

Preface

The goal of this seminal book on transgenerational epigenetics is to provide 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.

Since this burgeoning but relatively new field is replete with debates on topics ranging from the basic definition of transgenerational epigenetics to the impact of generational epigenetics on the environment (or *vice versa*), I have titled this book *Transgenerational Epigenetics: Evidence and Debate* to reflect some of the intriguing controversies that are confronted in this book. My hope is that a volume such as this may fuel further study to lead to a fuller resolution of the nature and impact of transgenerational epigenetics as well as additional applications of this knowledge to advance clinical science.

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, germline 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. Numerous chapters are also presented on the medical relevance of transgenerational epigenetics for disorders and diseases such as metabolic, reproductive, cardiovascular, and mental disorders. 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 previously mentioned, there are many ongoing debates surrounding organismal inheritance of epigenetic phenomena and this volume closes with a chapter dedicated to the controversies and debates surrounding the potentially powerful yet developing field of transgenerational epigenetics.

Although some books have dedicated a chapter or two to this topic, no book of which I am aware has yet been solely and comprehensively devoted to this important topic. This book 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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