

Contents

1	The Philosophy of Biotechnology	1
	A. Barbarisi	
1.1	Introduction	1
1.2	The Role of the Surgeon in Translational Research	9
	P. Innocenti, G. Liddo, F. Selvaggi	
1.3	The Role of Biotechnology in Oncologic Surgery	10
	References	13
2	New Approach to Diagnosis and Prognosis	15
	P. Bechi	
2.1	Secondary Peritoneal Carcinomatosis and Biotechnology: a New Approach to Diagnosis and Therapy	15
	R. Gattai, P. Turano, P. Bechi	
2.2	Pre-endothelial Cells and Prognosis of Intestinal Adenocarcinoma	18
	D. Pantalone, A. Parenti, P. Cirri	
2.3	Microarray Gene Expression of Pancreatic Carcinoma	23
	D. Pantalone, I. Giotti, V. Ceccherini	
2.4	The Significance of Circulating Tumor Cells as a Prognostic Marker for Colon Cancer: a New Biotechnology	27
	A. Taddei, F. Castiglione, M.N. Ringressi	
2.5	Advanced Diagnostic Applications	30
	G. Cafiero, F. Papale, A. Barbarisi	
	References	35

3 Biomolecular Staging: Reality or Future Perspective?	41
P. Bechi	
3.1 Introduction	41
M. Balzi, P. Faraoni, P. Bechi	
3.2 Molecular Biology as the Identity Card of Human Tumors	45
F. Selvaggi, P. Raimondi, P. Innocenti	
3.3 Interventional Timing According to New Insights in Basic Research .	50
P. Innocenti, F. Selvaggi, D. Risio	
3.4 Cellular Biology: A Way of Predicting Cancerogenic Progression, Prognosis and Response to Adjuvant Treatment	53
M. Balzi, P. Faraoni, A. Taddei	
References	57
4 Technology for Biotechnology	61
F. Rosso, M. Barbarisi, A. Barbarisi	
4.1 Nanotechnology and Nanofabrication	61
4.2 Biosensors	66
4.3 Nanodiagnostics	69
G. Marino, F. Papale	
References	72
5 Regenerative Medicine: Current and Potential Applications	75
A. Barbarisi, F. Rosso	
5.1 Scaffold and Molecular Signals for Tissue Engineering	75
5.2 Cell Source for Tissue Engineering	77
5.3 Skin	82
5.4 Lung Epithelium	84
P. Spitalieri, M.C. Quitadamo, F.C. Sangiuolo	
5.5 The Bioartificial Liver	86
G. Resta, C. Rossi, G. Azzena	
References	91
6 In Vivo Imaging of Regenerated Tissue: State of Art and Future Perspectives	95
V. Lionetti, A. Pingitore	
6.1 Introduction	95
6.2 Conventional Imaging of Regenerated Tissue	96
6.3 Molecular Imaging of Regenerated Tissue	98
6.4 Conclusions	101
References	101

7 Biotechnological Approaches to Hemostasis and Molecular Mechanisms of Wound Healing	105
A. Grimaldi, F. Rosso, A. Barbarisi	
7.1 Biotechnology for Hemostasis Control	105
7.2 Hemostatic Agents and their Mechanism of Action	106
References	113
8 Gene Therapy	115
A. Malgieri, P. Spitalieri, G. Novelli, F.C. Sanguolo	
8.1 Gene Therapy	115
8.2 Gene Therapy for Neurodegenerative Diseases	119
8.3 Local Gene Delivery for Tissue Repair in Surgery	123
V. Lionetti	
References	127
9 Stem Cells	131
M. Monti, C.A. Redi	
9.1 Philosophical and Lexical Issues	131
9.2 Origin, Animal and Vegetal Models	133
9.3 Somatic and Embryonic Stem Cells	134
9.4 Stemness Genes	139
9.5 Induction of Pluripotency	140
9.6 Stem Cells in Regenerative Medici	142
9.7 International Legal Framework: Stem Cell Biopolitics and Scientific Citizenship	143
References	147
10 Cancer Stem Cells	151
M. Maugeri Saccà, V. D'Andrea, A. Pulcini, R. De Maria	
10.1 Origin and Evolution of the Cancer Stem Cell Paradigm	151
10.2 Functional Genomics of CSCs	152
10.3 Molecular Biology of CSCs	153
10.4 CSCs and Carcinogenesis	154
10.5 CSCs and Tumor Recurrence	155
10.6 CSC and Metastases	156
10.7 In Vivo Imaging of CSCs	158
10.8 CSCs and Colon Cancer	159
10.9 Breast Cancer and CSCs	160
10.10 CSCs and Ovarian Cancer	161
10.11 CSCs and Lung Cancer	162
10.12 CSCs and Pancreatic Adenocarcinoma	163

10.13 CSCs and Prostate Cancer	164
10.14 CSCs and Glioblastoma Multiforme	165
10.15 Eradication of CSCs	166
References	167
Appendix	169
The Impact on Surgical Practice of Recent Advances in Biotechnology.	
Interactions Between Inherited and Environmental Factors in the Occurrence	
- and Biological Behavior - of Diseases of Surgical Interest	169
F. Cetta	
Subject Index	191