



Anatomic Pathology Special Stains and IHC

Group I for Microorganisms

Special Stains Group I 88312

Fite stain
Gomori's methenamine silver (GMS)
Gram
PAS/light green counterstain
Warthin-Starry
Ziehl-Neelsen AFB

Primary Demonstration of:

Stains for *mycobacteria leprae*
Fungus, Pneumocystis, Bacteria
Gram-positive and gram-negative bacteria
Fungus
Bacteria, Spirochetes
Acid-fast mycobacterium

Group II (All Other)

Special Stains Group II 88313

Alcian Blue, pH 2.5
Alcian Blue/Hyaluronidase
Alcian Blue/PAS
Bielschowsky
Bile, Hall's method
Colloidal iron
Colloidal Iron/Hyaluronidase
Congo Red
Copper (Rhodanine)
Crystal Violet
Elastic stain (EVG)
Fontana-Masson
Giemsa (mast cell)
Iron stain
Jones methenamine silver
Luxol fast blue
Masson trichrome
Melanin bleach
Movat
Mucicarmine
Oil Red O
PAS/amylase (PAS/D)
Periodic acid-Schiff (PAS)
PTAH
Reticulum
SAB
Thioflavin S
Toluidine Blue
Uric acid
Von Kossa

Primary Demonstration of:

Acid mucopolysaccharides
Differentiation of epithelial and connective tissue mucins
Acid and neutral mucins
Neurofibrils
Bilirubin
Mucopolysaccharides, Collagen
Differentiation of epithelial and connective tissue mucins
Amyloid
Copper
Amyloid
Elastic fibers, Collagen
Argentaffin granules or Melanin
Eosinphilic granules and Mast cells
Iron
Basement membranes, Reticular fibers
Myelin
Collagen
Eliminates melanin
Elastic fibers, Collagen, Mucin, Fibrin and Muscle
Mucosubstances
Fat
Eliminates glycogen
Glycogen, Neutral mucopolysaccharides and Basement membranes
Collagen, Fibrin, Coarse elastic fibrils
Stains for reticulum fibers
Amyloid
Amyloid
Mast cell granules
Urate crystals
Calcium

Histochemical Stains (Enzyme) 88319

Acetylcholinesterase (ACE)
Acid phosphatase
Alkaline phosphatase
ATP (4.6, 9.8)
Cytochrome C
Esterase
NADH
Phosphofructokinase
Phosphorylase
Succinic dehydrogenase (SDH)

Primary Demonstration of:

Nerve fibers/Hirschsprung's disease
Muscle fibers undergoing degeneration
Basement membranes and regenerating fibers
Muscle fiber types
Cytochrome oxidase
Denervated muscle fibers
Whorls, Target fibers, Central cores, Moth-eaten fibers
PFK activity
Phosphorylase activity
Mitochondrial disease

Immunohistochemistry Stains

Stain

Antibody Specificity

ACTH	Human adrenocorticotrophic hormone
Actin HHF35	Human muscle actin
Actin SM	Alpha-smooth muscle isoform, Myoepithelium, etc.
Adenovirus	Adenovirus
AFP	Alpha fetoprotein
ALK (D5F3)	Anaplastic lymphoma kinase, clone D5F3
ALK-1	ALK-1
AMACR (p504s)	Prostate cancer marker
Amyloid Kappa (AMY-K)	Amyloidosis
Amyloid Lambda (AMY-L)	Amyloidosis
Androgen Receptor	Androgen Receptor
Annexin A1	Hairy cell leukemia
Arginase 1	Identify normal liver cells
ATRX	Glioma
β-Catenin	Beta Catenin
BCL2	Follicular lymphoma, Apoptosis inhibin protein
BCL2 EP36	BCL2, clone EP36
BCL-6	Follicular and diffuse lymphomas, Burkitt's lymphoma & Lymphocyte predominant Hodgkin's disease
B72.3 (TAG-72)	Tumor associated glycoprotein
BOB-1	Transcription coactivator for Oct-1 and Oct-2
BRAF V600E	Hairy cell Leukemia
CA9	Carbonic Anhydrase IX
CA 125	Tumor marker for ovarian, endometrial, breast, GI cancer
CA IX	see CA9
Calcitonin (P)	Calcitonin
Calponin	Myoepithelial differentiation and diagnosis of myoepithelial neoplasms
Calreticulin	Expressed in megakaryocytes when calreticulin is mutated
Calretinin (P)	Calcium-binding protein, Mesothelial cells
CAMTA1	Epithelioid hemangioendothelioma marker
Cathepsin K	Renal angiomyolipoma
C3d	Complement 3d, transplant rejection biomarker
C4d	Complement 4d, transplant rejection biomarker
CD1a	Cortical thymocytes-langerhans cells
CD2	Lymphocyte function-associated antigen 2

Stain**Antibody Specificity**

CD3 (2VG6)	T-Cells
CD4	T-Cells, Helper T
CD5	Pan T-cells, B-cell subset, Thymic carcinomas
CD7	Thymocytes, Immature t-cells, NK cells
CD8	T-Cells, Suppressor T
CD10	Common acute lymphoblastic leukemia
CD14	Identify monocytes and histiocytes
CD15	BRA4F1
CD15 (MMA)	Epithelial/Hodgkin's/Myeloid
CD19	B-Lymphocyte antigen
CD20	Human B-lymphocyte antigen
CD21	Dendritic cells, B-cells
CD22	Mature B-cells
CD23	Activated B-cells
CD25	Activated T-cells and B-cells
CD30	Ber-H2
C30 (1G12)	Ki-1: Activated T, B, RS cells
CD31	Endothelium (tumor angiogenesis)
CD33	Monocytes
CD34	Endothelium, Stem cells, Stromal tumors
CD35	Dendritic cells
CD43	T-cells, B-cell subset, Myeloid, Histiocytes, Plasma cells (leukosialin)
CD44	Phagocytic glycogen-1
CD45	Helper, Inducer T-cells
CD56	Natural killer cells
CD57	Neural and neuroendocrine marker NK cells, Stromal tumors
CD61	GP111A
CD68 (KP1)	Sarcomas and leukemia
CD68 (PG-M1)	Monocytes/Macrophages
CD71	Erythroid precursor marker
CD79a	B-cells
CD99	Ewing's sarcoma/PNET
CD117	C-kit
CD123	Alpha receptor for IL3
CD138	Plasma cell marker, Syndecan
CD163	Ber-MAC3
CDX-2	Metastatic colon CA
CEA	Carcinoembryonic antigen
Chromogranin (DAK-A3)	Chromogranin A
Chymotrypsin (10-104.10)	Expressed in cells of pancreatic acinar origin
Clusterin	Apoptosis
Cyclin-D1	Cyclin D1/PRAD-1 oncogene product, Mantle cell
Cytokeratin AE1/AE3	Keratin cocktail: 40, 48, 50, 50, 6, 58, 65, 5 kD
Cytokeratin CAM5.2	Keratin: 39, 43, 500 kD
Cytokeratin 5/6	Intermediate filament protein, Cytokeratin 5/6
Cytokeratin 7	Keratin: 54 kD
Cytokeratin 19	Human cytokeratin 19 polypeptide
Cytokeratin 20	Keratin: 54 kD
Cytokeratin KER903	High molecular weight cytokeratins
Cytokeratin OSCAR	
c-MYC	Lymphoma marker
CMV	Cytomegalovirus
CXCL-13	B-Lymphocyte chemoattractant

Stain

Antibody Specificity

D2-40	Podoplanin, lymphatic endothelial marker
Desmin	Desmin
DOG-1	GIST marker
EBNA-2	Stains nuclei of EBV-infected lymphoblastoid cells
EBV	Epstein-Barr virus
E-cadherin (CADH)	Epithelial marker
EMA	Epithelial membrane antigen
Enolase (NSE)	Neuron specific enolase
EP4-Ber	Epithelial antigen
ER	Estrogen receptor
ERG	Vascular marker and prostate malignancy marker
Factor VIII	Von Willebrand factor, Endothelium and megakaryocytes
Factor XIIIa	Fibrohistiocytic tumors, Dendritic interstitial cells
Fascin	Hodgkin's disease, High grade breast carcinoma
FGFR3	CD333, Fibroblast growth factor receptor 3
FOXL2	Ovarian sex cord-stromal tumors (SCSST)
FSH	Follicle stimulating hormone
Gastrin	Gastrin secreting tumors, G-cell hyperplasia
GATA-3	Urothelial carcinoma marker
GCET1	Germinal center B-cell marker
GFAP	Human glial fibrillary acidic protein
GH	Growth hormone
Glucagon	Glucagon
Glutamine Synthetase	Hepatocellular carcinoma marker
Glypican-3	Hepatocellular carcinoma marker
Granzyme-B	Serine protease
H3K27me3 Wild	Malignant peripheral nerve sheath tumor marker
H3K27M Mutant	Glioma/astrocytoma
HBcAg	Hepatitis B core antigen
HBsAg	Hepatitis B surface antigen
H-Caldesmon	Smooth muscle differentiation
H.pylori	Helicobacter pylori
HCG	HCG in trophoblastic elements of germ cell tumors
Hemoglobin-A	Hemoglobin-A
Hepatocyte	Hep-par1
Herpes (HSV I&II)	HSV I/II
HER2	Erb-2 oncoprotein, Clone 4B5
HHV8	Human herpesvirus 8
HMB-45	Melanoma associated marker
HPV	Human papilloma virus subtype
IDH-1	Glioma Marker
IgA	Immunoglobulin A
IgD	Immunoglobulin D
IgG	Immunoglobulin G
IgG4	Autoimmune pancreatitis
IgM	Immunoglobulin M
Inhibin	Granulosa cell tumor, Sex cord stromal tumor
INI1	Malignant rhabdoid tumor marker
Insulin	Insulin
Kappa	Kappa light chain
Ki67	Cell proliferation marker
Lambda	Lambda light chain
Langerin	Langerhans cell histiocytosis

Stain

Antibody Specificity

LEF1	Chronic lymphocytic (CLL)/small lymphocytic (SLL) leukemias
LH	Luteinizing hormone
LMO2	Large B-cell lymphoma marker
MAL	Myelin and lymphocyte protein; epressed in primary mediastinal large B cell lymphoma
Mammaglobin	Primary and metastatic breast carcinoma marker
MDM2	Liposarcoma
Melan A	Malignant melanoma marker
MiTF	Melanocyte development regulator, melanoma oncogene
MLH-1	Mismatch repair gene MLH-1
MOC-31	Differentiate carcinomas from mesothelial cells and mesotheliomas
MSH-2	Mismatch repair gene MSH-2
MSH-6	Mismatch repair gene MSH-6
MUC4	Fibromyxoid sarcoma
MUM-1	Multiple myeloma oncogene-1
Muramidase	Muramidase/Lysozyme
Myeloperoxidase	Neutrophilic granulocytes and monocytes
MyoD1	Rhabdomyosarcoma marker
Myogenin	Rhabdomyosarcoma marker
Napsin A	Lung adenocarcinoma marker
NeuN	Neuronal cell loss in drug resistant epilepsy
Neurofilament	Neurofilament
Neurofilament Cocktail	Cocktail of clones 2F11 and SMI-32
NKI/C3	Melanoma marker
NKX3.1	Differential marker for prostate carcinoma vs. urothelial carcinoma
OCT-2	Octamer transcription factor 2
OCT3/4	Marker for undifferentiated cells
p16	Cervical cancer marker
p40	Pulmonary squamous cell carcinoma marker
p53	Overexpression of the p53 oncogene
p57	Differential diagnosis of complete vs partial hydatidiform molar pregnancy
p63	Prostate cancer marker
p63/ERG Double Stain	A double stain for prostate cancer
pSTAT 5	Surrogate marker of JAK2 V617F mutation
P. jiroveci	Detection of Pneumocystis jirovecii
PAX-2	Tumor marker for kidney, prostate, breast, ovary
PAX-5	B-cell specific activator protein
PAX-8	Nephritic cell lineage marker
Perforin	T-cell and NK cell lymphoma
PD1	T-cell regulator
PD-L1	Clone 22C3 (LDT)
PD-L1	Clone SP263 (IVD)
PIN cocktail (p63/AMACR)	p63 and AMACR
PLAP	Placental alkaline phosphatase, Germ cell and adenocarcinoma
PMS2	Mismatch repair gene PMS-2
PR	Progesterone receptor
Prolactin	Prolactin in pituitary
PSA	Prostate specific antigen
PSAP	Normal hyperplastic and neoplastic, Prostatic cells
PSMA	Prostate specific membrane antigen
PTH	Parathyroid hormone
S-100	S100 protein
SALL4	Yolk sac tumor marker

Stain

SATB2
SDHA
SDHB
SF-1
SMMS1
SOX-10
SOX-11
STAT6
SV40
Synaptophysin
Syphilis
Tau/ β -amyloid DS
TCL-1A
TCR β F1
TCR-Delta
TdT
Thyroglobulin
TIA1
TLE-1 (1F5)
Transthyretin
Tryptase, Mast Cell
TSH
TTF-1
Tyrosinase
Ubiquitin
Vimentin
VS38C
WT1 (6F-H2)

Antibody Specificity

GI epithelial marker
Succinate dehydrogenase subunit A
Succinate dehydrogenase subunit B
Adrenocortical tumor marker
Smooth muscle myosin
Identify melanoma and nerve sheath tumors
Mantle cell lymphoma marker
Solitary fibrous tumor
Simian Virus 40, polyomavirus family
Synaptophysin
T. pallidum
Neurofibrillary tangle and amyloid in Alzheimer's postmortem specimens
Mature T-cell leukemia
T-cells
T-cells
Blasts, Immature lymphocytes
Thyroglobulin
Cytolytic effector cells in lymphocytic infiltrates
Synovial sarcoma marker
Amyloidosis
Human mast cells
Thyrotropic cells of pituitary
Thyroid and pulmonary carcinomas
Metastatic melanoma
Neurofibrillary tangles of Alzheimer's disease
Vimentin
Plasma cell
Wilms tumor

CISHs

CISH EBER Chromogenic in situ hybridization for EBV
CISH HPV Low Risk Chromogenic in situ hybridization for human papilloma virus low risk subtypes
CISH HPV High Risk Chromogenic in situ hybridization for human papilloma virus high risk subtypes
CISH Kappa Chromogenic in situ hybridization for Kappa
CISH Lambda Chromogenic in situ hybridization for Lambda



Every life deserves world class care.

9500 Euclid Ave., Cleveland, OH 44195

Cleveland Clinic is a nonprofit, multispecialty academic medical center integrating clinical and hospital care with research and education for better patient care. More than 3,500 staff physicians and researchers in 140 medical specialties provide services through 27 clinical and special expertise institutes. Cleveland Clinic comprises a main campus, ten regional hospitals and more than 150 outpatient locations, with 18 family health centers and three health and wellness centers in northern Ohio, as well as medical facilities in Florida, Nevada, Toronto and Abu Dhabi. Cleveland Clinic is currently ranked as the No. 2 hospital in the country by *U.S. News & World Report*. clevelandclinic.org

©2018 The Cleveland Clinic Foundation

201803.001