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Herpes Simplex Virus

Pathogenesis, Immunobiology and Control

Edited by B.T. Rouse

With 9 Figures

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Cover Illustration: Background: Cryo electron micrograph of purified B capsids of HSV-1 protein. Inset: Three-dimensional computer reconstruction of the Mab-labelled capsid, cut away to reveal a central cross section of the capsid shell and the inner capsid surface. The Fab fragments bound to the protruding tips of hexons are color-coded red. Preparation of capsids and antibodies: W.W. Newcomb and J.C. Brown, University of Virginia. Structural analysis and computer graphics: F.P. Booy, J.F. Conway, A.C. Steven and B.L. Trus, National Institutes of Health.

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Preface

Although upstaged by the tragic appearance of the human immunodeficiency virus, herpes simplex viruses (HSV) types 1 and 2 continue to be major human pathogens against which we lack acceptable vaccines or other means of immunological control. The virus is large and complex, coding for 70 or more proteins. Although many mysteries remain to be unraveled, our knowledge base regarding genomic organization, gene expression and regulation, pathogenesis, and immune recognition of component parts is quite considerable. Indeed, meetings devoted entirely to herpesviruses are conspicuous by their frequency and excellent, yet sometimes exclusive, attendance. The purpose of this volume is to compile in a single book a series of reviews by leading investigators that deal with various aspects of virus-host interactions and which hopefully will provide clues as to how to best manage HSV from an immunobiological perspective. Ultimately, one anticipates that a full understanding of virus-host interaction will lead to strategies useful for the prevention and control of HSV. The state of current progress with conventional vaccines is presented, as is a chapter on intracellular immunization. This latter novel approach to virus infections comes at approximately the bicentenary of Jenner's introduction of a successful conventional immunization strategy.

Since effective antiviral vaccines, immunomodulators, and intracellular immunogens demand a detailed understanding of the molecular biology of HSV, the volume begins with a chapter by HAY and RUYECHAN which briefly presents an overview of HSV gene expression and mentions the protein products that could be targeted for conventional immunological or intracellular attack. Following this are two chapters on pathogenesis. The first, by STANBERRY, deals with the many disease situations which involve HSV and the experimental animal models used to investigate them. The second, by SIMMONS, TSCHKARKE, and SPECK, focuses on a major target organ of HSV infection, the nervous system. The review presents a detailed discussion of

how the immune system interacts with HSV in the nervous system. The next three chapters are concerned with immunobiology and discuss the role of various host defense mechanisms in preventing and controlling infection. Thus, SCHMID and ROUSE deal with T cell immunity, emphasizing the relevance of cytotoxic T lymphocytes. KOHL discusses antibody-mediated immunity particularly as it relates to neonatal infections. Finally, WU and MORAHAN discuss the many aspects of nonadaptive immunity which play a vital role in containing HSV infection. The subsequent chapter introduces the intriguing possibility that the virus has evolved means of avoiding or dealing with the immune response. In this review, DUBIN and coworkers discuss instances in which viral properties appear to diffuse the otherwise protective effects of the immune response. The following chapter by DOYMAZ and ROUSE points out situations in which the immune response appears to contribute to disease lesions. Such immunopathological events are particularly damaging to the eye. BURKE summarizes our state of progress with vaccine development and considers both vaccines to prevent infection and those claimed to be therapeutically effective against HSV. The volume ends with a chapter by WONG and CHATTERJEE on the exciting new topic of intracellular immunization, which may represent the future of antiviral control. Their chapter is a general one, but it does focus on their own recent studies on HSV.

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Contents

Contributors

(Their addresses can be found at the beginning of their respective chapters)