

Preface

This second edition on transgenerational epigenetics continues the goal of the first edition as a comprehensive analysis of the exciting and rapidly developing field of generational transfer of epigenetic information and its impact on basic biological processes and clinical disorders. Many biological phenomena are controlled not through gene mutations but rather through reversible and heritable epigenetic processes. The mitotic cell-to-cell inheritance of epigenetic information has been established for quite some time; however, meiotic generational epigenetic transfer has only relatively recently emerged as a potentially important factor in inheritance.

The first edition of this book was the seminal volume dedicated to the topic of generational epigenetic inheritance, and many of the topics from the first edition of *Transgenerational Epigenetics* have been updated in this second edition to keep up with the most recent developments in this field. Many of the authors from the first edition have also contributed to the second edition, and other authors have also been recruited to provide a new perspective on the topics in the first edition. Further, the original chapter on heritable generational epigenetics through RNA has now been expanded into two chapters focusing more specifically on either small or long noncoding RNA to reflect the rapid growth in this emerging area of transgenerational epigenetics. Additional models have been added thereby extending the reach of studies in this fast-developing field to more diverse organisms. Given the rapid rise of obesity in developed nations, I have also added a chapter focusing on transgenerational epigenetics of parental obesity and insulin resistance.

Epigenetic information can be transferred through a number of mechanisms including DNA methylation, histone modifications, and RNA, and the effects may persist for multiple generations. This book consists of chapters on topics as diverse as the definitions and history of generational epigenetic inheritance, germ line epigenetics, transgenerational epidemiology, and basic mechanisms of epigenetic inheritance. Additionally, model organisms utilized in studies of transgenerational epigenetics, the evolution of transgenerational epigenetics, parental epigenetic inheritance, and environmental epigenetic effects on the offspring are covered. Chapters are also presented on the medical relevance of transgenerational epigenetics for disorders such as those of a metabolic nature. Clinical interventions in transgenerational epigenetic inheritance are presented and may be on the horizon to help prevent diseases before the offspring are born or to reduce the severity of diseases at the very earliest stages of development in utero.

As this book was the first volume devoted to this topic in its first edition form, this second edition continues its comprehensive coverage as a leading and updated resource on generational epigenetic inheritance. This volume is intended for those with interests ranging from the fundamental basis of transgenerational epigenetics to therapeutic interventions into epigenetic-based generational inheritance.

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