

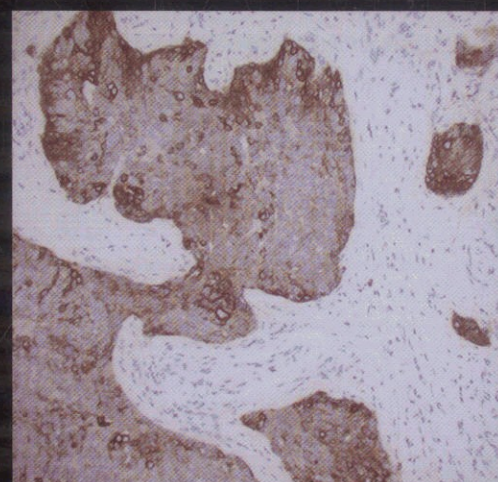
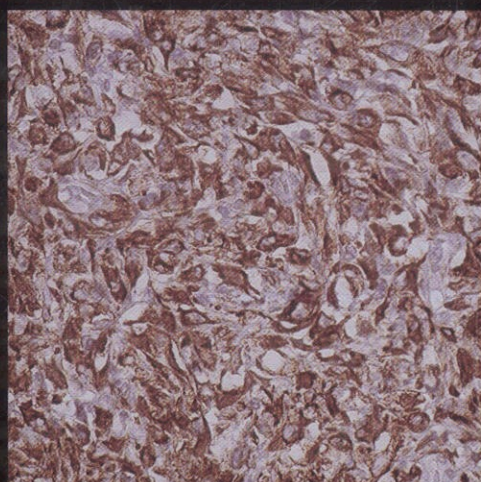
CAMBRIDGE

Medicine

Illustrated Surgical Pathology

SERIES EDITOR: LAWRENCE WEISS

MODERN IMMUNOHISTOCHEMISTRY



Peiguo Chu • Lawrence Weiss



CONTENTS

1. Modern Tumor Immunohistochemistry	1
Introduction	1
Quality Assurance and Certification	2
Tissue Preparation	2
Epitope Retrieval	2
Controls	3
Antibodies	3
Unwanted Immunostaining	9
2. Skin Tumors	11
Melanocytic Tumors	11
Melanocytic Markers	14
Adnexal Tumors	24
Epidermal Tumors	31
Paget Disease	38
3. Tumors of Head and Neck	52
Tumors of Salivary Gland	52
Salivary Gland Tumors with Dual Luminal– Myoepithelial/Basal Cell Differentiation	52
Salivary Gland Tumors with a Single Line Differentiation	64
Tumors of the Nasal Cavity and Paranasal Sinuses	77
4. Tumors of the Lung and Mediastinum	88
Tumors of the Lung	88
Immunohistochemical Markers of Lung Tumors	88
Different Types of Lung Tumors	90
Tumors of the Mediastinum	101
Tumors of the Pleura	108
Mesothelioma-Associated Markers	121
Adenocarcinoma-Associated Markers	124
5. Tumors of the Endocrine System	137
Immunohistochemical Markers of Neuroendocrine Differentiation	138
Immunohistochemistry of Endocrine Organs	142

Pituitary Gland	142
Adrenal Gland	147
Paraganglia	151
Thyroid Gland	153
Parathyroid Gland	158
Endocrine Lung	159
Gastrointestinal Endocrine System	164
Endocrine Pancreas	168
Merkel Cells and Merkel Cell Carcinoma	171
6. Tumors of the Digestive System	188
Esophagus	189
Squamous Cell Carcinoma	189
Intestinal Metaplasia	189
Esophageal Adenocarcinoma	193
Stomach	193
Gastric IM/Gastric Adenocarcinoma	193
Gastric Intraepithelial Dysplasia	195
Intestinal Type of Gastric Adenocarcinoma	197
Diffuse Type of Gastric Adenocarcinoma	199
Gastrointestinal Stromal Tumor	203
Duodenum and Small Bowel	209
Colon, Appendix, and Rectum	211
Colon Immunohistochemical Markers	211
Colorectal Signet-Ring Cell Carcinoma	216
Pancreas	216
Pancreatic Ductal Carcinoma	221
Adenocarcinoma of Ampulla of Vater	227
Mucinous Cystic Neoplasms	228
Solid Pseudopapillary Neoplasm	233
Serous Cystic Neoplasms	238
Pancreatoblastoma	241
Acinar Cell Carcinoma	242
Mixed Exocrine-Endocrine Tumors	242
Liver	244
Hepatocellular Carcinoma	244
Benign Bile Duct Proliferations	
(Bile Duct Adenoma and Hamartoma) and	
Bile Duct Carcinomas (Intrahepatic	
Cholangiocarcinoma and Extrahepatic	
Bile Duct Carcinoma)	254

7. Tumors of the Genitourinary System	270
Tumors of the Prostate	270
Metastatic Prostate Carcinoma Versus Nonprostate Carcinoma	270
Prostate Specific Markers	271
Differential Diagnosis of Primary Prostate Adenocarcinoma	273
Tumors of the Kidney	290
Markers for Renal Cell Carcinoma	292
Immunohistochemical Diagnosis of Renal Cell Carcinoma	304
Tumors of the Urinary Bladder	311
Urethelial Lesions	311
Adenocarcinoma	316
Spindle Cell Tumors	320
Tumors of the Testis	321
Germ Cell Tumors (GCTs)	321
Non Germ Cell Tumors	337
8. Tumors of the Breast and Female Genital Organs	357
Tumors of the Breast	357
Breast Prognostic Markers	357
Metastatic Breast Adenocarcinoma Versus Metastatic Nonbreast Adenocarcinoma	363
Breast-Specific Markers	364
Metaplastic Carcinoma Versus Breast Spindle Cell Tumors	370
Intraductal Versus Invasive Ductal Carcinoma	372
Myoepithelial Markers	375
Intraductal Papillary Neoplasms	381
Ductal Versus Lobular Carcinoma	383
Basal-Like Carcinoma	385
Tumors of the Vulva, Vagina, and Cervix	387
Tumors of the Uterus	395
Uterine Glandular Lesions	395
Uterine Spindle Cell Lesions	403
Gestational Trophoblastic Tumors (GTT)	406
Ovarian Tumors	418
Epithelial Tumors	418
Sex Cord-Stromal Tumors	434
Ovarian Stromal Tumors	442
Small Cell Carcinoma	450

9. Hematopoietic Tumors	472
Panleukocyte Antibody	473
B-Lineage Antibodies	476
Hodgkin Antibodies	482
T-/NK-Lineage Antibodies	484
Other Lymphoid Markers	489
Myeloid Markers	499
Histiocytic and Dendritic Antibodies	503
Mast Cell Antibodies	506
Epithelial Antibodies	506
Proliferation Antibodies	507
Applications of Immunohistochemistry to the Diagnosis of	
Malignant Lymphoma	508
Diagnosis of Malignant Lymphoma Versus	
Other Neoplasms	508
Diagnosis of Malignant Lymphoma Versus Reactive	
Lymphoid Hyperplasia	508
Subtypes of B-Cell Lymphoma	512
Subtypes of T-Cell Lymphoma	518
Immunophenotyping of Acute Leukemias, Myelodysplasia, and	
Myeloproliferative Disorders	522
Acute Leukemia in General	523
Acute Myeloid Leukemia	523
Acute Biphenotypic Leukemia	524
Myelodysplasia and Myeloproliferative Disorders	524
Histiocytic and Dendritic Neoplasms	524
Histiocytic Sarcoma	524
Langerhans Cell Histiocytosis (LCH)	525
Rosai-Dorfman Disease	525
Interdigitating Dendritic Cell Tumors	525
Follicular Dendritic Cells and Their Corresponding Tumors	525
Mast Cell Neoplasms	525
10. Tumors of Soft Tissue and Bone	549
Epithelial Markers	551
Muscle Markers	552
Endothelial/Vascular Markers	561
Neural/Nerve Sheath Markers	563
Osteoblastic Markers	566
Other Markers Used in the Diagnosis of Soft Tissue and	
Bone Tumors	567
Immunohistochemistry of Soft Tissue Tumors	574

Spindle Cell Soft Tissue Tumors	576
Fibrosarcoma	576
Leiomyosarcoma	577
Neurofibroma	578
Schwannoma	579
Perineurioma	579
Malignant Peripheral Nerve Sheath Tumor	580
Synovial Sarcoma	580
Solitary Fibrous Tumor	583
Low-Grade Myofibroblastic Sarcoma	583
Desmoid-Type Fibromatosis	583
Dermatofibrosarcoma Protuberans	584
Spindle Cell Rhabdomyosarcoma	584
Inflammatory Myofibroblastic Tumor	584
Myxoid Soft Tissue Tumors	587
Myxoid Liposarcoma	587
Myxoid Leiomyosarcoma	587
Myxofibrosarcoma	588
Low-Grade Fibromyxoid Sarcoma	588
Myxoid Neurofibroma	588
Myxoid Malignant Peripheral Nerve Sheath Tumor	588
Myxoid Synovial Sarcoma	589
Myxoid Solitary Fibrous Tumor	589
Myxoma	589
Nerve Sheath Myxoma	590
Neurothekeoma	590
Aggressive Angiomyxoma	590
Superficial Angiomyxoma	591
Ossifying Fibromyxoid Tumor	591
Myxoinflammatory Fibroblastic Sarcoma	591
Extraskeletal Myxoid Chondrosarcoma	592
Epithelioid Soft Tissue Tumors	592
Epithelioid Sarcoma	592
Epithelioid Hemangioendothelioma	592
Epithelioid Sarcoma–Like Hemangioendothelioma	593
Epithelioid Angiosarcoma	593
Benign Epithelioid Peripheral Nerve Sheath Tumor	596
Epithelioid Malignant Peripheral Nerve Sheath Tumor	596
Epithelioid Leiomyosarcoma	596
Sclerosing Epithelioid Fibrosarcoma	597
Extrarenal Rhabdoid Tumor	597
Myoepithelial Tumors	597

Alveolar Soft Part Sarcoma	600
Clear Cell Sarcoma	600
PEComa	602
Pleomorphic Soft Tissue Tumors	602
Pleomorphic Liposarcoma	602
Pleomorphic Rhabdomyosarcoma	602
Pleomorphic Leiomyosarcoma	602
Pleomorphic Malignant Fibrous Histiocytoma	604
Small Round Cell Soft Tissue Tumors	604
Ewing Sarcoma/Primitive Neuroectodermal Tumor	604
Rhabdomyosarcoma	606
Desmoplastic Small Round Cell Tumor	607
Poorly Differentiated Synovial Sarcoma	607
Neuroblastoma	608
Immunohistochemistry of Bone Tumors	610
Conventional Osteosarcoma	610
Clear Cell Chondrosarcoma	610
Chondroblastoma	610
Adamantinoma	611
Chordoma	611
Small Round Cell Bone Tumors	611
Small Cell Osteosarcoma	615
Mesenchymal Chondrosarcoma	615
11. Tumors of the Central Nervous System	634
Tumors of Neuroepithelial Tissue	634
CNS Tumor Markers	634
Immunohistochemistry of CNS Tumors	639
Tumors of the Sellar Region	664
12. Metastatic Carcinoma of Unknown Primary	669
Common Sites of Metastatic Carcinoma of Unknown Primary (CUP)	669
Common Immunohistochemical Markers of CUPs	676
Common Types of CUPs	682
<i>Index</i>	689