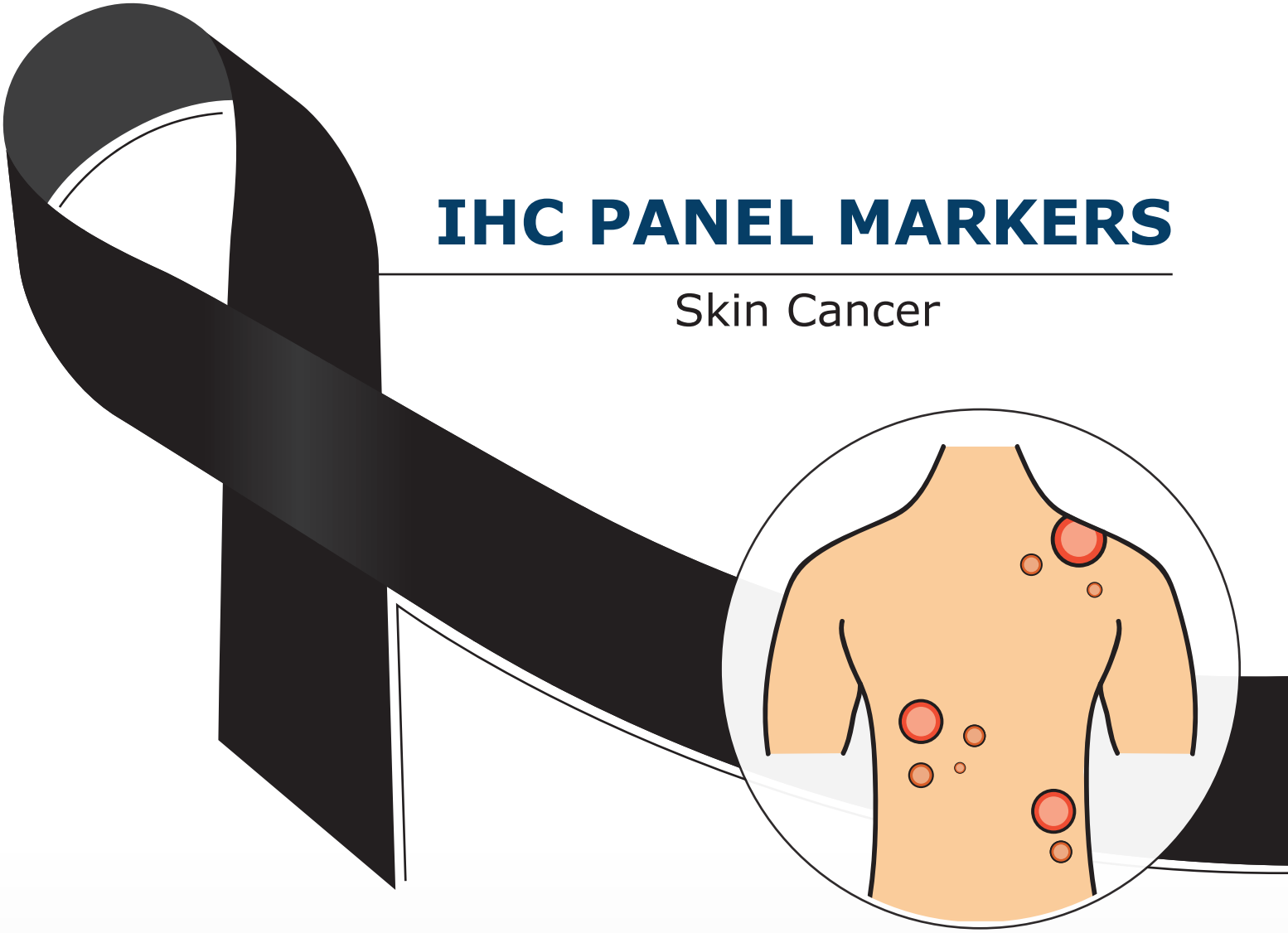
IHC PANEL MARKERS

Skin Cancer



BioGenex offers wide-ranging antibodies for several IHC panel for initial differentiation, tumor origin, treatment methods, and prognosis. All BioGenex antibodies are validated on human tissues to ensure sensitivity and specificity. BioGenex comprehensive IHC panels include a range of mouse monoclonal, rabbit monoclonal, and polyclonal antibodies to choose from.

Skin cancer disease is the most common type of cancer and its incidence is constantly increasing. It comprises various skin tumor types, such as basal and squamous cell carcinomas, melanoma, Merkel cell carcinoma, cutaneous lymphomas, and other rare diseases, which present very different etiologies, incidences, therapeutic opportunities, and outcomes. Melanoma, the most serious type of skin cancer, begins when healthy melanocytes change and grow out of control, forming a cancerous tumor.

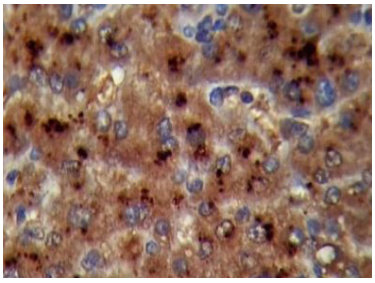
The following antibodies have been optimized for immunohistochemistry procedures on formalin-fixed, paraffin-embedded tissue sections for Dermopathology.

Antibodies for Skin Cancer

CK20, EMA, CK7, CD15, GCDFP, S100, Vimentin, CKLMW, CKHMW, CEA, CK Cocktail, Epcam, Bcl2, CD10, Androgen Receptor, BeR-EP4, CK19, CD34, CD45, CD2, CD3, CD4, CD7, Perforin, Granzyme B, ERG, MUM1, Survivin, NSE, COX-2, MiTF, Adipophilin, CD146, CK13, CK5&6, Cytokeratin, Melanoma, SOX 10, Tyrosinase, MSA, SMA, MART-1(Melan A), Desmin, vWF, Podoplanin, Nucleophosmin, Langerin, p63.

BioGenex

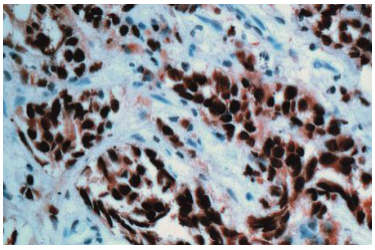
Adipophilin



Adipophilin (ADFP, adipocyte differentiation-related protein) belongs to the perilipin family associated with lipid globule surface membranes and intracellular lipid storage droplets in various normal cells. It is a major constituent of the globule surface and involved in the development and maintenance of adipose tissue. It is present in the cytoplasm of a wide range of cultured cell lines and tissues, including fibroblasts, endothelial and epithelial cells, lactating mammary glands, the adrenal cortex, Sertoli & Leydig cells, and hepatocytes in alcoholic liver cirrhosis. Anti-Adipophilin is considered a useful marker of cytoplasmic lipids, sebocytes, and lipid accumulation, and can be used to identify sebaceous lesions and carcinomas.

Antibody	Clone	Localization	Catalog Family
Adipophilin	ADFP/1494	Cytoplasm	AMA76, AXA76, MUA76

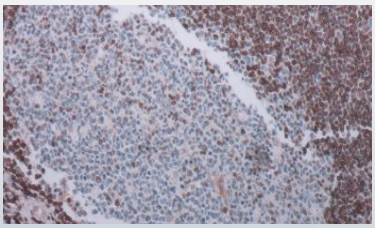
Androgen Receptor



This monoclonal antibody is specifically designed to recognize a unique immunogenic N-terminal transactivation domain of the androgen receptor that has a low degree of homology with other steroid receptors. This antibody binds to synthetic peptide SP61 of human androgen receptor as assessed by ELISA and recognizes a 100 kD human androgen receptor protein in Western blot analysis. In addition, this antibody binds to native human androgen receptor in immunoprecipitation, sucrose gradient centrifugation and immunohistochemistry. This antibody does not cross-react with human estrogen, progesterone or glucocorticoid receptor.

Antibody	Clone	Localization	Catalog Family
Androgen Receptor	F39.4.1	Nucleus/Cytoplasm	AM256, AX256, MU256

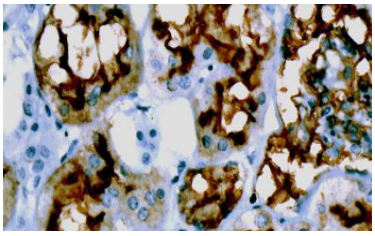
BCl-2



Expression of BCL-2 alpha oncoprotein inhibits the programmed cell death (apoptosis). In most follicular lymphomas, neoplastic germinal centers express high levels of BCL-2 alpha protein, whereas the normal or hyperplastic germinal centers are negative. Bcl-2 is useful in differentiation of follicular lymphoma from reactive follicular proliferation (bcl-2 negative). In addition, bcl-2 has been shown to be correlated with disease prognosis in breast cancer, prostate cancer, ovarian.

Antibody	Clone	Localization	Catalog Family
BCl-2	SP66	Membrane/Cytoplasm	AN758, AY758, NU758
BCl-2	EP36	Cytoplasm	AN723, AY723, NU723
BCl-2	bcl-2/100	Cytoplasm	AM287, AX287, MU287

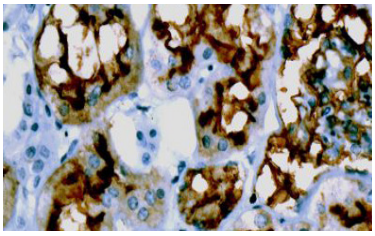
CD10



CD10, a 100 KD glycoprotein, also known as Common Acute Lymphocytic Leukemia Antigen (CALLA), is a cell surface enzyme with neutral metalloendopeptidase activity which inactivates a variety of biologically active peptides. CD10 is expressed on the cells of lymphoblastic, Burkitt's, and follicular germinal center lymphomas, and chronic myelogenous leukemia (CML). It is also expressed on the surface of normal early lymphoid progenitor cells, immature B cells within bone marrow and germinal center B cells within lymphoid tissue. CD10 is also present on breast myoepithelial cells, with especially high expression on the brush border of kidney and gut epithelial cells.

Antibody	Clone	Localization	Catalog Family
CD10	56C6	Membrane	AM451, AX451, MU451

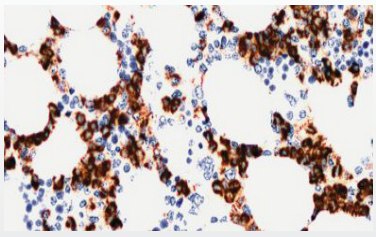
CD146



CD146 (cluster of differentiation 146) also known as the melanoma cell adhesion molecule (MCAM) or cell surface glycoprotein MUC18, is a 113kDa cell adhesion molecule currently used as a marker for endothelial cell lineage. In humans, the CD146 protein is encoded by the MCAM gene. In tumor, CD146 is expressed on tumor cells derived from peripheral nervous system, melanoma and clear cell sarcoma. It has been reported that CD146 is useful in differentiation of mesothelioma (CD146 positive) and reactive mesothelium (CD146 negative). CD146 is associated with tumor progression and the development of metastasis in human malignant melanoma.

Antibody	Clone	Localization	Catalog Family
CD146	EP54	Membrane/Cytoplasm	AN716, AY716, NU716

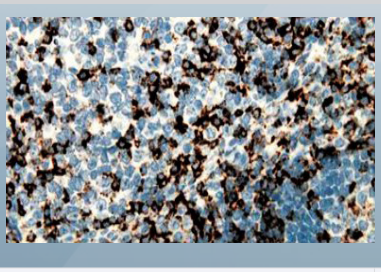
CD15



CD15 (BRA4F1) reacts with human CD15 antigen present on myeloid cells, mainly granulocytes but not on B cells, T cells, monocytes, erythrocytes or platelets. It also reacts with ReedSternberg cells in Hodgkin's disease.

Antibody	Clone	Localization	Catalog Family
CD15	BRA4F1	Membrane/Perinuclear	AM302,MU302, AX302

CD2



The CD2 antigen, also known as lymphocyte function antigen 2 (LFA2), is a single chain type I transmembrane molecule of about 50 kD and consists of 351 amino acids. It plays a critical role in activation of T cells. It binds to CD58 on antigen presenting cells and induces tyrosine phosphorylation of other molecules involved in T cell activation. It also plays a regulatory role in T-cell or NK-cell mediated cytolysis. CD2 antigen is expressed on the majority of T cells in peripheral lymphoid tissue, NK cells, cortical thymocytes and most malignant cells of T cell origin.

Antibody	Clone	Localization	Catalog Family
CD2	AB75	Membrane	AM438, AX438, MU438

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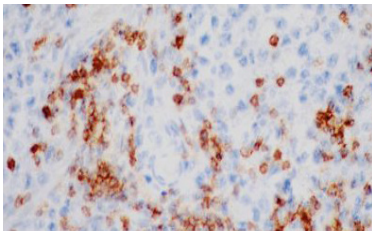
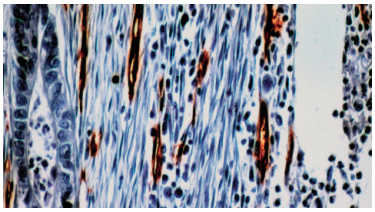
CD3



CD3 (Cluster of Differentiation 3) is a complex of proteins that associates directly with the T cell antigen receptor (TCR). CD3 is composed of five invariant polypeptide chains that associate to form three dimers. The five invariant chains of CD3 are labeled gamma, delta, epsilon, zeta, and eta. The CD3 is involved in T cell development and survival. It is expressed on T cells in Thymus, peripheral lymphoid tissue, blood and bone marrow. CD3 is a commonly used marker for identification of T cell and T cell derived malignancies. This CD3 antibody has been validated by the 9th International Conference on Human Leukocyte Differentiation Antigens (HLDA9).

Antibody	Clone	Localization	Catalog Family
CD3	EP41	Cytoplasm/Membrane	AN846, AY846, NU846
CD3	C3e/1931	Membrane	AM931, AX931, MU931

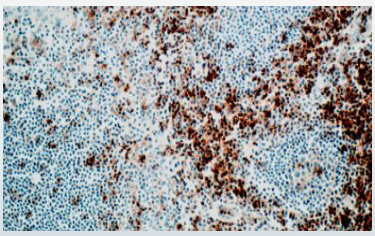
CD34



This is an antibody to the CD34 antigen in human endothelial and hematopoietic cells. It stains positive in a variety of vascular and lymphatic tumors. QBEnd/10 may now prove to be a more specific method of evaluating vascularization than Factor VIII antibody and is an important tool for tumor evaluation. This antibody stains endothelial cell cytoplasm and cross-reacts with basement membrane collagen.

Antibody	Clone	Localization	Catalog Family
CD34	QBend/10	Membrane	AM236, AX236, MU236

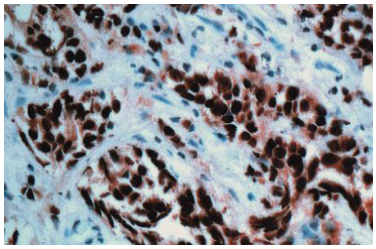
CD4



CD4 is a 55-60 kD cell-surface glycoprotein, which participates in the molecular complexes involved in both T cell development and its antigen recognizing activity, by binding to the nonpolymorphic region of class II MHC. CD4 is considered as a stage marker of T cell development in the thymus, for it is expressed on the cell surface in a stage specific manner, during T cell development. This antibody reacts on a low level with human monocytes and macrophages but does not react with B-cells , granulocytes and thrombocytes.

Antibody	Clone	Localization	Catalog Family
CD4	4B12	Membrane	AM421, AX421, MU421
CD4	Ep204	Membrane	AM722, AX722, MU722
CD4	rCD4/3930	Membrane	AMB99, AXB99, MUB99

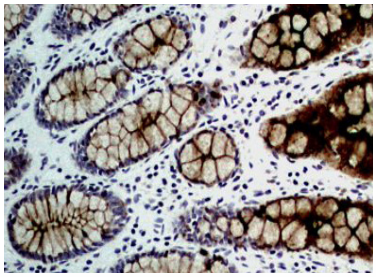
CD7



CD7 (SP94) is directed against the 40kD transmembrane glycoprotein. CD7 is expressed on the majority of immature and mature T-lymphocytes, and T cell leukemia. It is also found on natural killer cells, a small subpopulation of normal B cells and on malignant B cells. Anti-CD7 (SP94) may be used to aid in the identification of T cell lymphomas. This gene encodes a transmembrane protein which is a member of the immunoglobulin superfamily. Cross-linking surface CD7 positively modulates T cell and NK cell activity as measured by calcium fluxes, expression of adhesion molecules, cytokine secretion and proliferation.

Antibody	Clone	Localization	Catalog Family
CD7	SP94	Membrane	AN761, AY761, NU761

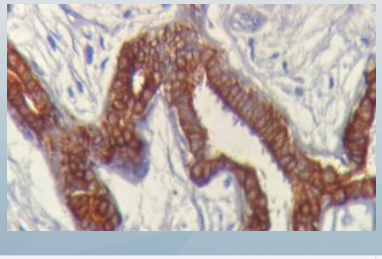
Carcinoembryonic Antigen



CEA is a heterogeneous family of related oncofetal glycoproteins of molecular mass 200 kD that is secreted into the glycocalyx surface of gastrointestinal cells Usually CEA is demonstrated as a linear labeling of the apical poles of cells lining the glandular lumen and, occasionally, as weak staining near the apex of colonic epithelial cells. CEA, however, should not be used as a marker of differentiation because many colon and lung tumors actually show increased staining with differentiation. Pancreatic carcinomas, testicular tumor, gall bladder neoplasms and granular cell myoblastomas stain positive, whereas malignant tumors of brain, prostate, skin, lymphoreticular tissues, hepatocellular carcinomas, oesophageal squamous cell carcinomas, and mesothelioma fail to stain for CEA

Antibody	Clone	Localization	Catalog Family
Carcinoembryonic Antigen	CEA88	Cytoplasm	AM365, AX365, MU365
Carcinoembryonic Antigen	B01-94-11M-P	Cytoplasm	AM009, AX009, MU009
Carcinoembryonic Antigen	Polyclonal	Cytoplasm	AR009, AW009
Carcinoembryonic Antigen	Polyclonal	Cytoplasm	AR909, AW909, PU909

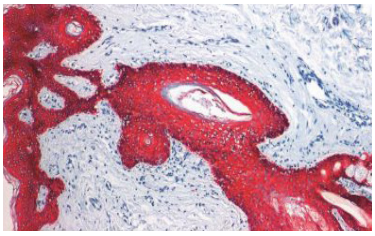
Cytokeratin



Cytokeratins are polypeptide chains that constituent major part of epithelial cell cytoskeleton. Cytokeratin (CAM 5.2) expression is seen in majority of epithelial tumors, including lung, liver, Breast Carcinoma, Gastro-Intestinal tract, breast, genitourinary system, female reproductive organs and some endocrine organs. It might not react with some squamous cell carcinomas. This antibody can be successfully used as a clinically reliable marker for neoplasms of epithelial origin and for distinguishing carcinomas from malignant tumors of non-epithelial origin such as lymphomas, melanomas, and sarcomas.

Antibody	Clone	Localization	Catalog Family
Cytokeratin	CAM 5.2	Cytoplasm	AMB50, AXB50, MUB50

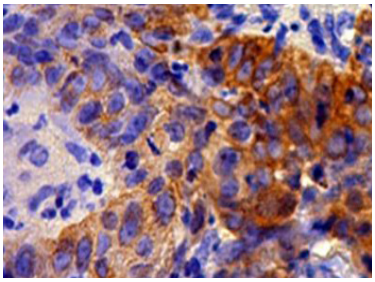
Cytokeratin Cocktail



Human cytokeratins of molecular mass 40kD to 68kD are a family of water-insoluble proteins that form a major part of epithelial cell?s cytoskeleton. Immunohistochemical analysis of a large number of neoplasms has established keratin protein immunohistochemistry as an important aid for classification of epithelial neoplasms. Monoclonal antibodies AE1 and AE3 identifies the basic and acidic subfamilies of cytokeratin respectively, thus the combination of these two antibodies can be used to detect almost all human epithelia. These antibodies show no cross-reactivities with other cytoskeletal proteins.

Antibody	Clone	Localization	Catalog Family
Cytokeratin Cocktail	AE1 & AE3	Cytoplasm	AM071, AX071, MU071

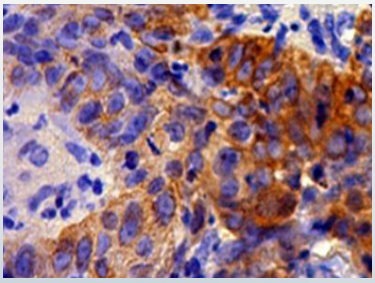
Cytokeratin 5 & 6



The two keratins specifically type II keratin CK5 and type II CK6, which essentially form 8-nm filaments. CK5 is a useful immunohistochemical marker in different studies of mesothelioma, and the expression is key tool for the histological differential diagnosis with adenocarcinomas, especially when confronting with metastatic tumors of unknown origin. CK5 labels myoepithelial cells of breast and prostate basal cells. The human type II Cytokeratin 6 (CK6) a 56 kD protein expressed on stratified epithelia including oral mucosa, esophagus, basal layer of epidermis, the outer root sheath of hair follicles, and in glandular epithelia.

Antibody	Clone	Localization	Catalog Family
Cytokeratin 5 & 6	EP24 & EP67	Cytoplasm	AN892, AY892, NU892

Cytokeratin 7



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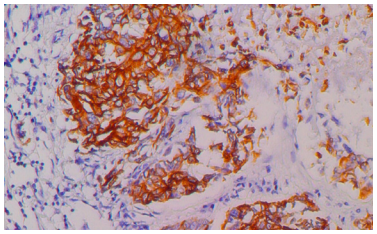
Antibody	Clone	Localization	Catalog Family
Cytokeratin 7	OV-TL12/ 30	Cytoplasm	AM255, AX255, MU255
Cytokeratin 7	KRT7/760	Cytoplasm	AM944, AX944, MU944

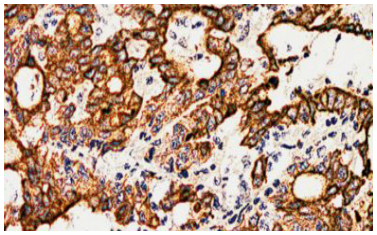
Cytokeratin 13



Cytokeratin 13 is a part of the keratin gene family, more specifically a type 1 keratin, as non-keratinized squamous epithelial marker. Type 1 keratins, compared to type 2 keratins, tend to be smaller and more acidic. These keratins constitute the type intermediate filaments of the intracytoplasmic cytoskeleton that are responsible for the structural integrity of mammalian epithelial cells. Cytokeratin 13 has been found to play a directive role in prostate cancer metastasis. The levels of Cytokeratin 13 were able to predict bone metastasis and overall survival rate of the patient.

Antibody	Clone	Localization	Catalog Family
Cytokeratin 13	KRT13/2213	Cytoplasm	AM989, AX989, MU989
Cytokeratin 13	AE8	Cytoplasm	AM132, AX132, MU132

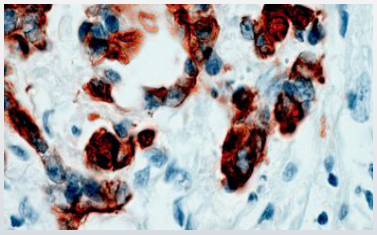
Cytokeratin 19



Cytokeratin 19 (molecular mass 40 kD) is a marker of simple epithelia. Cytokeratin 19 has been found in mesothelial and mesothelioma cells, ovarian cysts, cystadenomas, and ovarian carcinomas, in adenocarcinomas of the lung and in tumor cells of pulmonary metastases, in the ductal cells of normal pancreas and in pancreatic cancers. It has been shown to be present in the basal layer of non-keratinizing stratified squamous epithelia such as the oral cavity and the ectocervix. The RCK108 antibody to Cytokeratin 19 reacts with many types of epithelial cells including many ductal and glandular epithelia.

Antibody	Clone	Localization	Catalog Family
Cytokeratin 19	RCK108	Cytoplasm	AM246, AX246, MU246

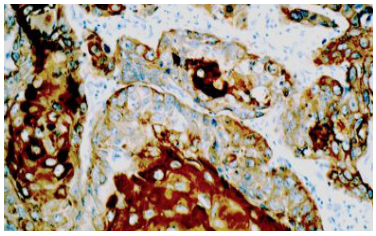
Cytokeratin 20



Cytokeratin 20 (46kD) is relatively less acidic than other type I keratins. This antibody reacts with certain types of carcinomas such as adenocarcinomas of the colon, transitional cell carcinomas of the bladder and Merkel cell tumors of the skin. It does not stain breast, lung, and endometrial adenocarcinomas. This differential staining pattern of this antibody makes it very useful for tumor evaluation when used in conjunction with cytokeratin 7 staining.

Antibody	Clone	Localization	Catalog Family
Cytokeratin 20	IT-Ks20.8	Cytoplasm	AM315, AX315, MU315
Cytokeratin 20	KRT20/1992	Cytoplasm	AM946, AX946, MU946
Cytokeratin 20	EP23	Cytoplasm	AN849, AY849, NU849

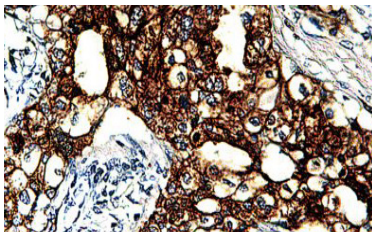
Cytokeratin, High MW



Monoclonal antibody 34βE12 is specific for "high molecular weight" cytokeratins 1, 5, 10, 14, corresponding to molecular weights of 68, 58, 56.5, and 50 kD, characteristically found in complex epithelium. The antibody reacts with all squamous and ductal epithelium and stains carcinomas. It reacts with benign small-acinar lesions of the prostate

Antibody	Clone	Localization	Catalog Family
Cytokeratin, High MW	34ßE12	Cytoplasm	AM291, AX291, MU291
Cytokeratin, High MW	AE3	Cytoplasm	AM133, AX133, MU133

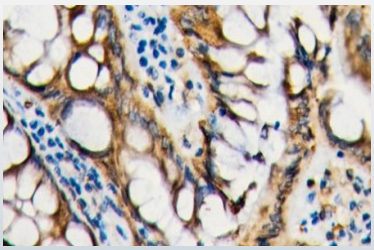
Cytokeratin, Low MW



The cytokeratins are a family of water-insoluble proteins (40-70 kD) found in almost all epithelial cell types. The presence of keratin appears to be a highly specific characteristic of various true epithelial cells in-situ and is maintained in epithelium-derived cells in culture, including highly malignant cell lines. Low molecular weight cytokeratin antibody AE1 has proven to be a widespread histological marker for the restricted staining of the epidermal basal layer of skin and almost all epithelially derived tumors. It can be used as a marker for cells of epithelial origin. Combined with other monoclonal keratin antibodies, it may be useful in studying the histogenesis of undifferentiated tumors

Antibody	Clone	Localization	Catalog Family
Cytokeratin, Low MW	AE1	Cytoplasm	AM075, AX075, MU075

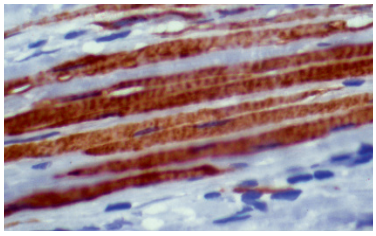
COX-2



The enzyme cyclooxygenase (COX), also known as prostaglandin H synthase or prostaglandin endoperoxide synthase, consists of two isoforms, COX-1 and COX-2. Both isoforms are associated with inner membranous compartments and represent key enzymes in the conversion of arachidonic acid to prostaglandin. COX-1 is constitutively expressed in most cell types and is involved in the homeostasis of various physiological functions, while COX-2 is considered to be a mitogen-inducible form, associated with biologic events such as injury, inflammation, and proliferation. COX-2 plays an important role in carcinogenesis of various human cancers, including colorectal cancer and cervical cancer.

Antibody	Clone	Localization	Catalog Family
COX-2	COX2/3320R	Cytoplasm/Membrane	ANA32, AYA32, NUA32

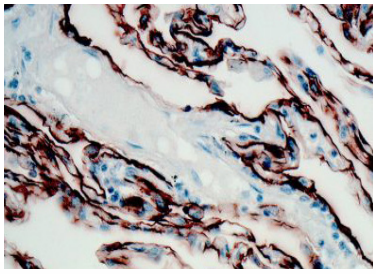
Desmin



Desmin is a 56 kD intermediate filament expressed by cells of smooth, skeletal, and cardiac muscle. In myofibrils, desmin is localized in skeletal and cardiac muscle Z lines, in regions of cell-cell juncture, at the site of apposition of the Z line with the plasma membrane, and in cardiac intercalated disks. The specificity of desmin to muscle cells makes it a useful marker in identifying sarcomas derived from smooth and striated muscle cells such as leiomyosarcomas and rhabdomyosarcomas. This antibody does not cross-react detectably with GFAP, keratin, vimentin, or neurofilament. This antibody stains positive in muscle cells.

Antibody	Clone	Localization	Catalog Family
Desmin	D33	Cytoplasm	AM072, AX072, MU072

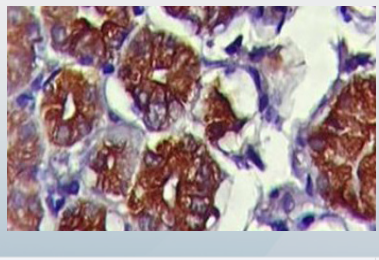
Epithelial Membrane Antigen(EMA)



Epithelial membrane Antigen (EMA), also known as milk fat globule membrane protein, is present on the luminal surface of mammary gland epithelium. Although EMA is primarily located in mammary gland epithelium, other normal epithelia (e.g., lung) will also react against EMA antibody. Cells obtained from solid metastases and pleural effusions accompanying a breast cancer will react with EMA antibody. Human colon carcinoma, osteosarcoma, kidney carcinoma, hepatocellular carcinomas, adrenal carcinoma, embryonal carcinoma, liposarcoma, lung carcinoma, and mixed parotid tumor do not stain with EMA antibody.

Antibody	Clone	Localization	Catalog Family
Epithelial Membrane Antigen	E29	Membrane/Cytoplasm	AM057, AX057, MU057
Epithelial Membrane Antigen	Mc5	Membrane/Cytoplasm	AM182, AX182, MU182
Epithelial Membrane Antigen	GP1.4	Membrane/Cytoplasm	AMB78, AXB78, MUB78

EPCAM

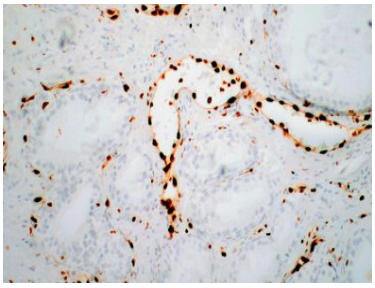


EpCAM (Epithelial Cellular Adhesion Molecule) also designated as CD326, KSA, TROP1 is a 40kD type I transmembrane calcium-independent homophilic adhesion glycoprotein. It functions as a homophilic calcium-independent epithelial-specific cell-adhesion molecule which is involved in cell signaling, cell migration, proliferation and differentiation. EPCAM is primarily expressed on the basolateral surface of most epithelia of different organs. It is highly expressed on most carcinomas of epithelial lineage and therefore used as a diagnostic and prognostic marker.

Antibody	Clone	Localization	Catalog Family
EPCAM	MOC-31	Membrane	AMC16, AXC16, MUC16

IHC PANEL MARKERS - Skin Cancer

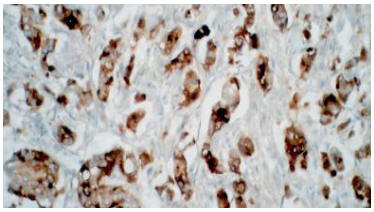
ERG



ERG, the ETS related gene, is directed against the C-terminus of the ETS transcription regulator, ERG, and is capable of detecting both wildtype ERG, and truncated ERG resultant of ERG gene rearrangement. This antibody exhibits a nuclear staining pattern and may be used to aid in the identification of prostate adenocarcinomas through the detection of truncated ERG. This ERG antibody also recognizes Fli-1 by western blot analysis.

Antibody	Clone	Localization	Catalog Family
ERG	EP111	Nucleus	AN782, AY782, NU782

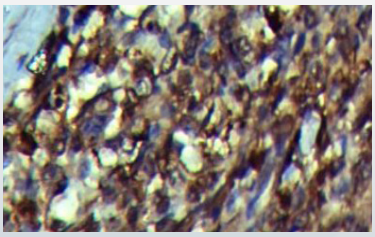
GCDFP-15



It recognizes a protein of 15kDa, identified as Gross cystic disease fluid protein 15 (GCDFP-15). It is a major protein component of benign breast gross cysts. It is a known marker of breast cancer, as it is found in approximately 50% of all breast cancer specimens. GCDFP-15, also known as prolactin inducible protein (PIP), is a prolactin and androgen controlled protein. This antibody is useful in the identification of metastatic breast carcinoma, or fluid analysis.

Antibody	Clone	Localization	Catalog Family
GCDFP-15	PIP/1571	Membrane	AM953, MU953, AX953
GCDFP-15	EP95	Cytoplasm	AN856, NU856, AY856

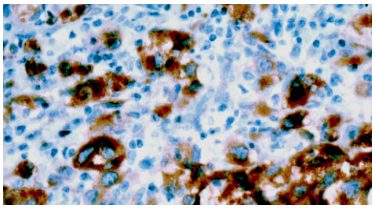
Granzyme B



Granzyme B is a member of the granzyme family of the serine proteases found specifically in the cytotoxic granules of cytotoxic T lymphocytes (CTL) and natural killer (NK) cells. They are synthesized, processed and released by exocytosis in lysosome-like granules containing perforin. Granzyme B has the strongest apoptotic activity of all the granzymes as a result of its caspase-like ability to cleave substrates at aspartic acid residues thereby activating procaspases directly and cleaving downstream caspase substrates.

Antibody	Clone	Localization	Catalog Family
Granzyme B	2C5	Membrane	AMB35, AXB35, MUB35
Granzyme B	GZMB/3014	Cytoplasm	AM996, AX996, MU996

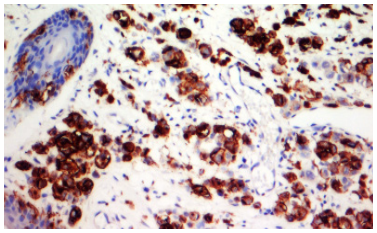
MART-1(Melan-A)



Melan-A, a product of the MART-1 gene, is a differentiation antigen which is expressed in 100% of melanocytes, most melanomas, and 50-60% of melanoma cell lines. It is one of the melanoma antigens recognized by autologous cytotoxic T cells, and as an antigenic target for tumor infiltrating lymphocytes. This antibody also stains Melan-A in normal melanocytes and in the retina. It does not stain normal or tumor tissues from non-melanocyte lineages. This antibody stains positive in cytoplasm of melanocytes and other positive cells.

Antibody	Clone	Localization	Catalog Family
MART-1(Melan-A)	A103	Cytoplasm	AM361, AX361, MU361

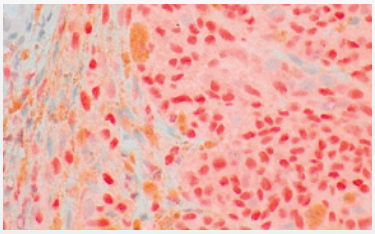
Melanoma



Metastatic melanoma is often confused with a variety of poorly differentiated carcinomas, sarcomas, and large cell lymphomas. Clone HMB45 reacts with fetal and neonatal melanocytes but not with normal adult melanocytes and junctional nevus cells but not with intradermal nevi, hence showing specificity for detection of melanocytic tumors. The panel of tumor markers, most commonly used in conjunction with HMB45, for evaluation of melanoma includes S-100 protein LCA, CEA, and EMA, as well as vimentin, an intermediate filament found in both melanomas and sarcomas.

Antibody	Clone	Localization	Catalog Family
Melanoma	HMB45	Cytoplasm	AM001, AX001, MU001

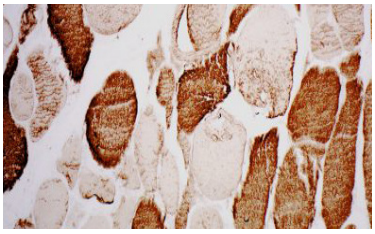
MiTF



Micropthalmia-associated Transcription Factor (MiTF) is a basic helix-loop-helix leucine zipper transcription factor involved in melanocyte and osteoclast development. Mutations in MiTF cause auditory pigmentary syndromes, such as Waardenburg Syndrome Type II, Type IIa and Tietz Syndrome in humans. MiTF plays a critical role in the differentiation of various cell types such as neural crest-derived melanocytes, mast cells, osteoclasts and optic cup-derived retinal pigment epithelium. This antibody recognizes serine phosphorylated and non-phosphorylated melanocytic isoforms of micropthalmia. It is useful in identifying malignant melanoma, and distinguishing mast cell lesions of myeloid derivation. A relatively rare class of tumors known as PEComas (tumors showing perivascular epitheloid cell differentiation) express MiTF in a high percentage of cases ~90%).

Antibody	Clone	Localization	Catalog Family
MiTF	MiTF/A13	Nuclear	AM554, AX554, MU554

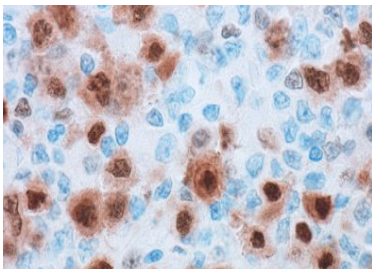
Muscle Specific Actin



Actin, a major component of the cytoskeleton, is a globular protein about 5 nm in diameter and is composed of one polypeptide chain with a mass of approximately 47 kD. This antibody recognizes alpha actin of skeletal, cardiac and smooth muscle cells and gamma actin from smooth muscle cells and will stain the cytoplasm in these cells. It is non-reactive with other mesenchymal cells and all epithelial cells except for myoepithelium. It can thus be used as a marker for leiomyomas, leiomyosarcomas, rhabdomyomas and rhabdomyosarcomas.

Antibody	Clone	Localization	Catalog Family
Muscle Specific Actin	HHF35	Cytoplasm	AM090, AX090, MU090
Muscle Specific Actin	SPM160	Cytoplasm	AMA48, AXA48, MUA48

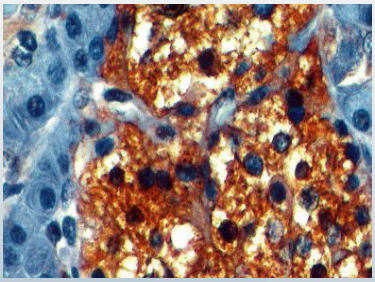
MUM1



MUM1/IRF4 protein is a member of the interferon regulatory factor (IRF) family of transcriptional factors initially described as downstream regulators of interferon signaling. The quantity of this factor varies within the hematopoietic system in a lineage and stage-specific way. It is considered to be a key regulator of several steps in lymphoid, myeloid, and dendritic cell differentiation and maturation. MUM1/IRF4 expression is observed in many lymphoid and myeloid malignancies, and may be a promising target for the treatment of some of these neoplasms. MUM1 is a valuable marker for understanding and characterizing histogenesis of Bcell lymphomas. It is an excellent marker for Reed-Sternberg cells of classic Hodgkin's disease.

Antibody	Clone	Localization	Catalog Family
MUM1	SP114	Nucleus	AN750, AY750, NU750

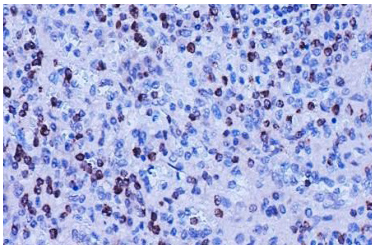
Neuron Specific Enolase(NSE)



The gamma-gamma isoenzyme of the cytoplasmic enzyme enolase, known as neuron-specific enolase (NSE), has been demonstrated in neurons and neuroendocrine cells. In normal tissues, most neurons and their axonal and dendritic processes stain strongly positive for NSE, with the exception of Purkinje cells. NSE has been demonstrated in Schwann cells, ganglioneuromas, neuroblastoma, schwannomas, malignant melanomas, pheochromocytoma, paragangliomas, carcinoids, medullary thyroid carcinomas, pituitary adenomas, pancreas and GI tract endocrine tumors, and small cell carcinoma of the lung. A number of non-neuronal and nonendocrine tumors may also express NSE. NSE positivity should not be relied upon entirely as evidence of the neuronal or neuroendocrine differentiation of a given neoplasm.

Antibody	Clone	Localization	Catalog Family
Neuron Specific Enolase	MIG-N3	Cytoplasm	AM055, AX055, MU055

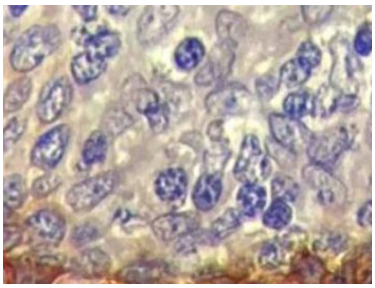
Perforin



Perforin-1 is a pore forming cytolytic protein. It is found in the granules of cytotoxic T lymphocytes and natural killer cells that drive to osmotic lysis of the target cells and subsequently empower granzymes to enter the target cells and stimulate apoptosis. The lytic membrane-inserting part of perforin is the MACPF domain. Perforin-1 has structural and functional similarities to complement component 9. It has been evaluated that perforin-1 acts by creating holes in the plasma membrane which generate an influx of calcium and begins membrane repair mechanisms. These repair mechanisms bring perforin-1 and granzymes into early endosomes. The expression of perforin-1 is reportedly upregulated in activated CD8+ T-cells, natural killer cells and some CD4+ T-cells.

Antibody	Clone	Localization	Catalog Family
Perforin	PRF1/2470	Cytoplasm	AMA26, AXA26, MUA26

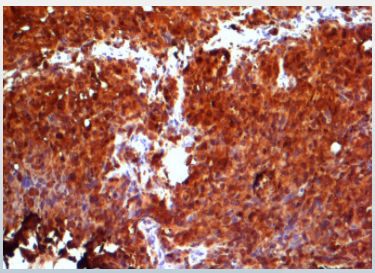
Podoplanin



Podoplanin, also known as glycoprotein 36 (gp36), PA2.26 antigen, T1-alpha (T1A), and aggrus, is a 36 kDa type I transmembrane sialoglycoprotein present on the surface of podocytes in kidney glomeruli and the parietal cells of Bowman's capsule. It is localizes in stromal cells of peripheral lymphoid tissue, follicular DCs and thymic epithelial cells. Podoplanin plays a crucial role in maintaining the unique shape of podocytes and serves as a ligand for CLEC-2. It is also directly involved in cell migration, aids metastases formation and tumor cell invasion of tissue. Research studies have shown that Podoplanin expression is upregulated in a number of tumor types including colorectal cancers, oral squamous cell carcinomas, and germ cell tumors, with higher expression levels often associated with more aggressive tumors.

Antibody	Clone	Localization	Catalog Family
Podoplanin	PDPN/4009R	Membrane	ANB95, AYB95, NUB95
Podoplanin	PDPN/1433	Membrane	AMB91, AXB91, MUB91

S100

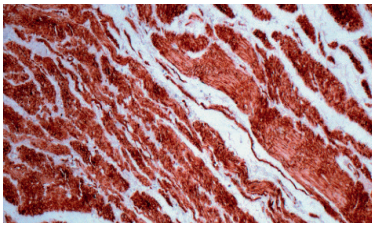


S100 protein is a low molecular weight soluble protein first isolated from the brain and initially believed to be exclusively a glial marker. Two subunits of S100 protein have been identified. The beta subunit is present in all S100 positive cells and tumors. In contrast, the alpha subunit is detectable only in neurons and lymph node macrophages. The presence of S100 protein is readily demonstrated in routinely processed malignant melanomas. S100 protein has also been found in normal melanocytes, Langerhans cells, histiocytes, chondrocytes, lipocytes, skeletal and cardiac muscle, Schwann cells, epithelial and myoepithelial cells of the breast, salivary and sweat glands, in addition to glial cells. Neoplasms derived from these cells also express S100 protein to varying degrees. A large proportion of well-differentiated tumors of salivary gland, adipose, cartilaginous tissue, and Schwann cell-derived tumors express S100 protein.

Antibody	Clone	Localization	Catalog Family
S100	S100B/1012	Cytoplasm & Nucleus	AMA15, AXA15, MUA15
S100	Polyclonal	Cytoplasm & Nucleus	AR058, AW058, PU058
S100	EP186	Cytoplasm & Nucleus	AN712, AY712, NU712
S100 Beta	EP32	Cytoplasm & Nucleus	AN713, AY713, NU713

IHC PANEL MARKERS - Skin Cancer

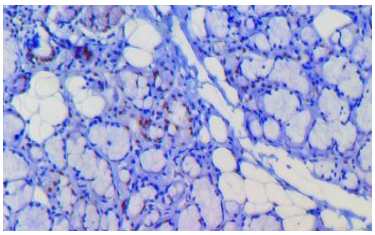
SMA



Actin is one of the two major cytoskeletal proteins. The antibody can be used to identify smooth muscle tumors. It stains leiomyomas and leiomyosarcomas but does not stain carcinomas, melanomas, lymphomas or non-smooth muscle sarcomas. It stains the muscularis and muscularis mucosa of the gastrointestinal tract, the uterine myometrium, medial layer of blood vessels, the mesenchymal components of the prostate, and myoepithelial cells of salivary glands and other organs. The antibody does not stain striated muscle such as skeletal and cardiac muscle, endothelium, connective tissue, epithelium or nerve. This antibody stains positive in cytoplasm of smooth muscle cells.

Antibody	Clone	Localization	Catalog Family
Actin, Smooth Muscle	1A4	Cytoplasm	AM128, AX128, MU128

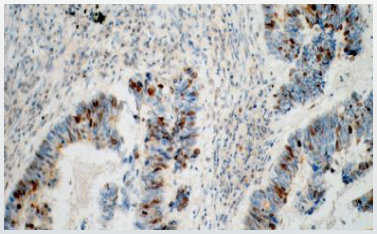
SOX 10



The SOX10 protein belongs to the SOX genes family of transcription factors that bind to the minor groove in DNA. They are characterized by a homologous sequence called the HMG-box. SOX10 is known to be involved in regulation of embryonic development and determination of cell fate. It combines with other proteins to form complexes and acts as a transcriptional activator. It is very important for neural crest and peripheral nervous system development. SOX10 plays an important role in melanocytic cell differentiation. It can be used as a sensitive marker for melanoma.

Antibody	Clone	Localization	Catalog Family
SOX 10	SOX10/991	Nucleus	AM995, AX995, MU995

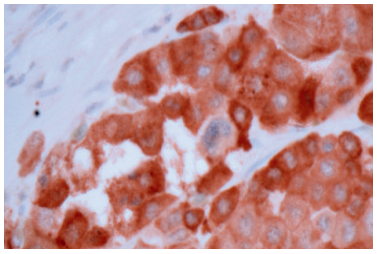
Survivin



CD4 is a 55-60 kD cell-surface glycoprotein, which participates in the molecular complexes involved in both T cell development and its antigen recognizing activity, by binding to the nonpolymorphic region of class II MHC. CD4 is considered as a stage marker of T cell development in the thymus, for it is expressed on the cell surface in a stage specific manner, during T cell development. This antibody reacts on a low level with human monocytes and macrophages but does not react with B-cells , granulocytes and thrombocytes.

Antibody	Clone	Localization	Catalog Family
Survivin	EP119	Nucleus/Cytoplasm	AN826, AY826, NU826

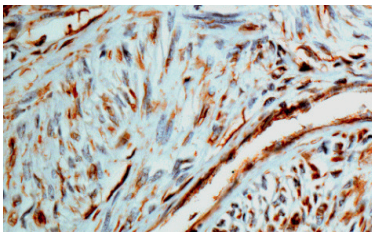
Tyrosinase



Tyrosinase is a copper-containing enzyme present in plant and animal tissues that catalyzes the production of melanin and other pigments from tyrosine by oxidation. The gene for tyrosinase is regulated by the microphthalmia-associated transcription factor. A mutation in the tyrosinase gene resulting in impaired tyrosinase production results in type I oculocutaneous albinism, a hereditary disease that one in every 17,000 person has in the US. Anti-tyrosinase has been found to be quite specific for melanotic lesions such as malignant melanoma, and melanotic neurofibroma. Essentially no carcinomas express this marker.

Antibody	Clone	Localization	Catalog Family
Tyrosinase	Ty/G5	Cytoplasm	AM535, AX535, MU535

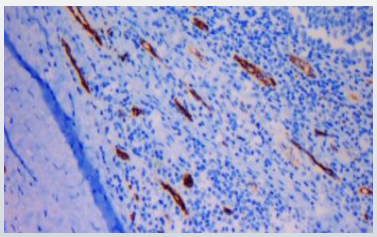
Vimentin



Vimentin is the major intermediate filament in a variety of mesenchymal or mesenchymally derived non-muscle cell types. Vimentin is found in all types of sarcomas and lymphomas. Positive staining for vimentin is seen in most cells of fibrosarcomas, liposarcomas, malignant fibrous histocytomas, angiosarcomas, chondrosarcomas and lymphomas. When the vimentin antibody is used in combination with other antibodies as a panel, it can aid in the histological classification of normal and malignant tissues. This antibody immunohistochemically labels a variety of mesenchymal cells.

Antibody	Clone	Localization	Catalog Family
Vimentin	V9	Cytoplasm	AM074, AX074, MU074
Vimentin	LN6	Cytoplasm	AM163, AX163, MU163

vWF



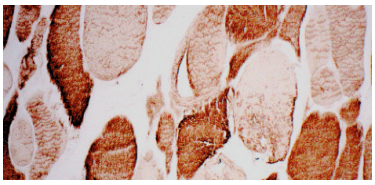
von Willebrand Factor (vWF) (Factor VIII related Ag) is a multimeric glycoprotein that is found in endothelial cells, plasma and platelets. It acts as a carrier protein for Factor VIII and promotes platelet adhesion and aggregation and transport of various proteins in the blood. vWF undergoes a variety of post translational modifications that influence the affinity and availability for Factor VIII, including cleavage of the propeptide and formation of Nterminal disulfide bonds. This antibody helps to establish the endothelial nature of some lesions of disputed histogenesis, e.g. Kaposi sarcoma and cardiac myxoma.

Antibody	Clone	Localization	Catalog Family
vWF	VWF/2480	Membrane/Cytoplasm	AMA04, AXA04, MUA04

Antibodies for Melanoma

MSA, S100, Melan-A, Vimentin, Tyrosinase, Melanoma, MiTF, Factor VIII, SMA, Desmin, CD34

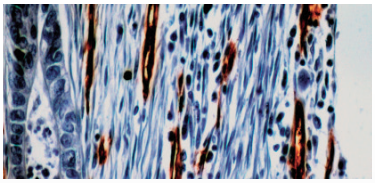
Actin, Muscle-Specific



Actin, a major component of the cytoskeleton, is a globular protein about 5 nm in diameter and is composed of one polypeptide chain with a mass of approximately 47kD. This antibody recognizes alpha actin of skeletal, cardiac and smooth muscle cells and gamma actin from smooth muscle cells. It is non-reactive with other mesenchymal cells and all epithelial cells except for myoepithelium. It can be used to stain leiomyomas, leiomyosarcomas, rhabdomyomas and rhabdomyosarcomas. This antibody labels cytoplasm in skeletal, cardiac and smooth muscle cells.

Antibody	Clone	Localization	Catalog Family
Actin, Muscle-Specific	HHF35	Cytoplasm	AM090, AX090, MU090

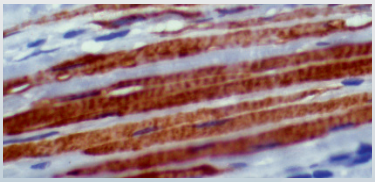
CD34



This is an antibody to the CD34 antigen in human endothelial and hematopoietic cells. It stains positive in a variety of vascular and lymphatic tumors. QBEnd/10 may now prove to be a more specific method of evaluating vascularization than Factor VIII antibody and is an important tool for tumor evaluation. This antibody stains endothelial cell cytoplasm and cross-reacts with basement membrane collagen.

Antibody	Clone	Localization	Catalog Family
CD34	QBend/10	Membrane	AM236, AX236, MU236
CD34	EP88	Membrane	AN779, AY779, NU779

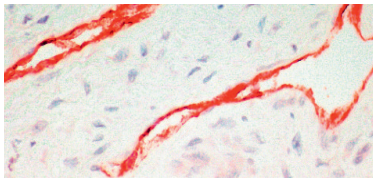
Desmin



Desmin is a 56 kD intermediate filament expressed by cells of smooth, skeletal, and cardiac muscle. In myofibrils, desmin is localized in skeletal and cardiac muscle Z lines, in regions of cell-cell juncture, at the site of apposition of the Z line with the plasma membrane, and in cardiac intercalated disks. The specificity of desmin to muscle cells makes it a useful marker in identifying sarcomas derived from smooth and striated muscle cells such as leiomyosarcomas and rhabdomyosarcomas. This antibody does not cross-react detectably with GFAP, keratin, vimentin, or neurofilament. This antibody stains positive in muscle cells.

Antibody	Clone	Localization	Catalog Family
Desmin	D33	Cytoplasm	AM072, AX072, MU072

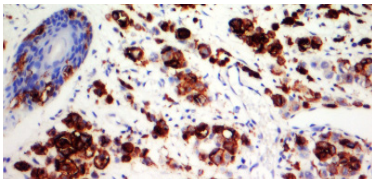
Factor VIII Related Antigen



This antigen has proven to be one of the best available immunohistochemical markers for the identification of endothelial cells. Demonstration of Factor VIII-related antigen by immunohistochemical staining has been suggested to identify vascular invasion by neoplasms.

Antibody	Clone	Localization	Catalog Family
Factor VIII Related Antigen	F8 2.2.9	Cytoplasm	AM016, AX016, MU016

Melanoma



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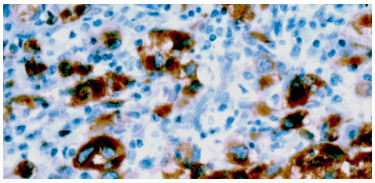
Antibody	Clone	Localization	Catalog Family
Melanoma	HMB45	Cytoplasm	AM001, AX001, MU001

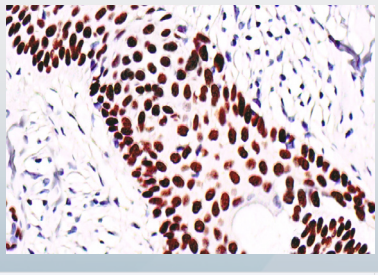
Melan-A



Melan-A, a product of the MART-1 gene, is a differentiation antigen which is expressed in 100% of melanocytes, most melanomas, and 50-60% of melanoma cell lines. It is one of the melanoma antigens recognized by autologous cytotoxic T cells, and as an antigenic target for tumor infiltrating lymphocytes. This antibody also stains Melan-A in normal melanocytes and in the retina. It does not stain normal or tumor tissues from non-melanocyte lineages. This antibody stains positive in cytoplasm of melanocytes and other positive cells.

Antibody	Clone	Localization	Catalog Family
Melan-A	A103	Cytoplasm	AM361, AX361, MU361

p63

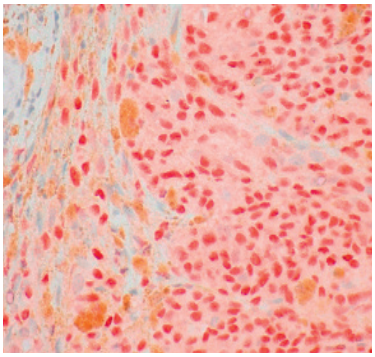


p63 (also designated tumor protein p63, p53cp or TP53CP or KET) is a transcription factor which is a homolog of the tumor suppressor p53. It induces p53-responsive genes and apoptosis, mutation of p63 rarely results in tumors. P63 is a nuclear protein widely expressed in basal cells in the epithelial layers of a variety of tissues, including epidermis, cervix, urothelium, breast and prostate. It has been identified as a useful panel marker for differential diagnosis of prostate and breast. P63 was also shown to be a sensitive marker for squamous cell carcinomas (SqCC).

Antibody	Clone	Localization	Catalog Family
p63	TP63/1423R	nucleus	ANC90, NUC90, AYC90

IHC PANEL MARKERS - Melanoma Cancer

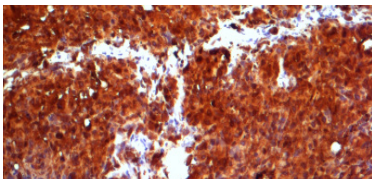
MiTF



Micropthalmia-associated Transcription Factor (MiTF) is a basic helix-loop-helix leucine zipper transcription factor involved in melanocyte and osteoclast development. Mutations in MiTF cause auditory pigmentary syndromes, such as Waardenburg Syndrome Type II, Type IIa and Tietz Syndrome in humans. MiTF plays a critical role in the differentiation of various cell types such as neural crest-derived melanocytes, mast cells, osteoclasts and optic cup-derived retinal pigment epithelium. This antibody recognizes serine phosphorylated and non-phosphorylated melanocytic isoforms of micropthalmia. It is useful in identifying malignant melanoma, and distinguishing mast cell lesions of myeloid derivation. A relatively rare class of tumors known as PEComas (tumors showing perivascular epitheloid cell differentiation) express MiTF in a high percentage of cases ~90%).

Antibody	Clone	Localization	Catalog Family
MiTF	MiTF/A13	Nuclear	AM554, AX554, MU554

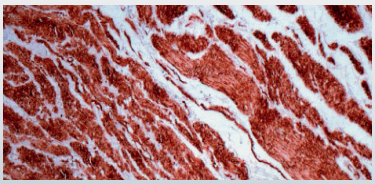
S100



S100 protein is a low molecular weight soluble protein first isolated from the brain and initially believed to be exclusively a glial marker. Two subunits of S100 protein have been identified. The beta subunit is present in all S100 positive cells and tumors. In contrast, the alpha subunit is detectable only in neurons and lymph node macrophages. The presence of S100 protein is readily demonstrated in routinely processed malignant melanomas. S100 protein has also been found in normal melanocytes, Langerhans cells, histiocytes, chondrocytes, lipocytes, skeletal and cardiac muscle, Schwann cells, epithelial and myoepithelial cells of the breast, salivary and sweat glands, in addition to glial cells. Neoplasms derived from these cells also express S100 protein to varying degrees. A large proportion of well-differentiated tumors of salivary gland, adipose, cartilaginous tissue, and Schwann cell-derived tumors express S100 protein.

Antibody	Clone	Localization	Catalog Family
S100	S100B/1012	Cytoplasm & Nucleus	AMA15, AXA15, MUA15
S100	Polyclonal	Cytoplasm & Nucleus	AR058, AW058, PU058
S100	EP186	Cytoplasm & Nucleus	AN712, AY712, NU712
S100 Beta	EP32	Cytoplasm & Nucleus	AN713, AY713, NU713

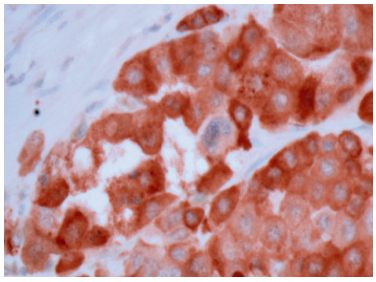
SMA



Actin is one of the two major cytoskeletal proteins. The antibody can be used to identify smooth muscle tumors. It stains leiomyomas and leiomyosarcomas but does not stain carcinomas, melanomas, lymphomas or non-smooth muscle sarcomas. It stains the muscularis and muscularis mucosa of the gastrointestinal tract, the uterine myometrium, medial layer of blood vessels, the mesenchymal components of the prostate, and myoepithelial cells of salivary glands and other organs. The antibody does not stain striated muscle such as skeletal and cardiac muscle, endothelium, connective tissue, epithelium or nerve. This antibody stains positive in cytoplasm of smooth muscle cells.

Antibody	Clone	Localization	Catalog Family
Actin, Smooth Muscle	1A4	Cytoplasm	AM128, AX128, MU128

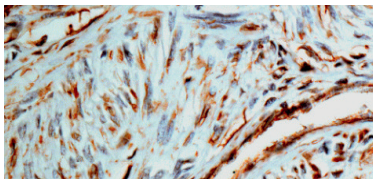
Tyrosinase



Tyrosinase is a copper-containing enzyme present in plant and animal tissues that catalyzes the production of melanin and other pigments from tyrosine by oxidation. The gene for tyrosinase is regulated by the microphthalmia-associated transcription factor. A mutation in the tyrosinase gene resulting in impaired tyrosinase production results in type I oculocutaneous albinism, a hereditary disease that one in every 17,000 person has in the US. Anti-tyrosinase has been found to be quite specific for melanotic lesions such as malignant melanoma, and melanotic neurofibroma. Essentially no carcinomas express this marker.

Antibody	Clone	Localization	Catalog Family

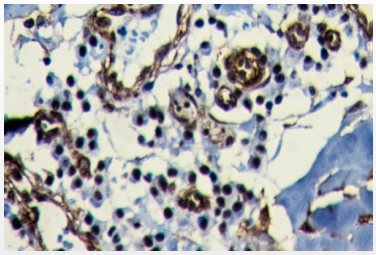
Vimentin



Vimentin is the major intermediate filament in a variety of mesenchymal or mesenchymally derived non-muscle cell types. Vimentin is found in all types of sarcomas and lymphomas. Positive staining for vimentin is seen in most cells of fibrosarcomas, liposarcomas, malignant fibrous histocytomas, angiosarcomas, chondrosarcomas and lymphomas. When the vimentin antibody is used in combination with other antibodies as a panel, it can aid in the histological classification of normal and malignant tissues. This antibody immunohistochemically labels a variety of mesenchymal cells.

Antibody	Clone	Localization	Catalog Family
Vimentin	V9	Cytoplasm	AM074, AX074, MU074
Vimentin	LN6	Cytoplasm	AM163, AX163, MU163

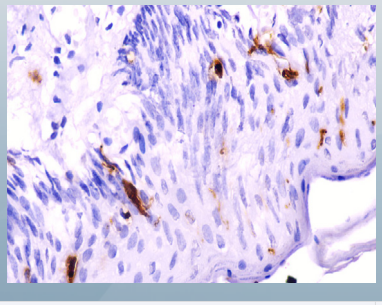
Nucleophosmin



Nucleophosmin, also known as nucleolar phosphoprotein B23 or numatrin, is a protein that in humans is encoded by the NPM1 gene. Nucleophosmin is a nucleolar phosphoprotein more abundant in tumor cells than in normal resting cells. An increase in nucleophosmin protein level accompanies stimulation of the growth of normal cells, e.g., mitogen activation of B lymphocytes. This protein is concentrated in the granular region of the nucleolus, where ribosome assembly occurs is likely involved in the assembly of ribosomal proteins into ribosomes.

Antibody	Clone	Localization	Catalog Family
Nucleophosmin	H-4	nucleus and cytoplasm	AMA47, MUA47, AXA47

Langerin [H-4]



Langerin is found on Langerhans cells and is a type II transmembrane cell surface receptor. Extracellular domain of langerin has a neck region containing series of heptad repeats and a CRD(C-terminal C-type carbohydrate-recognition domain). Langerhans cells are immature dendritic cells (DCs) which are seen in epidermis and other mucosal epithelia. Epidermal LCs has strong immune-stimulatory capacity and plays an important role in initiating and regulating of the immune system. Langerin protein can be found in Human spleen, lymph node, thymus, liver, lung and heart. Human langerin is found on the genome maps at chromosome 2p13.3 and encodes a 328 amino acid protein.

Antibody	Clone	Localization	Catalog Family
Langerin [H-4]	H-4	membrane & cytoplasm	AMB79, MUB79, AXB79

BioGenex Primary Antibody Format and Pack Size

BioGenex antibodies are optimized to provide a maximum signal with the minimum background for immunohistochemical staining. All our antibodies are optimized and recommended for use with all Super Sensitive™ Detection Systems to provide optimum staining.

BioGenex Ready-to-Use (RTU) antibodies are fully optimized for use with BioGenex Detection Systems without the need for further dilution or titration. BioGenex concentrated antibodies are provided with recommended dilutions for optimal use with BioGenex Detection Systems, allowing rapid titration and testing.

Prefix	Type	Species	Suffix	Volume and Format
AM/AN	Monoclonal	AM-Mouse/AN-Rabbit	-5M/5ME	6 mL - Ready-to-use (manual)
AM/AN	Monoclonal	AM-Mouse/AN-Rabbit	-10M/10ME	10 mL - Ready-to-use (i6000™)
AX/AY	Monoclonal	AX-Mouse/AY-Rabbit	-YCD/YCDE and -50D/50DE	16 mL and 5 mL Ready-to-use (Xmatrx®)
AR	Polyclonal	Rabbit	-5R/5RE	6 mL - Ready-to-use (manual)
AR	Polyclonal	Rabbit	-10R/10RE	10 mL - Ready-to-use (i6000™)
AW	Polyclonal	Rabbit	-YCD/YCDE and -50D/50DE	16 mL and 5 mL Ready-to-use (Xmatrx®)
MU/NU	Monoclonal	AM- Mouse/AN-Rabbit	-UC/UCE and -5UC/5UCE	1 mL and 0.5 mL Concentrate
PU	Polyclonal	Rabbit	-UC/UCE and -5UC/5UCE	1 mL and 0.5 mL Concentrate

Other Panel Markers from BioGenex	
Breast cancer panel	Pancreas tumor
B&T cell Associated Lymphoma	Liver cancer
Cervical cancer	Kidney cancer
Colorectal and stomach cancer	Head & neck cancer
Lung cancer	Bladder cancer
Muscle cancer	Germ cell tumor
Ovarian cancer	Vascular tumor
Prostate/Testicular cancer	Pituitary gland
Neuroendocrine tumor	Esophagus cancer

For specific information on the individual antibody, please refer to the datasheets available on www.biogenex.com or call BioGenex Technical Support at **1(800)421-4149** or write to support@biogenex.com.

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