

Trygve O. Tollefsbol (ed.): Epigenetics of aging

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Suresh I. S. Rattan

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There was a time when the term epigenetics was often employed by some to explain away our inability to describe a biological event in precise biochemical terms. This was especially true for invoking all those mechanisms necessary to unfold the genetic programme for development, growth and maturation in a more or less coordinated and regulated manner. Since then, a lot but not complete, understanding of epigenetics in those areas has been achieved, and this includes unraveling DNA methylation, histone modifications, chromosomal remodeling, alternative transcript splicing, small RNAs, noncoding RNAs, and gene silencing. Now, somewhat similar expectations have been raised for epigenetics to explain the process and progress of aging and its consequences—diseases and eventual death. This is a particularly challenging, and perhaps a bit erroneous, expectation because whereas development is a highly regulated process, aging is mostly stochastic. The book *Epigenetics of Aging* takes up this challenge and, to a large extent, meets it successfully. The editor, Trygve Tollefsbol, deserves to be given credit for that.

Spread through 25 chapters, written by more than 40 authors, this nearly 500-pages thick book covers almost everything around the topic of how aging and age-related diseases might be affected by epigenetic

processes. One of the most extensively covered topic is that of DNA methylation in aging and diseases, including Alzheimer's, autoimmunity, osteoarthritis, and cancers. Unfortunately, there is often significant repetition about the basic information about DNA methylation in these chapters, which could have been avoided by a strict editorial hand. A similar criticism can also be made of the chapters discussing other epigenetic markers, such as histone modifications. However, having these repetitions is certainly much better than having significant omissions. There is an abundance of information regarding the basic molecular biology of epigenetics in this collection of articles in this book. However, at present, not all this information is directly applicable to explaining aging and age-related changes, which still await much more research and investigation.

It is not possible in this brief book review to comment upon all the articles dealing with a range of topics within epigenetics, except that these are generally well written and are quite up-to-date. However, one of the crucial aspects of the role of epigenetics in aging is the so-called epigenetic drift, which is yet to be fully realized and needs to draw more attention. This is an extremely important point with respect to aging which is mostly stochastic, is manifested as a progressive increase in molecular heterogeneity, and leads to the failure of homeodynamics. Although these aspects are touched upon in some chapters in the book, the chapter "Epigenetic Drift and Aging" by the team of Mario Fraga, and the

S. I. S. Rattan (✉)
Department of Molecular Biology, Laboratory of Cellular Ageing, Aarhus University, 8000 Aarhus, Denmark
e-mail: rattan@mb.au.dk

final chapter “Perspectives in Aging and Epigenetics” by Robin Holliday need special mentioning for their excellent analysis and synthesis. Understanding the drifting and stochastic nature of aging is crucial

for making any use of the epigenetic pathways to intervention, and for developing future directions in research. I surely recommend this book, which will help to open up many doors towards achieving that.