



EDUCATIONAL CORNER OF THE ISSUE

Basic concepts of medical genetics

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1. Gene function

The genome of each organism, composed of all genes specific to the organism, is responsible for determining, configuring, and regulating all structural and functional aspects of that organism. These activities are actually mediated by the unique proteome of each organism, i.e. the sum of proteins produced in that particular organism by its own genome. The genomes of different organisms are composed of variable numbers of genes, up to tens of thousands as is the case in human, and can produce variable numbers, up to tens of thousands or even millions, of different proteins required for development and maintenance of all life aspects of the organism. So, the proteome of each organism is determined by its genome. Each of the genes of the genome is responsible for controlling a particular biological function through its product, may be a particular protein or a non-mRNA molecule responsible for mediating that particular biological function. Accordingly, the main function of the gene is the production of a unique product responsible for a specific biological function. Each gene carries in its unique base sequence the genetic information necessary

for production of its gene product or its unique protein synthesized in the cell cytoplasm or cytosol [1].

The central dogma of molecular biology, or the frame of mediation of life processes at the gene-protein level, as illustrated in (Fig. 1), entails that genes regulate synthesis of proteins which mediate all life activities of living organisms. Actually, this is the major function of most genes. Genes which directly regulate protein synthesis are called structural genes. The functions of these structural genes are conducted under strict supervision of regulatory genes which regulate switching on, or activation, and switching off, or suppression, of structural genes so that the proper amount of proteins necessary for mediating physiological processes is synthesized at proper times. Proper control of these temporal aspects of gene function is of utmost importance for fine control, regulation and cooperation of the very large number of metabolic networks of the cell. Still, a third group of genes, master genes or housekeeping genes, function in a continuous manner to ensure maintenance and permanence of life-dependant processes. Examples of these processes include cell growth, cell division, ATP production and apoptosis. Continuous monitoring of these life-dependant activities is mandatory to keep life activities in living organisms [1].

Structural genes regulate protein synthesis via the genetic information, or the genetic code, which is the information contained within the specific arrangement of the nucleotides, or bases, of the gene that determine the gene function(s). It is designed to function in a specific way so that each three nucleotides in sequence along the gene, known as the codon, which is the functional unit of the gene, define a single specific amino acid in the protein synthesized under regulation of the gene. There are 64 known codons: 61 functional codons which define specific amino acids in the proteins, and three termination or stop codons that do not define any amino acids in the protein (Fig. 2). Rather, they determine the end point of the synthesized protein.

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Basic Concepts In Medical Genetics

**SriniVas R. Sadda,Andrew P.
Schachat,Charles P. Wilkinson,David
R. Hinton,Peter Wiedemann,K. Bailey
Freund,David Sarraf**

Basic Concepts In Medical Genetics:

Basic Concepts in Medical Genetics Marshall Horwitz, Mary Beth Dinulos, Kris Carroll, 2000 **Basic Concepts in Medical Genetics** Marshall Horwitz, Mary Beth Dinulos, 2000 The main focus of this text is on medical genetics with a general approach to explanations It offers key concepts by the way of example to common problems and illustrations of concepts through working through some of the classic and prototypical problems that students encounter Introduction To Basic Concepts Of Medical Genetics Mohammad Salem, 2012 Medical genetics a branch of human genetics spans a wide spectrum of sub branches including basic clinical diagnostic therapeutic prophylactic and applied genetics This booklet I hope it be the first in a series is confined to two disciplines of basic genetics viz molecular genetics and pathogenetics that are concerned with studying the structure and function of the genetic material in health and disease states It aims at offering the basic concepts of these two subjects to clinicians and research workers in the field For clinicians beginning their specialization as medical geneticists I tried my best to offer as simplified as possible definitions and illustrations of the main points of both subjects concerning the structure and function of genes mutagens and disease causing mutations as well as the anti mutation mechanisms of the human genome For research workers I pointed out some of the most enigmatic aspects of the field that still await more research to disclose in order to go a step further in our way to understand what we think we know about the role of our genetic constitution in shaping our life **Medical Genetics E-Book** Lynn B. Jorde, John C. Carey, Michael J. Bamshad, 2019-09-27 Up to date and extensively revised to reflect recent advances in the genetics of common diseases as well as current progress in gene therapy Medical Genetics 6th Edition delivers easy to read highly visual coverage of this rapidly changing field This accessible practical text integrates key concepts with clinical practice highlighted by numerous illustrations tables concept summaries and more all designed to enhance effective learning and retention of complex material Discusses current topics including polygenic risk scores and their potential applications for diabetes cancer and heart disease and the latest sequencing technologies and their clinical application in genetic testing and diagnosis Offers a completely updated discussion of genetic testing modalities and applications Includes convenient concept summaries more than 230 photographs illustrations and tables as well as patient family vignettes that present valuable perspectives on disease and treatment Features Clinical Commentary boxes that demonstrate how the hard science of genetics has real applications to everyday patient problems preparing you for problem based integrated courses Illustrates key concepts with disease examples to demonstrate relevance to medicine Provides study questions for self assessment as well as 200 additional USMLE style questions online Enhanced eBook version included with purchase Your enhanced eBook allows you to access all of the text figures and references from the book on a variety of devices Medical Genetics Lynn B. Jorde, PhD, John C. Carey, MD, MPH, Michael J. Bamshad, MD, 2015-09-04 Popular for its highly visual clinical approach Medical Genetics delivers an accessible yet thorough understanding of this active and fast changing field Key updates in this new

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Human Genetics, Informational and Educational Materials National Clearinghouse for Human Genetic Diseases (U.S.), **Principles of Medical Genetics** Thomas D. Gelehrter, Francis S. Collins, David Ginsburg, 1998 **Human Genetics**, 1980 *Histology and Cell Biology: An Introduction to Pathology - E-Book* Abraham L. Kierszenbaum, Laura Tres, 2025-03-25 The first text to integrate microscopic anatomy with cell biology general pathology and physiology Histology and Cell Biology An Introduction to Pathology Sixth Edition continues to set the standard for studying today's rapidly evolving molecular oriented medicine Drs Abraham L Kierszenbaum and Laura L Tres present essential concepts in an accessible easy to understand manner with full color illustrations diagrams photomicrographs and pathology photos fully integrated on every page Linking pathological conditions to basic sciences throughout this award winning text helps you build a substantial clinical knowledge base while learning the structure and function of normal organs Provides cover to cover updates throughout reflecting current terminology basic science and clinical concepts Includes new material at the beginning of each chapter that assists you with the microscope as you first encounter the architectural complexity of tissues or organs Includes Primers in most chapters that provide a practical self contained integration of histology cell biology and pathology helping you understand the relationship between basic and clinical sciences Contains Essential Concepts at the end of each chapter highlighting relevant issues perfect for studying and reviewing for in course and board examinations Uses a light green background throughout the text to identify essential concepts of histology a feature requested by both students and instructors to quickly locate which concepts are most important for beginning learners or when time is limited Identifies clinical terms throughout the text and lists all clinical boxes in the table of contents for quick reference Helps you understand the links between chapter concepts with concept mapping animations online providing a dynamic supplement to in class instruction *Handbook of*

Neurodevelopmental and Genetic Disorders in Children, 2/e Sam Goldstein, Cecil R. Reynolds, 2010-10-19 Recognized as the definitive reference in the field this book addresses a broad range of biologically based disorders that affect children's learning and development. Leading authorities review the genetics of each disorder, its course and outcome, associated developmental, cognitive, and psychosocial challenges, and what clinicians and educators need to know about effective approaches to assessment and intervention. Coverage encompasses more frequently diagnosed learning and behavior problems with a genetic component as well as numerous lower incidence neurodevelopmental disabilities. Illustrations include 12 color plates.

Emery and Rimoin's Essential Medical Genetics David L. Rimoin, Reed E. Pyeritz, Bruce Korf, 2013-05-15 For decades Emery and Rimoin's *Principles and Practice of Medical Genetics* has provided the ultimate source for practicing clinicians to learn how the study of genetics can be integrated into practice. Developed in parallel to the sixth edition and featuring 174 original contributions from the many authors of the full set, this one volume work expertly condenses and synthesizes the most clinically relevant content for convenient desk reference. Helping to bridge the gap between high level molecular genetics and individual application, it follows the multi volume set in encompassing scientific fundamentals, full spectrum discussion of major inherited disorders and actionable therapies. Clinically oriented information is supported by concise descriptions of the principles of genetics, research approaches, and analytics to embrace the evolving population of students, researchers, and practitioners who are integrating their work to provide advanced diagnosis, prevention, and treatment of human disease. This print volume is complemented and enhanced with online access to the complete text, online only references, and high quality illustrations on www.expertconsult.com. Features 174 summarized contributions concisely discussing advances in cancer genetics, genomic technologies, and molecular genetics. Contains hundreds of full colour illustrations supporting users with identification, concept illustration, and method processing. Enhanced with full text online access, high quality illustrations, and online only references at www.expertconsult.com.

The Importance of Genetic Literacy and Education in Medicine Nina Perez, Borut Peterlin, Saša Ostojić, 2022-05-24

Medical Genetics for Healthcare Professionals Pasquale De Marco, Medical genetics is a rapidly evolving field that is having a profound impact on healthcare. This book provides a comprehensive overview of medical genetics for healthcare professionals, covering the basics of molecular and clinical genetics as well as the latest advances in the field. Written in a clear and engaging style, this book is accessible to readers with a variety of backgrounds, from those with no prior knowledge of genetics to those who are already familiar with the field. The book is divided into 10 chapters, each of which focuses on a different aspect of medical genetics. The first few chapters introduce the basic concepts of genetics, including DNA structure and function, gene expression, and genetic variation. The book then discusses the role of genetics in health and disease, and how genetic testing can be used to diagnose and treat genetic disorders. The book also explores the ethical and social implications of medical genetics, such as genetic discrimination and the use of genetic information in law enforcement. The

latter chapters of the book focus on specific areas of medical genetics such as cancer genetics cardiovascular genetics and neurogenetics The book also discusses the role of medical genetics in public health including genetic screening and prevention programs This book is an essential resource for healthcare professionals who want to learn more about medical genetics and its applications in clinical practice It is also a valuable resource for students and researchers in the field of genetics If you like this book write a review

Medical Genetics Ian D Young,2010-09-02 Medical Genetics provides medical and biomedical students with an understanding of the basic principles of human genetics as they relate to clinical practice showing how our genome lies at the heart of our health and well being

PDQ Medical Genetics Ronald G. Davidson,2002 Description PDQ Medical Genetics challenges students to learn to think genetically to recognize genetic factors and to explain genetics to patients The author presents an approach to solving clinical problems with genetic components rather than on the presentation of facts that would soon fall out of date The text is problem oriented Each chapter opens with a case scenario designed to direct the student toward learning both the clinical and the basic biological science The featured scenarios also provide direction in the dealing with a patient s and family s personal difficulties by listing genetic disease support groups The informative text also emphasizes how to go about obtaining the latest information on such topics as molecular testing and imaging techniques Key Features Features topics not found in most genetics texts designed primarily for medical students such as complex disorders ambiguous genitalia pharmacogenetics and bone dysplasias Includes a dual platform mini CD ROM with the complete text and illustrations in fully searchable PDF files Incorporates references and links to carefully selected websites for additional readings and a bonus self assessment question and answer section for each chapter all included on the accompanying CD ROM This book will help students understand the nature of genetics and how its principles flow from those of evolution and natural selection It provides to the medical student an approach to solving clinical problems and provides a conceptual framework within which to sort it all out Davidson approaches the subject of medical genetics as students will encounter it clinically The book is problem based and each chapter begins with a case scenario requiring a knowledge of genetics with which the practicing physician will have to come to grips fairly frequently with the emphasis on having the student recognize the applications of basic science data and solving the problem presented

It **Genetics** Ruth M. DeBusk,2003 Discover how the Human Genome Project will soon affect dietetic practice in this fascinating new reference Medical nutrition therapy nutrition and food service drug therapy gene therapy gene diagnostics and social and public nutrition policies will all feel the impact of this on going research Each chapter in the Genetic Connection begins to answer the question of how these advances will affect dietetics Prepare for the future with this exciting new title

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developments which are integrated with clinical practice to emphasize the central principles and how they apply to practice Photographs illustrations and tables along with boxes containing patient family vignettes demonstrate clinical relevance and enhance visual impact of the material for easier and more effective learning and retention Mini summaries study questions suggested reading and a detailed glossary supplement and reinforce what you learn from the text More than 230 photographs illustrations and tables along with patient family vignettes clarify difficult concepts and demonstrate clinical significance Clinical Commentary Boxes help demonstrate how the hard science of genetics has real applications to everyday patient problems and prepare you for problem based integrated courses Emery's Elements of Medical Genetics E-Book Peter D Turnpenny, Sian Ellard, Ruth Cleaver, 2020-12-15 Long recognized as a leading textbook in this fast moving field Emery's Elements of Medical Genetics and Genomics offers current complete information with a strong basis in practical clinical genetics and genomics for medical school and beyond The 16th Edition of this award winning text has been thoroughly updated throughout and includes case based and multiple choice questions end of chapter summaries an extensive glossary and convenient online access making it an ideal choice for all medical undergraduates as well as postgraduates seeking to improve their understanding and knowledge Includes new case based studies with questions and answers throughout in addition to multiple choice self assessment questions for study and review Covers key topics such as pharmacogenetics personalized medicine prenatal testing reproductive genetics and ethical and legal issues in medical genetics Divides the text into three easy to use sections The Scientific Basis of Human Genetics Genetics in Medicine and Genomic Medicine and Clinical Genetics Counseling and Ethics Features full color illustrations and other images that help readers visualize the appearance of genetic disorders and assist with the understanding of complex genetic structures Contains learning features such as summary boxes an extensive glossary of terms online hyperlinks to important genetics websites and clinical databases and more Presents the extensive knowledge and experience of distinguished editors Peter D Turnpenny and Sian Ellard as well as new editor Ruth Cleaver *Ryan's Retina E-Book* Srinivas R. Sadda, Andrew P. Schachat, Charles P. Wilkinson, David R. Hinton, Peter Wiedemann, K. Bailey Freund, David Sarraf, 2022-04-13 Through six outstanding and award winning editions Ryan's Retina has offered unsurpassed coverage of this complex subspecialty everything from basic science through the latest research therapeutics technology and surgical techniques The fully revised 7th Edition edited by Drs Srinivas R Sadda Andrew P Schachat Charles P Wilkinson David R Hinton Peter Wiedemann K Bailey Freund and David Sarraf continues the tradition of excellence balancing the latest scientific research and clinical correlations and covering everything you need to know on retinal diagnosis treatment development structure function and pathophysiology More than 300 global contributors share their knowledge and expertise to create the most comprehensive reference available on retina today Features sweeping content updates including new insights into the fundamental pathogenic mechanisms of age related macular degeneration advances in imaging including OCT angiography and

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