
Centenarians

Calogero Caruso
Editor

Centenarians

An Example of Positive Biology

 Springer

Editor

Calogero Caruso

Department of Biomedicine, Neurosciences and Advanced Diagnostics

University of Palermo

Palermo, Italy

ISBN 978-3-030-20761-8

ISBN 978-3-030-20762-5 (eBook)

<https://doi.org/10.1007/978-3-030-20762-5>

© Springer Nature Switzerland AG 2019

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

People worldwide are living longer.

At global level, the share of 80+ people rose from 0.6% in 1950 (15 million) to around 1.6% (110 million) in 2011, and it is expected to reach 4% (400 million) by 2050. The global population is projected to be 3.7 times bigger in 2050 than in 1950, but the number of 60+ people will increase by 10%, while the number of 80+ people will increase by 26%. The increase in lifespan does not coincide with the increase in health-span, i.e. the period of life free from serious chronic diseases and disability.

Improving the quality of life of oldest is becoming a priority due to the continuous increase in the number of this population who is at risk of frailty. This makes the studies of the processes involved in longevity of great importance.

Most biomedical researches are “negative biology”, because the study of the disease is its central heart, focusing on the causes of the diseases. On the contrary, a different approach is possible, called “positive biology”. Instead of placing diseases at the centre of research, positive biology searches, for understanding the causes of positive phenotypes, to explain the biological mechanisms of health and well-being. This means understanding why some individuals, namely the centenarians, have escaped neonatal mortality, infectious diseases in the pre-antibiotic era and the fatal outcomes of age-related diseases, thus living more than 100 years. The knowledge born from this approach could allow modulating the ageing rate by providing valuable information on lifestyle to achieve healthy ageing.

Furthermore, the study of centenarians could provide important indications on how to build drugs that can slow or delay ageing, with benefits for those who are more vulnerable to disease and disability. The identification of the factors that predispose to a long and healthy life is therefore of enormous interest for translational medicine.

It is known that the longevity phenotype is the result of a positive combination between genetic, epigenetic, stochastic and lifestyle factors. So, the analysis of all the known parameters that can influence these single elements, or their interaction, can give new possible information to delineate a sort of longevity signature.

In the different chapters of this book (see in Contents), a detailed analysis of the mechanisms involved in achieving longevity is performed. The role of chance, genetics, epigenetics, sex/gender, education and socio-economic level, social support and stress management, diet and nutrition, microbiota and pathogen burden, physical activity, immuno-inflammatory responses and oxidative stress are depicted.

Palermo, Italy

Calogero Caruso

Contents

1	Chance and Causality in Ageing and Longevity	1
	Giulia Accardi, Anna Aiello, Sonya Vasto, and Calogero Caruso	
2	Phenotypic Aspects of Longevity	23
	Giulia Accardi, Mattia Emanuela Ligotti, and Giuseppina Candore	
3	Centenarian Offspring as a Model of Successful Ageing	35
	Anna Aiello, Mattia Emanuela Ligotti, and Andrea Cossarizza	
4	Individual Longevity Versus Population Longevity	53
	Michel Poulain	
5	Dietary Inflammatory Index in Ageing and Longevity	71
	Luca Falzone, Massimo Libra, and Jerry Polese	
6	Genetic Signatures of Centenarians	87
	Francesco Villa, Anna Ferrario, and Annibale Alessandro Puca	
7	Epigenetics and Ageing	99
	Dina Bellizzi, Francesco Guarasci, Francesca Iannone, Giuseppe Passarino, and Giuseppina Rose	
8	Lifestyle Choices, Psychological Stress and Their Impact on Ageing: The Role of Telomeres	135
	Sergio Davinelli and Immacolata De Vivo	
9	Gut Microbiota Pattern of Centenarians	149
	Lu Wu, Angelo Zinellu, Luciano Milanese, Salvatore Rubino, David J. Kelvin, and Ciriaco Carru	
10	Impact of Mediterranean Diet on Longevity	161
	Antonia Trichopoulou and Vassiliki Benetou	
11	Lifespan and Healthspan Extension by Nutraceuticals: An Overview	169
	Sergio Davinelli and Giovanni Scapagnini	