

Contents

<i>Contributors</i>	ix
<i>Preface: Dendritic cells: Master regulators of innate and adaptive immunity</i>	xi
1. Origin and development of classical dendritic cells	1
Pierre Guérmonprez, Yohan Gerber-Ferder, Kristine Vaivode, Pierre Bourdely, and Julie Helft	
1. Introduction	2
2. Classical dendritic cell subsets	3
3. Growth factors dependence of classical dendritic cell subsets	10
4. Bone marrow progenitors for classical dendritic cells	15
5. Circulating precursors for classical dendritic cells	19
6. Peripheral niches	21
7. Transcriptional regulation of classical dendritic cell development	24
8. Conclusion and open questions	33
Acknowledgment	33
References	33
Further reading	54
2. Transcriptional control of dendritic cell development and functions	55
Lukas Amon, Christian H.K. Lehmann, Anna Baranska, Janina Schoen, Lukas Heger, and Diana Dudziak	
1. Introduction	56
2. The unique functions of DCs	58
3. Overview about antigen uptake, processing and presentation by DCs	59
4. Phenotypical characterization of cDCs and pDCs	62
5. Identification and functional specialization of the cDC1 subset	63
6. Identification and functional specialization of the cDC2 subset	65
7. cDC1 and cDC2 and the induction and maintenance of tolerance	68
8. Identification and functional specialization of pDCs	69
9. Origin, identification and functional specialization of Langerhans cells	77
10. Identification and functional specialization of MoDCs	79

11. Phenotypical characterization, functional specialization, and presence of DC subsets in human tissues	80
12. The development of early DC progenitors within the bone marrow	82
13. Crucial factors for DC development: Flt3 and Flt3L, GM-CSF and GM-CSFR	86
14. Transcriptional regulation of DC differentiation and function	87
15. Impact of post-transcriptional regulation by microRNAs	104
16. Epigenetic regulation of DCs	113
17. Conclusions	115
Acknowledgments	115
Statement	115
References	116
3. The impact of endoplasmic reticulum stress responses in dendritic cell immunobiology	153
Camilla Salvagno and Juan R. Cubillos-Ruiz	
1. A brief introduction to dendritic cell biology	154
2. ER stress responses in DCs	156
3. Concluding remarks	169
Acknowledgments	170
Competing interest	170
References	170
4. The versatile plasmacytoid dendritic cell: Function, heterogeneity, and plasticity	177
Rebecca Leylek and Juliana Idoyaga	
1. Introduction	178
2. Functional diversity of plasmacytoid dendritic cells	178
3. Sources of pDC functional diversity: Developmentally encoded subsets versus environmentally mediated plasticity	185
4. Concluding remarks	197
Acknowledgments	198
References	199

5. Dendritic cell extracellular vesicles	213
Joanna Kowal and Mercedes Tkach	
1. Introduction	214
2. Molecular identity of dendritic cell-derived extracellular vesicles	216
3. Diversity of extracellular vesicles from dendritic cells	221
4. The journey of an extracellular vesicle: From its biogenesis to its final destination in the target cell	222
5. Role of dendritic cell-derived extracellular vesicles as modulators of immune responses	227
6. Clinical application of dendritic cell-derived extracellular vesicles	235
7. Concluding remarks and perspectives	236
Acknowledgments	237
References	238
6. Ex vivo dendritic cell generation—A critical comparison of current approaches	251
Patrick Han, Douglas Hanlon, Olga Sobolev, Rabib Chaudhury, and Richard L. Edelson	
1. Cytokine signals	253
2. Physiological signals for DC differentiation	260
3. Gene engineering tools	267
4. Clinical trials of DC-based vaccines	281
5. Concluding remarks	289
Conflict of interest	290
References	290