Perspectives: Is Immunosenescence Clinically Relevant?

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Abstract

Ten years have passed since the first edition of this handbook. So much progress in the field has been made in this one decade that a second edition of the handbook is already overdue. Our rapidly increasing knowledge of the immunological changes occurring with aging and our improved understanding of their clinical implications have necessitated the addition of many new chapters to the handbook, as well as updates to many of those in the first edition. Together, this new edition comprehensively reflects the state of the art of knowledge in this field of aging. We hope that this book will stimulate new ideas and shed more light on the important question: What is immunosenescence and what is its clinical relevance?

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A decade after the first edition of this Handbook, this revised version encompasses a huge quantity of new data pertaining to changes to immunity with aging. There are many new chapters covering areas unimagined 10 years ago, some based on technological developments but also reflecting the great expansion of interest in this field. However, it still seems to us that we are only at the beginning of this scientifically and socially important journey of discovery to answer the burning question: What is immunosenescence and what is clinically relevant?

It is noteworthy that despite a wealth of data, the exact changes in the immune system with aging are still controversial because of the confounding influence of the physiological aging process and genetic as well as epigenetic factors, such as nutrition, neuroendocrine changes, chronic diseases, persistent infections (especially with Cytomegalovirus, CMV), and frailty. Thus, the field urgently needs to agree upon a set of biomarkers of immunosenescence to be applied preferably in careful longitudinal studies. There are still few such studies on the horizon. What we do know is that certain differences in immune parameters between younger and older individuals are associated with disease states, both independent of chronic age-related inflammatory status and as part of the syndrome of "inflammaging." Given the potential importance of immunosenescence and inflammaging in disease, some means of intervening to compensate for immune deregulation which could be applied in the elderly without ethical or regulatory problems do already exist. These include nutritional intervention using functional foods such as probiotic-containing yoghurt and sustained moderate aerobic exercise regimens. Such approaches could be relatively easily combined with improved vaccination strategies against different pathogens, especially influenza, pneumococcus pneumoniae, herpes zoster, and in the near future perhaps against CMV, and possibly application of certain antiviral drugs and low-dose cytokines. The use of immune modulators such as rapamycin may also prove effective for increasing protection after vaccination. Potentially deleterious effects of immune changes with aging may be overcome by combining innovative technologies and holistic approaches. Clearly, there is still a long way to go to implement more specific and effective safe immunorestorative therapies, as suggested in this book, even at the level of specific nutrients or drugs. Thus, a better understanding of immunosenescence as a result of intensive basic and clinical research and the development of new methods and strategies to intervene in its evolution are essential for improving the quality of life of the increasingly large elderly population.

Acknowledgments We thank all the authors of chapters in this book for their contributions toward answering this burning question and providing directions for the future of immunosenescence research. The reader perusing this book will be in a better position to assess whether immunosenescence is clinically relevant, and if so, what can and should be done for intervention and prevention.