Cyclosporin A

Ciclosporin; cyclosporine (USAN); cyclosporin (former BAN); or ciclosporin A, cyclosporine A, or cyclosporin A (often shortened to CsA) is an immunosuppressant drug widely used in organ transplantation to prevent rejection. It reduces the activity of the immune system by interfering with the activity and growth of T cells.

It was initially isolated from the fungus Tolypocladium inflatum (Beauveria nivea), found in a soil sample obtained in 1969 from Hardangervidda, Norway, by Hans Peter Frey, a Sandoz biologist.

Most peptides are synthesized by ribosomes, but ciclosporin is a cyclic nonribosomal peptide of 11 amino acids and contains a single D-amino acid, which are rarely encountered in nature.

In a study, Son et al., investigated whether CsA alters 27OHChol-induced cellular and molecular responses using the human monocyte/macrophage THP-1 cells. Treatment of the cells with CsA resulted in decreased expression of the mDC-specific markers (CD80, CD83 and CD88) induced by 27OHChol. Reduced endocytic activity recovered in the presence of CsA. The drug also inhibited the expressions of MHC class I and II molecules and CD197, a homing molecule of mDCs. We further investigated the outcomes of CsA treatment on the expression of M1 polarization markers and CD14, a component of the innate immune system. The drug decreased transcript levels of genes associated with the M1 polarization of monocytic cells, including CCL2, as well as expression of CD14 and MMP-9 which is involved in soluble CD14 shedding. Taken together, these results indicate that CsA inhibits the 27OHChol-induced differentiation and activation of monocytic cells into a mature dendritic cell (mDC) type and an immuno-stimulatory M1 subset, respectively, thereby modifying immune responses in a milieu rich in cholesterol and oxidized cholesterol molecules [1)].

The administration of CsA is not effective in the improvement of consciousness and cognitive function. However, it brings about no adverse effects [2)].

1)
Son Y, Choi J, Kim B, Park YC, Eo SK, Cho HR, Bae SS, Kim CD, Kim K. Cyclosporin A inhibits differentiation and activation of monocytic cells induced by 27-hydroxycholesterol. Int Immunopharmacol. 2019 Feb 15;69:358-367. doi: 10.1016/j.intimp.2019.01.045. [Epub ahead of print] PubMed PMID: 30776644.
2)
Aminmansour B, Fard SA, Habibabadi MR, Moein P, Norouzi R, Naderan M. The efficacy of Cyclosporine-A on Diffuse Axonal Injury after Traumatic Brain Injury. Adv Biomed Res. 2014 Jan 14;3:35. doi: 10.4103/2277-9175.125031. eCollection 2014. PubMed PMID: 24600605.