Sandro Iannaccone, J Neurol Disord 2017, 5:2(Suppl)
http://dx.doi.org/10.4172/2329-6895-C1-016

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New technologies: A new era for neurorehabilitation

Over the last years, there has been increasing developments of new technologies to provide solutions to the limitations of standard rehabilitation (drop-outs, limited evaluation scores, or physical limitations of therapists) to enhance learning following neurological insults. To this aim, virtual reality (VR) settings provide an enriched environment able to generate augmented multisensory feedbacks (auditory, visual and proprioceptive). These settings, involving the mirror neurons system, help patients to develop a real-time "knowledge of results" and "knowledge of performance", favoring the physiological mechanism of reinforcement learning. Such innovative strategies can be applied directly in the rehabilitation of motor, cognitive and speech functions, as well as in chronic pain treatment. Moreover, standard or virtual reality-based neurorehabilitation can be potentiated through the concomitant application of non-invasive brain stimulation, such as repetitive transcranial magnetic stimulation (rTMS) or transcranial direct current stimulation (tDCS). Indeed, the NeuroAD system offers the possibility of applying cortical stimulation during cognitive training. TDCS can also be applied on-line, during motor or cognitive rehabilitation. Moreover, as a portable device, it also brings the opportunity to the patient to be applied at home. Thus, the development of new technologies in neurorehabilitation is converging towards multimodal treatments offering the possibility of home-based monitoring.

Biography

Sandro Iannaccone is a Neurologist who received his Medical Training at the University of Milan (Italy) and completed his Residency in Neurology in July 1986 and further specialized in Neuropathology in 1992. Since 1989, he has been working as a contract Professor of Neurology at the Medical and Psychological faculties of the University Vita-Salute San Raffaele of Milan. He became responsible for the Neurologic Unit of the San Raffaele Turro Hospital in 1999. In 2013, he became Director of the Neurorehabilitation Unit of the San Raffaele Hospital. Since 2014, he is also the President of the Scientific Society entitled Association of Medical Rehabilitation Specialists of Private Hospitals (Associazione Medici Riabilitatori Specialisti dell'Ospedalità Privata). In a research point of view, he is leading research and development of innovative rehabilitative strategies using new technologies based on virtual reality. He is also leading trials on new pharmacological and non-pharmacological therapies for Alzheimer's disease. He has also been involved in investigations in early detection of neurological degenerative disease biomarkers through neuropathological, proteomics and PET studies.

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