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CYTOKINES BEYOND THE IMMUNE SYSTEM

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Although the immune system displays a degree of autonomy, it does not work independently of other body agencies. Both natural and adaptive immune responses need external support, which ranges from fuel supply to satisfy increased energetic metabolic demands during activation to refined regulatory effects mainly mediated by hormones, neurotransmitters and neuropeptides. Neuro-endocrine immune regulation is based on the emission of signals by activated immune cells that impinge the brain and structures under its control, and that, in turn, respond with signals that modulate the course and intensity of the immune response. Cytokines are the best characterized messengers that convey this immunologically derived information. However, these proteins can also mediate effects that are apparently not linked to immunity, such as those exerted on intermediate metabolism, central and peripheral neuro-endocrine systems, and brain physiological functions. These aspects, mainly focusing on the IL-1, IL-6 and TNF family, and on the cytokine network that these mediators activate, will be emphasized in this presentation. The scope is to propose a unifying model of cytokine effects that, whether exerted primarily at immunologic, systemic or central levels, are oriented to the mediation of an adaptive physiologic adjustment of the functional changes that occur in the two most complex systems of the organism, the immune and nervous systems. Such adjustments need to be well balanced and coordinated since they can become detrimental and contribute to the pathogenesis of a disease if they are not tightly regulated. Some possible cellular and molecular mechanisms linked to cytokine-mediated adjustments and the integration of immune and psycho-neuro-sensorial signals at brain levels will also be discussed.