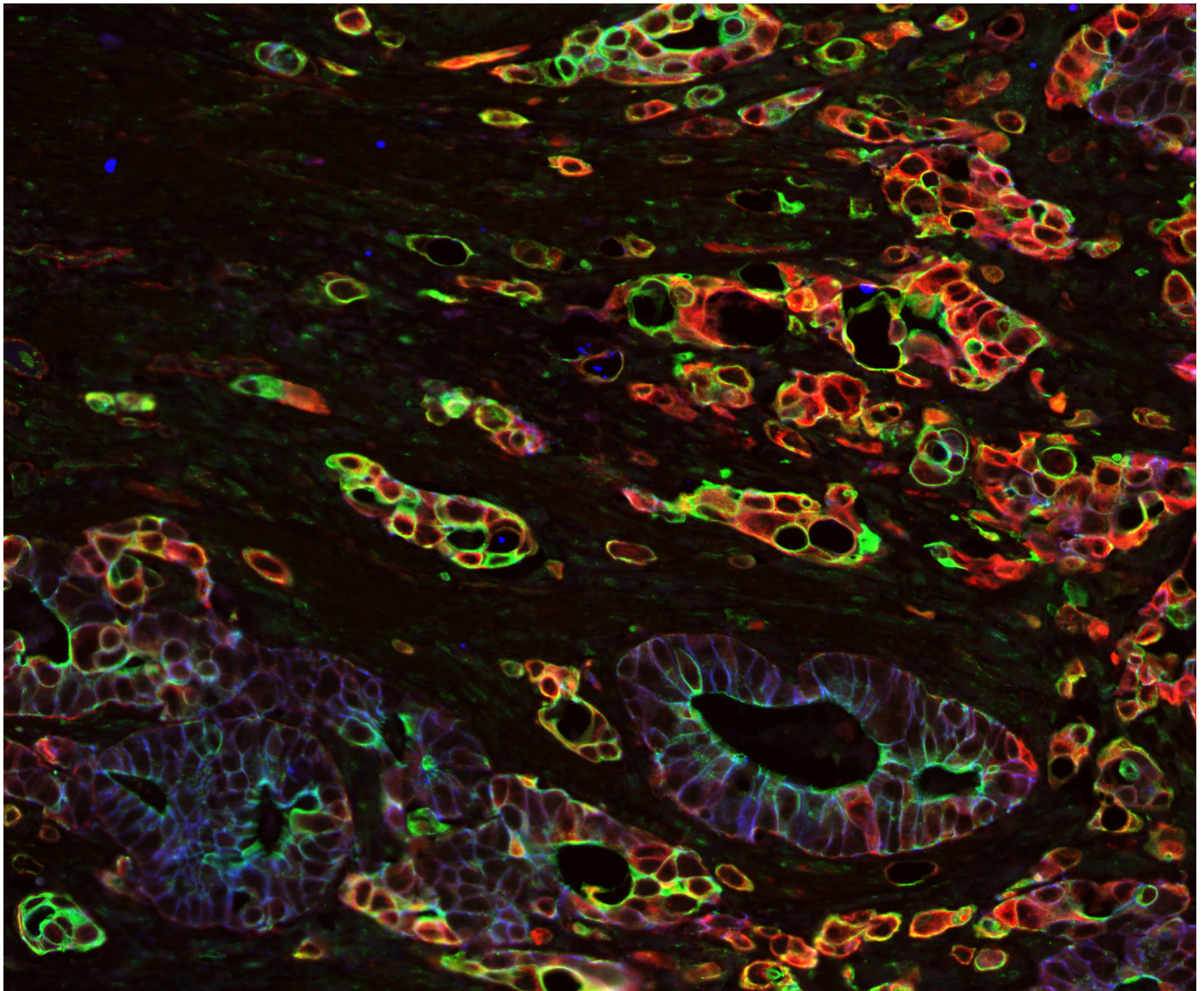


IMMUNO ONCOLOGY



CD MARKERS FOR CANCER RESEARCH

 **ATLAS ANTIBODIES**

PRIMARY ANTIBODIES TARGETING CLUSTERS OF DIFFERENTIATION (CD)



There is a high demand to identify biomarkers specific to this disease for screening for early detection, as well as new therapeutic targets. The capacity of these biomarkers to predict the existence, stages, and associated therapeutic efficacy of human cancers would enable improvements in the early diagnosis and survival of cancer patients.

We must expand our knowledge as a step toward the design of practical and safe treatments. Therefore, the identification of molecular biomarkers is unquestionably essential and urgent for an accurate prognosis and development of critical therapeutic targets.

NEEDS

- Specific and effective biomarkers able to identify early stages of the disease and reliable prognostic markers for predicting clinical responses as well as defining the divergent molecular pathways underlying the development of the disease.
- Protein-related data such as citations, application-specific validation and sequence information, and homology, are paramount in the buying process and the single biggest driver for antibody choice.
- A trusted source of data in order to feel confident in the purchase of new antibodies.

WHY ATLAS ANTIBODIES?

Atlas Antibodies continues searching for better early detection markers and new therapeutic targets.

- Over 12,000 product citations worldwide
- Application-specific Enhanced Validation
- Strong roots in the Human Protein Atlas
- Transparency & Open Access Data

Cluster of differentiation (CD) are surface molecules expressed on cells of the immune system such as lymphocytes (T-cells, B-cells, and NK-cells), neutrophils, and monocytes/ macrophages. CD molecules play key roles in immune cell-cell communication and sensing the microenvironment and are essential markers for the identification and isolation of the different cell types in the immune system (**Figure 1**).

Monitoring the expression profiles of different CD antigens allows the identification, isolation and phenotyping of cell types according to their function in various immune processes.

Cancer and Inflammation

The presence of leukocytes within tumors, observed in the 19th century by Rudolf Virchow, provided the first indication of a possible link between inflammation and cancer. Yet, it is only during the last years that clear evidence show how inflammation plays a critical role in tumorigenesis, and some of the underlying molecular mechanisms have been elucidated (Karin, 2006).

Many cancers arise from sites of infection, chronic irritation and inflammation. It is becoming clear that the tumour microenvironment, which is largely orchestrated by inflammatory cells, is an indispensable participant in the neoplastic process, fostering proliferation, survival and migration.

A multitude of research studies on cancer have now expanded the concept that inflammation is a critical component of tumor progression (Coussens, 2002). As a result, immune cells infiltration into developing tumors is now considered one of the hallmarks of cancer development (Colotta, 2009).

Both lymphocytes and neutrophils are involved in the immune response against cancer. However, the classic view that the role of immune cells in cancer is primarily one of tumor rejection has been supplanted by a more complex view of leukocytes having both pro-and anti-tumor properties (Ruffell 2010).

Importance of CD markers expression as diagnostic and prognostic factors for monitoring the progression of tumors.

CD markers, and the antibodies directed against them, are hence widely used in immune system research studies in human and animal models. These markers play a crucial role in cancer research by enabling researchers to identify and track specific cell populations infiltrating within tumors.

The evaluation of the abnormal expression of CD markers in solid and hemopoietic tumors can allow for the detection of diseases in early stages (diagnostic value at disease onset).

Furthermore, monitoring of tumors progression through CDs expressed on circulating tumor cells could be a new diagnostic and prognostic factor (Rezaeeyan, 2018; Shahrabi, 2020).

In summary, by identifying and targeting specific CD markers, researchers can develop new therapies for these conditions and gain a better understanding of the underlying mechanisms of disease.

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Shahrabi S, Ghanavat M, Behzad MM, Purrahman D, Saki N. CD markers polymorphisms as prognostic biomarkers in hematological malignancies. *Oncol Rev*. 2020 Jul 14;14(2):466.

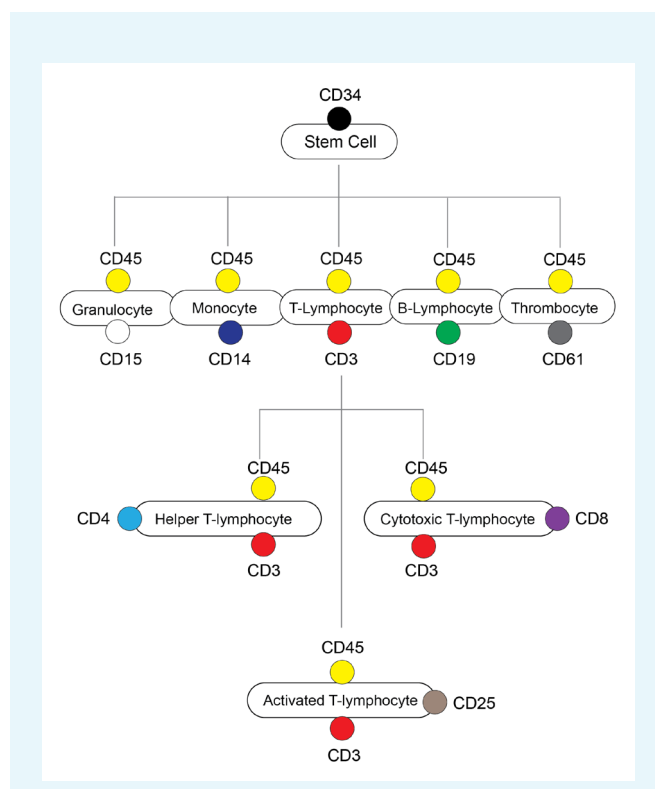


FIGURE 1
Schematic of the most widely used CD markers in diagnostic immunology

Cover Image: Immunofluorescence staining of human colorectal cancer tissue using primary antibodies against various CD markers to label the tumor cells, including Anti-ITGB1 (CD104) AMAb91454 (in red), Anti-TJP1 HPA001636 (in green) and Anti-CDH1 (CD324) AMAb90862 (in blue).

CD MARKERS IN CANCER RESEARCH

In cancer research, CD markers are used to identify and isolate tumor cells from the surrounding normal tissue and to distinguish between different subtypes of cancer cells. They are also used to monitor treatment response and disease progression, as changes in the expression of certain CD markers can indicate tumor growth or regression.

- **CD44 in Breast Cancer**

CD44 is a cell surface glycoprotein that is overexpressed in breast cancer and is associated with cancer progression and metastasis. Studies have shown that targeting CD44 using monoclonal antibodies can inhibit breast cancer cell migration and invasion, thereby reducing metastasis and improving patient outcomes (Xu 2020; Ricardo 2011).

- **CD166 in Prostate Cancer**

CD166, also known as activated leukocyte cell adhesion molecule (ALCAM), is a cell surface protein that is overexpressed in prostate cancer cells and is associated with tumor progression and metastasis. Research has shown that targeting CD166 using monoclonal antibodies or RNA interference can reduce prostate cancer cell proliferation, migration, and invasion (Jiao 2012; Kristiansen 2003).

- **CD47 in Lung Cancer**

CD47 is a cell surface protein that is overexpressed in lung cancer cells and is involved in immune evasion and tumor growth. Studies have shown that targeting CD47 using monoclonal antibodies can enhance phagocytosis of cancer cells by macrophages, leading to tumor cell death and improved patient outcomes (Weiskopf 2016; Zhao 2016).

The pathological role of CD47 is commonly responsible for the escape of malignant cancer cells from immune-surveillance. So, in addition to lung cancer, CD47 overexpression is found to be associated with poor prognosis in leukemia (Majeti 2009), non-Hodgkin's lymphoma (Chao 2010), bladder cancer (Chan 2009), breast cancer, and other cancers (Willingham 2012).

Targeting CD47 is in the spotlight of cancer immunotherapy so, anti-CD47 therapy is rapidly proceeded to clinical trials.

- **CD20 in colorectal cancer**

Colorectal cancer cells characteristically show strong expression of keratin 20 (KRT20) and lack expression of keratin 7 (KRT7). B-lymphocytes expressing CD20 have a prognostic importance in colorectal cancer (Edin 2019).

Infiltrating CD20+ B-lymphocytes along with infiltration of CD8+ cytotoxic T-cells in colorectal cancer, are visualized in the multiplexing images in **Figure 2 (A-C)**.

Examples of immunohistochemical staining of human cancerous tissues using Atlas Antibodies' Triple A Polyclonal™ antibodies are shown in **Figure 3**.

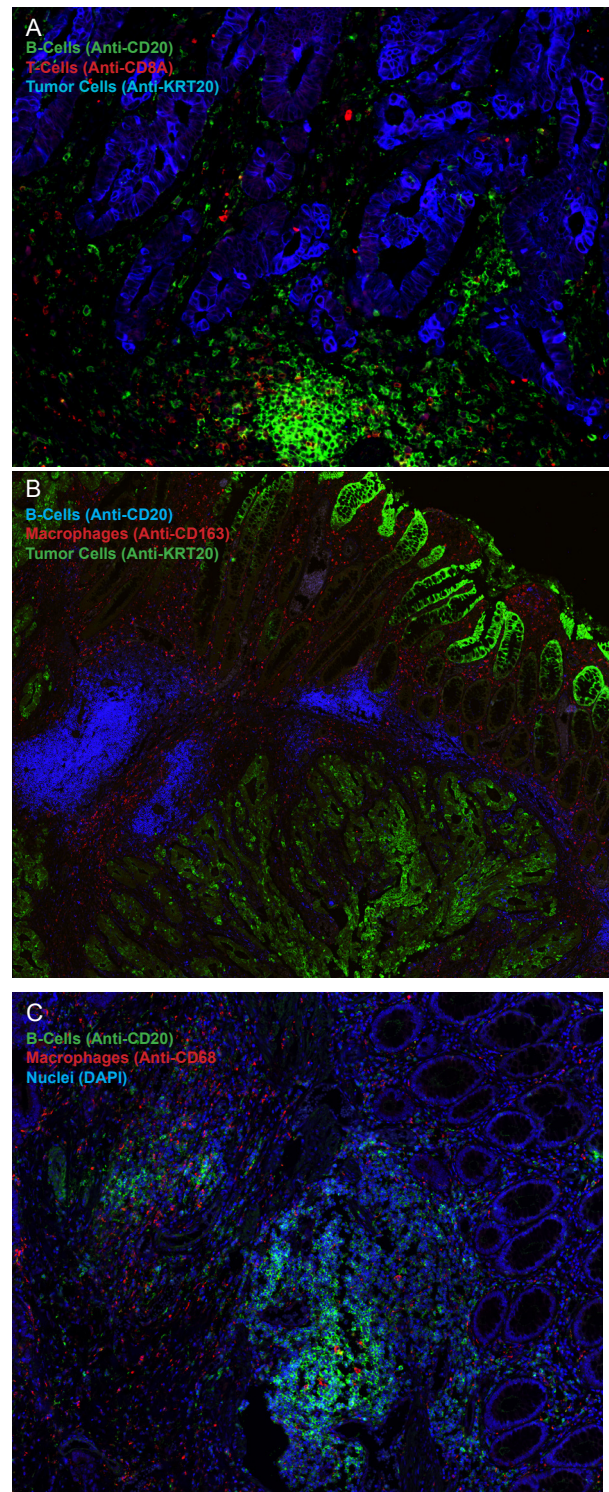


FIGURE 2
Multiplexing staining of human colorectal cancer tissue using CD markers for the B-cells, T-cells and macrophages.

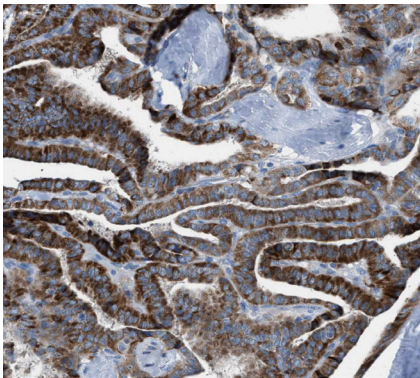
(A) Anti-CD20 (AMAb91636, green) and the T-cells Anti-CD8A (AMAb91646, red) monoclonal antibodies. Tumor cells are visualized in blue using the Anti-KRT20 (HPA024309) polyclonal antibody.

(B) Anti-KRT20 (HPA024309, green) for tumor cells and normal mucosa, Anti-CD20 (AMAb91636, blue) for B-cells and Anti-CD163 (AMAb91646, red) for tissue macrophages. Note that a large number of macrophages are present in the normal mucosa (upper half of the image), while they are almost absent in the tumor tissue (lower half of the image).

(C) Anti-CD20 (AMAb91636, green) and Anti-CD68 (AMAb90873, red) monoclonals. Nuclei are stained with DAPI (in blue).

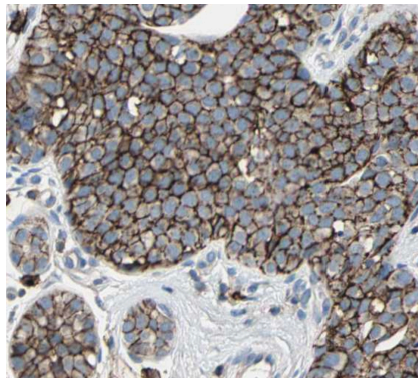
FIGURE 3

Examples of immunohistochemical staining of human cancerous tissues using Atlas Antibodies' Triple A Polyclonal™ antibodies.



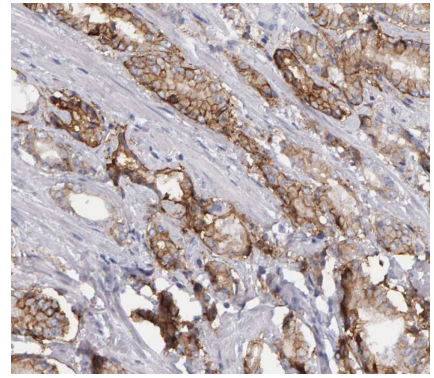
**CD1B - Thyroid Cancer
(Papillary Adenocarcinoma)**

Anti-CD1B (HPA021824)
Strong cytoplasmic/membranous staining
in tumor cells, in brown.



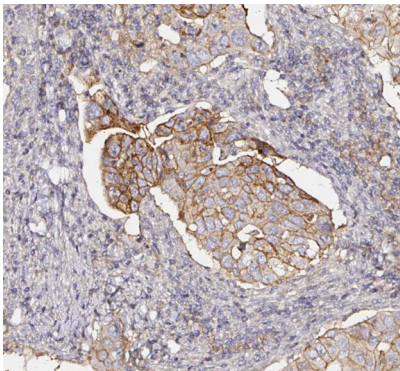
**CD44 - Breast Cancer
(Lobular carcinoma)**

Anti-CD44 (HPA005785)
Strong membranous staining in tumor cells,
in brown.



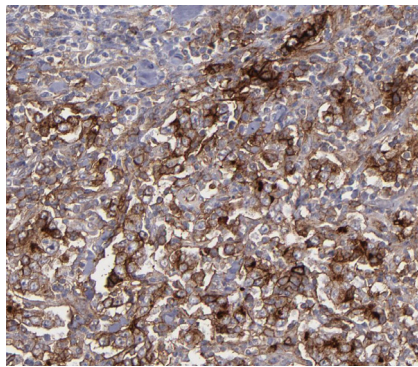
**CD38 - Prostate Cancer
(Adenocarcinoma, Low grade)**

Anti-CD38 (HPA022132)
Moderate cytoplasmic/membranous staining
in tumor cells, in brown.



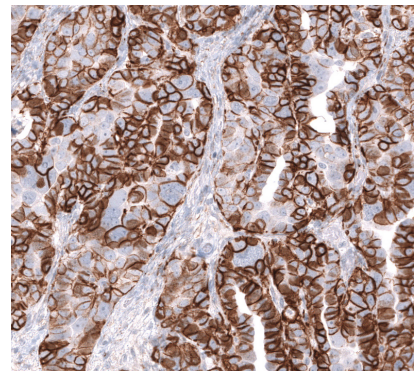
**CD47 - Lung Cancer
(Adenocarcinoma)**

Anti-CD47/ ALCAM (HPA044659)
Moderate membranous staining in tumor
cells, in brown.



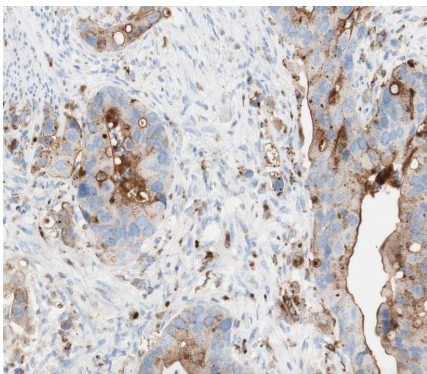
**CD54 - Stomach Cancer
(Adenocarcinoma)**

Anti-ICAM1/CD54 (HPA002126) strong
cytoplasmic/membranous positivity
in tumor cells, in brown.



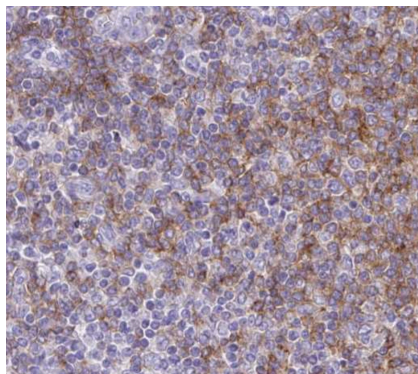
CD56 - Ovarian Cancer

Anti-NCAM1/CD56 (AMAb91807, IgG2b)
strong membranous positivity in tumor
cells, in brown.



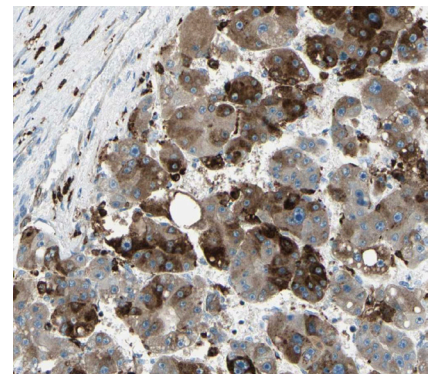
**CD66 - Colorectal Cancer
(Rectum, Adenocarcinoma)**

Anti-CD66/CEACAM1 (HPA011041)
Moderate cytoplasmic/membranous staining
in tumor cells, in brown.



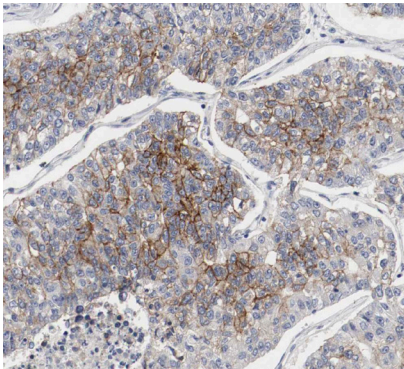
**CD72 - Malignant lymphoma
(non-Hodgkin's type, Low grade)**

Anti-CD72 (HPA044658)
Moderate cytoplasmic/membranous
staining, in brown.



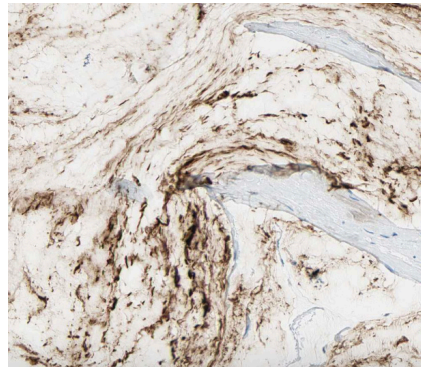
**CD74 - Liver Cancer
(Carcinoma, Hepatocellular)**

Anti-CD74 (HPA010592)
Strong cytoplasmic/membranous staining,
in brown.



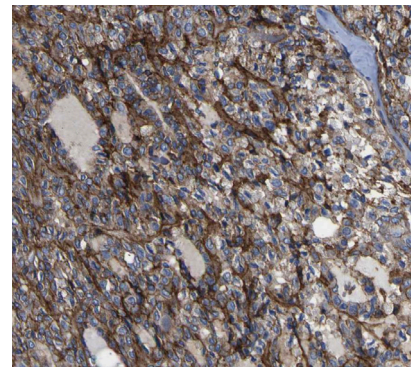
CD117 - Lung Cancer

Anti-KIT/CD117 antibody (HPA004471) shows cytoplasmic/membranous positivity in tumor cells, in brown.



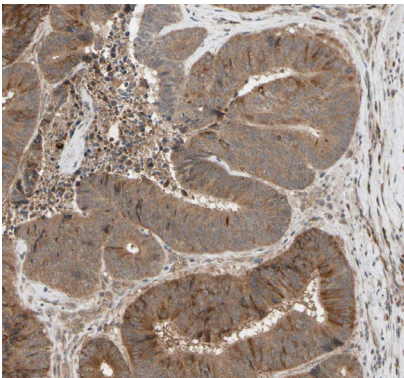
CD133 - Ovarian Cancer (Cystadenocarcinoma, Mucinous)

Anti-CD133/PROM1 (HPA004922) High cytoplasmic/membranous staining in tumor cells, in brown.



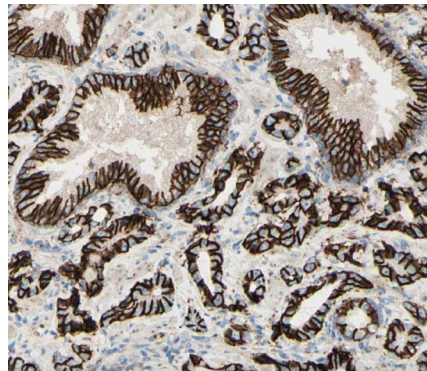
CD151 - Thyroid Cancer (Follicular adenoma carcinoma)

Anti-CD151 (HPA011906) High cytoplasmic/membranous staining in tumor cells, in brown.



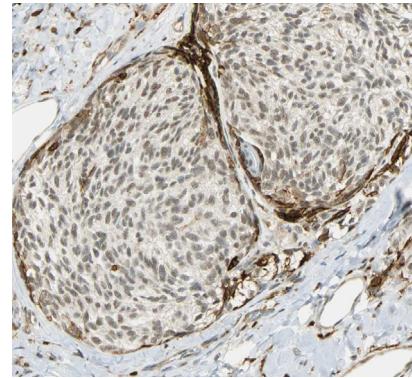
CD164 - Colorectal Cancer (Rectum, Adenocarcinoma)

Anti-CD164 (HPA010636) Moderate cytoplasmic/membranous staining in tumor cells, in brown.



CD166 - Prostate Cancer (Adenocarcinoma)

Anti-CD166/ALCAM (HPA010926) Strong cytoplasmic/membranous staining in tumor cells, in brown.



CD271 - Skin Cancer (Melanoma)

Anti-NGFR/CD271 (HPA004765) shows strong cytoplasmic/membranous positivity in tumor cells, in brown.



Triple A Polyclonals

Atlas Antibodies Advanced Polyclonals.

Triple A Polyclonals™ are rabbit polyclonals developed within the Human Protein Atlas project and made available to the scientific community by Atlas Antibodies.

- Validated on 40 different human tissue types.
- 500 staining images for each antibody.
- Validated for IHC, WB, ICC-IF.
- Several epitopes for high sensitivity.
- Unique antigen design for optimal specificity.
- Ensured lot-to-lot reproducibility.
- Enhanced Validation added as an layer of security.

CD MARKERS AND NEURO ONCOLOGY

CD markers are used to identify and track specific types of immune cells that are involved in brain function and disease. For example, CD4 and CD8 T-cells are known to play a role in multiple sclerosis and Alzheimer's disease, CD44 and CD133 are found in brain cancer, while CD38 is important in neuroinflammation and neurodegeneration.

• CD133 in brain cancer

Brain tumors are typically comprised of morphologically diverse cells that express a variety of neural lineage markers including neural stem cells. CD133 is a cell surface protein originally described as a hematopoietic stem cell marker, and found recently to be a marker of normal human neural stem cells. Of particular interest in brain cancer are CD133+ cells (or BTSC, i.e. brain tumor stem cell): comparison of normal neural stem cells and BTSCs can aid in finding the normal brain cell that originates the tumor (Singh 2003; Brown 2017).

• CD38 in neurodegeneration and neuroinflammation

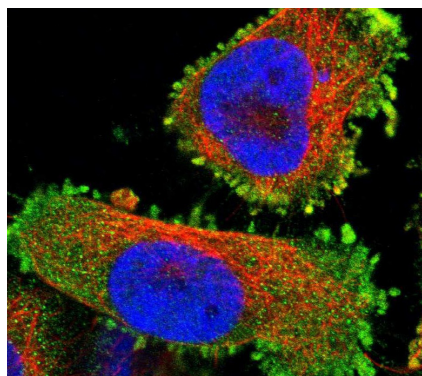
CD38 is strongly expressed in brain cells including neurons, astrocytes as well as microglial cells where it shows close link with aging, which is the primary risk factor associated with neurodegeneration and neuroinflammation (Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis, and Huntington's disease).

In human brain, CD38 expression was found to increase after neuroinflammatory insults (Kou 2009). Accordingly, CD38 knockout (KO) was found to repress neurodegeneration and neuroinflammation in experimental mice models of neurodegenerative disorders (Roboon 2019).

Examples of immunostaining of human glioblastoma and neuroblastoma-derived cell lines and glioma tissue using Atlas Antibodies' Triple A Polyclonal antibodies are shown in **Figure 4**.

FIGURE 4

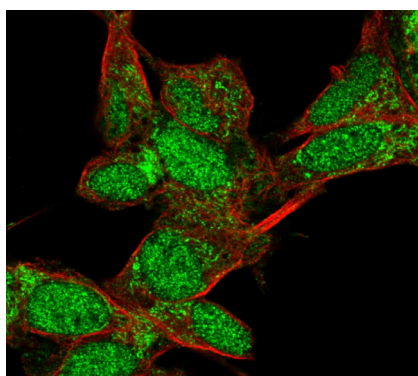
Examples of immunostaining of glioblastoma and neuroblastoma-derived cell lines and glioma tissue using Atlas Antibodies' Triple A Polyclonal antibodies.



CD305 - Glioblastoma

Anti-CD305 (HPA011155)

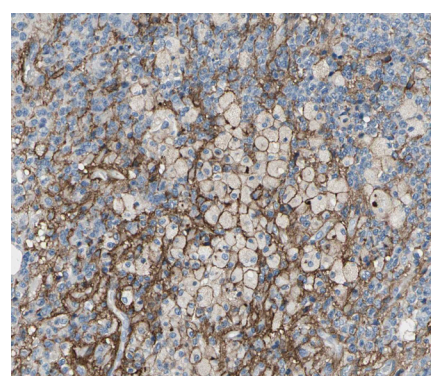
Immunofluorescent staining of human U-251 MG Glioblastoma cell line shows localization to plasma membrane, in green.



CD72 - Neuroblastoma

Anti-CD72 (HPA044658)

Immunofluorescent staining of human neuroblastoma-derived SH-SY5Y cell line shows localization to nucleoplasm and mitochondria, in green.



CD44 - Glioma

Anti-CD44 (HPA005785)

Immunohistochemical staining of human glioma tissue shows strong cytoplasmic/membranous staining in tumor cells, in brown.

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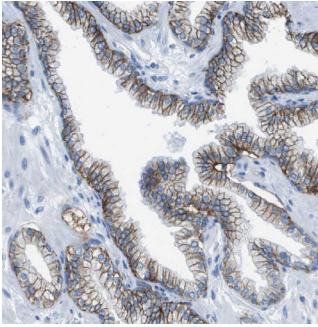
Willingham SB, et al. The CD47-signal regulatory protein alpha (SIRPα) interaction is a therapeutic target for human solid tumors. *PNAS USA* 2012;109:6662-7.

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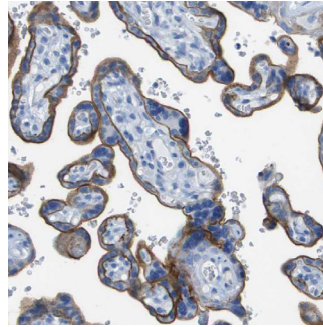
Xu, H., et al. CD44 as a tumor biomarker and therapeutic target. *Exp Hematol Oncol* 9, 36 (2020).

FIGURE 5
 Expression of CD markers in normal human tissues using Atlas Antibodies' Triple A Polyclonals™ and Precisa Monoclonals™.

Anti-CD46

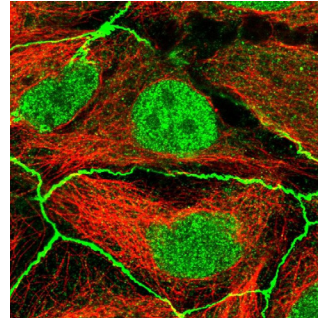


Immunohistochemical staining of human prostate using the **polyclonal antibody (HPA016903)** shows distinct membranous positivity in glandular cells, in brown.

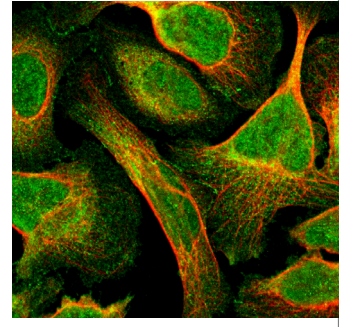


Immunohistochemical staining of human placenta using the **polyclonal antibody (HPA016903)** shows moderate membranous positivity in trophoblastic cells, in brown.

Anti-PDGFRα / CD140a

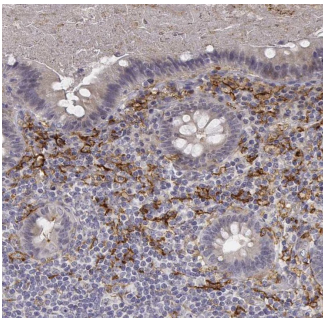


Immunofluorescent staining of human cell line CACO-2 (**left**) and U2OS (**right**) using the **polyclonal antibody (HPA004947)** shows localisation

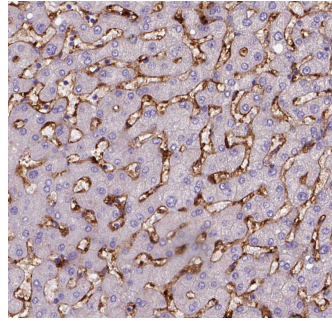


to nucleoplasm, plasma membrane & cell junctions, in green. Microtubules are shown in red.

Anti-CD14

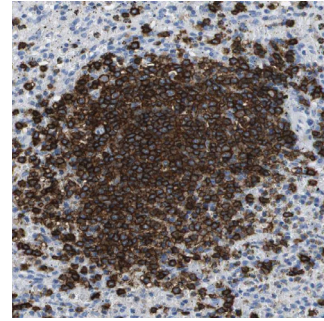


Immunohistochemical staining of human appendix using the **polyclonal antibody (HPA001887)** shows cytoplasmic positivity in immune cells, in brown.

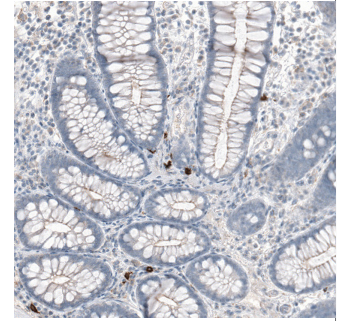


Immunohistochemical staining of human liver using the **monoclonal antibody (AMAb90897, IgG1)** shows membranous positivity in Kupffer cells, in brown.

Anti-CD20

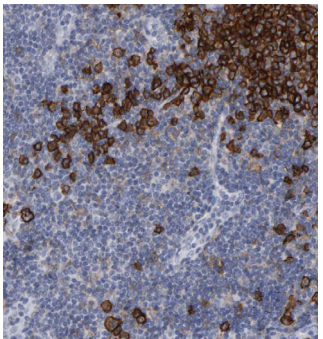


Immunohistochemical staining of human spleen using the **polyclonal antibody (HPA014341)** shows cytoplasmic positivity in cells of white pulp, in brown.

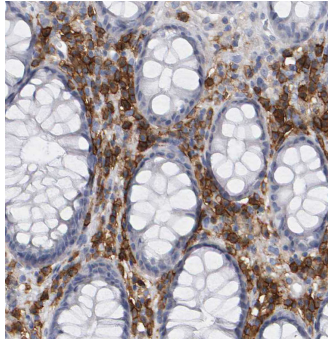


Immunohistochemical staining of human colon using the **monoclonal antibody (AMAb91636, IgG2a)** shows membranous positivity in a small subset of lymphoid cells, in brown.

Anti-CD38

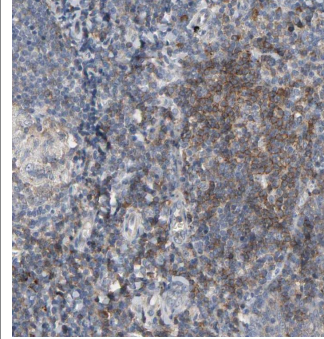


Immunohistochemical staining of human tonsil using the **polyclonal antibody (HPA022132)** shows strong cytoplasmic and membranous positivity in non-germinal center cells, in brown.

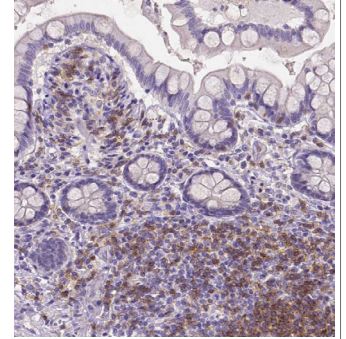


Immunohistochemical staining of human rectum using the **polyclonal antibody (HPA022132)** shows cytoplasmic and membranous positivity in lymphoid cells, in brown.

Anti-CD4



Immunohistochemical staining of human tonsil using the **polyclonal antibody (HPA00425)** shows moderate cytoplasmic positivity in lymphoid cells outside reaction centra, in brown.



Immunohistochemical staining of human small intestine using the **monoclonal antibody (AMAb90754, IgG1)** shows moderate cytoplasmic and membranous positivity in lymphoid cells, in brown.

CD MARKERS USED FOR THE IDENTIFICATION AND ISOLATION OF CANCER STEM CELLS (CSCS)

Cancer stem cells (CSCs), with their self-renewal ability and multilineage differentiation potential, are a critical subpopulation of tumor cells that can drive tumor initiation, growth, and resistance to therapy.

Like embryonic and adult stem cells, CSCs express markers that are not expressed in normal somatic cells and are thus thought to contribute towards a 'stemness' phenotype.

Many CD surface markers that are highly expressed in stem cells are also expressed in human cancers such as: CD13, CD19, CD20,

CD24, CD26, CD27, CD34, CD38, CD44, CD45, CD47, CD49f, CD66c, CD90, CD166, CD105, CD133, CD117/c-kit, CD138, CD151 and CD166.

The Table below, summarizes most of the stemness-related surface markers and the tumor types they have been found to be expressed in.

Among them, CD44 and CD133 are the most widely-used markers in CSC research and are also therapeutic targets in cancers.

Tumor	CD Markers
Brain	CD133+
Breast	CD44+, CD24-/low
Colon	CD133+, CD44+, CD24+ CD166+
Gastric	CD133+, CD44+, CD24+, CD90+, CD54+
Head & Neck	CD44+, CD66+
Leukemia	CD34+ , CD38+
Liver	CD133+, CD44+, CD90+, CD13+
Lung	CD133+, CD44+, CD117+
Ovarian	CD133+, CD56+, CD44+, CD117+
Pancreas	CD133+, CD44+, CD24+
Prostate	CD44+
Skin	CD20+, CD271+

CD Markers	Product Name	Products IDs
CD13	Anti-ANPEP	HPA004625*
CD20	Anti-MS4A1	AMAb91636* , HPA014341*, HPA014391*
CD24	Anti-CD24	HPA045879
CD34	Anti-CD34	HPA036722*, HPA036723*
CD38	Anti-CD38	HPA022132*, HPA052381*
CD44	Anti-CD44	AMAb91845* , AMAb91846* , AMAb91847* , AMAb91848* , HPA005785*
CD54	Anti-ICAM1	HPA002126*, HPA004877*
CD56	Anti-NCAM1	AMAb91807* , HPA039835*
CD66a	Anti-CEACAM1	HPA011041
CD90	Anti-THY1	AMAb90844 , AMAb90846* , HPA003733*
CD117	Anti-KIT	AMAb90900 , AMAb90901 , AMAb90904 , HPA004471, HPA073252
CD133	Anti-PROM1	AMAb91494 , HPA004922*, HPA031053*
CD166	Anti-ALCAM	HPA010926*
CD271	Anti-NGFR	HPA004765*

* Enhanced Validation
 HPAXxxxxx indicate TripleA Polyclonals™
[AMAbxxxxx](#) indicate PreciSA Monoclonals™

ATLAS ANTIBODIES' CD MARKERS SELECTION

* Enhanced Validation
 HPAxxxxxx indicate TripleA Polyclonals™
 AMAbxxxxxx indicate Precisa Monoclonals™

Product Name	CD Number	Product Number	Validated Applications	PrEST Control Antigens	Refs
Anti-ACE	CD143	HPA029298	IHC*, WB	APrEST85922	
Anti-ACKR1	CD23	HPA016421	IHC*	APrEST72761	
		HPA017672	IHC*	APrEST72761	
Anti-ADAM17	CD156B	HPA010738	IHC, ICC-IF	APrEST72102	1,2
		HPA051575	WB, ICC-IF	APrEST72102	
Anti-ADGRE5	CD97	HPA013707	IHC*	APrEST72602	3
Anti-ALK	CD246	HPA010694	IHC, ICC-IF	APrEST71454	
Anti-ANPEP	CD13	HPA004625	IHC*, WB, ICC-IF	APrEST86650	4
Anti-ATP1B3	CD298	HPA048963	IHC, ICC-IF	APrEST87523	
Anti-BST2	CD317	HPA017060	IHC, ICC-IF	APrEST70147	5,6
Anti-BTLA	CD272	HPA062029	IHC*	APrEST88753	
Anti-CD14	CD14	AMAb90897 IgG1	IHC*, WB	APrEST84388	
		AMAb90898 IgG1	IHC*	APrEST84388	
		HPA002127	IHC*, WB*	APrEST83071	7
Anti-CD151	CD151	HPA011906	IHC	APrEST72489	8
Anti-CD163	CD163	HPA046404	IHC*	APrEST88534	9
		HPA051974	IHC*	APrEST88760	10
Anti-CD163L1	CD163B	HPA015663	IHC*, WB	APrEST72966	
Anti-CD180	CD180	HPA003740	IHC*	APrEST86417	
Anti-CD1A	CD1A	HPA010734	IHC*	APrEST72090	11
Anti-CD1D	CD1D	HPA072662	ICC-IF	APrEST93092	
Anti-CD2	CD2	HPA003883	IHC*, WB*	APrEST86361	12
Anti-CD207	CD207	HPA011216	IHC*, WB*	APrEST71827	13-14
Anti-CD22	CD22	HPA024353	IHC*	APrEST70003	
Anti-CD226	CD226	HPA015715	IHC	APrEST72065	
Anti-CD247	CD247	HPA008750	IHC*, WB	APrEST70699	15-16
Anti-CD27	CD27	HPA038936	IHC*, WB	APrEST87323	17
Anti-CD28	CD28	HPA070003	IHC*	APrEST92904	
Anti-CD300LF	CD300F	HPA013712	IHC	APrEST72365	
Anti-CD33	CD33	HPA035832	IHC	APrEST71736	18
Anti-CD34	CD34	HPA036722	IHC*	APrEST87199	19
		HPA036723	IHC*, ICC-IF	APrEST87200	20
Anti-CD36	CD36	HPA002018	IHC*, ICC-IF	APrEST77481	21-23
Anti-CD37	CD37	HPA032120	IHC*, WB	APrEST78600	
		HPA032121	IHC*	APrEST78599	
Anti-CD38	CD38	HPA022132	IHC*, WB, ICC-IF	APrEST70297	24-25
Anti-CD3E	CD3E	AMAb90879 IgG1	IHC*, WB	APrEST87371	26
		HPA043955	IHC*, WB	APrEST87429	
Anti-CD3G	CD3G	HPA038494	IHC*, WB	APrEST80656	
Anti-CD4	CD4	HPA004252	IHC*, WB	APrEST86770	
		AMAb90754 IgG1	IHC*, WB	APrEST86770	
Anti-CD40	CD40	HPA031567	IHC*	APrEST78053	
		AMAb90905	IHC*, WB	APrEST78053	
Anti-CD44	CD44	HPA005785	IHC, WB*, ICC-IF	APrEST83079	27-28
		AMAb91845 IgG3	IHC*, WB*	-	
		AMAb91847 IgG2b	IHC*, WB*	-	

Product Name	CD Number	Product Number	Validated Applications	PrEST Control Antigens	Refs
Anti-CD46	CD46	HPA016903	IHC*, WB*	APrEST71847	
Anti-CD47	CD47	HPA044659	IHC	APrEST86204	
		AMAb91440 IgG1	IHC*	APrEST86204	
Anti-CD48	CD48	HPA055146	ICC-IF	APrEST91619	
Anti-CD5	CD5	HPA043416	IHC*	APrEST87414	
		AMAb91783 IgG2a	IHC*, WB, ICC-IF	-	
Anti-CD55	CD5	HPA002190	IHC*	APrEST78247	
Anti-CD59	CD59	HPA026494	IHC, WB*, ICC-IF	APrEST77861	29
Anti-CD63	CD63	HPA010088	IHC	APrEST72477	30,31
Anti-CD68	CD68	HPA048982	IHC*, WB*	APrEST85088	32,33
		AMAb90873 IgG1	IHC*	APrEST85088	34
		AMAb90874 IgG1	IHC*, WB*	APrEST85088	35
Anti-CD69	CD69	HPA050525	IHC*	APrEST87561	
Anti-CD7	CD7	HPA039079	IHC*	APrEST87329	
Anti-CD72	CD72	HPA044658	IHC*, ICC-IF	APrEST87444	
Anti-CD74	CD74	HPA010592	IHC, WB	APrEST71660	36, 37
Anti-CD80	CD80	HPA050092	IHC*	APrEST88451	
Anti-CD81	CD81	HPA007234	IHC*, ICC-IF	APrEST70220	38
Anti-CD82	CD82	HPA028900	IHC*, WB*	APrEST86805	
Anti-CD83	CD83	HPA041454	IHC*, ICC-IF	APrEST87377	
Anti-CD84	CD84	HPA070502	IHC*	APrEST88744	
Anti-CD8A	CD8A	HPA037756	IHC*	APrEST79645	39
		AMAb90883 IgG1	IHC*	APrEST79645	
Anti-CD8B	CD8B	HPA029164	ICC-IF	APrEST90687	
Anti-CD93	CD93	HPA009300	IHC*, WB, ICC-IF	APrEST71888	40, 41
Anti-CD96	CD96	HPA066754	IHC*	APrEST88530	
Anti-CD99	CD99	HPA035304	IHC*, WB	APrEST78251	42
		AMAb91823 IgG2a	IHC	-	
Anti-CDCP1	CD318	HPA010978	IHC*	APrEST72141	
		HPA010979	IHC*	APrEST72142	
Anti-CDH1	CD324	HPA004812	IHC*	APrEST86781	43
		AMAb90862 IgG2b	IHC*, WB*, ICC-IF	APrEST86781	
		AMAb90863 IgG1	IHC*, WB*	APrEST86781	
Anti-CDH2	CD325	HPA058574	IHC*	APrEST87840	
		AMAb91220 IgG1	IHC*, WB*, ICC-IF	APrEST87840	
Anti-CEACAM1	CD66A	HPA011041	IHC	APrEST72239	
Anti-CLEC4M	CD299	HPA042661	IHC	APrEST81866	
Anti-CR1	CD35	HPA042455	IHC*	APrEST83626	
		HPA049348	IHC, WB	APrEST84548	
Anti-CR2	CD21	HPA052942	IHC*	APrEST87630	44
		HPA060715	IHC*, WB	APrEST87889	
Anti-CSF1R	CD115	HPA012323	IHC, WB, ICC-IF	APrEST86535	45, 46
		AMAb91718 IgG1	ICC-IF	APrEST86535	
Anti-CSF3R	CD114	HPA048086	IHC	APrEST71845	
Anti-CXCR2	CD182	HPA031999	IHC*	APrEST87061	47
Anti-CXCR3	CD183	HPA045942	IHC*	APrEST87465	
Anti-ENG	CD105	HPA011862	IHC, WB	APrEST71767	48
		AMAb90925 IgG1	IHC	APrEST71767	
Anti-ENPP3	CD203c	HPA043772	IHC*	APrEST84398	

Product Name	CD Number	Product Number	Validated Applications	PrEST Control Antigens	Refs
Anti-ENTPD1	CD39	HPA014067	IHC*	APrEST72656	
Anti-EPCAM	CD326	HPA026761	IHC*, WB*	APrEST70142	49, 50
		AMAb91411 IgG3	IHC*, WB*	-	
Anti-HER2	CD340	HPA001338	ICC-IF	APrEST90536	
		AMAb90627 IgG1	IHC,WB	APrEST93786	51
Anti-F11R	CD321	HPA061700	IHC*	APrEST87935	
Anti-FCGR2A	CD32A	HPA010718	IHC*,WB*	APrEST72030	
Anti-FCGR3A	CD16	HPA055431	IHC	APrEST85885	
Anti-FZD10	CD350	HPA014484	IHC,ICC-IF	APrEST72737	
		HPA014485	IHC,ICC-IF	APrEST72738	
Anti-GP1BA	CD42b	HPA013316	IHC	APrEST72352	
Anti-GP9	CD42a	HPA063182	IHC	APrEST88020	
Anti-GYPA	CD235a	HPA014811	IHC	APrEST72970	
Anti-GYPC	CD236	HPA008965	IHC*,WB*	APrEST71967	
Anti-HMMR	CD168	HPA061524	ICC-IF	APrEST92159	
Anti-ICAM1	CD54	HPA002126	IHC*,WB*	APrEST83067	52, 53
		HPA004877	IHC*,WB	APrEST83068	54
Anti-IFITM1	CD225	HPA004810	IHC*,WB,ICC-IF	APrEST86661	55
Anti-IFNGR1	CD119	HPA063871	IHC	APrEST88533	
Anti-IGF2R	CD222	HPA011332	IHC,ICC-IF	APrEST86865	
Anti-IL2RA	CD25	HPA054622	IHC*	APrEST87682	
Anti-IL2RB	CD122	HPA062657	IHC*	APrEST86374	
Anti-ITGA2	CD49B	HPA060991	IHC*	APrEST87898	
		HPA063556	IHC*, WB*	APrEST88041	
		AMAb91469 IgG1	IHC*, WB	APrEST88041	
Anti-ITGA2B	CD41	HPA031168	IHC*	APrEST78037	56, 57
		HPA031169	IHC*	APrEST78035	
		HPA031170	IHC*,WB	APrEST78036	
		HPA031171	IHC*	APrEST78038	
Anti-ITGA3	CD49c	HPA008572	IHC*,WB*	APrEST86765	58-60
		AMAb91446 IgG1	IHC*,WB*	APrEST86765	
Anti-ITGA5	CD49e	HPA002642	IHC,WB	APrEST86565	61-63
		AMAb91447 IgG1	IHC*,WB*	APrEST86565	
		AMAb91449 IgG2b	IHC*,WB*	APrEST86565	
Anti-ITGAM	CD11B	AMAb90911 IgG1	IHC*,WB	APrEST83070	
Anti-ITGAV	CD51	HPA004856	IHC, ICC-IF	APrEST70094	
Anti-ITGAX	CD11C	HPA004723	IHC*	APrEST70096	
		AMAb90915 IgG1	IHC*,WB	APrEST70096	
Anti-ITGB2	CD18	HPA008877	IHC*,WB*	APrEST70102	64
		HPA016894	IHC*,WB*, ICC-IF	APrEST70101	
Anti-ITGB3	CD61	HPA027852	IHC	APrEST70070	
		AMAb91470 IgG1	IHC*,WB	APrEST70070	
Anti-ITGB4	CD104	HPA036348	IHC,WB*,ICC-IF	APrEST87175	65,66
		AMAb91453 IgG1	IHC*,WB	APrEST87175	
		AMAb91454 IgG2a	IHC*,WB	APrEST87175	
Anti-JAG1	CD339	HPA021555	IHC*	APrEST76170	67, 68
Anti-KIT	CD117	HPA073252	ICC-IF	APrEST93130	
		HPA004471	IHC	APrEST86859	69,70
		AMAb90901 IgG1	IHC,WB	APrEST86859	
		AMAb90904 IgG2a	IHC,WB	APrEST86859	
Anti-LAG3	CD223	HPA013967	IHC*	APrEST71687	71,72
Anti-LAIR1	CD305	HPA011155	IHC*,WB,ICC-IF	APrEST72187	73,74
Anti-LAMP1	CD107a	HPA014750	IHC	APrEST72362	
		AMAb91170 IgG2a	IHC*,WB	APrEST93498	
		AMAb91299 IgG1	IHC,WB	-	
		AMAb91300 IgG2b	IHC,WB	-	

Product Name	CD Number	Product Number	Validated Applications	PrEST Control Antigens	Refs
Anti-LAMP2	CD107b	HPA029100	IHC*, WB*	APrEST78254	75,76
Anti-LAMP3	CD208	HPA051467	IHC*,ICC-IF	APrEST85286	
Anti-LRP1	CD91	HPA004182	IHC, ICC-IF	APrEST86741	
		HPA022903	IHC*,WB	APrEST86752	
Anti-LY75	CD205	HPA049108	IHC,WB	APrEST85273	
Anti-MCAM	CD146	HPA008848	IHC*,WB*	APrEST71658	77
Anti-MME	CD10	HPA052583	IHC*	APrEST88588	
		AMAb91788 IgG2b	IHC*	-	
Anti-MRC1	CD206	HPA004114	IHC*,WB	APrEST86249	78-81
		AMAb90746 IgG2b	IHC*,WB	APrEST86249	82-84
Anti-MRC2	CD280	HPA041991	IHC*	APrEST71618	
Anti-MS4A1	CD20	HPA014341	IHC*,WB*, ICC-IF	APrEST73138	85,86
		AMAb91636 IgG2a	IHC*, WB	APrEST73138	
Anti-MSR1	CD204	HPA000272	IHC*,WB*	APrEST76111	87-90
Anti-MUC1	CD227	HPA004179	IHC*	APrEST86683	91-95
		AMAb91533 IgG1	IHC*	APrEST70726	
		HPA008855	IHC*	APrEST70726	
Anti-NCAM1	CD56	HPA039835	IHC*,WB,ICC-IF	APrEST87341	96-98
		AMAb91807 IgG2b	IHC*	APrEST87341	
Anti-NGFR	CD271	HPA004765	IHC*,WB,ICC-IF	APrEST70014	99-100
Anti-NT5E	CD73	HPA017357	IHC,WB,ICC-IF	APrEST72880	101-103
Anti-PDCD1	CD279	HPA035981	IHC*,WB*	APrEST70027	
		AMAb91197 IgG1	IHC,WB	APrEST70027	
Anti-PDGFRA	CD140a	HPA004947	ICC-IF	APrEST93915	
Anti-PRNP	CD230	HPA042754	IHC*	APrEST83152	
Anti-PROCR	CD201	HPA039461	IHC	APrEST81837	
Anti-PVRL2	CD112	HPA012759	IHC*	APrEST71916	104
Anti-S1PR1	CD363	HPA075568	ICC-IF	APrEST93288	
Anti-SELP	CD62	HPA002655	IHC, WB*	APrEST83066	
		HPA005990	IHC*, WB*	APrEST83065	
Anti-SIGLEC1	CD169	HPA053457	IHC	APrEST85314	
Anti-SIGLEC5	CD170	HPA009085	IHC,WB*	APrEST71740	
Anti-SIGLEC6	CD327	HPA009084	IHC*,WB	APrEST71738	
		HPA018198	IHC*	APrEST71739	
Anti-SLAMF7	CD319	HPA055945	IHC,WB	APrEST87737	105-107
Anti-SLAMF8	CD353	HPA067601	IHC*	APrEST92742	
Anti-SLC3A2	CD98	HPA017980	IHC,WB,ICC-IF	APrEST72200	108
Anti-SLC44A1	CD92	HPA064714	ICC-IF	APrEST92490	
Anti-SPN	CD43	HPA055244	IHC*	APrEST85995	
Anti-TEK	CD202b	HPA073265	ICC-IF	APrEST93133	
Anti-TFRC	CD71	HPA028598	IHC*,WB,ICC-IF	-	109
Anti-THBD	CD141	HPA002982	IHC,WB,ICC-IF	APrEST83062	
Anti-TLR8	CD288	HPA001608	IHC*	APrEST74296	
Anti-TNFRSF11A	CD265	HPA047976	ICC-IF	APrEST91115	
Anti-TNFRSF13C	CD268	HPA003246	IHC*,WB*	APrEST73581	
Anti-TNFSF11	CD254	HPA045142	IHC*	APrEST87449	110
Anti-TSPAN7	CD231	HPA003140	IHC,WB*	APrEST74399	111
		AMAb90621 IgG1	IHC*,WB	APrEST74399	
		AMAb90624 IgG1	IHC*	APrEST74399	112
Anti-VCAM1	CD106	HPA034796	IHC*	APrEST87093	
		HPA069867	WB, ICC-IF	APrEST90289	

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