

CONTENTS

Preface	xv
Ellis D. Avner and Robert M. Kliegman	

Preimplantation Genetic Diagnosis	559
David P. Bick and Eduardo C. Lau	

This article covers the rapidly advancing field of preimplantation genetic diagnosis (PGD), the molecular genetic analysis of cells taken from embryos formed through in vitro fertilization (IVF). The article focuses on current practices in patient management, relevant IVF and PGD procedures, molecular methods used in the genetic analysis, and technical difficulties that can affect test results. It discusses the growing list of indications for PGD including chromosomal disorders, monogenic disorders and human leukocyte antigen typing of embryos. The article also examines some of the emerging technologies being introduced into PGD.

The Application of Microarray Analysis to Pediatric Diseases	579
Martin J. Hessner, Mingyu Liang, and Anne E. Kwitek	

DNA microarrays are a tool for simultaneously assessing the expression levels of thousands of genes in a single experiment, making them well-suited to understanding the complex gene response patterns and the regulatory pathways involved in human disease. This article reviews the basics of array technology and analysis, and highlights its application to pediatric diseases.

Pharmacogenomics and the Future of Drug Therapy	591
Ronald N. Hines and D. Gail McCarver	

With the completion of the human genome project, many investigators are striving to translate the resulting wealth of new information into new and improved clinical practices. Pharmacogenomics represents one of the most promising of these applications

for adult- and pediatric-based therapies. This article provides a historical perspective, but most importantly, uses this background to illustrate important principles of the field. The application of pharmacogenomics to asthma therapy is presented as an example of the current status of pharmacogenomics as it is being applied to an important pediatric health problem. Finally, a discussion of future promises and challenges to the application of pharmacogenomics is presented, including economic and ethical issues.

Gene Therapy: Future or Flop

621

Frank Park and Kenneth W. Gow

Many pediatric diseases have now reached a therapeutic plateau using standard therapy. Gene therapy has emerged as an exciting new means to achieve specific therapeutic benefit. Although there have been important and promising breakthroughs in recent clinical trials, there have been some serious setbacks that have tempered this initial excitement. In this review, we discuss the important developments in the field of gene therapy as it applies to various pediatric diseases and relate the recent successes and failures to the future potential of gene therapy as a medical therapeutic application.

Pediatric Ethics in the Age of Molecular Medicine

639

Raymond C. Barfield and Eric Kodish

Many scientific advances in molecular medicine, such as those made in genomics, stem cell transplantation, and neurobiology, raise important ethical issues that are relevant to pediatrics. Although some of these novel issues appear to be nearly without precedent, others are illuminated by reflection on prior challenges. How do we approach such complex ethical questions in the context of pluralism? This article examines several important areas in molecular medicine exemplifying fundamental ethical questions that are broadly applicable.

Cellular and Genetic Basis of Primary Immune Deficiencies

649

James W. Verbsky and William J. Grossman

Knowledge of the genetic mutations of primary immune deficiency syndromes has grown significantly over the last 30 years. In this article the authors present an overview of the clinical aspects, laboratory evaluation, and genetic defects of primary immunodeficiencies, with an emphasis on the pathophysiology of the known molecular defects. This article is designed to give the primary pediatrician a general knowledge of this rapidly expanding field.

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