGNOSIS - HOSPITAL BASED PLATFORM

Tremor is the most common movement disorder and is strongly increasing in incidence and prevalence with ageing. Pathological tremors arise due to various conditions, making it very complicated to differentiate them according to their aetiology. This motivates the occurrence of exceedingly common misdiagnosis. Since treatment of tremors is disease specific, accurate diagnosis plays a fundamental role in tremor management.

The tool will provide support to both clinical tremor diagnosis and pathophysiological and neurophysiological research studies. Accurate and objective computer-aided quantification of pathological tremor will promote evidence-based tremor diagnosis, personalized tremor treatment and pathophysiological studies of different subgroups of tremor patients. Starting in the NeuroTREMOR project and further developed within the framework of the foreseen multicenter validation, a large database of reference tremor patients and their subgroups will be created, providing and interconnecting standardized

neurophysiological, clinical, neuroimaging and psychological profiles of pathological tremor patients, along with computer-aided measures of deviation of individual patients from these profiles. In order to promote the use of the system, the results of patient's classification and profile developments will be integrated into new clinical tremor assessment scales.
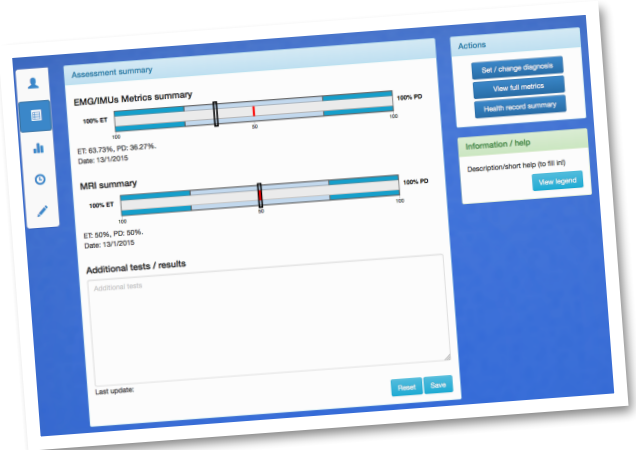
CONSORTIUM AND KNOWLEDGE TRANSFER

Results of the project so far are very positive and have encouraged the team to consider performing a large-scale multi-centre validation of the NeuroTREMOR concept, in particular in the platform to support tremor diagnosis. The benefit of this kind of study is that it will represent the clinical validation of the NeuroTREMOR concept and will ultimately help boost the overall impact of the project.

Two separate exploitation roadmaps have been drafted for a NeuroTREMOR diagnostic platform. In both cases the customers are defined as

clinicians that are able to collect specific data for their patients that is required as input into the software tool developed in NeuroTREMOR and processed to give potential diagnosis of the evaluated subject as either ET or PD patient.

Moreover, a spin-off product has been developed, and aims to reach the market. An implantable electrodes able to simultaneously record and stimulate was developed and

is under process to become available.