SCIENTIFIC BROCHURE

FESIA GRASP

fesia

The use of FES technology in neurorehabilitation

Functional Electrical Stimulation (FES) artificially stimulates motor nerves to elicit muscle contractions and thus, restore motor function.

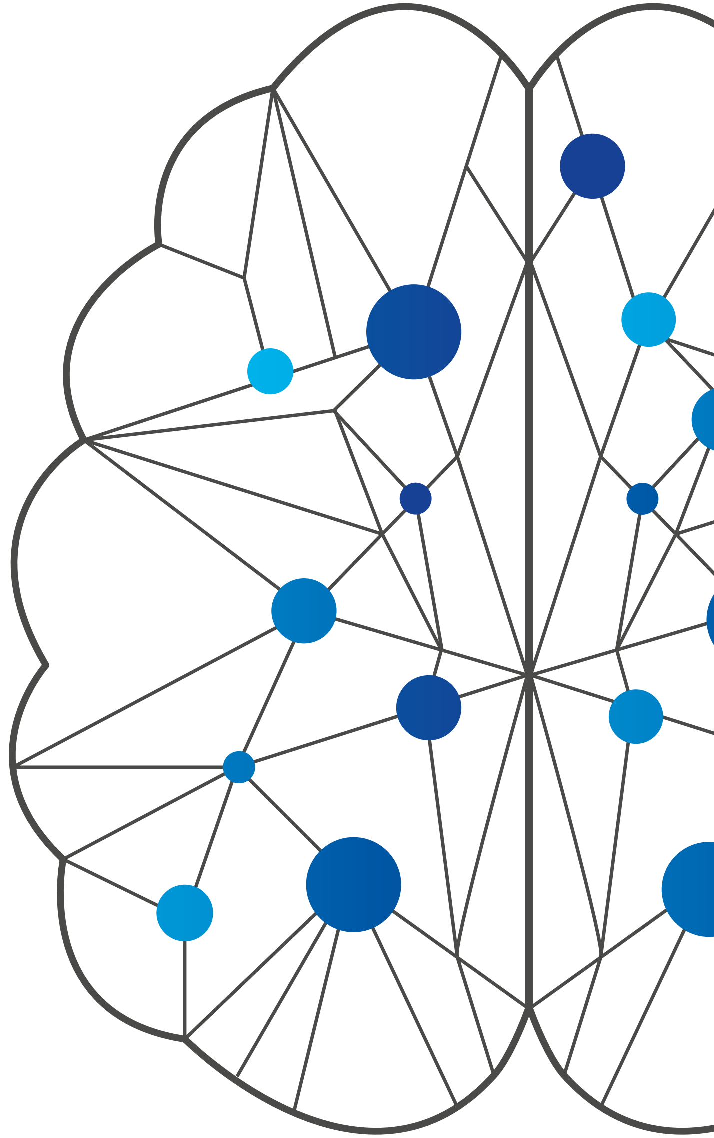
It has been used for rehabilitation purposes for more than 50 years [1], showing extensive benefits such as:

- Avoidance of muscle disuse atrophy [2].
- Maintenance of ranges of motion [3].
- Increase of local blood flow [4].
- Even therapeutic effects in terms of regaining of motor functions [5].

Neural repair

Studies have shown that FES stimulates the central nervous system, achieving improvements in different neurophysiological parameters:

- Increase in mean-absolute, root-mean-square and improved the surface electromyography power during maximum voluntary contractions [6].
- It strengthens voluntary pathways and changes some reflexes towards control values [7].
- Activation of motor cortical areas and their residual descending connections [8].
- Interlimb cutaneous inputs may access coordinated reflex pathways [9].
- It reverses axonal dysfunction [10].
- Change in reflex size to various degrees [7].
- Cortical tract excitability increase [7].



FES as an evidence-based resource for upper limb rehabilitation

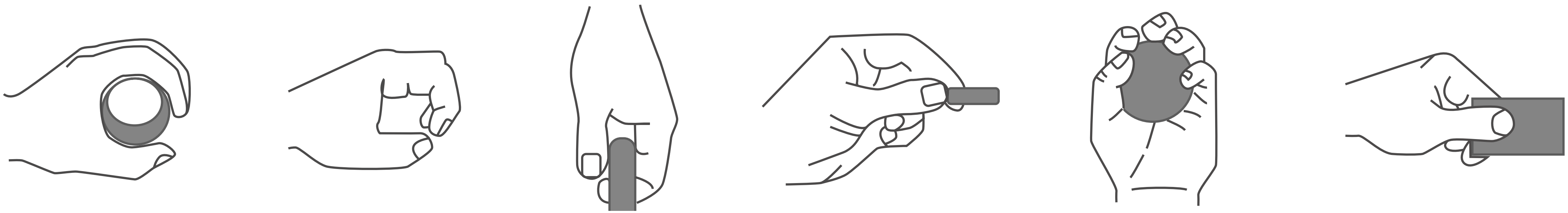
Upper limb therapy with FES has shown positive results in many parameters, improving people's quality of life.

More than 40 clinical trials have been carried out.

Improvements have been seen in biomechanical, functional and neurophysiological parameters.

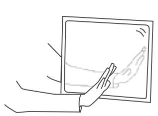
Effects:

- Improvement of motor function (differences up to 27,2 points in Fulg-Meyer Assessment) and use of the paretic arm [11].
- Activities of daily living (measured with the Barthel Index) [12].
- Functionality (differences up to 48% in the Box and Block test) [13].
- Range of motion in flexion and extension movements of wrist and fingers [14].
- 56% decrease in wrist and finger flexor muscles spasticity [15].
- Joint pain reduction [16].

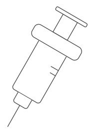


FES: Combinable with multiple therapies

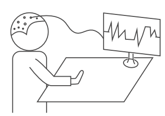
FES therapy has been extensively studied, also in combination with other therapies:



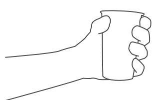
Mirror therapy



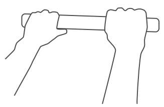
Botulinum toxin



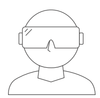
Action observation + brain computer interface



Task-oriented therapy



Bilateral arm training



Virtual reality

Clinical practice guidelines

The rehabilitation of the upper limb with FES is supported by prestigious international scientific societies, showing optimal levels of evidence:

"FES targeted at the wrist and forearm muscles should be considered to reduce motor impairment and improve function".
[Evidence Level: Early-Level A; Late-Level A]

Canadian Stroke Best Practices

"There is strong evidence that FES treatment improves upper extremity function".
[Evidence Level: 1a]

Heart & Stroke Foundation Canadian Partnership for Stroke Recovery

Fesia Grasp: the latest technology for hand function rehabilitation based on scientific evidence

Fesia Grasp has a very strong scientific background:

24 works published - Clinical research is the predominant one with a total of 18 publications and 54 persons included in the studies.

Our findings:

Studies carried out in Belgrade (Serbia) with persons with stroke showed that:

- Multi-field electrodes provide the desired level of selectivity and can be used for generating a functional grasp both in the clinical and home environments [17].
- Combining the performance of multi-field electrodes (increased selectivity and facilitated positioning) with surface-distributed low-frequency asynchronous stimulation (decreased fatigue), as **Fesia** Grasp does, improves FES applications [18].
- The use of multi-field electrodes resulted in fully functional and reproducible palmar and lateral grasps similar to healthy-like grasps [19].

A doctoral thesis developed by Dr. Imatz-Ojanguren with persons with stroke in Pamplona (Spain) showed that:

- Asynchronous stimulation (used in Fesia Grasp) resulted in lower perceived deep discomfort than synchronous stimulation and affected its efficacy [20].

A clinical study carried out in Mondragon (Spain) with persons with acquired brain injury in Mondragon (Spain) showed that:

- The multi-field electrode of Fesia Grasp allows to generate a wide range of movements of the hand. This fact allows to generate more physiological movement patterns during the rehabilitation process with FES, which could have a beneficial effect on the recovery of the persons with neurological diseases. Furthermore, the high repeatability in the generated movements could bring benefits in terms of usability [21].

Use cases:

PL. a 69-year-old female person suffered an ischemic stroke a year ago, which produced severe hemiplegia, with serious impairment of the hand function. After 10 1-hour sessions of treatment with Fesia Grasp, PL. can move her fingers selectively, has increased her grasping strength by 21% and is beginning to use her upper limb in daily living activities, such as drinking from a glass.

Fesia Clinic, San Sebastian, Spain.

A 20-year old male person suffered an AIS type-C spinal cord injury in the level C4. After 10 sessions of treatment with Fesia Grasp, he improved the results of the Box and Block test (by 11 cubes) and Nine-Hole Peg Test (by 73.1 s).

National Paraplegic Hospital, Toledo, Spain.

A. is a woman who suffered a cardioembolic ischemic stroke, which resulted in a left hemiplegia with motor impairment in upper extremity. The person started a comprehensive physiotherapy programme with Fesia Grasp. The results show great spasticity reduction effects, which were maintained 10 weeks after finishing the treatment.

Fesia Clinic, San Sebastian, Spain.

Ongoing:

A clinical trial with 20 persons with stroke in Córdoba (Spain).

Amazing use cases using our devices are being published in prestigious scientific journals. BMJ case reports published the use case of a 69 year old who suffered a cardioembolic ischaemic stroke, which resulted in a left hemiplegia with motor impairment in upper and lower extremities that made impossible for her to use the affected arm in daily living activities. The person commenced her comprehensive physiotherapy programme with Fesia Grasp. This therapy allowed to train different selective movements in isolation and combined with mirror therapy, achieving excellent functional outcomes [22].

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