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Introduction: Dopamine may participate in multiple sclerosis (MS) pathogenesis by modulating immune cell activity and cytokine production. This study aimed to clarify the effect of dopamine on Th17-cells, which plays a critical role in MS pathogenesis.

Methods: Forty patients with relapsing-remitting MS during clinical remission and twenty-five healthy subjects were examined. The concentrations of dopamine in blood plasma and culture supernatants were measured by high-performance liquid chromatography. The percentage of blood Th17-cells was determined by flow cytometry ($CD4^+CD161^+$). To assess the effect of dopamine on Th17-cells, purify $CD4^+$-T-cells were cultured in the presence of dopamine (10^{-5} M) and stimulated with anti-CD3/anti-CD28-antibodies. The levels of IL-17, IFN-γ, and GM-CSF in culture supernatants were assessed by ELISA. To study the involvement of dopaminergic receptors in dopamine-mediated immunomodulation, some samples of $CD4^+$-T-cells were pre-incubated with antagonist of D_1- or D_2-dopaminergic receptors, whereafter dopamine and anti-CD3/anti-CD28-antibodies were added to the cultures. In some experiments, $CD4^+$-T-cells were pre-incubated with antagonist of D_1- or D_2-dopaminergic receptors (both at 10^{-5} M) and activated by anti-CD3/anti-CD28-antibodies.

Results: The concentrations of dopamine in plasma and culture supernatants were not different between the groups. The percentages of Th17-cells, as well as the production of cytokines, were also comparable. Dopamine suppressed cytokine production in both groups ($p<0.0001$) without affecting on cell viability and proliferative response. Blockade of D_1-receptors enhanced the inhibitory effect of dopamine on cytokine production in both groups ($p<0.05$), while blockade of D_2-receptors decreased the inhibitory effect of dopamine in both groups ($p<0.05$). The blockade of D_1-receptors suppressed cytokine production in both groups ($p<0.01$).

Conclusion: These data suggest the inhibitory effect of dopamine on Th17-cells in MS, which could be mediated by the D_2-dopaminergis receptors.