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THE BASIS OF NEUROIMMUNOMODULATION

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The existence immune-neuro-endocrine interactions is at present well established.

These interactions are based on the fact that: 1) immune cells express receptors for hormones, neurotransmitters and neuropeptides, and, conversely, that neural and endocrine tissues express receptors for immune-derived products; 2) immune and neuro-endocrine products coexist in lymphoid, endocrine, and neural tissue; 3) Immune processes can be modulated by neuro-endocrine mediators and, reciprocally, immune-derived products can affect the functioning of neuro-endocrine structures.

These multidirectional interactions conform a complex network based on a dynamic interchange of messages between the systems, and its activity can be modified by internal and external inputs acting primarily at different levels, such as for example, the activation of the immune system by virus, bacteria or tumor cells, or by psycho-sensorial stimuli, such as stress or learning.

When disturbances in the network are caused at any level, the activity of its components is adjusted as an attempt to reestablish the equilibrium of the milieu intérieur, and therefore the return to healthy conditions. However, it is well established that alterations or disruptions in these neuro-endocrine-immune interactions can lead or contribute to pathologies. Examples of such disruptions derive from experiments in animal models of viral, bacterial and parasitic infections, septic shock, rheumatoid arthritis, multiple sclerosis, autoimmune thyroiditis, and systemic lupus erythematosus. These observations have also been confirmed in human pathologies, such as rheumatoid arthritis, multiple sclerosis, Sjorgen syndrome, allergic asthma, atopic skin disease, sepsis, inflammatory bowel disease, and fibromyalgia.

In this respect, probably the best-studied neuro-endocrine-immune circuits are those involving immune-derived cytokines, the hypothalamus-pituitary-adrenal axis, and the sympathetic nervous system. Selected examples will be discussed to illustrate this aspect.