



Letter to the Editor

## Neurobics: Revitalizing musculoskeletal rehabilitation with brain-boosting exercises

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Dear Editor,

### THE NEW SCIENCE OF BRAIN EXERCISE

Neurobic exercise is a distinctive brain training program grounded in the latest scientific research. This program integrates various physical senses, encompassing vision, hearing, taste, smell, and touch, along with emotional perception, within regularly changing daily routines. By doing so, it stimulates neural activity to continuously fortify and expand brain cells. These exercises induce nerve cells to generate natural brain nutrients known as neurotrophins, which augment the size and complexity of dendrites, thereby maintaining youthfulness and strength while enhancing memory retention. In addition, neurobic exercises activate new brain circuits and boost neurotrophin production, fortifying nerve connections and ensuring the resilience of nerve cells and synapses.<sup>[1]</sup>

Neurobic exercises enhance brain agility and flexibility, allowing it to adapt to diverse cognitive challenges, including memory, task performance, and creativity. This adaptability stems from Neurobic's approach, which is grounded in understanding the brain's intrinsic mechanisms rather than merely manipulating brain activity.<sup>[2]</sup> Neurobics, a fusion of "neuron" and "aerobics," involves stretching exercises aimed at improving oxygenation to brain neurons, thereby revitalizing them. These exercises entail engaging in novel activities, situations, or events to stimulate cognitive function.<sup>[3]</sup>

Emerging evidence suggests central nervous system alterations in the presence of musculoskeletal dysfunction and pain. Motor control exercises such as neurobics, coupled with other manual techniques, hold promise in increasing musculoskeletal activities in patients undergoing multimodal rehabilitation. Neurobic exercises constitute a pivotal component in optimizing musculoskeletal performance through the stimulation of various brain regions, thereby mitigating declines in memory function and maintaining memory proficiency during physical endeavors.<sup>[4]</sup> These exercises exert their influence on musculoskeletal performance through the following mechanisms:

- **Enhanced Neuromuscular Coordination:** Neurobic exercises present novel movements and sensory stimuli, eliciting adaptations in the brain that enhance coordination among muscles, joints, and nerves.

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- **Improved Balance and Proprioception:** Neurobic exercises entail activities challenging balance and proprioception, such as performing tasks on unstable surfaces or with closed eyes. By stimulating the proprioceptive system and enhancing spatial awareness, these exercises enhance postural stability and mitigate the risk of falls or injuries related to instability.
- **Increased Muscle Activation and Recruitment:** Many neurobic exercises engage multiple muscle groups concurrently in dynamic and unpredictable manners, resulting in heightened muscle activation and recruitment. This strengthens both primary and stabilizing muscles, thereby enhancing overall muscular endurance, strength, and power.
- **Enhanced Flexibility and Range of Motion:** Certain neurobic exercises involve stretching and mobilizing joints through unconventional ranges of motion. This improves flexibility, joint mobility, and tissue extensibility, reducing the likelihood of muscle tightness, stiffness, and joint restrictions that may impede performance and predispose to injuries.
- **Cognitive-Motor Integration:** Neurobic exercises integrate cognitive challenges, such as memory tasks, problem-solving, or decision-making, into physical movements. This integration fosters cognitive-motor skills, reaction times, and decision-making abilities, which are crucial for optimal performance across various activities.
- **Neuroplasticity and Adaptation:** Neurobic exercises introduce variability, novelty, and progressive challenges, promoting neuroplasticity—the brain's capacity to reorganize and adapt in response to new stimuli. This facilitates motor learning and skill acquisition, enabling expedited and more efficient adaptations to changes in movement patterns or environmental demands.

Neurobic exercises represent a comprehensive approach to optimizing musculoskeletal performance by targeting the intricate interplay between the brain and body. Through their multifaceted effects on neuromuscular coordination, balance, proprioception, muscle activation, cognitive-motor integration, and promotion of neuroplasticity, these exercises have the potential to enhance the resilience and robustness of the musculoskeletal system.<sup>[5]</sup> By integrating neurobic exercises into training and rehabilitation programs, individuals can achieve improved functional outcomes and enhanced performance across various activities.

## AUTHORS' CONTRIBUTIONS

MG and AKS designed this letter to the editor, provided the data material, interpreted the data, wrote the initial and

final manuscript, and reviewed the literature. MG and AKS have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

## ETHICAL APPROVAL

The Institutional Review Board approval is not required.

## DECLARATION OF PATIENT CONSENT

Patient's consent was not required as there are no patients in this study.

## USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY FOR MANUSCRIPT PREPARATION

The author confirms that there was no use of artificial intelligence (AI)-assisted technology to assist in the writing of the manuscript.

## CONFLICTS OF INTEREST

There are no conflicting relationships or activities.

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