**Editorial**
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# New Advances in Neurorehabilitation: An Editorial

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## Editorial

In recent years, the face of neurorehabilitation has gradually evolved. Most patients with major neurological conditions, such as stroke, Parkinson's disease, spinal cord injury, severe brain injury, spasticity, and cognitive impairments, may benefit from traditional neurorehabilitation techniques. In some cases, new technologies have been claimed to improve the effectiveness of rehabilitation techniques. They include robotic-assisted training, virtual reality, functional electrostimulation, Non-invasive Brain Stimulation (NIBS), and innovative approaches like assistive technology and domotics to improve the intensity and quality of neurorehabilitation and manipulate brain excitability and plasticity [1].

The application of modern technologies (functional MRI, near infrared spectroscopy, high-density EEG, etc.) to investigate the impact of neurorehabilitation technologies and NIBS on plasticity may constitute a surrogate outcome measure in the near future. Translational and back-translational models, on the other hand, are critical for providing solid neurobiological foundations for contemporary rehabilitative treatments to neurological illnesses. The link between central nervous system lesions and clinical characteristics and results is the foundation for personalised medicine in neurorehabilitation, a promising way to explain why people respond differently to treatment and enhance care quality. To enhance neurorehabilitation interventions, novel approaches to the acute and chronic phases of neurological illnesses, as well as the most appropriate timing, are critical. Furthermore, novel randomised controlled trial designs are being developed to investigate the role of combined medication and physiotherapy treatment [2].

Finally, despite the fact that evidence-based medicine has been largely absent from the area of neurorehabilitation for many years, there is a growing interest in systematic reviews, meta-analyses, and consensus conferences. Twenty high-quality publications were included in the Research Topic "Novel Advances in Neurorehabilitation," which provide a fascinating scenario on these technological and methodological advances, as well as new features and approaches to neurorehabilitation. Because chronic stroke is so common, one of the most important areas in neurorehabilitation is motor outcome after a stroke [3].

In 30 well-recovered chronic stroke patients and 26 controls, Schulz investigated whether prefrontal-premotor connections are associated to residual motor function. Direct fibre routes connecting the dorsolateral and ventrolateral prefrontal cortex to the dorsal and ventral premotor cortex, supplementary motor area, and primary motor cortex were reconstructed by the authors. Both groups had prefrontal-premotor tracts that could be traced. Stroke patients had only minor microstructural changes of these tracts on gross anatomic topography, mostly in the afflicted hemisphere. However, there was no link between tract-related microstructure of prefrontal-premotor connections and post-stroke residual motor function [4].

In a pilot investigation involving eight stroke patients and eight controls, Chen looked at functional cortico-muscular connection to assess motor function. They measured the functional link between an electroencephalogram and an electromyogram from a hand muscle during a steady-state grip task and discovered that cortico-muscular coupling's multiscale and directional properties are impaired in stroke. In a proof-of-concept open research on 20 patients, van Duijnhoven investigated whether a 5-week perturbation-based balance training programme on a movable platform may enhance reactive step quality in chronic stroke patients. Despite the lack of a control group, patients improved following therapy and continued to improve after 6 weeks [5].

In a randomised controlled study (RCT), Ye looked at the effects of oropharyngeal muscle workouts on 50 stroke patients with moderate obstructive sleep apnea syndrome, 25 of whom were assigned to the active group and 25 to the control group, who received sham deep breathing therapy. After 6 weeks of active treatment, polysomnography measurements of blockage severity, patient reported result, and anatomic structural remodelling of the pharyngeal airways all improved. In a mouse model of SCI, Zeng investigated the involvement of sorting nexin 27 (SNX27), an endosome-associated cargo adaptor implicated in a variety of neurological disorders. Down-regulation of SNX27, according to the findings, could be a possible therapeutic for acute neuronal death and chronic neuroinflammation, as well as facilitating nerve healing following SCI [6].

Schneider investigated the validity of wearable sensor-derived measures of physical activity in 63 wheelchair-bound SCI patients of various ages and damage levels/severity. With greater rehabilitation success, activity counts demonstrated persistent high single-day reliability, whereas measurements differed significantly, with decreasing movement quantity and increased movement quality. The findings of the study could be useful for sensor-based physical activity evaluations in clinical SCI studies [7].

## Conflict of Interest

None.

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