

Antibodies for Immunohistochemistry (IHC) and Immunofluorescence (IF)

This is a menu of antibodies and probes available at PhenoPath Laboratories for clinical immunohistochemical or in situ hybridization studies. Our collection of available antibodies and probes continues to expand; please contact us if there is an antibody or probe that you are unable to locate. Please note that this list does not include antibodies or probes available for research studies.

Target	Useful Application/Cells/ Tumors Identified
A	
ACTH	Subset of pituitary tumors
Actin, muscle specific (HHF-35)	Smooth, skeletal muscle differentiation: leiomyosarcoma, rhabdomyosarcoma, myofibroblasts, myoepithelium
Actin, smooth muscle alpha	(1A4) Smooth muscle differentiation: leiomyosarcoma, myofibroblasts, myoepithelium
Adenovirus	Adenovirus identification
ALK protein (p80)	Anaplastic large cell lymphoma (subset with t(2;5))
Alpha-1-antitrypsin	Alpha-1-antitrypsin deficiency
Alpha-fetoprotein	Yolk sac tumors, hepatocellular carcinoma
AMACR (p504s)	Prostate carcinoma marker
Amyloid type analysis	Amyloid P, Amyloid A, Transthyretin, Kappa, Lambda, β -Amyloid, Congo Red, β -2-Microglobulin
Amyloid A	Subtype of amyloid
Amyloid beta	Subtype of amyloid, Alzheimer disease
Amyloid P component	Amyloid (all subtypes)
Androgen receptor	Prognostic and predictive marker in prostate cancer
Arginase-1	Immunohistochemical marker of hepatocellular carcinoma
B	
bcl-2	Nodular lymphoma v. reactive hyperplasia, subset of lymphomas, carcinomas, and sarcomas
bcl-6	Follicular lymphoma
bcl-10	May be a sensitive and specific marker of pancreatic acinar cell carcinoma and might be helpful to distinguish from other pancreatic and non-adenocarcinoma neoplasms
Ber-Ep4	(Epithelial glycoprotein) Subset of adenocarcinoma, negative on mesothelioma
Beta-2-microglobulin	Amyloid subtype
Beta-catenin	Nuclear localization in colorectal adenocarcinoma and abdominal fibromatosis
Bg8	Blood group antigen (Lewis Y); subset of adenocarcinoma, negative on mesothelioma
β HCG	See Chorionic gonadotropin
BK virus	See SV40
Blood group A	Identification of tissue 'floaters'
Blood group B	Identification of tissue 'floaters'

Bob-1	B cell transcription factor
Brachyury	A specific marker of chordomas. Negative in other chondromatous and myxoid tumors.
C	
C3 (complement)	For skin immunofluorescence studies*
c-kit (CD117)	Gastrointestinal stromal tumors, mast cells
CA-125	Not offered; see WT-1
Calcitonin	Thyroid C cells, medullary carcinoma
Caldesmon	Endometrial stromal tumors vs. smooth muscle tumors
Calponin	Myoepithelial marker, in situ v. infiltrating breast carcinoma
Calretinin	Mesothelioma
Carbonic Anhydrase IX (CA-IX)	Differentiating clear cell RCC (positive) from chromophobe RCC (negative) as well as urothelial carcinoma (positive) from collecting duct carcinoma. Also prognostically important because low CA-IX expression reportedly indicates poor survival and low response to interleukin therapy in clear cell renal cell carcinomas.
Caspase 3 fragment	Apoptotic cells
CD1a	Langerhans cells, histiocytosis X
CD2	T cell subset
CD3	Mature T cells, T cell lymphoma
CD4	T cell subset
CD5	T cells, mantle zone cells, small lymphocytic B cell lymphoma
CD7	T cell marker
CD8	T cell subset
CD10 (CALLA)	Subset of lymphomas and carcinomas
CD15	Reed-Sternberg cells of Hodgkin lymphoma, neutrophils, some adenocarcinomas
CD20	B cell lymphomas, target of immunotherapy
CD21	B cell and follicular dendritic cells and tumors
CD22	B cell lymphomas, target of immunotherapy
CD23	Small lymphocytic (B cell) lymphoma
CD25 (IL-2RB)	Lymphoid activation marker, target of immunotherapy
CD30 (K-1 antigen)	Hodgkin disease, anaplastic large cell lymphoma, embryonal CA
CD31	Endothelial cells and tumors
CD33	Helps to establish myeloid lineage in poorly differentiated hematolymphoid neoplasms. CD33 is also a therapeutic target for the drug Myelotarg, used in treating myeloid neoplasms

CD34	Endothelium and endothelial tumors, leukemias, subset of mesenchymal tumors
CD35	Follicular dendritic cells and tumors
CD43	T cells, leukemias, macrophages, often coexpressed in B cell lymphomas
CD45	(Common leukocyte antigen, T200 antigen) Marker of lymphocytes, hematolymphoid processes
CD56 (NCAM)	Natural killer cells (NK/T cell lymphoma), neural tumors
CD57	Nerve sheath tumors, T cells in NLPHL
CD66	(CEA family) Adenocarcinoma subset, hepatocellular carcinoma (bile canalicular pattern), negative on mesothelioma
CD68	Macrophage marker
CD79a	B cell lymphomas
CD99	PNET/Ewing tumors
CD117 (c-kit)	Gastrointestinal stromal tumors, mast cells
CD123	Suitable for use within a panel of other antibodies to differentiate plasmacytoid dendritic cell neoplasm from other hematolymphoid neoplasms, and to help differentiate hairy cell leukemia from other B-cell malignancies. Also helps to characterize some acute leukemias.
CD138	Plasma cells and myeloma
CD163	Most specific IHC marker currently available to ID macrophages/histiocytes (but not Langerhans cells)
CDX2	Colorectal adenocarcinomas and subset of other GI adenocarcinomas
CEA (CD66e)	Adenocarcinoma subset, negative on mesothelioma
CEA family (CD66)	Adenocarcinoma subset, hepatocellular carcinoma (bile canalicular pattern), negative on mesothelioma
Chorionic gonadotropin	(HCG, β HCG) Trophoblasts and choriocarcinoma
Chromogranin A	Neuroendocrine differentiation
Clusterin	Differentiation of ALCLs from PTCL, NOS
Collagen, type IV	Basement membrane protein, subset of mesenchymal tumors
Common leukocyte antigen	See CD45
Complement C3	See C3
COX-2 (cyclo-oxygenase-2)	Predictor of treatment response
CXCL13	Sensitive marker for angioimmunoblastic T cell lymphomas; expressed in developing/evolving processes as well as in more established cases
Cyclin D1	Mantle cell lymphoma
Cytokeratin 1/10 (34B4)	Squamous cell carcinoma
Cytokeratin 5	Mesothelioma, squamous cell carcinoma, transitional cell carcinoma
Cytokeratin 7	Carcinoma subset
Cytokeratin 8	(Low MW cytokeratin) All non-squamous carcinomas

Cytokeratin 17	Carcinoma subset
Cytokeratin 19	Carcinoma subset
Cytokeratin 20	GI tumors, transitional cell carcinoma, Merkel cell tumors
Cytokeratin, high MW (34 β E12)	Carcinoma subset; normal or hyperplastic prostate v. prostatic carcinomas
Cytokeratins (pan)	(OSCAR, AE1/AE3) All epithelial cells and all carcinomas
Cytomegalovirus	CMV identification
D	
D2-40 (Podoplanin)	See Podoplanin
DBA.44	See Hairy cell leukemia
Desmin	Skeletal, smooth muscle tumors
DOG1	Specifically expressed in GISTs (GastroIntestinal Stromal Tumors)
E	
E-cadherin	Positive on ductal, negative on lobular breast carcinomas
EBV (EBER1)	(Via <i>in situ</i> hybridization) Post transplantation lymphoproliferative disorder, Hodgkin lymphoma, EBV identification [CISH0001]
EBV - LMP	LMP = Latent membrane protein of EBV
EGFR	(Epidermal growth factor receptor) Prognostic marker in certain carcinomas
EMA	(Epithelial membrane antigen) Some carcinomas, meningioma, anaplastic large cell lymphoma
Epithelial glycoprotein (Ber-Ep4)	Subset of adenocarcinomas, negative on mesothelioma
Estrogen receptor (ER)	Prognostic and predictive marker in breast and other carcinomas
F	
Factor VIII related antigen	(von Willebrand factor) endothelial cells, megakaryocytes
Factor XIIIa	Dermal dendrocytes, dermatofibroma
Fascin	Hodgkin lymphoma
Filaggrin	Squamous cell differentiation marker
FLI-1	Presence of EWS-FLI-1 fusion product secondary to (11;22)(q24;q12) translocation characteristic of PNET Ewing sarcoma
FOXP1	Useful as part of a panel of tests to distinguish GCB from non-GCB DLBCL
FSH	Subset of pituitary tumors
G	
Galectin-3	Useful in differentiating malignant v. benign thyroid tumors
Gastrin	Subset of pancreatic islet cell tumors
GCDFP-15 (Brst2)	Breast, salivary, sweat gland tumors
GCET	Useful as part of a panel of tests to distinguish GCB from non-GCB DLBCL
GFAP (Glial-fibrillary acidic protein)	Glioma
Glucagon	Subset of pancreatic islet cell tumors

Glycophorin A	Erythroid marker
Glypican-3 (GPC3)	Distinguishes hepatocellular carcinoma from non-neoplastic liver
gp100 (HMB-45)	Melanoma
gp200 renal tubular antigen	Not currently available
Growth hormone	Subset of pituitary tumors
H	
Hairy cell leukemia	(DBA.44) Hairy cell leukemia
HBME-1	Mesothelioma, thyroid carcinoma
HCG	See Chorionic gonadotropin
Helicobacter pylori	Positive identification of Helicobacter
Hemoglobin	Erythroid marker
Hepatitis B core Ag	Hepatitis B virus identification
Hepatitis B surface Ag	Hepatitis B virus identification
HepPar1 Antigen	Hepatocellular and hepatoid carcinomas
HER2 by FISH	Poor prognostic factor, predictor of treatment response in breast carcinoma
HER2 by IHC	Poor prognostic factor, predictor of treatment response in breast carcinoma
Herpes virus	HSV1, HSVII identification
HHV8 (human Herpes virus 8)	Kaposi sarcoma, HIV-related lymphomas
HLA-DR	Useful in differentiating acute myeloid leukemias of non-promyelocytic type (non-Me AMLs) from acute promyelocytic leukemias (AML M3). Can also help distinguish monocytic proliferations (HLA-DR+) from granulocytic proliferations (generally HLA-DR-).
HMB-45 antigen	(gp100) melanoma
hMLH1	See MLH1
hMSH2	See MSH2
hMSH6	See MSH6
hPMS2	See PMS2
HPV	Not offered, see p16
I	
IgA	Subset of myeloma: also for skin immunofluorescence studies*
IgD	Subset of myeloma: also for skin immunofluorescence studies*
IgG	Subset of myeloma: also for skin immunofluorescence studies*
IgG4	Expressed in IgG4-related sclerosing diseases (IgG4-related autoimmune disease). It is important to recognize IgG4-related sclerosing diseases because of (1) the potential to mistake them for lymphoma, and (2) they respond favorably to steroid treatment. NOTE: The IgG4-specific antibody is always run along with an antibody to the total IgG, in order to determine the proportion of IgG4-positive plasmacytoid cells among the total IgG-positive plasmacytoid cells.

IgM	Subset of myeloma: also for skin immunofluorescence studies*
INI-1	INI-1 & Lack of INI-1 protein expression has been described as a characteristic finding to distinguish rhabdoid tumors and other malignant central nervous system tumors
Inhibin-alpha	Granulosa cell tumors, adrenal cortical tumors
Insulin	Subset of pancreatic islet cell tumors
J	
JC virus (Jamestown Canyon)	see SV40
K	
Kappa light chains	Myeloma, some B cell lymphomas
Ki-1 antigen (CD30)	Hodgkin lymphoma, anaplastic large cell lymphoma, embryonal carcinoma
Ki-67 antigen	Cell proliferation marker (non-GO)
L	
Lambda light chains	Myeloma, some B cell lymphomas
Langerin	Differentiation of Langerhans Cell Histiocytosis (LCH) from non-LCH histiocytic neoplasms
Legionella	Legionella identification
Leutinizing hormone	Subset of pituitary tumors
LMO2	Differentiating between germinal center B-cell (GCB) DLBCLs and non-GCB DLBCLs
Lysozyme	Granulocytes & histiocytes, marker of leukemias
M	
Macrophage	(HAM56) macrophage
Mammaglobin	Breast cancer marker
MART-1 antigen	(Melan A) Melanoma, adrenal cortical and ovarian stromal tumors
Maspin	Myoepithelial marker. This antibody will be of use in a panel of other antibodies to determine the presence of invasive breast carcinoma.
Melanoma specific antigen	(gp100 as identified by HMB-45) Melanoma
Mesothelin	Ovarian (serous papillary) carcinoma, mesothelioma, pancreatic carcinomas
Mitochondria	Oncocytomas
Microphthalmia transcription factor	See MTF
MLH1	(Mismatch repair gene product) Subset of colorectal CA w/MSI
MOC-31	Adenocarcinoma related antigen, negative on mesotheliomas
MSH2	(Mismatch repair gene product) Subset of colorectal CA w/MSI
MSH6	(Mismatch repair gene product) Subset of colorectal CA w/MSI
MSI	See MLH1, MSH2, MSH6, PMS2
MTF	(Microphthalmia transcription factor) Melanoma and melanocytic tumors
MUM1	Lymphoid/plasma cell specific marker
Muscle specific actins	(HHF-35) Smooth, skeletal muscle differentiation: leiomyosarcoma,

	rhabdomyosarcoma, myofibroblasts, myoepithelium
Myeloperoxidase	Granulocytes and histocytes, marker of leukemias
MyoD1	Rhabdomyosarcoma
Myogenin	Rhabdomyosarcoma
Myoglobin	Rhabdomyosarcoma
N	
NapsinA	Novel, sensitive, and specific marker of lung adenocarcinomas
NB84 antigen	Neuroblastoma and other small, blue round cell tumors
NCAM (CD56)	Natural killer cells (NK/T cell lymphoma), neural tumors
NGFR	Nerve growth factor receptor (p75-NTR); nerve sheath differentiation
Neurofilaments	Neurons and neuronal tumors
NUT	(Nuclear protein in the testis) Normally confined to the germ cells of the testis and ovary. NUT midline carcinoma (NMC) is defined by the presence of chromosomal rearrangement involving the NUT gene on chromosome 15q14.
O	
Oct-2	B-cell transcription factor
Oct-3/4	Seminomatous/(dys)germinomatous tumors and embryonal carcinomas
P	
p16	Evaluation of cervical intraepithelial lesions; surrogate marker of high-risk HPV
p21-WAF1	Tumor suppressor gene
p53	Tumor suppressor gene product overexpressed in subset of malignancies - marker of p53 mutation and poor prognosis
p57	Distinction between complete and partial hydatidiform moles
p63	Myoepithelial marker, in situ v. infiltrating breast carcinoma; squamous, transitional cell marker; lost in prostatic adenocarcinomas
p75-NTR	Nerve growth factor receptor: nerve sheath differentiation
p80 (ALK protein)	Anaplastic large cell lymphoma [subset with t(2;5)]
p504s (Human AMACR)	Prostate carcinoma marker
Pancreatic polypeptide	Subset of pancreatic islet cell tumors
Parathormone	See PTH
Parvovirus	Parvovirus identification
PAX-2	Renal cell carcinoma
PAX-5	B cell specific activator protein (BSAP)
PAX-8	Marker of GYN, renal and thyroid carcinomas
PD-1	Sensitive marker for angioimmunoblastic T cell lymphomas and follicular T cell lymphomas
Pemphigoid (Bullous)	Assessment of circulating antibodies using indirect immunofluorescence on monkey esophagus

Pemphigus (Vulgaris)	Assessment of circulating antibodies using indirect immunofluorescence on monkey esophagus
Placental lactogen	Intermediate trophoblasts
PLAP	(Placental alkaline phosphatase) Seminoma
PMS2	DNA mismatch repair protein. This antibody will be of use in a panel of other antibodies to determine the presence of microsatellite instability.
Pneumocystis	Pneumocystis identification
Podoplanin	Lymphatic endothelium marker, distinguishes mesothelioma v. adenocarcinoma (D2-40)
Polyomavirus	see SV40
Prealbumin	(Transthyretin) Choroid plexus tumors, some forms of amyloid
Progesterone receptor (PR)	Breast (prognostic and predictive marker), meningiomas
Prolactin	Subset of pituitary tumors
Prostate specific antigen	(PSA) Prostate carcinoma
Prostatic acid phosphatase	(PAP) Prostate carcinoma
PTH	Parathyroid tissue and tumors
R	
Renal cell carcinoma (gp200)	Not currently available
Respiratory syncytial virus	RSV identification
S	
S-100	Melanoma, Schwann cells, neural support cells, Langerhans histiocytes
SALL4	Very sensitive and specific marker for metastatic germ cell tumors, with particular utility in detection of metastatic yolk sac tumors
Serotonin	Subset of carcinoid tumors
SMMHC	(Smooth muscle myosin heavy chain) Myoepithelial marker; in situ vs. infiltrating breast carcinoma
Smoothelin	Useful tool to differentiate between fully differentiated contractile smooth muscle cells (SMC's) from proliferative SMC's
Somatostatin	Subset of pancreatic islet cell & other neuroendocrine tumors
Surfactant ApoA1	Discontinued - refer to Napsin A: a novel, sensitive, and specific marker of lung adenocarcinomas
SV40 virus	SV40 virus identification, PML; cross reacts with BK virus, JC virus, and polyomavirus
Synaptophysin	Neuroendocrine differentiation (e.g., sm. cell CA), neuroblastoma
T	
TCL-1	Distinguishes T cell prolymphocytic leukemia (T-PLL) from other mature T cell neoplasms, and blastic plasmacytoid dendritic cell neoplasms (BPDCN's) from acute myeloid leukemia with monocytic differentiation
TCR-βF1	α-β T cells, and most neoplasms of these cells
TdT	Lymphoblastic lymphoma

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TFE3	Marker of alveolar soft part sarcoma and t(X;17) renal carcinomas
Thrombomodulin	Mesothelioma
Thymidylate synthase	Prognostic and predictive marker in GI and other carcinomas
Thyroglobulin	Thyroid follicular tumors
Thyroid stimulating hormone	Subset of pituitary tumors
TIA-1	(Cytotoxic granule protein) Anaplastic large cell lymphoma
TLE-1	Synovial sarcomas
Topoisomerase II α	Predictor of treatment response
Toxoplasma	Positive identification of toxoplasma
TRAcP	(Tartrate resistant acid phosphatase) Hairy cell leukemia
Transthyretin	(Prealbumin) Choroid plexus tumors, some forms of amyloid
Tryptase	Markers of mast cells and mast cell tumors
TTF-1	(Thyroid transcription factor-1) Lung and thyroid carcinomas
Type IV collagen	Basement membrane protein, subset of mesenchymal tumors
Tyrosinase	Melanoma
U	

Uroplakin	A transmembrane protein that is a specific marker of transitional cell epithelium and tumors
V	
Varicella-zoster	Positive identification of varicella- zoster
Villin	Adenocarcinoma subset, especially gastrointestinal
Vimentin	Sarcomas, lymphomas, coexpressed with cytokeratin in some carcinomas (e.g., renal cell and endometrial carcinomas)
VIP	(Vasoactive intestinal polypeptide) Subset of neuroendocrine tumors
von Willebrand factor (vWF)	(F. VIII related antigen) Endothelial cells, megakaryocytes
W	
WT-1	(Wilms tumor gene product) desmoplastic small round cell tumor, mesothelioma, ovarian surface epithelial tumors
Z	
ZAP-70	T cell marker, prognostic marker in CLL/SLL

*Skin biopsy specimens for IF require fresh tissue. Please call for instructions and special transport media.



Flow Cytometry Panels

Flow Cytometry "Tube"	Antigens Evaluated
Mature B cell tube	CD45, CD19, surface kappa & lambda, CD20, CD5, CD10, CD38, CD56
B cell therapy add-on	CD45, CD52, CD22, CD19, CD20, CD5, CD10, CD38
CLL/SLL/Mantle cell lymphoma add-on	CD45, CD19, CD5, FMC7, CD23, CD22, CD38, ZAP-70, CD200, CD79b
Hairy cell leukemia add-on	CD45, CD19, CD103, CD25, CD11c, CD22, CD20
Follicular lymphoma/Burkitt lymphoma add-on	CD45, CD19, bcl-2, CD20, CD10, CD38, CD5
Plasma cell neoplasm	CD45, cytoplasmic kappa & lambda, CD19, CD38, CD56, CD20, CD5
Mature T cell tube	CD45, CD3, CD2, CD4, CD5, CD7, CD8, CD34, CD56
T cell therapy add-on	CD45, CD3, CD52, CD30, CD25, CD4, CD8
T cell receptor subtype add-on	TCR-alpha/beta, TCR-gamma/delta, CD5, CD4, CD8, CD3, CD56
T cell clonality	24 TCR-beta isoforms, CD3, CD4, CD8, other T cell antigens as needed
Precursor B lymphoblastic lymphoma/leukemia	TdT, CD22, CD34, CD33, HLA-DR, CD11b, in addition to antigens in mature B cell tube above
Precursor T lymphoblastic lymphoma/leukemia	TdT, CD1a, CD34, CD13, CD33, HLA-DR, in addition to antigens in mature T cell tube above
Myeloid stem cell neoplasm (3 tubes)	CD45, CD15, CD33, CD34, CD117, CD38, CD71, CD19, HLA-DR, CD64, CD13, CD14, CD123, CD16, CD2, CD3, CD4, CD5, CD7, CD8, CD56, CD11b, CD36
Acute myeloid leukemia	3 myeloid stem cell tubes plus additional blast antigens (CD9, CD133, CD90); megakaryocytic antigens (CD41, CD61), and additional erythroid antigen (Glycophorin A) evaluated as needed
Cytoplasmic lineage add-on (if blast lineage is uncertain)	CD45, CD34, cytoplasmic myeloperoxidase, cytoplasmic CD3, cytoplasmic CD79a
Paroxysmal nocturnal hemoglobinuria (PNH)	CD59 (erythrocytes), FLAER, CD14 (monocytes), CD66b and CD16 (neutrophils), CD24 (neutrophils), plus gating antibodies
Small blue round cell tumors (favor non-hematopoietic)	CD45, EpCAM (epithelial cell adhesion marker), CD99, CD90, CD56, CD10, CD38



FISH (& CISH) Probes

This is a menu of probes available at PhenoPath Laboratories for clinical *in situ* hybridization studies. Our collection of available probes continues to expand; please contact us if there is a probe that you are unable to locate. Please note that this list does not include probes available for research studies.

Test Menu Name	Test #	Useful Application/Cells/Tumors Identified	CPT code(s)	Specimen source	
				FFPE Material*	Fresh Material**
Solid Tumors					
1p36/19q13 – Oligodendroglioma panel <i>Includes:</i> 1p36/1q25 (1p36 deletion) and 19q13/19p13 (19q13 deletion)	FISH0013	Oligodendrogliomas, mixed oligoastrocytomas	88368 (4)	X	
ALK (2p23) translocations BAP (Breakapart Probe)	FISH0033	Detects EML4-ALK translocations in lung cancer and aids in determining patient eligibility for novel ALK-specific tyrosine kinase inhibitors	88367 (2)	X	
EGFR/CEP7	FISH0016	Colorectal, breast and non-small cell lung carcinomas, and glioblastoma multiforme. EGFR gene amplification by FISH may identify tumors predicting responsiveness to EGFR-targeted therapies	88367 (2)	X	
EWSR1 (22q12) translocations (Breakapart)	FISH0004	Clear cell sarcoma, Extraskeletal myxoid chondrosarcoma, PNET/Ewing sarcoma, Desmoplastic small round cell tumor	88367 (2)	X	
HER2/CEP17 (PathVysion™)	FISH0001	Identifies the subset of breast carcinoma patients eligible for Herceptin™ (trastuzumab) therapy.	88367 (2)	X	
TP53/CEP17	FISH0024	Provides information on the chromosome 17 copy number. May provide additional information re: HER2 amplification status when the CEP17 signal number is increased or decreased. This may aid clinicians in choosing appropriate therapy.	88367	X	
SMS/RARA	FISH0022	Provides information on the chromosome 17 copy number. May provide additional information re HER2 amplification status when the CEP17 signal number is increased or decreased. This may aid clinicians in choosing appropriate therapy.	88367 (2)	X	
MDM-2/SE12	FISH0023	Well-differentiated liposarcoma, dedifferentiated liposarcoma, atypical lipomatous tumor, and pleomorphic lipoma	88367 (2)	X	
SS18 (SYT) translocations (Breakapart)	FISH0006	Synovial Sarcoma	88367 (2)	X	
TOP2A / CEP17	FISH0017	A predictive biomarker in a subset of breast carcinomas. TOP2A gene amplification may predict response to anthracycline-containing breast chemotherapy.	88367 (2)	X	
Lymphomas					
B cell, non-Hodgkin lymphoma (NHL)	NA	PhenoPath pathologists will select an appropriate panel based on clinical history. Panel may include some or all of the following: <ul style="list-style-type: none"> • IGH [BAP] (FISH0015) • T(14;18)BCL2 (FISH0005) • BCL6 [BAP] (FISH0018) • MYC [BAP] (FISH0009) • MALT1 [BAP] (FISH0007) • T(14;18)MALT (FISH0008) • T(11;18)MALT/API2 (FISH0003) Other tests may be added as medically necessary	Varies	X X X X X X X	X X X
BCL6 (3q27) translocations (Breakapart)	FISH0018	Subset of follicular lymphoma and DLBCL. Identifies t(3;14) and other translocations involving the BCL6 gene.	88367 (2)	X	



Test Menu Name	Test #	Useful Application/Cells/Tumors Identified	CPT code(s)	Specimen source	
				FFPE Material*	Fresh Material**
IGH (14q32) translocations (Breakapart)	FISH0015	Lymphomas with IGH translocations involving the IGH gene on 14q32	88367 (2)	X	X
MALT1 (18q21) translocations (Breakapart)	FISH0007	Translocations involving the MALT1 gene have been detected in approximately 20-30% of patients with extranodal low grade marginal zone B-cell lymphomas of MALT type (i.e., MALT lymphomas). Patients with t(11;18)(q21;q21)-positive gastric MALT lymphomas do not respond to Helicobacter pylori eradication therapy, are associated with more advance stage disease, and usually do not show transformation to large cell lymphoma.	88367 (2)	X	
MYC (8q24) translocations (Breakapart)	FISH0009	Burkitt lymphoma; MYC translocations (MYC/IGH, MYC/kappa, MYC/lambda); t(8;14), t(2;8), t(8;22)	88367 (2)	X	X
MYC Panel	PANL9101	Useful in Burkitt lymphoma and other aggressive B-cell lymphomas <ul style="list-style-type: none"> • IGH [BAP] (FISH0015) • MYC [BAP] (FISH0009) 	88367 (4)	X X	X X
t(14;18) IGH/MALT1	FISH0008	Subset of MALT lymphomas (Marginal zone B cell lymphoma)	88367 (2)	X	
t(11;18), MALT1/API2	FISH0003	Subset of MALT lymphomas (Marginal zone B cell lymphoma)	88367 (2)	X	
t(4;14) FGFR3/IGH	FISH0020	Identifies a subset of plasma cell neoplasms. The presence of t(4:14)(p16;q32) involving IgH/FGFR has been associated with a poor prognosis with shorter overall survival.	88367 (2)	X	
t(14;16) IGH/MAF	FISH0027	Identifies a subset of plasma cell neoplasms. The presence of t(14;16)(q32;q23) involving IgH/MAF has been associated with a poor prognosis with shorter overall survival.	88367 (2)	X	
t(11;14) CCND1/IGH	FISH0002	Identifies mantle cell lymphoma and subset of plasma cell neoplasms. Patients with multiple myeloma that have a t(11;14)(q13;q32) have been reported to have a neutral to slightly improved clinical course. FISH-based assays provide the most sensitive and specific methodology for detecting the t(11;14)(q13;q32).	88367 (2)	X	X
t(14;18) IGH/BCL2	FISH0005	Identifies follicular lymphoma and subset of DLBCL with the t(14;18)(q32;q21), which results in constitutive overexpression of the BCL-2 protein leading to alterations in programmed cell death (i.e., apoptosis) and tumor cell proliferation. FISH-based assays provide the most sensitive and specific methodology for detecting the t(14;18)(q32;q21).	88367 (2)	X	X
Leukemias					
APL Panel (Acute Promyelocytic Leukemia)	PANL9103	Useful in diagnosing promyelocytic (AML-M3) leukemia and identifying the common t(15;17) and variants. <ul style="list-style-type: none"> • t(15;17) PML/RARA (FISH0011) • RARA [BAP] (FISH0019) 	88367 (2) 88368 (2)	X	X X
t(9;22) BCR/ABL	FISH0010	CML and subset of ALL. CML has been traditionally diagnosed by detection of a Philadelphia chromosome (Ph) which has become the hallmark of this disease and is the result of a reciprocal translocation between the BCR gene on chromosome 22 and the ABL gene on chromosome 9. Detection of the Philadelphia chromosome by FISH (or other techniques) helps to confirm and/or monitor patients with CML or other myeloproliferative disorder. An alternate translocation involving BCR and ABL, which is also detected by this assay, can be seen in acute lymphoblastic leukemia (ALL).	88368 (2)	X	X
MLL (11q23) translocations (Breakapart)	FISH0014	AML, ALL, and mixed lineage acute leukemias. Translocations involving the MLL gene on chromosome 11q23 are noted in a subset of acute myeloid leukemias (AML) and acute lymphoblastic leukemias/lymphomas (ALL). ¹ Moreover, treatment-related leukemias, 5-10%, particularly those following anti-topoisomerase II or intercolating topoisomerase II inhibitors, but also alkylating therapy or radiotherapy, often have translocations involving 11q23. The detection of translocations involving MLL is important in the diagnosis of patients with AML and ALL as they predict a poor overall prognosis.	88368 (2)		X



Test Menu Name	Test #	Useful Application/Cells/Tumors Identified	CPT code(s)	Specimen source	
				FFPE Material*	Fresh Material**
t(15;17) PML/RARA	FISH0011	AML-M3 Proper subclassification of this leukemia is critical for optimal patient management (i.e., to alert the treating oncologist that there is a significant risk of DIC). In fact, the presence of a PML/RARA gene rearrangement is directly related to patients with AML-M3 who respond to ATRA therapy. FISH tests can be used to establish a definitive diagnosis of APL. This test is not intended to detect minimal residual disease.	88368 (2)		X
RARA (17q21) translocations (Breakapart)	FISH0019	AML-M3, t(17;V). Typically used in conjunction with the t(15;17) PML/RARA away (# FISH0011) in the diagnosis of AML-M3. Specifically detects variant PRARA translocations. The three variant translocations involving the RARA gene include: <ul style="list-style-type: none"> t(11;17)(q23;q21) involving the promyelocytic leukemia zinc finger gene (PLZF) on 11q23, t(5;17)(q23;q21) involving the nucleophosmin (NPM) on 5q23, and t(11;17)(q23;q21) involving the nuclear matrix associated gene (NUMA) on 11q13. Acute promyelocytic leukemias involving the variant t(11;17)(q23;q21) have been reported to be resistant to ATRA whereas those with variant t(5;17)(q23;q21) appear to respond to ATRA. ⁶ Results of this test must always be interpreted in the context of morphologic and other relevant data, and should not be used alone for the diagnosis of malignancy. This test is not intended to detect minimal residual disease.	88367 (2)	X	
Plasma Cell Neoplasms					
Plasma Cell / Myeloma FISH panel		Panel of tests for identification of plasma cell neoplasms. All cases will get the following: IGH (14q32) BAP (FISH 0015) P53 (17p13.1) (FISH0028) D13S319/LAMP (13q14.3/13q34) (FISH0029/0030) <i>If IGH is positive, we will run...</i> t(11;14) CCND1/IGH (FISH 0002) t(4;14) FGFR3/IGH (FISH0020) t(14;16) IGH/MAF (FISH0027) <i>If IGH is negative, we will run tests for hyperdiploidy...</i> CEP3 (FISH0034) D5S23, D5S721 (FISH0035) CEP7 (FISH 0036) CEP9 (FISH 0037) CEP11 (FISH 0038) CEP15 (FISH 0039)		X	X
IGH (14q32) translocations (Breakapart)	FISH0015	Lymphomas with IGH translocations involving the IGH gene on 14q32	88367 (2)	X	X
t(11;14) CCND1/IGH	FISH0002	Identifies mantle cell lymphoma and subset of plasma cell neoplasms. Patients with multiple myeloma that have a t(11;14)(q13;q32) have been reported to have a neutral to slightly improved clinical course. FISH-based assays provide the most sensitive and specific methodology for detecting the t(11;14)(q13;q32).	88367 (2)	X	X
t(4;14) FGFR3/IGH	FISH0020	Identifies a subset of plasma cell neoplasms. The presence of t(4;14)(p16;q32) involving IgH/FGFR has been associated with a poor prognosis with shorter overall survival.	88367 (2)	X	
t(14;16) IGH/MAF	FISH0027	Identifies a subset of plasma cell neoplasms. The presence of t(14;16)(q32;q23) involving IgH/MAF has been associated with a poor prognosis with shorter overall survival.	88367 (2)	X	
Other					
Hydatidiform Mole panel:	PANL9104	Useful in distinguishing partial hydatidiform mole (PHM) vs. complete hydatidiform mole (CHM) vs. hydropic villi in			



Test Menu Name	Test #	Useful Application/Cells/Tumors Identified	CPT code(s)	Specimen source	
				FFPE Material*	Fresh Material**
		products of conception (POC). <ul style="list-style-type: none"> • CEP-17 ploidy (FISH0021) • p57 by IHC • MIB (Ki-67) by IHC 	88367 88342 88360	X X X	
CEP-X/CEP-Y	FISH0012	Useful in detection of tissue contaminants/floaters by identification of chromosome X or Y; also in assessment of sex-mismatched BMT	88365 (2)	X	
EBV (EBER1 mRNA by ISH)	CISH0001	Post transplantation lymphoproliferative disorder, Hodgkin lymphoma, EBV identification	88365	X	

SPECIMEN REQUIREMENTS * Formalin-fixed paraffin-embedded (FFPE) material includes tissue blocks, as well as cell blocks from body fluids, FNAs, etc. Send a representative block or 5+ unstained section (cut at 4µm onto positively-charged (POP, APES, silane...) slides – 1 section/slide). Include H&E, surgical pathology report and completed requisition.

** Fresh material includes peripheral blood, bone marrow (including aspirates and fresh bone marrow biopsies), fresh tissue, body fluids (including cerebral spinal fluid), etc. (unfixed specimens). Peripheral blood and bone marrow should be collected in EDTA (lavender-top), or sodium heparin (green-top) tube. NOTE: if flow cytometry will also be ordered, heparin is preferred; if PCR will also be ordered, EDTA is preferred. Include surgical pathology report (if available) and completed requisition.

PCR

B cell (IgH) and T cell (TCR-gamma) Gene Rearrangement Studies

IgH Chain Gene Rearrangement Studies	B cell clonality assessment	PCR0001
TCR-gamma Chain Gene Rearrangement Studies	T cell clonality assessment	PCR0002
IgK (Kappa) Gene Rearrangement Studies	B cell clonality assessment	PCR0009

Mutational Analysis

BRAF by Real Time PCR	Detects the V600E BRAF-activating mutation. BRAF activation status determines patient eligibility for therapy and has diagnostic applications.	PCR0005
EGFR by Real Time PCR	Identifies the most common EGFR-activating mutations, including: L858R, exon 19 deletions, G719X, S768I, exon 20 insertions and L861Q, thus determining eligibility for therapy.	PCR0011
JAK2 by Real Time PCR	Detects the V617F mutation in the JAK2 gene, which is used in the diagnosis of polycythemia vera (PV), essential thrombocythemia (ET), and idiopathic myelofibrosis (MF).	PCR0007
KRAS by Real Time PCR	Detects the 7 most common codon 12 and 13 KRAS mutations (G12A,G12C,G12D,G12R,G12S,G12V,G13D). KRAS mutation status is a key predictor of patient responsiveness to anti-EGFR directed therapies.	PCR0010