

doi: 10.3325/cmj.2010.51.571

Joseph Lorenzo, Yongwon Choi, Mark Horowitz, Hiroshi Takayanagi, editors.
Osteoimmunology: Interactions of the Immune and Skeletal Systems.

1 edition; Amsterdam, Boston, Heidelberg, London, New York, Oxford, Paris, San Diego, San Francisco, Singapore, Sydney, Tokyo: Academic Press (Elsevier); 2010. 470 pages; ISBN-10: 0123756707, ISBN-13: 978-0123756701; price: US \$89.96

Danka Grčević

danka.grcevic@mef.hr

Field of medicine: Immunology, bone biology.

Format: Hardcover book.

Audience: Osteoimmunology is a rapidly evolving field that brings together two disciplines that have been developing separately – immunology and bone biology. This book is of great interest to researchers, clinicians, and students in a wide variety of biomedical and clinical areas including immunology, bone biology, rheumatology, hematology, infectious diseases, geriatrics, and endocrinology.

Purpose: The book explains basic pathways in both immunology and bone biology, as well as clinical approaches, which will translate the results of basic research to clinical diseases. This large amount of comprehensive, translational knowledge on all aspects of osteoimmunology is a ready source of information for both scientific and clinically oriented audience.

Content: The editors, four pioneers in the field of osteoimmunology, cooperated with 44 other outstanding experts in the field, to make, as Prof T. Suda stressed in the foreword, a book that is “spanning the breadth and depth of

our current knowledge of osteoimmunology from cell and molecular biology to clinical problems.”

The book includes 15 chapters followed by an index and color plate section. Chapters consist of the short introduction, several titled paragraphs dealing with the specific topics, and a list of references at the end. The content varies from basic descriptions of the various cell systems involved in the area of osteoimmunology to the detailed explanation of different aspects of their physiological functional interactions. The several finishing chapters stress the role of osteoimmunology in the pathogenesis of different human diseases.

The first chapter, written by the editors, introduces us to the relatively young field of osteoimmunology. Although the importance of the interactions between bone and immune cells has been observed more than 40 years ago, the term “osteoimmunology” was first used by Yongwon Choi in an editorial in *Nature* just 10 years ago. The authors believe that “after reading this book, one will hopefully appreciate the intricate interaction between the immune system and bone.” Despite the impressive progress that has been made in the last few years toward under-

standing the cross-talk between bone and the immune cells, the “biological implications of such interactions are only beginning to be identified.”

The following few chapters describe in detail the cells involved in the functional interactions between immune and skeletal systems, including T and B lymphocytes, osteoblasts, osteoclasts, and other hematopoietic cells within the bone-marrow microenvironment. They also clearly present and illustrate their precursor cells and details on different steps of their differentiation, intracellular pathways crucial for lineage determination, and critical regulators that influence their development and function.

Those initial chapters are summarized by the sixth chapter, which deals with the osteoclast, the principal bone-resorbing cell of hematopoietic origin, which emerged as the “pioneer” in osteoimmunology or, in other words, as a cell that shares the origin and functional regulations with other hematopoietic cells and, at the same time, represents one of two types of bone cells responsible for the maintenance of bone homeostasis. Consequently, the osteoclast is fundamental for the pathogenesis of all diseases associated with pathological bone loss. The authors concluded the chapter with the statement that “evidence that the classical immune system and skeletal cells share a commonality of regulation” leads to the significant changes of “the long predominant view that the skeleton is an organ unto itself in which its resident cells are regulated exclusively in an endocrine- or biomechanical-dependent manner.”

The following two chapters focus on the most intriguing and complex topics aimed to explain still not completely revealed mechanisms of the functional interactions between bone and immune cells, as well as critical mediators of those interactions. First, the effects of immune cell products, including cytokines, chemokines, and hematopoietic cell growth factors on bone cells are reviewed and then the complex interaction between osteoblasts, osteoclasts, and other cells presented in the bone/bone-marrow compartment are discussed.

The subsequent, clinically relevant, chapters of the book explore the human diseases in which interactions between bone and the immune system have a critical role. They explain the effect of estrogen on bone and immune cells, and the development of osteoporosis. They also explain pathologic conditions that develop within the immune systems and lead to the inflammation-induced bone loss, including inflammatory arthritis, inflammatory bowel disease, periodontal disease, and hematologic malignancies. The concluding chapters deal with the role that immune and bone cell interactions have in osteomyelitis and fracture healing. The book provides full understanding of the cells and mediators involved in the development of presented diseases and crucial for developing new therapeutic strategies aimed to modulate their actions.

Highlights: As the first comprehensive textbook of osteoimmunology, this book is an invaluable source of information, which provides an excellent overview of this “recently established field that seeks to bridge two well established disciplines.” Since bone biology and immunology evolved independently, the requirements for their unification in many aspects have not been fully recognized for a long time. This book is meant to provide “basic and clinical scientists with a better understanding of the role that the immune system and bone play in the development and function of each other so that advances in both fields will be facilitated.” It is easily readable by students “with a college level understanding of biologic science,” but also contains details that will be appreciated by experts in any of the relevant experimental or clinical biomedical areas.

Related reading: The editors and the authors provided a detailed list of references in this area, where the reader can find additional information. Also, the textbooks *Osteoimmunology: Interactions of the Immune and skeletal systems I and II* edited by Yongwon Choi (as a part of *Advances in Experimental Medicine and Biology*) present a complementary source of information within the same field.