

BIOLOGY OF AGING AND ITS MODULATION

# Modulating Aging and Longevity

Edited by  
Suresh I.S. Rattan



Series Editor: Suresh I.S. Rattan

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# Modulating Aging And Longevity Biology Of Aging And Its Modulation

**Marius P. Young**



## **Modulating Aging And Longevity Biology Of Aging And Its Modulation:**

Modulating Aging and Longevity S.I. Rattan, 2003-09-30 After decades of systematic collection of data describing age related changes in organisms organs tissues cells and macromolecules biogerontologists are now in a position to construct general principles of ageing and explore various possibilities of intervention using rational approaches While not giving serious consideration to the claims made by charlatans it cannot be ignored that several researchers are making genuine attempts to test and develop various means of intervention for the prevention and treatment of age related diseases for regaining the functional abilities and for prolonging the lifespan of experimental organisms This book provides the most up to date information and a critical evaluation of a variety of approaches being tried for modulating aging and longevity including dietary supplementation with antioxidants vitamins and hormones genetic engineering life style alterations and hormesis through mild stress The goal of research on ageing is not to increase human longevity regardless of the consequences but to increase active longevity free from disability and functional dependence The International Handbook on Aging Erdman P. Palmore, Frank Whittington, Suzanne Kunkel, 2009-10-27 The United Nations World Assembly on Aging has made advancing health and well being into old age a worldwide call for action And this text at hand shows us what researchers worldwide are doing to answer that call Here three of America s most esteemed experts on aging lead a global team of contributors each an expert in his or her country to show us what the top challenges of each nation are and what top research is being done there to meet those While we cannot predict with absolute certainty all of the issues that will arise over the next 20 years we can anticipate some and we must start now to prepare for these challenges an expert from the U S Department of Health and Human Services warned at a recent UN World Assembly on Aging Needed response to the global population shift is not just the responsibility of governments but will be a product of wise long term decisions made by individuals and societies she explained In most nations globally populations are graying and the number of people aged 65 and older is vastly increasing creating a larger segment of senior citizens than the world has ever before seen Across human history the elderly accounted for no more than 3 percent of the world population By the year 2030 the elderly are expected to make up about 25 percent of the world population And while longevity is of course seen as a great success longer lifespan for such masses also creates dilemmas For example the incidence of dementia has already increased significantly with an 11 fold increase in people aged 65 and older in the US since the turn of the century and a similar increase in aged people in Scotland has researchers there scrambling to find treatments for what they expect will be a 75 percent increase in dementia over the next 25 years Chronic diseases that come with aging are already taxing health care systems in the US and around the world to Japan with most experts aware their current health systems would be overrun and lack enough staff and facilities to handle the needs of an elderly population multiplying largely in the coming two decades Increases in psychological issues such as dealing with the depression often striking aged people are impending too as are social issues such as how families and public policies will deal

with the changing shape of the family      *Aging at the Molecular Level* Thomas von Zglinicki, 2013-06-29 During the last 40 years the study of the biological basis of aging has progressed tremendously and it has now become an independent and respectable field of study and research The essential cause of aging is molecular damage that slowly overwhelms cellular and organismic defense repair and maintenance systems In recent years a wealth of highly sophisticated research has transformed this idea from a credible hypothesis not only to a major theory but essentially to accepted knowledge *Aging at the Molecular Level* examines the key elements in this transformation Bringing together contributions from an international team of authors this volume will be of interest to graduates and postgraduates in the fields of medicine and nursing researchers of different aspects of biogerontology and those in the pharmaceutical cosmeceutical nutraceutical and health care industry      *Psychology In India Volume 3: Clinical And Health Psychology* Girishwar Misra, 2010-09 Psychology in India

Volume 3 Clinical and Health Psychology is part of the periodic surveys in the major disciplines of the social sciences to assess disciplinary developments and to identify gaps in research conducted by The Indian Council of Social Science Research This volume comprises six original essays It deals with the broad domain of disciplinary developments in the areas of clinical psychology and health psychology and explains developments applications analysis psychology geropsychology in India and the significant trends      **Aging Interventions And Therapies** Suresh I S Rattan, 2005-05-06 This comprehensive volume surveys the molecular cellular hormonal nutritional medical and lifestyle strategies being tested and applied for the prevention intervention and treatment of age related diseases With authoritative contributions not just from researchers in academic institutions and pharmaceutical and cosmeceutical industries but also practicing clinicians of both mainstream and alternative medicine demographers and bioethicists this book provides unique scientific ethical and social perspectives on the discussion of aging intervention In addition the latest technologies in development which will have serious bearings on future aging interventions are reviewed *Aging Interventions and Therapies* is ideal for graduates and undergraduates in universities and medical and nursing colleges as well as post graduates researching different aspects of aging and anti aging The topics covered are also highly relevant for professionals in the pharmaceutical cosmeceutical nutrition and healthcare industries and practicing clinicians looking for a reliable and up to date resource on aging intervention and therapy

**Prevention and Treatment of Age-related Diseases** Suresh I.S. Rattan, Moustapha Kassem, 2007-05-09 This book offers a broad ranging assessment of current efforts of the molecular cellular hormonal nutritional and lifestyle strategies being tested and applied by biogerontologists in the search for effective means of intervention prevention and treatment of age related diseases and for achieving healthy old age Employing a semi academic style the book presents data from experimental systems while focusing primarily on their applications to humans in the prevention and treatment of age related impairments      **Aging of the Organs and Systems** Richard Aspinall, 2013-06-29 During the last 40 years the study of the biological basis of aging has progressed tremendously and it has now become an independent and respectable field of study

and research This volume on Aging of Organs and Systems is an attempt to bring understanding to both the aging process and the disease processes of old age Bringing together contributions from an international team of authors it will be of interest to graduates and postgraduates in the fields of medicine and nursing researchers of different aspects of biogerontology and those in the pharmaceutical cosmeceutical nutraceutical and health care industry

**Aging of Organisms** H.D. Osiewacz, 2013-11-11 Biological aging as the time depending general decline of biological systems associated with a progressively increasing mortality risk is a general phenomenon of great significance The underlying processes are very complex and depending on genetic and environment factors These factors encode or affect a network of interconnected cellular pathways In no system this network has been deciphered in greater detail However the strategy of studying various biological systems has led to the identification of pathways and specific modules and makes it obvious that aging is the result of different overlapping mechanisms and pathways Some of these appear to be conserved public among species others are specific or private and only of significance in one or a few organisms This volume in the series on Biology of aging and its modulation specifically focuses on organismic aging The book covers research on organisms from lower to higher complexity representing examples from very diverse taxa like photosynthetic plants fungi sponges nematodes flies birds and mammals Such a broad treatise of this complex topic provides a comprehensive flavor about the current issues dealt with in this rapidly growing scientific discipline

**Biology of Longevity and Aging** Robert Arking, 2019-01-10 An introductory text to the biology of aging and longevity offering a thorough review of the field

**Biology of Aging** Roger B. McDonald, 2019-06-07 Biology of Aging Second Edition presents the biological principles that have led to a new understanding of the causes of aging and describes how these basic principles help one to understand the human experience of biological aging longevity and age related disease Intended for undergraduate biology students it describes how the rate of biological aging is measured explores the mechanisms underlying cellular aging discusses the genetic pathways that affect longevity in various organisms outlines the normal age related changes and the functional decline that occurs in physiological systems over the lifespan and considers the implications of modulating the rate of aging and longevity The book also includes end of chapter discussion questions to help students assess their knowledge of the material Roger McDonald received his Ph D from the University of Southern California and is Professor Emeritus in the Department of Nutrition at the University of California Davis Dr McDonald's research focused on mechanisms of cellular aging and the interaction between nutrition and aging His research addressed two key topics in the field the relationship between dietary restriction and lifespan and the effect of aging on circadian rhythms and hypothalamic regulation You can contact Dr McDonald at [rbrmcdonald@ucdavis.edu](mailto:rbrmcdonald@ucdavis.edu)

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**Trends in DNA Research** Corey R. Woods, 2006 Deoxyribonucleic acid DNA is a chemical found

primarily in the nucleus of cells DNA is a long spiralling molecule that orchestrates the cell's daily operations and provides the genetic blueprint for the physical characteristics of all living organisms It is the molecule that encodes genetic information in the nucleus of cells It determines the structure function and behaviour of the cell DNA is made up of two complementary strands the strands intertwine like a spiral staircase to form a structure called a double helix Subunits called bases are the rungs of the staircase The four nucleotides in DNA contain the bases adenine A guanine G cytosine C and thymine T This new book presents leading edge research in this dynamic field

**Aging of Cells in and Outside the Body** S. Kaul, Renu Wadwha, 2013-03-14 This book provides updated knowledge on the basic features and mechanisms of cellular aging established since its first manifestation at cellular level 40 years ago Contributions of genetic and environmental factors failure of genetic and cellular repair mechanisms and the epigenetic modifications determine the final lifespan of cells This book also provides an understanding on how aging mechanisms in mice a most frequently used model differ with that of humans who receive better tumor surveillance because of stringent controls on aging mechanisms It also appraises the use of modern technology for aging studies and its intervention This book serves as an excellent reading on cellular aging for undergraduate students researchers and experts of this area

**The spatiotemporal dynamics of longevity-defining cellular processes and its modulation by genetic, dietary and pharmacological anti-aging interventions** Vladimir I. Titorenko, Troy A. A. Harkness, Aging of multicellular and unicellular eukaryotic organisms is a highly complex biological phenomenon that affects a plethora of processes within cells This wide array of longevity defining cellular processes which are governed by an evolutionarily conserved signaling network includes oxidative metabolism and protein synthesis in mitochondria lipid and carbohydrate metabolism NAD homeostasis amino acid biosynthesis and degradation ammonium and amino acid uptake ribosome biogenesis and translation proteasomal protein degradation nuclear DNA replication chromatin assembly and maintenance actin organization apoptosis necrosis autophagy protein folding stress response signal transduction cell cycle and cell growth The focus of this Frontiers Special Topic Issue is on an important conceptual advance in our understanding of how cells integrate and control these numerous processes and how genetic dietary and pharmacological anti aging interventions extend longevity by altering their functional states and spatiotemporal dynamics The Issue will highlight the various strategies used by evolutionarily diverse organisms for coordinating these longevity defining cellular processes in space and time critically evaluate the molecular and cellular mechanisms underlying such coordination and outline the most important unanswered questions and directions for future research in this vibrant and rapidly evolving field

**Handbook of the Biology of Aging** Nicolas Musi, Peter Hornsby, 2015-08-20 Handbook of the Biology of Aging Eighth Edition provides readers with an update on the rapid progress in the research of aging It is a comprehensive synthesis and review of the latest and most important advances and themes in modern biogerontology and focuses on the trend of big data approaches in the biological sciences presenting new strategies to analyze interpret and understand the

enormous amounts of information being generated through DNA sequencing transcriptomic proteomic and the metabolomics methodologies applied to aging related problems The book includes discussions on longevity pathways and interventions that modulate aging innovative new tools that facilitate systems level approaches to aging research the mTOR pathway and its importance in age related phenotypes new strategies to pharmacologically modulate the mTOR pathway to delay aging the importance of sirtuins and the hypoxic response in aging and how various pathways interact within the context of aging as a complex genetic trait amongst others Covers the key areas in biological gerontology research in one volume with an 80% update from the previous edition Edited by Matt Kaeberlein and George Martin highly respected voices and researchers within the biology of aging discipline Assists basic researchers in keeping abreast of research and clinical findings outside their subdiscipline Presents information that will help medical behavioral and social gerontologists in understanding what basic scientists and clinicians are discovering New chapters on genetics evolutionary biology bone aging and epigenetic control Provides a close examination of the diverse research being conducted today in the study of the biology of aging detailing recent breakthroughs and potential new directions

Biology of Aging Robert Arking, 2006-02-02 Robert Arking's Biology of Aging 3rd edition is an introductory text to the biology of aging which gives advanced undergraduate and graduate students a thorough review of the entire field His prior two editions have also served admirably as a reference text for clinicians and scientists This new edition captures the extraordinary recent advances in our knowledge of the ultimate and proximal mechanisms underlying the phenomenon of aging As a result six important conceptual changes are included here Clarified distinctions between the biological mechanisms involved in longevity determination and those involved in senescent processes A new conceptual framework around which we can organize all the new facts about aging This will assist readers to make sense of the information and use the data to form their own ideas Increased knowledge of aging cells has led to new ideas on how a cell transits from a healthy state to a senescent state while still allowing for high levels of intra and inter specific variability Discussion of senescent mechanisms assists the reader to understand that aging is a non programmatic loss of function likely arising from the loss of regulatory signals and so is modifiable in the laboratory Because the standard evolutionary story does not fully explain the evolution of social organisms this edition also includes recent work dealing with intergenerational resource transfers Lastly if aging mechanisms are plastic then the demand to move these anti aging interventions into the human arena will inevitably grow A discussion of the biological and ethical arguments on both sides of the question frames the question in an appropriate manner The mass of data related to aging is summarized into fifteen focused chapters each dealing with some particular aspect of the problem The last two chapters integrate all this material into a coherent view of how the relevant biological processes change over the life span This view is expressed in two non technical figures you might say that the whole book exists to fully support Figs 9 4 14 9 whose meanings are elucidated as the reader progresses through the book

*Insights in Aging, Metabolism and Redox Biology: 2021/2022 Jianhua Zhang*

,Changhan David Lee,2024-07-08 We are now in the third decade of the 21st Century and especially in recent years the achievements made by scientists have been exceptional leading to major advancements in the fast growing field of Aging Metabolism and Redox Biology This editorial initiative of particular relevance is focused on new insights novel developments current challenges latest discoveries recent advances and future perspectives in the field of Aging Metabolism and Redox Biology

**DNA Research Trends** Marius P. Young,2007 Deoxyribonucleic acid DNA is a chemical found primarily in the nucleus of cells DNA is a long spiralling molecule that orchestrates the cell s daily operations and provides the genetic blueprint for the physical characteristics of all living organisms It is the molecule that encodes genetic information in the nucleus of cells It determines the structure function and behaviour of the cell DNA is made up of two complementary strands the strands intertwine like a spiral staircase to form a structure called a double helix Subunits called bases are the rungs of the staircase The four nucleotides in DNA contain the bases adenine A guanine G cytosine C and thymine T This volume presents the latest research from around the world

*Anti-Aging Therapeutics Volume XVII* A4M American Academy of Anti-Aging Medicine,2015-11-12 Proceedings of the Twenty Second World Congress on Anti Aging Medicine Regenerative Biomedical Technologies sponsored by the American Academy of Anti Aging Medicine A4M

Human Longevity Raymond C. Valentine,David L. Valentine,2014-09-18 More than 7 billion people inhabit the earth and all of them are subject to aging This book is aimed at persons interested in a molecular explanation of how our cells age Human Longevity Omega 3 Fatty Acids Bioenergetics Molecular Biology and Evolution is built on the proposition that we age as our mitochondria age It suggests a revised vers

Plant Bioactives as Natural Panacea against Age-Induced Diseases Kanti Bhooshan Pandey,Maitree Suttajit,2022-10-17 Plant Bioactives as Natural Panacea Against Age induced Diseases Nutraceuticals and Functional Lead Compounds for Drug Development presents comprehensive information on the complications of aging and the bioactive phytochemicals that in specific herbal formulations including beverages can mitigate them The book extensively describes the current information on the role of plant bioactive components in delaying or preventing the aging process and associated complications while also covering different strategies and scientific evidence of possible synergistic effects of these studies enabling the formulation of more effective natural drugs to intervene in aging and associated events Chapters cover the broad areas of plant bioactive compounds in promoting healthy aging and longevity including balancing glucose homeostasis in cognitive impairments age related diseases food trends and the anti aging diet in Asia and other regions as well as the social and economic impact of dietary patterns in aging interventions Written by a team of global experts Describes plant bioactives for specific age disorders Focuses on the discovery of new herbal origin drugs and potential druggable targets for the treatment of chronic diseases of world importance Includes cutting edge research information on cell senescence during aging and assesses the plant bioactive compounds



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