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The Translesional Spinal Network and Its Reorganization after Spinal Cord Injury

Krupa P., Siddiqui A.M., Grahn P.J., Islam R., Chen B.K., Madigan N.N., Windebank A.J., Lavrov I.A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© The Author(s) 2020. Evidence from preclinical and clinical research suggest that neuromodulation technologies can facilitate the sublesional spinal networks, isolated from supraspinal commands after spinal cord injury (SCI), by reestablishing the levels of excitability and enabling descending motor signals via residual connections. Herein, we evaluate available evidence that sublesional and supralesional spinal circuits could form a translesional spinal network after SCI. We further discuss evidence of translesional network reorganization after SCI in the presence of sensory inputs during motor training. In this review, we evaluate potential mechanisms that underlie translesional circuitry reorganization during neuromodulation and rehabilitation in order to enable motor functions after SCI. We discuss the potential of neuromodulation technologies to engage various components that comprise the translesional network, their functional recovery after SCI, and the implications of the concept of translesional network in development of future neuromodulation, rehabilitation, and neuroprosthetics technologies.

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Keywords

CPG, discomplete spinal cord injury, neuromodulation, neuroplasticity, regeneration, spinal cord injury, translesional spinal network

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