There are few clinical problems in the sleep medicine field that are more challenging to impact than the sleep difficulties experienced by individuals suffering from PTSD. They are instantly recognizable, unique in their presentation, and relatively impervious to change. In individuals with normal sleeping patterns prior to their traumatic exposure, a traumatic event can change a lifetime of sleep in those individuals affected. From that moment on, their ability to obtain what for others would seem to be commonplace is no longer obtainable.

That an isolated behavioral event associated with an extreme emotional reaction can leave such a lasting imprint on such a complex behavior as sleep, arousal, and dreaming implies some sort of permanent neurological trace in a fundamental cog of the working mind. In this manner, an experience alone, and without direct physical contact or perturbation, can have as long-lasting impact as if the individual had suffered an acute stroke where physical damage to a neuronal circuit has occurred. Critical to understanding what has happened requires a detailed understanding and investigation of the neural systems underlying these emotions, behaviors, and processes.

The chapters that follow begin this scientific journey and explanation, though further research is desperately needed to understand this complex of events and to clarify mechanisms by which they can be either protected against, the damage lessened, or once present, managed efficiently to sustain a meaningful life.

The individual chapters in this section follow the current windows into brain function available to the neuroscientist ranging from animal models of memory to genetic studies, functional and structural neuroanatomical approaches, and to the use of radioligands to study the neurochemistry of the disorder. As in the use of these techniques for many disorders, each has its strengths and limitations, and neurobiological models that can connect, span, and distil information across these multiple approaches are needed.

As these chapters demonstrate, extensive advances have been made in bridging the basic science of fear conditioning, a key construct for understanding PTSD, and the neurochemistry, genetics, and functional and structural alterations demonstrated in PTSD as a disorder. Alterations in the amygdala, the hippocampus, the prefrontal cortex, the anterior cingulate cortex and insula, as well as in the neurochemical alteration of their function, each of which can be linked to neurobiological mechanisms of fear conditioning, have been described. Still, bridges between these links and the mechanisms and treatment of the sleep disturbances unique to PTSD remain in their infancy. While less focused on results or conclusions in relation to
PTSD sleep disturbances, these authors outline exciting hypothetical models that can be tested in future studies. As sleep is among the most crippling of the disorders that PTSD patients face and clinicians loathe to overcome, these insights are a welcome addition to our knowledge base, and we should look forward to gleaning new insights as this work progresses.