

Preface

The humoral immune system, that is, antibodies produced by B cells, is an essential component of our defense against microbial infections. An impaired antibody response against bacterial, viral, or fungal microorganisms results in a heightened level of infections. This book brings together leading experts in the field of immunoglobulin activity and function to provide the reader with up-to-date information on the mechanisms of action of this class of molecules. During the last years, tremendous progress has been made in understanding how the different immunoglobulin isotypes mediate their activity. This book concentrates on IgM, IgA, and the four different IgG subclasses. We will not discuss the activity and function of IgE, which is covered in detail by other textbooks and reviews. The book is meant for readers with a basic understanding of how the immune system works. We will not introduce the molecular mechanism of how B cells develop and become activated and how immunoglobulin class switching is accomplished. Instead, we will focus on how immunoglobulin molecules recruit the humoral and cellular effector functions of the innate immune system. In Chap. 1, Mikael Karlsson from the Karolinska Institute in Stockholm in Sweden, will discuss the role of IgM and IgD in infection and inflammatory diseases. Jenny Woof from the University College of Dundee in the UK will give an in-depth overview in Chap. 2 of how IgA, the immunoglobulin subclass that dominates the inner body surfaces such as the gut, lung, and saliva, is critical to prevent microorganisms from invading the body at these sites. Chapters 3–8 will then switch to the family of immunoglobulin G subclasses, which are indispensable for protective antimicrobial immune responses. Peter Sondermann, head of research at SuppreMol GmbH in Munich, will start with a detailed insight into the IgG structure (Chap. 3), followed by a chapter (Chap. 4) of Jeanette Leussen from the University of Utrecht in the Netherlands and myself on the molecular and cellular mechanisms involved in the activity of IgG which, on the one hand, prevents infections but, on the other hand, is responsible for the destruction of healthy tissues during autoimmune diseases. Besides this pro-inflammatory activity, IgG is used since many years as an anti-inflammatory treatment to suppress autoimmune pathology. The tremendous advances we have made in understanding this “other side” of IgG activity are summarized in Chap. 5 by myself. Shozo Izui from the

University of Geneva in Switzerland will then provide in Chap. 6 a detailed example of how red blood cell or immunoglobulin-specific autoantibodies (so-called rheuma factors) mediate their activity. Michael Karsten and Jörg Köhl from the University of Lübeck in Germany will introduce the intricate interplay between cellular and humoral effector functions triggered by IgG (Chap. 7), followed by a detailed overview of how IgG half-life is controlled by the neonatal FcRn by Kristi Baker, Timo Rath, and Richard Blumberg from Harvard University in Boston (Chap. 8). Besides connecting the adaptive with the innate immune system, antibodies also feedback on B cells to regulate their own production, which will be introduced in Chap. 9 by Birgitta Heyman from Lund University in Sweden. Finally, Christian Kellner and Matthias Peipp from the University of Kiel in Germany will introduce in Chap. 10 how the function of IgG can be enhanced and which novel formats of therapeutic antibodies are currently used and may be used in the near future.

Last but not least, I would like to sincerely thank all the authors for their contributions and efforts for making this book possible.

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