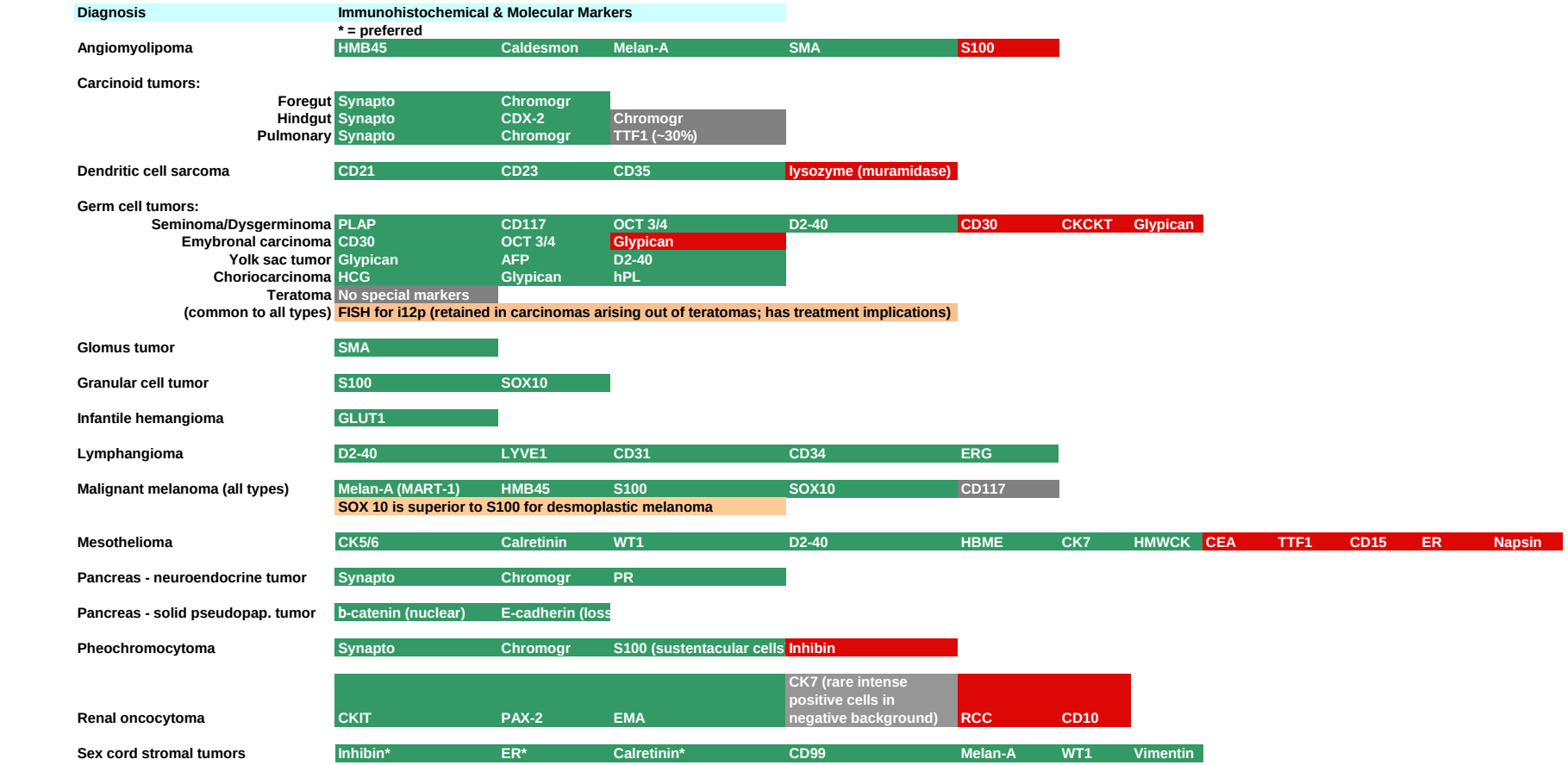
Diagnosis	Immunohistochemical & Molecular Markers * = preferred
Adrenal cortical carcinoma	Inhibin; Synap; Melan-A; Calretinin; Vimentin; Chromogr; CK7; CK20
Breast - ductal carcinoma	CK7; ER; PR; GATA3; Mammaglobin (50-70%); GCDFP-15 (50-70%); E-cadherin; HMWCK; CK20; PAX2 ER/PR/HER2 on all newly diagnosed cases
Breast - lobular carcinoma	CK7; ER; PR; GCDFP-15; GATA3; Mammaglobin (50-70%); E-cadherin; CK20
Breast - myoepithelial markers	p63; Calponin; SMMHC
Cervix - squamous cell ca	p63; p16
Cervix - adenocarcinoma	CK7*; p16 (>90%)*; CEA; ER; P63*; CK20; CDX2; TTF-1
Cholangiocarcinoma	CK7; CK19; N-cadherin; HMWCK; CK20; CDX2
Colon - adenocarcinoma	CK20; CDX2; CEA; CK7 MSI-colon IHC on all newly diagnosed cases of pT3 or pT4 w/o prior chemo/xrt
Endometrioid carcinoma	CK7*; ER*; Vimentin*; CA125; CK20; CDX2; CEA* *p16 can be positive by non-HPV mechanisms in poorly differentiated endometrial carcinomas (especially squamous morules)
Esophagus - adenocarcinoma	CK7; CDX2
Hepatocellular carcinoma	Glypican; Hepatocyte; AFP; CEA; CD10; CK7; CK20; PAX2 Dysplastic nodules also glypican positive, hepatic adenomas and normal hepatocytes are negative
Lung - adenocarcinoma	CK7; TTF1; CEA; CD15; Napsin; HMWCK; CK5/6; Calretinin; WT-1; HBME; D2-40; CDX-2
Lung - squamous cell carcinoma	p63; HMWCK; Napsin (20%); TTF-1
Lung - small cell carcinoma	CKCKT; Synaptophysin; Chromograniin; TTF-1; NSE; CD56; CK20; Napsin
Nasopharyngeal carcinoma	EBER (ISH); CKCKT; p63
Ovary - mucinous carcinoma	CK7; CK20; CDX2 (90%); ER supports if positive
Ovary - serous carcinoma	WT1*; CK7*; ER*; p53; CA125; PAX 2 (67%); CK20; CDX2
Paget's disease	CK7*; CAM5.2; EMA; CEA; Her2; S100*
Pancreas - ductal carcinoma	CK7; HMWCK; CK20; N-cadherin (30%); CDX2 (often + in duodenal/ampullary lesions)
Prostate carcinoma	PSA; PSAP; p504 racemase; Androgen Receptor; Erg (40%); CK7; HMWCK; CK20; p63; PAX2; GATA3 PIN4 cocktail includes p63 (nuclear, myoepithelial cells, brown), CK5/14 (nuclear, myoepithelial cells, brown), and racemase (cytoplasmic, most adenocarcinoma, red)
Renal - clear cell carcinoma	RCC; CD10 (membranous); Vimentin; PAX2; CK7; CD117; CK20
Renal - papillary carcinoma	RCC; CD10 (membranous); CK7; PAX2; Vimentin; p504s; AMACR; napsin; CK7; CK20; CD117
Renal - chromophobe carcinoma	Hale's Colloidal Iron; CD117; CK7; PAX2; RCC; CD10; Vimentin
Salivary - Ductal	Androgen Receptor; GCDFP-15; Her2; SOX10 SOX10 positive salivary gland tumors: acinic, adenoid cystic, epithelial myoepithelial, myoepithelial carcinomas, pleomorphic adenomas SOX10 negative salivary gland tumors: salivary duct, mucoepidermoid, oncocytic carcinoma, oncocytomas, Warthin's
Stomach:	
Intestinal type	CK7; CDX2; CK20
Diffuse/signet ring type	CK7; CK20; E-cadherin; CDX2 HER2 IHC on newly diagnosed cases
Thyroid - papillary & follic. carc.	TTF1; Thyroglobulin; CK7; HMWCK; Vimentin; HBME-1; Napsin
Thyroid - medullary carcinoma	TTF1; Calcitonin; CK7
Thymic carcinoma	CD117; CK5/6; CD5; P63
Urachal carcinoma	CK20; CDX2; CK7
Urothelial carcinoma	p63; CK7; CK5/6; HMWCK (34betaE12); GATA3; CK20; PAX2

Diagnosis	Immunohistochemical & Molecular Markers
Desmoplastic small round cell	CKCKT, Vimentin, Desmin, WT-1, NSE, CD99, Myogenin FISH for EWS translocation
Ewing's / PNET	CD99, S100 (20%), SOX10 FISH for EWS translocation
Lymphoblastic lymphoma	CD45, TdT, CD10, CD79a, PAX5, CD3
Merkel cell carcinoma	CKCKT, CK20 (dot-like), Synapto, Chromogr, PAX5 (93%), TTF1
Neuroblastoma	NF, CD56, Synapto, Chromogr, CD99 FISH for N-MYC amplification
Rhabdomyosarcoma - embryonal	Myogenin, Desmin, MSA
Rhabdomyosarcoma - alveolar	Myogenin (diffuse), Desmin, MSA FISH for FKHR translocation; t(2:13) or t(1;13) [FKHR also known as FOXO1]
Small cell carcinoma	CKCKT, Synap, Chromogr, TTF-1, PAX5 (73%), CK20
Wilms tumor	WT1, Vimentin, PAX2, CKCKT, EMA


Diagnosis
Immunohistochemical & Molecular Markers
Alveolar soft part sarcoma
TFE-3 (at Phenopath)
PAS/D positive crystals
MSA
SMA
CD99
t(X;17) TFE3-ASPL fusion (no FISH available)
Angiomyolipoma
HMB45
Melan-A
Angiosarcoma
CD31
CD34
Factor VIII
ERG
CKCKT
Atypical fibroxanthoma (Skin tumor)
CD68
CD10
CD99
CKCKT
CD34
S100
P63
CD31
desmin
Chordoma
CKCKT
EMA
S100
Clear cell sarcoma
SOX10
S100
HMB45
Melan A
SMA
CD99
FISH for EWS translocation (>75%)
Dermatofibroma
Factor 13a
CD34
Dermatofibrosarcoma protuberans
CD34
Factor 13a
FISH for t(17;22) PDGFB-COL1A1 fusion
Endometrial stromal sarcoma
CD10
Inhibin
b-catenin (nuclear; 40%)
Desmin
t(7;17) JAZF1-JJAZ1 fusion (no FISH available)
Epithelioid sarcoma
CKCKT
EMA, CD34 (60%)
INI1 (loss)
Vimentin
ERG (38%)
Extraskeletal myxoid chondrosarcoma
S100 (~20%)
SOX10
INI loss (50%)
FISH for EWS translocation (>50%); also t(9;17) & t(9;15)
Fibromatosis (desmoid)
β-catenin (nuclear)
SMA
Fibrosarcoma
Vimentin
GI Stromal Tumor
CD117
DOG1
CD34
SMA
Desmin
S100
Mutations in KIT (80%) & PDGFRA (8%)
Inflammatory myofibroblastic tumor
ALK1
FISH for ALK translocation
Kaposi's sarcoma
HHV8
ERG
CD31
Leiomyosarcoma
Desmin
H- Caldesmon
SMA
MSA
Calponin
CD117
DOG1
CD34
S100
CD10
Uterine leiomyosarcs are ER (30-80%) and PR positive (40-80%) vs other (0-25% and (0-13%) respectively
Liposarcoma, well-diff.
MDM2
CDK4
SMA
Desmin
S100
FISH for MDM2, Ring chromosomes/markers from 12q13-15
Liposarcoma, de-diff.
MDM2
CDK4
SMA
Desmin
S100
FISH for MDM2, Ring chromosomes/markers from 12q13-15
Liposarcoma, myxoid
t(12;16) or t(12;22)
FISH for FUS gene translocation
Low grade fibromyxoid sarcoma
FISH for t(7;16) (FUS gene translocation, 75% of cases)
Lymphangioma
D2-40
LYVE1
CD31
CD34
ERG
Malignant Peripheral Nerve Sheath Tumor
S100 (40%)
SOX10 (27%)
INI1 loss
TLE
Lost in 50% of epithelioid variant
Mesenchymal chrondrosarcoma
CD99
SOX10
Neurofibroma
S100
SOX10
Neurothekeoma (skin tumor)
NK1/C3, NSE, CD68
S100
Osteosarcoma
CDK4
MDM2
Perineurioma
EMA
GLUT1
S100
PEComa
SMA
Calretinin
HMB45
Desmin (50%)
Melan A (50%)
S100 (25%)
Pleomorphic rhabdomyosarcoma
Desmin
MSA
Myogenin (10-30% cells)
Schwannoma
S100
SOX10
Solitary fibrous tumor
CD34
BCL-2
β-catenin (nuclear; in 40%)
CD117
DOG1
S100
Synovial sarcoma
TLE
EMA
CKCKT
CD99
INI1 (loss)
SOX10
FISH for t(X;18) (SYT gene translocation)


Diagnosis
Immunohistochemical & Molecular Markers
* = preferred
Angiomyolipoma
HMB45
Caldesmon
Melan-A
SMA
S100
Carcinoid tumors:
Foregut
Synapto
Chromogr
Hindgut
Synapto
CDX-2
Chromogr
Pulmonary
Synapto
Chromogr
TTF1 (~30%)
Dendritic cell sarcoma
CD21
CD23
CD35
lysozyme (muramidase)
Germ cell tumors:
Seminoma/Dysgerminoma
PLAP
CD117
OCT 3/4
D2-40
CD30
CKCKT
Glypican
Emybronal carcinoma
CD30
OCT 3/4
Glypican
Yolk sac tumor
Glypican
AFP
D2-40
Choriocarcinoma
HCG
Glypican
hPL
Teratoma
No special markers
(common to all types)
FISH for i12p (retained in carcinomas arising out of teratomas; has treatment implications)
Glomus tumor
SMA
Granular cell tumor
S100
SOX10
Infantile hemangioma
GLUT1
Lymphangioma
D2-40
LYVE1
CD31
CD34
ERG
Malignant melanoma (all types)
Melan-A (MART-1)
HMB45
S100
SOX10
CD117
SOX 10 is superior to S100 for desmoplastic melanoma
Mesothelioma
CK5/6
Calretinin
WT1
D2-40
HBME
CK7
HMWCK
CEA
TTF1
CD15
ER
Napsin
Pancreas - neuroendocrine tumor
Synapto
Chromogr
PR
Pancreas - solid pseudopap. tumor
b-catenin (nuclear)
E-cadherin (loss
Pheochromocytoma
Synapto
Chromogr
S100 (sustentacular cells
Inhibin
Renal oncocytoma
CKIT
PAX-2
EMA
CK7 (rare intense positive cells in negative background)
RCC
CD10
Sex cord stromal tumors
Inhibin*
ER*
Calretinin*
CD99
Melan-A
WT1
Vimentin

* = preferred

Morphology	Suggestions For Starting Panel							
High grade undiff.	CKCKT	S100/SOX10	CD45	CD30	CD34	OCT3/4		
Small round blue cell	CD99	CD45	CKCKT	Desmin	Myogenin	S100/SOX10	Synapto	Chromogr
GI Spindle Cell	CD117	CD34	DOG1	Desmin	S100			
Adenoca vs Mesothelioma	Calretinin	WT1	CK5/6	TTF1	CEA	CD15	HBME	D2-40
Endometrial vs Cervical	ER	Vimentin	p16	CEA				