Sleep Deprivation and Disease
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Effects on the Body, Brain and Behavior
In the past and for the most part in the present, sleep deprivation has never received its due. While sleep is a necessary brain and body state for optimal health, it has remained the mostly forgotten youngest prince in the ancient biological hierarchy of important things—breathing, circulation, hunger, thirst, wakeful consciousness, and pain. The conscious perception of pain requires the brain, while the substance of the brain itself is devoid of pain sensations as we conventionally understand it. In fact, stimulation of the brain in wake patients is a standard mapping procedure for epilepsy surgery. Yet, to think that the brain cannot express distress when its core functions are compromised makes no biological sense. Perhaps we need to listen better.

Enter sleepiness and sleep deprivation. Sleep deprivation robs the brain of essential housekeeping and a host of other functions. Imagine a home with garbage that collects, electrical wiring that is frayed, drains clogged, and water pipes broken and leaking. Sleep deprivation also prevents the proper conduct of maintenance functions in other body systems, including metabolism. Sleep deprivation makes the brain and body sick. Sleepiness in the context of sleep deprivation is the brain in pain.

Yet, that pain is more often than not ignored or trivialized by individuals, society, regulators, and those who should certainly know better—health care professionals. A student falling asleep in class (or a committee member at a board meeting) is offered little sympathy or understanding, while if that same individual had a seizure, there would be a real risk of drowning under expressed concern and empathy.

In this era of “the book is dead,” I say, “Long live the book!” Reading books will remain, in my opinion, the most time and effort-efficient method to obtain a large amount of filtered and curated knowledge in a given area of interest. Books on sleep science and sleep disorders abound, while that on sleep deprivation less so. Matt Bianchi and the contributors to this wonderful book have summarized a complex body of work that reflects the role “brain pain” plays in health and disease. There are very few stones left unturned, either as dedicated chapters or within individual chapters. If nothing else, a sense of seriousness should infuse the reader that sleepiness and sleep deprivation should move up the hierarchy and rub shoulders with respiration, circulation, consciousness, hunger, thirst, and pain. If this book accomplishes that, as I fully expect it will, the function of books in general and this book in particular will have been achieved.

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Robert Joseph Thomas, M.D., M.M.Sc.
Preface

There is scarcely a segment of health or performance that has escaped linkage to sleep. Over recent decades, anecdote has given way to experiment, yielding an explosion of information demonstrating that the field of sleep deprivation is indeed fertile ground. Yet despite key advances in many areas, the field faces a diversity of challenges ranging from philosophical to practical. This state of affairs need not lead to pessimism; it should instead inspire future research. In this volume, experts review the links between sleep and a spectrum of medical specialties as well as operational settings. Each chapter builds on a rich evidence basis, while at the same time highlighting the uncertainties we face in the interpretation of the existing literature as well as the pathways that promise to move us forward. The intention is to provide readers from clinical and research backgrounds alike not only with a firm grounding in each subspecialty area covered but also with the tools to use a critical approach to understand and perhaps investigate key areas of need for future work. Sleep is a dynamic process, and its study requires interdisciplinary perspectives to build coherent and cohesive narratives.

The first part, “Sleep Physiology, Measurement, and Experimental Deprivation,” provides a foundation for modern approaches to sleep and the impact of deprivation. The second part, “Sleep and the Brain,” highlights clinically relevant implications of sleep loss in the fields of neurology and psychiatry, including a chapter devoted to the therapeutic use of sleep deprivation in psychiatry. The third part, “Sleep and Medical Topics,” carries the bulk of the volume to emphasize the diversity of human physiology beyond the central nervous system that is impacted by sleep deprivation. The final part, “Performance, Economics, and Operational Topics,” covers a broad societal perspective regarding the implications of sleep for health and performance. In each chapter, discovery is balanced against uncertainty—and it is precisely this interface that drives future progress. It is hoped that this volume inspires progress by arming the reader with a breadth of knowledge, a multidisciplinary perspective, and of course a healthy skepticism that forms the foundation of scientific progress.

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