Preface

This is the third edition of *The Human Frontal Lobes,* a long journey for a medical book that was first published in 1999. Imbued with passion for this subject by our mentor, D. Frank Benson, we were particularly excited for the first edition to tell the stories emerging in regard to frontal lobe anatomy, frontal–subcortical circuits, frontotemporal dementia (FTD), and psychiatric disorders with prominent frontal lobe symptomatology. Although the role of the left frontal lobe in language was already accepted, in the 1990s it was becoming evident that the right frontal lobe has distinctive functions related to the modulation of behavior—a finding that helped distinguish disorders affecting the nondominant versus the dominant hemisphere. Simultaneously, scholarly efforts to understand the structures that linked the basal ganglia and thalamus to the frontal lobes, along with clinical observations regarding the cognitive and behavioral disturbances associated with dysfunction in these structures, made it important to consider the frontal lobes along with their subcortical connections.

By 2007 the importance of the frontal lobes was more widely appreciated, and there had been significant new discoveries related to frontal lobe anatomy and function. The second edition of *The Human Frontal Lobes,* published that year, included extensive expansion of the sections on FTD and clinical neuropsychology; new chapters related to the function of the insula; and descriptions of recent discoveries related to von Economo neurons. Although the first and second editions emphasized the importance of frontal and frontal–subcortical circuits, the functional connectivity mapping of these circuits had not yet emerged.

With this third edition, it is highly satisfying to see how many new discoveries have been made about the structure, function, imaging features, and diseases of the frontal lobes. One of the breakthrough findings about the frontal lobes came in 2007 with William Seeley and colleagues' article on the salience network, which used functional connectivity mapping to delineate specific circuitry activated when the frontal lobes were needed. Other circuits have since been described, and this exciting work is now incorporated into the present edition.

We have reconsidered our goals for this third edition of *The Human Frontal Lobes,* making sure that we serve our continuing readers and the field in general, as well as attracting new investigators and clinicians to frontal lobe research and care. New information has been added to all reappearing chapters; new chapters have been added; chapters that seemed less relevant have been deleted from this edition.

Part I, "Neuroanatomy and Neurochemistry," presents an update on the histological and cellular architectonics, biochemical innervation, and organizational aspects of the major divisions of the frontal lobes. Systems

within the dorsolateral/cingulate cortex and the orbitofrontal cortex/insula are described in detail, as these comprise cognition-mediating and emotion-mediating aspects of the frontal lobes. The striking structural and functional asymmetries observed in the frontal lobes also receive detailed consideration. These asymmetries in normal brains are reflected in the asymmetries observed in FTD, with the behavioral variant disproportionately affecting the right frontotemporal structures, and primary progressive aphasia being associated with left frontotemporal involvement.

Part II, "Assessment: Neuropsychology and Behavior," has been reorganized, and new material has been introduced. Bedside testing, evaluation of the role of the frontal lobes in memory, assessment of language functions of the frontal lobes, and the critical role of frontal lobes in executive functions are described. Higher-order human functions that demand integrity of frontal function are also now discussed in Part II, including the role of the frontal cortex in decision making, socioemotional functioning, and self-awareness. The contributions of resting-state magnetic resonance imaging studies of the default network to understanding frontal lobe function and self-awareness are presented, and new insights are provided. Philosophical concepts central to human beings have now made their way into discussions of frontal lobe functions, and the chapters in this section include discussions of moral reasoning, legal responsibility and accountability, empathy, and crime.

Part III, "Neurological Diseases," integrates advances in understanding FTD and other disorders affecting the frontal lobes. The explosion of new information is discussed in chapters on the neuropathology and genetics of FTD, as well as clinical aspects of FTD and other tauopathies (progressive supranuclear palsy and corticobasal degeneration). The effects of normal aging, cerebrovascular disease, white matter diseases, Parkinson's disease, and traumatic brain injury are described in updated and new chapters.

Part IV, "Neuropsychiatric Disorders," describes the many disorders of this type that reflect frontal lobe dysfunction. The roles of frontal dysfunction in schizophrenia, obsessive–compulsive disorder, depression, frontal epilepsy/dissociative states, and antisocial and aggressive behavior are described. A new chapter on apathy synthesizes the information on motivation and the involvement of frontal lobes in amotivational and apathetic states.

Part V, "Treatment," addresses two different approaches to treatment of the frontal lobe disorders. A chapter on surgical treatment provides insight into progress in surgical and device-based interventions in these disorders. A chapter on clinical trials involving patients with frontotemporal lobar degeneration sets the stage for an evolving experimental pharmacology of frontal lobe dysfunction.

Together, the chapters in this third edition constitute a thorough reconsideration of our understanding of the structure, function, assessment, and disorders of the frontal lobes. Rich new discoveries in both normal and abnormal conditions are described. What emerges is an exciting new picture of what it means to be human and how the frontal lobes contribute uniquely and critically to central concepts of being human.

A new level of sophistication regarding the structural basis for behavior is captured in the chapters on neurological and neuropsychiatric disorders. Simultaneously, a rich new set of discoveries has emerged in regard to the personality, behavioral, and cognitive disorders found in patients with frontal lesions. Increased understanding of the pathology, genetics, and pathophysiology of FTD has made it feasible to begin planning clinical trials of therapies for FTD. Progress is being made in bringing treatments to patients who suffer from these disabling and ultimately fatal diseases. Modern philosophical concepts centering around decision making, moral reasoning, and legal responsibility for crime are adeptly addressed.

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