INTERACTION BETWEEN NERVOUS AND IMMUNE SYSTEM

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Abstract

Between nervous and immune system exists extensive bidirectional communications in both health and disease. In the nervous system there are over 200 neurotransmitters and neuromodulators. In the immune system T cells by means of cytokines activate the other immune cells as B cells, NK cells, macrophages and dendritic cells. On the other hand numerous transmitters regulate the immunity – T cells response at the innate immunity. The nervous system via mediators like dopamine, serotonin, glutamate, acetylcholine and neuropeptides regulates the immune system. The immune cells possess membrane receptors for these transmitters. The sympathetic nerve terminals secrete neuropeptides – NPY, substance P, VIP, CGRP, endorphins, somatostatins and others. The immune cells have receptors for these neuropeptides as well. The sensory fibers contain CGRP, which activate the macrophages, mast cells and other immune cells. The nervous system modulates the activity of the immune system also via the Hypothalamo-Pituitary-Adrenal axis ruling the stress homeostasis. The Corticotropin-Releasing Hormone effects directly upon immune system – stimulates antibody production, modulate the activity of NK cells and stimulates the proliferation of the lymphocytes. The chronic stress shapes the activity of the immune system. The cytokines secreted from the immune cells – cytokines, chemokines and growth factors are able to modulate the function of the nervous system – synaptic plasticity, changes in the aging brain, learning and memory. The neurons in some brain areas possess cytokine receptors. The cytokines could modulate the behavior. The therapy with cytokines leads to mood disorders, depression, fear, sleep problems, cognitive dysfunction, fatigue and others. The immune cells synthesize and secrete neurotransmitters – dopamine, serotonin, glutamate, norepinephrine, which can modulate the brain activity. The immune system plays important role in the autoimmune disorders affecting the nervous system.