Stella BIO

EGZOTech

ELECTROMYOGRAPHY & ELECTRICAL STIMULATION

FOR CLINICAL & HOME USE

WELCOME TO STELLA BIO THERAPY CONCEPT

Easy & Fun Functional Therapy with the Most Sensitive EMG and FES

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StellaBIO


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Stella BIO is the world's most sensitive electromyograph with implemented electrostimulation.

- 4+2 channel EMG+EMS
- the most sensitive EMG on the market
- for home and clinical use
- web-based application works on phones, tablets and computers

Stella BIO has pre-written programs for different patients groups - neurological, patients with pelvic floor disorders, orthopedic, but also for pain management and sports.

Stella BIO is based on **four main concepts:**

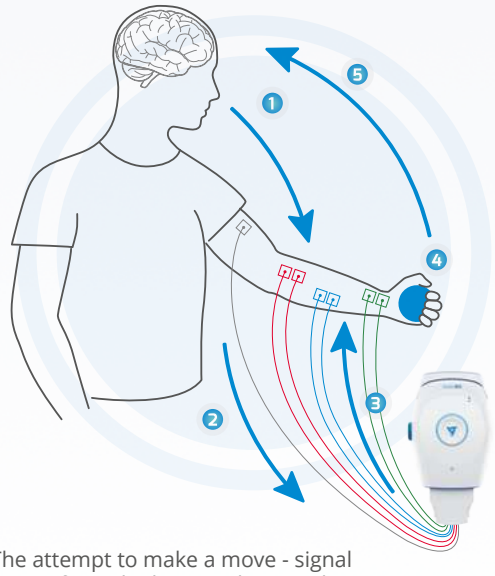
- EMG-triggered functional electrical stimulation (EMG-FES, FES)
- Electrical muscle stimulation (EMS)
- Electromyography measurements and biofeedback (EMG Biofeedback)
- Transcutaneous electrical nerve stimulation (TENS)

MAIN CONCEPTS

1 EMG-triggered functional electrical stimulation (EMG-FES)

EMG-triggered functional electrical stimulation (EMG-FES) is an intervention that combines 3 modalities: functional electrical stimulation, biofeedback, and exercise.

Patient initiates the movement. When EMG activity reaches a pre-set threshold level, the functional electrostimulation starts.

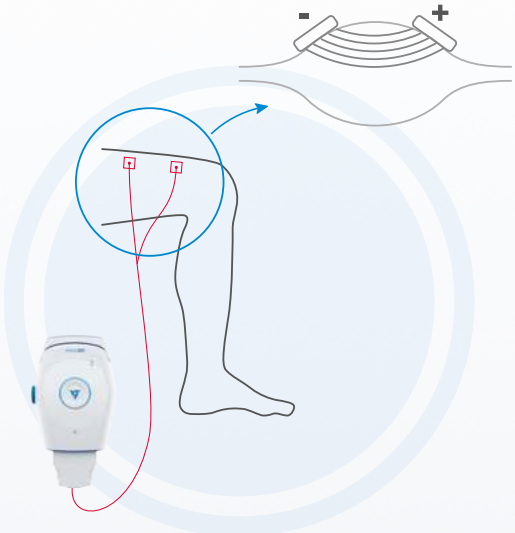


1. The attempt to make a move - signal is sent from the brainto the muscle.
2. EMG signal from the muscle is received by Stella BIO.
3. Electrostimulation is applied to the muscles, in a special sequence.
4. Functional movement is performed.
5. Voluntary activity is enhanced by electrostimulation and has an impact on neuroplasticity.

2 Electric muscle stimulation (EMS)

Electric muscle stimulation (EMS) is a way to trigger muscle contraction via external electric impulses.

Depending on the patient goal different stimulation parameters can be applied to achieve the best results.

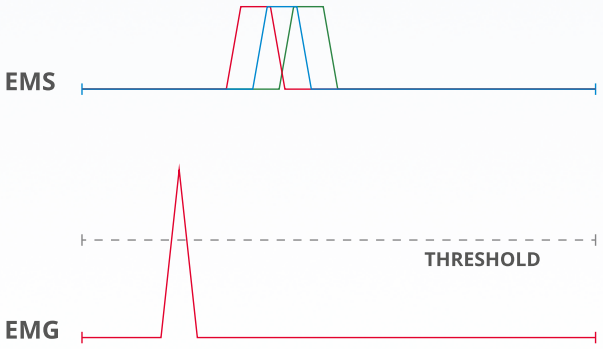


„Electrical stimulation for strengthening is useful clinically in cases involving immobilization or contraindications to dynamic exercise to prevent disuse atrophy, in early rehabilitation by facilitating muscle contraction, and in selective muscle strengthening or muscle re-education."

(Watson 2008)

*„Meta-analysis, which reviewed articles in regards to post stroke recovery, shows that **EMG-triggered neuromuscular stimulation is an effective poststroke protocol.”***

(Bolton et al. 2004)

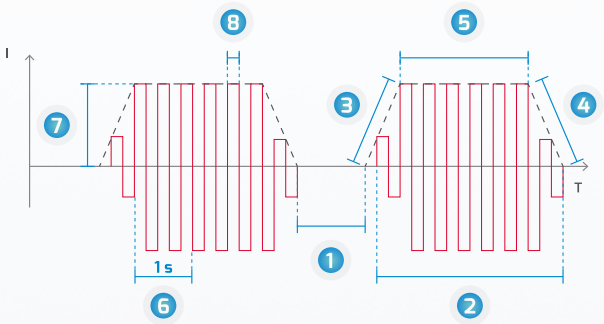


EMG-triggered EMS - amplitude over time.

EMG activity from one channel results in electrostimulation sequence of three EMS channels.

*„Review on the effect of electrical stimulation on the musculoskeletal system shows that 25 trials revealed **a positive effect of electrical stimulation on soft tissues and joints.”***

(Akai et al. 2002)



Parameters of an electrical muscle stimulation.

1. REST
2. CONTRACTION
3. RAMP - UP
4. RAMP - DOWN
5. PLATEAU
6. FREQUENCY
7. AMPLITUDE
8. PULSE WIDTH

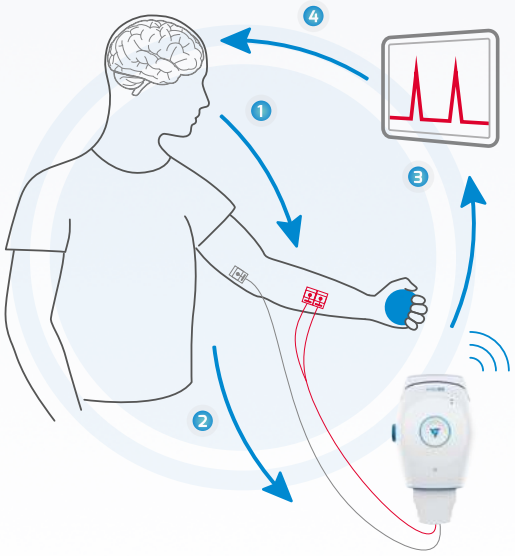
MAIN CONCEPTS

3 EMG biofeedback

EMG biofeedback is a method of retraining muscle by creating new feedback systems as a result of the conversion of electrical activity of the muscle into visual and auditory signals.

*„Results indicate that **EMG-BF is an effective tool for neuromuscular reeducation** in the hemiplegic stroke patient."*

Moreland et al. 1998

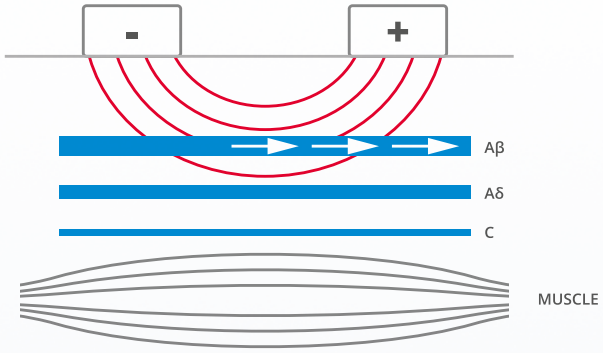


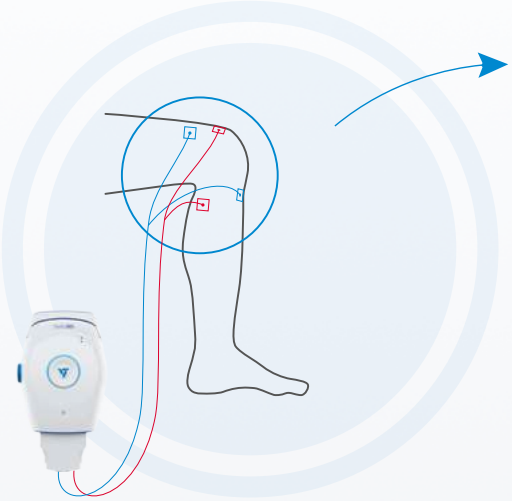
1. The attempt to make a move - signal is sent from the brain to the muscle.
2. EMG signal from the muscle is received by Stella BIO.
3. EMG signal is visible on the screen.
4. Voluntary activity is enhanced through biofeedback and has its impact on neuroplasticity and motor learning.

4 Transcutaneous electrical nerve stimulation (TENS)

Transcutaneous electrical nerve stimulation (TENS) is a therapy that uses low voltage electrical current to provide pain relief.

Pulses aimed at the nervous system, through selectively activation of large-diameter Aβ fibres (touch related) and block the transmission of pain signals from reaching the spinal cord and brain. The pulses also stimulate the body to produce more natural pain-relieving chemicals - endorphins.





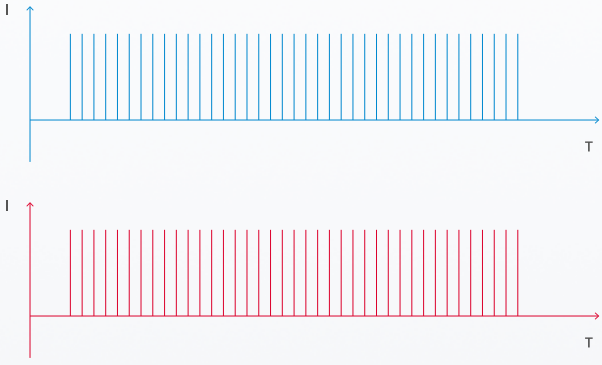
„Review of pelvic floor muscle physiotherapy (PFMT) and biofeedback (BF) shows a benefit for patients suffering from bladder dysfunction (incontinence, overactive bladder), bowel dysfunction (constipation, fecal incontinence), pelvic organ prolapse, and sexual dysfunction (pelvic pain).”

(Arnouk et al. 2017)

EMG activity over time - exceeding the set threshold line

„Meta-analysis focusing on back pain showed that treatment of chronic low back pain with TENS demonstrated significant pain reduction. The application of TENS may lead to less pain medication usage and should be incorporated into the treatment armamentarium for chronic low back pain.”

(Akai, M. and Hayashi, K., 2002)



Continuous TENS stimulation - amplitude over time

PATIENT GROUPS

NEUROREHABILITATION

Neurological patients:

- STROKE
- TRAUMATIC BRAIN INJURY
- SPINAL CORD INJURIES
- MULTIPLE SCLEROSIS
- CEREBRAL PALSY
- MOTOR NEURON DISEASES
- NEUROPATHIES
- FOOT DROP SYNDROME
- FACIAL PALSY
- RECOVERING FROM NEUROSURGICAL INTERVENTIONS
- NEUROMUSCULAR DISEASE

can benefit from:

- regain of lost functions
- strengthening of the muscles
- decrease of the spasticity
- improvement of the coordination

EMG-triggered electrostimulation EMG-FES among neurological patients:

- is used to enhance voluntary movement
- requires cognitive involvement by the motor cortex
- improvement following EMG-FES was reported to be accompanied by changes in somatosensory cortex activation.

EMG Biofeedback is making neurological patients more aware of muscle activity and helping them to control the level of muscle contraction applied.

Patient can train functional tasks eg. opening and closing the hand, grasping an object or training hand to mouth move.

Stella BIO also contains programs for electrostimulation of denervated muscles.

ORTHOPEDY

Orthopedic patients:

- RECOVERING FROM SURGICAL INTERVENTIONS
- WITH MUSCLE WEAKNESS DUE TO LACK OF MOBILITY
- WITH MUSCLE DISEASES OR INJURIES
- AFTER LIMB AMPUTATION

can achieve:

- decrease of pain
- prevention of muscle disuse
- strengthening muscles

Stella BIO has predefined orthopedic programs implemented, such as:

- atrophy training
- muscle spasm relaxation
- circulation training
- agonist/Antagonist training

"We've used Stella BIO as a part of our rehabilitation process. While using the EMG Biofeedback programs, my son was rediscovering his body and his muscles, how they work. Games are an excellent motivator for Kajetan and they work really well. "

Beata, Kajetan's mom
(Spinal Muscular Atrophy patient)

SPORT

Healthy athletes can choose out of several sports programs:

- EXERCISE PREP
- ACTIVE RECOVERY
- ENDURANCE TRAINING
- STRENGTH TRAINING
- POWER TRAINING
- MASSAGE

EMS and EMG Biofeedback programs implemented in Stella BIO can shorten the rehabilitation process and reduce complications. Stella BIO is a great tool, when a patient needs to improve muscle strength, but physical movement or training is prevented by pain and/or acute injury.

PATIENT GROUPS

PELVIC FLOOR DISORDERS

Training with Stella BIO leads to improvement of:

- URINARY INCONTINENCE (URGE, STRESS AND MIXED INCONTINENCE)
- FECAL CONTROL
- SEXUAL DYSFUNCTIONS
- PELVIC FLOOR DYSSYNERGIA - CONSTIPATION

Learning to control and strengthen pelvic floor muscle is crucial in therapy of pelvic floor disorders.

Stella BIO is dedicated for prevention and therapy of pelvic floor dysfunctions among:

- women after labour
- women practicing high-impact sports
- older men and women with weak pelvic floor due to aging
- men after prostatectomy

An intensive and EMG-biofeedback assisted PFMT is very effective. Often, avoidance of surgery is possible.

(Dannecker et al. 2005)

Jerez et. al. through the literature review in 2013, confirms that most of the clinical trials conclude that electrostimulation is effective in the treatment of urinary incontinence and overactive bladder in women.

(Jerez-Roig et al. 2013)

Stella BIO

PELVIC FLOOR DISORDERS

"I've been using Stella BIO for 6 months now, after my prostatectomy surgery. My incontinence symptoms has improved and I am glad that I can train at home."

Zygmunt, 71 years"

"I used Stella BIO for 4 weeks and the urinary leakage during coughing and sneezing it's totally gone."

Agnieszka, 34 years"

PATIENT GROUPS

PAIN MANAGEMENT

TENS programs implemented in Stella BIO may help treat the following symptoms:

- HEADACHE
- NECK PAIN
- UPPER BACK PAIN
- LOW BACK PAIN
- HAND PAIN
- ELBOW PAIN
- SHOULDER PAIN
- FOOT PAIN
- KNEE PAIN
- HIP PAIN

Using different kind of TENS programs:

- conventional
- frequency modulated
- acupuncture-like TENS (AL-TENS)
- burst

acute and chronic pain can be managed.

TELEREHABILITATION

To achieve the therapeutic goals, the patient needs to work both in the clinic and at home.

Thanks to implemented telerehabilitation platform, physical therapist is able to:

- SCHEDULE PATIENT'S HOME TRAININGS
- REMOTELY MONITOR PATIENT ACTIVITY AND THERAPY PROGRESS
- MOTIVATE THE PATIENT
- SCHEDULE THEIR NEXT APPOINTMENT

ENJOY THE TRAINING!

REHABILITATION GAMES

Stella BIO offers online games, which makes every training with EMG even more fun.

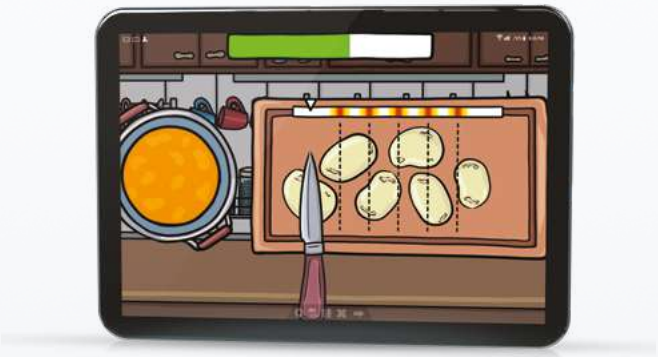
Games can be played through 1 or 2 EMG channels. One channel training allows to work on contraction and relaxation of one muscle group, two channels will enable training of antagonist or bilateral training.

Check out our games:

„Brick Pirates"

„Burgermania"

„Slice in Dice".



TECHNICAL SPECIFICATION

DIMENSIONS & WEIGHT (WITHOUT ACCESSORIES):

Total length:	9.15 cm (3.60 in)
Total width:	6.84 cm (2.70 in)
Total height:	2.40 cm (0.95 in)
Total weight (with battery):	112 g (0.25 lbs)

ELECTROMYOGRAPHY:

Electromyography measurement channels:	Up to 8, simultaneous sampling
Electromyography accuracy:	± 0.5 % full scale
Baseline noise:	< 0.5 µV RMS
Measurement resolution:	± 6 000 µV: 0.1µV
Sampling frequency:	Up to 4 000 samples per second per channel
Internal sampling:	24-bit
Impedance measurement accuracy:	± 0.5 kΩ
Input impedance:	> 100 MΩ

ELECTRICAL STIMULATION:

Electrical stimulation channels:	Up to 8, sequential
Up to 8, sequential	Low-frequency, dual-phase, and direct current free rectangular, triangular, and trapezoidal pulses, electromyography-triggered
Maximum output voltage and current:	50 V / 100 mA at 500 Ω
Waveform generation accuracy:	± 0.5 % full scale
Output Resolution:	16-bit
Sampling frequency:	Up to 1 000 000 samples per second
Load impedance:	500 - 2000 Ω

ENVIRONMENTAL

Operating temperature:	0 °C to 40 °C
Operating humidity:	10 % to 90 % RH, not-condensing
Maximum operating altitude:	3 000 m a.s.l.
Cooling:	convectional
Liquid ingress and solid particle protection:	IP32
Mobility:	Transit-operable, hand-held, body-worn under the operating environmental conditions listed above.
Operation type:	Continuous, software controlled

OTHERS

Power supply:	Battery powered Lithium-Ion 7.4 V, 700 mAh (5.18 Wh)
Applied part type:	BF
Communication:	WiFi 2.4 GHz (IEEE 802.11), Bluetooth Low Energy.

Stella BIO requires constant and reliable internet connection.

CE 2274

SCHEDULE A **STELLA.BIO DEMO**
TODAY AT **EGZOTECH.COM**

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