Introduction

Puneet Kumar Bansal

The human brain is the command center for the human nervous system. It contains 86 billion neurons along with other cells that make more than 100 trillion connections. Neurons are the building blocks of the nervous system which includes the brain and spinal cord. Neurons normally do not reproduce or replace themselves, so when they are damaged or die they cannot be replaced by the body. This unique anatomy of brain makes it more complex to understand. Brain is divided into different parts to perform specific functions, i.e., memory formation, movement, emotions, thought, speech, thinking, and many more. The brain is considered as the most complex part of the human body. This three-pound wonderful organ is the center of intelligence, interpreter of the senses, initiator of body movement, and controller of behavior. Contained in its bony shell and bathed by protective fluid, the brain is the originator of all the qualities that define humanity. For centuries, the brain has attracted and fascinated scientists and philosophers, and recently, it has been viewed the brain as nearly incomprehensible. Now, however, the brain is started to relinquish its secrets. Scientists have unfolded many secrets about the brain during 10 years than in past centuries due to the accelerating pace of research in neurological and behavioral science by virtue of new research techniques.

Damage or alteration in any part of brain results in impaired brain function. Brain disorders are mainly classified into two categories: neurodegenerative disorders and neuropsychiatric disorders. Neurodegenerative disorder is an umbrella term for varying conditions that primarily affect the neurons in the human brain. Neurodegenerative diseases such as Alzheimer's disease, Parkinson' disease, and

P.K. Bansal (✉)
Department of Pharmaceutical Sciences and Technology,
Maharaja Ranjit Singh Punjab Technical University (State Govt. University),
Bathinda, Punjab, India
e-mail: punnubansal79@gmail.com

P.K. Bansal
Department of Pharmacology, ISF College of Pharmacy, Moga 142001, Punjab, India

Huntington's disease are incurable and debilitating conditions and result in degeneration and/or death of nerve cells. Neuropsychiatric disorders are the illness of a psychological origin manifested either as symptom of emotional distress or in abnormal behavior. Neuropsychiatric disorders (psychiatric disorders) have been classified on the basis of criteria laid down in American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders—DSM-IV-TR, 2000, into major clinical depression, bipolar disorder, schizophrenia, anxiety disorders, attention deficit/hyperactivity disorder, migraine, and subsequent subcategories.

The development of drug therapy for neurological disorders is still an uphill task to the medical world. This may be due to their complex pathologies, inadequate understanding, and treatment. The development of novel drugs relies on the understanding of these complex mechanisms. Testing and evaluating new molecule directly on human subjects is impractical because of ethical issues. Thus, for drug discovery research, animal models have always played a crucial role. Several animal models have been designed and utilized in drug performance and evaluation studies. These animal models have played crucial role in developing new drug entities as well as understanding the pathophysiology and etiology of diseases. Neurological disorders represent major threat to human race due to increasing prevalence day by day. During past two decades, substantial progress was made in the understanding the pathophysiology of neurological disorders, but exact mechanisms is still to be established in most of the cases. A better understanding of these mechanisms is essential for the development of new animal models and design of novel therapeutic approaches for mitigation of neurological disorders. Animal models represent an attempt to mimic the pathologies associated with human disease in a preclinical setting. The creation of an animal model that assists in understanding the basic mechanism of pathology in a systematic way in order to establish the biological basis is thus a prerequisite in such studies. In this context, it is important to establish validity of correspondence of such model to clinical state in human being. However, it has become clear that introducing human disorders in an animal does not necessarily trigger pathogenetic cascades identical to those observed in the human disease. Thus, diseases need to be studied simultaneously with the animal models to ensure that they simulate some pathogenesis, against which the new therapeutics may be tested.

With the above object in view, we have introduced a new subject namely **"Animal Models for Neurological disorder."** This completion could very useful in the meant for the university/college students especially those who are engaged in research at any level. This book describes various animal models for neurological disorders with a special emphasis on working principle and the procedure. The data which have been provided in this book are on the basis of validated experimental procedures. The model included in this book for each disease successfully simulates sign and symptoms clinically relevant to neurological disorder prevalent in human beings. This book will provide certainly a coherent platform for effective learning of a wide variety of new validated research techniques that can be learnt.

The basic purpose of this book is to familiarize the students and researchers with basic concepts of neurological disorders and their validated animal models with the working procedures so as to hone their skill in the field of neuroscience for carrying useful research.