Preface

Numerous studies have indicated that epigenetic mechanisms may play a major role in both cellular and organismal aging. These epigenetic processes not only include DNA methylation and histone modifications but also extend to many other epigenetic mediators such as the polycomb group proteins, chromosomal position effects, and noncoding RNA. The topics of this seminal book on aging epigenetics range from fundamental changes in DNA methylation in aging to the most recent research on intervention into epigenetic modifications to modulate the aging process and age-associated disorders. The major topics of aging epigenetics covered in this book are (1) DNA methylation and histone modifications in aging, (2) other epigenetic processes and aging, (3) impact of epigenetics on aging, (4) epigenetics of age-related diseases, (5) epigenetic interventions and aging, and (6) future directions/perspectives in aging epigenetics.

The most studied of epigenetic processes, DNA methylation, has been associated with cellular aging and aging of organisms for many years. It is now apparent that both global and gene-specific alterations occur not only in DNA methylation during aging but also in several types of histone modifications. Many epigenetic aberrations may have an impact on aging processes through control of telomerase, modifications of telomeres, and epigenetic drift. The latter is evident in the recent studies of aging monozygotic twins.

Numerous age-related diseases are affected by epigenetic mechanisms. For example, recent studies have shown that DNA methylation is altered in Alzheimer’s disease and autoimmunity. Other prevalent diseases that have been associated with age-related epigenetic changes include cancer and osteoarthritis. Epigenetic alterations appear to have an effect on several of the progeroid syndromes of premature aging as well. Moreover, the impact of dietary or drug intervention into epigenetic processes as they affect normal aging or age-related diseases is becoming increasingly feasible.

This book is intended for those with interests ranging from the fundamental basis of aging to interventions in slowing the aging process or treating age-related disorders. The study of epigenetics as it relates to aging and age-related diseases is a relatively new field that is showing considerable promise in revolutionizing how the aging process is viewed. The purpose of this book on aging epigenetics is to provide
coverage of not only established aspects of epigenetics as applied to the aging process but also new approaches and perceptions in this important area of research.

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