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Modulation and rehabilitation of spatial neglect by sensory stimulation

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Abstract

After unilateral cortical or subcortical, often parieto-temporal lesions, patients exhibit a marked neglect of their contralateral space and/or body side. These patients are severely disabled in all daily activities, have a poor rehabilitation outcome and therefore require professional treatment. Unfortunately, effective treatments for neglect are just in the process of development. The present chapter reviews three aspects related to the rehabilitation of neglect. The first part summarizes findings about spontaneous recovery in patients and experimental animals with neglect. The second part deals with techniques and studies evaluating *short-term* sensory modulation effects in neglect. In contrast to many other neurological syndromes spatial neglect may be modulated transiently but dramatically in its severity by sensory (optokinetic, neck proprioceptive, vestibular, attentional, somatosensory-magnetic) stimulation. In part three, current treatment approaches are summarized, with a focus on three novel techniques: repetitive

optokinetic stimulation, neck vibration training and peripheral somatosensory-magnetic stimulation. Recent studies of repetitive optokinetic as well as neck vibratory treatment both indicate significantly greater as well as multimodal improvements in neglect symptomatology as compared to the standard treatment of neglect. This clear superiority might result from the partial (re)activation of a distributed, multisensory vestibular network in the lesioned hemisphere. Somatosensory-magnetic stimulation of the neglected or extinguishing hand provides another feasible, non-invasive stimulation technique. It may be particularly suited for the rehabilitation of somatosensory extinction and unawareness of the contralesional body side. Finally, pharmacological approaches for the treatment of neglect are shortly addressed. Isolated drug treatment of neglect is currently no successful rehabilitation strategy due to inconsistent results as well as possible side effects. However, combined behavioural and drug treatments might yield better results. This has to be tested empirically in patient studies. In conclusion, the findings obtained in short-term sensory stimulation studies led to the development of effective techniques for the long-term rehabilitation of neglect. Future rehabilitation studies should evaluate effective treatment *combinations* considering all possible techniques and devices (behavioural, pharmacological, prosthetic or physiological).



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