Book review

Magnetic resonance imaging in movement disorders

(edited by Paul Tuite and Alain Dagher)

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The book is a very useful guide for understanding the recent progress of the use of magnetic resonance imaging (MRI) in movement disorders. The usefulness is derived partly from the fact that the general readers including nuclear medicine physicians are not experts in various MRI technologies. By explaining the findings from various refined MRI technologies, this very well organized book gives the chance to understand the recent progress and the future prospects of MRI’s possible routine use for the characterization of movement disorders and their treatments.

Movement disorders, especially Parkinson’s disease, have long been treated by medication but their clinical course has rarely been modified, while their treatment looked successful initially but afterwards disease became intractable with various complications. In this book, the readers will enjoy how difficult is the disease-modifying treatment of movement disorders. In Parkinson disease, though we know the nature of the disease with partial help of MRI, reversing the neurodegeneration and associated abnormalities is still in vain, and other movement disorders are beyond comprehension despite the help of MRI. The readers might understand that the elucidation of the pathophysiologic basis of movement disorders using MRI is still in its infancy for movement disorders other than Parkinson’s disease.

The first half of this book was devoted to the Parkinson’s disease and the latter to other movement diseases. The readers can have a glimpse on the progress to examine the nature of these diseases by MRI and how their elucidation can affect the disease-modification that is ‘definitive treatment’ such as deep brain stimulation. After careful reading people can know that the recent progress of MR instrument and various MR techniques contributed to the evaluation of Parkinson disease and other movement disorders as well as positron emission tomography and single photon emission computed tomography. MRI, either standard Tesla or high field MRI, enabled morphometric analysis, iron imaging using T2*, magnetization transfer imaging, susceptibility weighted image (SWI), resting/activation functional MRI (fMRI), magnetic resonance spectroscopy (MRS), and diffusion tensor imaging (DTI).

The first half of this book was entirely devoted to Parkinson disease and related syndromes. Starting from iron imaging technique using T2* map, or susceptibility-weighted imaging for iron quantification and differential diagnosis of parkinsonian syndromes, neuroimaging studies regarding cognitive impairment and the related structural changes in gray and white matter were presented. Using fMRI studies, different clinical aspects such as motor, cognition and mood abnormalities were studied and literature was summarized here. Resting state fMRI studies was then explained in association with the clinical findings in Parkinson disease. Surgical planning of deep brain stimulation (DBS), which is the most useful clinical application of MRI in Parkinson disease followed and readers will understand that MR sequences such as SWI and T2* and high magnetic field MRI enabled characterization of such small targets as subthalamic nucleus (STN), globus pallidus internus (GPI) and DBS success depended heavily
on the MRI’s help. As the authors detailed MRS techniques and their application in movement disorders, one can even see that despite its potential to improve the understanding of the pathophysiology, none of MRS is definitive in movement disorders for clinical routine application.

The latter chapters were concise and interesting in that they summarized the utility of MRI in Huntington’s disease, Gilles de la Tourette syndrome, dystonia, multiple system atrophy, ataxia and tauopathy. For example, as movement disorders are sometimes associated with dementia and these complex syndrome challenges a lot clinically, and tauopathy chapter seemed to be the result of an effort to elucidate the possible contribution of MRI to understand and characterize these complex syndromes. Concise and unbiased description of the utility of MRI was appropriate and enjoyable with balanced description. Multiple neat representative cases of normal and abnormal MR findings in various movement disorders were presented in Chapter 17 which will enlighten the readers that the routine MRI findings in these movement disorders are ambiguous and/or nonspecific, but have more than as is seen and the relevant discovery might be yielded if better imaging sequences and analysis methods were devised.

Though basics in MRI physics and the utilities thereof were so short, and thus the reading might be challenging for those who are not very familiar with MR techniques, the structure and the depth of the description and organization through the chapters was appealing to this reader’s easy satisfaction. And more appealing was that the authors properly explained the analysis methods; voxel-based morphometry (VBM) for structural MRI imaging, resting state fMRI, motor activation fMRI, MR spectroscopy, network analysis based on the statistical parametric mapping (SPM) method. This increased the comprehensibility of the utility of MRI for movement disorders and with the help of or despite using best analytical approach, the findings obtained from MRI are presently limited in clinical perspectives though promising. As well as nuclear medicine physicians, neurologists and radiologists who are interested in understanding movement disorders are sure to enhance their understanding of the application of MRI and related methods to movement disorders in general.
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