Fesia Walk, the new concept of Functional Electrical Stimulation (FES) for DROP FOOT patients
Neurological diseases can affect motor control capability or, in severe cases, may cause a complete absence of muscular function; but the nerve conductivity and the excitability of the muscles remain. Because of this, Functional Electrical Stimulation (FES) technology, using electrical current to activate the nerves can, as a result, activate the muscle.

The actual incidence of stroke is between 1,254,000 and 708,000 (27-EU).

Approximately 20% of stroke survivors present pathologic steppage gait.

The new potential users of FES technology each year are between 250,000 and 141,000.

The average life expectancy after stroke is 8 years, so there are between 1 and 2 million potential users in EU right now.
Our solution

**Fesia Technology**

Our Fesia Technology-based devices enhance the capacity of FES by applying it through a multipad electrode. They all have some common elements and are based on a modular concept:

- A flexible garment that adopts the shape of the extremity/body segment where it is placed.
- A multipad electrode attached to a plastic socket.
- A stimulator.

The stimulator communicates with a PC, tablet or smartphone using serial communication over Bluetooth, a wireless interface. It can modulate the electrical impulse in frequency, amplitude, pulse width and pulse compensation. Each one of the pads is fully controllable and thus asynchronous activation of motorneurons is possible, which is important for fatigue reduction.

Asynchronous activation also improves the muscle selectivity. The multipad electrode is designed specifically for each muscle group and therefore reinforces the selectivity and also includes sensor elements, which facilitates the assessment of the user’s movement.
Fesia Walk
Patented Product for Drop Foot Patients
Our Fesia Walk patented product for drop foot patients has a 16 pad electrode attached to the garment. The garment embraces the shank just below the knee. The system also includes an Inertial Measurement Unit (IMU) sensor located and tied to the users shoe laces that continuously monitors the gait movement of the leg and determines the right point of time when the stimulation for dorsiflexion should be applied.
No external help is needed. The system donning and doffing can be done using the healthy and paretic hand (to hold, not to grasp). Single handed donning and doffing has been proven in real patients.

The use of Fesia Walk at home will give autonomy, independence and improve the quality of life for chronic patients. This advantage will also mean a substantial reduction of waiting lists, health costs, number of physician office visits, and third party dependence.

Gait speed is increased up to 35% as well as improved gait symmetry. The number of falls is reduced up to 90% and use increases the total number of steps per day (up to 18%).

Using a multipad electrode enables selective activation of desired muscles, improving the quality of induced movements (dorsiflexion, plantar flexion, inversion and eversion).

The system is able to dynamically modify active stimulation patterns for maintaining or improving the quality of induced movement.

The muscle twitch based calibration significantly reduces Fesia Walk setup duration. The automated algorithm uses IMU subsystem feedback as a reference for deriving a transfer function between selected stimulation pattern and elicited movement.

Thanks to the gait phase detection algorithm, and sensor information there are fewer muscle activation errors.
Fesia is a technology-based company launched by the applied research center TECNALIA, through its FIK initiative, aiming to develop a new approach to Functional Electrical Stimulation (FES) products for people affected by neurological diseases.

Fesia takes Functional Electrical Stimulation to a higher standard, enabling better functioning and assessment during rehabilitation therapies and bringing added value to all healthcare actors: patients, doctors, hospitals and insurance companies.