

## Spinal cord changes consequent to peripheral nerve injury: Neuroprotective role of thioctic acid enantiomers

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Peripheral neuropathies are in general characterized by hyperalgesia and allodynia with alterations of muscular sensitivity and functions. Selected antioxidants have been proposed as a potential therapeutic agents in the treatment or prevention of several pathologies related to oxidative stress. Thioctic acid is an antioxidant existing in nature and expressed in two optical isomers. (+)-Thioctic acid is the naturally occurring enantiomer, whereas the most used formulation of the compound in clinical practice, synthetic thioctic acid, is the mixture of (+) and (-)-enantiomers. The present study assessed if compression of sciatic nerve, induced by loose ligation, is accompanied by a central nervous system (CNS) changes and if thioctic acid enantiomers treatment may have a possible neuroprotective role.

Loose ligation of the right sciatic nerve was performed in spontaneously hypertensive rats (SHR), used as a model of increased oxidative stress, and in normotensive Wistar-Kyoto rats (WKY) used as a control group. Animals with sciatic nerve ligation were left untreated or were treated intraperitoneally for 14 days with (+/-)-(25 and 50 mg/Kg/day), (+)-(25 mg/Kg/day), (-)-(25 mg/Kg/day) thioctic acid. Analysis, centered on injury phenomena at level of dorsal root ganglia and spinal cord, consisted in an immunochemical and immunohistochemical analysis.

In the spinal cord an increase of oxidative stress markers was observed in rats after sciatic nerve ligation. It was accompanied by astrogliosis and neuronal damage without activation of apoptotic process primarily in the dorsal horn of spinal cord. Antioxidant treatment reduced oxidative stress and astrogliosis being (+)-thioctic acid was active than (+/-)- or (-)-enantiomers.

The above results demonstrated the spinal cord changes induced by peripheral nerve injury and a neuroprotective effect elicited by thioctic acid. The demonstration of a more pronounced activity of (+)-thioctic acid suggests that appropriate antioxidant strategies may represent a suitable approach in the treatment of mechanical neuropathies.

### Key words

Neuropathy, oxidative stress, neuronal damage, central nervous system.