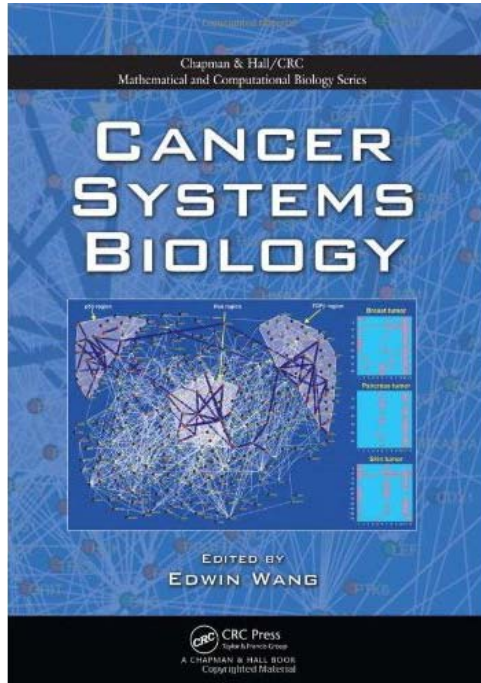


EDWIN WANG (ED.) CANCER SYSTEMS BIOLOGY



CRC Press, USA
ISBN-13: 978-1-43981-185-6
Hardcover
455 pages
1st Edition (2010)

The unprecedented amount of data produced with high-throughput experimentation forces biologists to employ mathematical representation and computation methods to glean meaningful information in systems-level biology. Applying this approach to the underlying molecular mechanisms of tumorigenesis, cancer researchers can uncover a series of new discoveries and biological insights.

The book is the First Cancer Systems Biology Book Designed for Computational and Experimental Biologists. Unusual in its dualistic approach, *Cancer Systems Biology* discusses the recent progress in the understanding of cancer systems biology at a time when more and more researchers and pharmaceutical companies are looking into a systems biology approach to find drugs that can effectively be used to treat cancer patients.

This book includes Contributions from more than 30 International Experts. *Part I* introduces basic concepts and theories of systems biology and their applications in cancer research, including case studies of current efforts in cancer systems biology. *Part II* discusses basic cancer biology and cutting-edge topics of cancer research for computational biologists. It contains an overview of genomics, cell signaling, and tumorigenesis, in addition to hot topics like molecular mechanisms of cancer metastasis and the molecular relationships between solid tumors, their microenvironments, and tumor blood vessels.

Rounding out the book's solid coverage, *Part III* explores a variety of computational tools and public data resources that are useful for studying cancer problems at a systems level.

Cancer systems biology is still in its infancy as a field of study, but it is fast becoming indispensable in the battle to defeat cancer and develop successful new treatments. *Cancer Systems Biology* marks an important step toward reaching that goal.

Table of Contents

Foreword	xi
<i>Hiroaki Kitano, President, The Systems Biology Institute, Tokyo, Japan</i>	
I. CANCER SYSTEMS BIOLOGY: CONCEPTS AND APPLICATIONS	
A Roadmap of Cancer Systems Biology	3
<i>Edwin Wang</i>	
Network Biology, the Framework of Systems Biology	23
<i>Jing-Dong Han</i>	
Reconstructing Gene Networks Using Gene Expression Profiles	35

<i>Mario Lauria and Diego di Bernardo</i>	
Understanding Cancer Progression in Protein Interaction Networks	53
<i>Jinsheng Sun, Jie Li, and Edwin Wang</i>	
From Tumor Genome Sequencing to Cancer Signaling Maps	69
<i>Cong Fu and Edwin Wang</i>	
Ubiquitin-Mediated Regulation of Human Signaling Networks in Normal and Cancer Cells	91
<i>Cong Fu, Jie Li, and Edwin Wang</i>	
microRNA Regulation of Networks of Normal and Cancer Cells	107
<i>Pradeep Kumar Shreenivasaiah, Do Han Kim, and Edwin Wang</i>	
Network Model of Survival Signaling in T-cell Large Granular Lymphocyte Leukemia	125
<i>Ranran Zhang, Thomas P. Loughran, Jr., and Réka Albert</i>	
Cancer Metabolic Networks: Metabolic Pathways Modeling and Metabolomics in Cancer Research	143
<i>Miroslava Cuperlovic-Culf</i>	
Warburg Revisited: Modeling Energy Metabolism for Cancer Systems Biology	165
<i>Mathieu Cloutier</i>	
Cancer Gene Prediction Using a Network Approach	191
<i>Xuebing Wu and Shao Li</i>	
II. CANCER BIOLOGY: BASIC CONCEPTS AND CUTTING-EDGE TOPICS	
Cancer Genomics to Cancer Biology	215
<i>Maria Luz Jaramillo and Chabane Tibiche</i>	
Epithelial-to-mesenchymal Transition (EMT): The Good, the Bad, and the Ugly	233
<i>Anne E. G. Lenferink</i>	
Tumors and Their Microenvironments	261
<i>Nicholas R. Bertos and Morag Park</i>	
Tumor Angiogenesis: Cell-microenvironment Interactions	283
<i>Ally Pen, Danica B. Stanimirovic, Maria J. Moreno</i>	
III. DATA RESOURCES AND SOFTWARE TOOLS FOR CANCER SYSTEMS BIOLOGY	
Modeling Tools for Cancer Systems Biology	305
<i>Wayne Materi and David S. Wishart</i>	
Advanced Visualization, Analysis and Inference of Biological Networks using VisANT	323
<i>Zhenjun Hu</i>	
Gene Set and Pathway-based Analysis for Cancer Omics	351
<i>Dougu Nam and Seon-Young Kim</i>	
SH2 Domain Signaling Network and Cancer	367
<i>Shawn S.-C. Li and Thamara K. J. Dayarathna</i>	
Data Sources and Computational Tools for Cancer Systems Biology	383
<i>Yun Ma, Pradeep Kumar Shreenivasaiah, and Edwin Wang</i>	