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Gut flora, immune responses and Multiple Sclerosis  

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**SUMMARY**

A recent field of investigation focuses on the role of intestinal microbiota in shaping and instructing immune responses, with effects that go well beyond those measurable locally, in the gut. An equilibrium has been established, during the course of millennia of evolution, between the microbiota and the immune system. However, epidemiological and clinical data describe a marked increase in the incidence of autoimmune and allergic disorders in western countries: It is in fact possible that the delicate equilibrium between the microbiota and the immune system is perturbed by modern lifestyle, resulting in an imbalance between harmful and protective bacteria known as dysbiosis. The ability of intestinal microbiota to sustain an inappropriate immune reaction, such as in autoimmunity, at distant sites has been recently shown in animal models of disease. Similarly, the possibility to generate protective immune responses through the inoculation of selected commensal bacteria which induce regulatory cells has also been shown. We have found that a distinct population of cells with antibacterial activity is expanded in MS patients. These cells, called MAIT lymphocytes, preferentially home to the intestine, but they can penetrate in the brain where they have been shown to be loaded with IFN-γ and IL-17 pathogenic cytokines.