
GLOREHA
Grab your life

MELODIA

The core of **Melodia** is the **rehabilitation glove**, which can generate **flexion** and **extension** of fingers. Depending on the stage and setting of the treatment, during mobilization, the patient can either watch a **3D simulation** of the hand in motion on the screen, designed to stimulate neuroplasticity, or concentrate on his hand and the **real objects** he is invited to interact with.

MELODIA is an extremely versatile device **both for adults and children**, applicable to a wide range of patients with neurological and orthopedic deficits that offers:

MOBILIZATION HAND THERAPIES

Ideal both for starting treatment, even in absence of active movements, and for patients at a more advanced stage to increase their ROM and rehabilitate functional gestures. The rehabilitation glove generates finger flexion-extension even with hypotonia or hypertonia (max MAS=3). The 3D simulation on the screen involves the patient, facilitates his **body awareness**, and helps him maintain and rebuild the **hand cortical representation**.

AOT (ACTION-OBSERVATION THERAPY)

Melodia allows the execution of exercises based on the logic of AOT for the **activation of mirror neurons**. In this case, the session consists of two steps: first, the patient observes a motor task on the screen; once the visual preview is over, the rehabilitation glove supports the specific motor exercise performance.

FUNCTIONAL TRAINING

Every rehabilitation program aims to re-educate the patient to use the hand and the whole upper limb during the **Activities of Daily Living (ADLs)**. Encouraging interaction with **real objects** is among the main goals of Melodia. Through functional exercises, the movements of the fingers and upper limb are contextualized, suggesting the patient not to think of a movement end in itself, but rather as an action with a final purpose. Functional exercises with **gross grasp** and **pinches** (bi-digital and tri-digital) are available.

MOVEMENTS IN ABSENCE OF GRAVITY

Melodia is equipped with two **dynamic supports** that allow the patient to move the upper limb with no gravity. The compensation level is calibrated according to the weight of the arm and the residual control and movement abilities of the patient.

The silicone gloves are supplied in 6 sizes (XXS, XS, S, M, L, XL), smaller sizes are also fit for **pediatric use**. The gloves, inspired by the Soft Robotics approach, are lightweight and comfortable; they let the patient actively cooperate with the robot and complete the movements started by the device.

The software offers a wide range of possibilities to customize the therapy.

The clinician can adjust:

- passive ROM for each finger;
- speed;
- exercise timing;
- audio-video effects (songs, vocal guidance, etc.);
- all the combinations of finger flexion-extension.

TWO HANDS

MELODIA PREMIUM PACKAGE

Add a sensor glove to trigger finger mobilization: it can be worn by the therapist or put on the patient's contralateral hand

BILATERAL MIRROR TRAINING

Bilateral Training is a **new and unique approach** of the Gloreha device: while the hemiplegic/hemiparetic patient actively moves the healthy hand, at the same time, the robotic glove generates a similar movement on the other hand.

The mirror motor mechanism, the observation of two moving 3D hands, and the **execution of bilateral functional tasks** with real objects amplify the stimulation of the cortical areas.

- Like in traditional **Mirror Therapy**, the patient is stimulated by observing the affected hand moving.
- In addition, **real motor training is generated by the system**, amplifying the positive effects of rehabilitation.

THERAPIST-DRIVEN MOBILIZATION

Therapists wear a glove endowed with sensors to **dynamically guide the movement** of the mobilization glove on the **patient's hand.**

- **Timing and amplitude** of finger flexion and extension movements are therefore managed by the operator in **real-time**, allowing the therapy to be constantly customized, depending on the patient's response and the specific motor task proposed.

- The **controller-follower** logic application amplifies the rehabilitation glove potential, synergizing with the relationship of trust and empathy between therapist and patient.

ACTIVE ASSISTED

MELODIA PREMIUM PACKAGE

Expand the Melodia potential thanks to exercises based on using the patient's active motricity of the hand

ASSIST-AS-NEEDED TECHNIQUE

During these exercises, the patient is instructed to **independently start the motor task** (flexion and extension of the fingers): the robotic glove will **assist only when necessary**.

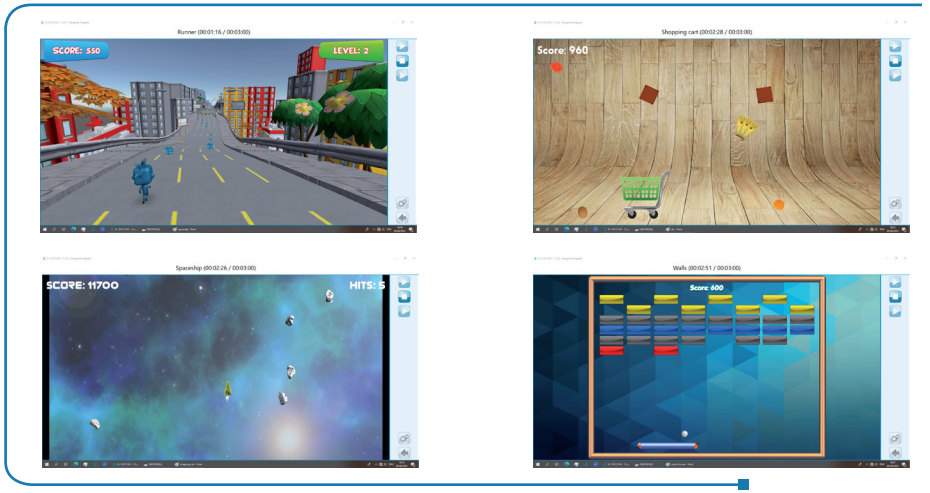
- **Performance indexes** give immediate feedback on the degree of **autonomy** of the patient in flexion and extension.
- The **data** of each session are reported in intuitive graphs and **can be exported** to pdf/excel files to monitor the patient's progress.
- The therapy can be oriented towards functional recovery thanks to exercises that involve **interaction with real objects**.
- The software offers a **high degree of customization** of the exercise: the therapist can set different parameters and vary the level of difficulty.

HAND GAMES

The device takes advantage of the sensor glove, which acts as a transformative tool by **turning the patient's hand into a game controller**. This innovative feature allows for engaging and interactive games that have been specifically designed to improve grasping and picking movements, enhancing **speed**, **dexterity**, and **coordination**.

This therapy offers a remarkable option known as **Focus**, enabling the therapist to actively regulate and choose the **specific area of the screen** with which they want the patient to engage. This feature is particularly valuable when addressing **neglect-related challenges**.

To further assist patients and therapists, intuitive graphs are generated at the end of each exercise. These visual representations provide a comprehensive **overview of the recorded progress**, facilitating detailed improvement monitoring over successive sessions.



WRIST ARM BRAIN

MELODIA PREMIUM PACKAGE

Play the serious games designed to train the whole upper limb, as well as neurocognitive skills and functional tasks

UPPER LIMB GAMES

The software offers several **challenging and recreational exercises** based on active movements of the upper limb detected by dedicated sensor. The graphics interface involves the patient and enhances the playful aspect of the treatment. The software records the levels of performance and offers an intuitive **assessment platform**.

The patient is free to actively **move the arm in space**, facilitated by a system for **weight compensation**. The sensor can detect:

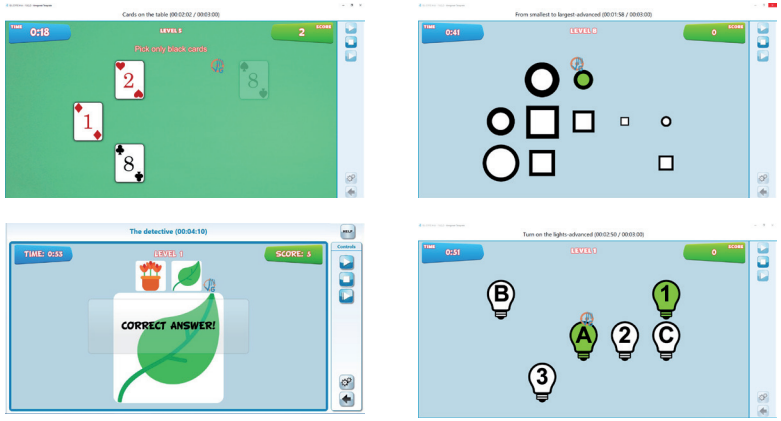
- flexion-extension of the fingers,
- pronation-supination of the wrist,
- radial-ulnar deviation,
- flexion-extension of the wrist,
- movements of the arm on the vertical and horizontal plane (back-forth, left-right, up-down)

COGNITIVE EXERCISES

In a comprehensive rehabilitative path, **neuro-cognitive recovery must support motor recovery.**

Specific exercises train cognitive abilities such as **problem-solving, memory, shifting skills, selective attention, visuo-spatial exploration skills, sustained attention**, etc. The combination of motor and cognitive tasks also trains divided attention, a skill of essential importance to perform many ADLs.

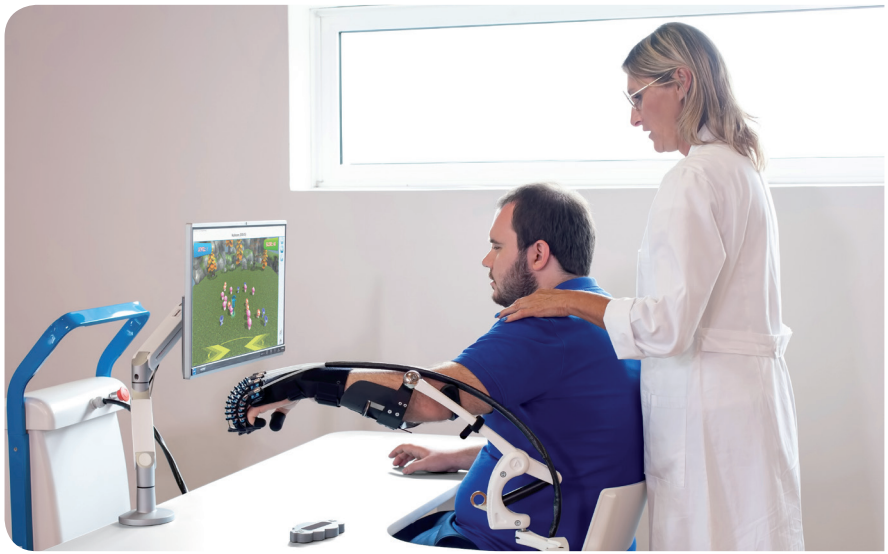
- The **difficulty level self-adapts** based on the patient's abilities
- The playful aspect and the combination of motor tasks facilitate the level of compliance of the patient with a cognitive deficit
- The fundamental principles of neuropsychological treatment have been included in the exercises proposed
- **Colors, numbers, images, playing cards**: the software offers interactive exercises of cognitive stimulation tailored to the patient



FUNCTIONAL EXERGAMES

It is possible to simulate complex reaching actions involving the proximal district and distal extremities following an **active-assisted approach**: the patient can **actively move his arm with no gravity**; when he reaches the target area, the rehabilitation **glove intervenes** to support flexion and extension of the fingers.

- The **difficulty level** of the exercise can be programmed by the therapist or **self-adapted** based on the patient's performance
- **All scores can be viewed** on the screen and **downloaded to a pdf/excel** file
- The glove can support grasping and pinches.



COMPOSE YOUR FAVORITE SOUNDTRACK

MELODIA

- MOBILIZATION HAND THERAPIES
- AOT (ACTION-OBSERVATION THERAPY)
- FUNCTIONAL TRAINING
- MOVEMENTS IN ABSENCE OF GRAVITY

+ TWO HANDS

MELODIA PREMIUM PACKAGE

- BILATERAL MIRROR TRAINING
- THERAPIST-DRIVEN MOBILIZATION

+ ACTIVE ASSISTED

MELODIA PREMIUM PACKAGE

- ASSIST-AS-NEEDED TECHNIQUE
- HAND GAMES

+ WRIST ARM BRAIN

MELODIA PREMIUM PACKAGE

- UPPER LIMB GAMES
- COGNITIVE EXERCISES
- FUNCTIONAL EXERGAMES

AIDA

AIDA is the **next-generation device for neurocognitive learning** and rehabilitation, based on **eye-tracking**: the patient trains his mind by simply interacting with the eyes.

Aida recognizes what the patient is looking at. On the device screen, exercises and games with different degrees of complexity are proposed: the patient is the protagonist of his treatment session through eye interaction. The Aida infrared eye-tracker, positioned at the base of the screen, reads eye movement and **interprets the patient's choices** in response to the stimuli proposed each time.

The use of Aida enables the neurocognitive rehabilitation process to begin at an **early stage of treatment**, promoting early stimulation.

Treatment starts after a quick calibration session.

The software automatically **adapts difficulty levels** according to the patient's performance and allows the therapist to customize parameters to optimize each rehabilitation session's effectiveness.

This technology enables to propose neurocognitive exercises to patients with a diversified medical history, thus ensuring that the complexity of patients with neurological disorders can be better managed:

- patients who **cannot use the verbal channel**
- patients with severe **paralysis** of voluntary limb movements
- patients with **neurodevelopmental disorders**
- patients for whom early **fatigue** makes it difficult to perform some exercises.

The software proposes many exercises developed in **collaboration with neuropsychologists**, designed to train specific neurological skills.

MAESTRO

Early and intensive mobilization can prevent dysfunctional reorganization of brain activity, avoid adhesions, contractures, and immobilization damages, improve joint metabolism and lymphatic and blood circulation, and maintain or even increase joint ROM.

MAESTRO is the **transportable** hand mobilization device that can be used in an **early phase on bedridden patients**, even if the patient has no **residual active movement,** and, subsequently, to support the recovery of **functional actions** with real objects.

The core of Maestro is the rehabilitation glove, which can generate both flexion and extension of fingers. The silicone gloves, which are easy to sanitize, leave the palm free to facilitate fitting even with spasticity, avoid grasping reflex, limit sweating, and facilitate grasping of objects.

The patient is not constrained to a predefined position: wrist and arm can be moved freely by the patient during therapy.

Maestro may be placed:

- next to **the patient's bed**, allowing rehabilitation treatment to begin already in the **acute phase**,
- in the **rehabilitation gym**, to carry out treatments with patients in a s**itting or standing position**,
- in an **occupational therapy room** to help patients train in **activities of daily living** (ADL).

CLINICAL INDICATION

Gloreha devices are extensively used on **neurologic patients with motor and/or cognitive deficits.** They can be effectively applied in sub-acute as well as in the chronic phase to support distal, proximal, functional, and cognitive recovery.

The most frequent indications are Stroke, Traumatic Brain Injury, Spinal Cord Injury, Cerebral Palsy, Parkinson's Disease, Peripheral Neuropathies, and Neurodevelopmental Disorders.

Gloreha devices can also be helpful supports for treating of patients with musculoskeletal disorders and the post-operative stage.

"According to recent literature, the hand rehabilitation program with Gloreha provides an intensive, repetitive, functional, task oriented, specific, and customizable treatment. [...] The exercises with devices work on plasticity in the central nervous system due to the neuromotor, audiovisual feedback: the multisensory action-observation system enables patients to re-learn impaired motor function through the activation of internal action-related representations. [...] Our results showed a great improvement on the ADL and positively marked functional recovery of motor function. An important aspect of our study was the association of robotic therapy with the traditional rehabilitation-based approach of physiotherapy and OT to provide more full and intensive sessions to improve the outcome."

Milia P, Peccini MC, De Salvo F, Sfaldaroli A, Grelli C, Lucchesi G, et al. Rehabilitation with robotic glove (Gloreha) in poststroke patients. Digit Med 2019;5:62-7

"Robot-assisted training using the Gloreha device demonstrated beneficial effects on body structure and function, including upper extremity motor function, brachioradialis muscle recruitment, and coordination, in children with Cerebral Palsy. The beneficial effects were maintained 1 month after training termination."

Kuo FL, Lee HC, Hsiao HY, Lin JC. Robotic-assisted hand therapy for improvement of hand function in children with cerebral palsy: a case series study. Eur J Phys Rehabil Med. 2020 Apr;56(2):237-242. doi: 10.23736/S1973-9087.20.05926-2. Epub 2020 Jan 14. PMID: 31939267.

"Gloreha glove is feasible and effective in recovering fine manual dexterity and strength and reducing arm disability in sub-acute hemiplegic patients. [...] Patients in the treatment group significantly improved the motor function of the paretic upper limb (Motricity Index), their coordination and mono-manual dexterity (Nine Hole Peg Test) and strength (Grip and Pinch) in contrast to controls, and the cost savings was considerable."

Vanoglio F, Bernocchi P, Mulè C, Garofali F, Mora C, Taveggia G, Scalvini S, Luisa A. Feasibility and efficacy of a robotic device for hand rehabilitation in hemiplegic stroke patients: a randomized pilot controlled study. Clin Rehabil. 2017 Mar;31(3):351-360. doi: 10.1177/0269215516642606. Epub 2016 Jul 10. PMID: 27056250.

CLINICAL BENEFITS

- Maintenance and improvement of the joint range
- Proprioceptive stimulation
- Improvement of visual-spatial and attentive skills
- Increase in functional independence
- Reduction of pain, edema and hypertonia
- Prevention of adhesions, contractures, and immobilization damages
- Improvement of joint metabolism, lymphatic and blood circulation
- Maintenance of functional skills and body perception
- Increase in coordination and dexterity
- Increase in grip and pinch strength

CLINICAL REFERENCES

Prof. Alberto Esquenazi,
MossRehab & Magee Rehabilitation Hospitals
USA

"Being first in the US implementation of robotics for rehabilitation means we know where the next important contribution to rehabilitation is. Allowing access at MossRehab to Gloreha Sinfonia opens the door for patients to participate in bimanual activities as a key element to their rehabilitation"

Ullrich Thiel
Hellmuth & Thiel Praxis
Germany

"Gloreha glove offers the patient the possibility to feel the object, grasp it autonomously and to benefit of a high quality proprioception stimulation"

Dr. Luciano Bissolotti
Domus Salutis Rehabilitation Center
Italy

"I had the opportunity to realize how much the robotics, in particular Sinfonia, was able to quickly act to the mutual satisfaction of the clinician and the patient.
In particular, within a few sessions, it was immediately possible to record a reduction in focal spasticity with a significant reduction in the Ashworth scale values"

Dr. Franco Molteni
Villa Beretta Rehabilitation Center
Italy

"The movement is experienced, imagined and perceived by the patient, thanks to the execution of activities the glove makes possible"

Tatiana Jeglic
Center Fizioterapije Ljubljana
Slovenia

"I chose Gloreha because it allows the patients to really feel and manipulate the objects, and also bimanual or bilateral activities. We can really improve their ability to perform their daily life activities in better quality of movement"

Rev. A

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