

Contents

<i>List of contributors</i>	xi
<i>Preface</i>	xxi
Part 1.1 Analytical techniques: analysis of DNA	
1. Cancer genome sequencing	1
Abizar Lakdawalla, Jeffrey Fisher, Mostafa Ronaghi, and Jian-Bing Fan	
2. Genome-wide association studies of cancer predisposition	10
Zsofia K. Stadler, Sohela Shah, and Kenneth Offit	
3. Comparative genomic hybridization	21
Donna G. Albertson and Daniel Pinkel	
4. Chromosome analysis: molecular cytogenetic approaches	28
Thomas Ried	
5. DNA methylation	37
Marsha Reyngold and Timothy A. Chan	
Part 1.2 Analytical techniques: analysis of RNA	
6. The application of high-throughput analyses to cancer diagnosis and prognosis	46
Edward P. Gelmann	
7. Cancer proteomics	52
Samir Hanash and Ayumu Taguchi	
8. Tyrosine kinome profiling: oncogenic mutations and therapeutic targeting in cancer	58
Paramita Ghosh, Yun Qiu, Ling-Yu Wang, and Hsing-Jien Kung	
9. In situ techniques for protein analysis in tumor tissue	76
Valsamo K. Anagnostou and David L. Rimm	
Part 2.1 Molecular pathways underlying carcinogenesis: signal transduction	
10. HER	85
Wolfgang J. Köstler and Yosef Yarden	
11. The insulin–insulin-like growth-factor receptor family as a therapeutic target in oncology	110
Michael Pollak	
12. TGF-β signaling in stem cells and tumorigenesis	119
Ying Li, Ruth He, and Lopa Mishra	
13. Platelet-derived growth factor	135
Arne Östman and Carl-Henrik Heldin	
14. FMS-related tyrosine kinase 3	144
Soheil Meshinchi and Derek L. Stirewalt	
15. ALK: Anaplastic lymphoma kinase	162
Karen Pulford	
16. The FGF signaling axis in prostate tumorigenesis	190
Fen Wang, Yongde Luo, and Wallace L. McKeehan	
17. Hepatocyte growth factor/Met signaling in cancer	204
Fabiola Cecchi, Young H. Lee, and Donald P. Bottaro	
18. PI3K	218
Kevin D. Courtney and Lewis C. Cantley	
19. Intra-cellular tyrosine kinase	231
Rosalyn B. Irby and Timothy J. Yeatman	
20. WNT signaling in neoplasia	243
Masaru Katoh	
21. Ras	258
Adrienne D. Cox and Molly J. DeCristo	
22. BRAF mutations in human cancer: biologic and therapeutic implications	272
Moriah H. Nissan and David B. Solit	
23. Aurora kinases in cancer: an opportunity for targeted therapy	278
Vikas Sehdev, Altaf A. Dar, and Wael El-Rifai	
24. 14-3-3 proteins in cancer	293
Alexandra K. Gardino and Michael B. Yaffe	

Contents

- 25. **STAT signaling as a molecular target for cancer therapy** 305
Hua Yu and Richard Jove
- 26. **The MYC oncogene family in human cancer** 313
Michael D. Cole
- 27. **Jun proteins and AP-1 in tumorigenesis** 319
Shira Anzi and Eitan Shaulian
- 28. **Forkhead box proteins: the tuning forks in cancer development and treatment** 328
Eric W.-F. Lam, Kyle W. Muir, and Chuay-Yeng Koo
- 29. **NF-κB and cancer** 336
Willscott E. Naugler and Michael Karin

Part 2.2 Molecular pathways underlying carcinogenesis: apoptosis

- 30. **Apoptosis: the extrinsic pathway** 353
Xinchen Teng and J. Marie Hardwick
- 31. **Apoptosis: the intrinsic pathway** 367
Jody White

Part 2.3 Molecular pathways underlying carcinogenesis: nuclear receptors

- 32. **Androgens and the androgen receptor (AR)** 378
Nicole L. Moore, Margaret M. Centenera, Lisa M. Butler, Theresa E. Hickey, and Wayne D. Tilley
- 33. **Emerging roles of peroxisome proliferator-activated receptor gamma in cancer** 392
Chenguang Wang, Xuemin Zhang, Lifeng Tian, and Richard G. Pestell

Part 2.4 Molecular pathways underlying carcinogenesis: DNA repair

- 34. **The ATM-mediated DNA-damage response** 403
Yosef Shiloh
- 35. **Werner syndrome: association of premature aging and cancer predisposition** 423
Byungchan Ahn, Tinna Stevnsner, and Vilhelm A. Bohr

- 36. **Hereditary disorders of DNA repair and DNA damage tolerance that predispose to neoplastic transformation** 434
Errol C. Friedberg and Roger A. Schultz
- 37. **Telomerase: target for cancer treatment** 442
Jerry W. Shay and Woodring E. Wright

Part 2.5 Molecular pathways underlying carcinogenesis: cell cycle

- 38. **Cell cycle: mechanisms of control and dysregulation in cancer** 452
Erik S. Knudsen, Ryan J. Bourgo, Elizabeth L. Gosnell, Jeffry L. Dean, and A. Kathleen McClendon
- 39. **DNA-damage-induced apoptosis** 465
Shun J. Lee, Benjamin F. O'Connor, Scott A. Stuart, and Jean Y. J. Wang

Part 2.6 Molecular pathways underlying carcinogenesis: other pathways

- 40. **The ubiquitin/proteasome pathway in neoplasia** 473
Robert C. A. M. van Waardenburg and Mary-Ann Bjornsti
- 41. **Small silencing non-coding RNAs: cancer connections and significance** 481
Milena S. Nicoloso and George A. Calin

Part 3.1 Molecular pathology: carcinomas

- 42. **Head and neck cancer** 497
Kelly Quesnelle, Jennifer Grandis, Karl Munger, and Marshall R. Posner
- 43. **Lung cancer** 506
Jill E. Larsen and John D. Minna
- 44. **Esophageal cancer** 526
DuyKhanh P. Ceppa and Thomas A. D'Amico
- 45. **Gastric cancer** 532
Yoshiaki Ito and Khay Guan Yeoh
- 46. **Small-bowel tumors: molecular mechanisms and targeted therapy** 542
Allan D. Spigelman and Janindra Warusavitarne
- 47. **Colon and rectal cancer** 547
Erin M. Perchiniak and Joanna Groden

48. **Pancreatic cancer** 557
Siong-Seng Liau and David A. Tuveson

49. **Hepatocellular carcinoma** 569
Augusto Villanueva, Yujin Hoshida, Derek Y. Chiang,
and Josep M. Llovet

50. **Renal-cell carcinomas** 579
Kyle A. Furge and Bin T. Teh

51. **Bladder cancer** 584
Robert S. Svatek and Colin P. Dinney

52. **Prostate cancer** 591
Kaustubh Datta and Donald J. Tindall

53. **Targeted therapies in breast cancer** 598
Nancy E. Hynes and Gwen MacDonald

54. **Molecular targets for epithelial ovarian cancer** 606
Grace K. Suh, Bryan T. Hennessy, Roeland Verhaak,
Ji-Yeon Yang, Gordon B. Mills, and Robert C. Bast, Jr.

55. **Testicular cancer: germ-cell tumors (GCTs)** 619
J. Wolter Oosterhuis and Leendert H. J. Looijenga

56. **Cervical cancer** 630
John Doorbar

Part 3.2 Molecular pathology: cancers of the nervous system

57. **Brain tumors** 641
Chang-Hyuk Kwon, Dennis K. Burns, and Luis F. Parada

58. **Mechanisms of pituitary tumorigenesis** 652
Shereen Ezzat and Sylvia L. Asa

59. **Molecular oncology of neuroblastoma** 669
Vandana Batra, Rebecca J. Deyell, and John M. Maris

60. **Neurofibromatosis type I** 679
Rachel S. Darken and David H. Gutmann

Part 3.3 Molecular pathology: cancers of the skin

61. **Squamous-cell carcinoma** 686
Carter Van Waes, Yansong Bian, Clint T. Allen, John C. Morris, and Zhong Chen

62. **Molecular oncology of basal cell carcinomas** 693
Ervin H. Epstein, Jr.

63. **Melanoma** 698
Adina Vultur, Keiran Smalley, and Meenhard Herlyn

Part 3.4 Molecular pathology: endocrine cancers

64. **Oncogenic events and therapeutic targets in thyroid cancer** 704
James A. Fagin and Julio C. Ricarte Filho

65. **The parathyroid glands** 712
Edward M. Brown and Andrew Arnold

66. **Multiple endocrine neoplasia type 2 (MEN2)** 720
Jo W. M. Höppener and C. J. M. Lips

Part 3.5 Molecular pathology: adult sarcomas

67. **Sarcomas** 731
Lee J. Helman

Part 3.6 Molecular pathology: lymphoma and leukemia

68. **Molecular pathology of lymphoma** 738
Christof Schneider, Laura Pasqualucci, and Riccardo Dalla-Favera

69. **The molecular basis of acute myeloid leukemia** 751
Kim L. Rice, Monica Buzzai, Jessica Altman, and Jonathan D. Licht

70. **Molecular oncology of acute promyelocytic leukemia (APL)** 769
Valérie Lallemand-Breitenbach and Hugues de Thé

71. **Acute lymphoblastic leukemia (ALL)** 777
Ido Paz-Priel and Alan D. Friedman

72. **B-cell chronic lymphocytic leukemia** 786
Francesco Bertoni, Francesco Forconi, Michele Dal-Bo, Antonella Zucchetto, Riccardo Bomben, Giovanni Del Poeta, and Valter Gattei

73. **Chronic myeloid leukemia: imatinib and next-generation ABL inhibitors** 793
Charles L. Sawyers

74. **Multiple myeloma** 799
W. Michael Kuehl and P. Leif Bergsagel

75. **EMS: the 8p11 myeloproliferative syndrome** 809
Donald H. C. Macdonald, Andreas Reiter, and Nicholas C. P. Cross

76. **JAK2 and myeloproliferative neoplasms** 818
Ross L. Levine

Contents

Part 3.7 Molecular pathology: pediatric solid tumors

- 77. **Pediatric solid tumors: embryonal cell oncogenesis** 826
Jeffrey A. Toretsky and Aerang Kim

Part 4 Pharmacologic targeting of oncogenic pathways

- 78. **Oncology drug discovery for biologics: antibody development strategies and considerations** 836
Bryan C. Barnhart, Marco M. Gottardis, and Matthew V. Lorenzi
- 79. **Targeting the EGFR family of receptor tyrosine kinases** 843
Siyuan Zhang and Dihua Yu
- 80. **Therapeutic approaches with antibodies to cell-surface receptors** 854
Antonio Gualberto
- 81. **Signal transduction in tumor angiogenesis** 861
Timothy Hla, Nasser Altorki, and Vivek Mittal
- 82. **Tyrosine-kinase inhibitors in oncology** 872
Anne S. Tsao, Vassiliki Papadimitrakopoulou, and Roy S. Herbst

- 83. **Anti-estrogens and selective estrogen-receptor modulators** 884
Ping Fan and V. Craig Jordan
- 84. **Therapeutic applications of anti-sense mechanisms for the treatment of cancer** 893
A. Robert MacLeod and C. Frank Bennett
- 85. **Induction of apoptosis** 903
Dario C. Altieri
- 86. **DNA-methylation inhibitors** 908
Jean-Pierre Issa
- 87. **Histone deacetylase inhibitor** 912
Paul A. Marks
- 88. **Drug resistance: as complex and diverse as the disease itself** 921
Antonio Tito Fojo
- 89. **Molecular profiling and therapeutic decision-making: the promise of personalized medicine** 929
Susan M. Henshall and Andrew V. Biankin
- 90. **DNA repair inhibition in anti-cancer therapeutics** 936
Brian M. Alexander and Alan D. D’Andrea

Index 945