



PATHOLOGY SERVICES

Immunohistochemistry Portfolio

A comprehensive portfolio of our IHC Services

Pathology-based technologies are used to address mechanistic cell response characterization and issue-driven needs of a comprehensive array of therapeutic modalities and chemical classes. Immunohistochemistry is a valuable tool used to localize cellular expression of specific proteins within the context of the tissue. IHC procedures can be quite complex to perform; thus, it is of utmost importance to choose a partner who has vast experience and deep scientific knowledge of performing these procedures in order to avoid compromised study design and delayed timelines.

Charles River offers a range of optimized immunohistochemical protocols and can develop new protocols to answer study-specific questions. We also evaluate and interpret staining data and produce high-quality reports for a variety of test articles.

This brochure contains a current list of our IHC stains and is updated several times throughout the year to include newly developed procedures.

Why partner with us?

- Experienced staff with state-of-the-art automated staining instruments
- Assay development for novel and unique antibodies (~70 annually)
- Experience with double IHC staining
- Protocol development for 100+ unique antibodies in a variety of species and tissues
- GLP and non-GLP studies
- Fluorescence microscope for immunofluorescence of up to 4 color channels
- Superior reproducibility of immunohistochemical techniques in conjunction with morphometric and stereological analysis



Ki67

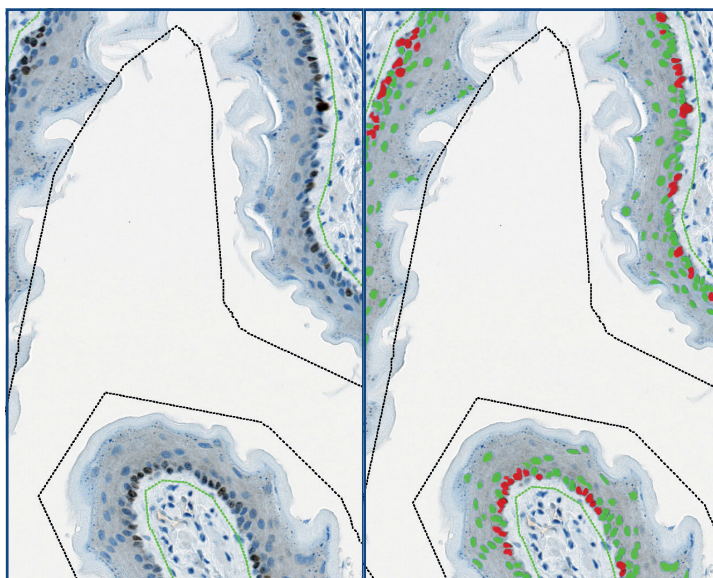
Function/Expression:

Used as a marker of cell proliferation.

Species Stained: Rat, Mouse, Nonhuman Primate, Dog

Tissues Stained: Several

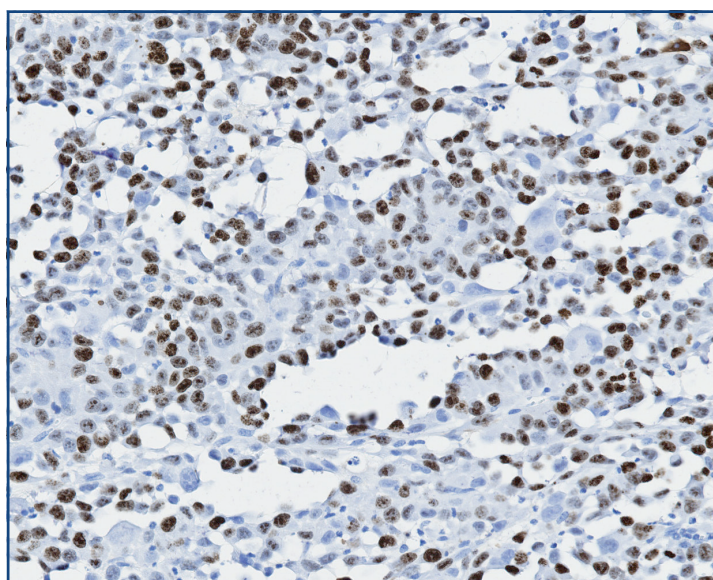
Notes: Can be combined with morphometric analysis for determination of labeling index in cell proliferation assays.



Mouse esophagus
Anti-Ki67 antibody
20X

Image analysis configuration for determination of labeling index.

- Green: unlabeled nuclei
- Red: labeled nuclei



Mouse tumor
Anti-Ki67 antibody
20X



BrdU (5-bromo-2'-deoxyuridine)

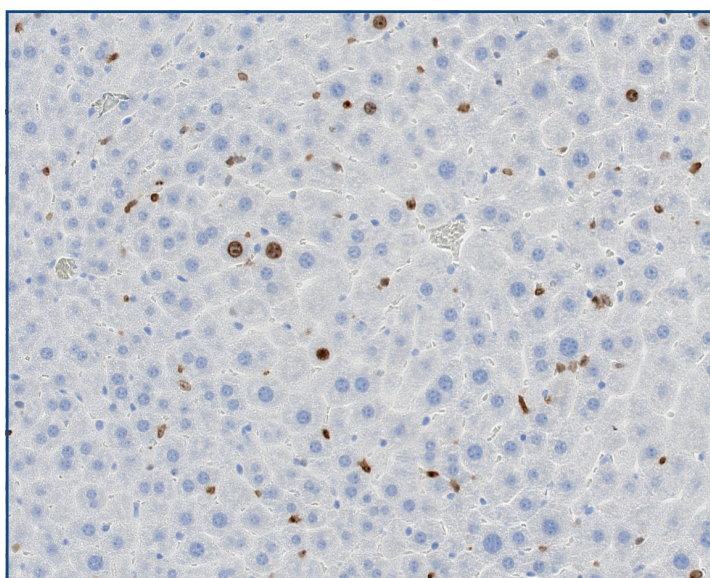
Function/Expression:

Reacts with BrdU in single stranded DNA. Detects nucleated cells in S-phase which have BrdU incorporated into their DNA.

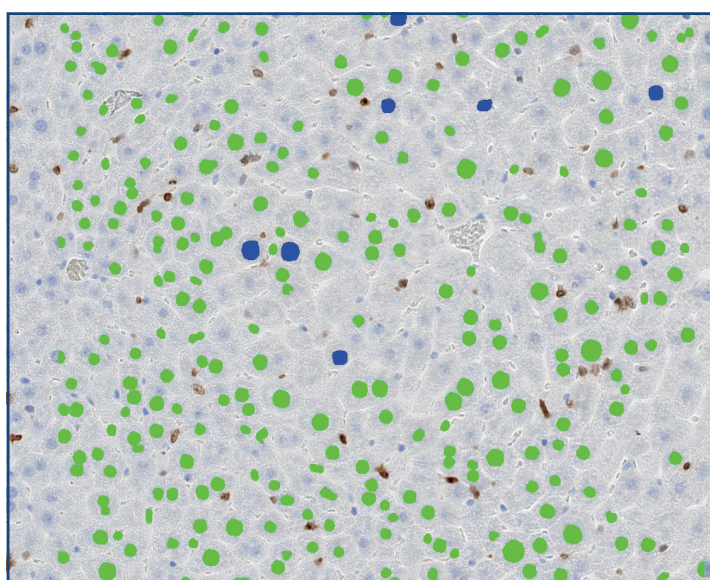
Species Stained: Rat, Mouse

Tissues Stained: Several

Notes: Can be used for detection of labeling index for cell proliferation assays.



Rat liver
Anti-BrdU antibody
20X



Rat liver
Anti-BrdU antibody
20X

Image analysis configuration for determination of labeling index.

- Green nuclei: unlabeled hepatocytes
- Blue nuclei: labeled hepatocytes



Proliferating Cell Nuclear Antigen (PCNA)

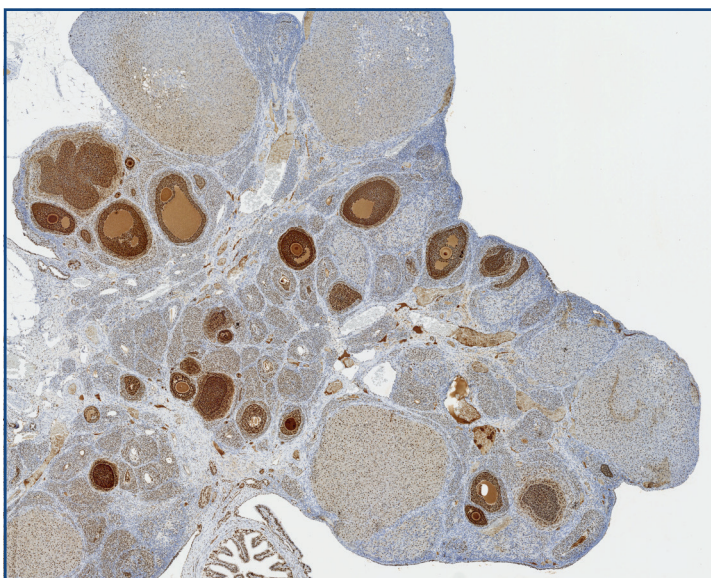
Function/Expression:

Involved in DNA replication. Used as a marker of cell proliferation. Also used to identify primordial and primary follicles for oocyte enumeration.

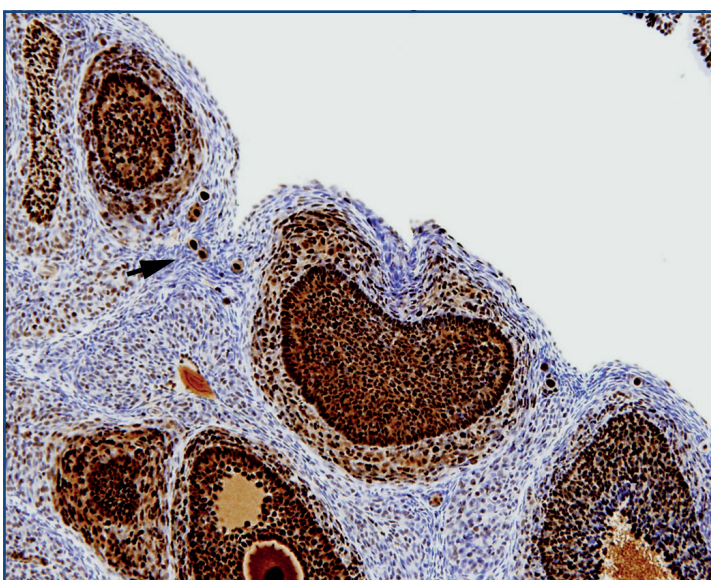
Species Stained: Rat, Mouse

Tissues Stained: Several

Notes: Used for oocyte enumeration studies (Picut *et al.* Ovarian follicle counts using PCNA and semi-automated image analysis in rats, *Toxicologic Pathology* **2008**, 36, 674-679).

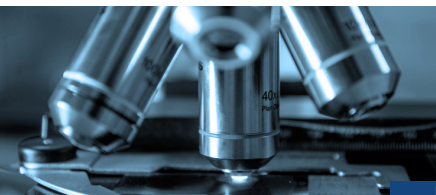


Rat ovary
Anti-PCNA antibody
2X



Rat ovary
Anti-PCNA antibody
10X

Arrow illustrates
primordial follicles.



Caspase 3

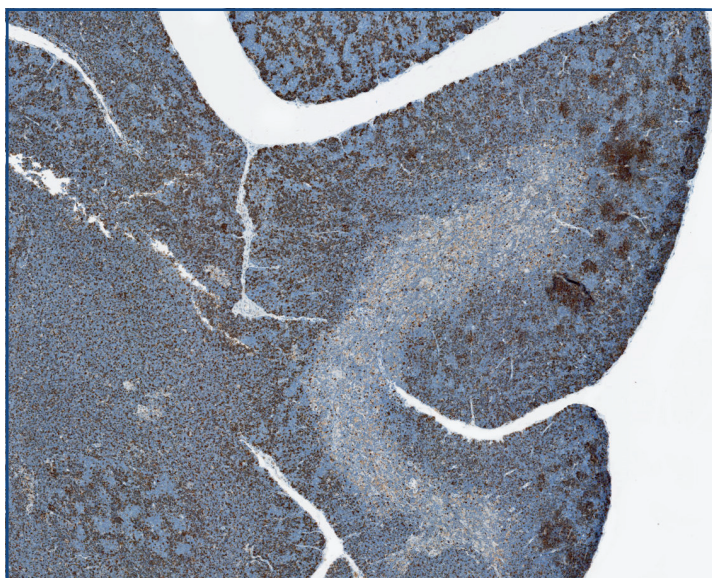
Function/Expression:

Involved in apoptosis.

Species Stained: Rat, Mouse

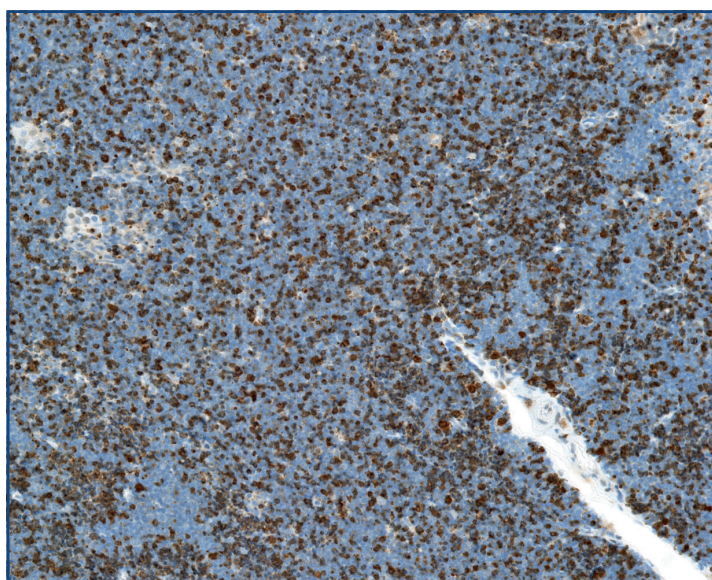
Tissues Stained: Several

Notes: Positive-control tissue obtained through in-house study.



Dexamethasone-treated rat thymus

Anti-caspase 3 antibody
5X



Dexamethasone-treated rat thymus

Anti-caspase 3 antibody
20X



TUNEL (terminal deoxynucleotidyl transferase [TdT]-mediated dUTP nick end labeling)

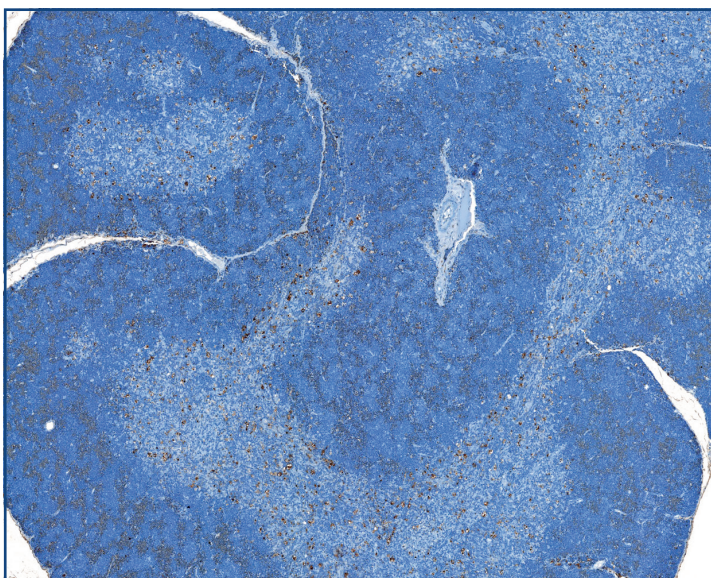
Function/Expression:

Kit for labeling apoptotic cells.

Species Stained: Rat, Mouse

Tissues Stained: Several

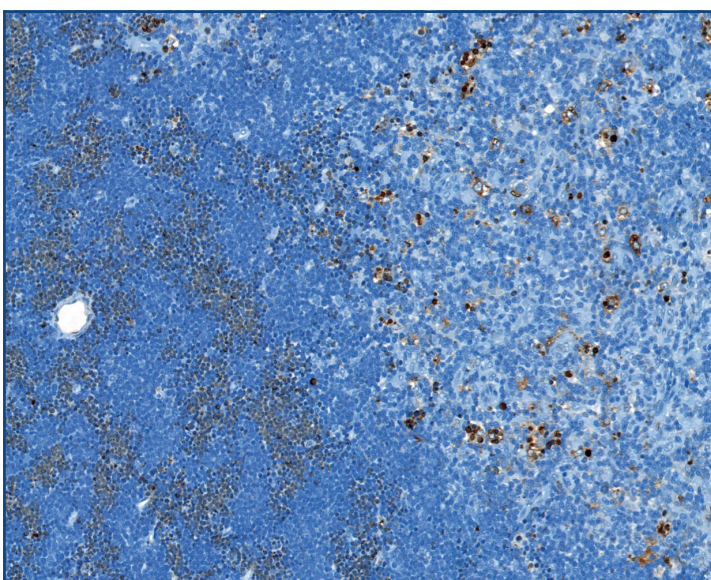
Notes: Positive-control tissue obtained through in-house study.



Dexamethasone-treated
rat thymus

TUNEL kit

5X



Dexamethasone-treated
rat thymus

TUNEL kit

20X



NeuN

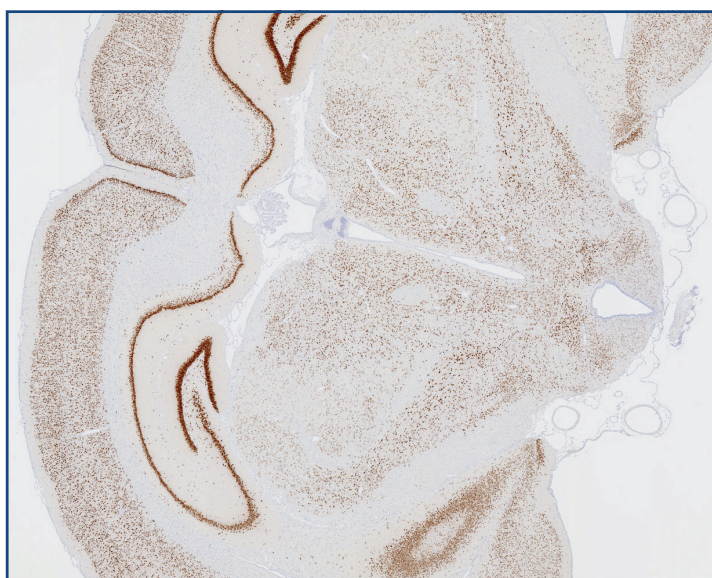
Function/Expression:

Neuron-specific protein. Used as a neuronal marker.

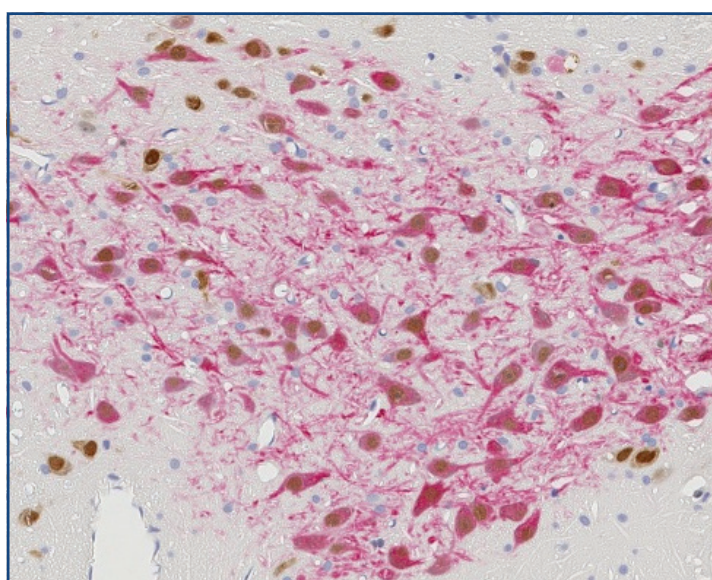
Species Stained: Rat, Mouse

Tissues Stained: Brain, Spinal Cord, Ganglia

Notes: Can be used in conjunction with a cytoplasmic marker for neuronal subpopulations (i.e., tyrosine hydroxylase for dopaminergic neurons) for use in stereology studies.



Rat brain, Anti-NeuN antibody
1X



Rat brain (substantia nigra)
Anti-TH antibody and Anti-NeuN
antibody double-stain
20X



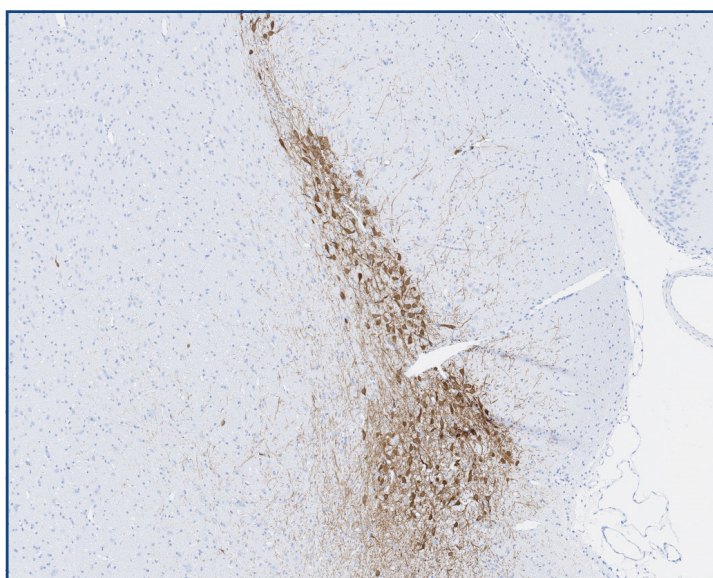
Tyrosine hydroxylase (TH)

Function/Expression:

Catalyzes conversion of L-tyrosine to L-DOPA, which is a precursor for epinephrine and norepinephrine.

Species Stained: Rat, Mouse, Nonhuman Primate

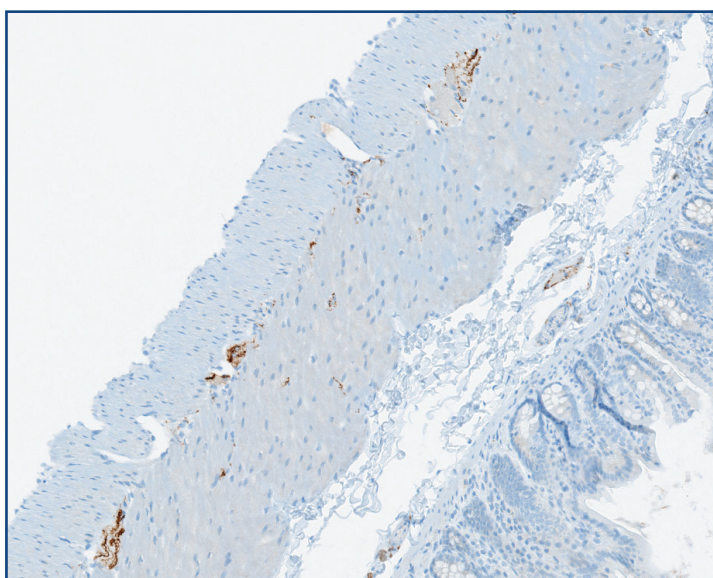
Tissues Stained: Several



Rat brain (substantia nigra)

Anti-TH antibody

5X



Rat cecum

Anti-TH antibody

10X



Choline acetyltransferase (ChAT)

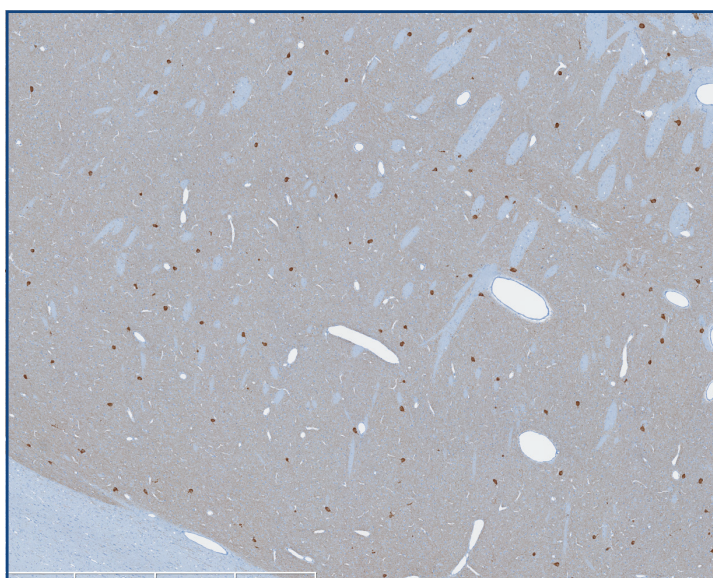
Function/Expression:

Involved in synthesis of the neurotransmitter acetylcholine. Used as a marker for cholinergic neurons.

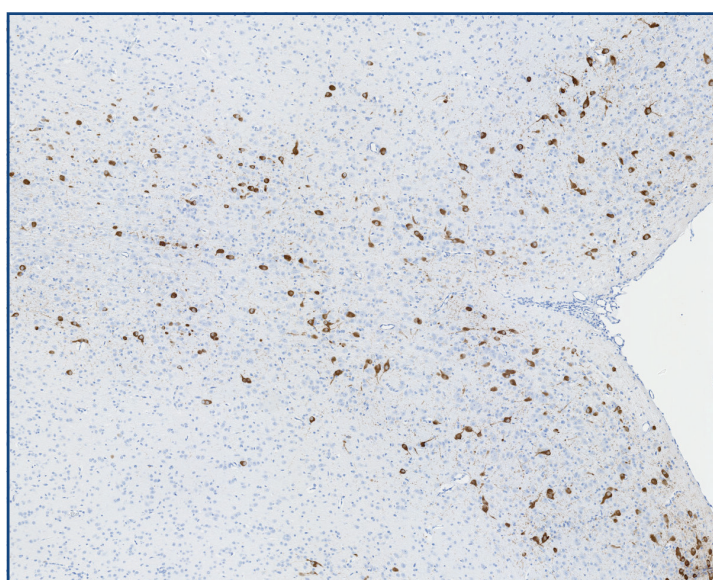
Species Stained:

Rat, Nonhuman Primate

Tissue Stained: Brain



Nonhuman primate brain
Anti-ChAT antibody
2X



Rat brain
Anti-ChAT antibody
5X



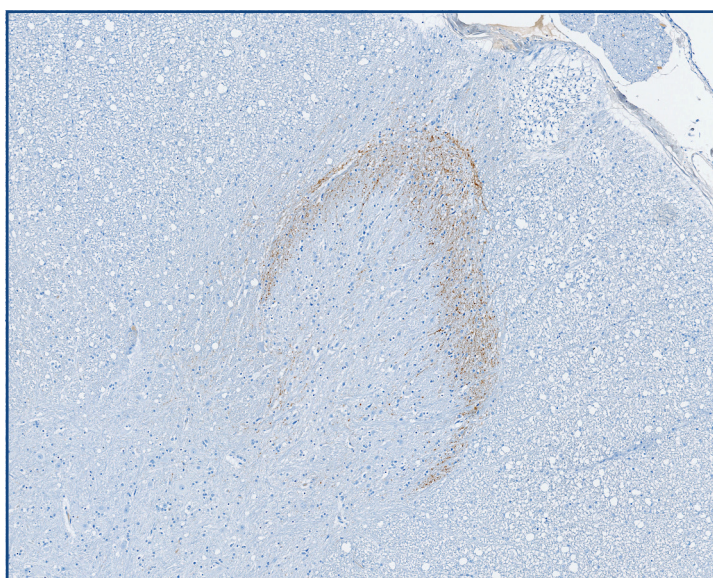
Substance P

Function/Expression:

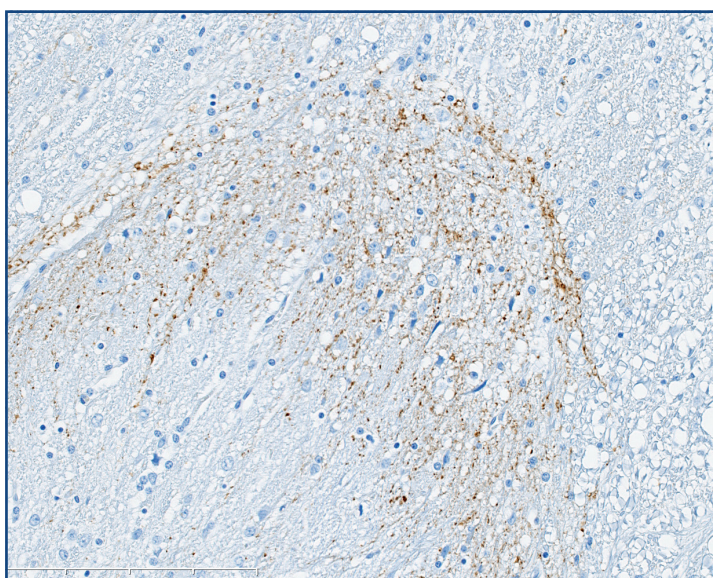
Tachykinin that excites neurons, is a potent vasodilator, and contracts smooth muscle.

Species Stained: Rat,
Nonhuman Primate

Tissues Stained: Brain,
Spinal Cord



Nonhuman primate spinal cord
Anti-Substance P antibody
5X



Nonhuman primate spinal cord
Anti-Substance P antibody
10X



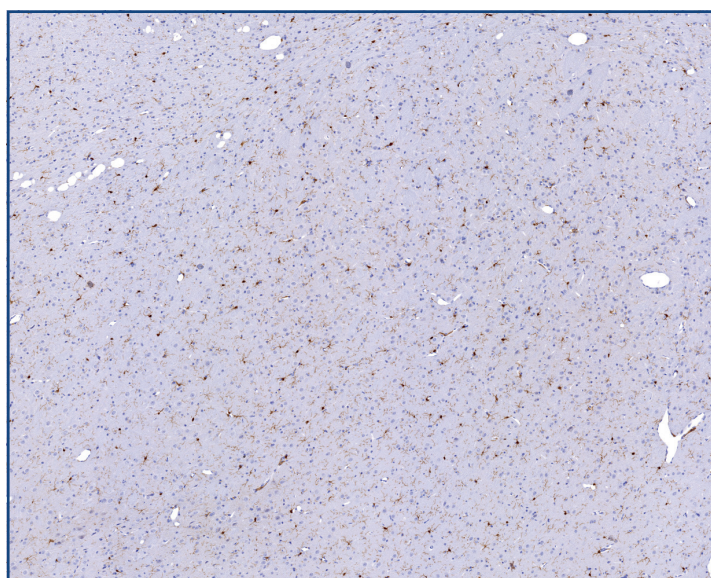
Ionized Calcium-Binding Adapter Molecule 1 (Iba1)

Function/Expression:

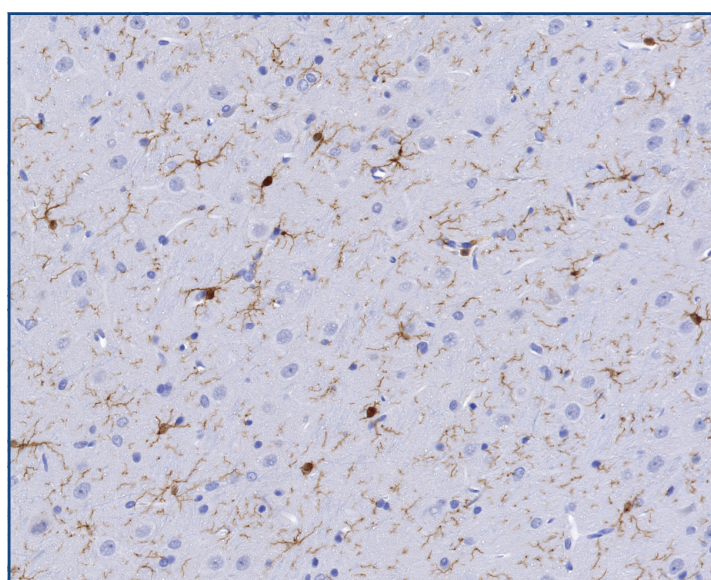
Expressed in macrophages/microglia and upregulated during activation of these cells. Upregulated in microglia following ischemia or nerve injury.

Species Stained: Rat, Mouse

Tissue Stained: Brain



Rat brain
Anti-Iba1 antibody
5X



Rat brain
Anti-Iba1 antibody
10X



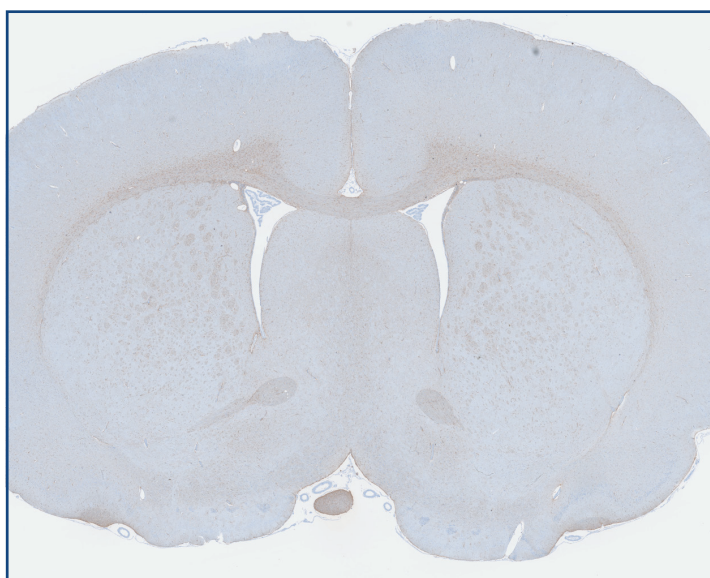
Glial Fibrillary Acidic Protein (GFAP)

Function/Expression:

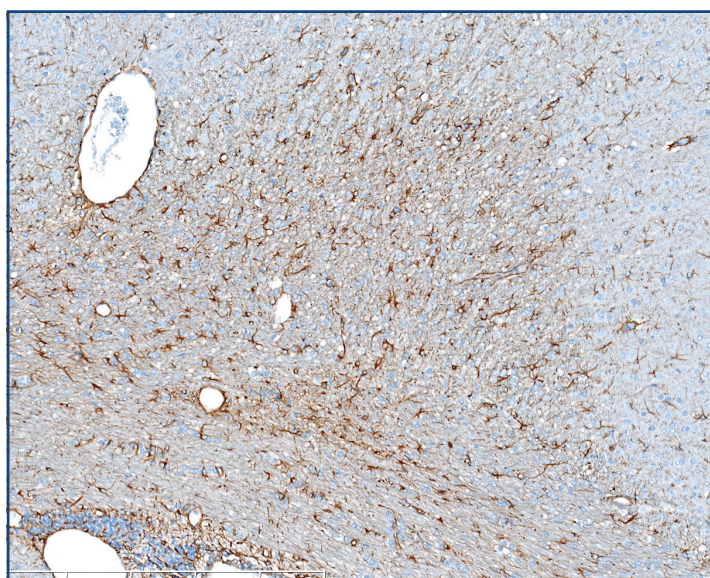
Intermediate filament that distinguishes astrocytes from other glial cells.

Species Stained: Rat, Mouse, Nonhuman Primate, Dog

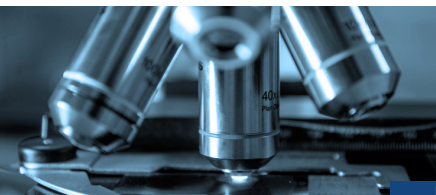
Tissues Stained: Brain, Spinal Cord



Mouse brain
Anti-GFAP antibody
1X



Rat brain
Anti-GFAP antibody
10X



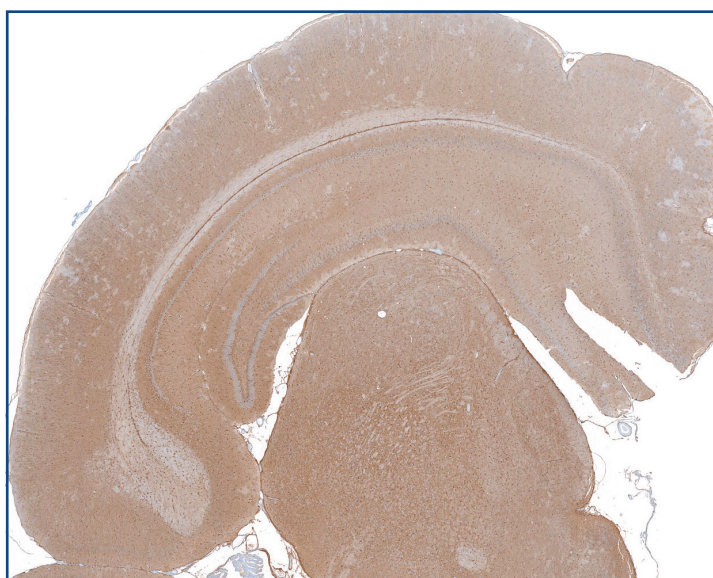
S-100

Function/Expression:

Involved in several processes, including protein phosphorylation, transcription, calcium homeostasis, and cell growth. Expressed in several tissues, including brain.

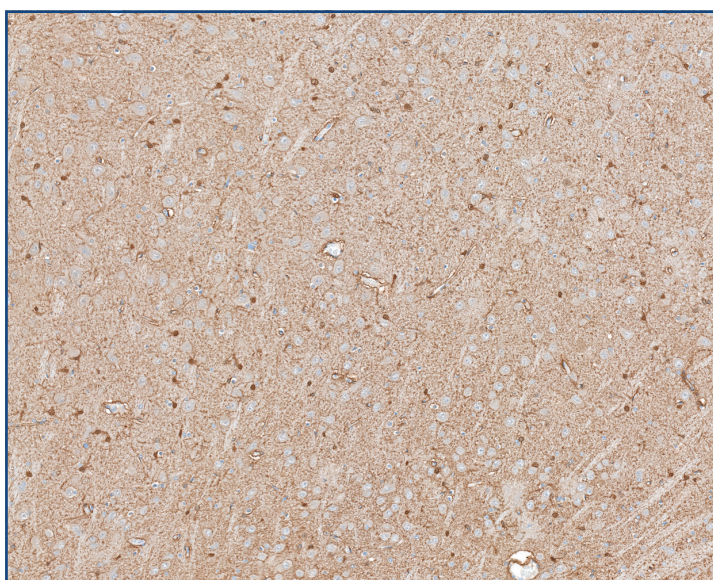
Species Stained: Rat

Tissue Stained: Brain



Rat brain

Anti-S100 beta antibody
1X



Rat brain

Anti-S100 beta antibody
10X



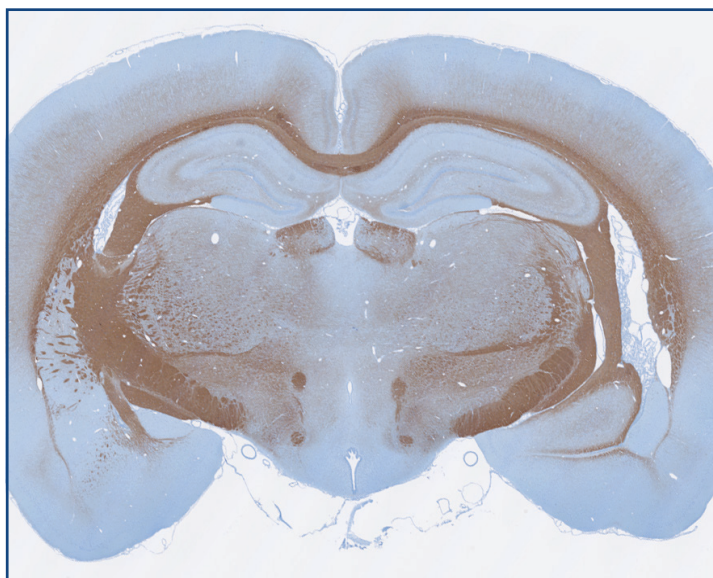
Myelin Basic Protein (MBP)

Function/Expression:

Role in formation and stabilization of myelin.

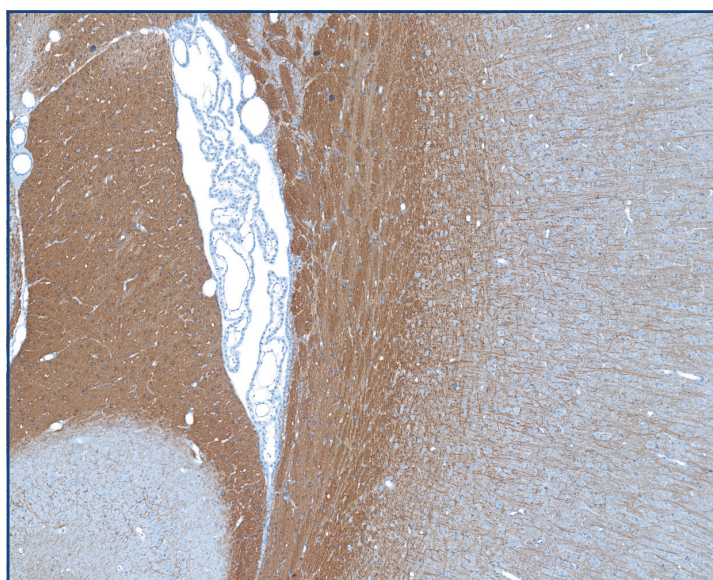
Species Stained: Rat, Mouse

Tissue Stained: Brain



Rat brain

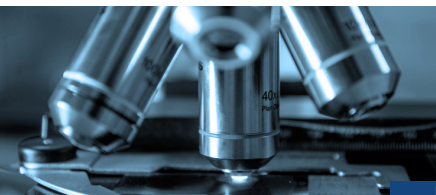
Anti-MBP antibody



Rat brain

Anti-MBP antibody

5X



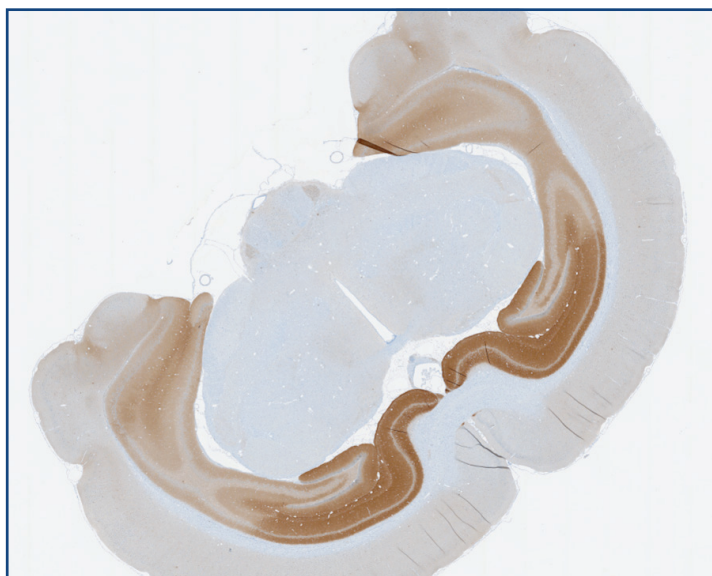
Glutamate Receptor 1 (AMPA subtype)

Function/Expression:

Ionotropic glutamate receptor. Glutamate is an excitatory neurotransmitter at many synapses in the central nervous system.

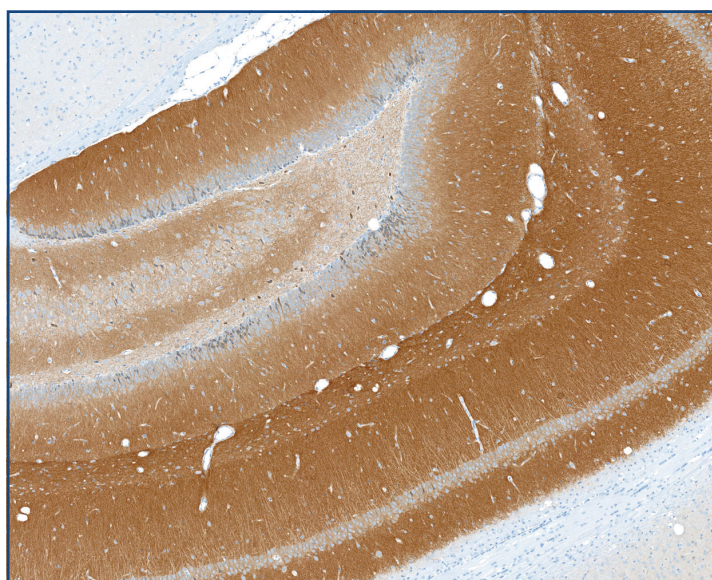
Species Stained: Rat

Tissue Stained: Brain



Rat brain

Anti-glutamate receptor 1 (AMPA subtype) antibody



Rat brain

Anti-glutamate receptor 1 (AMPA subtype) antibody

10X



CD3

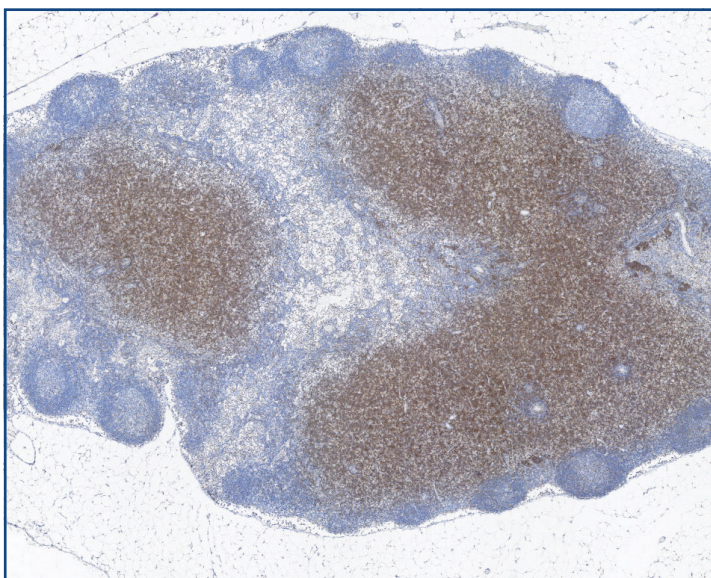
Function/Expression:

Mediates signal transduction in T lymphocytes. Used as a T cell marker.

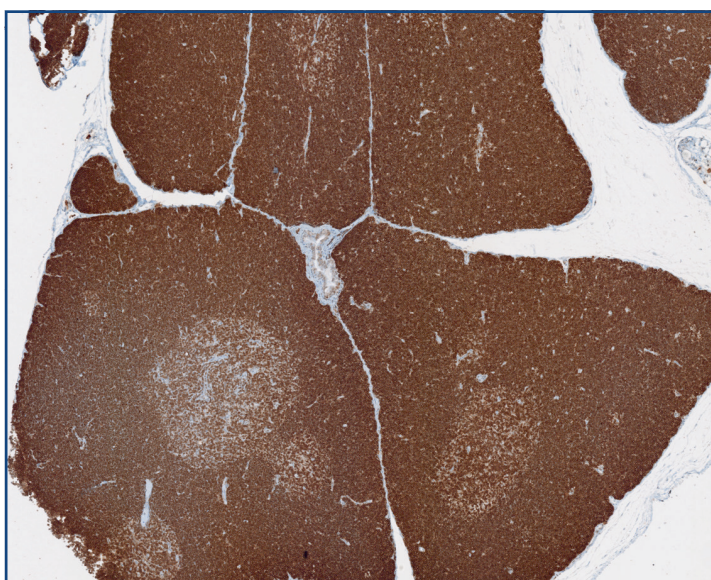
Species Stained: Rat, Nonhuman Primate

Tissues Stained:

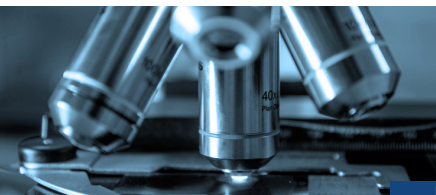
Lymphoid Tissues



Rat lymph node
Anti-CD3 antibody
2X



Rat thymus
Anti-CD3 antibody
5X



CD20

Function/Expression:

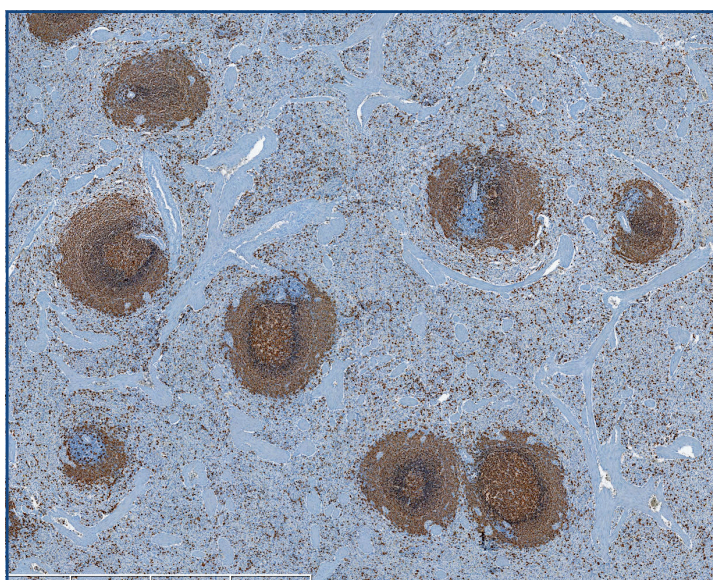
Expressed on B lymphocytes.

Species Stained: Dog,

Nonhuman Primate

Tissues Stained:

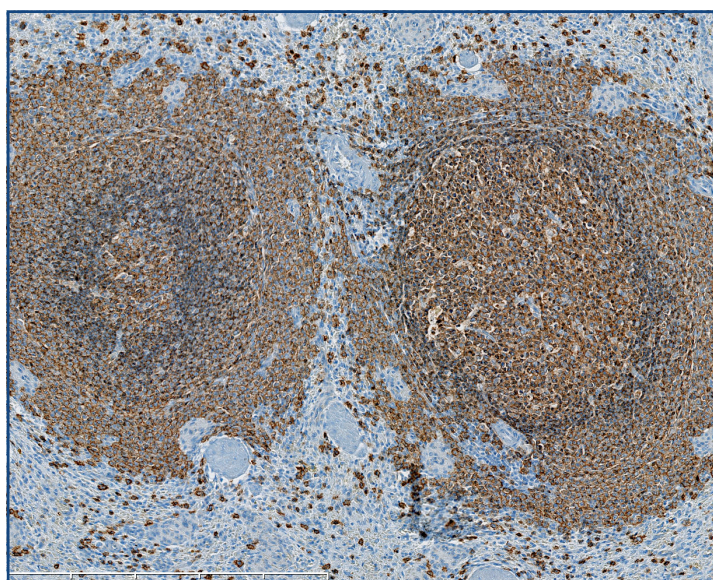
Lymphoid Tissues



Dog spleen

Anti-CD20 antibody

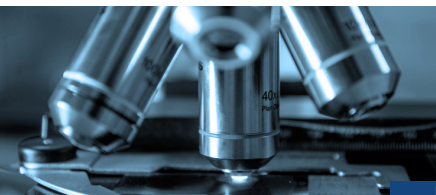
2X



Dog spleen

Anti-CD20 antibody

10X



CD45R

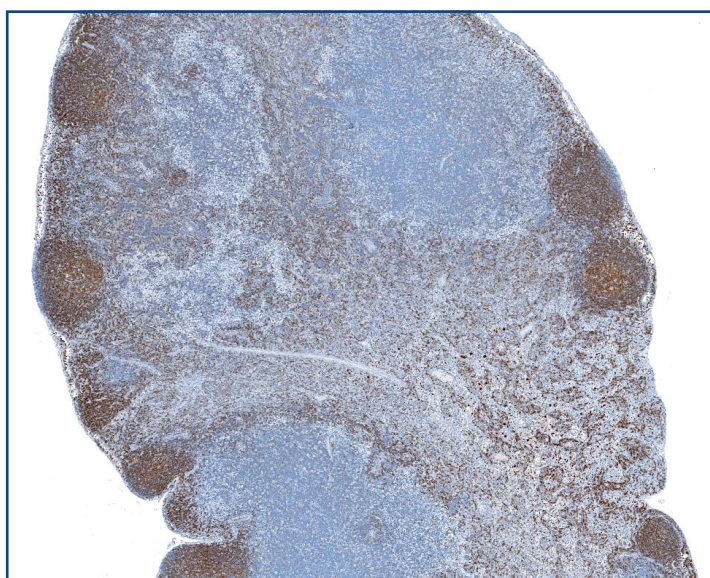
Function/Expression:

Expressed on B lymphocytes and other antigen-presenting cells.

Species Stained: Rat

Tissues Stained:

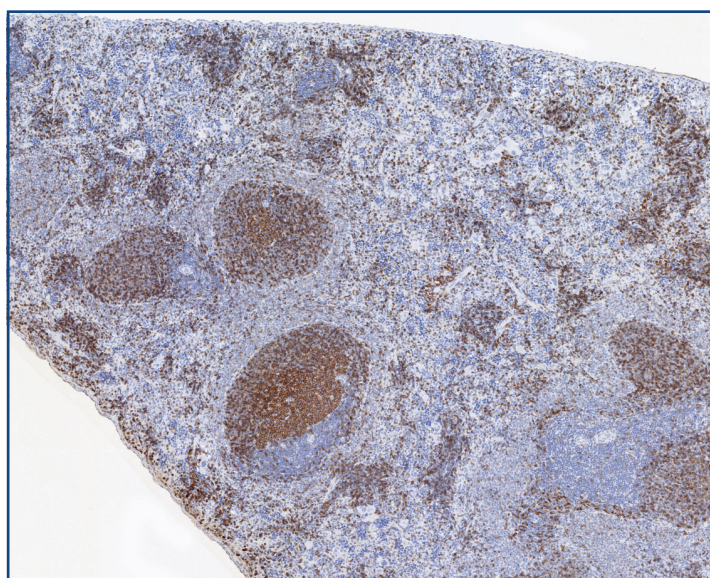
Lymphoid Tissues



Rat lymph node

Anti-CD45R antibody

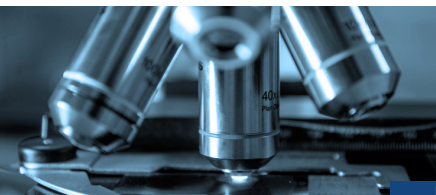
2X



Rat spleen

Anti-CD45R antibody

5X



Matrix Metalloproteinase 9 (MMP9)

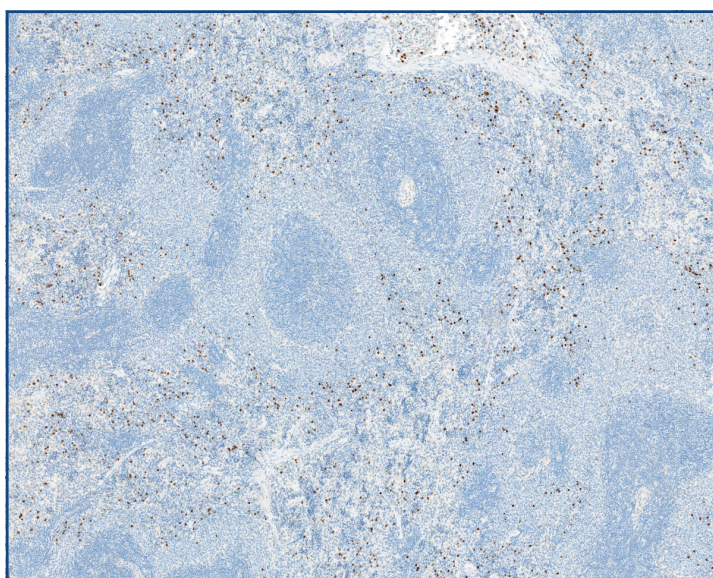
Function/Expression:

Proteolysis of extracellular matrix. Expressed by macrophages and granulocytes.

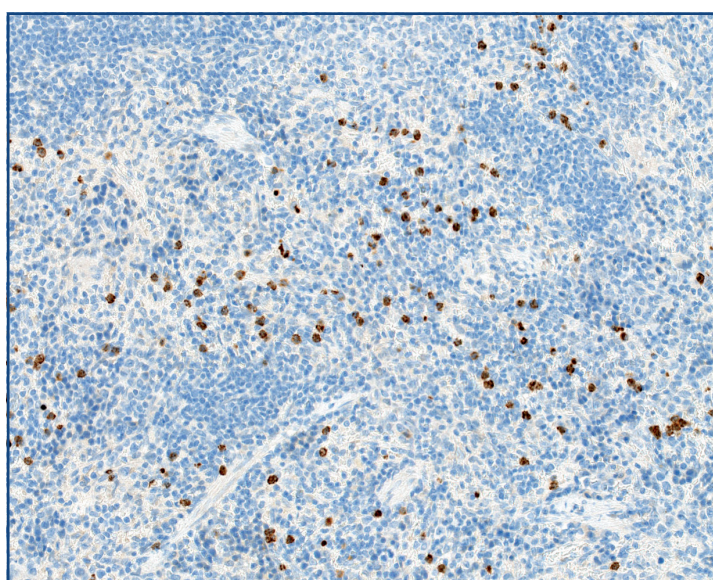
Species Stained: Rat

Tissues Stained:

Lymphoid Tissues, Lung



Rat spleen,
Anti-MMP9 antibody
5X



Rat spleen,
Anti-MMP9 antibody
20X



Alpha_{2u}-globulin

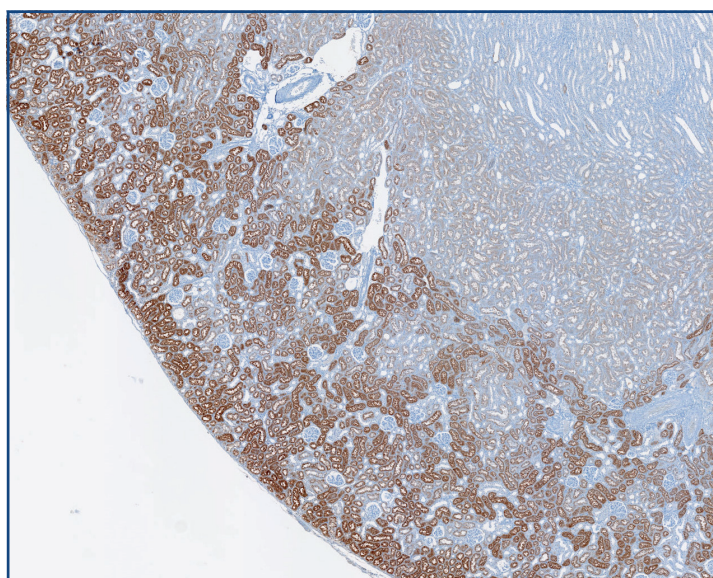
Function/Expression:

Major urinary protein excreted by adult male rats. Member of lipocalin family. Exact physiological role unknown.

Species Stained: Rat

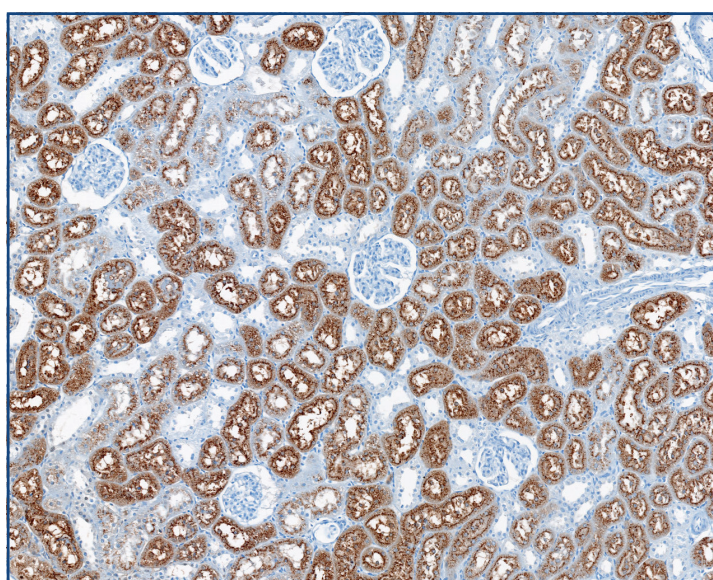
Tissue Stained: Kidney

Notes: Positive control tissue obtained from in-house study.



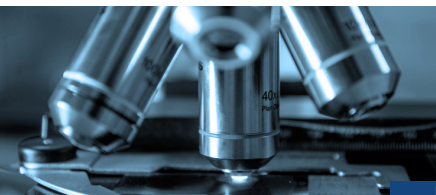
Kidney from male rat
positive control

Anti-rat alpha_{2u}-globulin antibody
2X



Kidney from male rat
positive control

Anti-rat alpha_{2u}-globulin antibody
10X



Kidney Injury Molecule 1 (Kim-1)

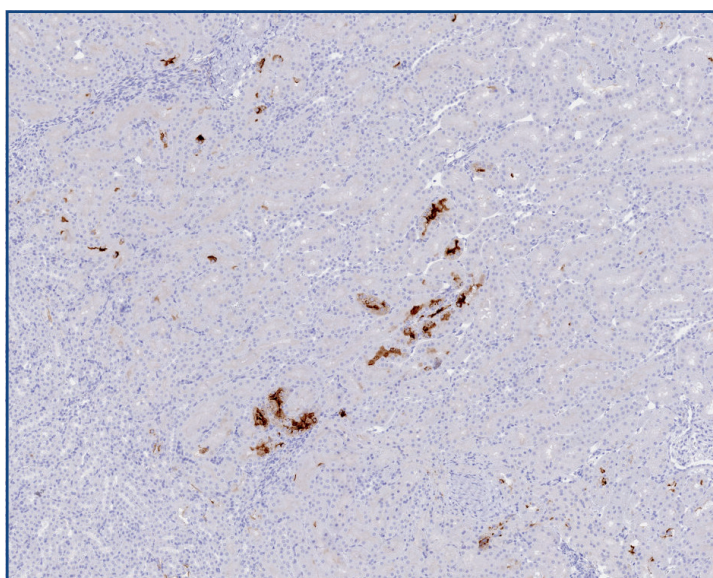
Function/Expression:

Used as a marker of renal proximal tubule injury.

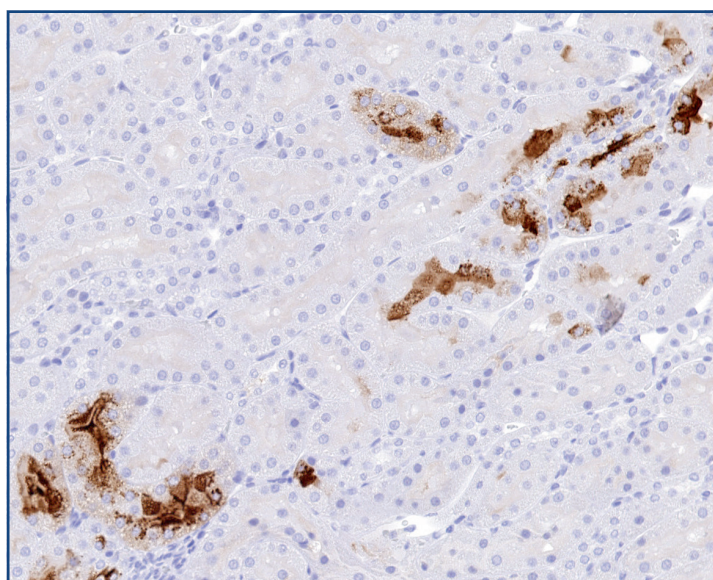
Species Stained: Rat

Tissue Stained: Kidney

Notes: Positive-control tissue obtained through in-house study.



Gentamicin-treated rat kidney
Anti-Kim1 antibody
5X



Gentamicin-treated rat kidney
Anti-Kim1 antibody
20X



Lysosomal-Associated Membrane Proteins (LAMP1 and LAMP2)

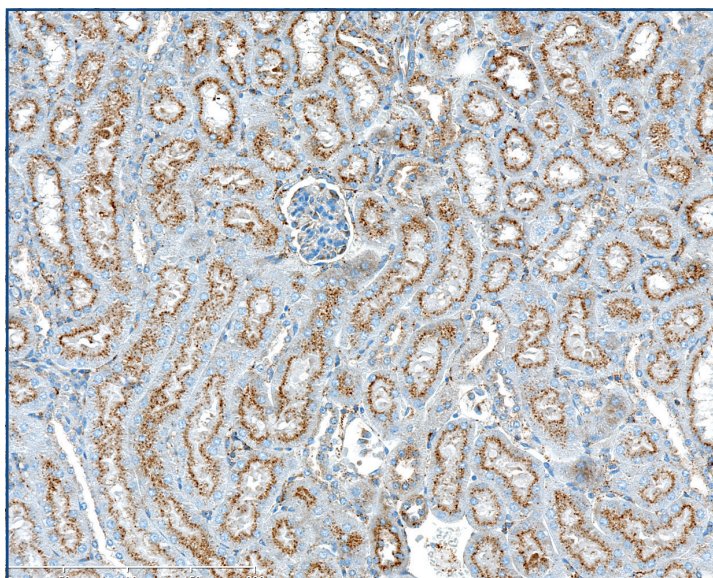
Function/Expression:

Lysosome markers.
Involved in cell adhesion
and implicated in tumor cell
metastasis.

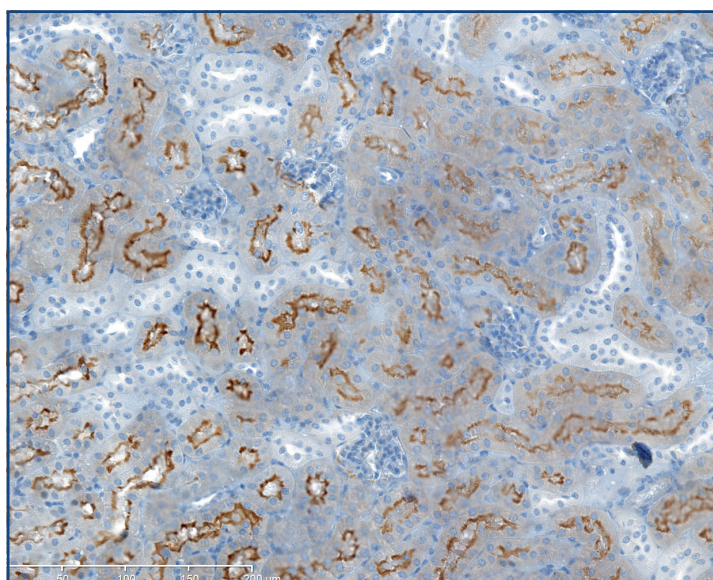
Species Stained: Rat, Mouse

Tissues Stained:

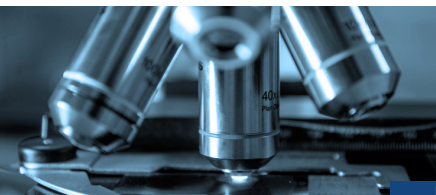
Kidney, Lung



Rat kidney
Anti-LAMP1 antibody
20X



Mouse kidney
Anti-LAMP2 antibody
20X



CD31

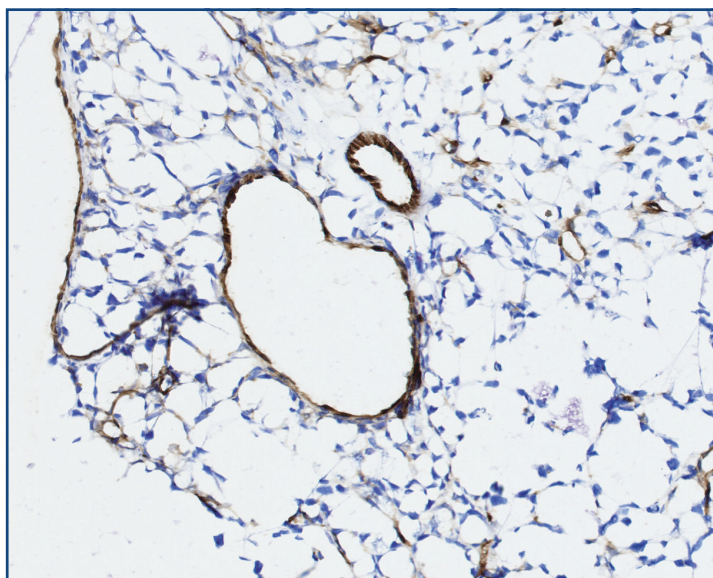
Function/Expression:

Involved in leukocyte transmigration and integrin activation. Used as an endothelial cell marker.

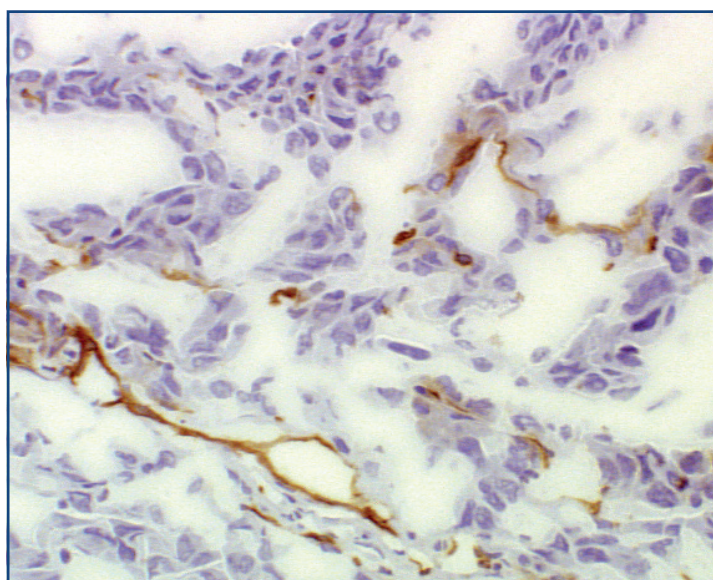
Species Stained: Rat, Mouse

Tissues Stained: Several

Notes: Can be combined with morphometric analysis for microvascular density evaluation.



Mouse tumor tissue
Anti-CD31 antibody
20X



Nude mouse xenograft tumor
Anti-CD31 antibody
40X



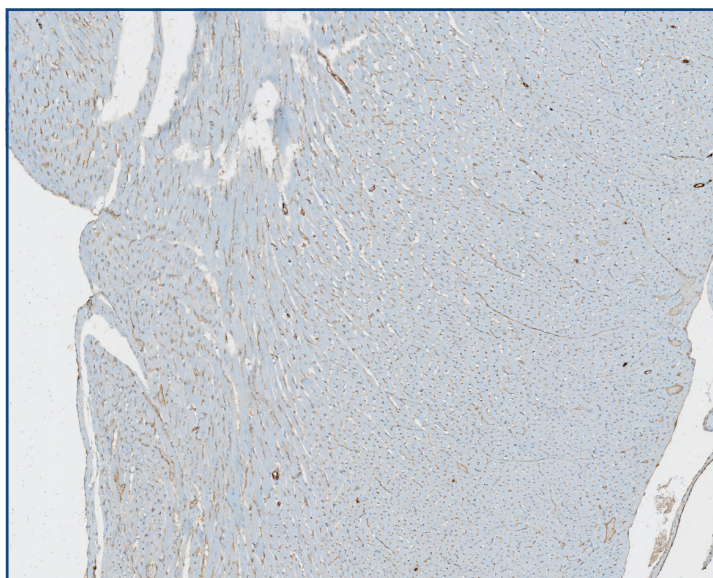
Rat Endothelial Cell Antigen-1 (RECA-1)

Function/Expression:

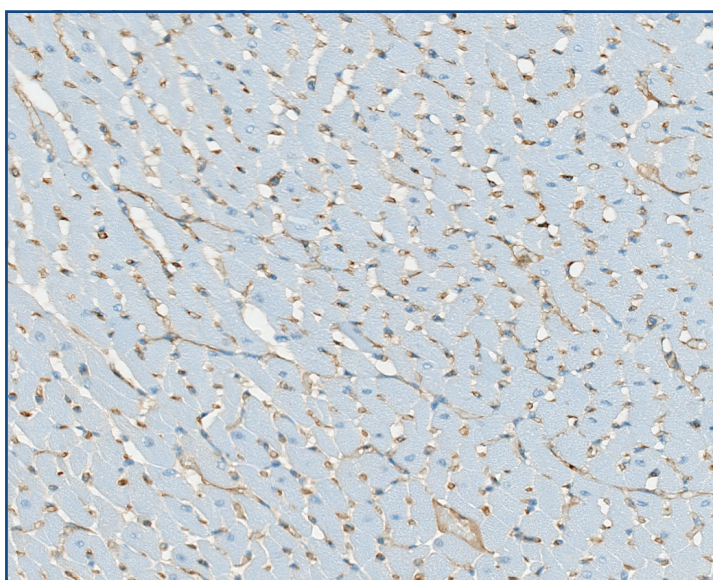
Expressed by vascular endothelial cells in rats.

Species Stained: Rat

Tissue Stained: Heart



Rat heart
Anti-RECA1 antibody
5X



Rat heart
Anti-RECA1 antibody
10X



Insulin

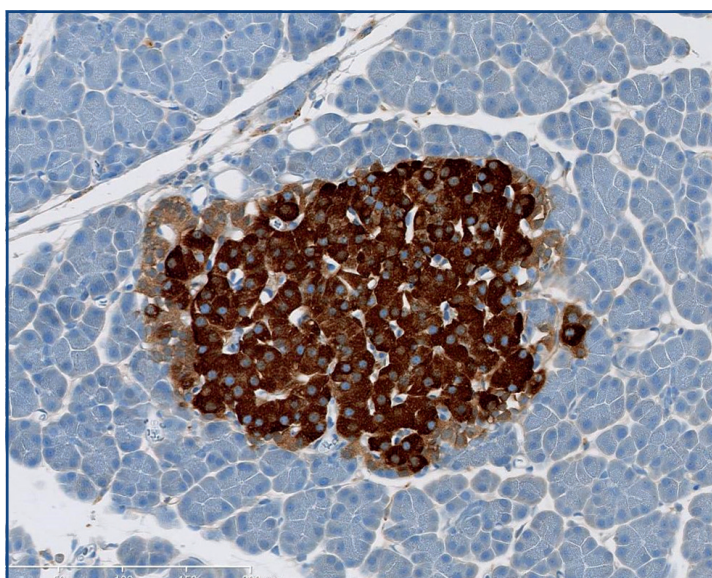
Function/Expression:

Expressed by beta cells in pancreatic islets. Decreases blood glucose concentration.

Species Stained: Rat, Mouse, Nonhuman Primate, Dog

Tissue Stained: Pancreas

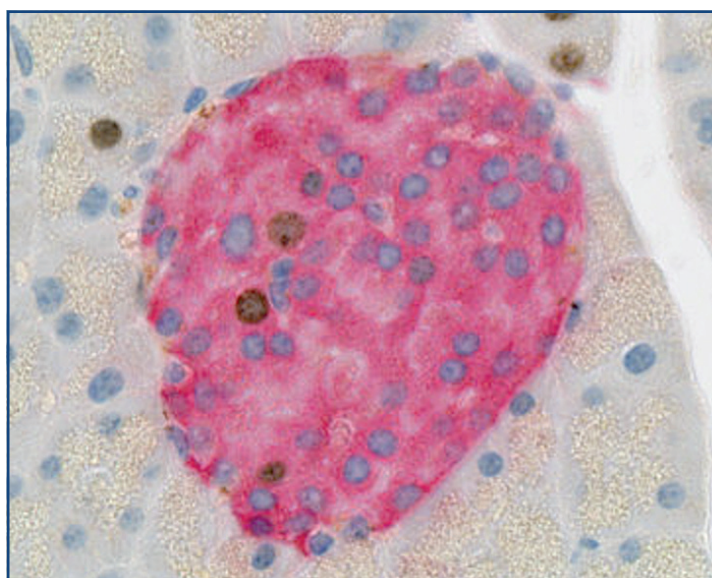
Notes: Double-staining with Ki67 used for determination of cell proliferation in beta cells.



Rat pancreas

Anti-insulin antibody

10X



Mouse pancreas

**Anti-insulin antibody and
Anti-Ki67 antibody double-stain**

40X



Catalase

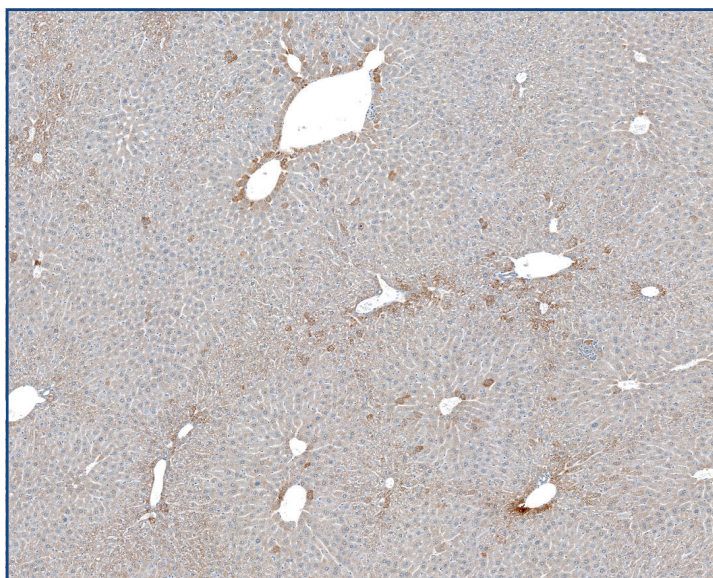
Function/Expression:

Classical marker for peroxisomes.

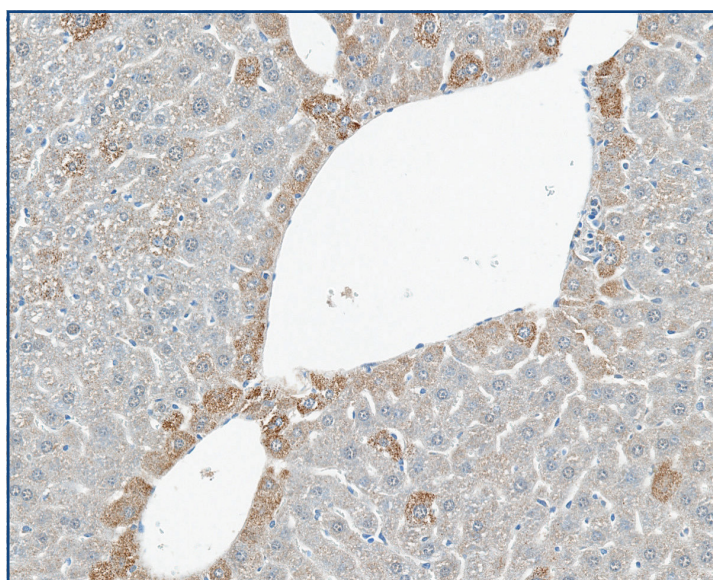
Species Stained: Rat

Tissue Stained: Liver

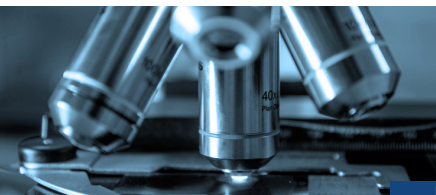
Notes: Can be combined with morphometric analysis to evaluate for peroxisome proliferation.



Rat liver
Anti-catalase antibody
5X



Rat liver
Anti-catalase antibody
20X



Dystrophin

Function/Expression:

Anchors extracellular matrix to cytoskeleton of muscle fibers.

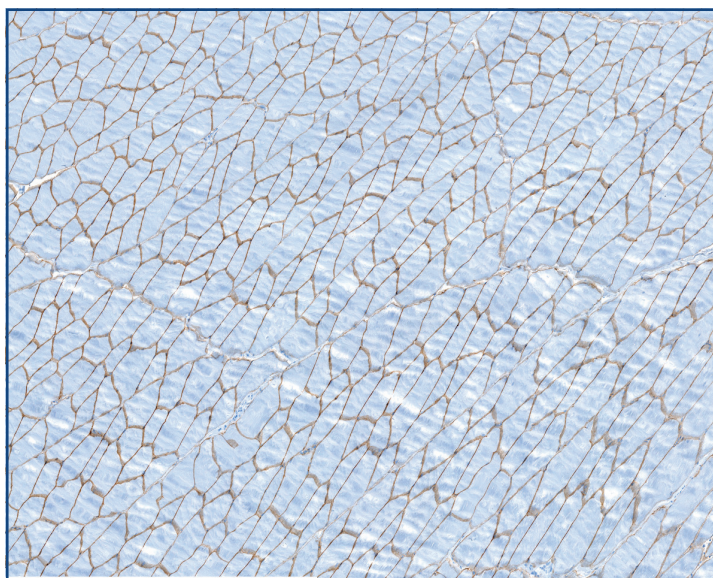
Species Stained:

Nonhuman Primate

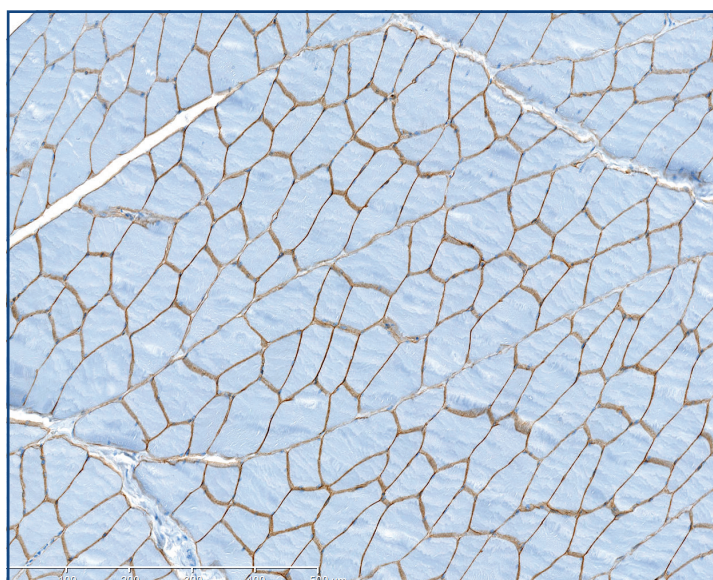
Tissue Stained:

Skeletal Muscle

Notes: Can be used to outline skeletal muscle fibers for morphometric analysis.



Nonhuman primate muscle
Anti-dystrophin antibody
5X



Nonhuman primate muscle
Anti-dystrophin antibody
10X



Pan-cadherin

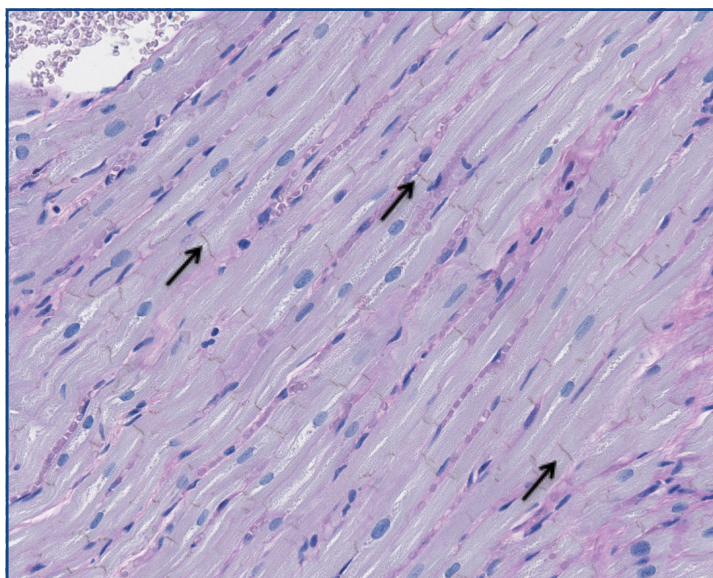
Function/Expression:

Important role in cell adhesion.

Species Stained: Rat

Tissue Stained: Heart

Notes: Used in conjunction with periodic acid–Schiff to illustrate intercalated discs for morphometric analysis of cardiomyocytes.

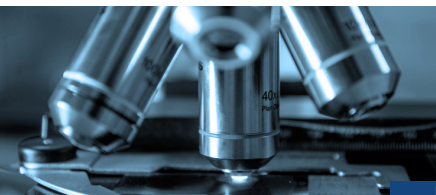


Rat heart

Pan-cadherin antibody with
PAS counterstain

20X

Note illustration of intercalated
discs by pan-cadherin (arrows).



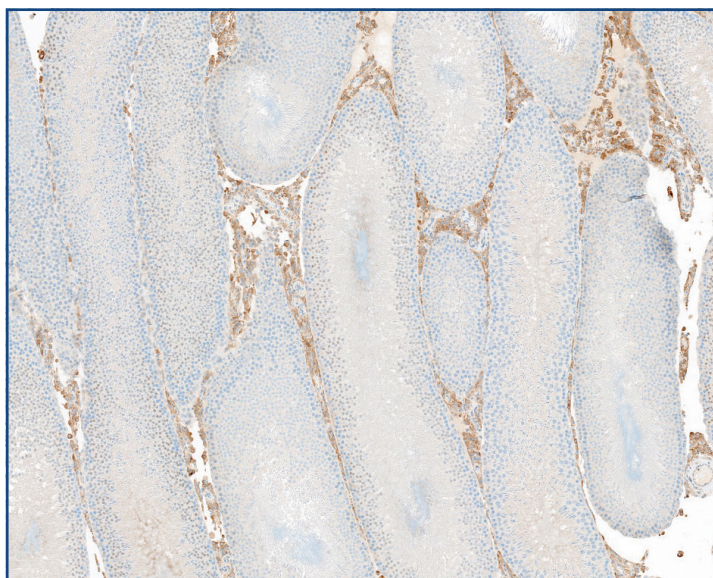
Hydroxysteroid 11-beta dehydrogenase (11 β -HSD)

Function/Expression:

Microsomal enzyme that catalyzes conversion of cortisol to cortisone. Expressed by Leydig cells in testes.

Species Stained: Rat

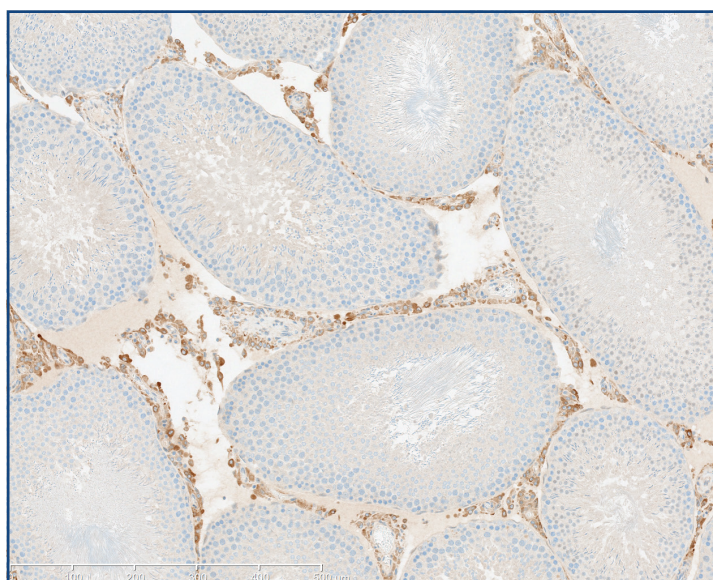
Tissue Stained: Testes



Rat testis

Anti-11 β -HSD antibody

5X



Rat testis

Anti-11 β -HSD antibody

10X



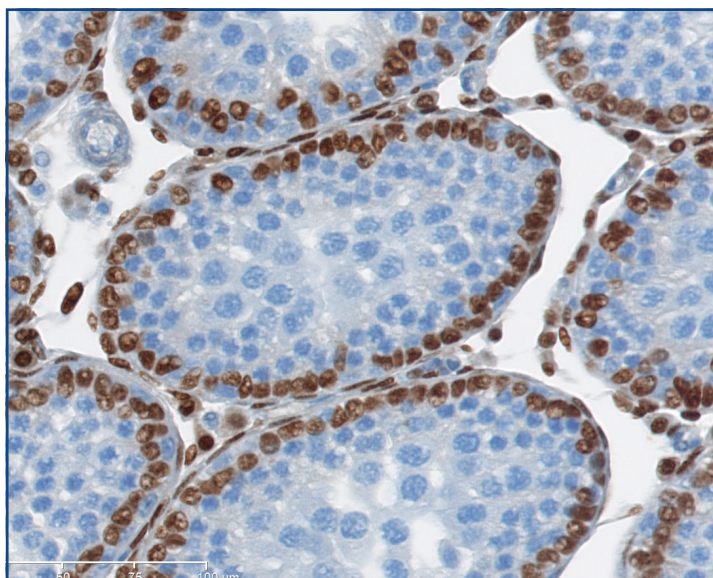
GATA-4

Function/Expression:

Functions in cardiomyocyte development and regulation of Sertoli cells.

Species Stained: Rat

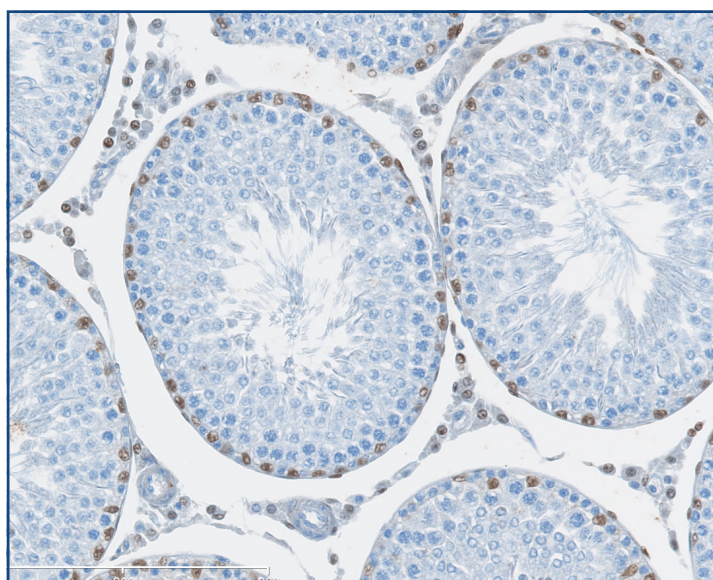
Tissue Stained: Testis



Postnatal Day 25 Rat testis

Anti-GATA-4 antibody

40X



Postnatal Day 46 Rat testis

Anti-GATA-4 antibody

20X