



When I was 20 years,



30 years



and

40 years old !!!!!

Defy the Clock with Slow Aging

Biswaranjan Paital
Editor

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Scope of the Book

The book “*Defy the Clock with Slow Aging*” aims to bring theoretical and practical aspects of biogerontology mechanisms that are responsible for biology of aging. Biochemical, molecular and clinical aspects of aging is covered in its chapters. The causes, process, control of aging is covered under one umbrella. There are ten chapters that illustrate how slowing the aging process involves a combination of lifestyle choices, scientific advancements, and holistic practices. Here’s a breakdown of key areas that contribute to longevity and healthy aging. Slowing the aging process is about more than just looking younger—it's about maintaining health, vitality, and quality of life as we grow older. Here’s why it matters. Looking younger is often associated with more than just aesthetics—it can impact how you feel, how others perceive you, and even your overall well-being. Here’s why it can be important. So, we hope this book will support those minds who want to slow their aging process.

Dr. Pritpal
25/4/25-

(Editor)

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This book “*Defy the Clock with Slow Aging*” would not have been possible without the support, encouragement, and expertise of many individuals.

First and foremost, we thank all the accomplished teachers and researchers from different Universities of India and abroad whose constructive, encouraging and motivating opinions on the content of the initial draft spurred us to expedite further writing and completing the current book project. Specific thanks to all the researchers of various institutes of India who always sparked us to write a book on aging. All your insights have greatly improved the quality of this work. We were fortunate to have had your input.

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Dr. Prithvi
25/4/25

(The Editor on behalf of all the authors)

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The Book is dedicated to



[Dr. Avnish Kumar]



[Prof. Dr. Chandrashekhar Naik]

This book entitled “Defy the Clock with Slow Aging” is dedicated with deep respect and gratitude to the late Dr. Avnish Kumar, Assistant Professor, Department of Biotechnology, School of Life Sciences, Khandari Campus, Dr. Bhimrao Ambedkar University, Agra - 282002, Uttar Pradesh, India, and the late Prof. Dr. Chandrashekhar Naik, Department of Biotechnology, Sir M. Visvesvaraya Institute of Technology, Hunasamarnahalli, via Yelahanka, Bangalore - 562157, who both served as lead authors of key chapters in this volume. The inspiration for this book stemmed from their guidance, dedication, and passion for science.

*Dr. Kumar, with over six years of teaching experience and seven years in research, had an impressive academic record with 4,932 citations, an h-index of 27, and an i10-index of 102. His commitment and scientific temperament were evident in the chapters he authored with great enthusiasm. He also founded the journal *STERBD - International Journal of Multidisciplinary Sciences*, a testament to his deep engagement in the scientific community.*

*Prof. Naik was a renowned microbiologist, whose work appeared in several prestigious international journals, including the *European Journal of Biotechnology and Bioscience*, *International Journal of Computational Biology and Bioinformatics*, *Applied Biochemistry and Microbiology*, and the *Journal of Enzyme Research*, among others.*

Tragically, we lost both of these exceptional scientists just as this book neared completion. Their absence is an immeasurable loss to the scientific world and to all who knew them.

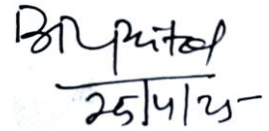
We offer our heartfelt condolences to their families. Our thoughts remain with both of them, and we pray for their eternal peace and a blessed resting place in the presence of the Almighty.

Preface

The process of getting older is usually referred to as ageing and applicable to all animals, plants and the micro-organism. However, the process of losing the physiological ability from their functions that lead to the organ(s) dysfunction and finally death is called as biological ageing. Therefore, biologically ageing includes both getting elder as well as losing control over physiological abilities. So, ageing is both biological (loss of body functions) and social (getting older). Some simple animals are potentially biologically immortal and are deviated from the above definitions of ageing. Sometime the process of ageing is also combined with psychological, physiological, environmental, behavioral changes along with biological and social processes. Biological broader definition is attributed to the ageing process when a single cell divides to form daughter cells. Roughly 150,000 people die under ageing or age associated issues. In modern era, the process of ageing is rather described with molecular changes that include stress accumulation in cells by reactive oxygen species leading to oxidative stress, DNA damage leading to telomere shortening and changes in epigenetic maintenance including DNA methylation.

The present book is started with a mechanistic definition of ageing followed by the factors that affect the ageing process. The causes of ageing are discussed in a stochastic manner. Factors such as senescence, inflammation, glycation, mitochondrial distribution, oxygen free radical, stress, disease susceptibility etc. are correlated with the process of ageing. An effect of nano-world with the ageing process was elegantly explained. Endocrine relationship with ageing process was established. An epigenetic issue such as regulation of ageing by miRNA at molecular level was discussed. Susceptibility ageing to associated issues such as vulnerability to infection, heat stroke or hypothermia, weakening and thinning of bones, waste molecule accumulation, telomeres shortening, amelioration of stiffer connective tissues, disturbed energy homeostasis was drowned. Effects of ageing process on cellular, tissues and organ systems especially on heart, sense organs, brain, and digestive system are covered. The process of ageing can also be diagnosed and this was explained using molecular mechanisms such as loss of protein homeostasis, loss of role of heat shock protein and molecular chaperons, autophagy, FOXO signaling, cytokines, tissue regeneration, mitochondria in ageing and neural dysfunctions. Slowing the ageing process can also be achieved by consuming antioxidants and plant products, immune-boosting and anti-inflammatory supports food supplements including proteins, sirtuins, caloric restriction, and exercise, adequate rest i.e. sleeping was suggested. Role of

consumption of general medicines such as rapamycin, torin, resveratrol, metformin, aspirin on ageing process was correlated. All the refereed materials listed in text are given at the end of the book in order to make the chapters short, readable and crispy. Hope this book “*Defy the Clock with Slow Aging*” will be widely accepted by our beloved readers.

Handwritten signature "BN Prithvi" and date "25/4/25" with a horizontal line above the date.

(The Editor on behalf of all the authors)