Preface

Recent studies have provided clear evidence on the role of neural–immune interactions in normal brain function and neuropathological conditions. Neuroimmune factors, which play an essential role in neuroinflammatory response, have been implicated in the regulation of neuronal function and plasticity. Thus, neural–immune interactions provide a new framework for understanding the role of the neuroimmune system in normal brain function, neurodevelopment, and a variety of neurological disorders. These advances have a far-reaching impact on many areas of neuroscience, including alcohol research. Studies using human alcoholic brains, gene knockout mice, and gene expression profiling have established a clear link between alcoholism and an altered neuroimmune profile. This book integrates emerging knowledge on neural–immune interactions with key discoveries in alcohol research and provides a comprehensive overview of neural–immune interactions in brain function and behavior associated with alcohol use disorders.

This book addresses this rapidly developing area of research. It contains three main sections. Section I focuses on the basics of the neuroimmune system and the neuroimmunological alterations that are directly relevant to alcoholism. It integrates the traditional role of the neuroimmune system with emerging novel functions of neuroimmune factors in the brain. This section highlights recent advances in microglia function, neuron–glia communication, as well as neural–immune interactions in synaptic function, stress, mood disorder, and neuroAIDS. It also provides a chapter on the clinical detection of brain–immune interactions using neuroimaging approaches. Section I sets the foundation for understanding alcohol and neuroimmune interactions, which are primarily presented in the second section. Section II provides a detailed overview of the impact of alcohol exposure on the neuroimmune system as well as the contribution of neural–immune interactions to alcohol use disorders. It highlights several key research discoveries in this area in the context of neuroimmune signaling, neurodevelopment, neurotransmission, alcohol drinking behavior, aging, HPA axis, and neuroAIDS. Section II also discusses the therapeutic potential of targeting neuroimmune modulation for the treatment of alcoholism and substance use. Section III provides a summary and future research directions by the book editors. Collectively, these three sections review exciting advances in

neuroimmune research and summarize current understanding of alcohol and neuroimmune interactions.

While this book focuses on neural–immune interactions in areas directly related to alcohol use disorders, it is not intended to be all inclusive. Several areas, including sleep disorders, pain, and cholinergic anti-inflammatory pathways, are not covered as independent chapters but briefly mentioned in the text. The close relevance of these topics to neural–immune interactions and alcohol use disorders warrants future discussion and more research efforts.

This book will appeal to scientists, students, and educators who are interested in cross disciplinary topics, particularly those in the fields of alcohol use disorders, addiction, neuroimmunology, neuroimmune pharmacology, neuropsychopharmacology, and neuroAIDS. Readers will benefit from cutting-edge insights provided by outstanding, active researchers in the fields of neural–immune interactions and alcohol use disorders. We would like to thank all the scientists who have contributed chapters to this book and those who have provided constructive comments and suggestions for the manuscripts.

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