Granulocyte-macrophage colony-stimulating factor

Granulocyte-macrophage colony-stimulating factor (GM-CSF) has been implicated in numerous chronic inflammatory diseases, including multiple sclerosis (MS). GM-CSF impacts multiple properties and functions of myeloid cells via species-specific mechanisms. Therefore, we assessed the effect of GM-CSF on different human myeloid cell populations found in MS lesions: monocyte-derived macrophages (MDM) and microglia. We previously reported a greater number of IL-15+ myeloid cells in the brain of MS patients than in controls. Therefore, we investigated whether GM-CSF exerts its deleterious effects in MS by increasing IL-15 expression on myeloid cells. We found that GM-CSF increased the proportion of IL-15+ cells and/or IL-15 levels on non-polarized, M1-polarized and M2-polarized MDM from healthy donors and MS patients. GM-CSF also increased IL-15 levels on human adult microglia. When co-cultured with GM-CSF-stimulated MDM, activated autologous CD8+ T lymphocytes secreted and expressed significantly higher levels of effector molecules (e.g. IFNγ and GM-CSF) compared to co-cultures with unstimulated MDM. However, neutralizing IL-15 did not attenuate enhanced effector molecule expression on CD8+ T lymphocytes triggered by GM-CSF-stimulated MDM. We showed that GM-CSF stimulation of MDM increased their expression of CD80 and ICAM-1 and their secretion of IL-6, IL-27 and TNF. These molecules could participate in boosting the effector properties of CD8+ T lymphocytes independently of IL-15. In contrast, GM-CSF did not alter CD80, IL-27, TNF and CXCL10 expression/secretion by human microglia. Therefore, our results underline the distinct impact of GM-CSF on human myeloid cells abundantly present in MS lesions [1)].

Granulocyte colony-stimulating factor (G-CSF) is a type of growth factor.

Also known as colony-stimulating factor 3 (CSF 3), this glycoprotein stimulates the bone marrow to produce granulocytes and stem cells and release them into the bloodstream.

Functionally, it is a cytokine and hormone, a type of colony-stimulating factor, and is produced by a number of different tissues. The pharmaceutical analogs of naturally occurring G-CSF are called filgrastim and lenograstim.

G-CSF also stimulates the survival, proliferation, differentiation, and function of neutrophil precursors and mature neutrophils.

Park et al. from the Inha University , Incheon , Republic of Korea, tried to identify that the combined G-CSF and treadmill exercise is more effective in functional recovery after spinal cord injury (SCI).

Rats in the Granulocyte colony stimulating factor (G-CSF)/exercise group showed the most effective functional recovery in the Basso, Beattie, and Bresnahan (BBB) scale and the inclined plane test, and spinal cord cavity size by injury were the smallest, and immunohistochemistry revealed expression of higher BDNF (brain derived neurotrophic factor) and VEGF (vascular endothelial growth factor) and lower GFAP (glial fibrillary acidic protein) than others.

Combined treatment provided more effective neuroplasty and functional recovery than individual treatments [2)]

G-CSF reduces hippocampal neuronal cell death dose-dependently and attenuates sensorimotor deficits after transient forebrain ischemia. These neuroprotective effects of G-CSF may be linked to inhibition of inflammation and possibly increased neurogenesis in the hippocampus [3].

1)
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