Movement Disorder Genetics
To Holger and Julius and to my dear parents,
in loving memory of Barbara
Susanne A. Schneider

To Eduardo, Maria Joaquina, Martinha
and especially to Rita
Jose Bras

This book is also dedicated to our mentors
in acknowledgement of their continuous
support.
Recent years have seen fascinating developments in the field of genetics. New technologies have, and continue to, enter the market; new genes have been and continue to be identified. In 2012 and in the USA alone, the genetic testing market was estimated to be around US$6 billion and predicted to rapidly increase by a factor of 3–4 until the year 2021. Neurogenetics is a part of this rapidly evolving field. Here, too, new methods and wider applications have led to the identification of novel genes associated with both Mendelian and/or complex inheritance.

While this has provided valuable insights into neurological conditions, at the same time it poses new challenges for clinicians. As the list of differential molecular diagnoses has grown, so has the difficulty in diagnosing patients with an obviously positive family history. In fact, this also holds true for patients with a negative family history, since it has become clear that heritable factors underlie a much larger proportion of patients than previously anticipated. Thus, even in these “sporadic” cases, genetic mutations should be considered and molecular testing may, in some cases, enable confirmation of a precise diagnosis. De novo mutations are an example of a previously underappreciated type of mutation that we now know are responsible for a significant proportion of early-onset sporadic disease. This, of course, has led to an increasing number of genetic tests becoming commercially available (with gene panels being the current trend at a continuously decreasing cost) requiring knowledge of how to best select the right test.

In parallel, the molecular genetic revolution has also changed the daily work of many scientists whose job is to understand the complexity of heritable diseases. Pathways are disentangled; complex puzzles of gene and protein interactions are unravelled. Yet the broader pathophysiology of the disease entities remains poorly understood; and we have only just begun to get a grasp on the roles of genes, the environment, and their interplay on the brain. Currently, treatment of the majority of heritable neurological disorders remains symptomatic, and knowledge of a molecular diagnosis has no direct consequence on therapeutic strategies. However, improved scientific understanding will, in the future, hopefully allow for the development of specific and perhaps even curative therapies.
This special edition is dedicated to movement disorders genetics and ties together up-to-date clinico-genetic knowledge, reviews on latest technologies as well as critical treatises about adjacent aspects, including ethical and legal considerations of genetic testing and contractual obligations in the context of health and life insurances. Indeed, with access to genetic testing becoming easier (because costs are dropping and because direct-to-consumer testing allows bypassing clinical services), there is a call for clear guidelines for genetic counselling and genetic testing. Because of this, we chose to dedicate separate chapters for a thoughtful and sensible discussion of these topics.

Putting this volume together has been an exciting journey, and we are grateful to all those who have contributed with their expertise and knowledge, with their time and other input. We are grateful to our patients who teach us valuable lessons and we are grateful to our own families who support us in what we do – every day.

Kiel, Germany
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