Tamas Fulop, Claudio Franceschi
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Editors

Handbook on Immunosenescence

Basic Understanding and Clinical Applications

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ISBN: 978-1-4020-9062-2 e-ISBN: 978-1-4020-9063-9

Library of Congress Control Number: 2008944075

Printed on acid-free paper

9 8 7 6 5 4 3 2 1

springer.com

Preface

What is Immunosenescence?

The number of elderly people is steadily increasing in most countries. Concomitantly, the number of age-related diseases is unfortunately also increasing. One of the leading causes of death in the very elderly is infection, with cardio-vascular diseases and cancer less prevalent than in younger elderly. All three major pathologies are to some extent related to the immune system due to its well-known but still imperfectly investigated deregulation during aging.

Thus, the large amount of data accumulated during the last decade or more has allowed a better but still incomplete understanding of all the complex alterations affecting the immune system with aging. Although we do not know everything, we feel that it is important for the scientific community to become more acquainted with the corpus of knowledge recently generated in this domain, presented in a manner providing a critical evaluation of the current status of research. Many accepted ideas have changed during the last decade, such as the effect of aging on the innate immune system, antigen presentation, the cytokine imbalance and low grade inflammation. If not exactly a paradigm shift, the time seems ripe to present this critical evaluation and update of the state-of-the-art in these different areas. We perceive a great need to assemble this current knowledge in one volume by collecting contributions from the most eminent researchers in the field from all around the world. In this way, we aim to facilitate a synthesis of the different aspects of the disparate disciplines in ageing research to focus on immunosenescence for the first time (basic and clinical, molecular, cellular, biochemical, genetics). We hope this multidisciplinary approach from the aging, immunity and inflammation community will also be important for future innovative research in this domain.

Thus, this book will have as its main themes Aging, Immunity and Inflammation, with an emphasis on studies in humans. However, as data are not always available in this species, work in experimental animals will be also treated as appropriate. A large number of colleagues responded enthusiastically to our proposal and contributed with very high quality chapters. We begin with a description of Methods and models for studying immunosenescence. We continue with Cellular immunosenescence, treating most specifically T cells, B cells, neutrophils, antigen presenting cells

and NK cells. We then proceed to mechanisms. In this context, receptor signaling, the role of mitochondrial activity, the proteasome, cytokine status and the neuro-endocrine-immune netweork are treated. The important but very challenging area of the Clinical relevance of immunosenescence for disease states is covered next by the individual treatment of infections, autoimmunity, cancer, metabolic syndrome, neurodegeneration and frailty. Finally, and even more challengingly, the last part of the book is devoted to possibilities for eventual intervention and modulation. We particularly emphasise nutritional aspects, lipids and experimental interventions. In this way we feel that we cover the whole range of areas from models, through basic molecular mechanisms to the clinical relevance and finally eventual modulation.

One of the main objectives of this book is to present in a systematic way our current knowledge in the field of the immunology related to aging. So do we now know what immunosenescence is? It is still difficult at answer this question, but we hope even the most specialist investigator in the field will find concepts and ideas within the book which will help him or her to approach an answer to this important question more closely than before. We would therefore sincerely like to hope that we have created an authoritative, innovative and thought-provoking book dedicated for the first time to this topic alone. We also like to hope that this volume will help to attract a new generation of researchers to the field of immunosenescence as an expanding and vital research arena.

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Cellular Immunosenescence - Neutrophils

Cellular Immunosenescence - Antigen Presenting Cells

Cellular Immunosenescence - NK and NKT Cells