

Editorial**Frontiers in Neuromuscular Physical Therapy****Saima Gul**

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Neuromuscular physical therapy, also known as neurological physical therapy, focuses on assessing and treating individuals with conditions affecting the nervous system and muscles. It is crucial in promoting recovery, improving function, and enhancing the quality of life for individuals with neurological disorders. As the field continues to evolve, several new frontiers and advancements have emerged in neuromuscular physical therapy. Some of the recent trends in neuromuscular physical trends include the following.

Technology-assisted rehabilitation: The integration of technology has revolutionized neuromuscular physical therapy. Various devices, such as robotic exoskeletons, virtual reality systems, and wearable sensors, are being utilized to enhance treatment outcomes. These technologies provide interactive and engaging platforms for therapy, facilitate repetitive practice, and offer real-time feedback on movement performance. They can be particularly beneficial in promoting motor recovery and functional improvements in individuals with stroke, spinal cord injury, and traumatic brain injury.

Motor learning principles: There is an increased focus on incorporating motor learning principles into neuromuscular physical therapy interventions. Motor learning involves acquiring and retaining new motor skills through practice and feedback. By tailoring therapy sessions to optimize motor learning, therapists can facilitate

more effective skill acquisition and long-term retention. This may involve techniques such as task-specific training, variable practice, and contextual interference.

Brain-computer interfaces (BCIs): BCIs are systems that establish direct communication pathways between the brain and external devices. In the context of neuromuscular physical therapy, BCIs hold promise in neurorehabilitation. They enable individuals with severe motor impairments to control external devices or robotic exoskeletons using brain signals. BCIs can provide opportunities for functional restoration, promote neuroplasticity, and enhance the rehabilitation process for individuals with conditions like spinal cord injury or amyotrophic lateral sclerosis (ALS).

Telerehabilitation: With the advancement of telehealth technology, telerehabilitation has gained momentum in neuromuscular physical therapy. Telerehabilitation allows therapists to deliver assessment and treatment remotely, overcoming barriers of geographical distance and accessibility. It enables real-time video consultations, remote exercise monitoring, education, and support. Telerehabilitation has the potential to increase access to care, improve convenience for patients, and enhance the continuity of therapy.

Personalized and precision rehabilitation: The concept of personalized and precision medicine is increasingly applied to neuromuscular physical therapy. By considering individual characteristics,

such as genetics, biomechanics, and neurophysiology, therapists can tailor interventions to meet specific needs and optimize outcomes. Advanced assessment tools like motion analysis systems and genetic testing can provide valuable insights for personalized treatment planning and targeted interventions.

These new frontiers in neuromuscular physical therapy hold great promise in advancing the field and improving outcomes for individuals with neurological conditions. Integrating technology, motor learning principles, brain-computer interfaces, telerehabilitation, and personalized approaches can enhance the effectiveness, accessibility, and individualization of neuromuscular rehabilitation programs.

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