
Preface

This is among several volumes in the series *Methods in Molecular Medicine* that concentrate on a relatively specialized topic: Rotaviruses, one genus within the Reoviridae family. Rotaviruses are the most frequent cause of infantile gastroenteritis worldwide and a significant cause of death, following severe diarrhea and dehydration, in infants and young children of developing countries. Recently, a live attenuated tetravalent rotavirus vaccine has been licensed in the United States, and any widespread use of a rotavirus vaccine will be a further milestone in viral vaccinology. Structure, replication, and various functions of rotaviruses have been thoroughly investigated, and their medical importance clearly justifies and attracts interest to a detailed presentation of the modern methods and approaches used. In organizing this collection we considered it important to strike a balance of presentation among molecular and other modern techniques applied in rotavirus research, accompanied by the relevant background information and review material needed to render this collection attractive to the widest audience.

A short introductory chapter (U. Desselberger) sets the scene. The enormous progress made in elucidating the detailed structure of rotaviruses using cryoelectron microscopy and complex computer imaging techniques is presented in the chapter by B. V. Prasad and M. K. Estes. Owing to easy propagation of some rotaviruses in tissue culture and to the application of molecular labeling, blotting, and specialized electrophoretic techniques, details of rotavirus replication, some in common with other Reoviridae and others specific to themselves, have been unraveled and are described in the chapter by J. T. Patton, V. Chizhikov, Z. Taraporelawa, and D. Chen. J. M. Gilbert and H. B. Greenberg contribute some recently developed methods to study the still evolving mechanisms of interaction of viral receptor(s) with the host cell and of viral penetration as the initial steps of viral replication. Because of the segmented nature of their genomes, rotaviruses (like other segmented RNA viruses: reo-, influenza -, bunyaviruses, etc.) have, from the very beginning of their identification, elicited the interest of viral geneticists, and R. F. Ramig's chapter describes some of the methods used in this context.

Rotaviruses have a very wide animal reservoir, and animal models (gnotobiotic piglets, calves, rabbits, mice) have significantly contributed to our understanding of pathogenesis, the immune response, and the study of the

most relevant correlates of protection. Three chapters are devoted to these important issues: L. S. Saif and L. A. Ward review pathogenesis models; K. K. Macartney and P. A. Offit, the application of immunological techniques; and M. A. Franco and H. B. Greenberg, the application of mouse genetics to the study and recognition of the significance of different branches of the immune response for protection. Properly controlled animal models have also been crucial for studying and dissecting the immune responses to rotavirus vaccine candidates of various kinds, and M. Ciarlet and M. E. Conner provide a comprehensive overview of the methods applied in this context in smaller animal models. We considered inclusion of a chapter on methods of human rotavirus vaccinology, but abstained since it would lead readers too far away from the framework of this book series.

In both humans and various mammals, rotaviruses exhibit a high degree of diversity of cocirculating strains, and reliable methods for detection, typing (by serological and, increasingly, molecular techniques), and phylogenetic grouping (based on genomic nucleotide sequence information) are prerequisite to any understanding of the detailed epidemiology and also to carrying out implementation studies on widely used vaccines. M. Iturriza Gómara, J. Green, and J. J. Gray review and describe the techniques applied for this purpose. Some of the epidemiological tools used in rotavirus surveillance are discussed by D. Brown and M. Ramsay. In a final chapter U. Desselberger and M. Estes have attempted to identify topics of future research and have come up with a number of relevant items, hoping that readers may be stimulated.

The editors have made an effort to produce a standard layout in all chapters, to convey better the application of the methods. Introductory remarks are followed by sections on Materials needed and the Methods proper; added Notes often reflect personal experience of the authors with the methods conveyed and are worth reading and considering; and Reference lists were intended to be up-to-date.

The editors wish to convey their sincere thanks to all contributors for providing their chapters in time and in smooth interaction. The Publishers have been understanding and very helpful, and we wish to thank Tom Lanigan, Craig Adams, Fran Lipton, and John Morgan. We are confident that the contributions speak for themselves and hope that readers will have some gain from and enjoy reading them.

J. J. Gray
U. Desselberger

Rotaviruses

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