

# Preface

The macrophages are the most versatile and still little understood cells of immune system. Phenotypically and functionally, the macrophages are exceptionally unique cells. They combine evolutionarily ancient, unicellular, amoeba-like attributes, such as ability to actively move and devour (phagocytize) prey, with evolutionarily modern abilities to function as immune sentinels, responders, and effectors within the multicellular/organismal environment. In their beneficial immune capacity, the macrophages safeguard tissue and organ homeostasis and play an active role in wound healing and innate and adaptive immunity. But they can also be detrimental by promoting inflammation, vascular and autoimmune diseases, and cancer metastasis. Not until recently it has been discovered that, at least in mammals, not only macrophage functions but also their origin is multifarious: some macrophages descend from the embryonic yolk sac and fetal liver and some from the adult bone marrow precursors and circulating monocytes. This volume describes the ontogeny of macrophages, their evolutionary origin, various aspects of macrophage properties and functions in health and disease, and potential use of macrophages as a target for clinical interventions.

The first section of the book concentrates on evolutionary aspects of macrophage origin and polarization in invertebrates and vertebrates, ontogeny and functions of tissue-resident macrophages, and the origin and function of Hofbauer cell-specialized fetal macrophages residing in the mammalian placenta and describes how phenotypical and functional fate of macrophages is determined and modulated by mesenchymal stem cells and cooperation with NK cells. The second section of the book focuses on macrophage immunobiology describing how different locales, mechanical forces, and inflammatory environments regulate expression of macrophage markers and functionally active molecules. The third section discusses the role of macrophages in vascular and respiratory diseases, wound healing, and regeneration. Finally, the fourth section outlines various potentially clinically applicable methods and biomaterials that can be used to manipulate macrophage functions and responses in wound healing, regeneration, and transplantation.

I dedicate this volume to my dear friend Dr. Rafik Mark Ghobrial who transplanted me from the germ cells and developmental biology métier to the realm of immunology.

Department of Surgery  
The Houston Methodist Hospital  
Houston, TX  
USA

Malgorzata Kloc

The Houston Methodist Research Institute  
Houston, TX  
USA

Department of Genetics  
MD Anderson Cancer Center  
The University of Texas  
Houston, TX  
USA

## Macrophages

Origin, Functions and Biointervention

Kloc, M. (Ed.)

2017, X, 376 p. 37 illus., 27 illus. in color., Hardcover

ISBN: 978-3-319-54089-4