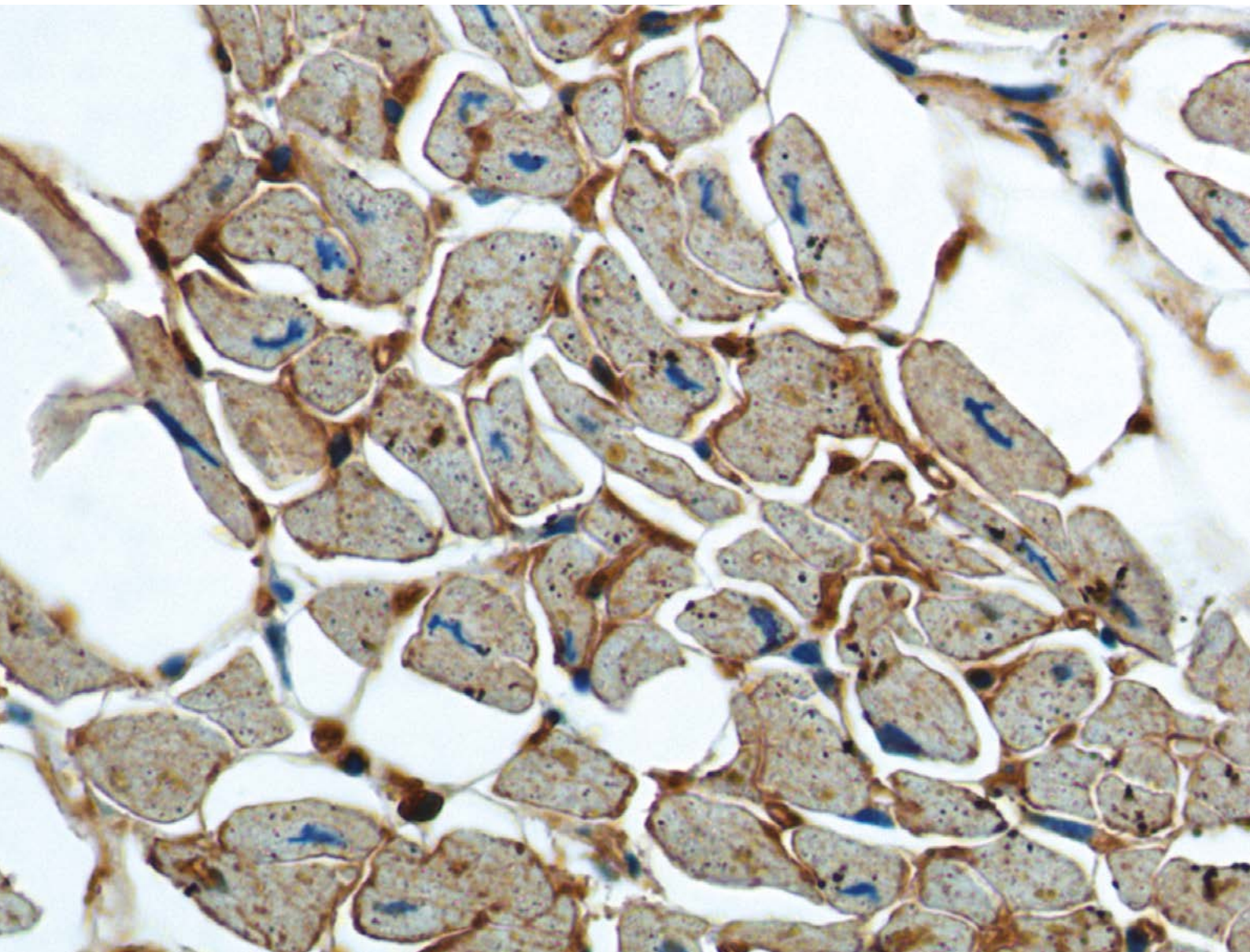


# MARKERS FOR IMMUNE CELLS

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**Front Cover:**

*Immunohistochemical staining of paraffin-embedded human heart tissue using CD36 antibody (18836-1-AP) at a dilution of 1:50 (40x objective).*

# WELCOME

The human immune system contains a collection of different cell types and molecules that help to protect the body from toxins, viral infections, bacteria, and parasites. Although immunology covers all aspects of this complex network, the field is united by the immune cell. The central points of immunology are: understanding, identifying, and distinguishing the many different immune cells that are essential for diagnosis and therapy. Cell markers are helpful tools used to identify a specific immune cell population. This catalog offers a detailed choice of the most commonly used cell markers and an extensive selection of antibodies used in immunology.

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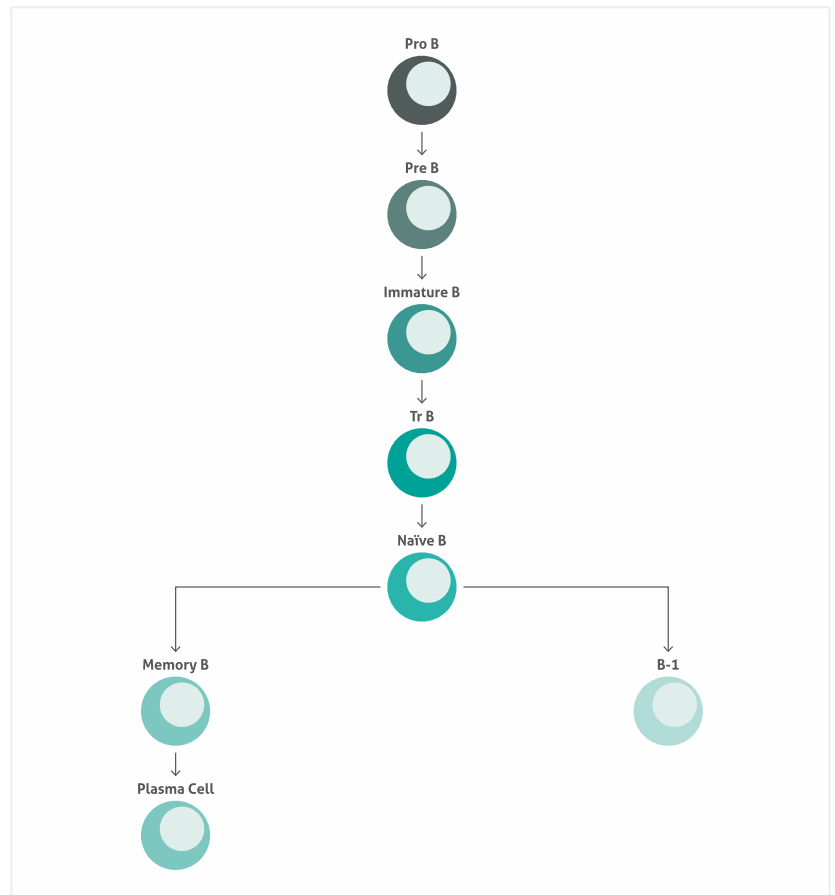




## B Cells

B cells (bursal or bone marrow-derived cells) are lymphocytes that play a pivotal role in the adaptive immune system and disruption of B cell function is a common hallmark of many different diseases. B cells are produced in the bone marrow and migrate to the spleen and other secondary lymphoid tissues for maturation. B cells go through several stages of development during exposure to antigens. Some cell surface markers used to identify B cells are listed below; more markers can be found at [www.ptglab.com](http://www.ptglab.com).

### Maturation Of Human B Cells



### Related Antibodies

Antibody Name	Catalog Number	Type	Applications
BSAP/PAX5	21388-1-AP	Rabbit Poly	ELISA, IHC, WB
BSAP/PAX5	60349-1-IG	Mouse Mono	ELISA, WB
CD38	<b>1</b> 25284-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
CD38	60006-1-IG	Mouse Mono	ELISA, IF, WB
CD138/Syndecan-1	<b>2</b> 10593-1-AP	Rabbit Poly	ELISA, IHC, WB
CD138/Syndecan-1	60185-2-IG	Mouse Mono	ELISA, IHC, WB
MME/CD10	<b>2</b> 18008-1-AP	Rabbit Poly	ELISA, FC, IHC, IP, WB
MME/CD10	60034-3-IG	Mouse Mono	ELISA, IHC, WB

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For more related antibodies visit [www.ptglab.com](http://www.ptglab.com).

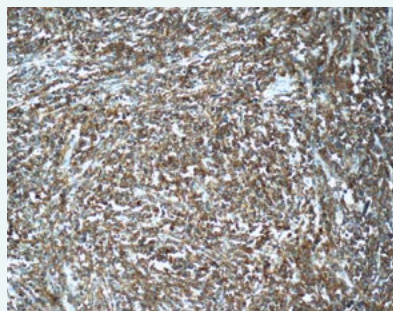
## PRODUCT FOCUS

### CD20

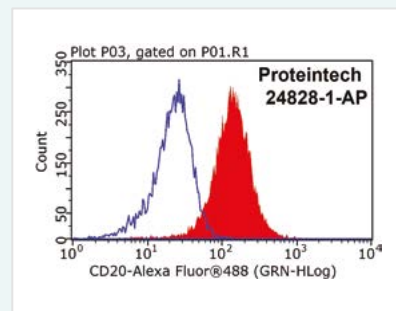
CD20 is a B-lymphocyte surface molecule that is widely expressed during B-cell ontogeny, from early pre-B-cell developmental stages until final differentiation into plasma

cells. It is involved in the regulation of B-cell activation and proliferation. CD20 also serves as a useful target for antibody-mediated therapeutic depletion of B cells.

Antibody Name	Catalog Number	Type	Applications
CD20	24828-1-AP	Rabbit Poly	ELISA, FC, IHC, IP, WB
CD20	60271-1-IG	Mouse Mono	ELISA, FC, IHC, WB



Immunohistochemical staining of paraffin-embedded human lymphoma slides using CD20 antibody (24828-1-AP) at a dilution of 1:50 (10x objective).



1X10<sup>6</sup> Raji cells were stained with 0.2ug MS4A1, CD20 antibody (24828-1-AP red), and control antibody (blue), fixed with 4% PFA, and blocked with 3% BSA (30 min). Secondary antibody: Goat anti-Rabbit IgG Alexa Fluor 488 conjugate, dilution 1:100.

### T Cells

T cells are white blood cells. They perform a variety of functions in the blood system. T cells detect cellular abnormalities, directly destroy bacterially infected cells, and support other immune cells to produce antibodies. Thus, T cells are essential for the human immune system. There are different types of T cells named helper T cell, killer T cell, and regulatory T cell (Treg). Every T cell type expresses different cell surface markers and secretes different cytokines. A short list is mentioned below and on the following page.

### Treg

Antibody Name	Catalog Number	Type	Applications
CD2	10299-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
CD3 epsilon	17617-1-AP	Rabbit Poly	ELISA, FC, IHC, IP, WB
CD3 epsilon	2 60181-1-IG	Mouse Mono	ELISA, FC, IHC, WB
CD3 gamma	21120-1-AP	Rabbit Poly	ELISA, IF, WB
CD3 gamma	60347-1-IG	Mouse Mono	ELISA, IHC, WB
NT5E/CD73	12231-1-AP	Rabbit Poly	ELISA, FC, IHC, WB

## T Helper Cells

Antibody Name	Catalog Number	Type	Applications
CCR5	<b>1</b> 11056-2-AP	Rabbit Poly	ELISA, IHC, IP, WB
CD4	17476-1-AP	Rabbit Poly	ELISA, FC, WB
CXCR3B-specific	<b>5</b> 60065-1-IG	Mouse Mono	ELISA, WB

## Killer T Cells

Antibody Name	Catalog Number	Type	Applications
CD8a	17335-1-AP	Rabbit Poly	ELISA, IHC
CD8b	21256-1-AP	Rabbit Poly	ELISA, WB

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For more related antibodies visit [www.ptglab.com](http://www.ptglab.com).

## Monocytes and Macrophages

Macrophages (and their precursor cells, monocytes) are important cells of the immune system. Upon infection or tissue damage, monocytes, one of the major groups of white blood cells, rapidly differentiate into macrophages. Macrophages are large, specialized cells that are present in every tissue of the body. They recognize and consequently destroy the target cell. Macrophages provide a first line of defense in protecting the host from infection.

## Related Antibodies

Antibody Name	Catalog Number	Type	Applications
CD11c/ Integrin alpha X	<b>1</b> 17342-1-AP	Mouse Mono	ELISA, FC, IHC, WB
CD11c/ Integrin alpha X	<b>1</b> 60258-1-IG	Rabbit Poly	ELISA, IHC, WB
CD13	<b>1</b> 14553-1-AP	Mouse Mono	ELISA, FC, IHC, WB
CD14	<b>3</b> 17000-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
CD206	<b>3</b> 18704-1-AP	Mouse Mono	ELISA, FC, IHC, WB
CD206	<b>1</b> 60143-1-IG	Rabbit Poly	ELISA, WB

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Macrophage is a Greek term formed by "makro" meaning big and "phagein" meaning eat.



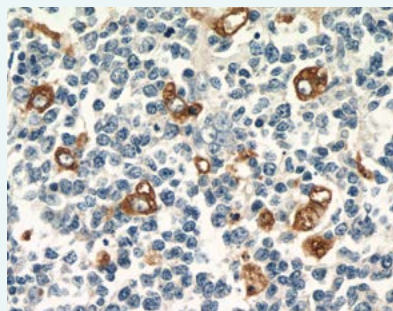
# PRODUCT FOCUS

## CD68

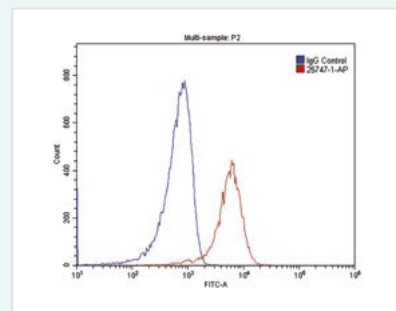
CD68 is an essential marker in macrophage research. CD68 is a type I transmembrane glycoprotein that is highly expressed by human monocytes and tissue macrophages. The main functions of CD68 include the

clearance of cellular debris and the recruitment of macrophages. CD68 is predominantly localized in lysosomes and endosomes, with a smaller amount localized in the cell surface.

Antibody Name	Catalog Number	Type	Applications
CD68	<b>12</b> 25747-1-AP	Mouse Mono	ELISA, FC, IF, IHC, WB



Immunohistochemical staining of paraffin-embedded human tonsillitis tissue slides using CD68 antibody (25747-1-AP) at a dilution of 1:50 (40x objective).



1X10<sup>6</sup> RAW 264.7 cells were stained with 0.2ug CD68 antibody (25747-1-AP, red) and control antibody (blue), fixed with 4% PFA, and blocked with 3% BSA (30 min). Secondary antibody: Goat Anti-Rabbit IgG(H+L) Alexa Fluor 488 conjugated, dilution of 1:1500.

## Granulocytes

Granulocytes are a type of white blood cells. They comprise about 60% of all white blood cells. There are three different forms of granulocytes: basophils, eosinophils, and neutrophils. All granulocyte forms have the capacity to ingest virus particles, bacteria, or other parasites. For this reason, granulocytes contain big granules packed with enzymes that help to digest the foreign molecule.

## Basophils

Basophils are a small subgroup of granulocytes. Basophils are mainly involved in defense against parasites and in response to allergic reactions. Basophils contain several surface molecules, the most representative of which are listed below.

Antibody Name	Catalog Number	Type	Applications
ICAM-1	<b>9</b> 10831-1-AP	Rabbit Poly	ELISA, FC, IHC, IP, WB
ICAM-1	<b>5</b> 60299-1-IG	Mouse Mono	ELISA, FC, IHC, WB
CD44	<b>13</b> 15675-1-AP	Rabbit Poly	ELISA, FC, IF, IHC, IP, WB
CD44	<b>1</b> 60224-1-IG	Mouse Mono	ELISA, FC, IF, IHC, WB
TLR4	<b>7</b> 19811-1-AP	Rabbit Poly	ELISA, IHC, WB

## Eosinophils

Eosinophils, like all other granulocyte forms, destroy parasites. Besides this, eosinophils are proinflammatory cells (that are) able to produce and release toxic proteins. Hence, eosinophils are also involved in allergic reactions.

Antibody Name	Catalog Number	Type	Applications
C5aR	<b>1</b> 21316-1-AP	Rabbit Poly	ELISA, FC, IF, IHC, IP, WB
CXCR3B-specific	<b>5</b> 60065-1-IG	Mouse Mono	ELISA, WB
Fc epsilon RI alpha	<b>3</b> 10980-1-AP	Rabbit Poly	ELISA, IHC, WB

## Neutrophils

Neutrophils are the most common granulocyte cell type found in the blood system. They display the first defense mechanism to bacterial infection or other acute inflammations. Some markers are mentioned below.

Antibody Name	Catalog Number	Type	Applications
C5aR	<b>1</b> 21316-1-AP	Rabbit Poly	ELISA, FC, IF, IHC, IP, WB
CD10	10302-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
CD14	<b>3</b> 17000-1-AP	Rabbit Poly	ELISA, FC, IHC, WB

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For more related antibodies visit [www.ptglab.com](http://www.ptglab.com).

## Dendritic Cells

Dendritic cells (DC) are potent antigen-presenting cells that are important for the induction of the primary immune response, including induction of T cell responses, migration, or antigen capture. Dendritic cells are found in different tissues and immature forms are also found in the blood. They differentiate and become active in different tissues to take up and process the antigen. In general, activated dendritic cells move to the lymph tissue to interact with T or B cells.

Selected dendritic cell marker antibodies from different monoclonal and polyclonal antibodies are listed below.

## Related Antibodies

Antibody Name	Catalog Number	Type	Applications
CD21	24374-1-AP	Rabbit Poly	ELISA, IHC
CD23	18642-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
CD23	60208-1-IG	Mouse Mono	ELISA, IHC, WB
Clusterin	12289-1-AP	Rabbit Poly	ELISA, IHC, IP, WB
Clusterin	66109-1-IG	Mouse Mono	ELISA, IHC, WB

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For more related antibodies visit [www.ptglab.com](http://www.ptglab.com).

## Mast Cells

Mast cells are a type of leukocyte. They are best known for their role in mediating allergic diseases and autoimmunity. However, they also play an important role in defending against pathogens. Mast cells are found in most tissues of the body, especially in areas that are in contact with the external environment such as the skin or intestine. In their immature form, mast cells circulate in the blood. Mast cells contain several inflammatory factors, lipid mediators, and many more factors. Upon stimulation, they degranulate and release different mediators, which in turn modulates the host's innate immune system.

### Related Antibodies

Antibody Name	Catalog Number	Type	Applications
CD33	17425-1-AP <span style="color: teal;">1</span>	Rabbit Poly	ELISA, IF, IHC, WB
Integrin alpha-4	19676-1-AP <span style="color: teal;">1</span>	Rabbit Poly	ELISA, IHC, WB
Integrin beta-1	12594-1-AP <span style="color: teal;">4</span>	Rabbit Poly	ELISA, WB
Transferrin receptor/CD71	10084-2-AP <span style="color: teal;">5</span>	Rabbit Poly	ELISA, IHC, IP, WB

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For more related antibodies visit [www.ptglab.com](http://www.ptglab.com).

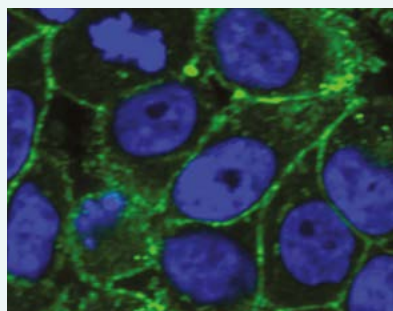
## PRODUCT FOCUS

### CD44

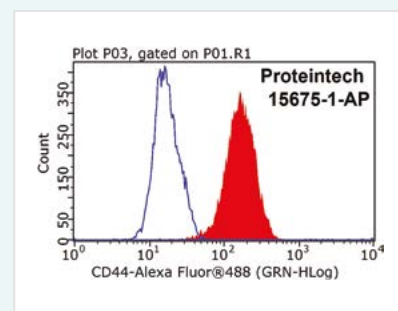
CD44 is a type I transmembrane glycoprotein that mediates cell-cell and cell-matrix interactions through its affinity for hyaluronic acid (HA) and possibly also through its affinity for other ligands.

Adhesion with HA plays an important role in cell migration and tumor growth. CD44 is also involved in lymphocyte activation, recirculation and homing, and in hematopoiesis.

Antibody Name	Catalog Number	Type	Applications
CD44	15675-1-AP <span style="color: teal;">13</span>	Rabbit Poly	ELISA, FC, IF, IHC, IP, WB
CD44	60224-1-IG <span style="color: teal;">1</span>	Mouse Mono	ELISA, FC, IF, IHC, WB



Immunofluorescence staining of HepG2 cells (-20°C Ethanol fixed) with CD44 antibody (15675-1-AP) at a dilution of 1:50 and Goat Anti-Rabbit IgG(H+L) Alexa Fluor 488-conjugated secondary antibody.



1X10<sup>6</sup> HeLa cells were stained with 0.2ug CD44 antibody (15675-1-AP, red) and control antibody (blue), fixed with 4% PFA, and blocked with 3% BSA (30 min). Secondary antibody: Goat anti-Rabbit IgG Alexa Fluor 488 conjugated, dilution of 1:100.

## Megakaryocytes

Megakaryocytes are rare myeloid cells found primarily in the bone marrow. Megakaryocytes produce thrombocytes, which are essential for normal blood clotting. The formation of platelets requires several intrinsic series of remodeling events of the megakaryocytes that result in the release of thousands of platelets from one single megakaryocyte.

### Related Antibodies

Antibody Name	Catalog Number	Type	Applications
CD42b	<b>2</b> 12860-1-AP	Rabbit Poly	ELISA, IHC, IP, WB
Integrin beta-3	<b>3</b> 18309-1-AP	Rabbit Poly	ELISA, IHC, WB

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For more related antibodies visit [www.ptglab.com](http://www.ptglab.com).

**A megakaryocyte is a large cell (around 100  $\mu\text{m}$  in diameter) with a polyploid nucleus. Megakaryocytes can mainly be found in bone marrow. Synonyms: megakaryocyte, megalokaryocyte, thromboplast.**

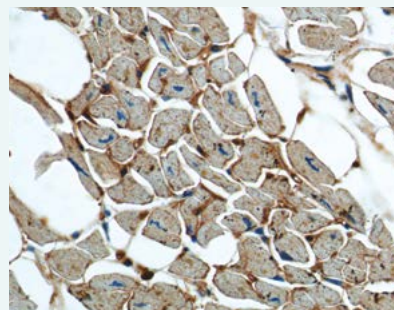
## PRODUCT FOCUS

### CD36

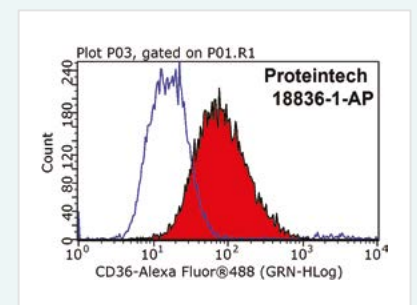
CD36 is a commonly used marker for megakaryocytes. It has numerous potential physiological functions. CD36 binds to collagen, thrombospondin, anionic phospholipids, and long-chain fatty acids

and may function in the transport of fatty acids. CD36 also functions as a cell adhesion molecule. It mediates cytoadherence of *Plasmodium falciparum*-parasitized erythrocytes.

Antibody Name	Catalog Number	Type	Applications
CD36	<b>10</b> 18836-1-AP	Rabbit Poly	ELISA, FC, IHC, WB



Immunohistochemical staining of paraffin-embedded human heart tissue using CD36 antibody (18836-1-AP) at a dilution of 1:50 (40x objective).



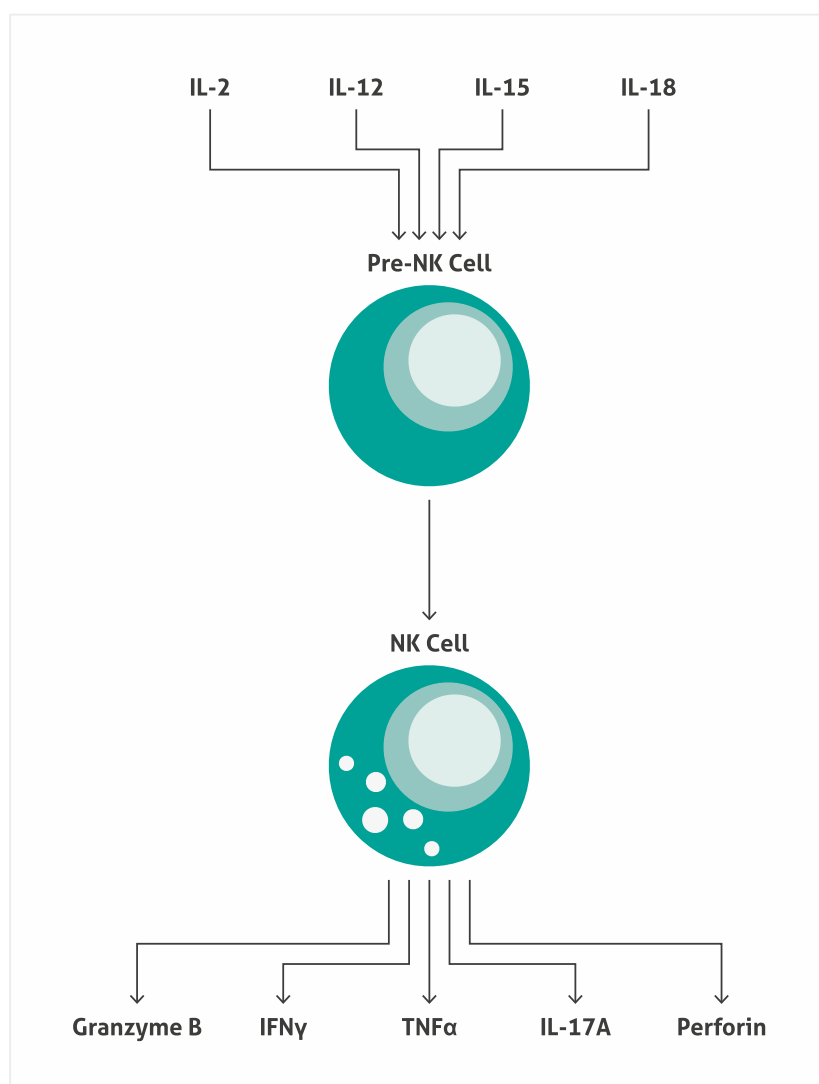
$1 \times 10^6$  RAW 264.7 cells were stained with 0.2  $\mu\text{g}$  CD36 antibody (18836-1-AP, red) and control antibody (blue), fixed with 90% MeOH, and blocked with 3% BSA (30 min). Secondary antibody: Goat Anti-Rabbit IgG(H+L) Alexa Fluor 488 conjugated, dilution of 1:1000.

## NK Cells

Natural killer (NK) cells are lymphocytes that are essential in the innate immune system. They are important especially for the destruction of cells infected by a virus or of tumor cells. NK cells kill infected cells by releasing small cytoplasmic granules that trigger cell death (apoptosis).

### Maturation Of Natural Killer Cells

The pre-NK cell gets activated in response to, e.g., IL-2, IL-12, IL-15, or IL-18. The NK cell then produces and secretes several cytokines, chemokines, and cell death-inducing proteins.



### Related Antibodies

Antibody Name	Catalog Number	Type	Applications
CD11c/ Integrin alpha X	<b>1</b> 17342-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
CD11c/ Integrin alpha X	<b>1</b> 60258-1-IG	Mouse Mono	ELISA, IHC, WB
GZMB	<b>2</b> 13588-1-AP	Rabbit Poly	ELISA, IF, IHC, WB
NCAM1/CD56	<b>3</b> 14255-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
TIA1	<b>4</b> 12133-2-AP	Rabbit Poly	ELISA, IP, WB

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For more related antibodies visit [www.ptglab.com](http://www.ptglab.com).



## Erythrocyte

Erythrocytes (also known as red blood cells) are the most common cell type in the blood system. They are essential for the delivery of oxygen from the lungs to body tissue. Mature erythrocytes do not have a nucleus and lack most organelles. They are of flexible shape, thus flowing easily through the blood circulation.

### Related Antibodies

Antibody Name	Catalog Number	Type	Applications
Hemoglobin alpha	2 12361-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
Hemoglobin epsilon	4 14537-1-AP	Rabbit Poly	ELISA, IP, WB

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For more related antibodies visit [www.ptglab.com](http://www.ptglab.com).

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### CD24

CD24 (known as heat stable antigen) is a small highly glycosylated GPI-linked sialoprotein. It is normally expressed at the surface of most B lymphocytes and differentiating neuroblasts, and is also upregulated in a wide variety

of cancers. Studies have shown that CD24 functions in the regulation of B-cell apoptosis, leukocyte signal transduction, and leukocyte adhesion.

Antibody Name	Catalog Number	Type	Applications
CD24	1 18330-1-AP	Rabbit Poly	ELISA, WB

## Myeloid-derived Suppressor Cells

Myeloid-derived suppressor cells (MDSCs) form a very heterogeneous cell population. MDSCs are of great interest as they expand during cancer, inflammation, or infection. In addition, they have not only the ability to secrete immunosuppressive cytokines that regulate T cell function, but they also have the capacity to suppress the cytotoxic effects of natural killer cells.

### Related Antibodies

Antibody Name	Catalog Number	Type	Applications
CD11B/ Integrin alpha M	20991-1-AP	Rabbit Poly	ELISA, FC, IHC, WB
CD33	1 17425-1-AP	Rabbit Poly	ELISA, FC, IF, IP, WB
VEGFR-1/FLT-1	1 13687-1-AP	Rabbit Poly	ELISA, IP, WB

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