Preface

The DNA sequencing is the process of determining the precise order of nucleotides within a DNA molecule. It includes any method or technology that is used to determine the order of the four bases—adenine, guanine, cytosine, and thymine—in a strand of DNA. The advent of rapid DNA sequencing methods has greatly accelerated biological and medical research and discovery.

Knowledge of DNA sequences has become indispensable for basic biological research, and in numerous applied fields such as diagnostic, biotechnology, forensic biology, and biological systematics. The rapid speed of sequencing attained with modern DNA sequencing technology has been instrumental in the sequencing of complete DNA sequences, or genomes of numerous types and species of life, including the human genome and other complete DNA sequences of many animal, plants, and microbial species.

In first chapter human papillomavirus infections are discussed. Human Papillomavirus (HPV) is arguably the most common sexually transmitted agent worldwide, either in its clinical (genital warts) or subclinical presentation in men and women. The main interest in HPV relates to its recognized as a causal and necessary factor for cervical cancer one of the most common cancers in women (80% of cases in most developing countries, with an annual incidence of almost half a millon and a mortality rate of approximately 50%), and other types of cancer, such as penis, anal or oral cancer.

Chromatin consists of the DNA and all proteins involved in organizing and regulating DNA structure. The building block of chromatin is the nucleosome, which is composed of 146 base pairs of DNA and a core histone octameris defined in second chapter. The core histone oactomer is composed of two heterodimers of histone H2A and histone H2B and a tetramer of histone H3 and histone H4. The overall chromatin structure is very dynamic in response to diverse biological events. Regulation of chromatin structure is achieved by two major mechanisms. The first is posttranslational modification (PTM) of histones and other chromatin proteins via phosphorylation, methylation, acetylation, ubiquitination and sumoylation.

In chapter three micrornas and lncrnas are described. As we know cancer is one of the most serious diseases around the world and it is the third leading cause of death, exceeded only by heart and infectious diseases. There are five major steps for cancer development: initiation, promotion, malignant conversion, progression, and metastasis. Cancer is result of process, where somatic cells mutate and escape the controlled balance of gene expression and cellular networks that maintain cellular homeostasis, which normally prevent unwanted expansion. Perturbations in these pathways results in cellular transformation.

How to repair DNA is defined in chapter four. DNA repair is critical for maintaining genomic integrity. The DNA damage such as those induced by endogenous processes (methylation, hydroxylation, oxidation by free radicals) or by exogenous agents such as ionizing radiation, environmental toxins, and chemotherapy is processed through the DNA repair machinery in cells.

Chapter five describes biological systems that control transcription of DNA repair and Telomere maintenance-associated genes. The roles of epigenetics in neurodegenerative diseases are given in six chapter. Seven chapter shows modern molecular and clinical approaches to Eradicate HPV-mediated cervical cancer.

In recent years, a large and growing body of evidence has shown that noncoding small RNAs regulate a wide range of important biological processes across all domains of life. The most extensively studied type of such small RNA regulators controls gene expression at the posttranscriptional level by base pairing with mRNA targets and thereby causing the degradation of mRNA, inhibiting translation, or both. In bacteria, regulatory small RNAs (sRNAs) are often associated. Chapter eight shows the bacterial small RNA that controls multicellular fruiting body development.

Editor