REPRODUCTIVE BIOLOGY

REVIEW

The role of immunological system in the regulation of gonadoliberin and gonadotropin secretion

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SUMMARY

This article reviews data concerning the interactions between immune and neuroendocrine systems in the regulation of reproduction processes at the hypothalamic and pituitary level during immunological stress. Hypothalamus seems to play the most important role in the inhibitory action of immune challenge on the gonadoliberin (GnRH) and gonadotropin secretion as well in the inhibition of the reproductive functions. The administration of endotoxin as a model of immunological stress could alter circulating concentrations of luteinizing hormone (LH) *via* actions at the hypothalamus through altered GnRH secretion, or at the level of the pituitary *via* inhibition of LH production and release in response to GnRH. At the central level, interleukin (IL)-1β seems to play the most important role in the suppression of GnRH secretion during immune challenge. The inhibitory action of this cytokine on GnRH may involve different neural mechanisms: direct action on the GnRH neurons through the IL-1 receptors or indirect action involving other mediators such as

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opioids, catecholamines, γ-aminobutyric acid, prostaglandins or nitric oxide. *Reproductive Biology 2009, **9**, 1: 11-23.*
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INTRODUCTION

Homeostasis is an essential requisite for the survival of a living organism, maintenance of which is coordinated by neural, endocrine and immune systems. Interactions between these systems have long been recognized with the most known immunosuppressive effects of glucocorticoids. However, there is a growing realization that other hormones, peptides and neuropeptides have immune effects as well and that immune cell products may profoundly affect endocrine function [6]. In recent years, the bi-directional communication between the neuroendocrine and immune systems has received considerable attention. Interconnections between the immune and the neuroendocrine systems are complex and widespread: neuroendocrine cells express various cytokines along with their receptors, whereas immune cells synthesize neurohormones and also express the corresponding receptors [5]. A large body of evidence suggests that cytokines are the main mediators between the immune and neuroendocrine systems. More than 100 cytokines have been described that make up a large and diverse family of polypeptide regulators produced widely throughout the body. Historically the term “cytokine” has been used to refer to the immunomodulating agents such as: interleukins (IL), lymphokines, monokines, chemokines, tumor-necrosis factors (TNF), interferons and growth factors [1]. Apart from playing a crucial role in local immune response, cytokines can reach general circulation and thus affect distinct endocrine organs, where they act either by themselves or through the release of intermediators such as prostaglandins (PG), nitric oxide (NO), neuropeptides or neurotransmitters [31].

Although interactions between the immune system and the hypothalamic-pituitary-adrenal axis (HPA) have been extensively investigated,