BioXtreme
Reprogramming the mind

Transformative Technology for Upper Limb Neurorehabilitation

deXtreme™
Error Enhancement Technology

Rebuilding Motor Learning and Instilling New Dexterity for Stroke and TBI Patients

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deXtreme™

Innovative Technology for Post-Stroke Rehab

BioXtreme's solution uses the body's adaptive response (a universal bio-mechanical phenomenon), thus bypassing cognition, for an automatic, intuitive movement. Our methodology shortens upper limb post-stroke recovery time and dramatically improves position accuracy and stability while increasing patients' range of motion (compared to other treatment methods).

Rapid Motor Recovery

Unique treatment protocol allows upper limb rehab period of only two weeks!

Visible Change

Patients' motor improvement is immediately visible, in both quantity and quality of movement

Regain & Retain

Error enhancement improves the brain's capability to regain & retain lost movements

Accelerate, Stimulate, Encourage

deXtreme™ opens the brain's motor drawer by applying error enhancement forces

Backed up by Evidence

deXtreme™ is validated by 5 completed and published clinical trials

BioXtreme vs. Traditional Rehab Comparison

deXtreme™

- Groundbreaking error enhancement technology
- 2 weeks rehab period, significant improvement in motor results

Traditional

- Corrective & assistive treatment methods
- Long rehab period, limited motor improvement

> BioXtreme's deXtreme brings innovation in both Hardware and Software. Exercise control by means of precise error provides stroke patients with an excellent training path.

Dr. Franco Molteni, Clinical Director
Villa Beretta Rehabilitation Innovation Research Institute, Costa Masnaga, Italy

Significant Improvement in Motor Recovery

Based on error enhancement forces applied during motor practice, BioXtreme has developed a robotic device for upper limb rehab of post-stroke patients. Utilizing a 3D VR exercise environment to motivate patients, the deXtreme™ device delivers unparalleled results in the field of neurorehabilitation.

Short set-up time

No harnessing, no strapping, no complicated calibration processes needed. Set up for both therapist and patient is easy and fast, allowing maximum use of therapy time.

Easy to use

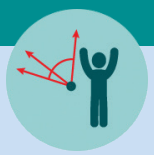
Patient engagement to the device is simple and intuitive. Switching left and right arm is instant with minimal therapist involvement. The device allows direct wheel chair access.

Adaptive learning

Advanced AI algorithms combined with ongoing machine learning allow for realtime adjustments according to patient's progress and provide accurate, comprehensive data to therapists.

Error Enhancement Technology

Adaptive Response
Our method is based on the body's reaction to changes in environmental forces



Error Enhancement
A robotic system applies error enhancement forces during motor practice

Instinctive Correction
The forces applied trigger the patient to the immediate instinctive correction of movement

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> “There are many advantages to deXtreme™ as a therapy tool in the recovery of post stroke patients, and I can clearly see the improvement in arm functionality after using the system.”

Shiran Dahari-Yakobovich, Occupational Therapist
Reuth Rehabilitation Hospital
Tel-Aviv, Israel

Validated by Clinical Trials

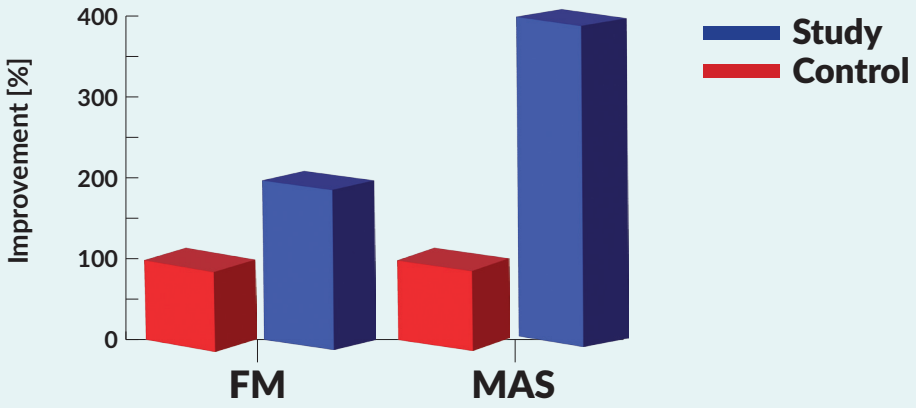

Diagram 1 - Comparisons of clinical scores (MAS & Fugl-Meyer) of combined low and high skills patient groups

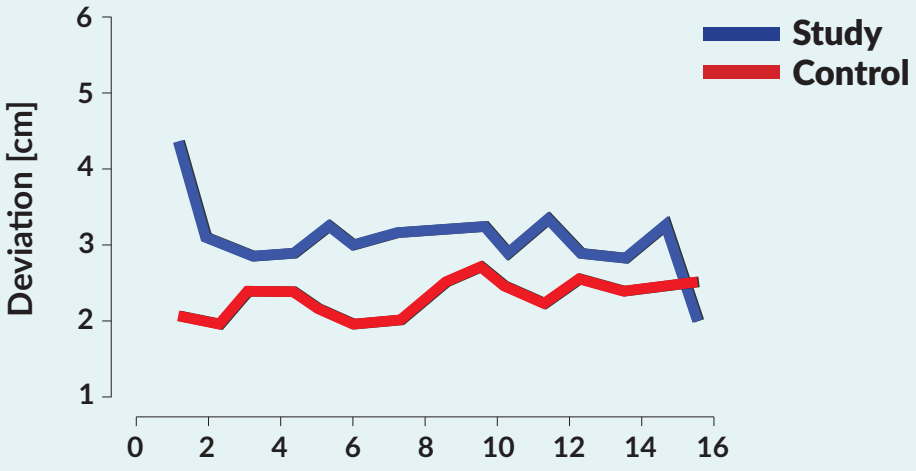

Diagram 2 - Comparisons of deviation (motor error) during practice, in games were groups were either exposed to error enhancement forces (study) or not (control)

Source for both diagrams:
Robotically driven Error Augmentation training enhances post-stroke arm motor recovery
Eli Carmeli et al Engineering reports Wiley DOI: 10.1002 / eng 2.12720

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BioXtreme Rehabilitation Robotics is instilling new dexterity for stroke and other neuro injuries patients.

Using a patent-protected groundbreaking technology, BioXtreme has developed a robotic system for motor rehabilitation for stroke and other neurological injuries.
Our product, Dextreme™ does automatic rebuild of motion range through automatic/intuitive learning. Based on unique robotic system that applies Error Enforcement forces, BioXtreme technology helps reprogramming the mind for extreme performance.

Clinically validated
CE & FDA registered
Patent protected

deXtreme™ Features

- Virtual environment in 3D to create movement exercising scenes.
- A robotic arm engaged to the upper limb for movement practice, as well as motor detection.
- Algorithms to calculate and command error enhancement forces, a realtime control system commanding 3 motors applying forces in 3 dimensions.
- Machine learning and AI - patient data stored in Cloud to maximise treatment efficiency.

Advantages & Innovation

Revolutionazing Neurotherapy

New inherent therapy treatment.

Current robotics - focusing on automation of human treatment. dextreme™ - automatic rebuild of motion capability through adaptive learning.

Decreasing Rehabilitation period

Recovery period shortened by approx. 50%.

BioXtreme patients achieve 100% motor range improvement compared to other therapy methods.

Groundbreaking Technology

Adaptive product to each patient's individual rehab scheme. System is adaptive for patient and operator's needs to achieve maximum impact.

A smart, learning system, motivational and work-encouraging for the patients through user-friendly interface.

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BioXtreme: “Error” on the side of Outcomes

BioXtreme is revolutionizing Rehabilitation Robotics through its groundbreaking Error Enhancement Technology, advancing outcomes for patients having experienced a stroke or other neurological conditions. BioXtreme’s unique Error Enhancement technology not only influences brain neuroplasticity but also influences muscle plasticity as well - resulting in true neuromuscular reeducation. BioXtreme has developed a robotic system for upper limb motor rehabilitation - deXtreme™. deXtreme™ drives proven outcomes by leveraging technology in creating a new therapeutic approach for intuitive patient learning. Research shows improvements between 59% to 150% in Low and Mild Skilled patients versus traditional therapy methods as measured by MAS (Motor Assessment Scale), and shortened therapy periods.

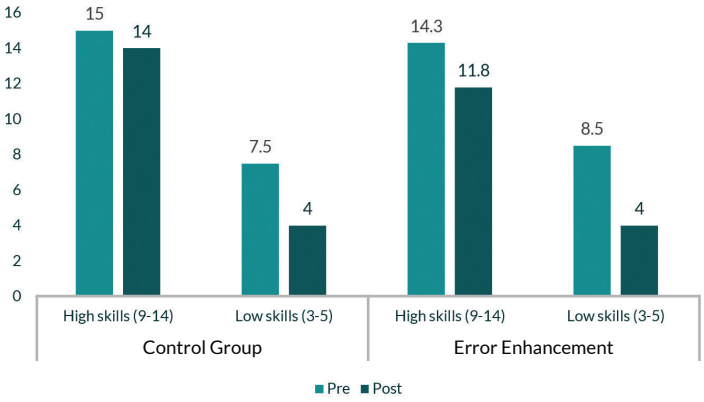
deXtreme™: reprogramming the mind and body for extreme performance!

deXtreme™ Features

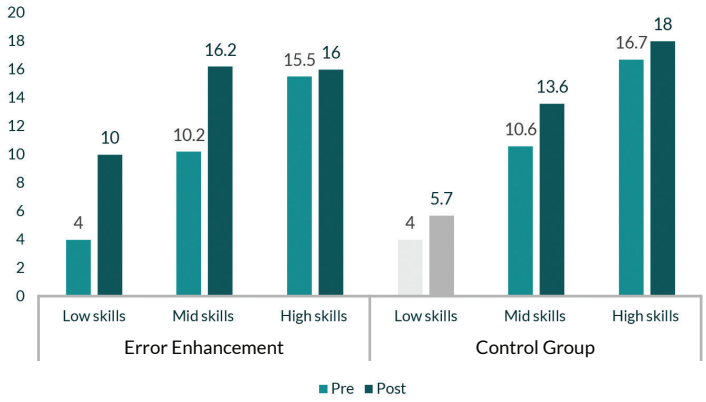
- Virtual, 3D environment to create immersive therapy activities to enhance outcomes.
- Robotic arm allows for movement in a large 3D therapy space.
- AI and ML enhanced algorithms to drive Error Enhancement forces, and to provide real-time patient specific adjustments through three motors applying forces in all three separate movement dimensions.
- Cloud-based analytics to maximize treatment efficiency and to provide patient progress and outcomes re-ports.

Developed and Driven by Clinical Research[1]

Pre / Post MAS Score



Motor Assessment Scale (MAS)



[1] A prelimnary investigation of error enhancement of the velocity component in stroke patients’ reaching movements. R. Givon-Mayo, E, Simons, A. Ohry, H. Karpin, S, Israely and E. Carmeli. International Journal of April 2014, Vol, 21, No 4.

Advantages & Innovation

Revolutionizing Neurotherapy through groundbreaking technology

- Current robotics focus on impacting brain neuroplasticity through high repetition and intensity for up to 60 minutes of treatment time.
- deXtreme™ expands beyond brain neuroplasticity and incorporates muscle plasticity. The result is that true neuromuscular re-education is occurring. deXtreme™ delivers high repetition and intensity through non-repetition, meaning every repetition is different further enhancing the impact on neuroplasticity.
- deXtreme™ goes beyond current robotic systems that focus on automation of human treatment by creating a whole new therapeutic approach through Error Enhancement.
- Adaptive to each patient's individuals needs and abilities, creating an environment for optimized patient benefits and for enhanced patient outcomes.
- Expands beyond traditional one or two plane movements to allow functional 3D movements which are more aligned with natural movement
- Algorithms feed by multiple sensors pre-define patients correct motor movements and adjust for movement errors.

Maximizing Rehabilitation times

- MAS results of patients using deXtreme™ show significant improvement from only 4 weeks of 15 minute treatment sessions 3x per week.[1]
- Current, ongoing clinical trials show an average improvement of 113% in MAS results in both High Skilled and Low Skilled groups from only 2 weeks of 20 minute deXtreme™ treatment session 3x per week.[2]

[1] A prelimnary investigation of error enhancement of the velocity component in stroke patients' reaching movements. R. Givon-Mayo, E, Simons, A. Ohry, H. Karpin, S, Israely and E. Carmeli. International Journal of April 2014, Vol, 21, No 4.

[2] Error augmentation training enhances post-stroke arm motor recovery - RCT - S. Israely, H. Barel, O. Zalesov, N. Zaygraykin, R. Mansour and E. Carmeli. World Congress for Neurorehabilitation, Vienna AT, December 2022.