The Neuromodulatory Effect of Rosmarinic Acid on Spinal Locomotor Activity

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Rosemary (Rosmarinus officinalis L.) is a common herb, employed in traditional medicine for its healing properties. One of its active compounds, Rosmarinic acid, is a well known natural antioxidant, possessing neuroprotective effects in different models of neuroinflammation, neurodegeneration, as well as chemically-induced neurotoxicity and oxidative stress. These effects are beneficial for cancer and spinal cord injury patients, as well for the potential treatment of other neurodegenerative diseases. Nevertheless, it has not been determined if this compound produces secondary effects in locomotion. This study focused on assessing the effects of Rosmarinic Acid as a potential modulator of motor activity using the lumbar spinal cord of neonatal mice, which possesses the neural network controlling locomotion. The evaluation of this potential modulatory effect was performed through electrophysiological techniques, including extracellular recordings of ventral nerves during a motor rhythm, which can be elicited by a mixture of serotonin, NDMA and dopamine. Changes were measured in peak amplitude, burst duration and cycle period of the recorded motoneuron-produced rhythm before, during and after the application of Rosmarinic acid at concentrations of 1μM, 100μM and 1mM. No changes on locomotor activity were observed at low (1μM) or moderate concentrations (100μM). However, experiments at a higher concentration (1mM) showed an inhibitory effect, including a reduction of the burst amplitude and the cycle period, suggesting less motoneuron recruitment and a slower locomotor rhythm. These findings support the use of this compound as a commercial drug or natural supplement, as a neuroprotective therapeutic agent, and as a potential analgesic drug.

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