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Interaction between the neuroendocrine and immune systems has been the subject of intensive research over the past 10–15 years, putting aside conventional barriers between different research disciplines, and leading to increasing understanding of the integrity of the body. Two apparently distinct physiological systems have been shown to be intimately inter-related, often using similar forms of communication signals and thus blurring the distinction between neurotransmitters, neuromodulators, immune modulators, cytokines and chemokines. Indeed, with the discovery of the neuro- and immunomodulatory role of nitric oxide and, more recently, carbon monoxide, the very nature of signalling has undergone fundamental reappraisal. This current volume is by no means a comprehensive review of the state of neuroendocrine-immune interactions, but is rather a report from the front line of this intriguing and fast-moving area. We hope it will spur on and excite many new investigators to explore this exciting and expanding field.

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This volume puts together a number of reviews on ‘hot topics’ in studies of neuroendocrine-immune interactions. It does not intend to be a complete text, but offers instead insightful reviews in some of the more important emerging novel areas of investigation.

The introductory chapter is presented by the team of Besedovsky and del Rey, two of the earliest and foremost original workers in this field, who overview the subject and allow subsequent chapters to be put into some form of historical and systems-based context. In the post-genomic era, such an integrated approach to apparently disparate biological systems is becoming essential. Considerable emphasis is then given to the roles of nitric oxide and carbon monoxide by the three major groups working in this area, attempting to define an integrated function for these gases in neuroendocrinology. This has previously proven to be extremely difficult, with positive and negative effects of different agents modifying gaseous function according to the precise parameters of the system explored. Such a uniquely defined role for nitric oxide and carbon monoxide remains elusive, but many of us believe that these strange substances will eventually be shown to have a definable functional role. Many immune-mediated diseases in the human show a remarkable and largely unexplained sexual dimorphism, and this area is reviewed by the joint Lausanne–Le Plata group. Conversely, the modulation of inflammatory disorders in the human, and in rat models, is analysed in depth by Jafarian-Tehrani and Sternberg. David Jessop reviews the presence of neuroendocrine modulators within the cells of immune system; this is an area which may have particularly important pharmacological and therapeutic implications for human disease. Similarly, the fascinating activity of the anti-glucocorticoid MIF, an ‘old’ cytokine which has been shown to have novel and unexpected actions, is signposted by Petrovsky and Bucala.
Neuroendocrine-immune interactions involve the interface between neurology, endocrinology and immunology, and indeed may help to explain, in terms of accepted biological principles, many phenomena often ascribed to irrational processes and incorporated into complementary or alternative medical therapies. They may involve the difficult and controversial interface between the mind/brain and conventional physiology. We believe that acknowledged physicochemical and biological processes will eventually explain all such interactions, and we offer this series of reviews as useful starting points for further investigation.

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