Modification of caspase gene expressions in the cortex of neuropathic mice after mesenchymal stem cells transplantation

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Neuropathic pain, caused by injury and/or dysfunction of the nervous system, has gained a significant clinical interest, since there are still no drugs able to act efficiently and definitive in this pathology. A new possibility of treatment could be offered by stem cell transplantation.
The efficacy of mesenchymal stem cells in the treatment of neuropathic pain has already been demonstrated by our research group. The aim of this new research was to study the variations of gene expression and caspase activation in response to cellular transplantation. Caspases are cysteine ??proteases active in the induction and propagation of neuropathic pain. To this end, human mesenchymal stem cells (hMSCs) were injected systemically in mice rendered neuropathic by spared nerve injury (SNI) of the sciatic nerve. The hMSCs were isolated from a small bone marrow aspirate and expanded in vitro. HMSCs cells ($2x10^6$) were injected into the tail vein of neuropathic mice and control mice 4 days after the induction of the damage to the sciatic nerve (SNI).
Neuropathic pain was monitored up to 90 days after SNI. The injected hMSCs were effective in decreasing the main symptoms of neuropathic pain: the mechanical allodynia and thermal hyperalgesia, starting from the seventh day after surgery (two days after the transplantation of cells). Furthermore, the hMSCs were able to modify, in the cortex of SNI mice, the levels of mRNA and protein of regulatory and effector caspases, such as caspase-3, -7, -12.
The data show that the hMSCs exert an anti-inflammatory and analgesic effect in neuropathic pain. Their anti-nociceptive and anti-inflammatory action, exerted by cellular activation through cell-to-cell contact and by the secretion of a wide spectrum of molecules, could be mediated by a different regulation of caspases.

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