Neuroimmunoendocrine Communications in Placenta are Necessary for Survival and Growth of the Baby

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Abstract

Now it is well-known, that three main regulatory systems, named the nervous, endocrine and immune ones have well-established and very closed related interrelations for the regulation of the systemic homeostasis, that involves the production and secretion of a variety of cellular mediators, known as regulatory peptides (peptide hormones, cytokines, chemokines, integrins and others) [1]. The regulatory peptides together with other related molecules (for example, such as biogenic amines, steroids, etc.) regulate homeostasis in the tissue of origin, either via local actions or by recruitment of the external systems that facilitate restoration of the local homeostasis.

During last decade, the studies on isolated-cell systems as well as in vivo have obtained that many regulatory peptides and biogenic amines, which earlier have been found within the brain, immune system, as well as in the visceral organs, where they are produced by the diffuse neuroendocrine cells, also are expressed within placenta. At the same time, the expression of many cytokines and other immuno-endocrine mediators have been shown in placental tissues [2-6]. The placenta is a highly specialized organ, whose primary function is to promote the exchange of nutrients and oxygen between maternal and fetal blood, essential for survival and growth of the baby. From this point of view, the placenta could be considered as immuno-endocrine organ, which ensures the normal development of embryo. The placental functions are regulated by the local production of more over then 100 biologically active neuro-immuno-endocrine mediators. Different modern techniques have revealed many molecules involved in trophoblast development uncluding.

Intra-and intercellular signaling molecules (such as neuropilins, integrins, chemokines, chaperons, and many others substances). The human decidua, despite its proposed immunodepressive function, hosts a variety of immunocompetent cells such as natural killer cells, macrophages, T-cells, and dendritic cells. The fact of the presense of dendritic cells in placenta excite a special interest, because they are sentinel cells of the immune system important in initiating antigen-specific T-cell responses to microbial and transplantation antigens. This unical riches of cellular types, hormones and messengers, which are produced in placenta is not fortuity. Exactly, the variety of the biochemical effects of these molecules and their close interrelationships permit placenta to realize its functions for survival and growth of the baby. Thus, it seems to be very important to study in next decades the immunocytochemical phenotype of all placental neuro-immuno-endocrine cells, and to identify the wide spectrum of immune and endocrine mediators, which they are able to produce. Also, taking into account the role of many neuro-immuno-endocrine hormones, mediators and messengers in the mechanisms of cell proliferation and differentiation, as well as in oxidative stress and apoptosis, which can provoke different placental dysfunctions, it is necessary to carry out the special investigations of the structure-function organization of dendritic, other immunocompetent and endocrine placental cells during of placental pathology. We are sure, that the integration and development of the research devoted of neuroimmunoendocrinology of placenta will allow to extend our understanding of the molecular mechanisms of placental functions, which are very important for embryo development, as well as for survival and growth of the baby.

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