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# Molecular and Cell Biology of Cancer

When Cells Break the Rules and Hijack Their Own Planet

 Springer

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ISSN 2509-6125

ISSN 2509-6133 (electronic)

Learning Materials in Biosciences

ISBN 978-3-030-11811-2

ISBN 978-3-030-11812-9 (eBook)

<https://doi.org/10.1007/978-3-030-11812-9>

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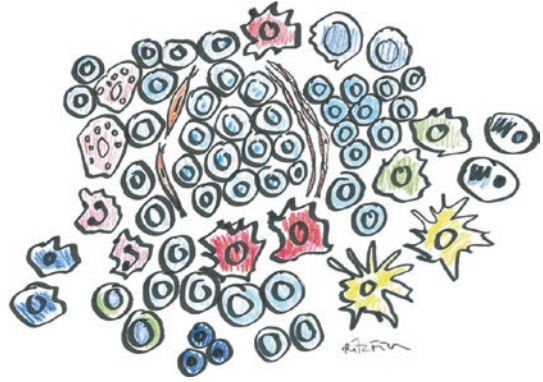
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## Preface

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In this book, we have put together a series of lectures to take students on an expedition in cancer biology, where we mix developmental, evolutionary, and cell biology perspectives, to then wrap up with an integrated clinical approach in the form of case studies.

We look at cancer cells as outlaws, i.e., cells that break the rules by which the multicellular society is generated and maintained. Cells that not only disrupt their cell-autonomous control buttons but can also, through non-cell-autonomous interactions with normal cells, hijack and “corrupt” their host.



We start with an introductory chapter where all major concepts are broadly approached and connected in a developmental and evolutionary perspective, trying to open questions and tease curiosity for the chapters to come. Then we will explore the idea of cancer as a mass of somatic cells undergoing a microevolutionary process and how the same rules of Darwinian evolution may be applied to cancer but in a completely different time scale! The main signaling pathways deregulated in cancer will be revisited. Then, we will go through the main Hanahan and Weinberg “Hallmarks of Cancer,” revising the topics of proliferation, apoptosis, genomic instability, DNA damage, and cancer metabolism, and then into hallmarks that illustrate how cancer cells hijack the host. Tumor cells not only avoid immune detection but also hijack and corrupt immune cells to work for them. Another form of hijacking the host is when tumor cells recruit blood vessels to feed the tumor and provide a highway to invade and migrate to other organs through the multistep process of metastasis. Then we will explore what is known about metastasis formation.

In most themes, we will go through historical experiments that led to key molecular discoveries or concepts, establishing a bridge between basic biology and biomedicine. Finally, all these concepts will be integrated in clinical studies where molecular diagnosis as well as various classical and modern therapeutic strategies will be addressed.

We would like to highlight that this book is not a thorough revision of each topic and in time some details will become outdated. Nevertheless, our goal is to provide essential concepts and a systemic and comprehensive overview of cancer. Designed for advanced undergraduates, master students, or even patients looking for a further understanding of the disease, we tried to use an easy-to-read language without underestimating the scientific accuracy. The editor rules of starting each chapter with an overview, defined learning objectives, and important concepts, and finishing with a take-home message, will surely help readers to an active understanding. Although there is a logical order in the

topics presented, each chapter can be read independently and used as a rapid revision concerning each specific theme. We hope this book gives a conceptual framework for the mass of information that is presently available about cancer but also stimulate readers to question and encourage further individual research.

We would like to thank all the authors that contributed to the writing of this book for their knowledge, expertise and dedication. Thank you **Lília Perfeito, Mariana L. Oliveira** and **João T. Barata, Irina S. Fonseca** and **Mónica Bettencourt-Dias, Ana Rita Carlos, Inês Castro, Vanda Póvoa, Ana Magalhães** and **Sérgio Dias, Hélia Neves, Mireia Castillo,** and **Joana Ribeiro.**

Specially, we would like to thank **Inês Amendoeira Cabral** (Instituto Gulbenkian Ciência) and **Ana Rita Carlos** for the beautiful illustrations based on the figures suggested by the authors.

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