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0521780705 - Neonatal Hematology
Edited by Pedro A. de Alarcon and Eric J. Werner
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Neonatal Hematology

Written by practicing physicians specializing in pediatric hematology, neonatology, immunology, pediatric infectious disease, and transfusion medicine, this is a practical guide to the pathogenesis, recognition, and management of hematologic problems in the neonate. The focus is on clinical issues encountered by pediatric specialists. There are chapters devoted to disorders of leukocytes, platelets, procoagulant and anticoagulant proteins, and disorders of red blood cells. Neonatal transfusion, malignant disorders in the newborn, neonatal hemoglobinopathy screening, and harvesting and storage of umbilical-cord stem cells are also covered, and practical approaches to diagnosis and treatment are given.

Pedro de Alarcón is a Member of St Jude Children's Research Hospital, Professor of Pediatrics at the University of Tennessee.

Eric Werner is Professor of Pediatrics and Director of the Division of Pediatric Hematology/Oncology at the Eastern Virginia Medical School and Co-Director of the Division of Pediatric Hematology/Oncology, Children's Speciality Group, Children's Hospital of the King's Daughters.

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Dedication



Dedication to Dr Frank A. Oski

Our journey to the creation of this book in neonatal hematology began with a challenge from Dr Oski to update the text that he and Dr Naiman last produced in 1982. A hematologist and a consummate pediatrician, Dr Oski's special love was neonatal hematology. We both were attracted to Syracuse, New York, not because of the wonderful weather in that sunny city of eternal snow but because of the program that Dr Oski had built both in pediatrics and in pediatric hematology. As Fellows, we had the privilege and unusual experience of making neonatal hematology rounds once a week. Dr Oski attended in the neonatal intensive care unit once a year. A MEDLINE search yields 80 publications by Dr Oski in the field of neonatal hematology. Three editions of *Hematologic Problems in the Newborn*, co-edited with his friend and colleague Dr Laurie Naiman, helped many of us maintain an interest in neonatal hematology. Inspired by Dr Diamond's contributions, Drs Oski and Naiman established neonatal hematology as a field worth devoting a career to. Dr Oski contributed basic information to the field of neonatal red-cell enzymes, the neonatal red cell as it differed from the characteristic red cell in children and adults. Oxygen delivery and the hemoglobin dissociation curve were a natural sequence of study in an attempt to understand why newborns became "anemic" at birth. The role of iron, transfusions of red cells, and vitamin E

in the anemia of the newborn and the premature followed suit, culminating with Dr Oski's logical next step, nature's solution, breast milk, became areas to which Dr Oski contributed throughout his career. It is with respect and a deep felt thanks that we dedicate this book to our mentor Dr Oski. We also want to thank Dr Naiman for writing the foreword to this book. He also deserves credit and gratitude for his contributions to the field of neonatal hematology and his role in establishing this discipline.

PEDRO DE ALARCÓN AND ERIC WERNER

Dedication to Dr Maureen E. Andrew

Dr Maureen Andrew (1952–2001) died suddenly during the preparation of this chapter. Dr Andrew

was one of the most influential pediatric researchers/clinicians of our time. A past president of the Society for Paediatric Research, she worked actively in research until her death, introducing the concept of developmental hemostasis and leading the field of thromboembolic disease in children with an evidence-based approach. As founder of the 1-800-NO-CLOTS service, she directly helped thousands of babies as a source of clinical expertise. Dr Andrew trained numerous pediatricians in the art of pediatric haematology. She will be remembered by many as a brilliant scientist, a caring doctor, a thoughtful mentor, and, for those of us lucky enough to know her well, as a warm and wonderful friend.

PAUL MONAGLE

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Foreword

It is an honor to be invited to write a foreword to this book. I know my friend and late colleague Dr Frank A. Oski, with whom I coauthored three editions of the monograph *Hematology of the Newborn* from 1966 to 1982, would echo this sentiment. And he would be delighted that his former fellows Drs Werner and de Alarcón shared our interest in the importance of this subject sufficiently to bring it up to date in an expanded textbook rich with information of great scientific and practical value.

As expected, there have been many important advances in the field of neonatal hematology in the past 20 years – new diseases, new ways of diagnosing, treating, and preventing old diseases. These are covered thoroughly in the chapters written by the authors of this book, each chosen carefully by the editors for his or her expert knowledge and experience.

With progress, diseases that virtually established neonatal hematology as a distinct discipline have largely come under control, reducing the space needs for describing them. There is no greater example of this than in the section devoted here to hemolytic disease of the fetus and newborn (formerly referred to as erythroblastosis fetalis), one that represented the largest chapter in our earlier monograph. All this resulted from the successful implementation in 1968 of Rh immunoglobulin to prevent Rh alloimmunization and hemolytic disease of the newborn. In its place, we now see chapters devoted to subjects hardly known then,

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such as hemoglobinopathy screening, immunology, malignancy, thromboembolic disorders, transfusion practices, and umbilical-cord stem-cell harvest and transfusion.

What started as a practical monograph to assist clinicians dealing with hematologic problems encountered in the newborn has grown into a comprehensive reference source for everyone interested in the unique aspects of blood and neoplastic disorders seen at this age – and a useful guide to those directly responsible for care of these patients.

Books such as the present one and that by Dr Oski and myself serve also to stimulate others to investigate unsolved problems and develop new therapies. I was reminded of this by a chance meeting several years ago with Dr Pablo Rubinstein, who developed

the first public cord blood bank (Placental Blood Program) at the New York Blood Center and made these products available for hematopoietic stem-cell transplant programs worldwide. At this, our first meeting together, he attributed his interest in the potential of cord blood for transplantation to statements in our book about cord blood being a rich source of blood-cell precursors. At the time we wrote our book, we had no idea that statements like that might have led to a major development such as the use of cord blood for transplantation. But it encourages me to predict that similar material in the present book by Drs Werner and de Alarcón will provide the seed for advances by others that were not at all conceived at the time this text went to press. And this is how the tree of knowledge grows.

J. Lawrence Naiman, M.D.

Preface

There is no time in life when human physiology changes more rapidly than in the neonatal period. The blood is very much affected by the transition from the intrauterine to the extrauterine environment. During this time, the normal range becomes a moving target, making it difficult to distinguish many abnormalities from physiologic variations. Furthermore, remarkable advances in perinatal/neonatal medicine have led to dramatic improvements in infant survival – now extending to the extremely low-birthweight infant. Many previously fatal congenital disorders are no longer universally so, due both to advances in basic and clinical research and to the hard work of perinatologists, neonatologists, pediatricians, pediatric subspecialists, and surgeons.

Melissa Warfield, M.D., a pediatric hematologist of great experience, would refer to textbooks as either “How come?” books or “How to” books. It is the goal of this textbook to be a “How to” book, with some discussion of the pathophysiology of the hematologic problems while focussing on practical aspects for the clinician. While there is some overlap between each of the areas covered in this book, as there is with most of the hematologic disorders of the newborn, we have chosen to be inclusive of the discussions prepared by each of the contributors.

The contributors to this text bring a wealth of knowledge and expertise to each of the chapters. We are so fortunate to have readily acknowledged

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experts with a wide range of backgrounds, including neonatologists, pediatric hematologists, pediatric immunologists, pediatric transfusion medicine specialists, and pediatric infectious diseases physicians. These authors took time from their very busy activities to review the state of the art in their fields, often dealing with repeated questions and requests from the editors. In particular, we, and the entire medical world, will greatly miss Dr Maureen Andrew. In addition to her extensive research into hematologic problems of the newborn, especially in the area of thromboembolic disease, she could always be called

upon for her wisdom and experience in the management of difficult clinical problems.

We thank Dr J. Lawrence Naiman for his continuous support through the production of this text and Drs James A. Stockman III and Jack Widness for their insightful comments and criticisms. Lastly, but certainly not the least, we wish to thank our wives (Jill and Alice), our children (Alessandro, Tessa, Jacob, Abby, and Andrew), and the patient spouses and children of all of our contributors whose family activities were limited by their dedication to completing this text.