



Modern Blood Banking and Transfusion Practices

Fifth Edition

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F.A. Davis Company • Philadelphia

F. A. Davis Company
1915 Arch Street
Philadelphia, PA 19103
www.fadavis.com

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Printed in the United States of America

Last digit indicates print number: 10 9 8 7 6 5 4 3 2 1

Acquisitions Editor: Christa Fratantoro
Developmental Editor: Peg Waltner
Design Manager: Joan Wendt

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Library of Congress Cataloging-in-Publication Data

Modern blood banking and transfusion practices / [edited by] Denise M. Harmening.— 5th ed.
p. ; cm.

Includes bibliographical references and index.

ISBN 0-8036-1248-6 (hardcover : alk. paper)

1. Blood banks. 2. Blood—Transfusion. 3. Immunohematology.

[DNLM: 1. Blood Banks—methods. 2. Blood Grouping and Crossmatching. 3. Blood Transfusion—methods. WH 460 M688 2005] I. Harmening, Denise.
RM172.M62 2005
615'.39—dc22

2004020021

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F O R E W O R D

Blood groups were discovered over a hundred years ago, but most of them have been recognized only in the last 50 years. Although transfusion therapy was used soon after the ABO blood groups were discovered, it was not until after World War II that blood transfusion science really started to become an important branch of medical science in its own right. Thus, compared with many sub-disciplines of medicine, blood transfusion science is an infant, growing fast, changing continually, and presenting a great potential for research and future development. To be able to grow, transfusion science needs to be nurtured with a steady flow of new knowledge generated from research. This knowledge then has to be applied at the bench. To understand and best take advantage of the continual flow of new information being generated by blood transfusion scientists and to apply it to everyday work in the blood bank, technologists and pathologists need to have a good understanding of basic immunology, genetics, biochemistry (particularly membrane chemistry), and the physiology and function of blood cells. To apply new concepts, they need technical expertise and enough flexibility to reject old dogma when necessary and to accept new ideas when they are supported by sufficient scientific data. High standards are always expected and strived for by technologists who are working in blood banks or transfusion services. I strongly believe that technologists should understand the principles behind the tests they are performing, rather than perform tasks as a machine does. Because of this, I do not think that “cookbook” technical manuals have much value in *teaching* technologists; they

do have a place as reference books in the laboratory. During the years (too many to put in print) that I have been involved in teaching medical technologists, it has been very difficult to select one book that covers all that technologists in training need to know about blood transfusion science without confusing them. Dr. Denise Harmening has produced that single volume. She has been involved in teaching medical technologists for most of her career; after seeing how she has arranged this book, I would guess that her teaching philosophies are close to my own. She has gathered a group of experienced scientists and teachers who, along with herself, cover all the important areas of blood transfusion science. The chapters on the basic principles of cell preservation, genetics, immunology, and molecular biology provide a firm base for the learner to understand the practical and technical importance of the other chapters. The chapters on the blood groups and transfusion practice provide enough information for medical technologists without overwhelming them with esoteric and clinical details. Although this book is designed primarily for medical technologists, I believe it is admirably suited to pathology residents, hematology fellows, and others who want to review any aspect of modern blood transfusion science.

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P R E F A C E

This book is designed to provide the medical technologist, blood bank specialist, and resident with a concise and thorough guide to transfusion practices and immunohematology. This text, a perfect “crossmatch” of theory and practice, provides the reader with a working knowledge of modern routine blood banking. Forty contributors from across the country have shared their knowledge and expertise in 27 comprehensive chapters. Over 500 illustrations and tables facilitate the comprehension of difficult concepts not routinely illustrated in other texts. In addition, color plates provide a means for standardizing the reading of agglutination reactions and illustrating complex material. Several features of this textbook offer great appeal to students and educators. There are outlines and educational objectives at the beginning of each chapter; as well as each chapter ends with case histories and study guide questions. An extensive and convenient glossary is provided for easy access to definitions of blood bank terms. A blood group antibody characteristic chart is provided on the inside cover of the book to aid in retention of the vast amount of information and to serve as an easy access and guide to the characteristics of the blood group systems. Summary charts at the end of each chapter identify for students the most important information to know for clinical rotations. Original comprehensive step by step illustrations of ABO forward and reverse grouping, not found in any other book, help the student to quickly master this important testing, which represents the foundation of blood banking. The introduction to the historical aspects of blood transfusion and preservation is a prelude to the basic concepts of genetics, blood group immunology, molecular biology, and current overview of blood group systems. The next section of the book focuses on routine blood bank practices, including donor selection, component preparation, detection and identification of antibodies, compatibility testing, transfusion

therapy, and apheresis. A chapter on transfusion safety and federal regulations clarifies the required quality assurance and inspection procedures. New to the fifth edition is Chapter 4, *Concepts in Molecular Biology*, which introduces the student to nucleic acid techniques and theory that govern molecular genetics in determining compatibility between donor and recipient, production of recombinant proteins such as growth factors utilized in certain apheresis procedures, and detection of transfusion-transmitted viruses in transfusion medicine. Certain clinical situations that are particularly relevant to blood banking are discussed in detail, including transfusion reactions, hemolytic disease of the newborn, autoimmune and drug-induced hemolytic anemia, transfusion-transmitted viruses, human leukocyte antigens, and paternity testing. Chapter 26, *Informational Systems in the Blood Bank*, helps prepare blood bankers for the responsibility of operating and maintaining a blood bank information system. Unique to this book is Chapter 27, *Medicolegal and Ethical Aspects of Providing Blood Collection and Transfusion Services*.

This book is a culmination of the tremendous efforts of a number of dedicated professionals who participated in this project by donating their time and expertise because they care about the blood bank profession. The book's intention is to foster improved patient care by providing the reader with a basic understanding of the function of blood, the involvement of blood group antigens and antibodies, the principles of transfusion therapy, and the adverse effects of blood transfusion. It has been designed to generate an unquenchable thirst for knowledge in all medical technologists, blood bankers, and practitioners, whose education, knowledge, and skills provide the public with excellent health care.

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