

**Proliferation markers**

MIB-1(Ki-67)                      Tonsil

**Use**

Apoptosis

**Endothelial markers**

CD31                                      Tonsil/BM

Endothelial cells

CD34                                      Tonsil/BM

Sweat gland neoplasm

Factor VIII                              Tonsil/BM

Hemophilia A (HEMA)

**Epithelial Markers**

CAM 5.2                                  Skin

Residual tumor post-treatment

CK7  
Tumors                                      Lung

Immunophenotypes of Various

CK8    Lung

CK19                                        Liver

EMA                                         Skin

Pan keratin                                Skin

MNF-116                                  Skin

**Muscle& mesenchymal**

actin/SMA/1A4                              Tonsil/BM, tongue, small intestine, colon, ureter, prostate, skin

Actin/MSA/HHF35                        Tonsil/BM

desmin                                        Appendix

Myogenin                                    Rhabdo

MYOD1                                        Rhabdo

S100    Skin, colon, brain, melanoma

SM myosin                                    Intestine

Vimentin                                    Tonsil/BM, Colon, prostate, uterus, ureter

**Neural and Glial**

GFAP                                         Brain

Myelin basic protein                        Brain

NeuN                                         Brain



Neurofilament	Spinal cord
Neurofilament(SMI-31)	Spinal cord
NB84a	Neuroblastoma
Olig-2	Brain
PGP9.5	Neuroblastoma
NSE	Pancreas
Synaptophysin	Pancreas, brain, adrenal, thyroid

**Tumor Associated**

AFP	AFP tissue
Alpha1-antitrypsin	Tonsil
Beta-HCG	Placenta
Calretinin	Appendix, testis
CD99	Ewings
FLI-1	Ewings
Galectin-3	Thyroid
HMB-45	Melanoma
Melan-A/mart-1	Skin
PLAP	Placenta
TTF-1	Thyroid

**Infectious**

- Use infected tissue
- EBV/EBER in situ
- Hep B(core)
- Hep B (surface)



H.pylori

HHV8

HSVI

HSVII

**Endocrine- pituitary**

ACTH	Pituitary
Calcitonin	Thyroid
Chromogranin	Pancreas
FSH	Pituitary
Glucagon	Pancreas
Inhibin	Placenta
Insulin	Pancreas
Insulin A	Pancreas
LH	Pituitary
Thyroglobulin	Thyroid
TSH	Pituitary

**Hematopoetic Markers**

Bcl-2	Tonsil/BM
Bcl-6	Tonsil/BM
CD1a	Skin
CD3	Tonsil/BM
CD4	Tonsil/BM
CD5	Tonsil/BM
CD8	Tonsil/BM
CD10	Tonsil/BM
CD15	Tonsil/BM



CD20	Tonsil/BM
CD21	Tonsil/BM
CD30(KI-67)	Tonsil/BM
CD31	Tonsil/BM
CD34	Tonsil/BM
CD43	Tonsil/BM
CD45-LCA	Tonsil/BM
CD45RO	Tonsil/BM
CD56	Neuroblastoma
CD57	Tonsil
CD61	BM
CD68	Tonsil/BM
CD71(TfR)	Tonsil/BM

**Hematopoetic Markers cont.**

CD79a	Tonsil/BM
CD117/C-kit	Skin/BM
CD163	Placenta
DDX4	Ovarian Cancer
Fascin	Tonsil/BM
Granzyme B	Tonsil/BM
J chain	Tonsil/BM
Kappa light chain	Tonsil/BM

Alpha light chain	Tonsil/BM
Kappa light chain in situ	Tonsil/BM
Alpha light chain in situ	Tonsil/BM
Langerin	Skin
Lysozyme	Tonsil/BM
Myeloperoxidase	BM
TdT	BM

<u>Alphabetical</u>	<u>Positive Controls</u>	<u>Used for</u>
8-OHdG	Skin	
14-3-3 Sigma		
Acid Fast Bacilli (AFB)	Acid fast bacteria	
ACTH		
Actin Muscle specific	Skeletal Muscle, leiomyoma	
Actin Smooth muscle (SMA)	Uterus	
Actin	Normal: heart, skeletal muscle, smooth muscle	
AFP	Germ cell, liver hepatoma, fetal liver	
Albumin	Liver	
Alcian Blue (1.0+2.5)	Normal small intestine, colon	
Alcian blue/PAS	Normal small intestine	
Alizarin red S	Calcium	
ALK-1	Large cell lymphoma	

Alpha 1 fetoprotein	hepatoma, fetal liver
Alpha 1 Antichymotrypsin (AACT)	Tonsil, hepatoma
Alpha 1 antitrypsin (AAT)	Tonsil, hepatoma
Androgen Receptor (AR)	Prostate
Aniline Blue-Azan, Heidenhain's	Normal: uterus, bone marrow, skeletal muscle
Aurora A/STK-15	MCF-7 cell, cancer tissue
B-cell	Tonsil
B72.3	Colon carcinoma, pancreatic carcinoma, breast
Bax	Mammary carcinoma, breast carcinoma
BCL-1(cyclin D-1)	Mantle cell lymphoma
BCL-2	Lymph node, tonsil
BCL-6	Tonsil
Bet-Catenin	Liver, testicle
Ber-H2	Lymphoma, pancreas
Ber-EP4 (epithelial antigen)	Skin, colon adenocarcinoma, mesothelioma, lung CA
Beta amyloid	Alzheimer's brain
Bim	Skin/ skin tumor
Bieschowsky	Brain
Bile (Halls)	Bile
Bodian	Alzheimer's brain
Bombesin	Stomach, Duodenum, lung
BrdU	BrdU treated tissue
Brown and Brenn Gram	Gram Pos/Neg
BRST-2	Breast Carcinoma
C3d patients.	Kidney from post streptococcal glomerulonephritis
	Human skin tissue from lesion of the early pemphigus vulgaris (without blister formation)



c-erbB-2 (HER-2/neu)	Breast carcinoma
CA 125	Ovarian carcinoma, breast CA
CA19-9	Lung
Calbindin D	Cerebellum
Calcitonin	Thyroid, medulla carcinoma of thyroid
Calponin	Fibro adenoma
Calretinin	Mesothelioma, brain
Cam 5.2	Breast carcinoma
Casein	Lactating mammary gland
Caspase 3	Skin/ tumor, embryo
Cat Scratch Fever	Cat Scratch Fever
Catalase	Liver, brain (basal ganglia, thalamus, cerebellum)
Catenin	Intestine
Cathepsin D	breast carcinoma
CC10	Lung
CD1a	Skin, thymus, tonsil
CD3	Tonsil
CD4	Tonsil
CD5	Tonsil
CD7	Tonsil
CD8	Ewing's sarcoma, pancreas
CD10	Tonsil, kidney, uterus
CD11b	Spleen, cerebellum (microglia)
CD13	Brain (striatum)
CD14	Placenta
CD15 (leuM1)	Metastatic adenocarcinoma of pleura or Hodgkin's lymphoma
CD15 (C3D-1)	Tonsil

CD20, B-cell	Tonsil
CD21	Tonsil
CD23, B-cell	Tonsil, spleen
CD25	Tonsil, spleen, thymus
CD30	Hodgkin's lymphoma, reed sterberg
CD31	Tonsil
CD34, vascular Ag	Tonsil
CD35	Tonsil
CD38	Spleen
CD40	Spleen
CD41	Spleen
CD43	Tonsil
CD44	Spleen, tonsil
CD44V6	Baby thymus, tonsil
CD45(LCA)	Tonsil, lymph node, lymphoma
CD45RA	Tonsil
CD45RO, t-cell	Tonsil
CD54	Liver, spleen, lung
CD56	Tonsil
CD57	Tonsil
CD68	Tonsil, lymph node
CD74	Tonsil
CDw75	Tonsil
CD79a	Tonsil
CD80	Spleen
CD99 Ewing's sarcoma	Ewing's sarcoma
CD105	Kidney



CD117 (C-KIT)	GI stromal tumor
CD138	Tonsil
Cdc2	Lung tumor, breast carcinoma
CDC47	Tonsil
Cdk2	Colon
Cdk4	Skin
CDw49f (integrin-alpha6)	Skin (basement membrane)
CDx2	Colon CA
CEA	Breast carcinoma, colon adenocarcinoma
CellMate	Mast cell, Bone marrow, HP
CERB2	Breast cancer, gastric cancer, adeno cancer
HCG	Placenta
Chromogranin A	Pancreas
Claudin 1	Normal: Skin
C-MYC	Lung CA, Breast CA, colon CA
Collagen III	Normal: Skin
Collagen IV	Normal: Skin, kidney, tonsil, Bladder
Collodial Iron	Normal: Small Intestine, Colon
Combined Eosinophil/ Mast cell (CEM) Mast cell	
Congo Red	Amyloid
Copper	Copper
Crystal violet amyloid	Amyloid Alpha
CK5	Prostate normal
Cytokeratin 5/6	Mesothelioma
CK6	Normal: Skin
Cytokeratin 7	Aenocarcinoma, breast cancer
CK10	Normal Skin

Cytokeratin 14	Skin
CK15	Normal Skin
CK16	Normal Skin
CK17	Normal Skin
Cytokeratin 8&18	Skin, prostate carcinoma, breast, pancreas/tumor
CK19	Normal Skin
Cytokeratin 20	Colon carcinoma
Cytokeratin 903	Skin, adenocarcinoma
Cytokeratin AE1/AE3	Skin, prostate adenocarcinoma
Cytokeratin HMW	Normal: skin, prostate
Cytokeratin LMW	Normal: skin
Cytokeratin MNF-116	Skin, squamous cell carcinoma
Cytokeratin WSS	Skin
Cytokeratin Pan (AE1&Cam5.2)	Skin, adenocarcinoma
CKR6	Lymph node
CKR7	Lymph node
CNPase	Brain/ glia tumor
Collagen I	Placenta. Kidney
Collagen IV	Kidney, skin, placenta, lymph node
Cox2	Colon, kidney
CX3CR1	Lymph node
CXCR4	Skin
CYP1B1	Liver
D2-40	Brain
DBA.44 hairy cell	Reactive lymph node, spleen, hairy cell leukemia
DDX4	Testis    Ovarian Cancer
Defensin1-alpha (HDEFA-1)	Skin



Defensin1-beta (NBD-1)	Skin
Defensin2-beta (HBD-2)	Skin
Desmin	Leiomyoma
Dieterle's	Spirochete, aspergillus, Legionnaires, candida, albicans, helicobacter pylori
DOG1 bladder	Prostate, breast, liver, stomach, testis, pancreas gall
Dopamine Hydroxylase	Brain (stratum/Substantia nigra)
EBV-LMP	EBV infected tissue
E-Cadherin	Pancreas, lung carcinoma, breast carcinoma
EGFR	Placenta
Elastic, Verhoeff's	Aorta
EMA	Breast carcinoma, normal thyroid
Epithelial antigen	Colon adenocarcinoma
Estrogen receptor	Breast carcinoma, breast
F4/80	Spleen, Thymus, lung, liver
Factor VIII	Tonsil, skin, intestine
Factor XIII	Dermatofibroma
Fas	Spleen, Thymus, colon
Fas-L	Spleen, thymus, colon
Fhit	Muscle
Flag (M2)	Heart muscle
Fleugen	Tonsil
Fite's	Leprosy
Flk-1	Colon carcinoma, blood vessel endothelium
Filaggrin	Skin
Flt-1	Kidney, heart
Fontana Masson	Normal Skin

FSH	Pituitary
Gastrin	Stomach, antrum
GAPDH (V-18)	Lens, liver, lung, prostate cancer
GCDFP/BRST 2	Breast carcinoma
<b>Genta triple stain</b>	<b>Helicobacter pylori</b>
GFAP	Astrocytoma, brain
<b>Giemsa</b>	<b>Helicobacter pylori, mast cell, toxoplasma gondi, bone marrow</b>
Glucagon	Pancreas
Glycophorin A	3 <sup>rd</sup> term placenta
Glycoprotein IIIa	1 <sup>st</sup> term placenta
Glypican 3	hepatocellular carcinoma (HCC)
<b>Gram</b>	<b>Gram pos/neg</b>
Granzyme B, T-cell	Tonsil
<b>Grimelius</b>	<b>Argentaffin-argyophil</b>
<b>Grocott's Methanamine Silver (GMS)</b>	<b>Aspergillus, candida, albicans, pneumocystis</b>
GRB2	Colon carcinoma
<b>Gridley's</b>	<b>Aspergillus, amoeba, candida albicans</b>
GSH2 (E-20)	Lens
Growth hormone(hGH)	Pituitary
HbcAg hepatitis B core	Infected liver
HbcAg hepatitis B surface	Infected liver
HDJ2	Tonsil
Helicobacter pylori	Helicobacter pylori
Heme-Oxygenase-1 (HO-1)	Lung
Hepatitis C	Hepatitis C
Hep par 1	Hepatocellular carcinoma
Hemoglobin	tonsil



Her2Neu (cerbB2)	Breast carcinoma
Herpes simplex virus I	Infected lung
Herpes simplex virus II	Infected lung
HGF	Liver
HIF-1 alpha	Prostate tumor, lung tumor
Histone 1	Tonsil
Histone H2AX	Tonsil, skin
Histone H3 (Phospho-histone H3)	Tonsil, skin, spleen, small intestine
HMB45 (melanosome)	Melanoma
Hormone	Tonsil
HPL	Placenta, tonsil, colon
HPV	HPV infected tissue, anogenital tissue
HSA (hepatocyte specific antigen)	Normal liver or liver carcinoma
HSP70	Skin, pulmonary arteries, smooth muscle
IgA	Tonsil
IgD	Tonsil
IgG	Tonsil
IgM	Tonsil
IL-1	Lung
IL-6	Lung
IL-8	Lung
Inhibin	Granular cell tumor
Insulin, insulin A	Pancreas
Integrin	Skin (basement membrane)
Involucrin	Skin
<b>Iron</b>	<b>Ferric Iron</b>
<b>Jones</b>	<b>Kidney, Reticulum</b>

Kaposi's sarcoma (KSHV)	Kaposi's sarcoma
Kappa	Tonsil
KP-1	Colon, Small Bowel, Liver, Skin
Keratin	Skin
Keratin7	Lung, Ovary, endometrium and breast carcinoma, skin
Keratin14	Skin
Keratin15	Skin
KI67	Skin, small intestine, tonsil, thymus, breast carcinoma
Lambda	Tonsil
Laminin	Skin, Kidney
LAT	Spleen
LCA	Tonsil
<b>Luxol fast blue (LFB)</b>	<b>Brain, spinal cord</b>
Ly-6A/E	Thymus
Ly-6G (monocytes)	Spleen, bone marrow
Ly-49	Spleen
Hormone	Tonsil
MAC	Placenta, spleen
MALT-1	Tonsil
Mantle Cell	Mantle cell lymphoma
MAP2	Brain (cerebral cortex)
Mast cell tryptase	Bone marrow, lung, skin, colon
MEK ½ (phosphor-MEK ½)	Breast cancer
Methylene blue	Helicobacter pylori, Mast cell
MHV	MHV liver
MLH-1	Tonsil
MIP2	Skin

MItf	Bone marrow, lung, skin, colon
MMP-2	Placenta, skin
MMP9	Lung
MOMA1	Spleen
MRP14	CAPAN-1 cells, lung cancer
MSH2	Tonsil
MSH-6	Colon cancer
MT-1	Tonsil
MT-2	Tonsil
Muci-10 Carmine	Normal: small intestine, colon
MUM-1	Tonsil
Muscle specific actin (MSA)	Normal prostate
Myeloperoxidase	Bone marrow, spleen, tonsil
Myosin	Skeletal muscle, tonsil, tongue
Myoglobin	Heart, tonsil
Nestin	Brain
Neuroblastoma	Neuroblastoma
Neurofilament	CNS
Neutrophil Esterase	Brain, peripheral nerve
Nitrotyrosine	Kidney, uterus, heart, placenta
NOS2	Liver, Uterus
NOS3	Kidney, brain
NSE (neuron specific enolase)	Brain (cerebral cortex)
Occludin	Lung
Osteonectin/sparc	Cartilage, lens
PSA	Prostate
Pancreatic polypeptide	Pancreas, duodenum, Gastric antrum

P34cdc2	Tonsil
P16	Fetal brain lysate or human uterus adenocarcinoma tissue
P53	Breast cancer, colon, skin
P63	Breast cancer, colon, skin
P105	Tonsil
Pan Cytokeratin (Lu-5)	Skin
Panendothelial cell antigen	Kidney, spleen, lung
Pap 2b	Bladder
PAR, alpha	Ischemia Brain (piriform cortex)
Pax-5	Spleen
Paxillin	Placenta
PCNA	Small intestine, skin, tonsil, lymphoma
PDGF receptor	Mammary carcinoma
PDGF-beta	Mammary tumor
<b>Movat's pentachrome</b>	<b>Aorta, skeletal muscle</b>
<b>Periodic acid Schiff (PAS)</b>	<b>Glycogen, Aspergillus, candida albicans</b>
PEP-1	Malignant melanoma, amelanotic
PEP-13	Malignant melanoma, amelanotic
<b>Picro-sirius Red</b>	<b>Uterus</b>
PLAP	Placenta, tonsil, colon cancer
Progesterone	Normal breast/ breast cancer
PR (progesterone receptor)	Uterus, breast, prostate
Prolactin	Pituitary
PS2	Breast cancer
<b>PTAH</b>	<b>Uterus, heart, skeletal muscle</b>
Sarcomeric actin	Tongue, tonsil
Serotonin	Appendix, adrenal, bronchial epithelium





SCF (stem cell factor)	Brain
SLUG	Tongue
SMAD2 (phosphor-SMAD2)	Embryo
Somatostatin	Pancreas, brain
Somatostatin receptors	Pancreas, Brain
Sos-1	Placenta
SOX-10	Embryo
Survivin Ab-3	Stomach/ lung tumor
SV40	Tumor, mammary carcinoma
TAG-72	Colon adenocarcinoma
Tau	Alzheimer's brain
TCR, beta	Spleen, thymus
Testosterone	Testis
TGF-beta RI	Prostate
TGF-beta1 LC	Placenta
TH (tyrosine hydroxylase)	Brain (striatum, substantia nigra)
TNF, alpha	Skin, lung
Thymine dimer	Skin
Thyroglobulin	Normal thyroid
TLT-1	Spleen
TSH	Pituitary
TTF-1 (thyroid transcription factor)	Lung, thyroid, pituitary
Tubulin III, beta (Tuj1)	Brain (cerebral cortex)
Ubiquitin	Alzheimer's/ Parkinson's brain
UCHL	Tonsil
UCP-1	Pancreas
UCP-2	Pancreas

ULEX	Prostate, tonsil
VCAM-1	Vessel in tissue
VE-Cadherin	Kidney
VEGF	Pancreas, kidney, adenocarcinoma
VEGF R1	Skin, brain, hey cells, angiosarcoma
VEGF R2(FLK-1)	Kidney, heart, prostate carcinoma, tumor
VIP (vaso intestinal polypeptide)	Gastric antrum, small intestine, brain (amygdala)
vWF (von Willebrand factor)	Tonsil, skin
WT-1 (wilms' tumor)	Kidney (glomeruli), testis

**In Situ Hybridization stains are in  
Bold as of 05-22-2013**

14-3-3-Sigma	Granulosa cell and steroid cell tumors
a-smooth muscle actin (SMA)	Smooth muscle or myofibroblastic differentiation
a-1 antichymotrypsin	Outdated so-called histiocytic marker
a-1 antitrypsin	a-1 antitrypsin deficiency (liver tissue)
ACTH	Pituitary tumors
Actin, smooth muscle (SMA)	Smooth muscle or myofibroblastic differentiation
Actin, muscle-specific (MSA) (HHF-35)	Smooth muscle and skeletal muscle differentiation
Adenovirus	Adenovirus infection
AFP	Hepatoma, Hepatoid Carcinoma, Yolk sac tumors
ALK (clone 5A4)	ALK positive lymphoma and lung carcinomas
AMACR (P504S)	Prostate cancer diagnosis, also other carcinomas
Amebiasis (E. Histolytica)	Ambeiasis – cross reacts with histiocytes, so order CD68 w
Amyloid AA protein	Amyloid subtyping
Amyloid P protein	Amyloid subtyping (also stains normal elastic tissue)
Androgen Receptor	Breast cancer, prostate cancer, others
Annexin A1	Hairy cell leukemia, T-cells, myeloid cells
AP12 (MALT) (FISH)	t(11;18) (q21;q21)
Arginase-1	Hepatocellular carcinoma, hepatoid differentiation
b-catenin	Fibromatosis, metastatic carcinoma unknown primary
BAF47 (INI1)	Epithelioid sarcoma, teratoid/rhabdoid tumor, MPNST
Bartonella Henselae	Cat scratch disease organism
B72.3	Mesothelioma vs. adenocarcinoma
BCL-1	Same as Cyclin D1
BCL-2	Lymphoma typing, soft tissue tumors

BCL-6	Lymphoma typing
Ber-EP4	Mesothelioma vs. adenocarcinoma
BG-8	Mesothelioma vs. adenocarcinoma
BK virus	Marker of BK Polyomavirus infection
Bob.1	B-cells, plasma cells
Brachyury	Chordoma, Hemangioblastoma
BRAF-V600E antibody (clone VE1)	Specific for BRAF-V600E mutation
BRST-1 (BCA-225)	Some epithelial tumors
c-MYC probes (FISH)	Burkitt lymphoma
C4d	Used for assessment of rejection in transplant bxs
C9	Diagnosis of myocardial infarction (used with troponin T)
c-kit (CD117)	Gastrointestinal stromal tumors, mast cells
CA-125	Multiple epithelial tumors, also in mesothelial cells
CA19-9	Metastatic carcinoma unknown primary
CAIX	Renal cell carcinoma classification,
Calcitonin	Medullary carcinoma thyroid
Caldesmon	Smooth muscle differentiation
Calponin	Smooth muscle differentiation, myoepithelial cells
Calretinin	Mesothelioma, adrenal cortical tumors, sex cord stromal tu
Cat Scratch Disease	Bartonella henselae infection
Cathepsin D	Not very useful
Cathepsin K	TFEB translocation-associated renal cell carcinomas
CD1a	Thymic T-cells, thymoma, Langerhans cells
CD2 T-cells)	Lymphoma/leukemia typing
CD3 (T-cells)	Lymphoma/leukemia typing
CD4 (T-helper, inducer)	Lymphoma/leukemia typing
CD5 (T-cells)	Lymphoma/leukemia typing (damaged by B5)
CD7 (T-cells)	Lymphoma/leukemia typing
CD8 (T-suppressor/cytotoxic)	Lymphoma/leukemia typing
CD10 (CALLA)	Lymphoma typing, DFSP vs DF, endometrial stromal tumo
CD11c	Leukemia typing, hairy cell leukemia
CD15	Lymphoma typing, mesothelioma vs. adenocarcinoma
CD20 (L26)	Lymphoma/leukemia typing
CD21	Follicular dendritic cells, lymphoma typing
CD23	Lymphoma/leukemia typing
CD25 (IL-2)	Lymphoma/leukemia typing
CD30 (Ki-1)	Lymphoma typing
CD31	Vascular differentiation, some histiocytes
CD33	Monocytic marker
CD34	Soft tissue tumor classification, leukemia typing
CD38	Plasma cell differentiation (does not work well on B5)
CD43 (MT1)	Lymphoma/leukemia typing

CD44	Burkitt vs non-Burkitt, carcinoid prognosis
CD45 (LCA)	Recognition of lymphohematopoietic tumors
CD45RA (4KB5)	Lymphoma/ leukemia typing
CD45RB	Lymphoma/ leukemia typing
CD45RO (UCHL1)	Lymphoma typing (T-cells, some myeloid cells)
CD45RO (OPD4)	Lymphoma typing (stains mostly CD4+ cells)
CD56 (NCAM)	Lymphoma typing, neuroendocrine differentiation
CD57 (NK-1, Leu 7)	Lymphoma typing, neuroendocrine differentiation
CD61	Megakaryocytes, megakaryocytic leukemia
CD68 (KP1)	Histiocytic/myeloid/monocytic marker
CD68 (PG-M1)	Histiocytic/monocytic marker
CD71 (transferrin receptor)	Erythroid cells, some lymphomas
CD74 (LN-2, B-cells)	Lymphoma typing
CD79a (B-cells)	Lymphoma/leukemia typing
CD82 (KAI-1)	Kidney tumor subtyping
CD99 (MIC-2)	Soft tissue tumor classification
CD117 (c-kit)	Gastrointestinal stromal tumors, mast cells, blasts
CD123	plasmacytoid dendritic cell tumors, hairy cells
CD138	Plasma cells (also stains many epithelial tumors)
CD 163	Histiocytic - Monocytic marker
CDK4	Liposarcoma
CDX2	Metastatic carcinoma unknown primary
CEA (clone COL-1)	Mesothelioma vs. adenocarcinoma, metastatic ca. unknown
CEA (polyclonal)	Hepatoma vs. adenocarcinoma (use COL1 for other applica
c-erbB2 (HER2)	HER2 overexpression
Chromogranin	Neuroendocrine differentiation
Claudin-1	Perineurioma
Claudin-5	Endothelial marker
Clusterin	Lymphoma typing, follicular dendritic marker
CMV	Cytomegalovirus infection
Coccidioidomycosis	Coccidioidomycosis infection (cross reacts w Histoplasmosis
Collagen IV	Soft tissue tumor classification
COX2	Not sure what people use this for
Cryptococcus	Cryptococcus neoformans infection
Cyclin D1	Mantle cell lymphoma
Cytokeratin 5	Mesothelioma, squamous carcinoma
Cytokeratin 7	Metastatic carcinoma unknown primary
Cytokeratin 14	Oncocytic tumors
Cytokeratin 15	Useful for diagnosis of cutaneous adnexal tumors
Cytokeratin 17	Metastatic carcinoma unknown primary
Cytokeratin 19	Papillary thyroid carcinoma, prognostic marker in islet cell
Cytokeratin 20	Metastatic carcinoma unknown primary

Cytokeratin AE1/AE3  
 Cytokeratin HMW (34bE12)  
 Cytokeratin LMW (8,18)  
 CXCL13  
 D2-40 (podoplanin)  
 DBA.44  
 Desmin  
 DOG1  
**EBV (EBER probe)**  
 EBV (LMP-1)  
 E-Cadherin  
 E. Histolytica  
 EGFR (pharmDx)  
 EGFR (31G7)  
**EGFR amplification (FISH)**  
 EMA  
 Emerin  
 ERCC1  
 ERG  
 Estrogen receptor  
**EWSR1 probe (FISH)**  
 Factor VIII  
 Factor XIIIa  
 Fascin  
 Fibroblast  
 FLI-1  
 FSH  
**FUS probe (FISH)**  
 Galectin-3  
 Gastrin  
 GATA-3  
 GCDFP-15  
 GFAP  
 GH (growth hormone)  
 Giardia  
 Glucagon  
 GLUT-1  
 Glycophorin A  
 Glypican 3  
 Granzyme B  
 H. Pylori

Epithelial tumors, hepatoma vs. adenocarcinoma (NOT a “  
 Metastatic carcinoma unknown primary, prostate basal cell  
 Epithelial tumors, especially renal, prostate, hepatoma  
 Angioimmunoblastic T-cell lymphoma  
 Mesothelioma, lymphatics, seminoma  
 Hairy cell leukemia, some marginal zone lymphomas  
 Smooth and skeletal muscle differentiation  
 Gastrointestinal stromal tumor (GIST) marker (better than  
**In-situ hybridization stain for EBV**  
 Epstein-Barr virus infection  
 Lobular vs. Ductal breast carcinoma, erythroid precursors  
 Amebiasis- cross reacts with histiocytes, so order CD68 with  
 Erbitux eligibility (FDA-approved test)  
 Sweat gland carcinoma, squamous tumors  
**EGFR gene amplification status**  
 Metastatic carcinoma of unknown primary, Lymphoma typ  
 Useful for highlighting nuclear membrane in papillary ca t  
 Prognostic marker in non-small cell lung carcinoma  
 Endothelial marker (stains nuclei), subset of prostate carcin  
 Breast cancer prognostic marker, metastatic carcinoma unk  
**Ewing/ PNET, DSRCT, clear cell sarcoma, extra  
 chondrosarc**  
 Megakaryocytic marker, endothelial marker  
 Dermatofibroma vs. DFSP  
 Hodgkin’s cells, other reticulum cells  
 Research marker  
 Ewing’s sarcoma, vascular tumors, lymphoblastic lymphoma  
 Pituitary tumors  
**Low grade fibromyxoid sarcoma, angiomatoid MFH, myx**  
 Papillary thyroid carcinoma  
 Gastrinomas  
 breast ca, urothelial ca, trophoblastic tumors  
 Breast carcinoma, sweat gland, salivary gland marker  
 Glial tumors, salivary gland tumors  
 Pituitary tumors  
 Giardia lamblia infection  
 Pancreatic endocrine tumors  
 Perineurioma  
 Erythroid marker  
 Yolk sac tumor, hepatoma, hepatoid adenocarcinoma  
 Lymphoma typing  
 Helicobacter pylori infection

HBME-1	Chordoma, papillary thyroid carcinoma
HbsAg	Hepatitis B surface antigen
HCG	Choriocarcinoma
Hemoglobin	Erythroid marker
HER-1	Same as EGFR
HepPar1	Hepatoma, gastric carcinoma
HER2 immunostain	HER2 protein overexpression
<b>HER2 (FISH)</b>	<b>HER2 gene amplification status</b>
Herpes Simplex I & II	Herpesvirus I and II infection
HHV8 (KSHV)	Kaposi's sarcoma, some cases Castleman's, lymphoma
Histoplasmosis	Histoplasmosis capsulatum infection (also stains other fungi)
HIV (p24-gag)	Detects HIV only in tissues that contain follicular dendritic cells
HLA-Dr (LN3)	Leukemia typing
HLA-G	Intermediate trophoblasts (choriocarcinoma, other)
HMB-45	Melanoma marker, angiomyolipoma and other PEComas
HPL	Germ cell tumors, trophoblastic tumors
<b>HPV-Pan</b>	<b>In-situ hybridization stain, detects HPV types 6, 11, 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 73, 82, 84, 89, 91, 92, 93, 94, 95, 97, 98, 99</b>
<b>HPV, types 6/11</b>	<b>In-situ hybridization stain</b>
<b>HPV, types 16/18</b>	<b>In-situ hybridization stain</b>
<b>HPV, types 31/33/51</b>	<b>In-situ hybridization stain</b>
IgA	Plasma cell subclassification
IgG	Plasma cell subclassification
IgG4	IgG4-related sclerosing diseases
IgM	Plasma cell subclassification
<b>IgH-MALT1 (MALT) (FISH)</b>	<b>t(14;18) (q32;q21)</b>
IL-2 (CD25)	Lymphoma/leukemia typing
IMP3 (L523S, KOC)	Dysplasia marker, marker of serous carcinoma
Inhibin	Adrenal cortical tumors, sex-cord stromal tumors
INI-1 (BAF47)	Epithelioid sarcoma, teratoid/rhabdoid tumor, MPNST
Insulin	Pancreatic endocrine tumors
Kappa light chains	Plasma cell clonality
Ki-67 (clone K2)	Proliferative fraction, viable fat cell membranes, lipoblasts
Ki-67 (clone MIB-1)	Proliferative fraction, hyalinizing trabecular tumor of thyroid
Kit	Same as c-kit, CD117
Ki-67 (clone SP6)	Proliferative fraction
KOC (L523S, IMP3)	Dysplasia marker, marker of serous carcinoma
L523S (KOC, IMP3)	Dysplasia marker, marker of serous carcinoma
Lambda light chains	Plasma cell clonality
Laminin	Basement membrane marker
LAT	T-cells
LCA (CD45)	Lymphohematopoietic tumors
LEF-1	Marker of SLL / CLL

LH	Pituitary tumors
Lipase	Acinar cell tumor of pancreas, other
LN3 (HLA-Dr)	Leukemia typing
Lysozyme	Myeloid and histiocytic marker
<b>MALT probes (FISH)</b>	<b>MALT lymphomas, 3 probes, API2/MALT1 t(11;18), IgH/MALT1 t(14;18), and BCL6 breakapart probe</b>
Mammaglobin	Breast marker, salivary glands, sweat glands
MART-1 (clone A103)	Melanoma, adrenal cortical tumors, sex cord-stromal tumors
MART-1 (M2-7C10+M29E3)	Melanoma, angiomyolipoma and other PEComas
Mast cell tryptase	Mastocytosis
MDM2	Liposarcoma
Mesothelin (clone 5B2)	Mesothelioma, serous carcinoma, squamous carcinoma
MIC-2 (CD99)	Soft tissue tumor classification
MiTF	Melanoma, thyroid tumors, many soft tissue tumors
Mitochondria	Oncocytic tumors
MLH1	Hereditary cancer syndromes, mismatch repair gene mutations
MOC-31	Mesothelioma vs. adenocarcinoma
MSA (muscle-specific actin)	HHF-35, smooth muscle and skeletal muscle
MSH2	Hereditary colon cancer syndrome, mismatch repair gene mutations
MSH6	Hereditary colon cancer syndrome, mismatch repair gene mutations
MUC1	Paget's disease
MUC2	Ovarian mucinous carcinoma vs. colorectal carcinoma
MUC4	Marker of low grade fibromyxoid sarcoma
MUC5AC	Ovarian mucinous carcinoma vs. colorectal carcinoma
MUC6	Seminal vesicle marker, serous neoplasms of pancreas
MUM1	Lymphoma typing
<b>MYC probes (FISH, 2 probes)</b>	<b>Burkitt lymphoma</b>
MYC Protein IHC	Assists in diagnosis of tumors with MYC translocations
Myeloperoxidase	Myeloid and histiocytic marker
Myosin Heavy Chain	Smooth muscle and myoepithelial marker
Myogenin	Rhabdomyosarcoma
Myosin, smooth muscle	Myoepithelial marker, smooth muscle differentiation
N-Cadherin	Metastatic carcinoma unknown primary
Napsin A	Lung carcinoma, alveolar macrophages, some renal cell carcinoma
Nestin	Neuroendocrine, melanoma, other
NeuN	Neuronal marker
Neurofilament	Neural tumors, occasional non-neural tumors
NGFR	DFSP, Soft tissue tumor classification
NKI-C3	Melanoma, neural marker, lysosomal marker
NPM	AML subset
NKX2.2	Ewing sarcoma / PNET
NKX3.1	Sensitive and specific nuclear marker of prostate carcinoma

NSE	Worthless marker, don't use it
NUT	Marker of NUT positive midline carcinomas
NY-ESO-1	Synovial sarcoma
OCT 2	Lymphoma typing
OCT3/4	Seminoma, embryonal carcinoma
Osteonectin	Osteosarcoma, also other sarcomas (not bone-specific)
p16 (INK4)	Cervical dysplasia, HPV-associated head and neck squamous
P24-gag	Detects HIV only in tissues that contain follicular dendritic
p27	Research marker
p40	Squamous ca, urothelial ca, myoepithelial
P501S (Prostein)	Prostate marker
P504S (AMACR)	Prostate cancer diagnosis
P504S / p63 cocktail	Prostate cancer diagnosis
p53	p53 tumor suppressor gene mutations
p57	Molar pregnancy (in conjunction with Ki-67)
p63	Myoepithelial, prostatic basal cell, squamous marker
P63/ P504S cocktail	Prostate cancer diagnosis
Pancreatic polypeptide	Pancreatic endocrine tumors
Parathyroid hormone (PTH)	Parathyroid tumors
Parvovirus	Parvovirus B19 infection
Pax-2	Renal cell carcinoma, serous carcinoma, lymphoid cells
Pax-5 (B-cells)	B-cells, some neuroendocrine tumors
Pax-8	Kidney, thyroid, female genital tract carcinomas, some lymph
PCP (Pneumocystis carinii)	Pneumocystis carinii infection
PD-1	Assists in dx of angioimmunoblastic lymphoma
PDEGF	Platelet-derived epidermal growth factor
PDGFR-alpha	Diagnosis of c-kit negative GISTs (DOG1 is better for this)
PDX1	Stains some pancreatic neuroendocrine tumors
Perforin	Lymphoma typing
PE-10 (SP-A)	Lung adenocarcinoma and some thyroid carcinomas
PGP9.5	Neural/neuroendocrine marker
PHH3	Mitosis marker
Placental S100 (S100P)	Benign vs malignant pancreatic lesions, urothelial ca, other
PLAP	Many carcinomas, also some germ cell tumors
PMS2	Hereditary colon cancer syndrome, mismatch repair gene r
Pneumocystis (PCP)	Pneumocystis carinii infection
Podoplanin (D2-40)	Same as D2-40, mesothelioma, lymphatics, seminoma
Polyomavirus (BK, SV-40)	Marker of BK Polyomavirus infection
Prealbumin (transthyretin)	Choroid plexus tumors, some types of amyloid
Procollagen 1	Fibroblastic differentiation, AFX, also some carcinomas
ProExC	Cervical dysplasia
Progesterone receptor	Breast cancer prognostic marker



Prolactin	Pituitary tumors
Prostein (P501S)	Prostate marker
PSA (prostate)	Prostate marker
PSAP (prostate)	Prostate marker (prostatic acid phos), also rectal carcinoid
PSMA (prostate)	Prostate marker
PTH	Parathyroid tumors
pVHL	Renal tumors, clear cell ca fem gen tract, bile duct marker
RB Protein	spindle cell / pleomorphic lipoma, myofibroblastoma
RCC (PN-15)	Renal cell carcinoma marker (Pax8 is much more sensitive)
Ret oncoprotein	Ganglion cells
RON	Renal oncocytoma, other
RRM2	Evaluation of urothelial dysplasia
RSV	Respiratory Syncytial Virus
Rocky Mountain Spotted Fever	Rocky Mountain Spotted Fever bug
S100	Melanoma, neural marker, myoepithelial, other
S100P (Placental S100)	Benign vs malignant pancreatic lesions, urothelial ca, other
SALL4	Germ cell tumors, hepatoid adenocarcinoma of stomach
SATB2	Colorectal carcinomas
SDHB	SDHB-deficient tumors
Skel. Myosin MY-32	Skeletal muscle differentiation
SMA (smooth muscle actin)	Smooth muscle or myofibroblastic differentiation
Smooth muscle myosin	Myoepithelial marker, smooth muscle differentiation
Smoothelin	Used to distinguish muscularis mucosa from detrusor in bladder
Somatostatin	Pancreatic endocrine tumors
Sox10	Sensitive melanoma marker (better than S100), neural, myoepithelial
SST-2A	Somatostatin receptor
Stathmin	Cervical dysplasia - CIS
SV-40 (BK, Polyomavirus)	Marker of BK Polyomavirus infection
Synaptophysin	Neuroendocrine differentiation
Syphilis	Treponema pallidum infection
<b>SYT probe, t(X;18) (FISH)</b>	<b>Synovial sarcoma</b>
<b>t(11;14) (FISH)</b>	<b>Mantle cell lymphoma</b>
<b>t(14;16) (FISH)</b>	<b>Follicular lymphoma</b>
TDT	Lymphoma/leukemia typing, Merkel cell tumors
Telomerase	Identification of cells with telomerase activity
TFE3	Alveolar soft part sarcoma, some renal tumors
TFEB	Some renal tumors
Thrombomodulin	Urothelial carcinoma, mesothelioma, squamous tumors
Thymidylate Synthase	Prognostic marker
Thyroglobulin	Thyroid carcinoma
TIA-1 (cytotoxic)	Lymphoma typing
TLE-1	Synovial sarcoma, other tumors



Topoisomerase	Prognostic marker
Toxoplasmosis	Toxoplasmosis gondii
Transthyretin (prealbumin)	Choroid plexus tumors, some types of amyloid
TRAP	Hairy cell leukemia
Troponin T	Diagnosis of myocardial infarction (used with C9)
Trypsin	Acinar cell tumor of pancreas
Tryptase, mast cell	Mast cell marker
TSH	Pituitary tumors
TTF-1	Lung & thyroid marker, also some neuroendocrine tumors
Tyrosinase	Melanoma maker
Ubiquitin	Alzheimer's disease, recognition of Mallory bodies in liver
<b>Urinary FISH panel (FISH on urine)</b>	<b>Cytologic diagnosis of bladder cancer</b>
Varicella Zoster	Varicella Zoster infection
VEGF	Misc tumors
Villin	Metastatic carcinoma unknown primary
Vimentin	Metastatic carcinoma unknown primary
VIP	Pancreatic endocrine tumors
VS38	Plasma cells, plasmacytoid, epithelial cells
Whipple's disease	Whipple's disease
WT-1 (6F-H2)	Mesothelioma and serous carcinoma marker
ZAP-70	CLL prognostication