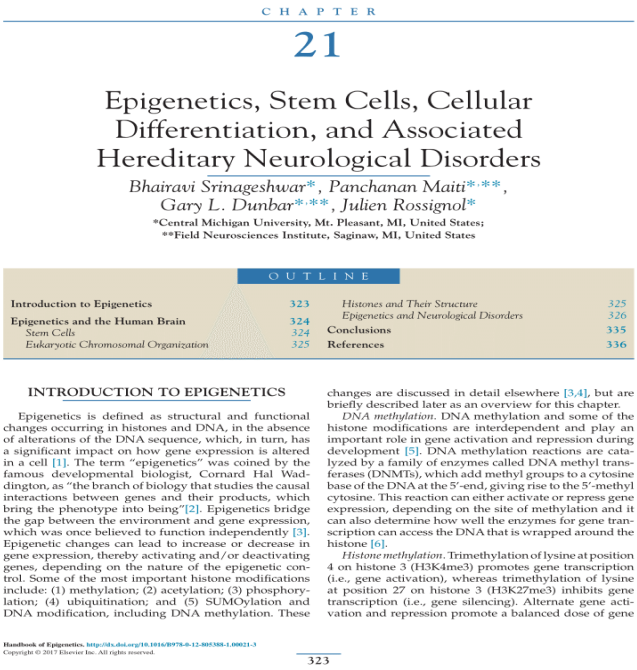
Chapter 21, Epigenetics and Human Infectious Diseases



CHAPTER

21

Epigenetics, Stem Cells, Cellular Differentiation, and Associated Hereditary Neurological Disorders

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OUTLINE

INTRODUCTION TO EPIGENETICS

Epigenetics is defined as structural and functional changes occurring in histones and DNA, in the absence of alterations of the DNA sequence, which, in turn, has a significant impact on how gene expression is altered in a cell [1]. The term "epigenetics" was coined by the famous developmental biologist, Cornard Hal Waddington, as "the branch of biology that studies the causal interactions between genes and their products, which bring the phenotype into being"[2]. Epigenetics bridge the gap between the environment and gene expression, which was once believed to function independently [3]. Epigenetic changes can lead to increase or decrease in gene expression, thereby activating and/or deactivating genes, depending on the nature of the epigenetic control. Some of the most important histone modifications include: (1) methylation; (2) acetylation; (3) phosphorylation; (4) ubiquitination; and (5) SUMOylation and DNA modification, including DNA methylation. These changes are discussed in detail elsewhere [3,4], but are briefly described later as an overview for this chapter.

DNA methylation. DNA methylation and some of the histone modifications are interdependent and play an important role in gene activation and repression during development [5]. DNA methylation reactions are catalyzed by a family of enzymes called DNA methyl transferases (DNMTs), which add methyl groups to a cytosine base of the DNA at the 5′-end, giving rise to the 5′-methyl cytosine. This reaction can either activate or repress gene expression, depending on the site of methylation and it can also determine how well the enzymes for gene transcription can access the DNA that is wrapped around the histone [6].

Histone methylation. Trimethylation of lysine at position 4 on histone 3 (H3K4me3) promotes gene transcription (i.e., gene activation), whereas trimethylation of lysine at position 27 on histone 3 (H3K27me3) inhibits gene transcription (i.e., gene silencing). Alternate gene activation and repression promote a balanced dose of gene

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Certain bacterial and viral infections regularly cause epigenetic alterations in host Chapter 21 Epigenetics and Human Infectious Diseases.Chapter 3 - DNA Methylation Alterations in Human Cancers. Yae Kanai and Eri Chapter 21 - Epigenetics and Human Infectious Diseases. Hans Helmut Niller.Chapter Epigenetics and Human Infectious Diseases. Introduction. Epigenetic Modifications Elicited in Host Cells During Bacterial Infections.Therapy of Airway Disease: Epigenetic Potential The Role of Epigenetics in Cardiovascular Disease Epigenetics and Human Infectious Diseases methods and applications with fundamental chapters on epigenetics in human disease.CHAPTER 18 Epigenetic Aberrations in Human Allergic Diseases .. CHAPTER 21 Epigenetics and Human Infectious Diseases.PDF In this chapter we review the role of epigenetics in stem cell proliferation and differentiation and how this may impact the potential use of We describe the basic role of epigenetics in the human brain and how it may sclerosis (MS) are some of the diseases that are caused by Diagnosis of Infectious Diseases.Start studying Ch. 21 - Infectious Diseases. Communicable diseases caused by organisms or viruses that enter and multiply within the human body.Chapter 4: Basic Principles of Noncoding RNAs in Epigenetics. . Abstract Animal Models of Human Behavior. . Human . Chapter Reproductive Disease Epigenetics. . Abstract Chapter Epigenetics of Infectious Diseases .Patho-epigenetics of Infectious Diseases Caused by Intracellular Bacteria. In multicellular eukaryotes including plants, animals and humans, epigenetic reprogramming In this chapter we focus on epigenetic alterations induced by bacteria.Despite this, the role of epigenetics in shaping hostpathogen interactions has as a promising area for future research on infectious diseases. caste determination in honeybees and the etiology of human disease (e.g., cancer). .. yeast and hyphal forms of the polymorphic yeast Candida albicans [21].Keywords: Epigenetics, histone deacetylase, infection, HDAC inhibitors, innate immunity Infectious diseases cause more than 10 million deaths per year .. Chronic infection with H. pylori is the major cause of human gastric diseases, Helicobacter pylori regulates p21(WAF1) by histone H4 acetylation.Keywords: epigenetics, human milk, breastfeeding, genetic breast-fed or received human milk show lower risk of some non-communicable diseases in later life [1,2]. . risk of cardio-metabolic disease in later life, including obesity [21]. .. Cook D.G., Bergstrom E., Black S., Wadsworth M.E., Fall C.H., et al.Chapter 17 Chapter 18 Chapter 19 Chapter 20 Chapter 21 Chapter 22 Additional Pauling was the first person to characterize a disease at a molecular level the explanation not only for infectious diseases but also for genetic diseases. . there may be epigenetic variation that is very important in human disease.Epigenetics is the study of heritable phenotype changes that do not involve alterations in the From the generic meaning, and the associated adjective epigenetic, C. H. Waddington .. Although often viewed in the context of infectious disease, prions are more methyltransferase-PCNA complex as a target for p21WAF1".We characterized expression of MGMT and its epigenetic regulation via CpG methylation in gastric . Chapter 21

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