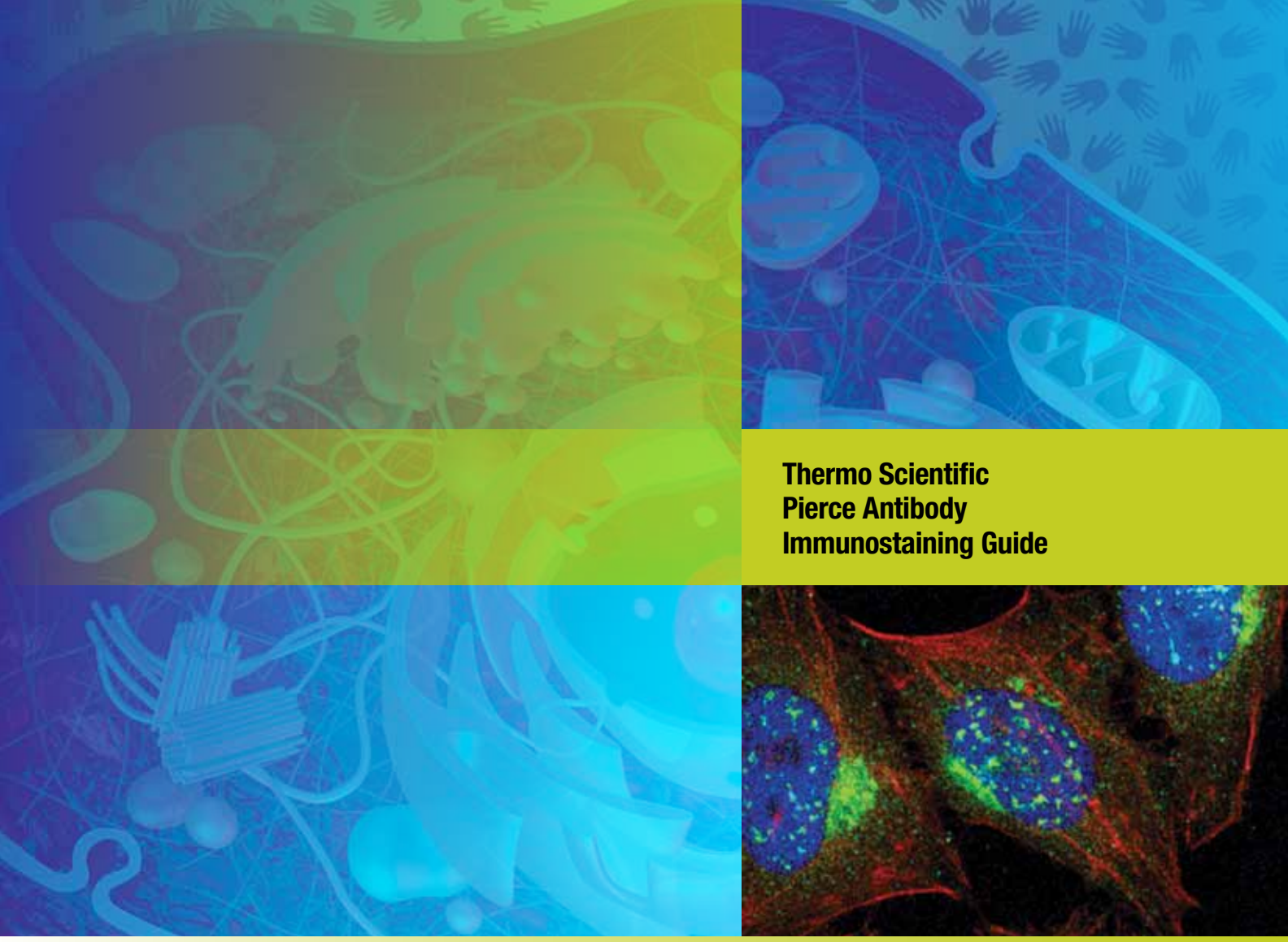

Thermo Scientific
Pierce Antibody
Immunostaining Guide

Design, visualize and detect

Immunostaining

Primary Antibodies • Secondary Antibodies • Staining Dyes • Kits

Thermo
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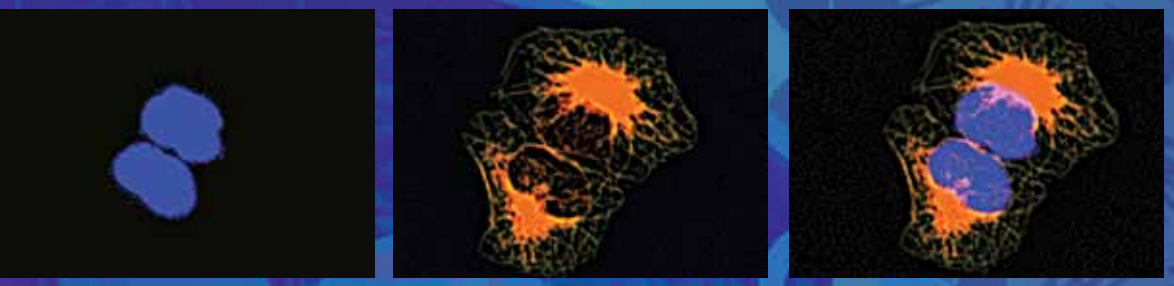
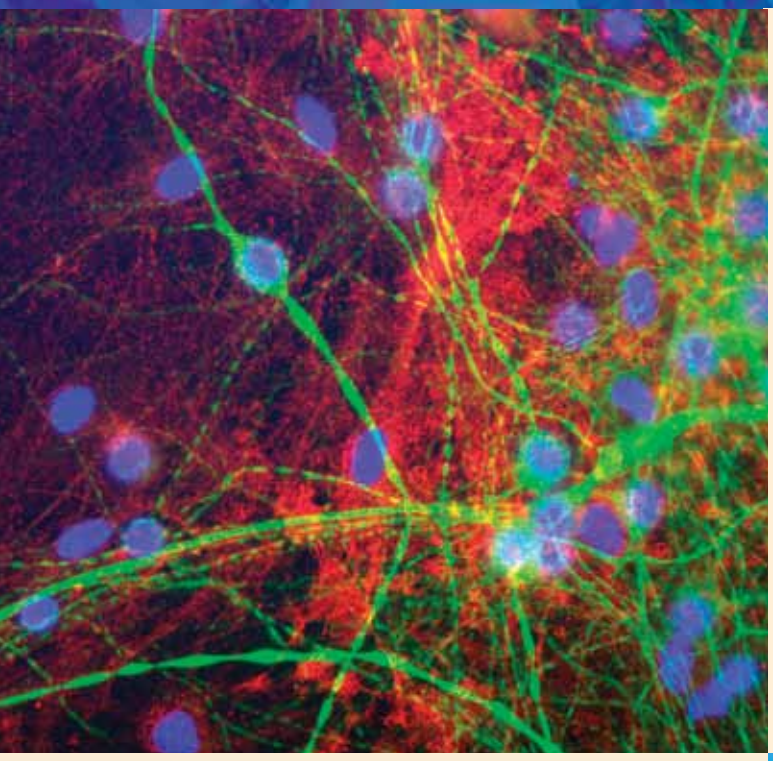
Table of Contents

Thermo Scientific
Pierce Antibody Immunostaining Guide



Left: Detection of mouse anti-α-tubulin in an A549 cell in Telophase with Thermo Scientific DyLight Dye 550-GAM. Chromosomes (orange) at the poles become diffuse, while nuclei (blue) divide into two future cells.



Immunofluorescence (IF) and immunohistochemistry (IHC) are two methods commonly used to detect proteins in a cellular context. Immunofluorescent detection of proteins can be performed on both fixed cells in culture and on paraffin or frozen tissue sections.

The advantages of using IF to detect cellular proteins includes the ability to visualize the subcellular location of protein(s) of interest, assess both protein expression and post-translational modifications, and design multiplex experiments. When IF detection is extended to tissues sections (IHC), a higher level of resolution is achieved because researchers are analyzing target protein(s) in a near physiological state, making it ideal for assessing normal and disease tissues.

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- Control
- ELISA
- Electron Microscopy
- FACS
- Functional Assay
- Gel Shift
- Hemagglutination Assay
- Inhibition Assay
- Immunocytochemistry
- Immunodiffusion
- Immunofluorescence
- Immunohistochemistry (Frozen)
- Immunohistochemistry (Paraffin)
- Immunohistochemistry (Paraffin, Frozen)
- Infection
- Immunoprecipitation
- Immunoradiometric Assay
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- Western Blot

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With both immunofluorescence (IF) and immunohistochemistry (IHC), a fluorophore conjugated to an antibody is used for detection (see Figure 1). Fluorophores can be conjugated to a primary antibody (direct), secondary antibody (indirect), or tertiary-labeled antibodies (e.g., biotin/avidin system) for signal amplification. However, with multiple amplification steps the researcher may observe an increase in background, making it critical to determine the best conjugation method for each detection antibody and to include both positive and negative controls.

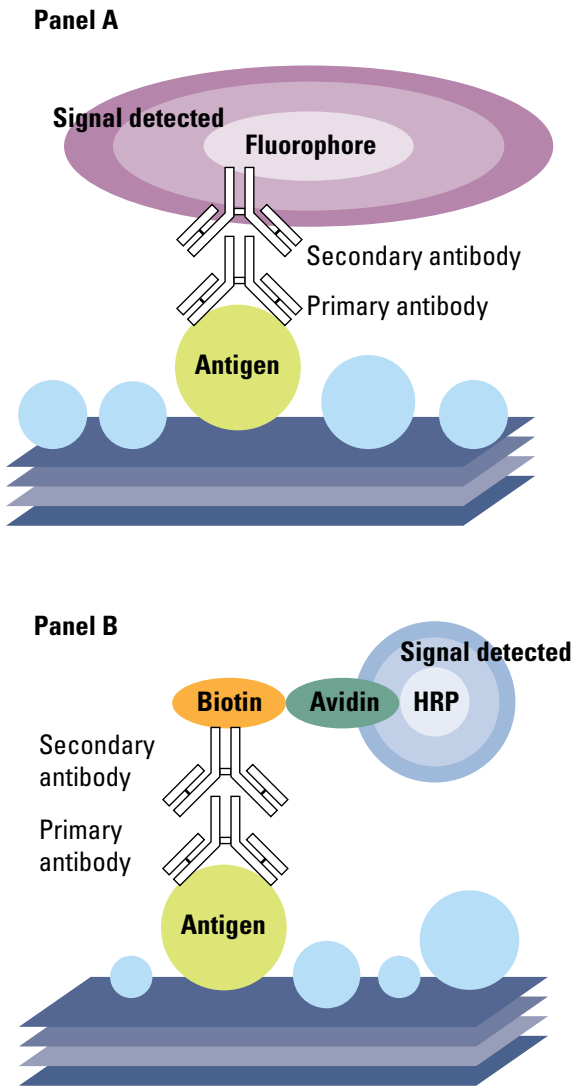
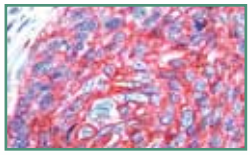


Figure 1. Detection of antigens in immunofluorescence (Panel A) and immunohistochemistry applications (Panel B).

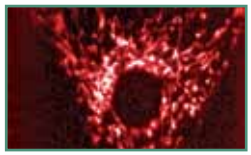
Immunofluorescence and Immunohistochemistry

Plasma Membrane



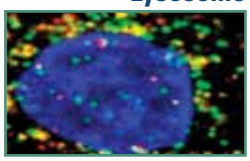
Glucose Transporter 1 Monoclonal Antibody (SPM498) #MA1-37783

Mitochondria



Mitochondrial Heat Shock Protein 70 Monoclonal Antibody (JG1) #MA3-028

Lysosome

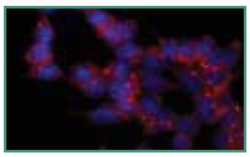


LAMP1 Polyclonal Antibody #PA1-654A

Microtubules

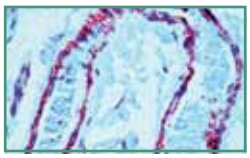
Tubulin β (TBN06(Tub2.5)) Monoclonal Antibody #MA5-117332

Centrosome



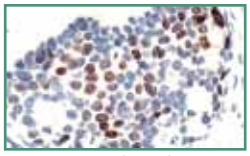
γ Tubulin Monoclonal Antibody (TU-30) #MA1-19421

Actin

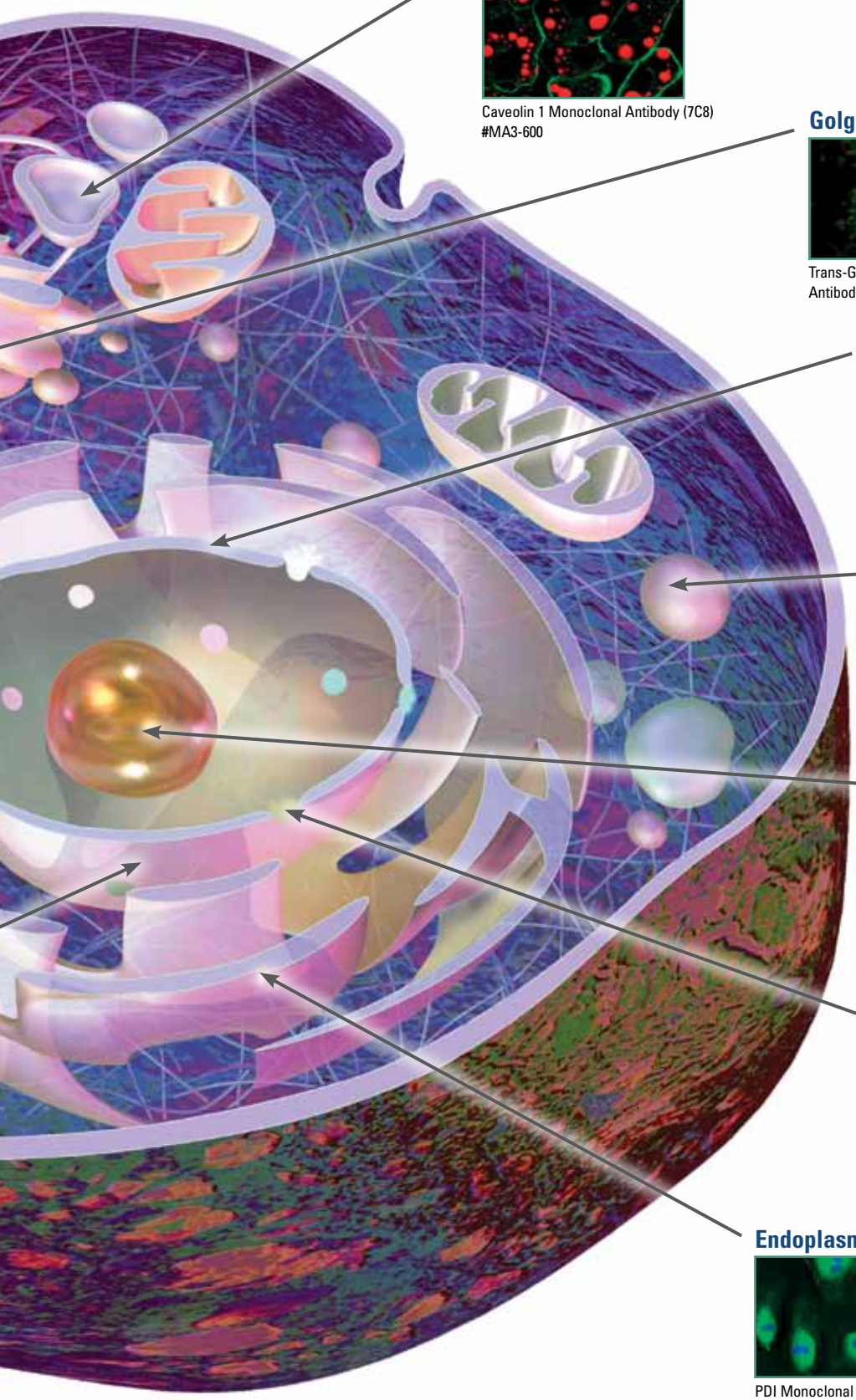


Filamin (FLM NO1(PM6/317)) Monoclonal Antibody #MA5-11705

Nucleus



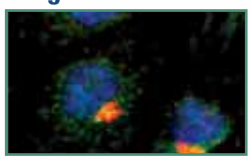
Phospho-c-Jun (Ser73) Polyclonal Antibody #PA5-17879



Endosome

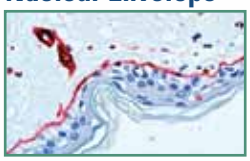
Caveolin 1 Monoclonal Antibody (7C8) #MA3-600

Golgi



Trans-Golgi Network 38 Monoclonal Antibody (2F7.1) #MA3-063

Nuclear Envelope

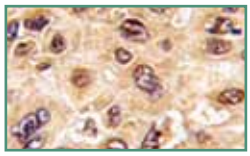


Laminin Rabbit Polyclonal #PA5-16287

Peroxisome

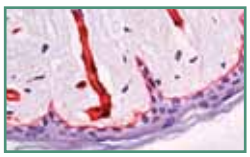
PXF Polyclonal Antibody #PA5-12171

Nucleolus



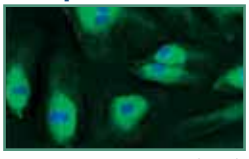
Nucleostemin Polyclonal Antibody #PA5-11440

Nuclear Pore



Laminin B2/γ 1 Monoclonal Antibody (D18) #MA5-11992

Endoplasmic Reticulum



PDI Monoclonal Antibody (RL90) #MA3-019

Mammalian Cell Type Choices

Target protein expression levels should be considered when choosing a cell type because expression levels may vary significantly between cell lines. Additionally, the cell line should closely match the desired *in vivo* model. For example, researchers interested in understanding cellular mechanisms involved in liver development and disease most commonly choose a hepatic-derived cell line such as HepG2. Stem cells have become a growing trend in the lab. The advantage of using pluripotent stem cells is their ability to differentiate into virtually any cell type, which also lays the foundation to understand the initial stages of development and disease. The National Cancer Institutes has a panel of 60 markers to identify stem cells and to highly characterize multiple cell lines (NCI 60 panel), which is a common starting point for choosing an appropriate cell line (see Table 1).

Another consideration in cell line choice is whether to use primary or immortalized/transformed cell lines. Primary cells are isolated directly from tissue and represent the closest genotype to the intact organism under study. Primary cells closely mimic a "normal" state of protein expression. Consequently, they can maintain integrity of critical signaling pathways which mediate all biological processes. On the downside, primary cells proliferate in culture for a limited amount of time (~15-20 passages) before reaching the "Hayflick limit" or "crisis." A cell which reaches the Hayflick limit will enter into either a reversible state of quiescence or an irreversible but metabolically active state of senescence. Primary cells are also more difficult to transfect with exogenous DNA or siRNA.

The use of immortalized or transformed cell lines bypasses the limitations of primary cells. Transformed cells arise when primary cells circumvent replicative senescence by exposure to oncogenic insults such as overexpression of oncoproteins (Ras) introduced by viruses, loss of tumor suppressor protein function (p53), or through DNA damaging events caused by UV, radiation or chemicals. Immortalized cells are generated primarily through the deregulation of telomere maintenance. Typically transformed or immortalized cells are easier to culture and have the potential to proliferate indefinitely. Transformed and immortalized cells are also more efficiently transfected with DNA vectors or siRNA than primary cells, making them ideal for characterizing a protein's function in a cellular context. The primary disadvantage of using an immortalized cell line is that it does not truly recapitulate the normal cell state.

The use of mammalian cells in culture is very beneficial in terms of cost and time. Cell culture enables researchers to model near physiological events and address basic biological questions without the need of constructing time-consuming animal models. Although the maintenance of cells in culture is a highly efficient process, it does have its limitations with regards to mimicking the three-dimensional microenvironment present in an intact organism. Cell culture models typically represent the first stage of understanding protein or DNA function before generating a more expensive animal model.

Table 1. Markers commonly used to identify stem cells and to characterize differentiated cell types.

Page citation: From Appendix E: Stem Cell Markers. In Stem Cell Information *[World Wide Web site]. Bethesda, MD: National Institutes of Health, U.S. Department of Health and Human Services, 2009 [cited Friday, July 09, 2010] Available at <http://stemcells.nih.gov/info/scireport/appendixe>*

Marker Name	Cell Type	Significance
Blood Vessel		
Fetal liver kinase-1 (Flk1)	Endothelial	Cell-surface receptor protein that identifies endothelial cell progenitor; marker of cell-cell contacts
Smooth muscle cell-specific myosin heavy chain	Smooth muscle	Identifies smooth muscle cells in the wall of blood vessels
Vascular endothelial cell cadherin	Smooth muscle	Identifies smooth muscle cells in the wall of blood vessels
Bone		
Bone-specific alkaline phosphatase (BAP)	Osteoblast	Enzyme expressed in osteoblast; activity indicates bone formation
Hydroxyapatite	Osteoblast	Mineralized bone matrix that provides structural integrity; marker of bone formation
Osteocalcin (OC)	Osteoblast	Mineral-binding protein uniquely synthesized by osteoblast; marker of bone formation
Bone Marrow and Blood		
Bone morphogenetic protein receptor (BMPR)	Mesenchymal stem and progenitor cells	Important for the differentiation of committed mesenchymal cell types from mesenchymal stem and progenitor cells; BMPR identifies early mesenchymal lineages (stem and progenitor cells)
CD4 and CD8	White blood cell (WBC)	Cell-surface protein markers specific for mature T lymphocyte (WBC subtype)
CD34	Hematopoietic stem cell (HSC), satellite, endothelial progenitor	Cell-surface protein on bone marrow cell, indicative of a HSC and endothelial progenitor; CD34 also identifies muscle satellite, a muscle stem cell
CD34+Sca1+ Lin- profile	Mesenchymal stem cell (MSC)	Identifies MSCs, which can differentiate into adipocyte, osteocyte, chondrocyte, and myocyte
CD38	Absent on HSC Present on WBC lineages	Cell-surface molecule that identifies WBC lineages. Selection of CD34+/CD38- cells allows for purification of HSC populations
CD44	Mesenchymal	A type of cell-adhesion molecule used to identify specific types of mesenchymal cells
c-Kit	HSC, MSC	Cell-surface receptor on BM cell types that identifies HSC and MSC; binding by fetal calf serum (FCS) enhances proliferation of ES cells, HSCs, MSCs, and hematopoietic progenitor cells
Colony-forming unit (CFU)	HSC, MSC progenitor	CFU assay detects the ability of a single stem cell or progenitor cell to give rise to one or more cell lineages, such as red blood cell (RBC) and/or white blood cell (WBC) lineages

Marker Name	Cell Type	Significance
Bone Marrow and Blood (cont'd.)		
Fibroblast colony-forming unit (CFU-F)	Bone marrow fibroblast	An individual bone marrow cell that has given rise to a colony of multipotent fibroblastic cells; such identified cells are precursors of differentiated mesenchymal lineages
Hoechst® dye	Absent on HSC	Fluorescent dye that binds DNA; HSC extrudes the dye and stains lightly compared with other cell types
Leukocyte common antigen (CD45)	WBC	Cell-surface protein on WBC progenitor
Lineage surface antigen (Lin)	HSC, MSC Differentiated RBC and WBC lineages	Thirteen to 14 different cell-surface proteins that are markers of mature blood cell lineages; detection of Lin-negative cells assists in the purification of HSC and hematopoietic progenitor populations
Mac-1	WBC	Cell-surface protein specific for mature granulocyte and macrophage (WBC subtypes)
Muc-18 (CD146)	Bone marrow fibroblasts, endothelial	Cell-surface protein (immunoglobulin superfamily) found on bone marrow fibroblasts, which may be important in hematopoiesis; a subpopulation of Muc-18+ cells are mesenchymal precursors
Stem cell antigen (Sca-1)	HSC, MSC	Cell-surface protein on bone marrow (BM) cell, indicative of HSC and MSC Bone Marrow and Blood
Stro-1 antigen	Stromal (mesenchymal) precursor cells, hematopoietic cells	Cell-surface glycoprotein on subsets of bone marrow stromal (mesenchymal) cells; selection of Stro-1+ cells assists in isolating mesenchymal precursor cells, which are multipotent cells that give rise to adipocytes, osteocytes, smooth myocytes, fibroblasts, chondrocytes, and blood cells
Thy-1	HSC, MSC	Cell-surface protein; negative or low detection is suggestive of HSC
Cartilage		
Collagen types II and IV	Chondrocyte	Structural proteins produced specifically by chondrocyte
Keratin	Keratinocyte	Principal protein of skin; identifies differentiated keratinocyte
Sulfated proteoglycan	Chondrocyte	Molecule found in connective tissues; synthesized by chondrocyte
Fat		
Adipocyte lipid-binding protein (ALBP)	Adipocyte	Lipid-binding protein located specifically in adipocyte
Fatty acid transporter (FAT)	Adipocyte	Transport molecule located specifically in adipocyte
Adipocyte lipid-binding protein (ALBP)	Adipocyte	Lipid-binding protein located specifically in adipocyte

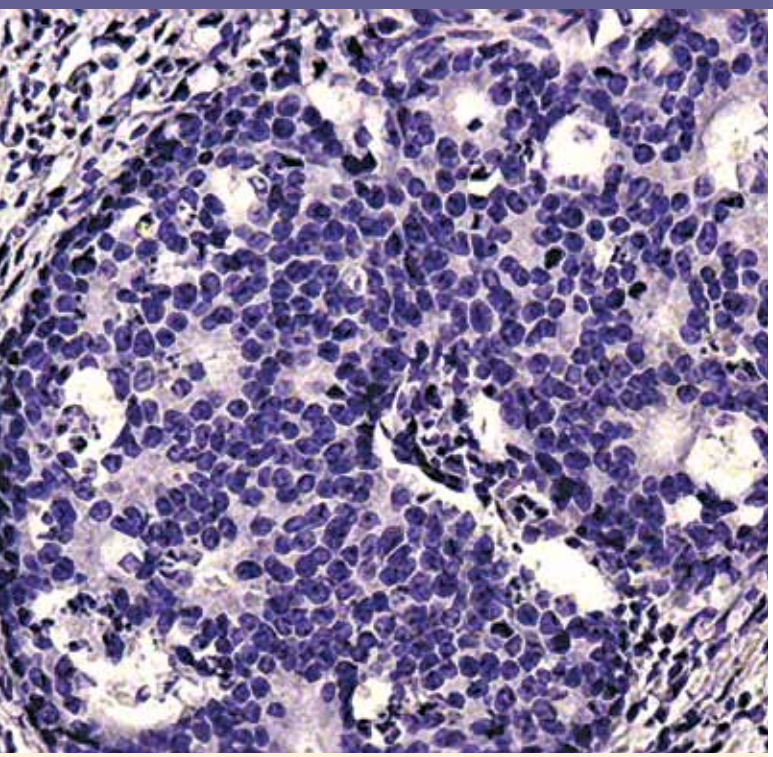
Marker Name	Cell Type	Significance
General		
Y chromosome	Male cells	Male-specific chromosome used in labeling and detecting donor cells in female transplant recipients
Karyotype	Most cell types	Analysis of chromosome structure and number in a cell
Liver		
Albumin	Hepatocyte	Principal protein produced by the liver; indicates functioning of maturing and fully differentiated hepatocytes
B-1 integrin	Hepatocyte	Cell-adhesion molecule important in cell-cell interactions; marker expressed during development of liver
Nervous System		
CD133	Neural stem cell, HSC	Cell-surface protein that identifies neural stem cells, which give rise to neurons and glial cells
Glial fibrillary acidic protein (GFAP)	Astrocyte	Protein specifically produced by astrocyte
Microtubule-associated protein-2 (MAP-2)	Neuron	Dendrite-specific MAP; protein found specifically in dendritic branching of neuron
Myelin basic protein (MPB)	Oligodendrocyte	Protein produced by mature oligodendrocytes; located in the myelin sheath surrounding neuronal structures
Nestin	Neural progenitor	Intermediate filament structural protein expressed in primitive neural tissue
Neural tubulin	Neuron	Important structural protein for neuron; identifies differentiated neuron
Neurofilament (NF)	Neuron	Important structural protein for neuron; identifies differentiated neuron
Neurosphere	Embryoid body (EB), ES	Cluster of primitive neural cells in culture of differentiating ES cells; indicates presence of early neurons and glia
Noggin	Neuron	A neuron-specific gene expressed during the development of neurons
O4	Oligodendrocyte	Cell-surface marker on immature, developing oligodendrocyte
O1	Oligodendrocyte	Cell-surface marker that characterizes mature oligodendrocyte
Synaptophysin	Neuron	Neuronal protein located in synapses; indicates connections between neurons
Tau	Neuron	Type of MAP; helps maintain structure of the axon

Immunofluorescence and Immunohistochemistry

Marker Name	Cell Type	Significance
Pancreas		
Cytokeratin 19 (CK19)	Pancreatic epithelium	CK19 identifies specific pancreatic epithelial cells that are progenitors for islet cells and ductal cells
Glucagon	Pancreatic islet	Expressed by alpha-islet cell of pancreas
Insulin	Pancreatic islet	Expressed by beta-islet cell of pancreas Pancreas
Insulin-promoting factor-1 (PDX-1)	Pancreatic islet	Transcription factor expressed by beta-islet cell of pancreas
Nestin	Pancreatic progenitor	Structural filament protein indicative of progenitor cell lines including pancreatic
Pancreatic polypeptide	Pancreatic islet	Expressed by gamma-islet cell of pancreas
Somatostatin	Pancreatic islet	Expressed by delta-islet cell of pancreas
Pluripotent Stem Cells		
Alkaline phosphatase	Embryonic stem (ES), embryonal carcinoma (EC)	Elevated expression of this enzyme is associated with undifferentiated pluripotent stem cell (PSC)
α-fetoprotein (AFP)	Endoderm	Protein expressed during development of primitive endoderm; reflects endodermal differentiation Pluripotent Stem Cells
Bone morphogenetic protein-4	Mesoderm	Growth and differentiation factor expressed during early mesoderm formation and differentiation
Brachyury	Mesoderm	Transcription factor important in the earliest phases of mesoderm formation and differentiation; used as the earliest indicator of mesoderm formation
Cluster designation 30 (CD30)	ES, EC	Surface receptor molecule found specifically on PSC
Cripto (TDGF-1)	ES, cardiomyocyte	Gene for growth factor expressed by ES cells, primitive ectoderm, and developing cardiomyocyte
GATA-4 gene	Endoderm	Expression increases as ES differentiates into endoderm
GCTM-2	ES, EC	Antibody to a specific extracellular-matrix molecule that is synthesized by undifferentiated PSCs
Genesis	ES, EC	Transcription factor uniquely expressed by ES cells either in or during the undifferentiated state of PSCs
Germ cell nuclear factor	ES, EC	Transcription factor expressed by PSCs
Hepatocyte nuclear factor-4 (HNF-4)	Endoderm	Transcription factor expressed early in endoderm formation
Nestin	Ectoderm, neural and pancreatic progenitor	Intermediate filaments within cells; characteristic of primitive neuroectoderm formation
Neuronal cell-adhesion molecule (N-CAM)	Ectoderm	Cell-surface molecule that promotes cell-cell interaction; indicates primitive neuroectoderm formation

Marker Name	Cell Type	Significance
OCT4/POU5F1	ES, EC	Transcription factor unique to PSCs; essential for establishment and maintenance of undifferentiated PSCs
Pax6	Ectoderm	Transcription factor expressed as ES cell differentiates into neuroepithelium
Stage-specific embryonic antigen-3 (SSEA-3)	ES, EC	Glycoprotein specifically expressed in early embryonic development and by undifferentiated PSCs
Stage-specific embryonic antigen-4 (SSEA-4)	ES, EC	Glycoprotein specifically expressed in early embryonic development and by undifferentiated PSCs
Stem cell factor (SCF or c-Kit ligand)	ES, EC, HSC, MSC	Membrane protein that enhances proliferation of ES and EC cells, hematopoietic stem cell (HSCs), and mesenchymal stem cells (MSCs); binds the receptor c-Kit
Telomerase	ES, EC	An enzyme uniquely associated with immortal cell lines; useful for identifying undifferentiated PSCs
TRA-1-60	ES, EC	Antibody to a specific extracellular matrix molecule is synthesized by undifferentiated PSCs
TRA-1-81	ES, EC	Antibody to a specific extracellular matrix molecule normally synthesized by undifferentiated PSCs
Vimentin	Ectoderm, neural and pancreatic progenitor	Intermediate filaments within cells; characteristic of primitive neuroectoderm formation
Skeletal Muscle/Cardiac/Smooth Muscle		
MyoD and Pax7	Myoblast, myocyte	Transcription factors that direct differentiation of myoblasts into mature myocytes
Myogenin and MR4	Skeletal myocyte	Secondary transcription factors required for differentiation of myoblasts from muscle stem cells
Myosin heavy chain	Cardiomyocyte	A component of structural and contractile protein found in cardiomyocyte
Myosin light chain	Skeletal myocyte	A component of structural and contractile protein found in skeletal myocyte

Immunohistochemistry



Immunohistochemistry using formalin-fixed, paraffin-embedded tissues

Immunohistochemistry (IHC) combines anatomical, immunological and biochemical techniques for the identification of specific tissue components by means of a specific antigen/antibody reaction tagged with a visible label. IHC makes it possible to visualize the distribution and localization of specific cellular components within a cell or tissue. The term immunohistochemistry is often used interchangeably with immunocytochemistry and immunostaining.

Immunohistochemistry is an extremely powerful methodology used to study expression and modification of proteins in biopsied tissue samples. The use of IHC allows the researcher to observe biological events in near physiological sample. The method is applicable for both colorimetric and fluorescent applications. The following is a sample immunohistochemistry method.

IHC Protocol

Deparaffinization/rehydration

1. De-wax slides in xylene three times for 5 minutes.
2. Hydrate slides in 100%, 100%, 95%, 80% ethanol for 3 minutes each, then immerse slides in tap water for 5 minutes.

Endogenous peroxide quenching (for horseradish peroxidase detection method)

1. Immerse slides in 3% hydrogen peroxide solution for 10 minutes, then wash slides in PBS two times for 3 minutes.

Pretreatment/antigen retrieval

1. If Heat Induced Epitope Retrieval (HIER) is recommended:
   a. Place racked slides in citrate, EDTA, or Tris HCl buffer
   b. Heat samples to near boiling for 10-20 minutes. Some samples may require longer heating times and/or higher temperatures.
   c. Important: Cool slides in buffer at room temperature for at least 20 minutes before proceeding.
   d. Rinse in PBS at least three times for 1 minute each before proceeding.
2. If enzyme pretreatment is recommended:
   a. Add enzyme (pepsin, trypsin, protease, proteinase K) to cover tissue, put in moisture chamber, and incubate at 37°C for 10 minutes.
   b. Rinse off enzyme using PBS squirt bottle, avoiding tissue section. Rinse in PBS at least three times for 1 minute each before staining.

Primary antibody

1. Dilute the primary antibody (if necessary). Note: The recommended dilution provided with the antibody is a guideline only. The optimal dilution should be determined by the investigator. Add enough antibody diluent to cover entire tissue section (~200µL).
2. Place the slides in a humidity chamber to minimize reagent evaporation. Note: Drying out the slides any time during staining will result in background staining.
3. Incubate according to the recommended time and temperature, then wash slides in PBS three times for 3 minutes.

Secondary antibody

1. Cover tissue with prepared secondary antibody, incubate at room temperature for 10 minutes, then wash in PBS three times for 3 minutes.

Substrate/chromogen

1. Cover tissue section with chromogenic substrate.
2. Monitor development under light microscope. Terminate development by placing slide in PBS for 3 minutes. Repeat one additional time.

Counterstaining (optional)

1. Place slide rack in hematoxylin (nuclear staining) or eosin (primarily cytosolic structures) bath for 1-4 minutes (optimization required).
2. Wash in water bath 7-8 times, PBS (or other alkaline rinse) for 1 minute, then tap water for 3 minutes.

Coverslipping

1. For permanent mounting with coverslip:
   a. Dehydrate through 100% alcohol and in xylene three times for 1 minute.
   b. Mount coverslip with permanent mounting media.
2. For aqueous mounting media:
   a. Using UltraMount (no coverslip necessary): Place mounting media to cover tissue section and dry overnight.
   b. Using other aqueous mounting media: Cover tissue section with mounting media, overlay with coverslip.

Immunohistochemistry

Thermo Scientific ABC Staining Kits

Systems that offer highly sensitive and rapid detection.

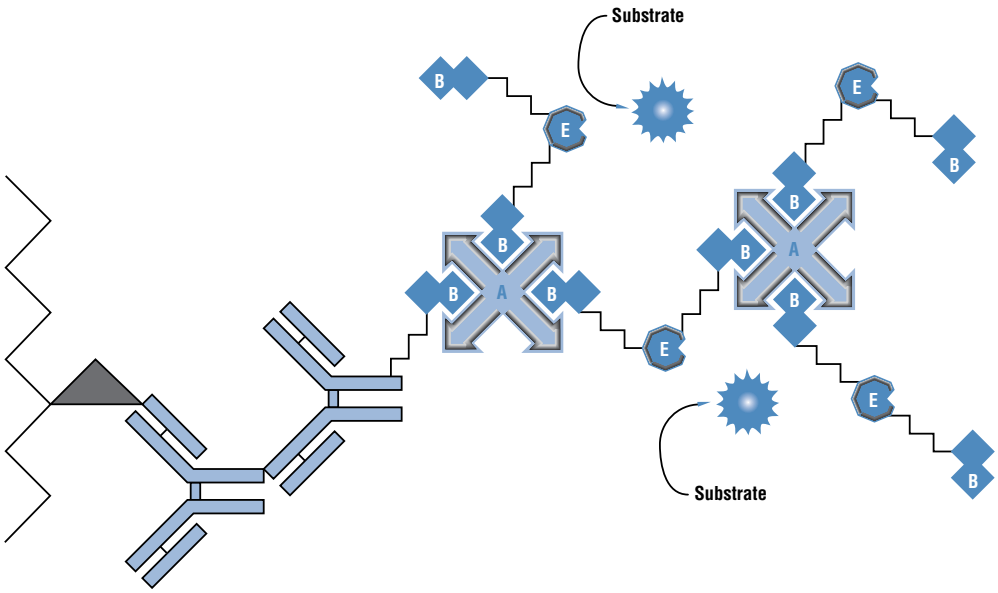
The ABC Staining Kits for the avidin-biotin complex (ABC) technique are highly sensitive, produce very low background staining and have rapid avidin-biotin interactions. Highly diluted primary antibodies can be used with ABC Staining Kits, producing stain intensity comparable to other methods that require higher concentrations of antibody.

The Ultra-Sensitive ABC Peroxidase Staining Kits are more sensitive than the ABC Peroxidase Staining Kits, without exhibiting increased background staining. These kits supply the extra sensitivity needed for localizing antigens present in very small quantities. An expensive primary antibody may be diluted approximately five-fold further than with the standard ABC Peroxidase Kit – while producing equal staining intensity.[1]

Ordering Information

Description	Pkg. Size	Product #
Ultra-Sensitive ABC Peroxidase Mouse IgG Staining Kit Includes: Biotinylated Anti-Mouse IgG Antibody Blocking Buffer Avidin Biotinylated HRP	Kit	**32052**
Ultra-Sensitive ABC Standard Peroxidase Rabbit IgG Staining Kit Includes: Biotinylated Anti-Rabbit IgG Antibody Blocking Buffer Avidin Biotinylated HRP	Kit	**32054**
ABC Standard Peroxidase Staining Kit Includes: Avidin Biotinylated HRP	Kit	**32020**
Ultra-Sensitive ABC Standard Peroxidase Staining Kit Includes: Avidin Biotinylated HRP	Kit	**32050**

Reference
1. Bayer, E.A., *et al.* (1988). *Anal. Biochem.* **170**, 271-281.



Avidin-biotin complex (ABC) for signal amplification.

Thermo Scientific Pierce Metal Enhanced DAB Substrate Kit

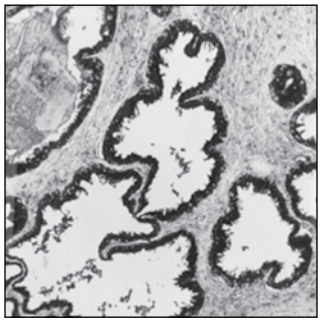
The most sensitive DAB substrate formulation available.

The Pierce® Metal Enhanced DAB Substrate Kit optimizes this intensifying chemistry, producing an exceptionally sensitive colorimetric detection system for immunohistochemistry applications.

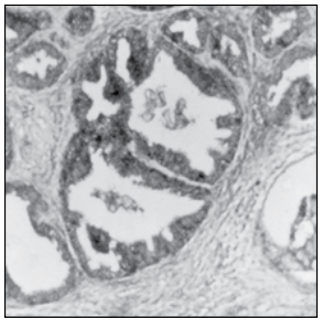
Highlights:

- **Incredible sensitivity** – 50 times more sensitive than the traditional DAB and 30 times more sensitive than other metal-intensified versions
- **Low background, high intensity** – crisp dark brown-black precipitate, almost no background
- **Six-hour stability** – solution is stable for > six hours

Thermo Scientific Pierce Metal Enhanced DAB



Ordinary DAB Method (Graham and Karnovsky, 1966)



Superior staining performance with Thermo Scientific Pierce Metal Enhanced DAB Substrate Kit. Specific staining of prostatic acid phosphatase detected with the Pierce Kit (**left panel**) exhibits higher intensity and greater resolution than staining detected by non-enhanced DAB method (**right panel**).

Reference

1. Graham, R.C. and Karnovsky, M.J. (1966). *J. Histochem. Cytochem.* **14**, 291-302.

Ordering Information

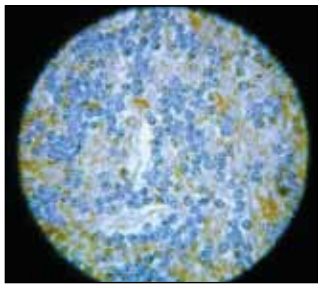
Description	Pkg. Size	Product #
Metal Enhanced DAB Substrate Kit	Kit	**34065**
Includes: 10X Metal Enhanced DAB	25mL	
Stable Peroxide Buffer	250mL	

Thermo Scientific Pierce Peroxidase Detection Kit

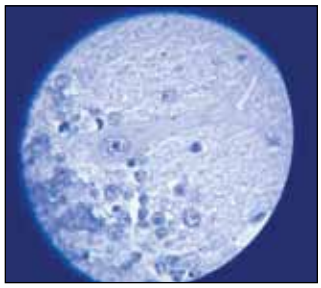
The benefits of metal enhanced DAB in a complete kit.

This immunohistochemical staining kit bundles the Pierce Metal Enhanced DAB Substrate Kit with all necessary components to stain, counter-stain and preserve experimental results with frozen or paraffin tissue section.

A. Metal enhanced DAB substrate staining of GFAP



B. Negative control (no primary antibody)



Staining of glial fibrillary acidic protein (GFAP) using the Thermo Scientific Pierce Peroxidase Detection Kit. Panel A. Staining was performed as indicated in the protocol provided with the kit. Anti-GFAP and goat anti-mouse IgG biotin conjugate were used as the primary and secondary antibodies, respectively. Streptavidin-HRP was the detection conjugate. **Panel B.** Same as Panel A except no anti-GFAP primary antibody was used.

Ordering Information

Description	Pkg. Size	Product #
Pierce Peroxidase Detection Kit	Kit	**36000**
Includes: DAB/Metal Concentrate (10X)	25mL	
Peroxidase Detection Reagent Pack:		
Stable Peroxide Substrate Buffer (1X)	250mL	
Universal Blocker in TBS	250mL	
Peroxidase Suppressor	2 x 100mL	
BupH™ Tris Buffered Saline	4 packs	
Surfact-Amps 20 (10% Tween®-20)	10mL	
Harris Modified Hematoxylin (without Acetic Acid, Hg free)	100mL	
Mounting Medium (dropper bottle)	60mL	

Immunohistochemistry

Other Common Substrates and Counterstain

NBT/BCIP Substrate Solutions

The combination of NBT and BCIP is an ideal system for blotting or staining applications with alkaline phosphatase (AP). Together, they yield an intense, black-purple precipitate that provides much greater sensitivity than either substrate alone.

- Ready-to-use, single-component solutions
- Regular formulation ideal for Western blotting
- Suppressor formulation contains levamisole for inhibition of endogenous enzyme, making it ideal for immunohistochemistry applications

Colorimetric β-Galactosidase Precipitating Substrates

For detection of β-Galactosidase in immunohistochemical and clone expression applications.

X-Gal (5-bromo-4-chloro-3-indolyl-β-D-galactopyranoside), a chromogenic substrate for β-Galactosidase, yields a blue precipitate. IPTG (isopropyl-β-D-thiogalactopyranoside) maximizes the expression of β-gal.

Peroxidase Suppressor

A stable, easy-to-use endogenous peroxidase inhibitor.

The Thermo Scientific Peroxidase Suppressor inhibits endogenous peroxidase activity even more effectively than the method using hydrogen peroxide in methanol.

DAPI Counterstaining Reagents

Compatible blue color with fluorescent staining.

Ordering Information

Description	Pkg. Size	Product #
NBT/BCIP Substrate Solution	250mL	34042
NBT/BCIP Plus Suppressor Substrate Solution	100mL	❄ 34070
X-Gal	100mg powder	34050
IPTG	1g powder	34060
Peroxidase Suppressor Supplied in methanol solution.	100mL	35000
4′,6-Diamidino-2-phenylindole, hydrochloride (DAPI)	10mg	46190

❄ *Additional dry ice and/or freight charges*

Thermo Scientific Immunohistochemistry Reagents

Normal Sera for Blocking

The most popular blocking agent for immunohistochemical staining; great for use as blocking reagents or negative controls.

Formaldehyde Ampules, Methanol-free

High-purity, 16% (w/v) formaldehyde for use as crosslinker and fixative.

Formaldehyde is a highly reactive, cell-permeable agent that is used by researchers as a reversible crosslinking agent for proteins and nucleic acids within the cell or as a general cell-fixing agent for imaging-based applications.

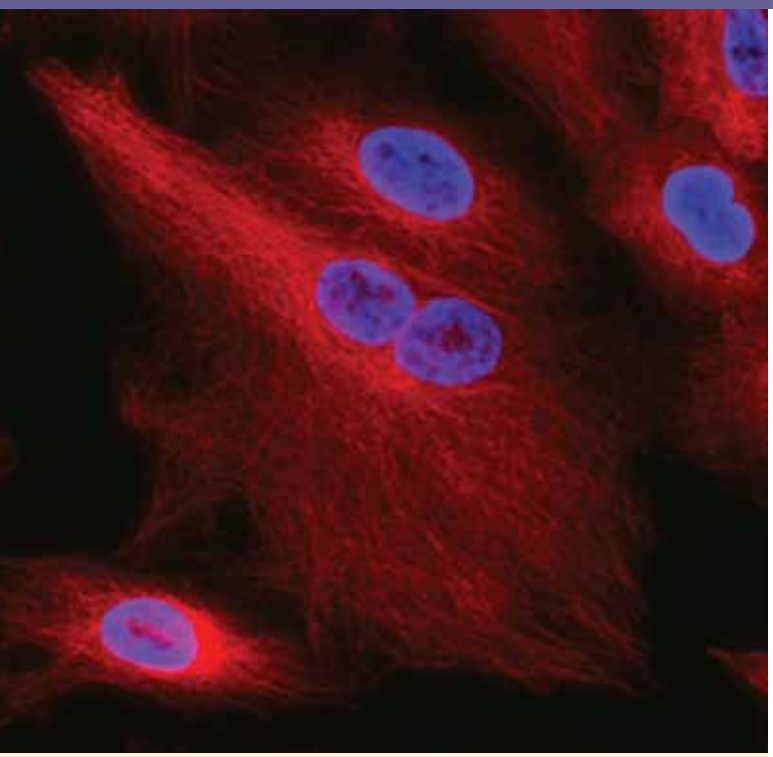
Ordering Information

Description	Pkg. Size	Product #
Normal Goat Serum	2mL	31872
Normal Goat Serum	10mL	31873
Normal Horse Serum	2mL	31874
Normal Human Serum	2mL	31876
Normal Mouse Serum	2mL	31880
Normal Mouse Serum	5mL	31881
Normal Rabbit Serum	2mL	31884
Normal Rabbit Serum	5mL	31883
Normal Rat Serum	2mL	31888
Normal Swine Serum	2mL	31890
16% Formaldehyde (w/v), Methanol-free	10 x 1mL	28906
16% Formaldehyde (w/v), Methanol-free	10 x 10mL	28908

Related Products

Pierce Immunostain Enhancer *Sufficient for 100 large (~3cm²) tissue section slides.*	20mL	46644
Pierce Immunostain Enhancer *Sufficient for 10 large (~3cm²) tissue section slides.*	2mL	46645

Immunofluorescence



Immunofluorescence using fixed cells in culture

Traditional immunohistochemical staining methods are rapidly being replaced with fluorescence techniques. The development of high-performance fluorescent dyes that have complementary (non-overlapping) emission spectra enables simultaneous detection and analysis of multiple parameters in whole cells.

Immunofluroescent staining of fixed cells in culture is a powerful technique to study protein expression in an intact cell. This method is also commonly used to track protein localization in response to various cellular treatments. In-cell fluorescent technologies have also been adapted to study biological events occurring on DNA. Following is a sample method for the immunofluorescent staining of fixed cells.

IF Protocol (Fixed Cells in Culture)

Buffer preparation

Make fresh before each use.

Wash buffer: Prepare 500mL of a 1X PBST/0.1% Tween-20 solution by adding 1 pack of PBS BupH (Product # 28372) pack to 500mL of Milli-Q® water. Add 500µL of 100% Tween-20 to make 0.1%.

Fixation buffer: Add 3mL 16% paraformaldehyde (PFA) (Product # 28908) to 9mL 1X Wash buffer. Use appropriate personal protective equipment, fume hood. Collect PFA waste in a separate container in fume hood. Pre-warm fixation solution to 37°C prior to adding.

Permeabilization buffer: Add 1.5mL 10X stock solution (Product # 8408400) to 13.5mL Milli-Q water.

Blocking buffer: Add 7.5mL 10X stock solution (Product # 8408500) to 67.5mL 1X wash buffer to make a 0.3% blocking solution.

Note: Normal serum may be substituted in place of 10X blocking solution.

Primary antibody: Dilute primary antibody 1:100-1:1000 in 2mL blocking buffer. Prepare just before use.

Secondary antibody dilution buffer: Prepare a 1:500-1:1000 dilution of fluorescent secondary antibody in 6mL of 1X blocking buffer. Add 3µL of DAPI dye (Product # 62248).

Protocol

1. Aspirate media and add 100µL of warm fixation solution to each well. Incubate at room temperature for 15 minutes in fume hood.
2. Remove fixation solution and discard into PFA waste container (fume hood). Note: Remaining steps are performed at room temperature.
3. Add 100µL wash buffer to each well. Aspirate buffer.
4. Repeat step 3 one additional time.
5. Add 100µL of 1X permeabilization buffer to each well. Incubate for 15 minutes. Aspirate 1X permeabilization buffer.
6. Add 100µL blocking buffer to each well. Aspirate buffer.
7. Repeat step 6 one additional time.
8. Add 100µL blocking buffer to each well. Incubate for 15 minutes. Aspirate blocking buffer.
9. Add primary antibody solution to primary antibody positive wells. To negative control wells add blocking buffer. Incubate for 1 hour at 37°C. Aspirate primary antibody solution.
10. Add 100µL 1X blocking buffer to each well. Aspirate buffer.
11. Repeat step 10 one additional time.
12. Add secondary antibody/DAPI solution to all wells. Incubate at room temperature for 30 minutes in the dark. Aspirate secondary antibody solution.
13. Add 100µL wash buffer to each well. Aspirate buffer.
14. Repeat step 13 one additional time.
15. Add 150µL wash buffer to each well, avoiding bubbles.
16. Seal plate with thin adhesive plate seal.
17. Store plates of 4°C until ready to process. Plate can be stored for up to one week before processing. Do not allow plate to dry out.

Bright New Alternatives to Alexa Fluor®, CyDye® and LI-COR® Fluorescent Dyes

Thermo Scientific DyLight Fluorescent Dyes are a complete family of high-intensity, photostable fluorescent tags for labeling antibodies and other molecular probes. The DyLight® Fluors are available as reactive labeling agents and as conjugates of secondary antibodies, biotin-binding proteins and molecular weight markers for use in fluorescence microscopy, flow cytometry, Western blotting, ELISA, high-content screening and other array platforms.

Properties of DyLight Fluorophores

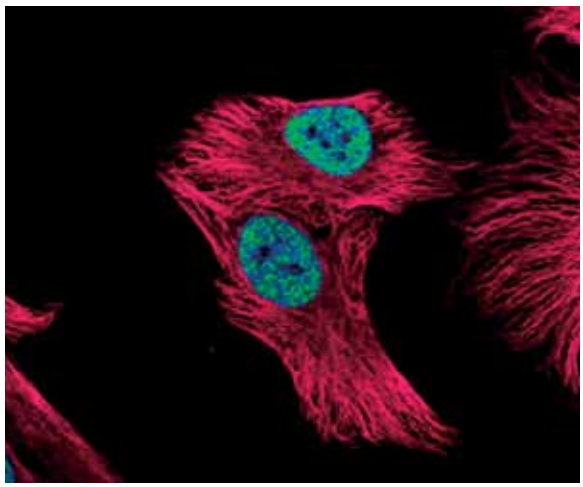
DyLight Fluors have absorption maxima ranging from 350nm to 777nm (Table 2), covering the entire visible light spectrum and several key near-infared and infrared wavelengths. Both the absorption and emission properties of the DyLight Fluors match the output (excitation) and detection wavelengths of common fluorescence instrumentation.

The DyLight Dyes exhibit higher fluorescence intensity and photostability than Alexa Fluor, CyDye and LI-COR Dyes in many applications and remain highly fluorescent over a broad pH range (pH 4-9). Additionally, the water solubility of the DyLight Dyes allows a high dye-to-protein ratio to be achieved without causing precipitation of conjugates.

Table 2. Spectral properties of Thermo Scientific DyLight Fluorescent Dyes.

Emission	DyLight Dye	Ex/Em*	$\varepsilon^{\dagger}$	Spectrally Similar Dyes
Blue	350	353/432	15,000	AMCA, Alexa Fluor 350 Dye
Blue	405	400/420	30,000	Alexa Fluor 405 and Cascade Blue® Dyes
Green	488	493/518	70,000	Alexa Fluor 488, fluorescein and FITC Dyes
Yellow	550	556/576	150,000	Fluor 546, Alexa Fluor 555, Cy®3 and TRITC Dyes
Red	594	593/618	80,000	Alexa Fluor 594 and Texas Red® Dyes
Red	633	638/658	170,000	Alexa Fluor 633 Dye
Red	650	652/677	250,000	Alexa Fluor 647 and Cy5 Dyes
Near-IR	680	692/712	140,000	Alexa Fluor 680 and Cy5.5 Dyes
Near-IR	800	777/790	270,000	IRDye® 800 Dye

**Excitation and emission maxima in nanometers (± 4nm)*
†Molar extinction coefficient (M^{-1} cm^{-1})



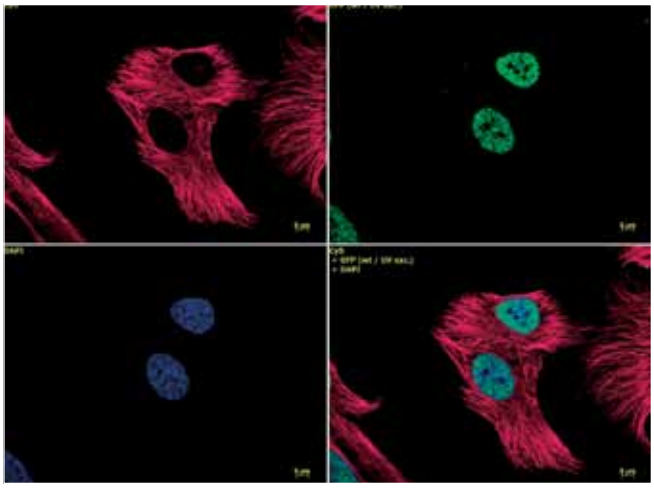
Thermo Scientific DyLight 488 and DyLight 633 Dyes exhibit outstanding fluorescence in structured illumination. The uniform fluorescence intensity throughout the images demonstrates the outstanding brightness and photostability of DyLight 488 and 633 Dyes. **Red:** α-tubulin detected in HeLa cells with anti-tubulin monoclonal antibody and DyLight 633 Dye-conjugated secondary antibody (highly cross-adsorbed). **Green:** Histone H4 detected with anti-histone monoclonal antibody and DyLight 488 Dye-conjugated secondary antibody (highly cross-adsorbed). **Blue:** Nucleus counter-stained with fluorescent mounting media containing DAPI. Images were acquired with the Axio Imager™ Z1 and ApoTome™ Slider (Zeiss MicroImaging, Inc). The ApoTome Module provides confocal-like resolution allowing optical sectioning without using a pinhole (e.g., confocal). No image enhancement was performed.

Thermo Scientific DyLight Amine-Reactive and Sulfhydryl-Reactive Dyes

Excellent photostability make these dyes the clear alternative.

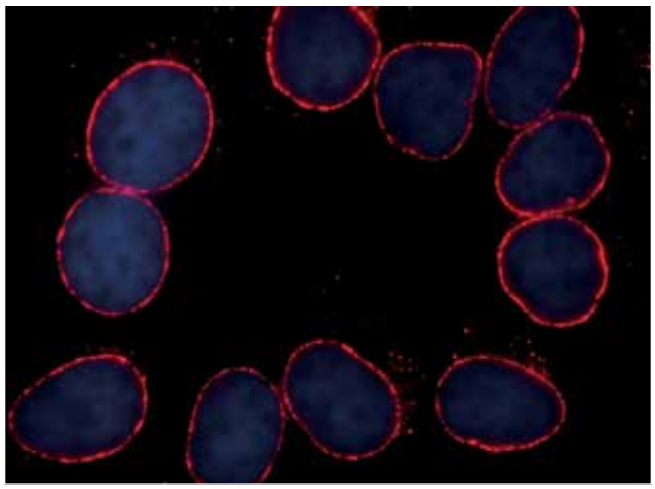
Highlights:

- Available in both amine- and sulfhydryl-reactive chemistries for fast and efficient labeling of IgG or other proteins
- High water solubility
- Excellent photostability
- Compatible with common fluorescence instrumentation



Applications:

- Fluorescence microscopy
- Western blot detection
- Protein arrays
- Flow cytometry
- ELISA
- FRET-based technology
- And many more



Ordering Information

Description	Pkg. Size	Product #
Amine-Reactive Dyes		
DyLight 350 NHS Ester	1mg	46426
DyLight 350 NHS Ester	5 x 65µg	46427
DyLight 405 NHS Ester	1mg	46400
DyLight 405 NHS Ester	5 x 50µg	46401
DyLight 488 NHS Ester	1mg	46402
DyLight 488 NHS Ester	5 x 50µg	46403
DyLight 550 NHS Ester	1mg	62262
DyLight 550 NHS Ester	5 x 50µg	62263
DyLight 594 NHS Ester	1mg	46412
DyLight 594 NHS Ester	5 x 65µg	46413
DyLight 633 NHS Ester	1mg	46414
DyLight 633 NHS Ester	5 x 50µg	46417
DyLight 650 NHS Ester	1mg	62265
DyLight 650 NHS Ester	5 x 50µg	62266
DyLight 680 NHS Ester	1mg	46418
DyLight 680 NHS Ester	5 x 50µg	46419
DyLight 800 NHS Ester	1mg	46421
DyLight 800 NHS Ester	5 x 50µg	46422

Ordering Information

Description	Pkg. Size	Product #
Sulfhydryl-Reactive Dyes		
DyLight 350 Maleimide	1mg	46622
DyLight 405 Maleimide	1mg	46600
DyLight 488 Maleimide	1mg	46602
DyLight 550 Maleimide	1mg	62290
DyLight 594 Maleimide	1mg	46608
DyLight 633 Maleimide	1mg	46613
DyLight 650 Maleimide	1mg	62295
DyLight 680 Maleimide	1mg	46618
DyLight 800 Maleimide	1mg	46621
Related Products		
Dye Removal Columns	Kit	22858
Includes: Purification Resin	5mL	
Spin Columns	10 each	
Microcentrifuge Collection Tubes	20 each	

Thermo Scientific DyLight Antibody Labeling Kits

Label and purify antibodies in one hour.

The DyLight Antibody Labeling Kits for fast, efficient labeling of antibodies are supplied in two convenient kit formats to accommodate varied labeling requirements. The Antibody Labeling Kits contain all necessary components to perform three separate labeling reactions using 1mg of IgG or similar quantities of other proteins. The DyLight Microscale Antibody Labeling Kits contain all the necessary components to perform five separate labeling reactions using 100µg of IgG. The labeling kits use high-performance spin desalting columns to provide exceptional dye removal and antibody recovery.

Highlights:

- Fast – fluorescently label and purify protein in approximately one hour
- Amine-reactive dyes – label virtually any protein
- Pre-measured fluorescent dye – eliminate the time, waste and hassle associated with weighing dye
- Efficient non-reacted dye removal
- Minimal sample dilution
- Spin column format eliminates the need for column preparation, fraction screening and waiting for protein to emerge from column
- Easy protocol

Microscale Kits

Contain sufficient reagents to label and purify 5 x 100µg of IgG.

In addition to contents listed below, all Microscale Kits include:
Reagent Buffer, 1mL
Spin Columns, 5 each
Microcentrifuge Collection Tubes, 10 each
Purification Resin, 5mL

Ordering Information

Description	Pkg. Size	Product #
DyLight 350 Microscale Antibody Labeling Kit DyLight 350 NHS Ester	Kit 5 vials	**62276**
DyLight 405 Microscale Antibody Labeling Kit DyLight 405 NHS Ester	Kit 5 vials	**53021**
DyLight 488 Microscale Antibody Labeling Kit DyLight 488 NHS Ester	Kit 5 vials	**53025**
DyLight 550 Microscale Antibody Labeling Kit DyLight 550 NHS Ester	Kit 5 vials	**84531**
DyLight 594 Microscale Antibody Labeling Kit DyLight 594 NHS Ester	Kit 5 vials	**53045**
DyLight 633 Microscale Antibody Labeling Kit DyLight 633 NHS Ester	Kit 5 vials	**53047**
DyLight 650 Microscale Antibody Labeling Kit DyLight 650 NHS Ester	Kit 5 vials	**84536**
DyLight 680 Microscale Antibody Labeling Kit DyLight 680 NHS Ester	Kit 5 vials	**53057**
DyLight 800 Microscale Antibody Labeling Kit DyLight 800 NHS Ester	Kit 5 vials	**53063**

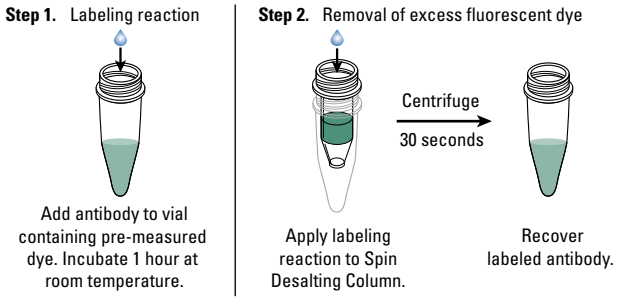
Antibody Labeling Kits

Contain sufficient reagents to label and purify 3 x 1mg of IgG or similar quantities of other proteins.

In addition to contents listed below, all Antibody Labeling Kits include:
Reagent Buffer, 1mL
Spin Columns, 6 each
Microcentrifuge Collection Tubes, 12 each
Purification Resin, 5mL

Ordering Information

Description	Pkg. Size	Product #
DyLight 350 Antibody Labeling Kit DyLight 350 NHS Ester	Kit 3 vials	**62275**
DyLight 405 Antibody Labeling Kit DyLight 405 NHS Ester	Kit 3 vials	**53020**
DyLight 488 Antibody Labeling Kit DyLight 488 NHS Ester	Kit 3 vials	**53024**
DyLight 550 Antibody Labeling Kit DyLight 550 NHS Ester	Kit 3 vials	**84530**
DyLight 594 Antibody Labeling Kit DyLight 594 NHS Ester	Kit 3 vials	**53044**
DyLight 633 Antibody Labeling Kit DyLight 633 NHS Ester	Kit 3 vials	**53046**
DyLight 650 Antibody Labeling Kit DyLight 650 NHS Ester	Kit 3 vials	**84535**
DyLight 680 Antibody Labeling Kit DyLight 680 NHS Ester	Kit 3 vials	**53056**
DyLight 800 Antibody Labeling Kit DyLight 800 NHS Ester	Kit 3 vials	**53062**



Thermo Scientific Pierce Fluorescein

Amine-reactive derivatives of fluorescein dye.

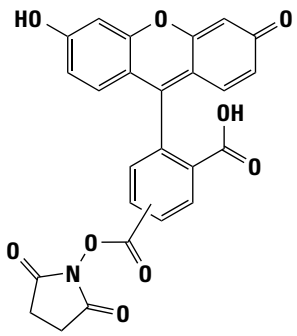
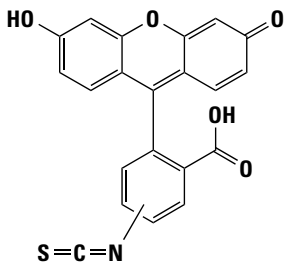
NHS-fluorescein and fluorescein isothiocyanate (FITC), two reactive derivatives of fluorescein dye, are used in wide-ranging applications including fluorescence microscopy, flow cytometry and immunofluorescence-based assays such as Western blotting and ELISA. FITC is the base fluorescein molecule functionalized with an isothiocyanate reactive group (-N=C=S), replacing a hydrogen atom on the bottom ring of the structure. This derivative is reactive toward primary amine groups on proteins, peptides and other biomolecules. A succinimidyl-ester functional group attached to the fluorescein core, creating NHS-fluorescein, forms another common derivative that has much greater specificity toward primary amines in the presence of other nucleophiles and a more stable linkage following labeling.

Pierce Fluorescein is a mixture of isomers with reactive groups attached at the five and six positions of the bottom ring (See Structure). The properties of these isomers are indistinguishable in terms of excitation and emission spectra and for protein applications there is no need to isolate a specific isomer.

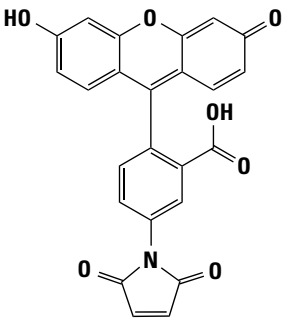
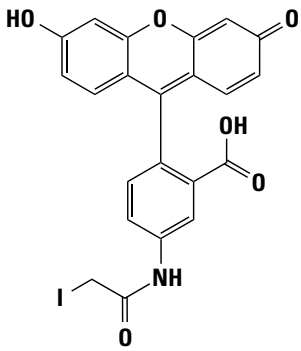
Fluorescein-5-maleimide and 5-Iodoacetamidofluorescein (5-IAF) are sulfhydryl-reactive derivatives of fluorescein dye. Fluorescein-5-maleimide is the base fluorescein molecule functionalized with a maleimide reactive group by replacing a hydrogen atom on the bottom ring of the structure. 5-IAF is the core fluorescein molecule functionalized with an iodoacetamide group. Both fluorescein derivatives are reactive toward sulfhydryl groups (e.g., reduced cysteine residues) on proteins, peptides and other biomolecules.

A derivative of fluorescein, DyLight 488 Fluor, has been tailored for various chemical and biological applications where greater photostability and fluorescence intensity, pH independence, and a narrower emission spectrum are required.

Properties of amine-reactive fluorescein dyes.

	NHS-Fluorescein	FITC
Structure	 **NHS-Fluorescein MW 473.39**	 **FITC MW 389.38**
Alternative names	5/6-FAM SE	5/6-FITC
Chemical name	5/6-carboxyfluorescein succinimidyl ester	5(6)-fluorescein isothiocyanate mixed isomer
Molecular weight	473.4	389.2
Excitation source	488nm spectral line, argon-ion laser	488nm spectral line, argon-ion laser
Excitation wavelength	494nm	494nm
Emission wavelength	518nm	518nm
Extinction coefficient	> 70,000/M^{-1} cm^{-1}	> 70,000/M^{-1} cm^{-1}
CAS #	117548-22-8	27072-45-3
Purity	> 90% by HPLC	> 95% by HPLC
Solubility	Soluble in DMF or DMSO	Soluble in aqueous buffers at pH > 6
Storage	Desiccated at -20°C, protect from moisture, use only fresh solutions	Desiccated at -20°C, protect from moisture, use only fresh solutions
Reactive groups	NHS ester, reacts with primary amines at pH 7.0 to 9.0	Isothiocyanate, reacts with primary amines at pH 7.0 to 9.0

Properties of sulfhydryl-reactive dyes.

	Fluorescein-5-maleimide	5-Iodoacetamido-fluorescein
Structure	 **Fluorescein-5-Maleimide MW 427.36**	 **5-IAF 5-Iodoacetamido-fluorescein MW 515.25**
Alternative names	5-MF, 5-maleimido-fluorescein	5-IAF, 5-iodoacetamidofluorescein
Chemical name	1H-Pyrrole-2,5-dione, 1-(3',6'-dihydroxy-3-oxospiro(isobenzofuran-1(3H),9'-(9H)xanthen-5-yl)-	Acetamide, N-(3',6'-dihydroxy-3-oxospiro(isobenzofuran-1(3H), 9'-(9H)xanthen)-5-yl)-2-iodo
Molecular weight	427.36 ±3	515.26 ±3
Excitation source	488nm spectral line, argon-ion laser	488nm spectral line, argon-ion laser
Excitation wavelength	494nm	494nm
Emission wavelength	518nm	518nm
Extinction coefficient	~ 68,000/M^{-1} cm^{-1}	> 80,000/M^{-1} cm^{-1}
CAS #	75350-46-8	63368-54-7
Solubility	Soluble in DMF or DMSO	Soluble in DMF; aqueous buffers at pH > 6
Storage	Desiccated at -20°C, protect from moisture, use only fresh solutions	Desiccated at -20°C, protect from moisture, use only fresh solutions
Reactive groups	Maleimide, reacts with sulfhydryls at pH 6.5 to 7.5	Iodoacetamide, reacts with sulfhydryls at pH 7.0 to 7.5

Ordering Information

Description	Pkg. Size	Product #
FITC (Fluorescein Isothiocyanate)	1g	**46424**
FITC (Fluorescein Isothiocyanate)	100mg	**46425**
NHS-Fluorescein	1g	**46409**
NHS-Fluorescein	100mg	**46410**
FITC Antibody Labeling Kit *Efficiently labels and purifies 3 x 1mg of IgG or other protein in about 1 hour.*	Kit	**53027**
Includes: FITC	3 vials	
Borate Buffer	1mL	
Spin Columns	6 each	
Microcentrifuge Collection Tubes	12 each	
Purification Resin	5mL	

Ordering Information

Description	Pkg. Size	Product #
Fluorescein Antibody Labeling Kit *Efficiently labels and purifies 3 x 1mg of IgG or other protein in about 1 hour.*	Kit	**53029**
Includes: NHS Fluorescein	3 vials	
Borate Buffer	1mL	
Spin Columns	6 each	
Microcentrifuge Collection Tubes	12 each	
Purification Resin	5mL	
Fluorescein-5-Maleimide	25mg	**62245**
5-Iodoacetamido-fluorescein (5-IAF)	25mg	**62246**

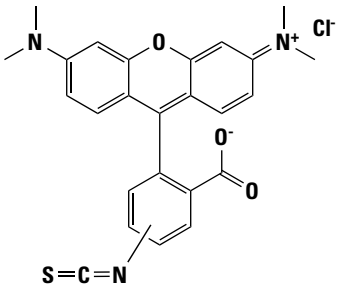
Thermo Scientific Pierce Rhodamine

Amine-reactive derivatives of rhodamine dye.

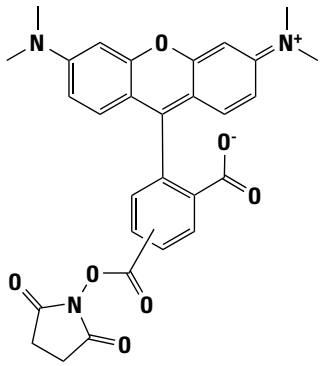
NHS-rhodamine and tetramethylrhodamine isothiocyanate (TRITC), two reactive derivatives of rhodamine dye, are used in wide-ranging applications including fluorescence microscopy, flow cytometry and immunofluorescence-based assays such as Western blotting and ELISA.

TRITC is the base tetramethylrhodamine molecule functionalized with an isothiocyanate reactive group (-N=C=S), replacing a hydrogen atom on the bottom ring of the structure. This derivative is reactive toward amine and sulfhydryl groups on proteins, peptides and other biomolecules. A succinimidyl-ester functional group attached to the tetramethylrhodamine core, creating NHS-fluorescein, forms another common derivative that has much greater specificity toward primary amines in the presence of other nucleophiles and a more stable linkage following labeling. Texas Red Sulfonyl Chloride is a long-wavelength derivative of rhodamine that is modified with sulfonyl chloride for reaction to primary amines.

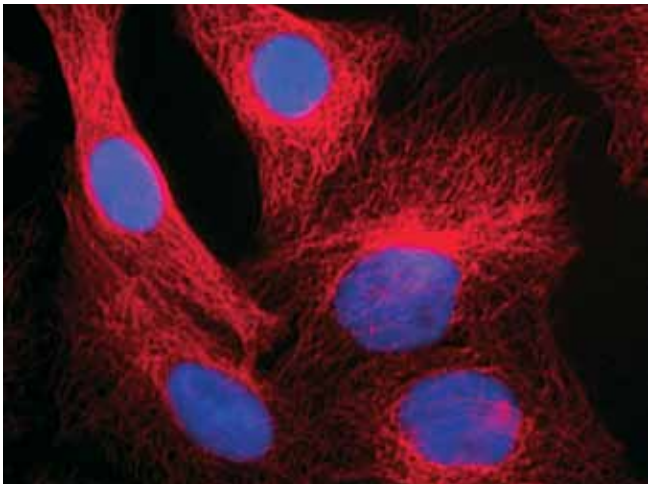
Pierce Rhodamine Dyes are a mixture of isomers with reactive groups attached at the five and six positions of the bottom ring (See Structure). The properties of these isomers are indistinguishable in terms of excitation and emission spectra and for protein applications there is no need to isolate a specific isomer.



TRITC
MW 478.97
Em/Ex 544/572



NHS-Rhodamine
MW 527.52
Em/Ex 552/575



The Thermo Scientific NHS-Rhodamine Antibody Labeling Kit (Product # 53031) produces ideal conjugates for immunofluorescence. A549 cells were fixed with 4% paraformaldehyde (Product # 28906) and permeabilized with 0.1% Surfact-Amps® X-100 (Product # 28314). The cells were then probed with a 0.4µg/mL mouse anti-α-tubulin antibody and 2µg/mL rhodamine-goat anti-mouse secondary antibody. Nuclei were labeled with Hoechst 33342. Images were acquired on Nikon Eclipse TS100 fluorescent microscope using Zeiss AxioCam® camera and AxioVision® software.

Ordering Information

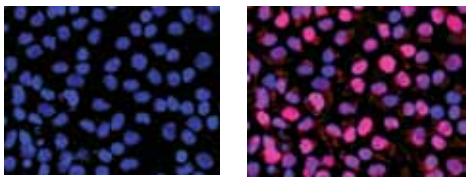
Description	Pkg. Size	Product #
TRITC (Tetramethylrhodamine Isothiocyanate)	10mg	**46112**
NHS-Rhodamine	25mg	**46406**
Rhodamine Antibody Labeling Kit *Efficiently labels and purifies 3 x 1mg of IgG or other protein in about 1 hour.*	Kit	**53031**
Includes: NHS Rhodamine	3 vials	
Borate Buffer	1mL	
Spin Columns	6 each	
Microcentrifuge Collection Tubes	12 each	
Purification Resin	5mL	

Thermo Scientific DAPI Stain

DAPI reagents are high-purity forms of DAPI dye for fixed-cell, fluorescent staining of DNA content and nuclei for cellular imaging techniques.

DAPI (diamidino-2-phenylindole) is a blue fluorescent probe that fluoresces brightly when it is selectively bound to the minor groove of double-stranded DNA where its fluorescence is approximately 20-fold greater than in the nonbound state. This selectivity for DNA, along with cell permeability allows staining of nuclei with little background from the cytoplasm, making DAPI the classic nuclear counterstain for immunofluorescence microscopy. DAPI has greater photostability than Hoechst dyes, another common nuclear counterstain, when it is bound to double-stranded DNA. DAPI has an excitation maximum at 345nm and an emission maximum at 455nm. DAPI is compatible with fluorescein and rhodamine dyes, as well as with DyLight and Alexa Fluor Dye, for nuclear counterstaining of DNA in fluorescence imaging.

As a counterstain in fluorescence imaging methods, DAPI is compatible with antibodies and other probes labeled with fluorescein and rhodamine dyes, as well as with DyLight Fluors. DAPI has greater photostability than Hoechst dyes, although Hoechst 33342 can be use for live cell imaging while use of DAPI is confined to fixed cells. DAPI is offered in powdered solid and aqueous solution forms.

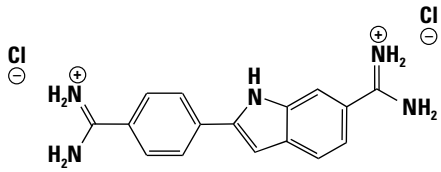


DAPI | DAPI + HMGB

Dual imaging with DAPI and antibody probes. DU145 prostate cancer cells DU145 were grown in 96-well plates, fixed with paraformaldehyde and permeabilized for 15 minutes. Cells were incubated for 1 hour at room temperature with a mouse anti-human HMGB antibody, then for 45 minutes with Thermo Scientific DyLight 549 Goat Anti-Mouse Secondary Antibody. Finally, Thermo Scientific DAPI was added at 1µg/mL for 5 minutes. Stained cells were imaged with the Thermo Scientific ArrayScan VTI Instrument (Obj. 20X/0.45NA).

Properties of DAPI Fluorescent Dye.

Structure



DAPI
4,6′-Diamidino-2-phenylindole dihydrochloride
MW 350.25

Alternative names	DAPI Stain, DAPI Dye, DNA Content Counterstain
Chemical name(s)	4,6′-diamidino-2-phenylindole, dihydrochloride 4′,6-diamidine-2-phenyl indole 2-(4-Amidinophenyl)-6-indolecarbamidine dihydrochloride
Molecular formula	$C_{16}H_{15}N_5$ 2HCl
Molecular weight	350.25
Excitation wavelength	341 ±3nm (near 360nm when bound to dsDNA)
Emission wavelength	452 ±3nm (456 to 460nm when bound to dsDNA)
Extinction coefficient	> 30,600/M^{-1} cm^{-1} at 347nm in methanol
CAS #	28718-90-3
Purity	> 95% (most lots >98%) by HPLC at 240nm
Solubility	> 1mg/mL in water; compound is soluble in DMF, water and various non-phosphate aqueous buffers
Storage	Store solid at room temperature (RT), protected from light Store DAPI solution (1mg/mL) at -20°C protected from light
Reactive groups	None; binds to minor groove of double-stranded DNA

Ordering Information

Description	Pkg. Size	Product #
DAPI Formulation: 4′,6-Diamidino-2-phenylindole, dihydrochloride; powder.	10mg	**62247**

Ordering Information

Description	Pkg. Size	Product #
DAPI Solution Formulation: 4′,6-Diamidino-2-phenylindole, dihydrochloride; 1mg/mL aqueous solution.	1mL	**62248**

Thermo Scientific Hoechst 33342 Stain

Hoechst 33342 Solution is a high-quality form of Hoechst dye for fixed- and live-cell fluorescent staining of DNA and nuclei in cellular imaging techniques

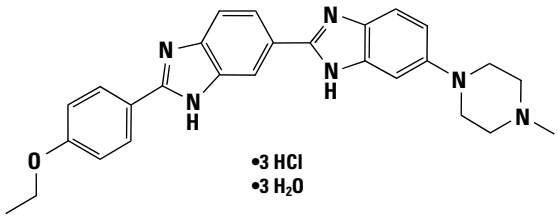
Hoechst 33342 (2′-[4-ethoxyphenyl]-5-[4-methyl-1-piperazinyl]-2,5′-bi-1H-benzimidazole trihydrochloride trihydrate) is a cell-permeable DNA stain that is excited by ultraviolet light and emits blue fluorescence at 460-490nm. Hoechst 33342 binds preferentially to adenine-thymine (A-T) regions of DNA. This stain binds into the minor groove of DNA and exhibits distinct fluorescence emission spectra that are dependent on dye:base pair ratios.

Hoechst 33342 is used for specifically staining the nuclei of living or fixed cells and tissues. This stain is commonly used in combination with 5-bromo-2′-deoxyuridine (BrdU) labeling to distinguish the compact chromatin of apoptotic nuclei, to identify replicating cells and to sort cells based on their DNA content. A combination of Hoechst 33342 and propidium iodide have been extensively used for simultaneous flow cytometric and fluorescence imaging analysis of the stages of apoptosis and cell-cycle distribution.

As a counterstain in fluorescent imaging, Hoechst dye is compatible with antibodies and other probes labeled with fluorescein and rhodamine dyes, as well as with Thermo Scientific DyLight Fluors. The stable 20mM aqueous stock solution is essentially ready for use.

Properties of Hoescht 33342 Dye.

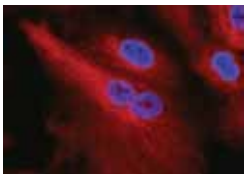
Structure



Hoechst 33342
MW 615.99

Alternative names	Hoechst Stain, Hoechst Dye, DNA Content Counterstain
Chemical name	2′-(4-Ethoxyphenyl)-5-(4-methyl-1-piperazinyl)-2,5′-bi-1H-benzimidazole trihydrochloride trihydrate
Molecular formula	$C_{27}H_{28}N_6O \bullet 3HCl \bullet 3H_2O$
Molecular weight	615.99
Excitation wavelength	346 ±3nm (361nm when bound to dsDNA)
Emission wavelength	497 ±3nm
Extinction coefficient	Source compound ~47,000/M^{-1} cm^{-1} (> 45,000) at 343nm in methanol
CAS #	28491-52-3
Purity	> 95% (most lots >98%) by HPLC at 240nm
Solubility	Product is supplied at 20mM (12.3mg/mL) in water; Hoechst dye is soluble in DMF, water and various non-phosphate aqueous buffers
Storage	Store supplied solution at 2 to 8°C protected from light
Reactive groups	None; dye binds to minor groove of double-stranded DNA

Hoechst 33342



Hoechst + α-Tubulin

Cellular imaging with Hoechst 33342. A549 human lung cancer cells were grown on 96-well plates, fixed with paraformaldehyde and permeabilized for 15 minutes. Cells were incubated for 30 minutes at room temperature with mouse anti-human α-tubulin antibody, then for 45 minutes with Thermo Scientific DyLight 549 Goat Anti-Mouse Secondary Antibody. Finally, Thermo Scientific Hoechst 33342 Solution was added at 1µg/mL for 5 minutes. Stained cells were imaged with the ArrayScan® VTI Instrument (Obj. 20X/0.45NA).

Ordering Information

Description	Pkg. Size	Product #
Hoechst 33342 Solution Formulation: 12.3mg/mL (20mM) aqueous solution.	5mL	**62249**

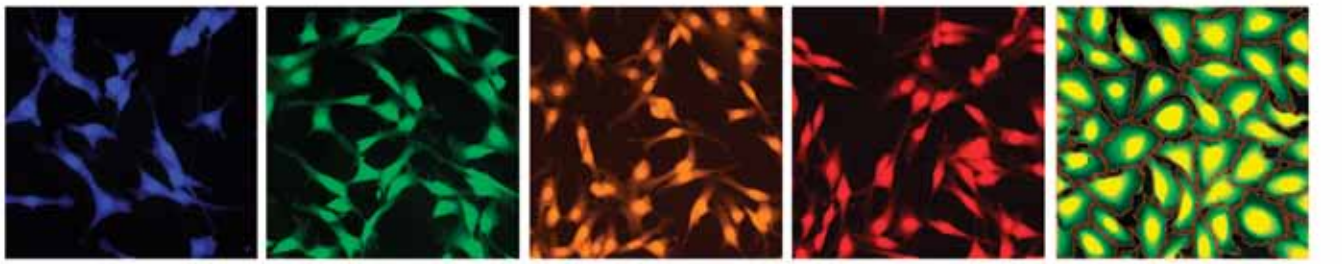
Immunofluorescence

Thermo Scientific Cellomics Fluorescent Whole Cell Stains Imaging

Cellomics® Whole Cell Stains provide excellent staining of fixed cells for high content screening (HCS) assays and fluorescence microscopy. These stains are intense, highly photostable and compatible with standard fluorescence instrumentation. Cellomics Whole Cell Stains can be used to identify and count individual cells, as well as to define the cellular region in which the active target in the cell image is to be analyzed. With appropriate image analysis software, our Whole Cell Stains enable intact cells to be distinguished from bordering cells.

Highlights:

- Em/Ex spectra designed similar to standard dyes
  - Blue: 350/450nm
  - Green: 493/518nm
  - Orange: 550/568nm
  - Red: 654/673nm
- Stain different cells types
- Good cell-to-cell separation
- Minimal bleed-through
- Multiplexing capability



Thermo Scientific Cellomics Whole Cell Stains. NIH 3T3 cells were stained with Whole Cell Stain Blue, Green, Orange and Red for 30 minutes (left to right, respectively.) U20S cells (rightmost image) in sub-confluent culture conditions were stained with Whole Cell Stain Green and the cell boundary (red line) was identified using the Thermo Scientific Cellomics Morphology Explorer BioApplication.

Ordering Information

Description	Pkg. Size	Product #
Whole Cell Stain Blue	1 x 96	8403501
	5 x 96	8403502
Whole Cell Stain Green	1 x 96	8403201
	5 x 96	8403202
Whole Cell Stain Orange	1 x 96	8403301
	5 x 96	8403302
Whole Cell Stain Red	1 x 96	8403401
	5 x 96	8403402

Thermo Scientific Pierce Immunostain Enhancer

Alleviates common immunostaining problems such as low signal and poor sensitivity.

The Pierce Immunostain Enhancer is compatible with fluorescence and chromogenic detection and routinely increases both signal intensity and detection sensitivity. Signal enhancement is antibody-dependent and typically ranges from 3- to 12-fold. Because of the strong signal enhancement, the Pierce Immunostain Enhancer reduces the amount of antibody required to achieve optimal detection.

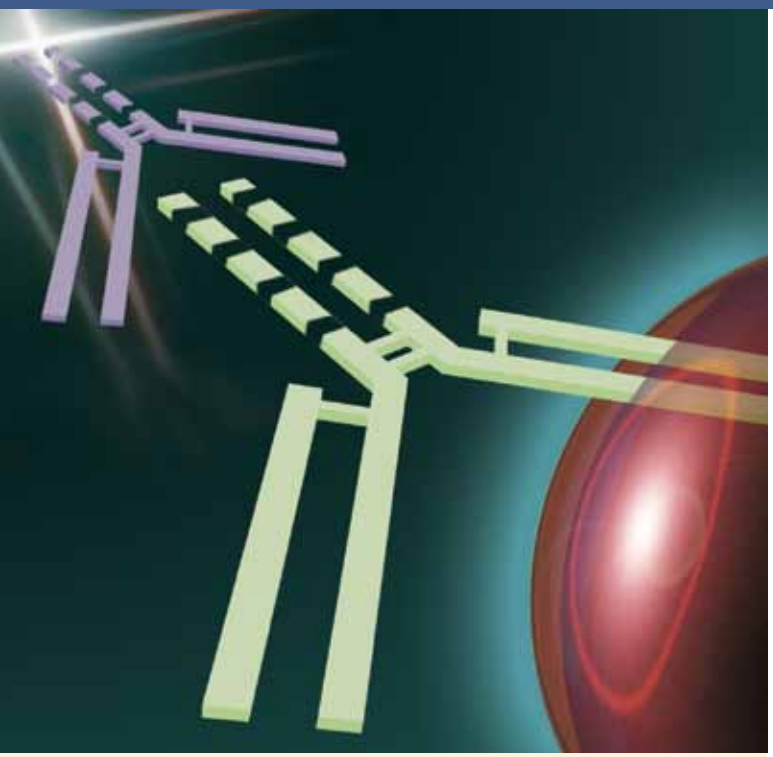
Highlights:

- **Save precious antibody** – Pierce Immunostain Enhancer allows the customer to use only a fraction of antibody to achieve the same signal as with conventional immunodetection
- **Convenience** – simply replace your current antibody dilution buffer with Pierce Immunostain Enhancer (unlike other signal enhancement methods which require additional steps)
- **Increased signal intensity and sensitivity** – provides 3- to 12- fold increase in signal intensity and sensitivity for improved visualization of the antigen of interest in cells and tissues
- **Improved specificity** – significantly improves signal-to-noise ratio for poor quality and low affinity antibodies
- **Compatible** – can be used with chromogenic and fluorescent detection methods

Ordering Information

Description	Pkg. Size	Product #
Pierce Immunostain Enhancer *Sufficient for 100 large (~3cm²) tissue section slides.*	20mL	46644
Pierce Immunostain Enhancer *Sufficient for 10 large (~3cm²) tissue section slides.*	2mL	46645

Secondary Antibodies



A secondary antibody indirectly detects a target antigen to which a specific primary antibody is first bound. The secondary antibody has a tag or other label to facilitate detection or purification. It also requires that the secondary antibody has the same specificity for the primary antibody species and isotypes.

Although indirect detection using a secondary antibody requires more steps, it offers increased sensitivity through the signal amplification of multiple secondary antibodies binding to a single primary antibody. Secondary antibodies are also a more versatile reagent than individually labeled primary antibodies. A given secondary antibody can be used with any primary antibody of the same type and host species.

Because the vast majority of primary antibodies are produced in just a few host animal species and most are of the IgG class, it is easy and economical for manufacturers to produce and supply ready-to-use secondary antibodies for many methods and detection systems. From a relatively small number of secondary antibodies, many options are available for purity level, specificity and label type required for a given application.

Secondary Antibody Fragments

Secondary antibodies may be provided in three formats: whole IgG, divalent F(ab')$_2$ fragments and monovalent Fab fragments.

Whole IgG
Secondary antibodies are typically affinity purified from the pooled serum of immunized hosts. In this first round of purification, whole immunoglobulins binding to the immunizing antibody are recovered and mainly consist of the ~150-kDa IgG class. Further affinity purification with Protein A or G removes all immunoglobulin classes except IgG. Whole IgG secondary antibodies produced in the manner are widely applicable, easiest to produce and least expensive.

F(ab')$_2$ antibody fragments
While whole immunoglobulins are compatible with most assays, certain methods benefit from removing the Fc portion of the antibody by either reducing the mass of the antibody or reducing cross-reactivity with probed samples containing active Fc-binding proteins (e.g., Fc receptors, Protein A, Protein G). The Fc portion can be removed from several species of IgG by digestion with pepsin, leaving the divalent F(ab')$_2$ fragment (~100 kDa) of the antibody intact.

Fab antibody fragments
Some species of IgG can be enzymatically digested with papain to cleave the antibody between the antigen binding domain and hinge region to produce two Fab fragments and an Fc fragment. The monovalent Fab antibody fragments are useful in blocking applications and other special circumstances where controlled binding ratios and/or the elimination of Fc interactions is required. The small size (~50 kDa) of Fab fragments may improve antigen detection by penetrating deeper than whole IgG into tissue sections and other complex samples.

Specificity of Secondary Antibodies

Secondary antibodies are generated by immunizing a host animal with the antibody(s) from a different species. For example, anti-mouse antibodies are raised by injecting mouse antibodies into an animal other than a mouse. Goat, donkey and rabbit are the most commonly used host species for raising secondary antibodies, but others may be available from individual suppliers.

The most common types of secondary antibodies are those generated against a pooled population of immunoglobulins from a target species. For example, immunizing a goat with purified mouse IgG will generate goat anti-mouse IgG antibodies that will bind to all classes, heavy and light chains (H&L) and fragments of mouse IgG as well as any other molecules sharing the same conserved domains (e.g., IgM shares the same light chains as IgG). In contrast, immunizing a goat with only mouse IgG$_1$ antibodies will only generate antibodies specific for mouse IgG$_1$ antibodies and molecules sharing the same conserved domains.

Because of the high degree of conservation in the structure of many immunoglobulin domains, class-specific secondary antibodies must be affinity purified and cross-adsorbed to achieve minimal cross-reactivity with other immunoglobulins. Using the

Secondary Antibodies

example described above, immobilized mouse IgG_1 antibodies would be used to affinity purify all goat antibodies that bind to mouse IgG_1. These anti-mouse IgG_1 antibodies would then be further purified by passage through a chromatography column(s) containing mouse IgG_{2a}, IgG_{2b}, IgG_3, IgM, etc., to remove any antibodies that cross-react with non-IgG_1 isotypes.

Additionally, secondary antibodies can be further purified by passage through columns containing the immobilized serum proteins from species other than those used to immunize the host. This method of cross-adsorption (often referred to as "Highly Cross-Adsorbed") is an additional purification step recommended for applications where primary antibodies from multiple species will be used and when immunoglobulins or other serum proteins may be present in the samples being probed.

Highly Cross-Adsorbed Thermo Scientific Pierce Secondary Antibodies are purified for minimal cross-reactivity with the serum proteins of specific species. These antibodies are indicated by the code "min x Sp" where Sp is an abbreviation for the one or more species of serum proteins against which the secondary antibody was cross-adsorbed. A list of Sp abbreviations used with Pierce Antibodies follows in Table 3. Other companies often use similar codes.

Table 3. Common Sp abbreviations for Thermo Scientific Pierce Secondary Antibodies.

Bv =	Bovine	Hs =	Horse
Ch =	Chicken	Ms =	Mouse
Gt =	Goat	Rb =	Rabbit
Gu =	Guinea pig	Rt =	Rat
Ha =	Hamster	Sh =	Sheep
Hn =	Human	Sw =	Swine

In addition to class and species specificity, secondary antibodies can be generated against specific antibody fragments [$F(ab')_1$, Fab] or individual antibody chains (mu, gamma, kappa) and domains. Table 3 contains a list of commonly used notations that indicate the specificity of secondary antibodies.

Table 4. Commonly used notations for secondary antibody specificity.

H+L (heavy and light chains)	whole immunoglobulin (Ig) and any molecule containing those chains or domains
Fc (Fragment, crystallizable region)	heavy chain regions forming the hinge and binding sites for Fc receptors, Protein A and Protein G
Fab (Fragment, antigen binding)	heavy and light chain regions forming the antigen binding domain
$F(ab')_2$	heavy and light chain regions forming the antigen-binding domains as well as the hinge region
μ	mu heavy chain (IgM class)
γ	gamma heavy chain (IgG class)
κ	kappa light chain
λ	lambda light chain

Choosing a Secondary Antibody

The following steps will help you choose the most appropriate antibody for your specific application.

1) Determine the host species of the primary antibody (mouse anti-tubulin, rabbit anti-CD4, etc.)

2) Select an appropriate host species for the secondary antibody (goat anti-mouse IgG, donkey anti-rabbit IgG)

3) Consider cross-reactivity or specificity issues of the secondary:
- **Highly cross-absorbed** – for multiple-labeling applications or when using samples with endogenous antibodies
- **Specificity** – binds to correct fragments, classes or chains of the primary antibody

4) Detection or purification method
- **Label** – horseradish peroxidase, alkaline phosphates, fluorophore, biotin, etc.
- **Ability to bind to Protein A, Protein G or Protein L** – make sure the secondary antibody chosen has sufficient affinity for the molecules used upstream or downstream (e.g., Protein A-coated microplates.)

5) Consider requirements of the supplied secondary:
- **Label** – appropriately conjugated to the correct enzyme, tag or fluorophore for the chosen detection method
- **Supplied state** – sterile liquid or lyophilized, suspended in PBS or Tris buffer, contains carrier proteins such as gelatin or albumin or the addition of stabilizers such as sucrose or microbial inhibitors

Ordering Information

Specificity	Source	Product # Unconjugated	Biotin	Peroxidase	Alk. Phos.	Fluorescein	Rhodamine	Texas Red
Chicken IgY (H+L)	Rabbit	**31104**	**31720**	**31401**		**31501**		
Goat IgG (H+L) (min x HnMsRb Sr Prot)†	Mouse	**31107**	**31730**	**31400**		**31512**	**31620**	**31940**
Goat IgG (H+L)	Rabbit	**31105**	**31732**	**31402**	**31300**	**31509**	**31650**	**31492**
Goat IgG [F(ab')$_2$]	Rabbit	**31214**	**31753**	**31403**		**31553**		
Goat IgG (Fc)	Rabbit	**31133**		**31433**	**31337**	**31533**		
Goat IgG (H+L) (min x Hn Sr Prot)†	Rabbit F(ab')$_2$	**31109**			**31302**			
Hamster IgG (H+L)	Goat	**31115**	**31750**					
Hamster IgG (H+L)	Rabbit	**31120**				**31587**		
Horse IgG (H+L)	Goat		**31760**					
Human IgG (H+L)	Goat	**31130**	**31770**	**31410**	**31310**	**31529**	**31656**	**31943**
Human IgG γ Chain Specific	Goat	**31118**						
Human IgG (H+L) (min x BvHsMs Sr Prot)†	Goat	**31119**	**31774**	**31412**		**31531**	**31683**	**31944**
Human IgG [F(ab')$_2$]	Goat	**31122**		**31482**	**31312**	**31628**		
Human IgG [F(ab')$_2$] (min x BvHsMs Sr Prot)†	Goat	**31132**		**31414**				
Human IgG (Fc) (min x BvHsMs Sr Prot)†	Goat	**31125**		**31413**				
Human IgM (Fc5μ)	Goat	**31136**		**31415**		**31575**		
Human IgM (μ)	Goat	**31124**	**31778**					
Human IgA (α)	Goat	**31140**		**31417**	**31314**	**31577**		
Human IgA + IgG + IgM (H+L)	Goat	**31128**	**31782**	**31418**	**31316**			
Human κ Chain	Goat	**31129**	**31780**					
Human λ Chain	Goat	**31131**						
Human IgG (H+L) (min x Ms Sr Prot)†	Mouse	**31135**		**31420**				
Human IgG (H+L) (min x BvHsMs Sr Prot)†	Mouse	**31137**	**31784**					
Human IgG (H+L)	Rabbit	**31143**	**31786**					
Human IgG (Fc)	Rabbit	**31142**	**31789**	**31423**	**31318**	**31535**		
Human IgG (Fc)	Goat F(ab')$_2$	**31163**						
Human IgG (H+L)	Goat F(ab')$_2$	**31165**						
Human IgA + IgG + IgM (H+L)	Goat F(ab')$_2$					**31539**		
Mouse IgA (α) (min x Hn Sr Prot)†	Goat	**31169**						
Mouse IgA + IgG + IgM (H+L)	Goat	**31171**						
Mouse IgG (H+L)	Goat	**31160**	**31800**	**31430**††	**31320**	**31569**	**31660**	**31498**
Mouse IgG (H+L), Highly Cross-adsorbed	Goat							
Mouse IgG (H+L) (min x BvHnHs Sr Prot)†	Goat	**31164**	**31802**	**31432**	**31322**	**31541**	**31661**	**31500**
Mouse IgG [F(ab')$_2$]	Goat	**31166**	**31803**	**31436**	**31324**	**31543**		
Mouse IgG (Fc)	Goat	**31168**	**31805**	**31437**	**31325**	**31547**	**31663**	
Mouse IgG (Fc) (min x BvHnHs Sr Prot)†	Goat	**31170**		**31439**	**31327**	**31632**		
Mouse IgM (μ)	Goat	**31172**	**31804**	**31440**	**31326**	**31992**		
Mouse IgG + IgM (H+L)	Goat	**31182**	**31807**	**31444**	**31328**			
Mouse IgG + IgM (H+L) (min x BvHnHs Sr Prot)†	Goat			**31446**	**31330**			
Mouse IgG (Fcγ) (subclasses 1+2a+2b+3) (min x BvHnRb Sr Prot)†	Goat	**31232**				**31630**		
Mouse IgG (Fcγ) subclass 1 specific (min x BvHnRb Sr Prot)†	Goat	**31236**						
Mouse IgG (Fcγ) subclass 2a specific (min x BvHnRb Sr Prot)†	Goat	**31237**				**31634**		
Mouse IgG (H+L)	Horse	**31181**	**31806**					
Mouse IgG (H+L)	Rabbit	**31188**		**31450**	**31329**	**31561**	**31665**	**31610**
Mouse IgG (H+L) (min x Hn Sr Prot)†	Rabbit	**31190**		**31452**	**31334**			
Mouse IgG [F(ab')$_2$]	Rabbit	**31192**		**31451**	**31331**	**31559**		
Mouse IgG (Fc)	Rabbit	**31194**	**31813**	**31455**	**31332**	**31555**		
Mouse IgM (μ)	Rabbit	**31196**		**31456**	**31333**	**31557**		
Mouse IgG + IgM (H+L)	Rabbit	**31198**		**31457**	**31335**	**31558**		
Mouse IgG (H+L) (min x BvHnHs Sr Prot)†	Goat F(ab')$_2$	**31185**		**31438**		**31565**		
Mouse IgM (μ)	Goat F(ab')$_2$	**31178**						
Mouse IgM (μ) (min x BvHnHs Sr Prot)†	Goat F(ab')$_2$	**31186**						
Mouse IgG + IgM (H+L) (min x BvHnHs Sr Prot)†	Goat F(ab')$_2$			**31448**				
Rabbit IgG (H+L) (min x BvChGtGuHaHnHsMsRtSh Sr Prot)†	Donkey	**31238**	**31821**	**31458**	**31345**	**31568**	**31685**	**31504**
Rabbit IgG (H+L)	Goat	**31210**	**31820**	**31460**††	**31340**	**31635**	**31670**	**31506**
Rabbit IgG (H+L), Highly Cross-Adsorbed	Goat							
Rabbit IgG (H+L) (min x Hn Sr Prot)†	Goat	**31212**	**31822**	**31462**	**31342**	**31583**	**31686**	**31507**
Rabbit IgG [F(ab')$_2$]	Goat	**31234**	**31823**	**31461**	**31343**	**31573**		
Rabbit IgG (Fc)	Goat	**31216**		**31463**	**31341**			
Rabbit IgG (H+L) (min x GtHnMsSh Sr Prot)†	Mouse	**31213**	**31824**	**31464**		**31584**		
Rabbit IgG (H+L)	Goat F(ab')$_2$					**31579**		
Rabbit IgG (H+L) (min x HnMsRt Sr Prot)†	Goat F(ab')$_2$	**31239**				**31636**		
Rat IgG (H+L)	Goat	**31220**	**31830**	**31470**	**31350**	**31629**	**31680**	**31508**
Rat IgG [F(ab')$_2$]	Goat			**31474**				
Rat IgG (Fc)	Goat	**31226**		**31475**		**31621**		
Rat IgM (μ)	Goat		**31832**	**31476**	**31354**	**31631**		
Rat IgG (H+L)	Rabbit	**31218**	**31834**					
Rat IgG (H+L) (min x Ms Sr Prot)†	Rabbit	**31219**						
Sheep IgG (H+L)	Rabbit	**31240**	**31840**	**31480**	**31360**	**31627**		
Streptavidin	Recombinant	**21125**		**21127**	**21323**	**21224**	**21724**	**21726**
NeutrAvidin Protein	Hen Egg	**31000**		**31001**	**31002**	**31006**		

† See Tables on page 24 for the Key to Abbreviations. *†† Stabilized, pre-diluted format also available; see our website.*

See page 26 for DyLight Dye fluorescent-conjugated secondary antibody.

Secondary Antibodies

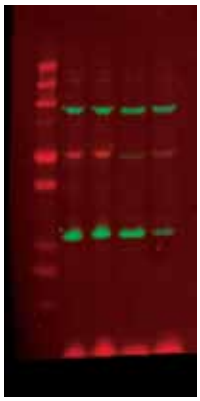
Thermo Scientific DyLight Conjugates

Excellent brightness make these conjugates a clear alternative.

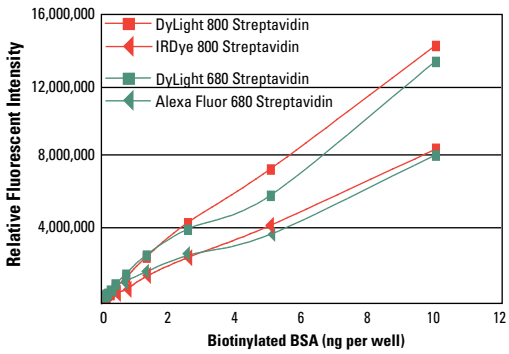
Highlights:

- Available conjugated to commonly used secondary antibodies, Streptavidin and Thermo Scientific NeutrAvidin Biotin-Binding Protein
- Molar ratio (dye:protein) optimized to provide excellent fluorescent intensity
- Stable for 1 year at 4°C
- Antibody conjugates are affinity-purified to minimize cross-reactivity

Western Blotting



Two-color infrared Western blot detection of p53 and cyclophilin B knockdown using Thermo Scientific DyLight 680- and Thermo Scientific DyLight 800-labeled secondary antibodies. Protein lysate from transfected A549 cells was separated using SDS-PAGE and transferred to PVDF membrane. **Lane 1:** MW marker, **Lane 2:** mock transfected sample, **Lane 3:** negative control siRNA, **Lane 4:** siRNA targeted against p53 and **Lane 5:** siRNA targeted against cyclophilin. The membranes were imaged with the Odyssey® Infrared Imaging System using the 700 and 800 channels.



Thermo Scientific DyLight 680 and Thermo Scientific DyLight 800 Streptavidin Conjugates are brighter than Alexa Fluor 680 or IRDye 800 Conjugates in microplate-based assays. Microplates were coated with biotinylated BSA at the indicated concentrations. Conjugates were diluted to 10µg/mL in PBS and 100µL was applied to each plate. Fluorescent intensity was measured with the Odyssey Infrared Imaging System using the 700 and 800 channels.

Ordering Information

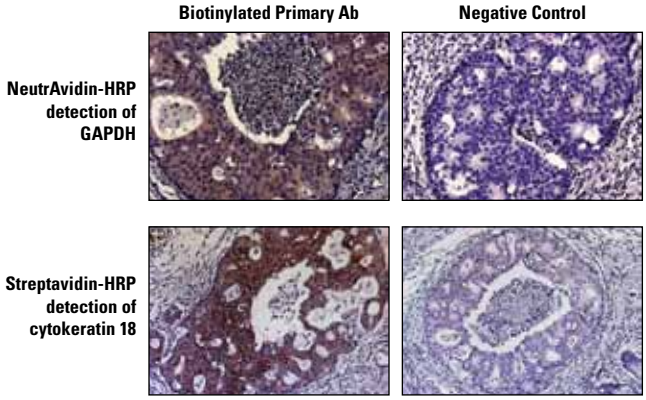
Conjugates: *Package size for these items is 1mg at 1mg/mL.*

Description	Product #							
	DyLight 405 Dye	DyLight 488 Dye	DyLight 550 Dye	DyLight 594 Dye	DyLight 633 Dye	DyLight 650 Dye	DyLight 680 Dye	DyLight 800 Dye
Goat Anti-Mouse IgG (H+L)		35502	84540			84545	35518	35521
Goat Anti-Mouse IgG Highly Cross-Adsorbed	35500	35503		35511	35513		35519	
Goat Anti-Rabbit IgG (H+L)		35552	84541			84546	35568	35571
Goat Anti-Rabbit IgG Highly Cross-Adsorbed	35550	35553		35561	35563		35569	
Streptavidin		21832	84542			84547	21848	21851
NeutrAvidin® Biotin-Binding Protein		22832	84606			84607	22848	22853

Thermo Scientific High Sensitivity HRP Conjugates

High-performance horseradish peroxidase conjugates for the most demanding immunoassays.

Our High Sensitivity HRP Conjugates meet the demands of today's scientists for utmost sensitivity in ELISA and Western blotting applications. Our Thermo Scientific Streptavidin and NeutrAvidin Protein Conjugates are ideal for immunohistochemistry (IHC), Western blotting and ELISA applications using chemiluminescence, chemifluorescence or colorimetric substrates. Each High Sensitivity HRP Conjugate is packaged in an easy-to-use stabilized solution that enables convenient storage at 4°C for up to 1 year.



Excellent IHC staining of GAPDH and cytokeratin 18 in human colon carcinoma with Thermo Scientific High Sensitivity HRP Conjugates. Formalin-fixed paraffin embedded human colon carcinoma tissues were stained using Metal Enhanced DAB Substrate (Product # 36000). The tissues were incubated with biotinylated mouse anti-GAPDH at 4.6µg/mL or rabbit anti-cytokeratin 18 at 0.1µg/mL or blocking buffer alone (right panels). The sections were incubated with High Sensitivity Neutravidin HRP (4µg/mL, top panels) or High Sensitivity Streptavidin HRP (4µg/mL bottom panels). Tissues were counterstained using Harris-modified hematoxylin solution (blue staining in all panels).

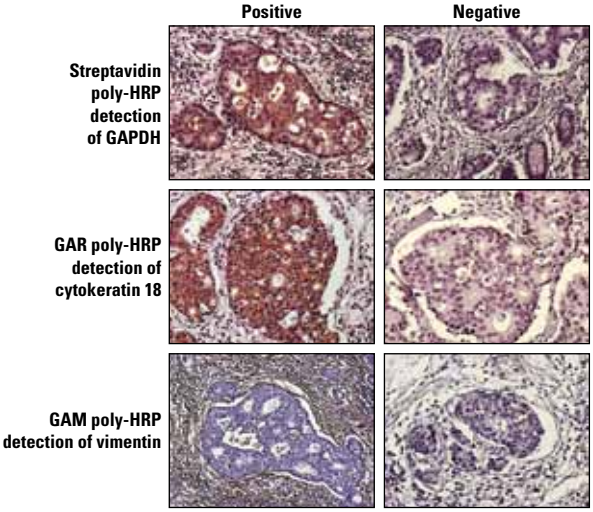
Ordering Information

Description	Pkg. Size	Product #
High Sensitivity Streptavidin-HRP (1mg/mL)	0.5mL	21130
High Sensitivity Streptavidin-HRP (1mg/mL)	5mL	21132
High Sensitivity Streptavidin-HRP, pre-diluted (10µg/mL)	2mL	21134
High Sensitivity NeutrAvidin-HRP (1mg/mL)	0.5mL	31030
High Sensitivity NeutrAvidin-HRP (1mg/mL)	5mL	31032

Thermo Scientific Pierce Poly-HRP Conjugates

Get the ultimate sensitivity in immunodetection techniques with Pierce Poly-HRP Conjugates.

The Pierce Poly-HRP Conjugates deliver the highest sensitivity and low background in immunoassays where sample volume is limited or when the target molecule is present at low levels. Pierce Poly-HRP Conjugates are purified to remove unconjugated probe molecules that reduce signal intensity by competing for binding sites with HRP-conjugated molecules. In addition, these conjugates are free of HRP monomers that may lead to increased background signal. Together, these features provide consistent and reliable sensitivity and deliver higher sensitivity than conventional HRP and poly-HRP conjugates without the need for additional signal amplification steps. These conjugates are compatible with chromogenic, fluorogenic and chemiluminescent HRP substrates used in ELISA, Western blotting, IHC and nucleic acid hybridization assays.

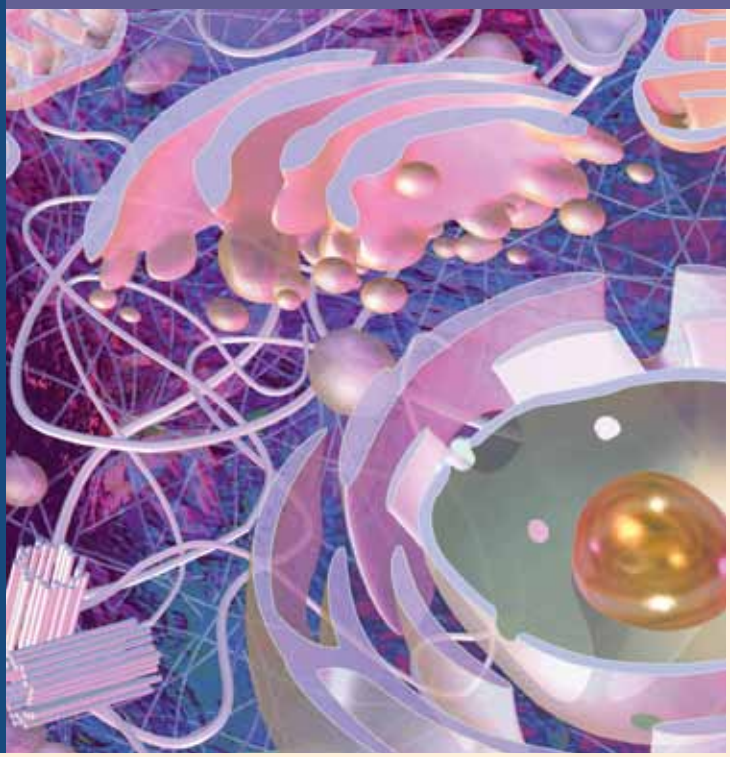


Obtain immunohistochemical images with outstanding clarity using Thermo Scientific Pierce Poly-HRP Conjugates. Formalin-fixed paraffin embedded human colon carcinoma tissues were stained using Metal Enhanced DAB Substrate (Product # 36000). The tissues were incubated with biotinylated mouse anti-GAPDH at 4.6µg/mL or rabbit anti-cytokeratin 18 at 1µg/mL or mouse anti-vimentin at 2µg/mL or blocking buffer alone (right panels). The sections were incubated with Streptavidin Poly-HRP (4µg/mL, top panels) or Goat Anti-Rabbit Poly-HRP (2µg/mL, middle panels) or Goat Anti-Mouse Poly-HRP (2µg/mL, bottom panels). Tissues were counterstained using Harris-modified hematoxylin solution (blue staining in all panels).

Ordering Information

Description	Pkg. Size	Product #
Pierce Streptavidin Poly-HRP (0.5mg/mL)	0.5mL	21140
Pierce Goat Anti-Mouse Poly-HRP (0.5mg/mL)	0.5mL	32230
Pierce Goat Anti-Rabbit Poly-HRP (0.5mg/mL)	0.5mL	32260

Primary Antibodies by Cellular Structures



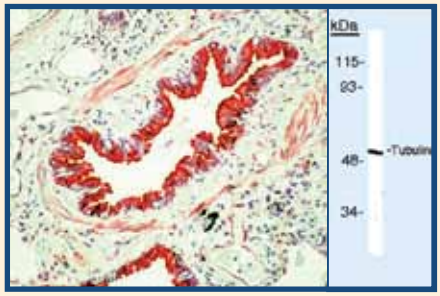
The maintenance and control of cell shape, cell movement, cytokinesis and the organization of organelles are some of the most basic functions of the cell. Because changes in these features are often the consequence of cellular differentiation, cellular toxicity, pathology or other critical cellular event, their measurement against potential therapeutic targets can be critical.

The cytoskeleton is typically composed of microfilaments, microtubules and intermediate filaments in the cell and plays a key role in the morphological change of cells. The cytoskeleton also facilitates proper function of other cellular proteins through direct binding, transporting, repositioning and sequestering these proteins. For certain cell types such as neurons, cellular morphological changes during development are necessary for the proper function in the tissue.

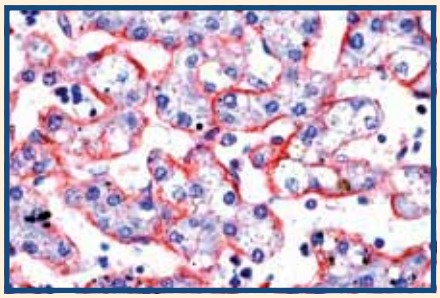
Fluorescence microscopy provides both intensity as well as spatial information of the fluorescently labeled constituents that are imaged and analyzed. Spatial information, such as cell shape and morphology, sizes and arrangements of intracellular constituents, and the arrangement and location of cells relative to each other, can all be obtained from fluorescence microscopy that other methods may not.

We offer a broad array of antibodies that can be used solely or in combination with one another to help visualize cellular organelles and structures and orient the stains of your primary antibody target. Primary antibodies from different species hosts can be used to multiplex antibodies together and provide multiple colors in the same test. To do this standard fluorescent dyes such as FITC and Rhodamine (see pages 17-19) or more diverse brighter dyes such as DyLight Dyes are combined with species-specific secondary antibodies (see Secondary Antibodies, pages 23-27) for detection after probing with the variable host antibodies.

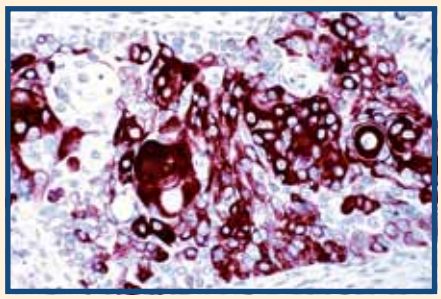
Primary antibodies can also be directly conjugated to dyes and used to visualize up to six different colors at one time (see DyLight Dye table, page 14). It is best to pick dyes that are distal from each other on the color wheel for adjacent stains to maximize the degree of spectral differentiation and minimize the amount of emission cross-reactivity from the dyes.



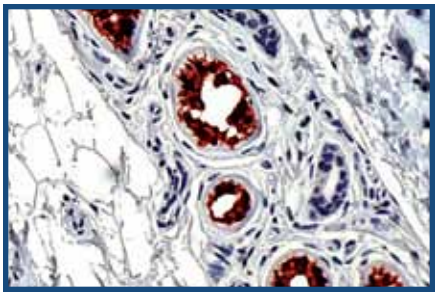
Tubulin β Mouse Monoclonal
(TBN06 (Tub 2.5)) #MA5-11732



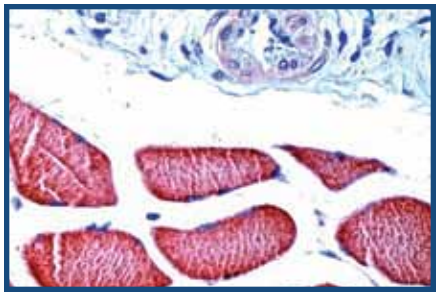
Annexin VI Rabbit Polyclonal #PA1-37086



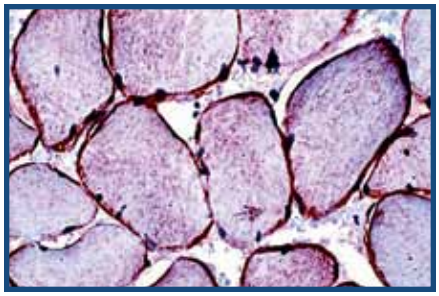
Keratin 14 Rabbit Polyclonal #PA1-38001



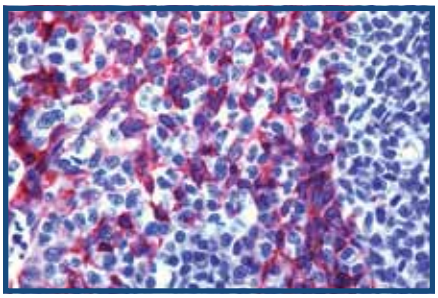
Keratin 18 Mouse Monoclonal (SPM510) #MA1-38011



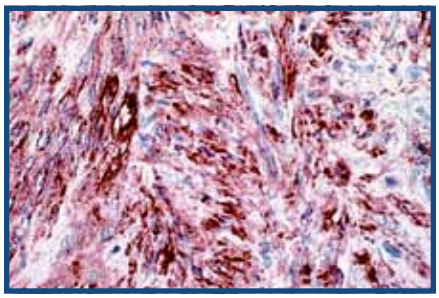
Skeletal Muscle Actin Rabbit Polyclonal #PA1-37020



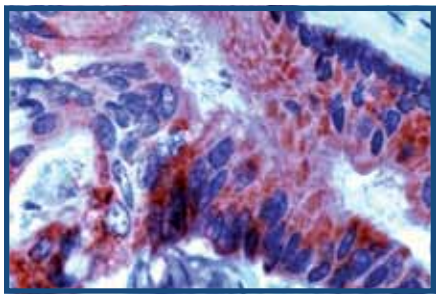
Dysferlin Rabbit Polyclonal #PA1-37585



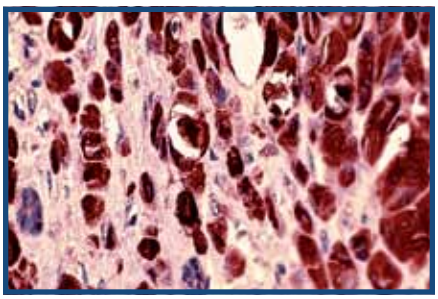
Keratin 5 Rabbit Polyclonal #PA1-37974



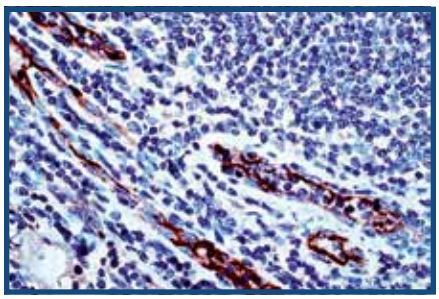
Smooth Muscle Actin Rabbit Polyclonal #PA1-37024



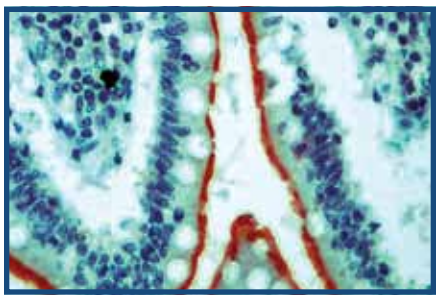
Retinoic Acid Receptor β Rabbit Polyclonal #PA1-38562



S100 α-4 Rabbit Polyclonal #PA1-38589



CD105 Rabbit Polyclonal #PA1-37372



Villin Rabbit Polyclonal #PA1-38853

Ordering Information for Select Thermo Scientific Pierce Antibodies

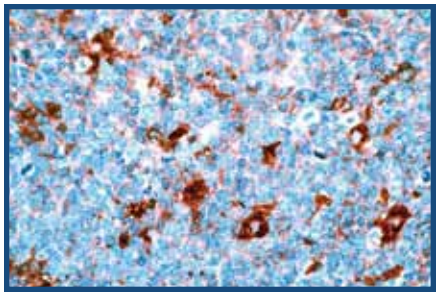
Product Description	Target Species	Applications	Size	Product #
α-1 Antichymotrypsin Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37070
Annexin VI Polyclonal Antibody	Hu, Ms, Rt	IHC (P), WB	1mL	PA1-37086
Cadherin P Monoclonal Antibody (6A9)	Hu	IF, IP, WB	100µg	MA1-2003
Calcitonin Polyclonal Antibody	Ca, Eq, Hu, Ms, Nhp, Ov, Po, Rt	IHC (P)	1mL	PA1-37211
Calreticulin Polyclonal Antibody	Ca, Hm, Hu, Ms, Rb, Rt	ICC, IF, IP, WB	100µL	PA1-903
Calreticulin Polyclonal Antibody	Ca, Hu, Ms, Nhp, Rb, Rt	FACS, ICC, IF, IP, WB	100µL	PA3-900
Caveolin 1 Monoclonal Antibody (7C8)	Hm, Rt	IF, WB	100µL	MA3-600
CD105 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37372
CD9 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37299
CD99 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37370
CDX2 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-39430
Chromogranin A Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37445
Clathrin, Heavy Chain Monoclonal Antibody (X22)	Bv, Hm, Hu, Ms, Nhp, Rt	ICC, IF, IP, WB	100µL	MA1-065
Dysferlin Polyclonal Antibody	Hu	IHC (P), WB	1mL	PA1-37585
Epithelial Specific Antigen Monoclonal Antibody (SPM491)	Hu	IHC (P)	1mL	MA1-37643

For species and application abbreviations, see page 77.

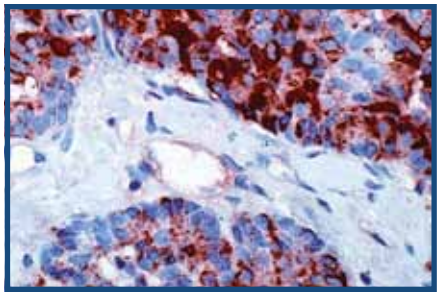
Designates product with photo.

More antibodies on next page

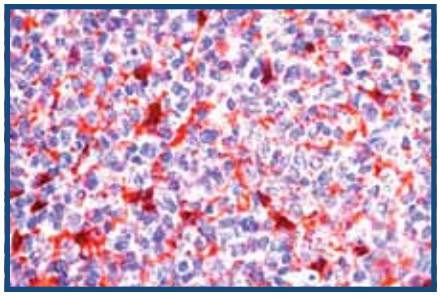
Primary Antibodies by Cellular Structures



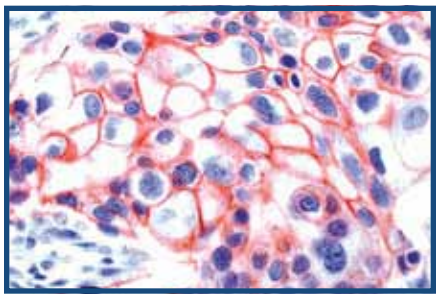
α-1 Antichymotrypsin Rabbit Polyclonal #PA1-37070



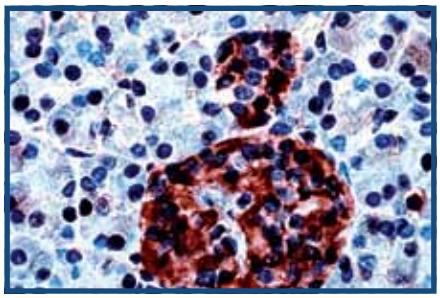
Calcitonin Rabbit Polyclonal #PA1-37211



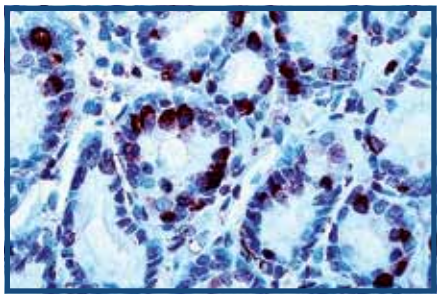
CD9 Rabbit Polyclonal #PA1-37299



Epithelial Specific Antigen Mouse Monoclonal (SPM491) #MA1-37643



GAD65 Rabbit Polyclonal #PA1-37732



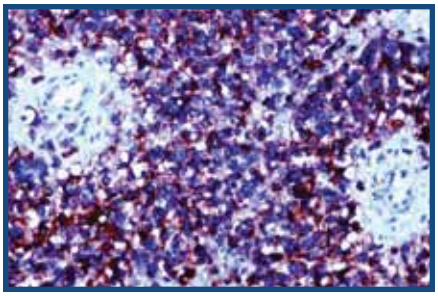
Gastrin 1 Rabbit Polyclonal #PA1-37749

Ordering Information for Select Thermo Scientific Pierce Antibodies

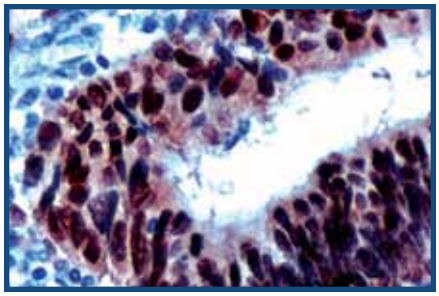
Product Description	Target Species	Applications	Size	Product #
ERp29 Polyclonal Antibody	Bv, Ca, GP, Hm, Hu, Ms, Nhp, Rt	IF, IP, WB	100µL	PA3-011
Filamin Monoclonal Antibody (FLMN01 (PM6/317))	Hu, Ms, Rt, Ck, Gp, Rb	ELISA, IHC (P), WB	500µL	MA5-11705
GAD65 Polyclonal Antibody	Hu, Rt	IHC (P), IP	1mL	PA1-37732
γ Tubulin Monoclonal Antibody (4D11)	Hu, Ms, Rt	IF, IP, WB	100µg	MA1-850
γ Tubulin Monoclonal Antibody (TU-30)	Ck, Hu, Ms, Pl, Po, Pz, Rt	ICC, WB	100µg	MA1-19421
Gastrin 1 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37749
Glucose Transporter 1 Monoclonal Antibody (SPM498)	Hu	IHC (P)	1mL	MA1-37783
Glucose-regulated Protein 94 Polyclonal Antibody	Hu	IHC (P), IP	1mL	PA1-37807
Keratin 14 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-38001
Keratin 18 Monoclonal Antibody (SPM510)	Hu	IHC (P)	1mL	MA1-38011
Keratin 5 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37974
Lamin A/C Monoclonal Antibody (mab636)	Bv, Hu, Po	IF, IHC (F), WB	200µL	MA3-1000
Laminin B2/γ1 Monoclonal Antibody (D18)	Hu, Rt, Gp	IHC (P)	500µL	MA5-11992
Laminin Polyclonal Antibody	Hu, Rt	IHC (P)	500µL	PA5-16287
LAMP1 Polyclonal Antibody	Hu	IF	100µg	PA1-654A
LAMP2 Polyclonal Antibody	Hu, Ms, Rt	IF, WB	100µL	PA1-655
LAP1 Monoclonal Antibody (RL13)	Rt	IF, IP, WB	200µL	MA1-074
Mannose 6-Phosphate Receptor Monoclonal Antibody (2G11)	Bv, Hu, Nhp, Rt	ICC, IF, IP, WB	100µg	MA1-066
Methyl CpG Binding Protein 2 Polyclonal Antibody	Hu, Ms, Rt	IF, IP, WB	100µg	PA1-887
Mitochondrial Heat Shock Protein 70 Monoclonal Antibody (JG1)	Ca, Hu, Ms, Nhp	ICC, IP, WB	100µL	MA3-028
Mitofilin Polyclonal Antibody	Ca, Fe, Hu, Ms, Rt	IF, WB	100µL	PA3-870
NCK2 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-38262
Nucleoporin p62 Monoclonal Antibody (RL31)	Rt	IF, WB	200µL	MA1-073
Nucleostemin Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-11440
Paxillin Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-38419
PDI Monoclonal Antibody (RL90)	Hm, Hu, Ms, Po, Rt	FACS, IF, IHC (P, F), IP, WB	100µL	MA3-019
PGP9.5 Polyclonal Antibody	Rt, Hu	IHC (P)	1mL	PA1-38446
Phospho-c-Jun (Ser73) Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17879

For species and application abbreviations, see page 77.

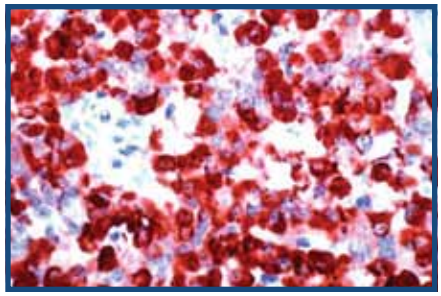
Designates product with photo.



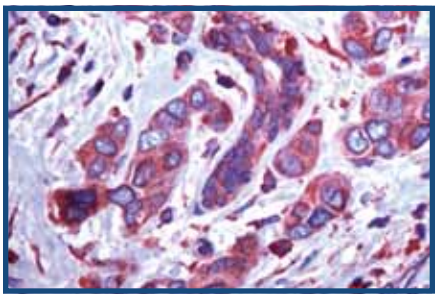
CD99 Rabbit Polyclonal #PA1-37370



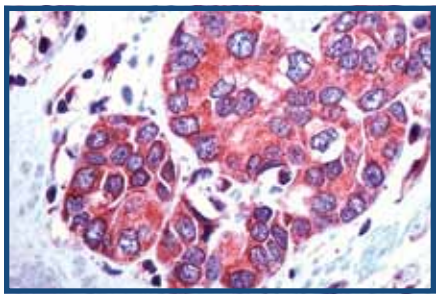
CDX2 Rabbit Polyclonal #PA1-39430



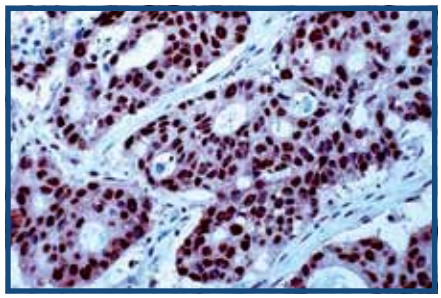
Chromogranin A Rabbit Polyclonal #PA1-37445



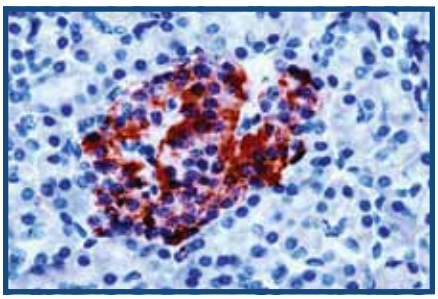
Glucose-Regulated Protein 94 Rabbit Polyclonal #PA1-37807



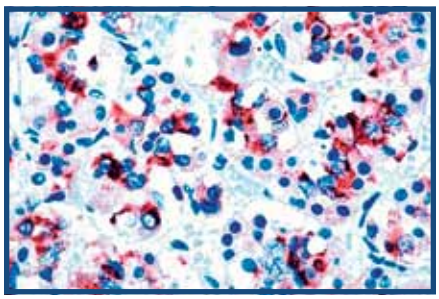
Paxillin Rabbit Polyclonal #PA1-38419



Retinoid X Receptor γ Rabbit Polyclonal #PA1-38583



PGP9.5 Rabbit Polyclonal #PA1-38446



Prolactin Rabbit Polyclonal #PA1-39446

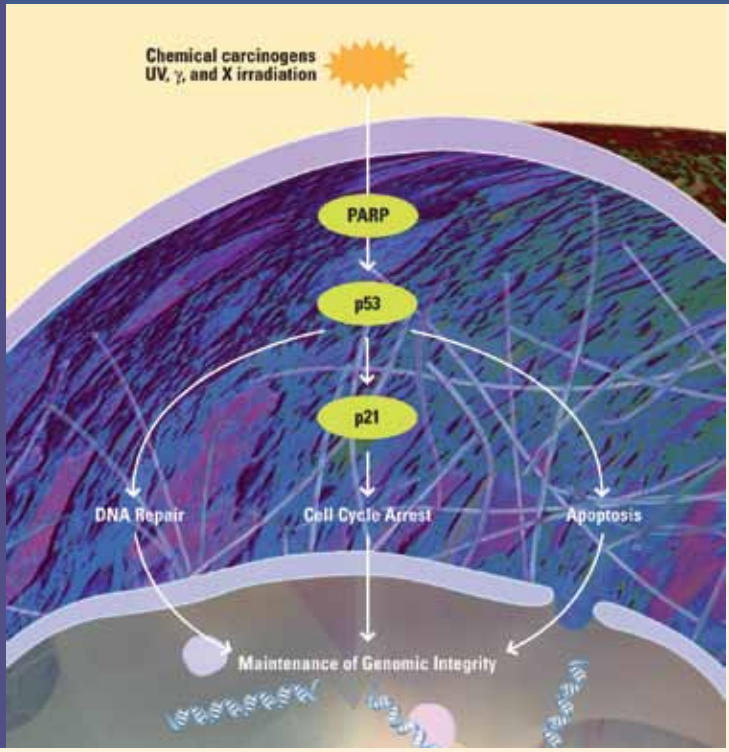
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Progestin Receptor β Polyclonal Antibody	Hu, Ms, Po, Rt	ICC, WB	100µL	**PA3-881**
Prolactin Polyclonal Antibody	Hu	IHC, (P)	1mL	**PA1-39446**
RAB4 Polyclonal Antibody	Hu	IF, WB	100µL	**PA3-912**
RAB5 Polyclonal Antibody	Hu	IF, WB	100µL	**PA3-915**
Renal Cell Carcinoma Marker Monoclonal Antibody (PN-15)	Hu, Rt	IHC (P), WB	500µL	**MA5-13365**
Retinoic Acid Receptor β Polyclonal Antibody	Hu	IHC (P)	1mL	**PA1-38562**
Retinoid X Receptor γ Polyclonal Antibody	Hu, Ms, Rt	IHC (P), WB	1mL	**PA1-38583**
S100 α-4 Polyclonal Antibody	Hu	IHC (P)	1mL	**PA1-38589**
Skeletal Muscle Actin Polyclonal Antibody	Gp, Hu, Rb, Rt	IHC (P)	1mL	**PA1-37020**
Smooth Muscle Actin Polyclonal Antibody	Bv, Ck, Hu, Ms, Nhp, Rb, Rt	IHC (P)	1mL	**PA1-37024**
Sodium/Potassium ATPase Monoclonal Antibody (9-A5)	Ca, Ck, Hu, Rt	ELISA, ICC, IF, IHC, IP	100µL	**MA3-924**
Trans-Golgi Network 38 Monoclonal Antibody (2F7.1)	Hu, Rt	FACS, ICC, IF, WB	100µL	**MA3-063**
Tubulin β Monoclonal Antibody (TBN06 (Tub 2.5))	Hu, Ms, Rt, Am, Bv, Ck, Rb	IF, IHC (P), WB	500µL	**MA5-11732**
Villin Polyclonal Antibody	Hu	IHC (P)	1mL	**PA1-38853**
Vimentin Monoclonal Antibody (J144)	Hu, Ms, Rt	IF, IHC (P), WB	200µL	**MA3-745**

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Research Areas



At the molecular level cancer development is highly complex, arising from deregulation of numerous biological processes that manage the balance between tumor suppressor and proto-oncogenes. When this balance is disrupted, uncontrolled cell proliferation and ultimately tumorigenesis results.

The "Two-Hit Hypothesis" proposed by Nordling in the 1950s and experimentally demonstrated by Knudson in the 1970s is the central dogma to the mechanistic study of human cancer formation. In short, tumor formation requires an initial "hit" or gain of function mutation in a deregulated proto-oncogene such as K-Ras, followed by a loss of function mutation in a tumor suppressor protein such as p53, Rb and/or PTEN. Common oncogenic insults that may trigger these genetic mutations include viruses, toxic chemicals, UV and γ-irradiation. Recent research on stem cells suggests that humans may be predisposed to cancer from the initial stages of development.

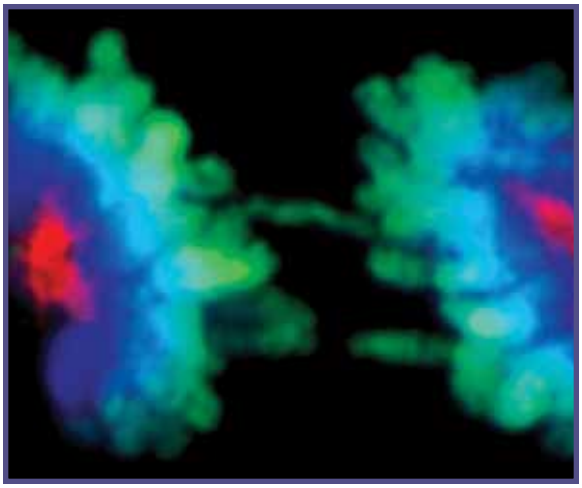
Central to tumor formation is the deregulation of multiple cellular processes including cell proliferation, cell survival, transcription/translation control and angiogenesis. Depending on the cell type, normal somatic adult cells enter into one of two different resting stages referred to as quiescence or senescence. During quiescence cells proceed into a reversible, metabolically active stationary phase and await cellular cues to re-enter the cell cycle. Senescence, however, is an irreversible metabolically active state. The integrity of both proliferating and resting cells are maintained through a highly regulated circuitry of cellular checkpoints. Two essential proteins involved in this process are the tumor suppressor proteins p53 and Rb.

The transcription factor p53, often referred to as the gatekeeper of the genome, regulates gene expression of myriad key players involved in cell proliferation, cell survival, DNA repair, senescence and angiogenesis. In response to genotoxic stress, p53 functions to determine the level of the damage signal and to make a cellular decision to either arrest the cell cycle or trigger a cell death program termed apoptosis. p53-dependent cell cycle arrest and apoptosis is stimulated primarily through up-regulation and expression of the cyclin-dependent kinase inhibitor $p21^{CIP1/WAF1}$ and the pro-apoptotic protein Bax, respectively. Other key genes regulated by p53 include MDM2, HIF1α, GADD45, BRCA1, FAS and PTEN. Interestingly, the E3 ubiquitin ligase MDM2 participates in a negative feedback loop stimulating degradation of p53 via the 26S proteosome. Overexpression of MDM2 has been observed in numerous human tumors.

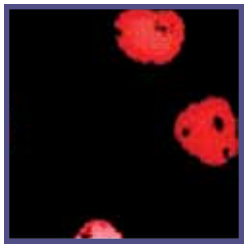
The retinoblastoma protein, Rb, functions as a major tumor suppressor protein to control cell cycle progression during the G1/S phase checkpoint by controlling the transcriptional activity of E2F proteins. Protein complex formation between Rb and E2F inhibits E2F-dependent gene expression of numerous genes involved in cell cycle progression. Rb is regulated primarily through phosphorylation by cyclin:cdk complexes which results in release of E2F and subsequent transcriptional activation.

Loss of cell cycle checkpoint control is a hallmark of nearly all human cancers. Genetic mutations resulting in loss of heterzygosity and subsequent decreased protein expression of both p53 and Rb are observed in over 50% of all human cancers. In addition to deregulation in cell cycle checkpoint control, tumors also display an imbalance in the level of anti-apoptotic (pro-survival) proteins as compared to pro-apoptotic proteins.

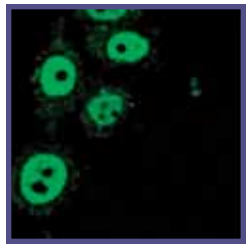
Tumors also require a nutrient supply for cells to grow and divide. These nutrients are delivered to tumors through the formation of new vasculature, termed angiogenesis. This process is aided by an increase in activity in tissue remodeling proteins such as the matrix metalloprotease family (MMPs) of enzymes which help guide new blood vessel formation into the tumor. Current research is focused on developing a combinatorial therapeutic approach to target multiple integration points along cancer pathways.



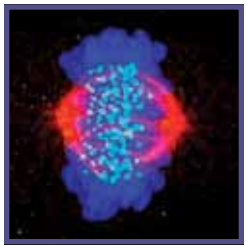
Aurora A-AIK Rabbit Monoclonal (J.458.1) #MA5-15075



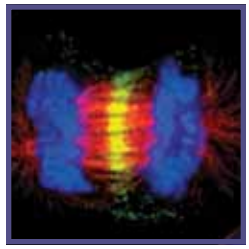
HIF-1α Mouse Monoclonal (mgc3) #MA1-516



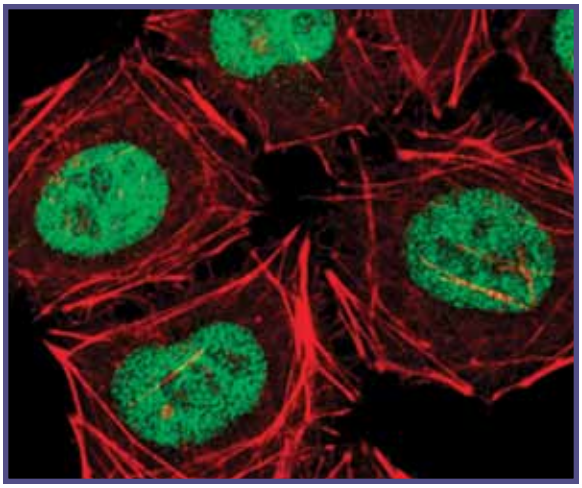
TIF1β Mouse Monoclonal (20C1) #MA1-2023



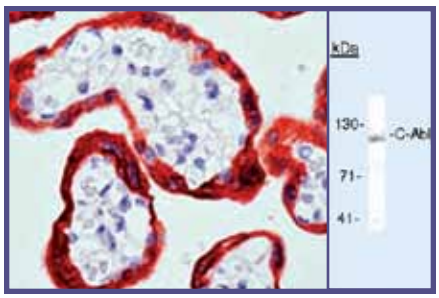
Phospho-CENP-A Rabbit Polyclonal (Ser7) #PA5-17195



INCENP Rabbit Polyclonal #PA5-17201



CDK9 Rabbit Monoclonal (K.513.1) #MA5-14912



c-Abl Mouse Monoclonal (8E9) #MA5-14398

Ordering Information for Select Thermo Scientific Pierce Antibodies

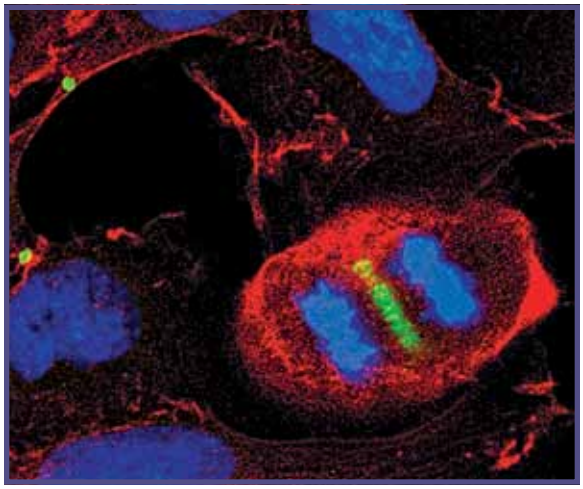
Product Description	Target Species	Applications	Size	Product #
Androgen Receptor Monoclonal Antibody (AN1-15)	Hu, Ms, Nhp, Rt	GS, ICC, IHC (P, F), IP, WB	50µg	MA1-150
Androgen Receptor Monoclonal Antibody (AR 441)	Hu, Ca	GS, IF, IHC (P), IP, WB	500µL	MA5-13426
Aurora A/AIK Monoclonal Antibody (J.458.1)	Hu, Nhp	ICC, IP, WB	100µL	MA5-15075
c-Abl Monoclonal Antibody (8E9)	Hu, Ms	IF, IHC (P), IP, WB	500µL	MA5-14398
CDK9 Monoclonal Antibody (K.513.1)	Bv, Ca, Hm, Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), IP, WB	100µL	MA5-14912
Cyclin A Polyclonal Antibody	Hu, Ms, Rt	IHC (P), IP, WB	500µL	PA5-16519
Cyclin B1 Polyclonal Antibody	Hm, Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17220
Cyclin D1 Monoclonal Antibody (S738.0)	Hu, Ms, Rt	FACS, IHC (P), WB	100µL	MA5-15057
EGF Receptor Polyclonal Antibody	Hu	IF, IHC, IP, WB	100µg	PA1-1110
FAK Polyclonal Antibody	Bv, Ck, Hu, Ms, Nhp, Po, Rt	IHC (P), IP, WB	100µL	PA5-17591
HIF-1 α Monoclonal Antibody (mgc3)	Bv, Hu, Ms, Nhp, Po	GS, ICC, IF, IP, WB	100µL	MA1-516
HIF-1 β Monoclonal Antibody (2B10)	Hu, Ms, Nhp, Rt	GS, ICC, IF, IP, WB	100µL	MA1-515
INCENP Polyclonal Antibody	Hu	FACS, ICC, WB	100µL	PA5-17201
iNOS Polyclonal Antibody	Hu, Ms, Rt	IF, WB	200µL	PA1-036
MMP-10 Polyclonal Antibody	Hu	IHC	100µg	PA5-13179

For species and application abbreviations, see page 77.

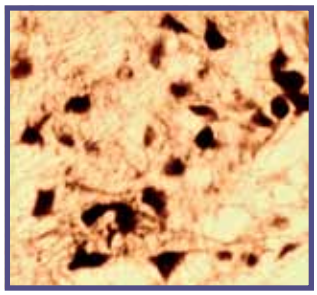
Designates product with photo.

More antibodies on next page

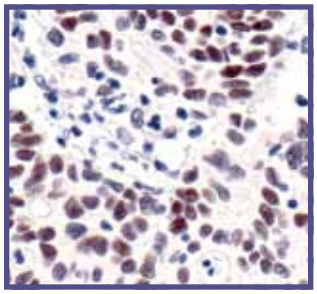
Primary Antibodies by Research Areas



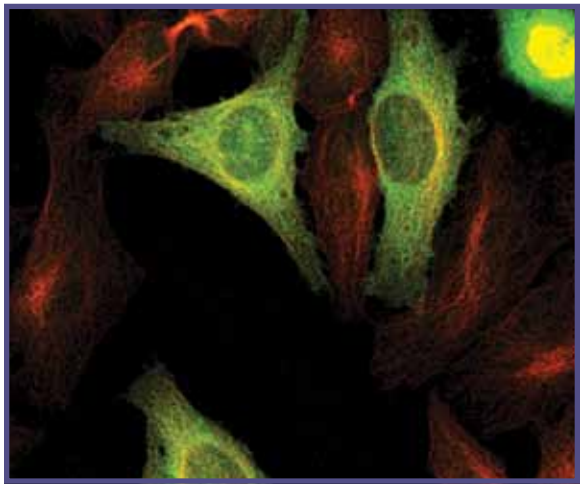
PLK4 Rabbit Polyclonal #PA5-17272



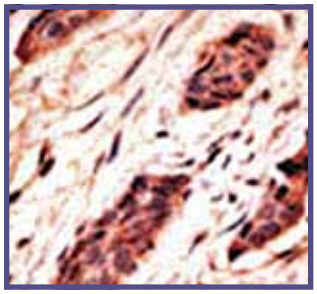
Androgen Receptor Monoclonal (AN1-15)
MA1-150



Cyclin D1 Mouse Monoclonal (S.738.0)
#MA5-15057



Cyclin B1 Rabbit Polyclonal #PA5-17220



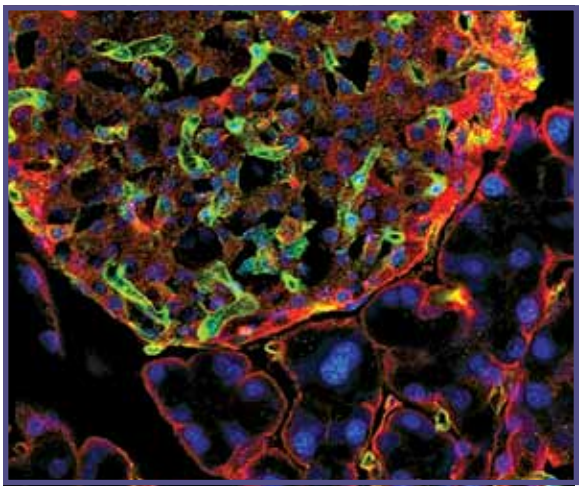
MMP-10 Polyclonal #PA5-13179

Ordering Information for Select Thermo Scientific Pierce Antibodies

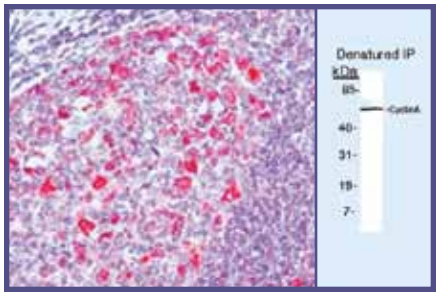
Product Description	Target Species	Applications	Size	Product #
p53 Monoclonal Antibody (PAb 240)	Hu	FACS, IHC (P), IP, WB	500µL	MA5-15244
p53 Monoclonal Antibody (S.18.9)	Hu, Nhp	FACS, ICC, IHC (P), WB	100µL	MA5-15152
Phospho-ATM (Ser1981) Monoclonal Antibody (10H11)	Hu, Ms	IF, IP, WB	200µg	MA1-2020
Phospho-ATM (Ser1981) Monoclonal Antibody (10H11)	Hu, Ms	IF, IP, WB	200µg	MA1-2020
Phospho-Bad (Ser112) Monoclonal Antibody (G.445.9)	Hu, Ms, Nhp, Rt	FACS, IHC (P), WB	100µL	MA5-15085
Phospho-CaM Kinase II (Thr286) Monoclonal Antibody (22B1)	Ms, Rt	ELISA, ICC, IF, IHC, IP, WB	100µL	MA1-047
Phospho-Caveolin 2 (Tyr19) Polyclonal Antibody	Ms	IF, WB	100µg	PA1-060
Phospho-CENP-A (Ser7) Polyclonal Antibody	Hu, Nhp	ICC, IP, WB	100µL	PA5-17195
Phospho-Chk2 (Thr68) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17818
Phospho-EGF Receptor (Tyr1173) Monoclonal Antibody (S.331.5)	Hu, Ms, Rt	IHC (P), IP, WB	100µL	MA5-15158
Phospho-eIF2-α (Ser51) Monoclonal Antibody (S.674.5)	Dm, Hu, Ms, Nhp, Rt	IHC (P), IP, WB	100µL	MA5-15133
Phospho-FAK (Tyr397) Polyclonal Antibody	Hm, Hu, Ms, Po, Rt	FACS, ICC, WB	100µL	PA5-17084
Phospho-H2AX (Ser140) Monoclonal Antibody (3F2)	Hu, Ms	ELISA, IF, WB	100µg	MA1-2022
Phospho-Histone H3 (Ser10) Monoclonal Antibody (K.872.3)	Hu, Ms, Rt	FACS, ICC, IF, WB	100µL	MA5-15220
Phospho-JAK1 (Tyr1022) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14228
Phospho-JAK2 (Tyr1007) Polyclonal Antibody	Hu, Ms, Rt	IHC (P), WB	200µg	PA1-14232

For species and application abbreviations, see page 77.

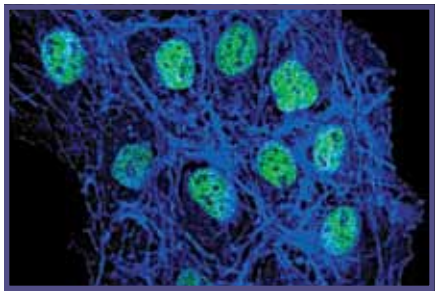
Designates product with photo.



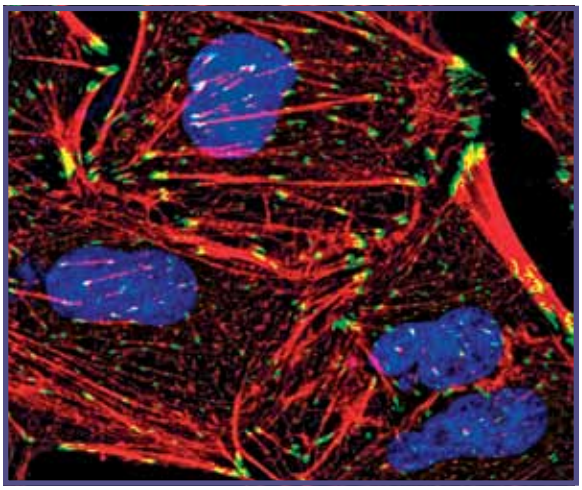
VEGF Receptor 2 Rabbit Monoclonal (B.309.4) #MA5-15157



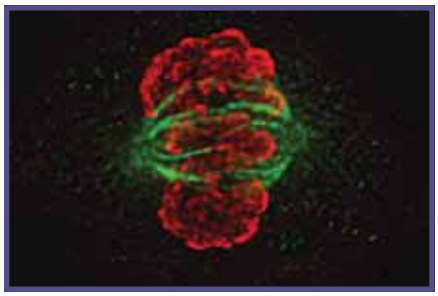
Cyclin A Rabbit Polyclonal #PA5-16519



Phospho-p53 Rabbit Polyclonal (Ser37) #PA5-17866



Phospho-FAK (Tyr397) Polyclonal #PA5-17084



Phospho-Histone H3 Mouse Monoclonal (Ser10) (K.872.3) #MA5-15220

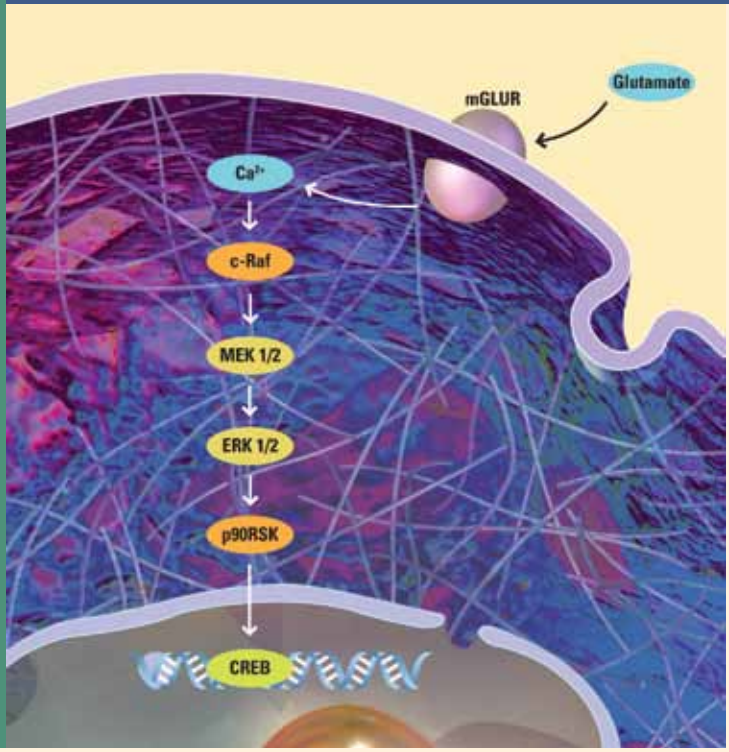
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Phospho-MAPK1/3 (Thr202/Tyr204) Polyclonal Antibody	Hu, Rt	DB, IHC, WB	100µL	PA1-4607
Phospho-p53 (Ser15) Monoclonal Antibody (C.381.0)	Hu	FACS, ICC, WB	100µL	MA5-15229
Phospho-p53 (Ser33) Polyclonal Antibody	Hu, Nhp	IHC (P), WB	100µL	PA5-17596
Phospho-p53 (Ser37) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17866
Phospho-p53 (Ser46) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17817
Phospho-p53 (Thr81) Polyclonal Antibody	Hu, Nhp	IHC (P), WB	100µL	PA5-17545
Phospho-SAPK/JNK (Thr183/Tyr185) Monoclonal Antibody (E.665.10)	Hm, Hu, Ms, Rt, Ys	FACS, ICC, IP, WB	200µL	MA5-15228
Phospho-Stat1 (Ser727) Polyclonal Antibody	Bv, Hu, Ms, Rt	ChIP, FACS, ICC, WB	100µL	PA5-17635
Phospho-Stat1 (Tyr701) Monoclonal Antibody (S.213.5)	Hu, Ms	ChIP, FACS, ICC, IHC (F), IHC (P), IP, WB	100µL	MA5-15071
Phospho-Stat3 (Tyr705) Monoclonal Antibody (R.263.6)	Bv, Hu, Ms, Rt	FACS, IP, WB	100µL	MA5-15193
Phospho-STAT5a (Ser780) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14399
Phospho-STAT6 (Tyr641) Polyclonal Antibody	Hu	IHC, WB	200µg	PA1-14401
PLK4 Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17272
RB1 Monoclonal Antibody (R.232.9)	Bv, Hu, Nhp, Po	FACS, IF, IHC (P), IP, WB	100µL	MA5-15203
TIF1 β Monoclonal Antibody (20C1)	Hu, Ms	IF, WB	100µg	MA1-2023
VEGF Receptor 2 Monoclonal Antibody (B.309.4)	Hu, Ms	FACS, ICC, IF, IHC (P), IP, WB	100µL	MA5-15157

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Research Areas



Neurobiology has rapidly become one of the most important and exciting areas of life science research. The field of neurobiology involves studying how cells of the nervous system process information and mediate behavioral changes. The nervous system is composed of neurons and other supportive cells, such as glial cells. These cells compose the functional circuits that sense and respond to biological signals. Understanding the molecular mechanisms of nerve function, including how neurotransmitters and electrical signals are processed by neurons (e.g., dendrites, axons) continues to be a major focus of neuroscience research. Neuronal differentiation, growth, survival and regeneration are also key areas of investigation. Neurobiology research has far reaching implications into human health, including development, memory, mood disorders, aging and disease.

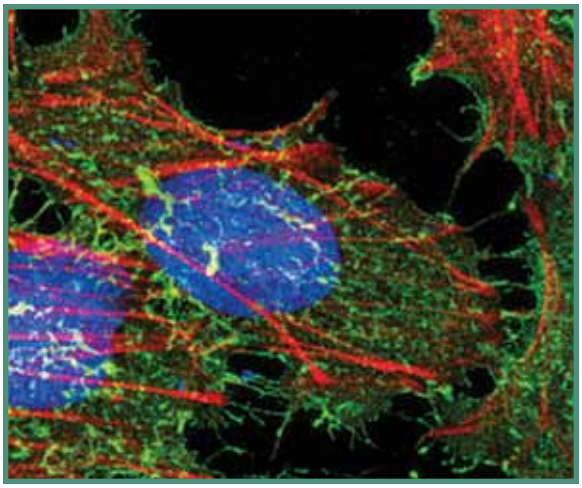
Neurons represent a highly specialized cell type. A neuron's genetic expression profile is designed to generate cells capable of transducing electrochemical impulses originating from external stimuli to the central nervous system and from there to the various organs of the body. Understanding the spatial and temporal molecular cues that regulate the differentiation of ectodermal stem cells to neuron cells is a central area of study in neurobiology and mammalian development.

An integral part to neural cell differentiation is the movement of sheets of epithelial cells during early stages of development. Neural tube formation involves invagination of the neural ectoderm to generate the central nervous system while neural crest cells migrate throughout the embryo to form what will become the peripheral nervous system. In each case, regulation of cell motility is critical for proper development and is dependent on the function of key regulatory proteins, such as the neural-specific members of the Rho-family of GTPases.

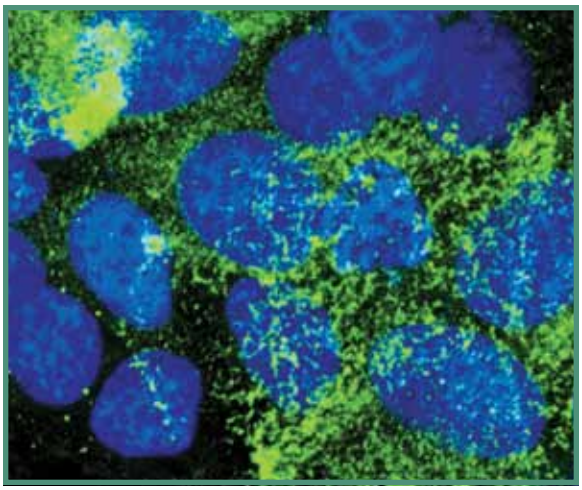
The increasing rate of occurrence of neurodegenerative disorders, such as Alzheimer's and Parkinson's diseases, have highlighted the need to better understand the cellular mechanisms and pathways involved in neural function. A common thought suggests that a phenotype of every major neurodegenerative disease centers on the accumulation of insoluble filamentous aggregates of normally soluble proteins. Much of this research focuses on Amyloid-β (Aβ) peptide and Tau protein.

The ability to disrupt the regulation of key proteins involved in neural development and function has enabled researchers to identify hallmark events in the progression of neurodegenerative diseases. For example, altered phosphorylation of the microtubule stabilizing protein Tau as well as modifications in the ratio of splice variants that compose Tau aggregates, have provided insight into its role in Alzheimer's and Parkinson's diseases. Mapping the cleavage pathways of amyloid precursor protein (APP) using different secretases has increased understanding of β-amyloid peptide formation and amyloidosis, which is often found in Alzheimer's, Creutzfeldt–Jakob disease and other neurodegenerative diseases. Detection of γγ enolase (enolase 2) in cerebral spinal fluid has become a useful marker for neural damage after injury, stroke and the presence of tumors.

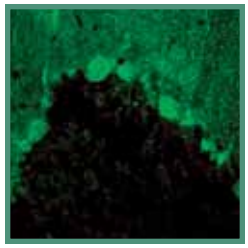
Despite major advances, neurobiology research has been hindered by various technical limitations. For example, primary neuronal cells are difficult to culture *in vitro*, traditional transfection reagents have been relatively ineffective and toxic for primary neurons, and neurite outgrowth measurements are laborious and time-consuming. Powerful new techniques have been developed to address these technical challenges. For example, the introduction of RNA interference (RNAi) for modulating expression levels of key neurobiology targets, high-efficiency and low-toxicity transfection reagents for neuronal cells, novel stem cell reagents, optimized neurite outgrowth assays and new antibodies specific for neurobiology and signal transduction pathway studies should accelerate neurobiology research forward.



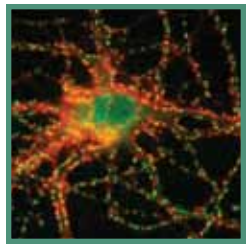
CD44 Mouse Monoclonal (E.649.3) #MA5-14983



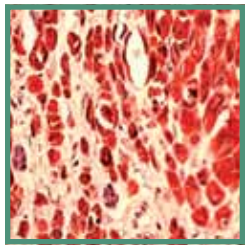
NHERF1 Rabbit Polyclonal #PA5-17045



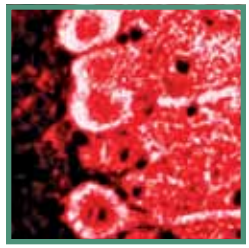
PSD93 Rabbit Polyclonal
#PA1-043



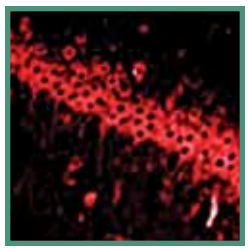
SynGAP Rabbit Polyclonal
#PA1-046



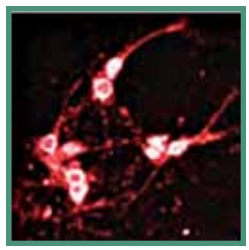
S100 A4 Rabbit Polyclonal
#PA5-16586



Calmodulin Mouse
Monoclonal (2D1)
#MA3-917



NMDA Receptor 1 Rabbit
Polyclonal #PA3-102



NMDA Receptor 2B Rabbit
Polyclonal #PA3-104

Ordering Information for Select Thermo Scientific Pierce Antibodies

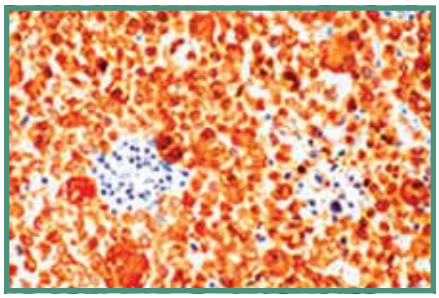
Product Description	Target Species	Applications	Size	Product #
Acetylcholinesterase Monoclonal Antibody (HR2)	Hu, Rb, Bv, Fe	ELISA, IHC (F), IP	200µL	MA3-042
Acetylcholinesterase Monoclonal Antibody (ZR3)	Fe, GP, Rb, Rt	IHC, IP	100µL	MA3-041
Amyloid β Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37077
Ataxin 7 Polyclonal Antibody	Dm, Hu	IHC (F), WB	100µg	PA1-749
β Amyloid Monoclonal Antibody (10H3)	Hu	ELISA, IHC, Neu, WB	100µg	MN1150
β Synuclein Polyclonal Antibody	Hu, Rt	IHC (P)	1mL	PA1-38703
Calmodulin Monoclonal Antibody (2D1)	Ba, Bv, Ck, Rt	ELISA, ICC, WB	200µL	MA3-917
Calpastatin Monoclonal Antibody (1F7E3D10)	Bv, Hu, Po, Rt	ICC, WB	100µL	MA3-944
Cannabinoid Receptor I Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), WB	100µL	PA1-745
Cannabinoid Receptor II Polyclonal Antibody	Hu, Rt	FACS, ICC, IF, IHC (P, F), WB	100µL	PA1-744
CD44 Monoclonal Antibody (E.649.3)	Hu	FACS, ICC, IHC (P), IP, WB	100µL	MA5-14983
CREB Monoclonal Antibody (C.12.2)	Hu, Ms, Nhp, Rt	FACS, ICC, IF, WB	100µL	MA5-15114
CREB Monoclonal Antibody (LB9)	Hu, Ms, Rt	ELISA, WB	100µg	MA1-083
Cystic Fibrosis Transmembrane Regulator Monoclonal Antibody (M3A7)	Hu, Ms, Rt	IF, IP, WB	500µL	MA5-11768
Dihydropyridine Receptor α 2 Monoclonal Antibody (20A)	GP, Hu, Ms, Rb, Rt	ICC, IF, IHC (P, F), WB	100µL	MA3-921
DISC1 Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	100µL	PA1-46163

For species and application abbreviations, see page 77.

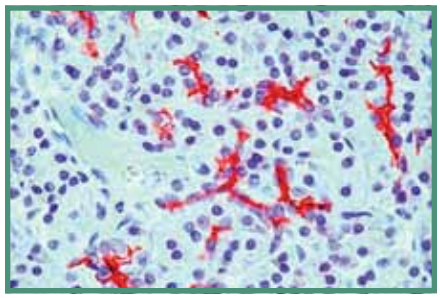
Designates product with photo.

More antibodies on next page

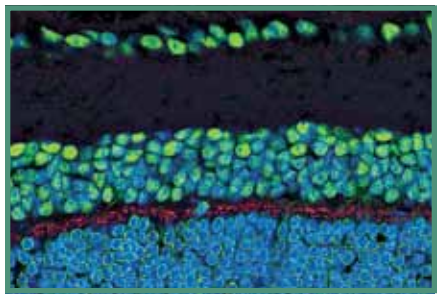
Primary Antibodies by Research Areas



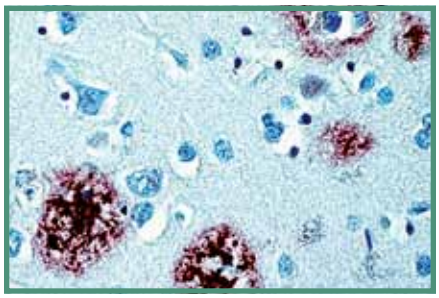
S100 Protein Mouse Monoclonal (4C4.9) #MA5-12969



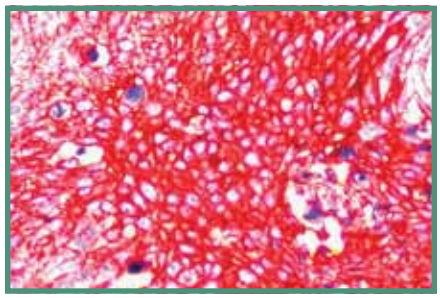
Cystic Fibrosis Transmembrane Regulator Mouse Monoclonal (M3A7) #MA5-11768



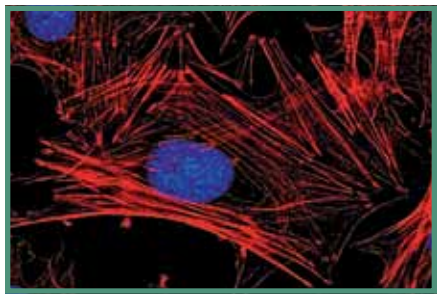
Phospho-NMDAR1 Rabbit Polyclonal (Ser890) #PA5-17750



Amyloid β Rabbit Polyclonal #PA1-37077



GLUT-1 Mouse Monoclonal (SPM498) #MA5-11315



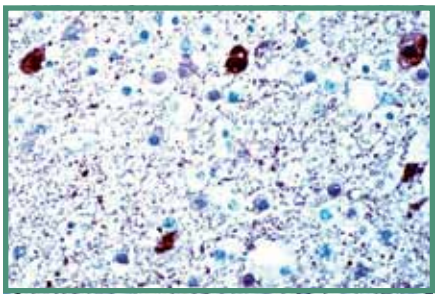
Phospho-GSK-3β Rabbit Monoclonal (Ser9) (C.367.3) #MA5-14873

Ordering Information for Select Thermo Scientific Pierce Antibodies

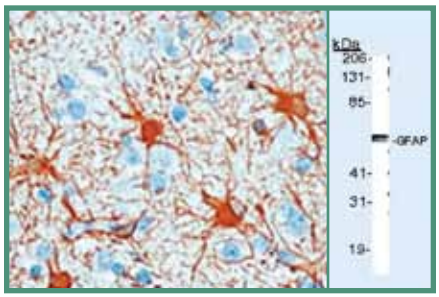
Product Description	Target Species	Applications	Size	Product #
Dopamine β Hydroxylase Polyclonal Antibody	Hu, Ms, Rt	ICC, IF, IHC (F), WB	100µL	PA3-925
FGF Receptor 3 Monoclonal Antibody (T.994.9)	Hu	ICC, IHC (P), IP, WB	100µL	MA5-14843
Glial Fibrillary Monoclonal Antibody (MIG-G2)	Hu	IHC staining	500µL	MN1180
Glial Fibrillary Acidic Protein Monoclonal Antibody (ASTRO6)	Hu, Rt, Ck, Po	IF, IHC (P), WB	500µL	MA5-12023
GLUT-1 Mouse Monoclonal (SPM498)	Hu, Rt	IHC (P)	500µL	MA5-11315
iNOS Polyclonal Antibody	Hu, Ms, Rt	IF, WB	200µL	PA1-036
Laminin Monoclonal Antibody (A5)	Hu, Ms	ICC, IHC (F)	100µg	MA1-06100
LAP1 Monoclonal Antibody (RL13)	Rt	IF, IP, WB	200µL	MA1-074
Munc18 Polyclonal Antibody	Ms, Rt	IHC (F), IP, WB	100µg	PA1-742
Nestin Monoclonal Antibody (10C2)	Hu	ICC, IHC (P, F), WB	100µg	MA1-06802
Neurofibromin Monoclonal Antibody (McNFn27b)	Hu, Ms, Rt	IHC, WB	200µg	MA1-085
Neurofilament Monoclonal Antibody (MIG-N18)	Hu	IHC	500µL	MN1190
Neurofilament, Heavy Chain Monoclonal Antibody (3G3)	Hu, Rt	IF, IHC, WB	100µg	MA1-2012
Neurofilament, Light Chain Monoclonal Antibody (DA2)	Hu, Rt	ELISA, ICC, IF, WB	100µg	MA1-2010
Neurofilament, Medium Chain Monoclonal Antibody (3H11)	Hu, Rt	IF, IP, WB	100µg	MA1-2011
Neuropeptide S (NPS) Polyclonal Antibody	Hu , Ms , Rt	ICC, IHC (P)	100µL	PA3-212
Neurotensin Receptor 1 (NTSR1) Polyclonal Antibody	Hu	ICC, WB	100µL	PA3-214
NHERF1 Polyclonal Antibody	Hu	ICC, WB	100µL	PA5-17045
NMDA Receptor 1 Polyclonal Antibody	Hu, Ms, Rt	ELISA, ICC, IHC, IP, WB	200µL	PA3-102
NMDA Receptor 1 Polyclonal Antibody	Hu, Ms, Rt	ELISA, ICC, IHC, IP, WB	200µL	PA3-103
NMDA Receptor 2B Monoclonal Antibody (NR2B)	Hu, Ms, Rt	ICC, WB	100µg	MA1-2014
NMDA Receptor 2B Polyclonal Antibody	Hu, Ms, Rt	ELISA, ICC, IHC, IP, WB	200µL	PA3-104
nNOS Polyclonal Antibody	Bv, Ms, Rb, Rt	IHC (F), IP, WB	100µL	PA3-032A
Parkin Polyclonal Antibody	Hu, Rt	IHC, WB	100µg	PA1-751
Parkin Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-38412
Parvalbumin Polyclonal Antibody	Hu, Rt	ELISA, IHC (P), IP, WB	100µg	PA1-933
PHF-tau (Ser202/Thr205)a Monoclonal Antibody (AT8)	Hu	ELISA, IF, IHC(P), WB	100µg	MN1020

For species and application abbreviations, see page 77.

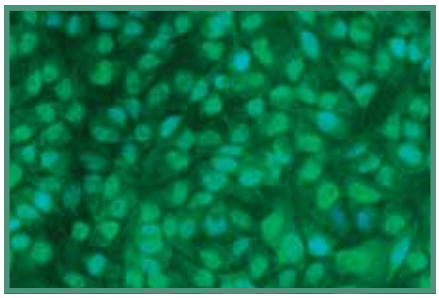
Designates product with photo.



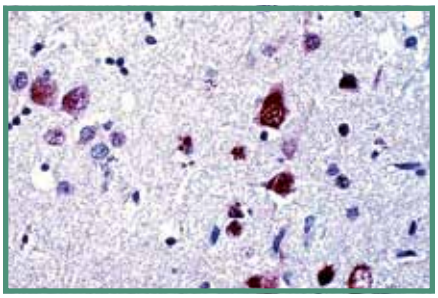
β Synuclein Rabbit Polyclonal #PA1-38703



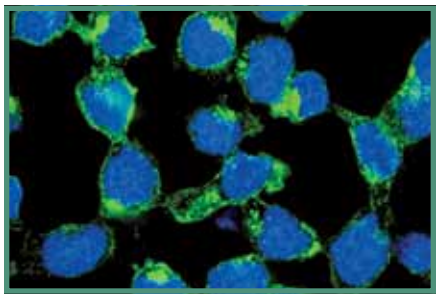
Glial Fibrillary Acidic Protein Mouse Monoclonal (ASTRO6) #MA5-12023



CREB Mouse Monoclonal (LB9) #MA1-083



Parkin Rabbit Polyclonal #PA1-38412



FGF Receptor 3 Rabbit Monoclonal (T.994.9) #MA5-14843

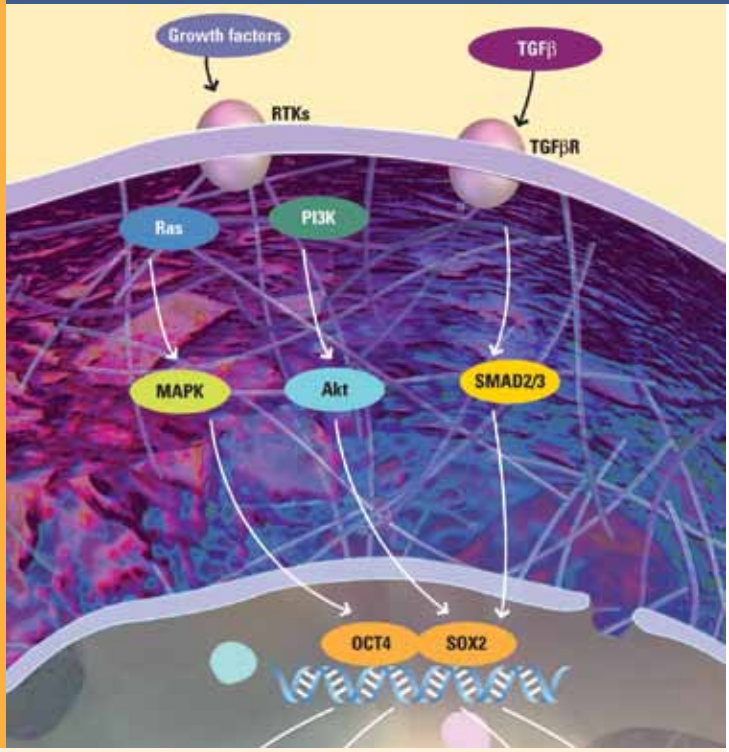
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
PHF-tau (Thr231) Monoclonal Antibody (AT180)	Hu	IF, IHC, WB	100µg	MN1040
Phospho-GSK-3β (Ser9) Monoclonal Antibody (C.367.3)	Hu, Ms, Nhp, Rt	ICC, IHC (P), WB	100µL	MA5-14873
Phospho-NMDAR1 (Ser890) Polyclonal Antibody	Hu, Ms, Rt	IF, WB	100µL	PA5-17750
PSD93 Polyclonal Antibody	Rt	IHC (F), WB	100µg	PA1-043
PSD95 Monoclonal Antibody (6G6-1C9)	Ms, Rt	ICC, IF, IP, WB	100µL	MA1-045
PSD95 Monoclonal Antibody (7E3-1B8)	Ms, Rt, Xl	ICC, IF, IHC (F), IP, WB	100µL	MA1-046
RAGE Polyclonal Antibody	Ms, Rt	IHC (F), WB	100µg	PA1-075
Ryanodine Receptor Monclonal Antibody (C3-33)	Hu, Ms, Rt, Rb, Am, Ca, Ck, Fs, GP	FACS, ICC, IF, IHC (F), IP, WB	100µg	MA3-916
S100 A4 Polyclonal Antibody	Hu, Ms, Rt, Bv, Ca, Eq	IHC (P)	500µL	PA5-16586
S100 Protein Monoclonal Antibody (4C4.9)	Hu, Ms, Rt, Bv	IHC (P)	500µL	MA5-12969
SNAP25 Monoclonal Antibody (11D2)	Hu	ELISA, IHC, WB	100µg	MN1280
Superoxide Dismutase 2 Monoclonal Antibody (37CT127.5.11.6)	Hu	IHC, WB	100µg	MA5-11157
Synapsin Monoclonal Antibody (5C8)	Hu, Po	ELISA, IHC, WB	100µg	MN1260
Synaptophysin Polyclonal Antibody	Ms, Rt	IHC, WB	100µL	OSS00021W
SynGAP Polyclonal Antibody	Ms, Rt	ICC, WB	100µg	PA1-046
Syntrophin Monoclonal Antibody (1351)	Am, Ca, Ck, Hu, Ms, Rt	IF, IP, WB	100µg	MA1-745
Synuclein Monoclonal Antibody (9B6)	Hu	ELISA, IHC, WB	100µg	MN1290
Tau Monoclonal Antibody (BT2)	Bv, Hu, Nhp, Rt	ELISA, WB	100µg	MN1010
Tau Monoclonal Antibody (HT7)	Bv, Hu	ELISA, IHC, WB	100µg	MN1000
Tau Polyclonal Antibody	Bv, Hu, Rt	IHC, WB	500µg	PN1000
TPH1 Polyclonal Antibody	Hu, Ms, Nhp, Rb, Rt	ICC, IP, WB	100µL	PA1-777
TPH2 Polyclonal Antibody	Hu, Ms, Nhp, Rb, Rt	ICC, IP, WB	100µL	PA1-778
Vanilloid Receptor 1 Polyclonal Antibody	Hu	IF, IHC (F)	100µg	PA1-748
VEGF Receptor 2 Monoclonal Antibody (B.309.4)	Hu, Ms	FACS, ICC, IF, IHC (P), IP, WB	100µL	MA5-15157

For species and application abbreviations, see page 77.

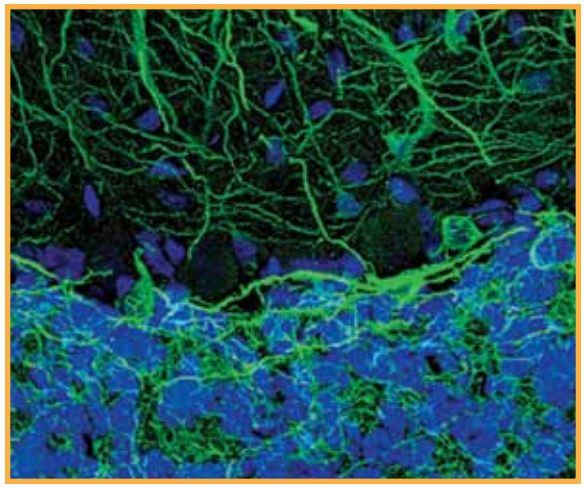
Designates product with photo.

Primary Antibodies by Research Areas

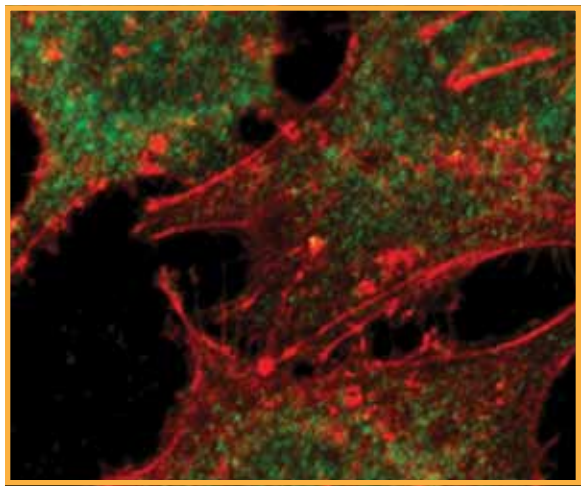


Stem cells are characterized by their ability to self-renew an initial, undifferentiated state. Stem cells also have the ability to give rise to more specialized or differentiated cells, referred to as potency. There are different degrees of stem cell potency. Totipotent or pluripotent stem cells can give rise to cells from all three germ layers (endoderm, ectoderm and mesoderm), while multi- and oligopotent cells can give rise to only a small number of closely related cells. In addition to normal stem cells, recent work has established the existence of cancer stem cells. Cancer stem cells maintain many of the normal stem cell markers; however, in contrast to their normal counterparts, cancer stem cells are able to give rise to tumors once transplanted.

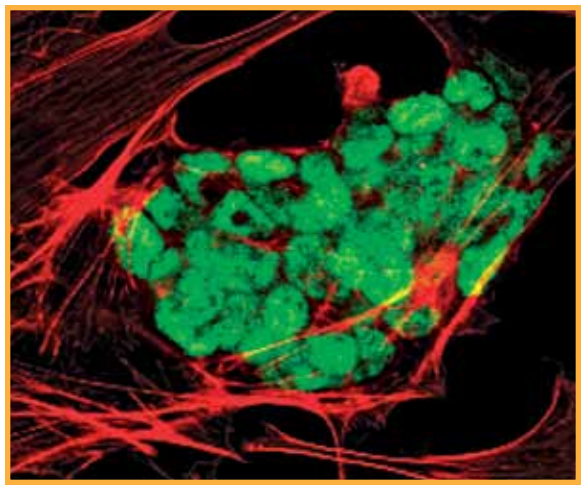
Various pluripotent stem cells can be guided to differentiate *in vitro* into hematopoietic progenitors, muscle cells or neuronal cells. In reverse, differentiated somatic cells can be re-programmed to become pluripotent stem cells. Pluripotent cells can be generated from somatic cells in one of three different ways: nuclear transfer involving the transplantation of a somatic nucleus into an enucleated oocyte, cell fusion of a somatic cell and an embryonic stem cell resulting in pluripotent hybrids, or induced pluripotent stem cells (iPS). Induction of pluripotency requires transduction of somatic cells with the transcription factors c-Myc, Sox2, Klf4 and Oct4. Bottlenecks to iPS generation include the low frequency and asynchronous generation of iPS cells. In addition to the above-mentioned transcription factors, activation-induced cytidine deaminase (AID)-dependent DNA demethylation is also required for efficient iPS generation. AID was found to be necessary for promoter demethylation and induction of the Oct4 and NANOG genes. The efficient generation of iPS cells has great potential in the study of human disease, regenerative medicine and individualized, patient-specific targeted therapy.



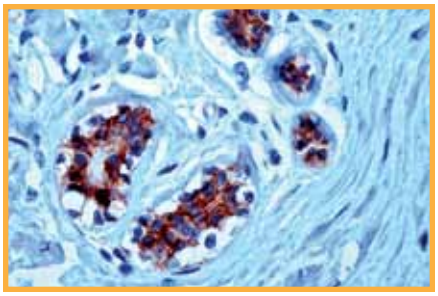
MAP2 Rabbit Polyclonal #PA5-17646



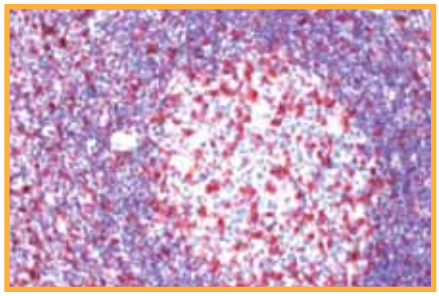
SMAD2 Rabbit Monoclonal (R.542.9) #MA5-14996



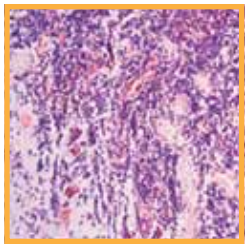
Oct-4A Monoclonal Antibody (T.631.9) #MA5-14845



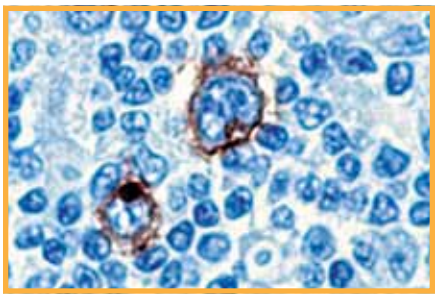
Cadherin E Rabbit Polyclonal #PA1-37204



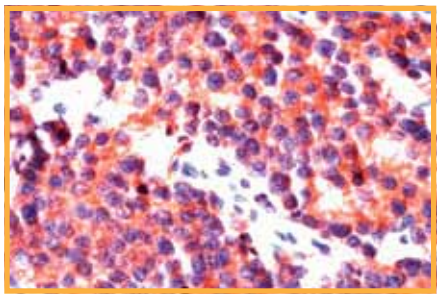
CD45 Mouse Monoclonal (SPM496) #MA1-37337



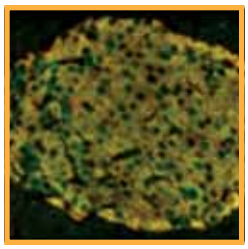
CD31 Mouse Monoclonal (1A10) #MA5-12564



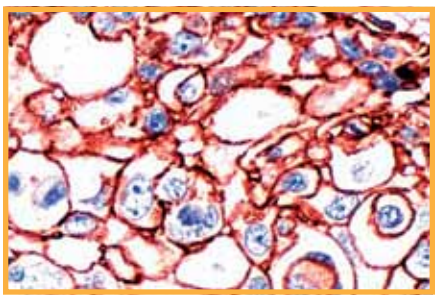
CD15 Mouse Monoclonal (SPM119) #MA1-37308



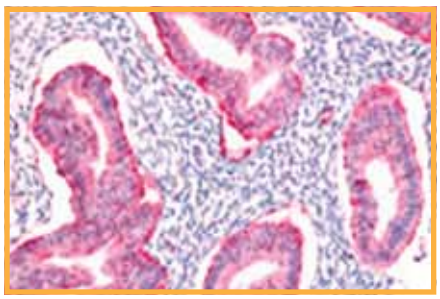
CD56 Mouse Monoclonal (123C3) #MA1-37354



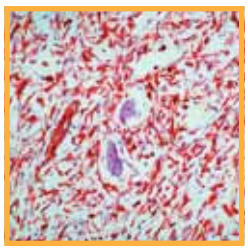
PDX-1 Polyclonal #PA3-830



CD44 Mouse Monoclonal (SPM521) #MA1-39422



SOX2 Polyclonal #PA1-16968



Vimentin Mouse Monoclonal (V9) #MA5-11883

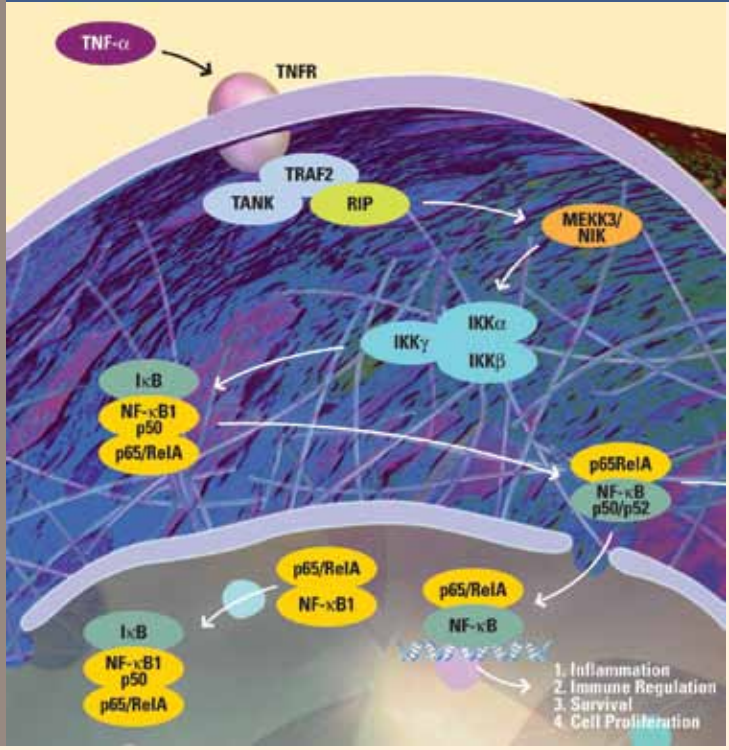
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Cadherin E Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37204
CD15 Monoclonal Antibody (SPM119)	Hu	IHC (P)	1mL	MA1-37308
CD31 Monoclonal Antibody (1A10)	Hu	IHC (P)	500µL	MA5-12564
CD44 Monoclonal Antibody (SPM521)	Hu	IHC (P)	1mL	MA1-39422
CD45 Monoclonal Antibody (SPM496)	Hu	IHC (P)	1mL	MA1-37337
CD56 Monoclonal Antibody (123C3)	Hu	IHC (P)	1mL	MA1-37354
c-KIT Polyclonal Antibody	Hu, Ms	WB, IHC, IF	100µg	PA5-14695
c-Myc Monoclonal Antibody (9E10)	Hu, Ms	IHC, IP, WB	100µg	MA1-980
MAP2 Polyclonal Antibody	Hu, Ms, Nhp, Rt	IF, WB	100µL	PA5-17646
Oct-4A Monoclonal Antibody (T.631.9)	Hu, Ms	FACS, ICC, WB	100µL	MA5-14845
PDX-1 Polyclonal Antibody	Hu, Ms	IF, IHC, WB	100µL	PA3-830
PRDM14 Polyclonal Antibody	Hu	WB, IHC, IF	100µg	PA5-11303
SMAD2 Monclonal Antibody (R.542.9)	Hu, Nhp	ICC, IP, WB	100µL	MA5-14996
SOX2 Polyclonal Antibody	Hu, Ms, Ov	FACS, ICC, IF, IHC (P), WB	100µL	PA1-16968
Vimentin Monoclonal Antibody (APD)	Hu, Ms, Rt, Bv, Ca, Ck, Eq, Gb, Hm, Nhp, Po, Rb	IHC (P)	500µL	MA5-11883

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Research Areas



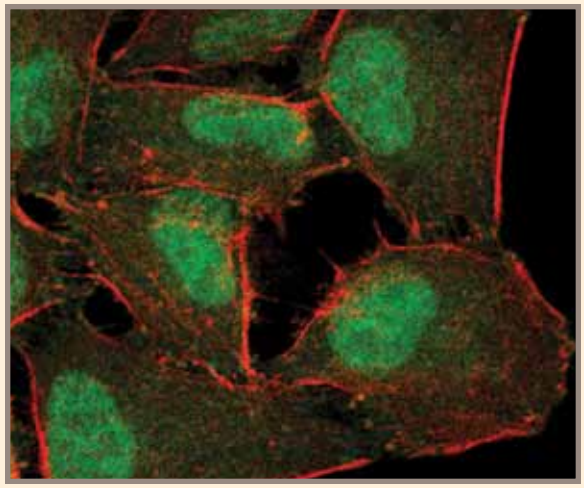
The process of inflammation provides affected cells, tissues or the entire organism an opportunity to regain homeostasis. Inflammation is triggered by a variety of stimuli such as infection, tissue stress, malfunction and injury. Pathological consequences of inflammation include autoimmunity, fibrosis, tissue damage and tumor microenvironment establishment.

The normal inflammatory pathway consists of inducing stimuli, sensors, mediators and effectors. The source of the stimulus determines whether inflammation inducers are endogenous or exogenous. For example, in the case of bacterial infection, lipopolysaccharides (LPS) serve as exogenous inducers; toll-like receptors (TLRs) on the surface of resident macrophages serve as sensors; cytokines (e.g., TNFα) are mediators; and hepatocytes, epithelial cells and neutrophils are the inflammatory pathway effectors. Neutrophils are normally restricted to blood vessels and are recruited to the infection site by selectins which are expressed on the surface of infected epithelial cells. Upon selectin binding, integrins become activated and then bind to intercellular adhesion molecules (ICAMs), which are expressed on the surface of the infected epithelial cells. The neutrophils are now able to penetrate the epithelium into the affected tissue where they unload toxic contents (ROS, neutrophil elastase, cathepsin G and proteinase 3) to fight the source of the infection. If the neutrophils fail to clear the infection, additional cells, including macrophages and T-cells, are recruited to the inflammation site. Finally, if all attempts fail to degrade or clear the source of inflammation, the foreign body is gradually engulfed by layers of macrophages to form a granuloma.

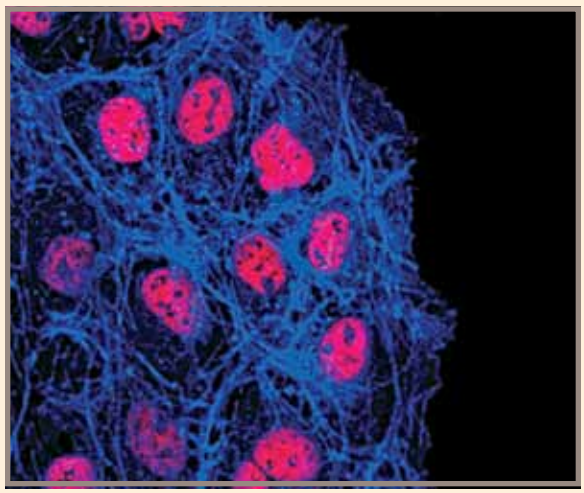
Endogenous inducers generate inflammation signals often by sensing "abnormal states" arising from the inappropriate cellular or tissue localization of various factors. For example, purinoreceptors on the surface of macrophages detect ATP released from necrotic cells as a result of membrane disruption.

ATP binding to the purinoreceptors results in increased potassium ion (K^+) influx and successive activation of the NALP inflammasome. The activated NALP (via endogenous or exogenous inducers) in turn stimulates caspase-1, which then promotes the processing and secretion of pro-inflammatory cytokines.

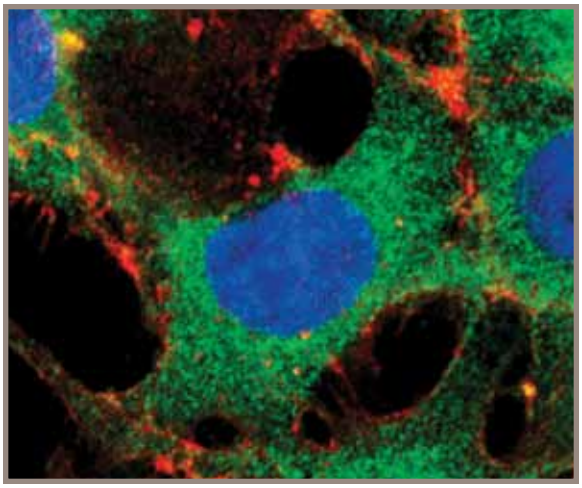
Several different types of inflammation mediators exist. Pro-inflammatory cytokines are one of several mediators of inflammation. Other well known mediators of inflammation are vasoactive amines (histamine, serotonin), vasoactive peptides which can be generated by the Hageman factor, lipid mediators (eicosanoids), chemokines, and proteases (elastin, cathepsin, MMP). Negative regulators of inflammation include lipoxins, resolvins and protectins. Other negative regulators include inhibitors of pro-inflammatory cytokine production and function such as the p38 MAPK pathway, antagonists of COX-1/COX-2 and TNFα signaling.



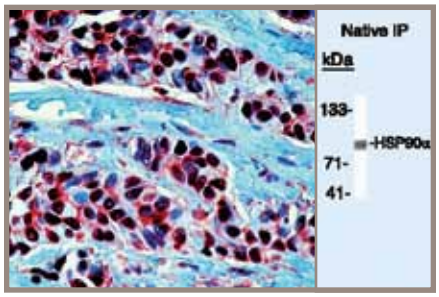
Phospho-p38 MAPK Rabbit Monoclonal (Thr180-Tyr182) (S.417.1) #MA5-15182



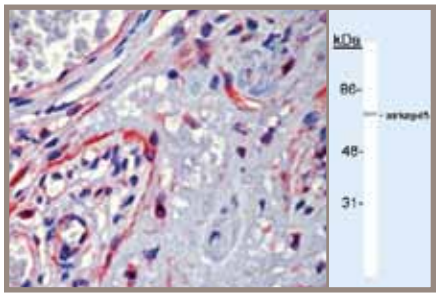
Phospho-p53 Rabbit Polyclonal (Ser37) #PA5-17866



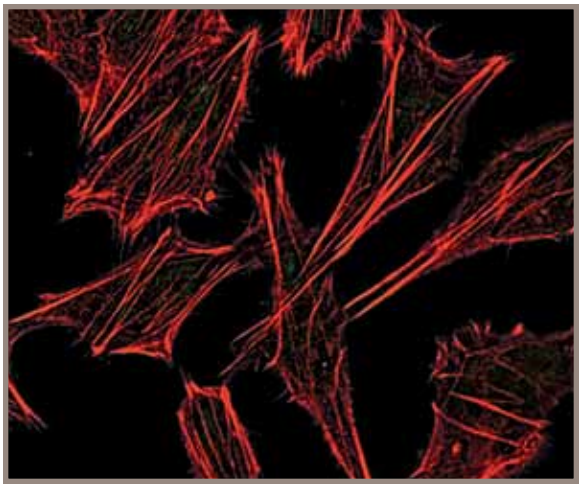
FoxO3a Rabbit Monoclonal (K.115.9) #MA5-14932



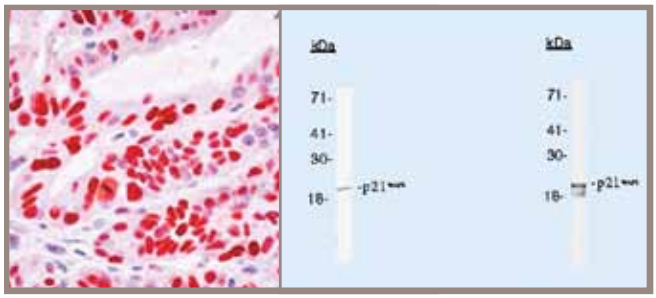
Heat Shock Protein 90 α Rabbit Polyclonal
#PA5-16341



NFκB-p65 Rabbit Polyclonal #PA5-16545



Phospho-ATF-2 Rabbit Polyclonal (Thr71) #PA5-17885



p21WAF11 Mouse Monoclonal (CP74) #MA5-14353

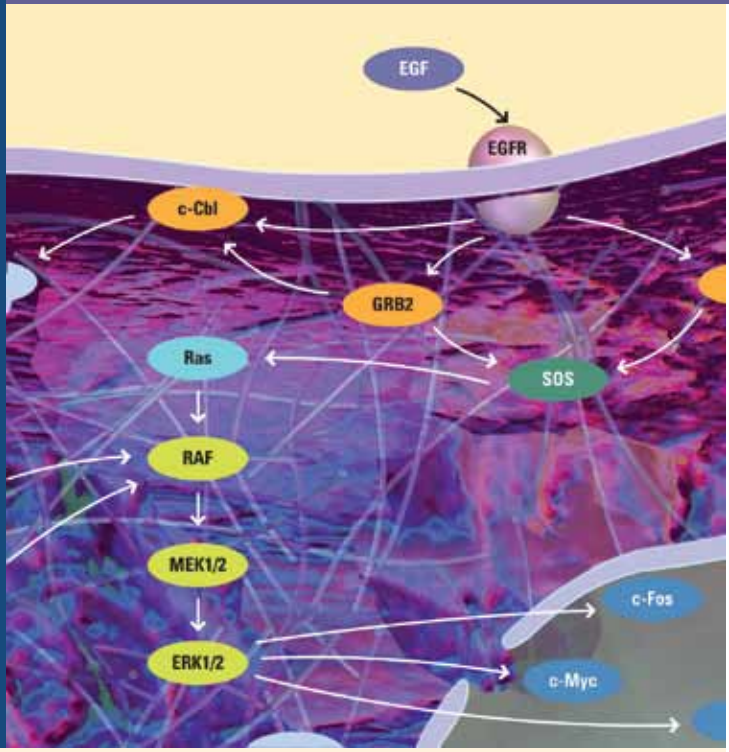
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
COX-1 Polyclonal Antibody	Hu	IHC (P)	500µL	PA5-16318
COX2 Polyclonal Antibody	Hu, Ms, Rt	IHC (P), IP, WB	500µL	PA5-16817
COX2 Polyclonal Antibody	Hu, Ms, Rt	IHC (P), WB	100µL	PA5-17614
FoxO3a Monoclonal Antibody (K.115.9)	Hu, Ms, Nhp, Rt	ICC, WB	100µL	MA5-14932
Heat Shock Factor 1 Monoclonal Antibody (4B4)	Hu, Ms, Rt	GS, IF, IP, WB	500µL	MA5-14622
Heat Shock Protein 27 Monoclonal Antibody (G3.1)	Ca, Hu, Rt	ELISA, ICC, IF, IHC (P), IP, WB	100µL	MA3-015
Heat Shock Protein 60 Monoclonal Antibody (A57-B9)	Ba	ICC, IP, WB	100µL	MA3-023
Heat Shock Protein 70 Monoclonal Antibody (3A3)	Am, Ar, Av, Dm, Fs, Hu, Ms, Pl, Po, Rt, Ys	GS, ICC, IF, IHC (P), IP, WB	50µL	MA3-006
Heat Shock Protein 84 Polyclonal Antibody	Hu, Ms, Rt	IF, IHC (F), IP, WB	100µg	PA3-012
Heat Shock Protein 90 α Polyclonal Antibody	Hu, Ms, Rt	IF, IHC (P), IP, WB	500µL	PA5-16341
NFκB/p65 Polyclonal Antibody	Hu, Ms, Rt, Bv, Ca, Dm, Hm, Po, Rb, Xl	IHC (P), WB	500µL	PA5-16545
p21WAF11 (CP74)	Hu, Rt	FACS, IHC (P), IP, WB	500µL	MA5-14353
Phospho-ATF-2 (Thr71) Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (F), IHC (P), IP, WB	100µL	PA5-17885
Phospho-p38 MAPK (Thr180/Tyr182) Monoclonal Antibody (S.417.1)	Bv, Dm, Hm, Hu, Mn, Ms, Nhp, Po, Rt, Ys, Zf	FACS, ICC, WB	200µL	MA5-15182
Phospho-p53 (Ser37) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17866
SOD2 Monoclonal Antibody (37CT127.5.11.6)	Hu	WB, IHC	100µg	MA5-11157

For species and application abbreviations, see page 77.

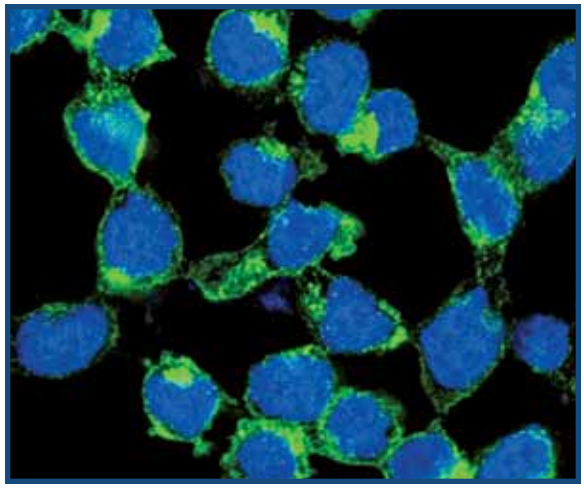
Designates product with photo.

Primary Antibodies by Cell Signaling

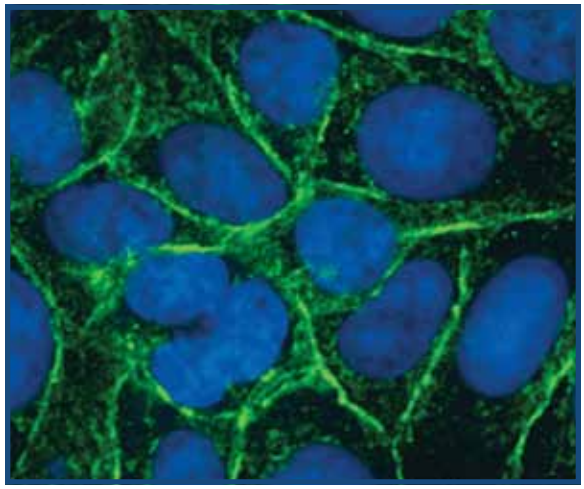


Receptor Tyrosine Kinases (RTKs) are essential cell surface receptors which mediate signal transmission from external ligands such as growth factors, hormones and cytokines. RTKs are key regulators of multiple biological processes including cell proliferation, cell growth, cell survival, development, vascular-genesis, transcription and protein synthesis. Over 50 RTKs have been identified (e.g., EGFR, PDGFR, VEGFR, c-Kit, InsR and c-Met).

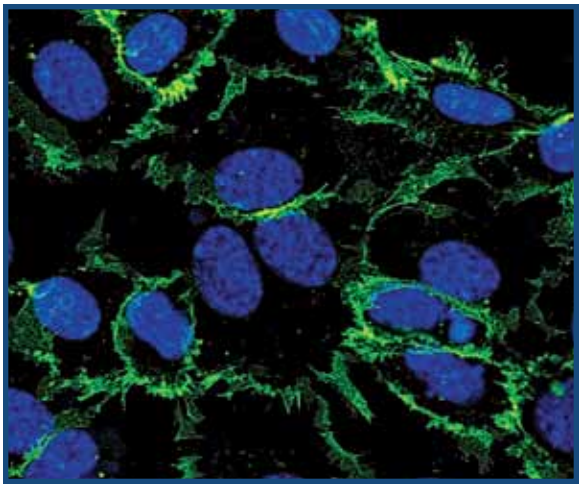
The primary mode of RTK activation involves binding of external ligand, receptor dimerization and autophosphorylation of tyrosine residues located within the cytoplasmic tail of the receptor. Tyrosine phosphorylation of RTKs results in docking of Src Homology domain (SH2)-containing proteins which transmit the signal through a cascade of downstream phosphorylation events, ultimately resulting in target protein functionality. Deregulation of RTKs have been implicated in human disease and is a hallmark of a myriad of human cancers. Current research on RTKs focuses on development of both chemical- and antibody-based inhibitors of receptor tyrosine kinase activation including SH2 domain inhibitor mimetics.



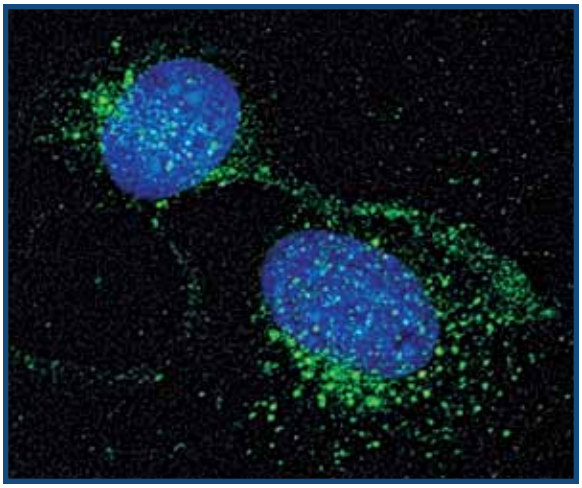
FGF Receptor 3 Rabbit Monoclonal (T.994.9) #MA5-14843



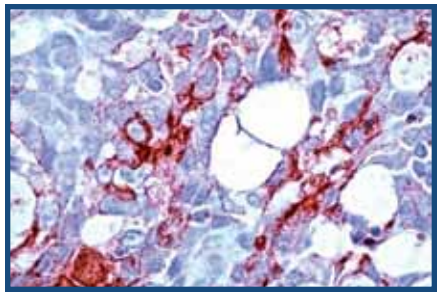
IGF-I Receptor β Rabbit Polyclonal #PA5-17530



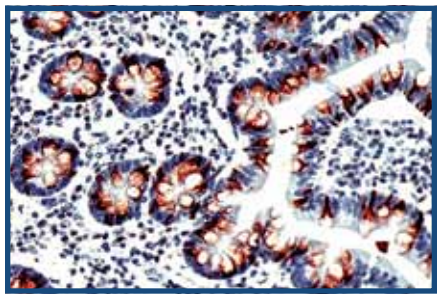
Phospho-VEGF Receptor 2 Rabbit Monoclonal (Tyr1175) (S.657.3) #MA5-15170



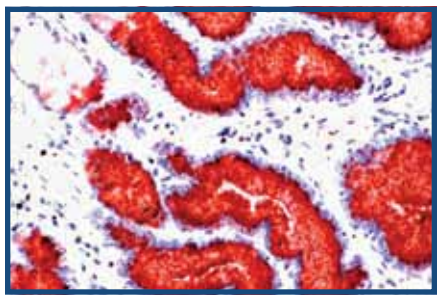
PDGF Receptor β Rabbit Monoclonal (G.290.3) #MA5-15143



MUC1 Mouse Monoclonal (SPM492) #MA1-38209



MUC2 Mouse Monoclonal (SPM512) #MA1-38215



MUC5AC Mouse Monoclonal (SPM488) #MA1-38221

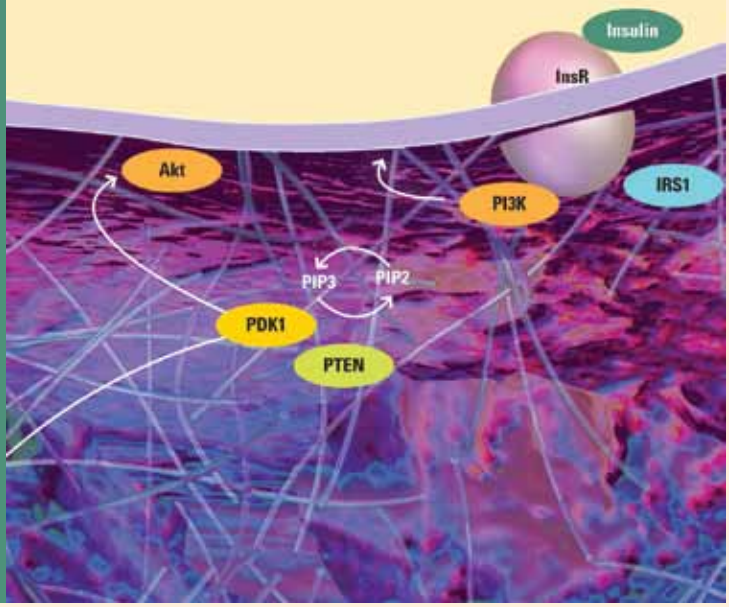
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
FGF Receptor 3 Monoclonal Antibody (T.994.9)	Hu	ICC, IHC (P), IP, WB	100µL	MA5-14843
HER2/ErbB2 Monoclonal Antibody (K.929.9)	Hu, Ms, Rt	FACS, ICC, IHC (F), IHC (P), IP, WB	100µL	MA5-15050
IGF-I Receptor β Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), IP, WB	100µL	PA5-17530
MUC1 Monoclonal Antibody (SPM492)	Hu	IHC (P)	1mL	MA1-38209
MUC2 Monoclonal Antibody (SPM512)	Hu	IHC (P)	1mL	MA1-38215
MUC5AC Monoclonal Antibody (SPM488)	Hu, Ms, Rt	IHC (P)	1mL	MA1-38221
PDGF Receptor β Monoclonal Antibody (G.290.3)	Hu, Ms, Rt	ICC, IHC (F), IHC (P), IP, WB	100µL	MA5-15143
Phospho-EGF Receptor (Tyr1045) Polyclonal Antibody	Hu, Rt	ICC, IHC (P), WB	100µL	PA5-17816
Phospho-EGF Receptor (Tyr1068) Monoclonal Antibody S.684.2)	Hu, Nhp, Rt	IHC (P), IP, WB	100µL	MA5-15199
Phospho-EGF Receptor (Tyr1068) Polyclonal Antibody	Hu, Ms, Rt	IHC (P), WB	100µL	PA5-17848
Phospho-EGF Receptor (Tyr1148) Polyclonal Antibody	Hu, Nhp, Rt	IHC (P), WB	100µL	PA5-17640
Phospho-EGF Receptor (Tyr992) Polyclonal Antibody	Hu, Rt	IHC (P), WB	100µL	PA5-17835
Phospho-HER3/ErbB3 (Tyr1289) Monoclonal Antibody (E.350.3)	Ca, Hu, Ms, Rt	IHC (P), IP, WB	100µL	MA5-15166
Phospho-M-CSF Receptor (Tyr723) Monoclonal Antibody (F.540.2)	Hu, Ms	FACS, IHC (P), IP, WB	100µL	MA5-15151
Phospho-VEGF Receptor 2 (Tyr1175) Monoclonal Antibody (S.657.3)	Hu, Ms	ICC, IHC (P), WB	100µL	MA5-15170
Src Monoclonal Antibody (E.872.9)	Bv, Ck, Hm, Hu, Ms, Nhp, Po, Rt	FACS, ICC, IF, IHC (F), IHC (P), WB	100µL	MA5-15139

For species and application abbreviations, see page 77.

Designates product with photo.

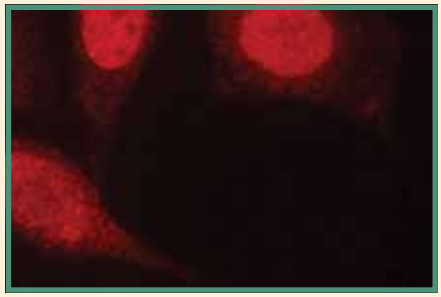
Primary Antibodies by Cell Signaling



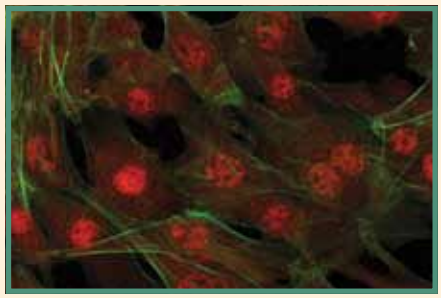
Protein phosphatases are a class of enzymes which catalyze the dephosphorylation of target proteins. At the most basic level, protein phosphatases counteract protein kinases, enzymes that catalyze the addition of phosphate groups to target proteins, thereby influencing their activity. The most common form of reversible protein post-translational modification (PTM) is phosphorylation.

Protein phosphorylation is an essential cellular event which mediates nearly all biological processes and is a central circuit for transmission of extracellular stimuli throughout the cell via signal transduction pathways. Protein phosphorylation occurs primarily on four amino acids, Serine (Ser), Threonine (Thr), Tyrosine (Tyr), and Histidine (His), with a frequency of approximately 80%/15%/5%/0.1%, respectively. Phosphorylation also occurs on lipid moieties essential for activation of the PI3K/Akt signaling cascade. More recent analysis of the phosphoproteome using mass spectrometry suggests that greater than 60% of the human proteome is phosphorylated at any given time. The exact level of protein phosphorylation is a complicated question to resolve, as any protein containing kinase consensus motifs with the amino acids Ser, Thr or Tyr have the potential to become phosphorylated at any given time in response to biological signals.

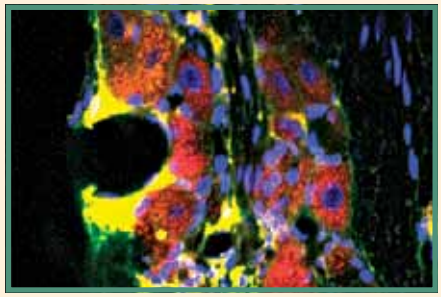
As is the case for protein phosphorylation, dephosphorylation can either influence protein function in a positive or negative manner. Five main classes of protein phosphatases exist including tyrosine-specific (PTP1B), serine/threonine-specific (PP2C), dual-specific (DUSP1), histidine (PHP) and lipid phosphatases (PTEN). Deregulation of protein phosphatases has been implicated in many human diseases including cancer, neurodegeneration and metabolic disorders. A classic example of a deregulated phosphatase in human disease is the **P**hosphatase and **Ten**sin homolog, PTEN. PTEN is a critical tumor suppressor protein which mediates signaling through the PI3K/Akt pathway by counteracting PI3K-directed phosphorylation of membrane lipids. Epigenetic downregulation and loss of heterozygosity mutations at the PTEN locus account for aberrant PI3K/Akt signaling contributing to the formation of numerous human cancers.



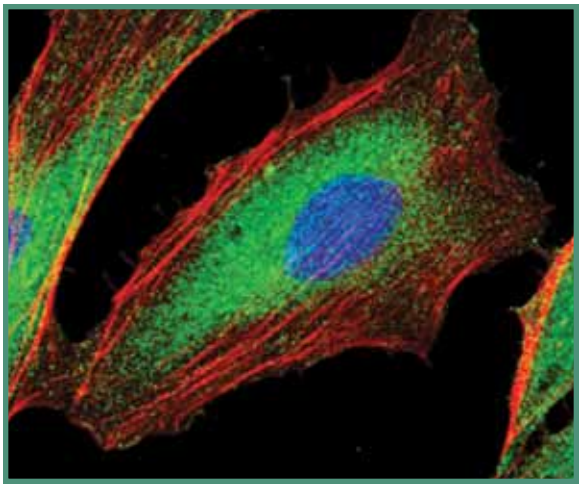
PP2A A Subunit Rabbit Polyclonal #PA5-17516



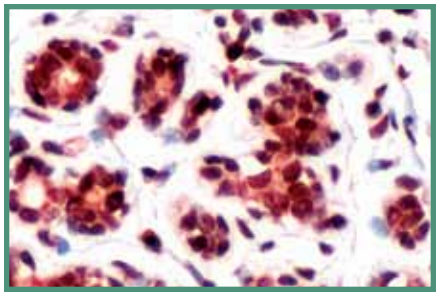
Akt1 Mouse Monoclonal (G.668.2) #MA5-15187



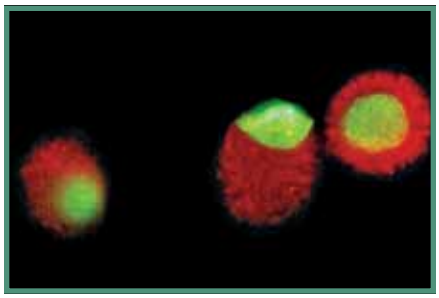
RhoA Rabbit Polyclonal #OSR00266W



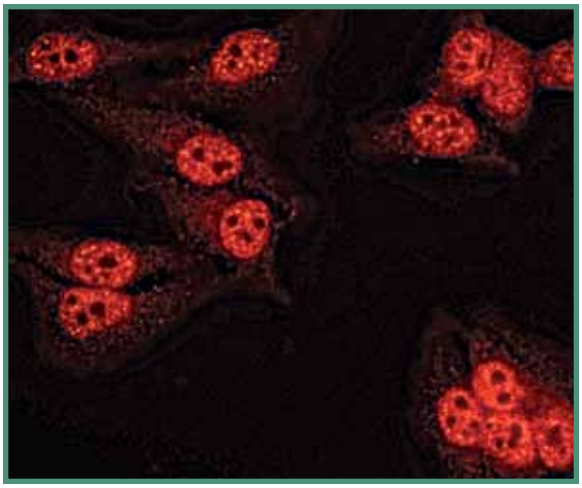
SHIP2 Rabbit Monoclonal (T.194.8) #MA5-14844



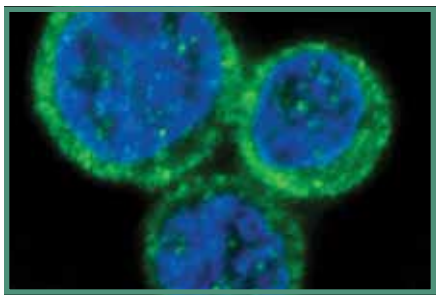
DRAK2 Rabbit Polyclonal #PA1-37583



Phospho-cdc25C Rabbit Polyclonal (Thr48) #PA5-17777



PP2A B Subunit Rabbit Polyclonal #PA5-17515



SHIP1 Rabbit Monoclonal (T.7.7) #MA5-14893

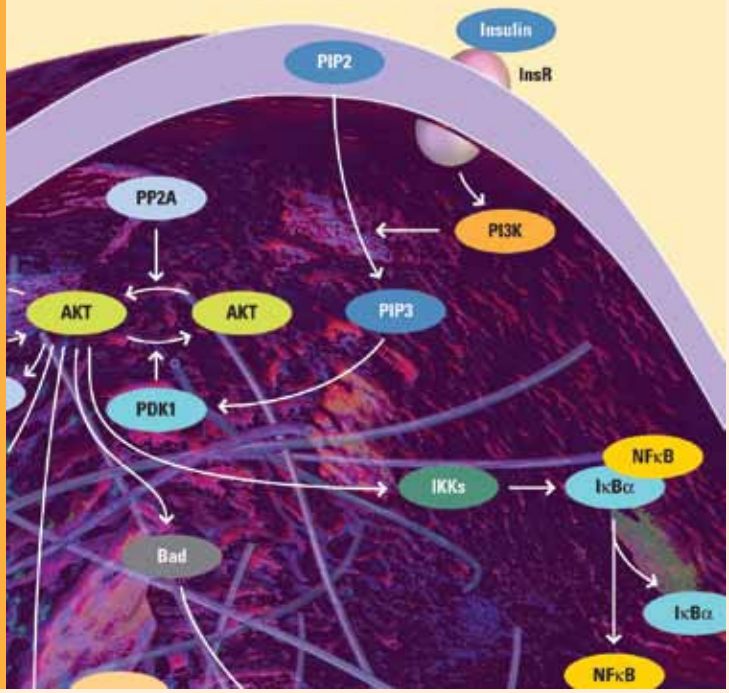
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Akt1 Monoclonal Antibody (G.668.2)	Hu, Ms, Rt	IP, WB	100µL	MA5-15187
DRAK2 Polyclonal Antibody	Hu	IHC (P), IP	1mL	PA1-37583
Pan-Calcineurin A Polyclonal Antibody	Bv, Ck, Dm, Hu, Ms, Nhp, Po, Rt, Xl	FACS, ICC, IP, WB	100µL	PA5-17446
Phospho-cdc25C (Thr48) Polyclonal Antibody	Hu, Nhp	ICC, IHC (P), WB	100µL	PA5-17777
Phospho-PP1α (Thr320) Polyclonal Antibody	Hu, Ms, Nhp, Rt	IHC (P), WB	100µL	PA5-17819
PP2A A Subunit Monoclonal Antibody (J.613.4)	Hu, Ms, Nhp, Rt	ICC, IHC (P), WB	100µL	MA5-14952
PP2A A Subunit Rabbit Polyclonal	Hu, Ms, Rt, Nhp	ICC, FACS, WB	100µL	PA5-17516
PP2A B Subunit Monoclonal Antibody (F.722.1)	Bv, Ck, Dm, Hu, Ms, Nhp, Po, Rt	IHC (P), IP, WB	100µL	MA5-15007
PP2A B Subunit Polyclonal Antibody	Ck, Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), IP, WB	100µL	PA5-17515
PP2A C Subunit Polyclonal Antibody	Ck, Dm, Hu, Ms, Nhp, Po, Rt	FACS, ICC, IHC (P), IP, WB	100µL	PA5-17510
PTPN6 Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-12417
RhoA Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	100µL	OSR00266W
SHIP1 Monoclonal Antibody (T.7.7)	Hu	FACS, ICC, IP, WB	100µL	MA5-14893
SHIP2 Monoclonal Antibody (T.194.8)	Hu	FACS, ICC, IP, WB	100µL	MA5-14844
STEP / PTPN5 Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-15531

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Cell Signaling



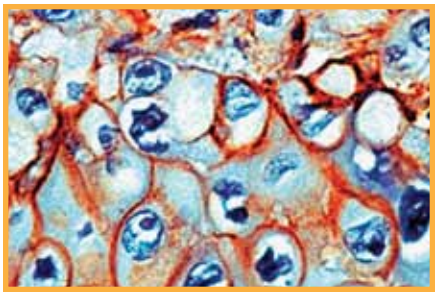
The phosphatidylinositol-3-kinase (PI3K) signaling pathway is an essential mediator of cell growth, differentiation and survival. Activation of the PI3K signaling cascade is triggered by growth factor stimulation which activates receptor tyrosine kinases, including Platelet Derived Growth Factor Receptor (PDGFR), Epidermal Growth Factor Receptor (EGFR), Vascular Endothelial Growth Factor Receptor (VEGFR), Insulin Receptor (InsR) and others. Receptor Tyrosine Kinase (RTK) activation results in autophosphorylation on tyrosine residues located within the cytoplasmic domain of each receptor. Tyrosine phosphorylation on specific sites stimulates docking of PI3K through its Src Homology (SH2) Domain. Docking of PI3K to activated RTKs triggers activation of the signaling cascade, ultimately resulting in activation of the protein kinase Akt (PKB).

Three isoforms of Akt exist: Akt1, Akt2 and Akt3. All Akt isoforms are expressed differentially in tissues and cell types. Akt is a master regulator of multiple downstream biological processes including cell proliferation, cell survival, glucose metabolism, protein synthesis and neurological functions.

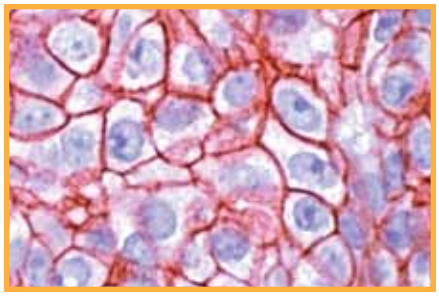
Phosphorylation of membrane lipids PtdIns-P3by PI3K stimulates translocation and anchorage of Akt into the cell membrane through its pleckstrin homology domain. An increase in the local concentration of Akt at the plasma membrane results in phosphorylation of Akt at two key sites: Thr308 and Ser473. The kinases responsible for these two phosphorylation events are PDK1 and mTOR, respectively.

A major regulator of the PI3K/Akt pathway is the tumor suppressor protein PTEN which functions as a phosphatase to dephosphorylate phospholipids within the cell membrane, preventing attraction of Akt to the lipid membrane. Loss of function mutations in the tumor suppressor protein PTEN have been implicated in numerous human cancers. Current research is focused on multiple aspects of Akt's role in multiple biological processes and human disease. Of recent intense focus is the interplay between Akt and the protein kinase mTOR (mammalian **T**arget **O**f **R**apamycin) which plays an essential role in stimulating protein synthesis. A significant amount of pharmacological development has been focused on a combined drug regimen which targets both Akt and mTOR (rapalogs). Blockage of the Akt/mTOR pathway is designed to diminish protein synthesis, cell cycle progression, and cell survival, all key biological events necessary for tumorigenesis.

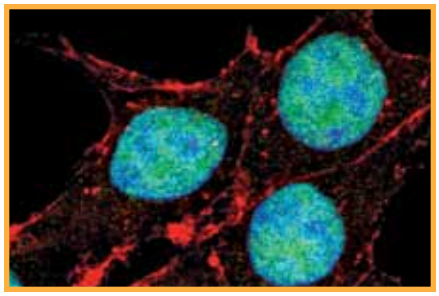
In addition to translation control, the PI3K-Akt pathway also plays an essential role in cell proliferation and cell survival. Akt stimulates cell proliferation and survival through down-regulation via phosphorylation of numerous cell proliferation and survival inhibitory proteins including $p27^{Kip1}$, FOXO and Bad. Mechanistically, the result of phosphorylation of these protein targets by Akt is elegant involving degradation of $p27^{Kip1}$, transcriptional repression of FOXO, and cytoplasmic sequestration of the pro-apoptotic protein Bad. In short, Akt plays a central role in regulating cell cycle regulation through phosphorylation of the anti-proliferation transcription factor FOXO. Phosphorylation of FOXO by Akt results in cytoplasmic sequestration, thereby inhibiting FOXO-dependent transcription of the cell cycle inhibitory protein, $p27^{Kip1}$, and the pro-apoptotic protein, FasL. Akt also exerts its pro-survival effects through phosphorylation of the pro-apoptotic protein Bad. Similar to FOXO, phosphorylation of Bad results in cytoplasmic sequestration, thereby preventing Bad's function of disrupting mitochondrial integrity resulting cell death. Because of these cellular activities, uncontrolled regulation of the PI3K-Akt pathway through loss of function mutations in PTEN result in sustained signaling, thereby promoting tumorigenesis through upregulation of the cell cycle machinery and downregulation of pro-apoptotic proteins.



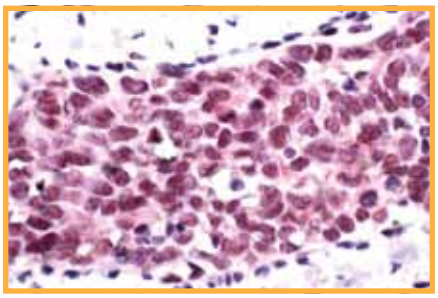
EGF Receptor Mouse Monoclonal (SPM341) #MA1-37605



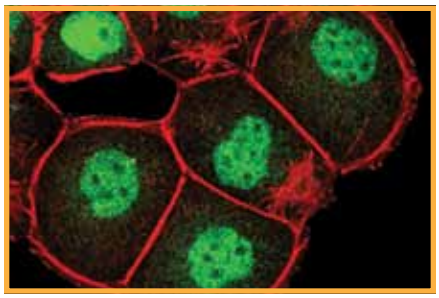
ErbB2 Rabbit Polyclonal #PA1-37426



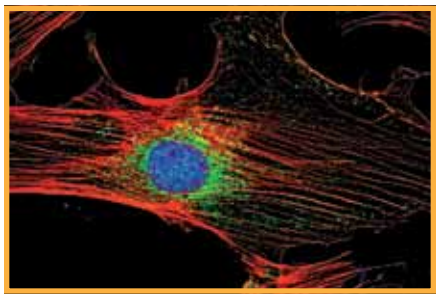
FoxO3a Rabbit Monoclonal (K.115.9) #MA5-14932



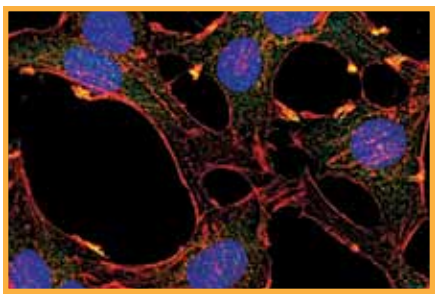
Phospho-Akt Rabbit Polyclonal (Ser473) #PA1-37046



FoxO1 Rabbit Monoclonal (S.502.4) #MA5-14846



Phospho-GSK-3β Rabbit Monoclonal (Ser9) (C.367.3) #MA5-14873



Akt Rabbit Monoclonal (pan) (E.32.10) #MA5-14999

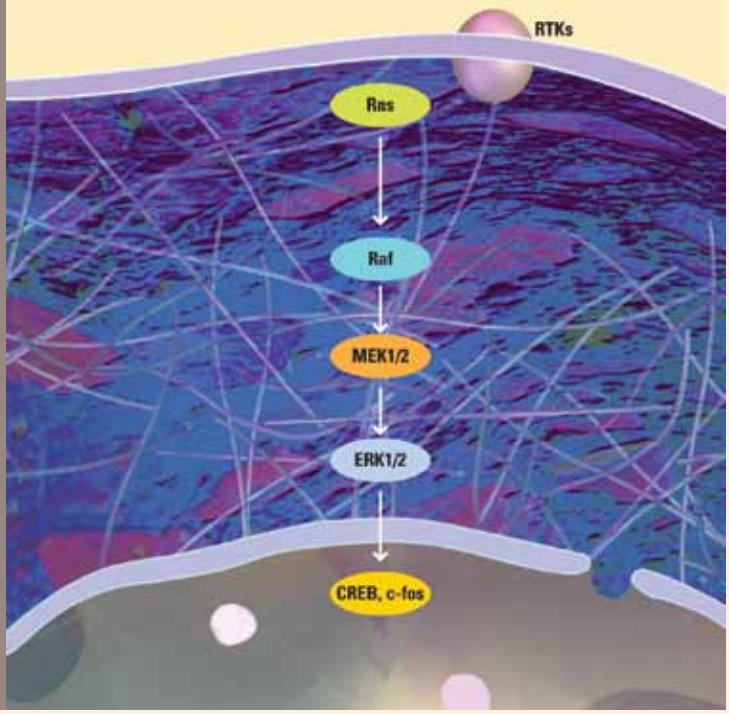
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Akt (pan) Monoclonal Antibody (E.32.10)	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), IP, WB	100µL	**MA5-14999**
Akt1 Monoclonal Antibody (G.145.7)	Hu, Ms, Nhp, Rt	IHC (P), IP, WB	100µL	**MA5-14898**
EGF Receptor Monoclonal Antibody (SPM341)	Hu	IHC (P)	1mL	**MA1-37605**
eNOS Polyclonal Antibody	Bv, Ca, Hu, Ms, Po, Rt	IHC (P, F), WB	100µL	**PA1-037**
ErbB2 Polyclonal Antibody	Hu, Ms, Nhp, Rt	IHC (P), WB	1mL	**PA1-37426**
FoxO1 Monoclonal Antibody (S.502.4)	Hu, Ms, Nhp, Rt	ICC, IHC (P), WB	100µL	**MA5-14846**
FoxO3a Monoclonal Antibody (K.115.9)	Hu, Ms, Nhp, Rt	ICC, WB	100µL	**MA5-14932**
Phospho-AKT (Ser473) Monoclonal Antibody (14-6)	Hu, Ms	ICC, IF, WB	100µL	**OMA1-03061**
Phospho-AKT (Ser473) Polyclonal Antibody	Hu	IHC (P)	1mL	**PA1-37046**
Phospho-AKT (Thr308) Polyclonal Antibody	Hu, Ms, Rt	IF, IHC, WB	200µg	**PA1-14030**
Phospho-AKT2 (Ser474) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	**PA1-14034**
Phospho-GSK3 α (Ser21) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	**PA1-14180**
Phospho-GSK3 β (Ser9) Polyclonal Antibody	Hu, Ms, Rt	IF, IHC, WB	200µg	**PA1-14182**
Phospho-GSK-3β (Ser9) Monoclonal Antibody (C.367.3)	Hu, Ms, Nhp, Rt	ICC, IHC (P), WB	100µL	**MA5-14873**
PI3 Kinase p110-α Monoclonal Antibody (H.843.0)	Bv, Hu, Ms, Rt	IHC (P), IP, WB	100µL	**MA5-14870**
PTEN Monoclonal Antibody (17.A)	Hu	IHC	500µL	**MA5-12278**

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Cell Signaling

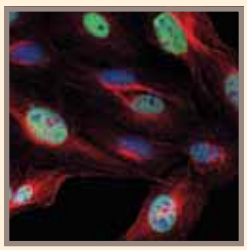


The Mitogen Activated Protein Kinases (MAPK) family of serine/threonine protein kinases regulates a diverse range of biological processes including cell proliferation, development, differentiation, cell survival and protein synthesis. Three classical MAPK pathways have been identified in mammalian cells. These pathways include the growth factor signaling ERK1/2 pathway and two stress-activated pathways, SAPK/JNK and p38. More recently another MAPK pathway, ERK5/BMK1, has been discovered and has been shown to be responsive to both growth factor and stress signals. More recent evidence suggests that these pathways are nonlinear and that extensive crosstalk exists between neighboring signaling cascades including parallel MAPK and PI3K/Akt pathways.

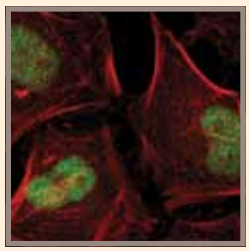
MAPK (ERK1/2) Signaling Pathway
The first characterized MAPK was ERK1/2 also known as p42/p44. This kinase cascade responds primarily to growth factor stimulation which then activates receptor tyrosine kinases and GPCRs. Receptor activation results in downstream signaling through small G-proteins, such as the proto-oncoprotein $p21^{Ras}$ which stimulates a conformational change and subsequent activation of the serine/threonine kinase family Raf (A-Raf, B-Raf, c-Raf). Activated Raf phosphorylates the downstream dual-specific serine/threonine/tyrosine kinase MEK1/2, which in turn phosphorylates the activation loop of ERK1/2 on residues Thr202/Tyr204. Activated MAPK translocates into the nucleus where it phosphorylates multiple transcription factors and key regulatory proteins involved in cell proliferation, cell growth, cell survival and differentiation. Because of the role that the ERK1/2 pathway plays in tumorigenesis, intense research is focused on the development of pharmacological inhibitors to ameliorate this disease.

JNK/SAPK Signaling Pathway
The Jun N-terminal Kinase (JNK), Stress Activated Protein Kinases (SAPK) families of MAP kinases play crucial roles in regulating responses to cell stress, inflammation and apoptosis. The JNK/SAPK pathway is activated by UV, gamma radiation, ceramides, inflammatory cytokines and, in rare cases, growth factors signaling through GPCRs. The small GTPases belonging to the Rho family (Rho, Rac, cdc42) mediate the signaling process by activating downstream MAPKKKs which activate the dual specific serine/threonine/tyrosine kinases MKK4/7 and result in downstream activation of SAPK/JNK protein complexes. Dimerized SAPK/JNK translocate to the nucleus where they stimulate activity of multiple transcription factors, including c-Jun, ATF-2, SMAD4, p53, STAT3 and NFAT4.

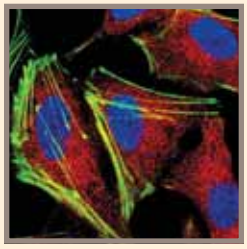
p38 MAPK Pathway
Similar to the JNK/SAPK pathway, the p38 MAPK cascade also responds to cell stress, including UV irradiation, heat shock, high osmotic stress, lipopolysaccharide and proinflammatory cytokines such as IL-1 and TNF-α. Although both pathways target many of the same downstream effector proteins, the primary difference between these two pathways is the fate of the cell. Signaling through the JNK/SAPK pathway often triggers apoptosis whereas the p38 pathway favors cell cycle arrest. Factors which influence these decisions are the nature of the signal, signal strength and signal duration. Understanding the mechanisms of differential signaling through these two pathways remains a central focus for many research labs.



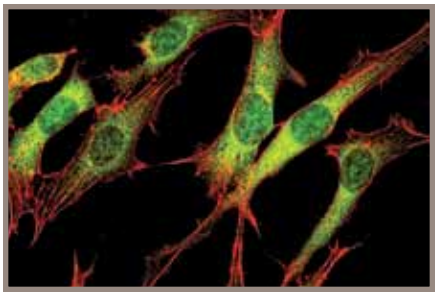
Phospho-c-Jun Rabbit Polyclonal (Ser73) #PA5-17879



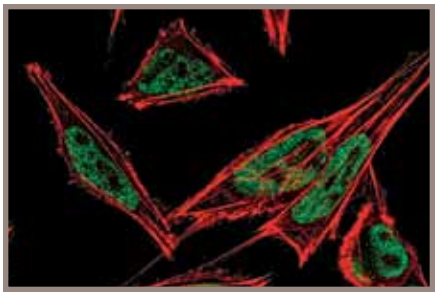
JunB Rabbit Polyclonal #PA5-17263



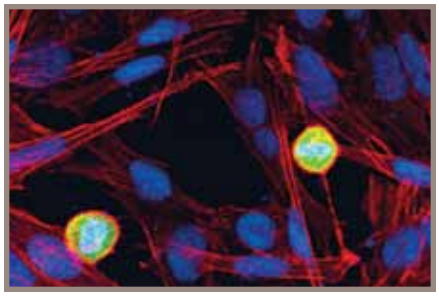
MEK1/2 Monoclonal (J.653.9) #MA5-15135



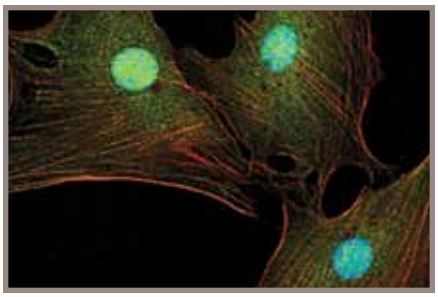
p44/42 MAPK Rabbit Monoclonal (Erk1-2) (K.913.4) #MA5-15134



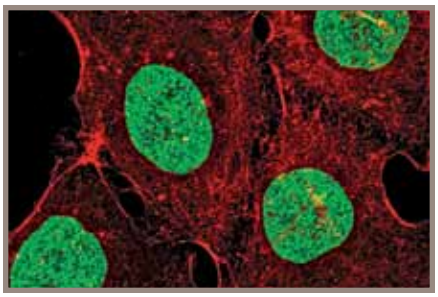
Phospho-ATF-2 Rabbit Polyclonal (Thr71) #PA5-17885



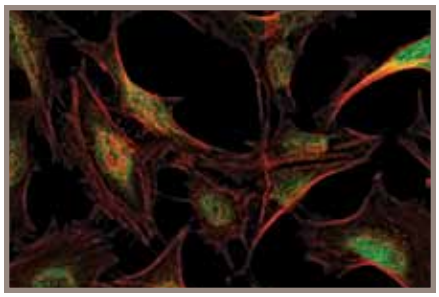
Phospho-MEK1 Rabbit Polyclonal (Thr286) #PA5-17664



Phospho-p44/42 MAPK Rabbit Monoclonal (Erk1-2) (Thr202-Tyr204) (B.742.5) #MA5-15174



Phospho-p90RSK Rabbit Polyclonal (Thr573) #PA5-17841



RSK1-RSK2-RSK3 Rabbit Monoclonal (F.940.7) #MA5-15040

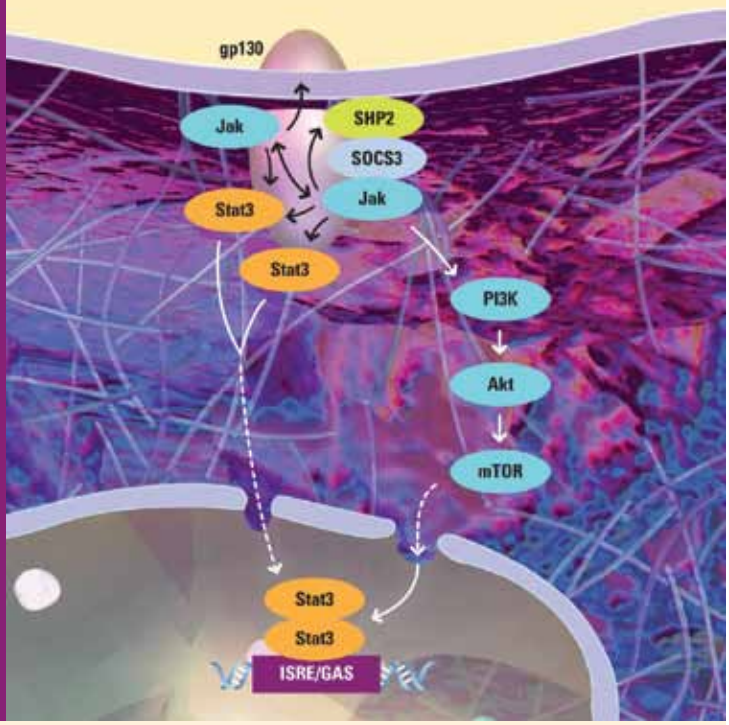
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
14-3-3 Tau Polyclonal Antibody	Hu, Ms, Nhp, Rt	IHC (P), WB	100µL	PA5-17426
ATF-2 Monoclonal Antibody (S.613.5)	Hu, Ms, Nhp, Rt	IHC (P), IP, WB	100µL	MA5-15169
c-Jun Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14099
ERK1 Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-14093
ERK2 Polyclonal Antibody	Hu	WB, IHC, FACS	100µg	PA5-14414
JunB Polyclonal Antibody	Hu	ICC, IP, WB	100µL	PA5-17263
JunD Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14238
MEK1/2 Monoclonal Antibody (J.653.9)	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), WB	100µL	MA5-15135
p38-α MAPK Polyclonal Antibody	Hu, Ms, Rt, Nhp	IHC (P), IP, WB	100µL	PA5-17713
p42 MAP Kinase (Erk2) Polyclonal Antibody	Hu, Mn, Ms, Nhp, Rt	IHC (P), WB	100µL	PA5-17710
p44/42 MAPK (Erk1/2) Monoclonal Antibody (K.913.4)	Bv, Ca, Ce, Ck, Dm, Hm, Hu, Mn, Ms, Nhp, Po, Rt, Ys, Zf	FACS, ICC, IHC (P), IP, WB	200µL	MA5-15134
Phospho-ATF-2 (Thr69/71) Polyclonal Antibody	Hu, Ms, Nhp, Rt	IHC (P), WB	100µL	PA5-17886
Phospho-ATF-2 (Thr71) Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (F), IHC (P), IP, WB	100µL	PA5-17885
Phospho-c-Jun (Ser243) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14100
Phospho-c-Jun (Ser63) Monoclonal Antibody	Hu, Ms, Rt	IHC (P), WB	100µL	MA5-15115
Phospho-c-Jun (Ser73) Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17879
Phospho-c-Jun (Thr239) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14098
Phospho-c-Jun (Thr91) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14106
Phospho-c-Jun (Thr93) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14108
Phospho-JunB (Ser259) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14233
Phospho-JunB (Ser79) Polyclonal Antibody	Hu, Ms, Rt	IHC	200µg	PA1-14235
Phospho-JunD (Ser255) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14237
Phospho-MAPKAPK-2 (Thr334) Polyclonal Antibody	Hu, Ms, Nhp, Rt	IHC (P), WB	100µL	PA5-17791
Phospho-MEK1 (Thr286) Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, IP, WB	100µL	PA5-17664
Phospho-MEK1/2 (Ser221) Monoclonal Antibody (K.742.1)	Ca, Hu, Ms, Nhp, Rt	FACS, IHC (P), WB	100µL	MA5-15118
Phospho-p44/42 MAPK (Erk1/2) (Thr202/Tyr204) Monoclonal Antibody (B.742.5)	Hu, Ms, Rt, Dm, Mn, Nhp, Po, Zf	FACS, ICC, WB	200µL	MA5-15174
Phospho-p90RSK (Thr573) Polyclonal Antibody	Hu, Ms, Rt, Ck, Hm, Xl, Zf	ICC, WB	100µL	PA5-17841
RSK1/RSK2/RSK3 Monoclonal Antibody (F.940.7)	Hu, Ms, Rt, GP, Nhp	ICC, IP, WB	100µL	MA5-15040

For species and application abbreviations, see page 77.

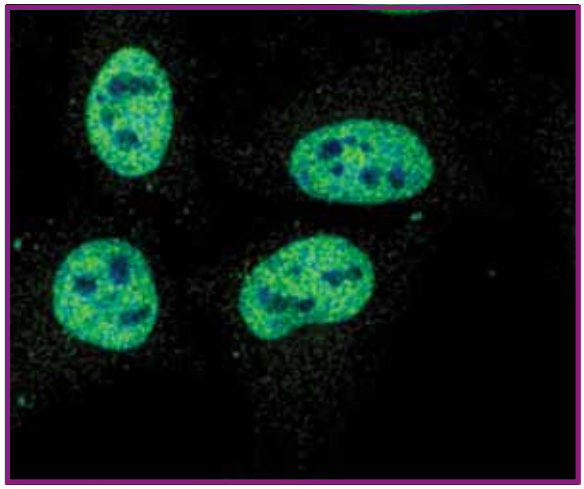
Designates product with photo.

Primary Antibodies by Cell Signaling

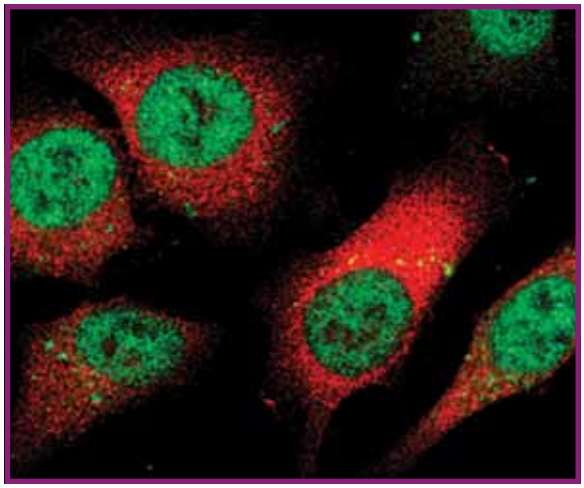


The JAK-STAT pathway is a major regulatory element in cytokine signaling. When cytokines, such as interferons and IL-6, are activated, they bind to their respective receptors, resulting in the activation of receptor-associated JAK tyrosine kinases. Several receptors exist that are capable of inducing various JAK kinases. With IL-6, the receptor consists of IL-6R α chain and gp130 subunits. IL-6 binding results in the activation of Jak1, Jak2 and Tyk2 tyrosine kinases, which in turn phosphorylate STAT1 and STAT3 transcription factors. Tyrosine phosphorylated STATs dimerize via binding to their respective SH2 domains and accumulate in the nucleus where they mediate IL-6-induced gene transcription.

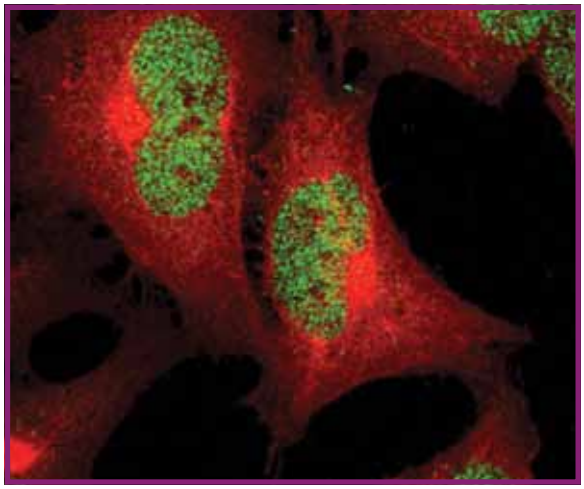
Negative regulators of the JAK-STAT pathway include SOCS, SHP1 and PIAS proteins. Recent work suggests a more complex image of the JAK/STAT pathway, which involves regulation of gene transcription via unphosphorylated STATs, glycosylated STATs and crosstalk with other signaling pathways, such as the PKC-delta, p38 MAPK and NFκB pathways.



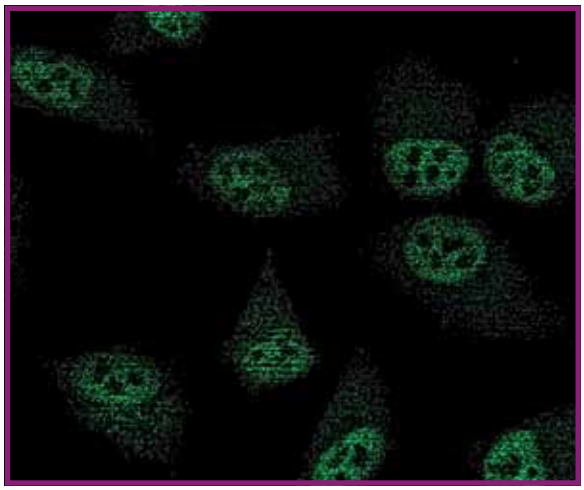
Phospho-STAT1 Rabbit Monoclonal (Tyr701) (S.213.5) #MA5-15071



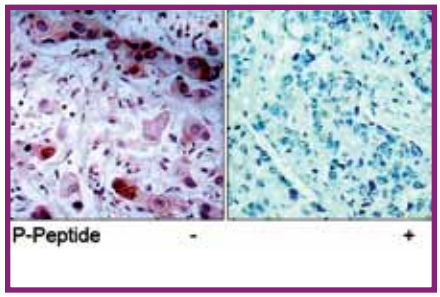
Phospho-STAT3 Rabbit Polyclonal (Ser727) #PA5-17876



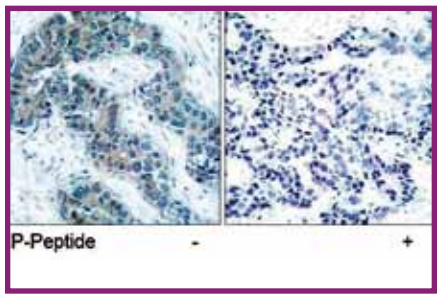
Phospho-STAT5 Rabbit Monoclonal (Tyr694) (J.536.2) #MA5-14822



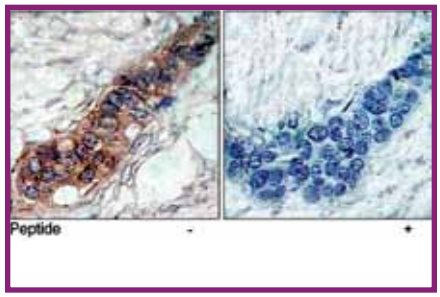
STAT3 Mouse Monoclonal (G.659.4) #MA5-15179



Phospho-JAK1 (Tyr1022) Rabbit Polyclonal
#PA1-14228



Phospho-JAK2 (Tyr1007) Rabbit Polyclonal
#PA1-14232



JAK2 Polyclonal #PA1-14231

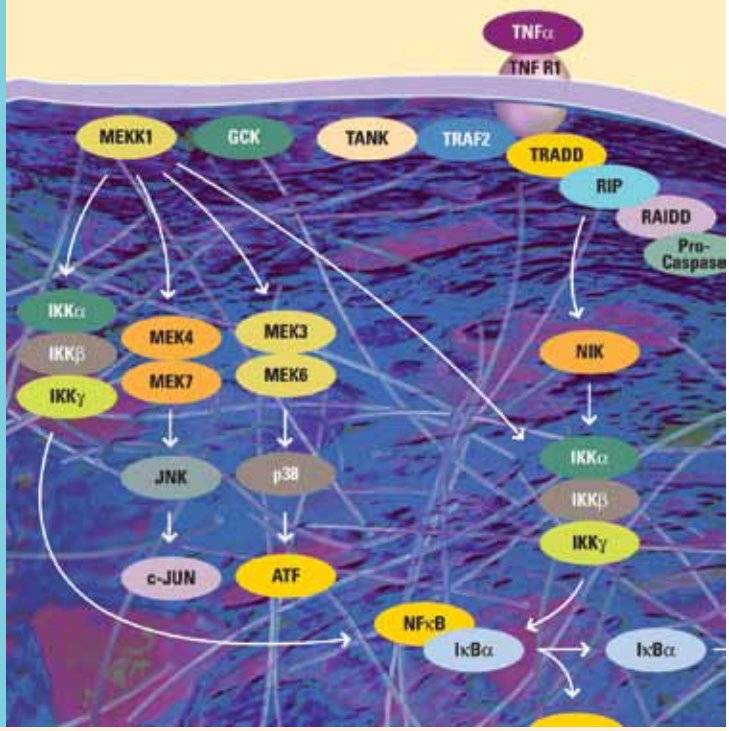
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
JAK1 Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	**PA1-14229**
JAK2 Polyclonal Antibody	Hu, Ms, Rt	IHC	200µg	**PA1-14231**
Phospho-JAK1 (Tyr1022) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	**PA1-14228**
Phospho-JAK2 (Tyr1007) Polyclonal Antibody	Hu, Ms, Rt	IHC (P), WB	200µg	**PA1-14232**
Phospho-JAK2 (Tyr221) Polyclonal Antibody	Hu, Ms, Rt	IHC	200µg	**PA1-14230**
Phospho-Stat1 (Ser727) Polyclonal Antibody	Bv, Hu, Ms, Rt	ChIP, FACS, ICC, WB	100µL	**PA5-17635**
Phospho-Stat1 (Tyr701) Monoclonal Antibody (S.213.5)	Hu, Ms	ChIP, FACS, ICC, IHC (F), IHC (P), IP, WB	100µL	**MA5-15071**
Phospho-Stat3 (Ser727) Polyclonal Antibody	Bv, Hu, Ms, Rt	ChIP, ICC, IP, WB	100µL	**PA5-17876**
Phospho-Stat5 (Tyr694) Monoclonal Antibody (J.536.2)	Bv, Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), WB	100µL	**MA5-14822**
Phospho-Stat6 (Tyr641) Polyclonal Antibody	Bv, Hu	FACS, ICC, IP, WB	100µL	**PA5-17902**
PRMT5 Polyclonal Antibody	Hu	WB, IHC	100µg	**PA5-11121**
Stat1 Monoclonal Antibody (C.156.9)	Hu, Nhp	IHC (P), WB	100µL	**MA5-15129**
STAT2 Polyclonal Antibody	Hu	WB, IHC	100µg	**PA5-11629**
Stat3 Monoclonal Antibody (F.424.5)	Hu, Ms, Nhp, Rt	ChIP, IHC (P), IP, WB	100µL	**MA5-15147**
Stat3 Monoclonal Antibody (G.659.4)	Hu, Ms, Nhp, Rt	ChIP, FACS, ICC, IHC (P), IP, WB	100µL	**MA5-15179**
TYK2 Polyclonal Antibody	Hu, Ms, Rt	IHC	200µg	**PA1-14430**

For species and application abbreviations, see page 77.

Designates product with photo.

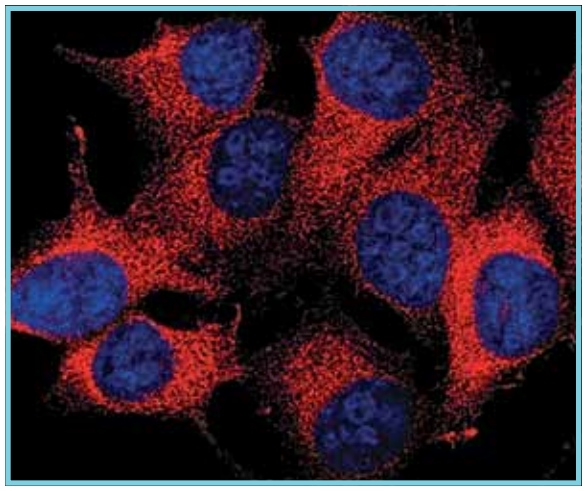
Primary Antibodies by Cell Signaling



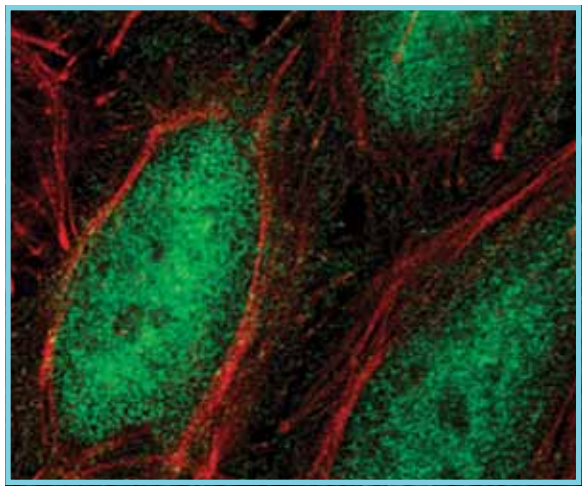
Signaling through the NFκB pathway is a fairly complex and strictly regulated process in mammalian cells. The NFκB pathway is crucial to the function of the immune system because it modulates the expression of various cytokines and growth factors in response to activation of various receptors involved in immunity, such as the TNF receptor, TLR/IL-1 receptor, T-cell and B-cell receptors. For example, in the case of TNFα, it has been shown that NFκB activation counters uncontrolled TNF-induced apoptosis by providing a balance of pro-apoptotic and pro-proliferative signaling events.

The NFκB family of transcription factors consists of 5 members: RelA (p65), RelB, c-Rel, NFκB1 (p50, p105) and NFκB2 (p52, p100). Under non-activating conditions, NFκB members form a complex with IκB, which prevents translocation to the nucleus. TNFα binding to the TNF receptor triggers NFκB activation through the canonical pathway, while TCR activation can also induce an alternative NFκB pathway. In the canonical pathway, TNF-receptor binding leads to phosphorylation of the IKK complex, which consists of IKKα, IKKβ and NEMO and subsequent phosphorylation of IκB. Phosphorylated IκB is then targeted for β-TrCP-mediated proteasomal degradation thereby allowing Rel-NFκB dimers to translocate to the nucleus and to regulate gene transcription.

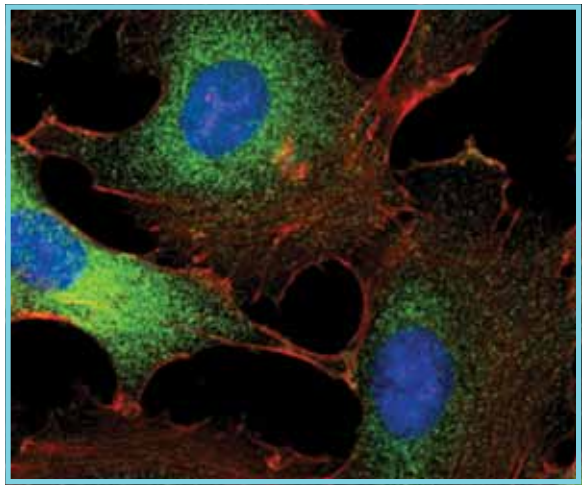
In the alternative pathway, IKKα is activated via NIK kinase resulting in phosphorylation and subsequent proteasomal processing of RelB-bound p100 protein. After proteasomal processing of p100, active RelB-p52 heterodimers are now able to translocate to the nucleus and regulate gene transcription. A well known mechanism of feedback inhibition of the NFκB pathway is through export of nuclear NFκB to the cytosol by newly synthesized IκB.



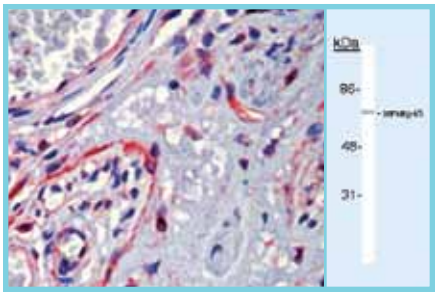
Mouse Monoclonal IκB-α (T.937.7) #MA5-15132



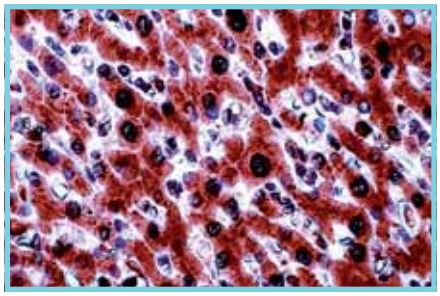
Phospho-NFκB p65 Rabbit Monoclonal (Ser536) (T.894.2) #MA5-15160



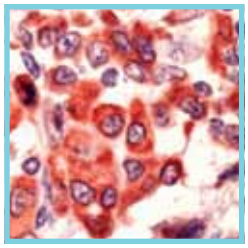
TRAF1 Rabbit Monoclonal (K.915.10) #MA5-15043



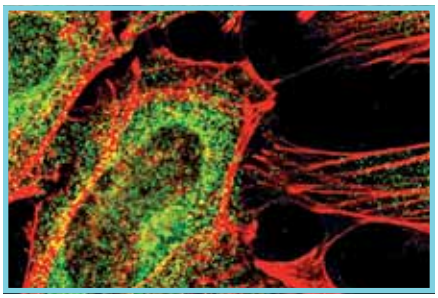
NFκB-p65 Rabbit Polyclonal #PA5-16545



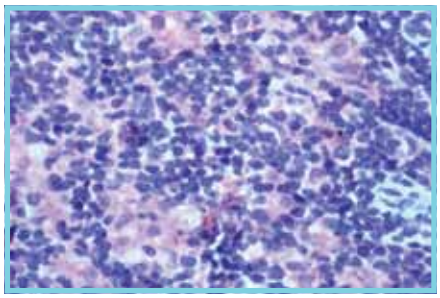
TRADD Rabbit Polyclonal #PA1-38791



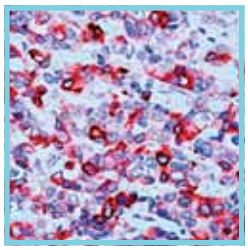
COX-1 Rabbit Polyclonal #PA5-16318



c-Rel Rabbit Polyclonal #PA5-17452



TNF Receptor II Rabbit Polyclonal #PA1-38784



COX2 Rabbit Monoclonal (SP21) #MA5-14568

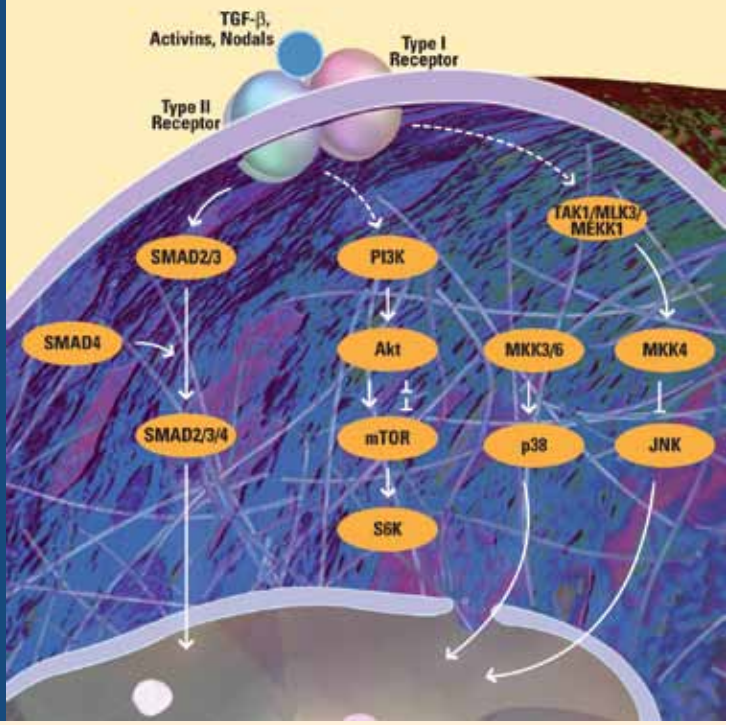
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Cox-1 Polyclonal Antibody	Hu	IHC(P)	500µL	PA5-16318
COX2 Monoclonal Antibody (SP21)	Hu, Ms, Rt	IHC (P)	500µL	MA5-14568
c-Rel Polyclonal Antibody	Hu, Nhp	FACS, ICC, IHC (P), IP, WB	100µL	PA5-17452
I-κ-B-α Monoclonal Antibody (T.937.7)	Bv, GP, Hu, Ms, Nhp, Po, Rt	FACS, ICC, IHC (P), IP, WB	100µL	MA5-15132
IRAK1 Polyclonal Antibody	Hu, Nhp	ICC, WB	100µL	PA5-17490
IRAK2 Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17448
NFκB/p65 Polyclonal Antibody	Hu, Ms, Rt, Bv, Ca, Dm, Hm, Po, Rb, Xl	IHC (P), WB	500µL	PA5-16545
Phospho-I-κ-B-α (Ser32/36) Monoclonal Antibody (H.709.9)	Bv, Ca, Hu, Ms, Nhp, Po, Rt	IHC (P), IP, WB	100µL	MA5-15224
Phospho-NF-κB p65 (Ser276) Polyclonal Antibody	Bv, Ca, Hu, Ms, Po, Rt	IHC (P), WB	100µL	PA5-17643
Phospho-NF-κB p65 (Ser536) Monoclonal Antibody (T.849.2)	Ca, Hm, Hu, Ms, Nhp, Po, Rt	FACS, ICC, IP, WB	100µL	MA5-15160
Phospho-NFκB p100/p52 (Ser865) Polyclonal Antibody	Hu, Ms, Rt	IF, IHC, WB	200µg	PA1-14273
Phospho-NFκB p100/p52 (Ser869) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14275
Phospho-NFκB p105/p50 (Ser337) Polyclonal Antibody	Hu, Ms, Rt	IF, IHC, WB	200µg	PA1-14277
Phospho-NFκB p105/p50 (Ser893) Polyclonal Antibody	Hu	IHC, WB	200µg	PA1-14279
Phospho-NFκB p105/p50 (Ser907) Polyclonal Antibody	Hu	IHC, WB	200µg	PA1-14281
Phospho-NFκB p105/p50 (Ser932) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14283
Phospho-NFκB p65 (Ser311) Polyclonal Antibody	Hu, Ms, Rt	IF, IHC, WB	200µg	PA1-14289
Phospho-NFκB p65 (Ser468) Polyclonal Antibody	Hu, Ms, Rt	IF, WB	200µg	PA1-14293
Phospho-NFκB p65 (Ser529) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14295
Phospho-NFκB p65 (Thr254) Polyclonal Antibody	Hu, Ms, Rt	IHC	200µg	PA1-14285
Phospho-NFκB p65 (Thr435) Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	200µg	PA1-14291
RAGE Polyclonal Antibody	Ms, Rt	IHC (F), WB	100µg	PA1-075
TLR2 Polyclonal Antibody	Hu, Ms	WB, IHC	100µg	PA5-11592
TLR4 Polyclonal Antibody	Ms	WB, IHC	100µg	PA5-11597
TLR5 Polyclonal Antibody	Hu, Ms	WB, IHC	100µg	PA5-11599
TNF Receptor II Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-38784
TRADD Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-38791
TRAF1 Monoclonal Antibody (K.915.10)	Hu, Nhp	FACS, ICC, IHC (P), IP, WB	100µL	MA5-15043
TRAF2 Polyclonal Antibody	Hu, Ms, Nhp	ICC, IP, WB	100µL	PA5-17500

For species and application abbreviations, see page 77.

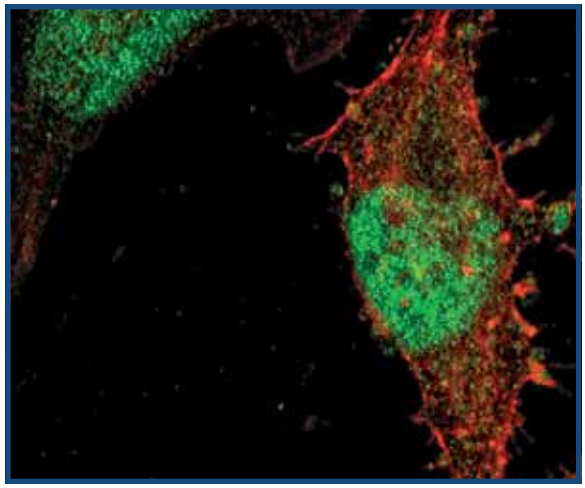
Designates product with photo.

Primary Antibodies by Cell Signaling

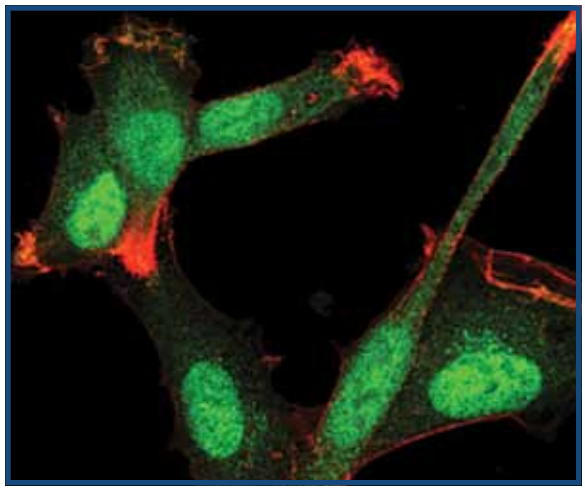


Transforming growth factor beta (TGF-β) signaling is implicated in a variety of biological processes, including embryogenesis, cell differentiation and adhesion. Members of the TGF-β family of ligands include activins, nodals, bone morphogenetic proteins (BMPs) and TGF-β 1-3. Ligand-receptor binding and subunit oligomerization results in SARA (SMAD Anchor for Receptor Activation)-assisted binding and serine phosphorylation of the receptor-bound R-SMADs, such as SMAD2 and SMAD3. Once phosphorylated, R-SMADs dissociate from SARA and the TGF-β receptor. Active R-SMADs can then form dimers via MH2 (MAD Homology 2) domains or dimerize with the co-SMAD SMAD4, translocate to nucleus and bind to the promoters of TGF-β regulated genes.

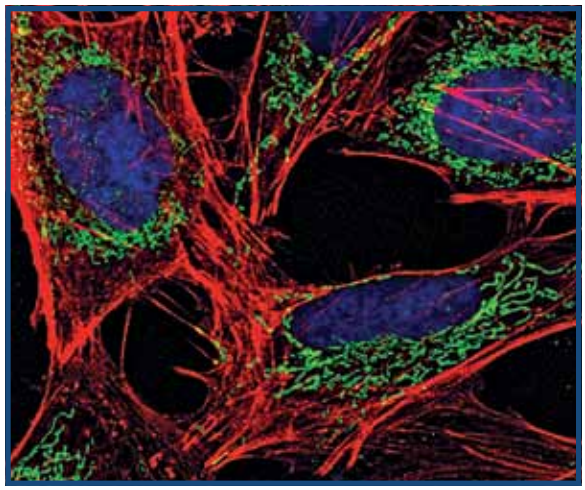
In addition to the SMADs, TGF-β signaling can also modulate accessory pathways such as the JNK/p38/MAPK cascades and Rho/ROCK pathways. The TGF-β pathway is strictly regulated by a series of negative regulators, such as the ligand antagonists Noggin and Lefty; the inhibitory SMADS, I-SMAD6 and I-SMAD7; and the E3 ubiquitin ligases SMURF1 (SMAD ubiquitin regulatory factor 1) and SMURF2.



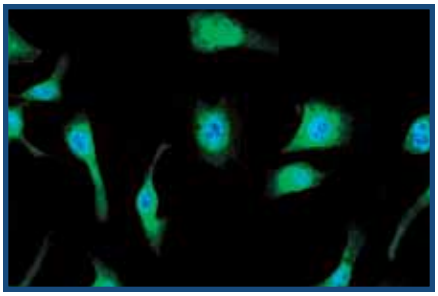
SMAD2 Rabbit Monoclonal (R.542.9) #MA5-14996



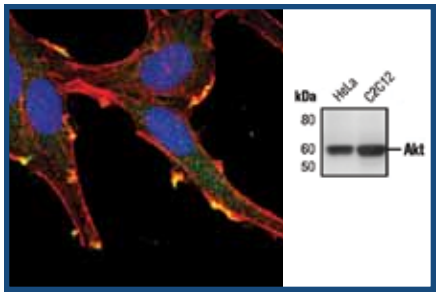
SMAD3 Rabbit Monoclonal (E.980.9) #MA5-14939



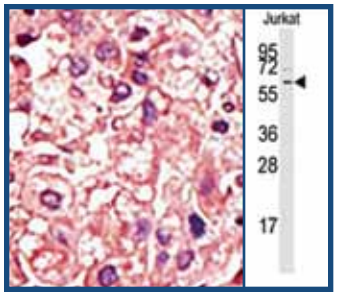
TAB1 Rabbit Polyclonal #PA5-17483



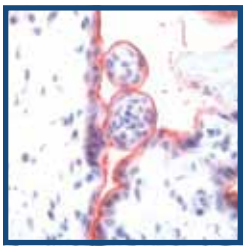
ERK1 Monoclonal (12D11) #MA1-13041



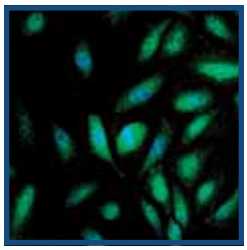
Akt (pan) Monoclonal (E.32.10) #MA5-14999



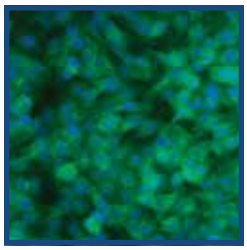
TGF β Receptor 1 Rabbit Polyclonal #PA5-14959



TGF β Receptor 1 Rabbit Polyclonal #PA1-38737



mTOR Polyclonal #PA1-518



EGF Receptor Polyclonal #PA1-1110

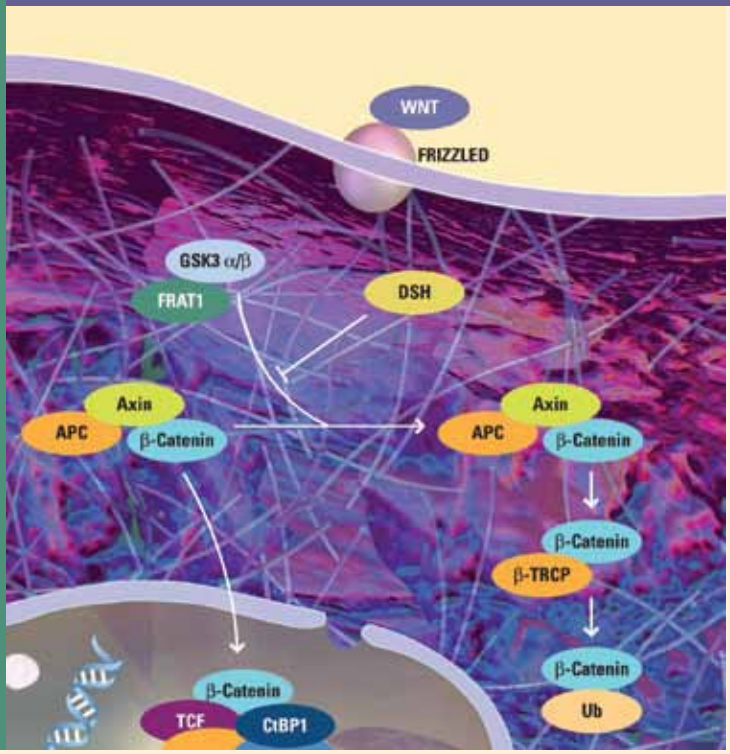
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Akt (pan) Monoclonal Antibody (E.32.10)	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), IP, WB	100µL	MA5-14999
β-IG-H3 Polyclonal Antibody	Hu, Nhp	ICC, IP, WB	100µL	PA5-17189
BMP10 Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-11711
BMP15 Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-11713
BMP3 Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-11716
BMP-4 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37175
BMP9 Polyclonal Antibody	Hu, Ms	WB, IHC	100µg	PA5-11931
EGF Receptor Polyclonal Antibody	Hu	IF, IHC, IP, WB	100µg	PA1-1110
ERK1 Monoclonal Antibody (12D11)	Hu, Ms, Nhp	IF, IHC, WB	100µL	MA1-13041
ERK2 Polyclonal Antibody	Hu	WB, IHC, FACS	100µg	PA5-14414
GREMLIN Polyclonal Antibody	Hu, Ms	WB, IHC	100µg	PA5-13123
Lefty Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-14182
Mic-1 Polyclonal Antibody	Hu, Nhp	IHC (P), WB	100µL	PA5-17066
mTOR Polyclonal Antibody	Hu, Nhp, Rt, Ms	IF, IHC, IP, WB	100µg	PA1-518
NEDD4 Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, WB	100µL	PA5-17463
NEDD8 Monoclonal Antibody (B.226.2)	Bv, Hu, Ms, Nhp, Rt, Xl, Zf	FACS, ICC, IHC (P), IP, WB	100µL	MA5-15028
Phospho-mTOR (Ser2448) Polyclonal Antibody	Hu	IHC (P)	200µg	PA1-14263
Phospho-SMAD1/5 (Ser463/465) Monoclonal Antibody (E.239.4)	Hu, Ms, Rt	FACS, ICC, WB	100µL	MA5-15124
PI3 Kinase p110-α Monoclonal Antibody (H.843.0)	Bv, Hu, Ms, Rt	IHC (P), IP, WB	100µL	MA5-14870
SMAD2 Monoclonal Antibody (R.542.9)	Hu, Nhp	ICC, IP, WB	100µL	MA5-14996
SMAD3 Monoclonal Antibody (E.980.9)	Bv, Hu, Ms, Nhp, Rt, Xl, Zf	ChIP, FACS, ICC, IP, WB	100µL	MA5-14939
SMAD3 Monoclonal Antibody (F.701.10)	Hu , Ms, Rt	WB, IP, IF, FACS, ChIP	100µL	MA5-11194
SMAD4 Monoclonal Antibody	H	IF, IP, WB	500µL	MA5-14297
SMURF1 Polyclonal Antibody	Hu, Ms	WB, IHC	100µg	PA5-11943
SMURF2 Polyclonal Antibody	Hu	WB, IHC, IF	100µg	PA5-11946
TAB1 Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, WB	100µL	PA5-17483
TAK1 Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-15149
TGF β Receptor I Polyclonal Antibody	Hu, Ms	WB, IHC	100µg	PA5-14959
TGF β Receptor 1 Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-38737

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Cell Signaling



Wnt signaling
Wnt proteins are secreted glycoproteins crucial for normal embryonic development. Their effects include dorso-ventral patterning, which is essential for neural tube formation, regulation of cell polarity, morphogenic cell migration and proliferation. In the wnt pathway, Wnt-ligand binds to the LRP (lipoprotein receptor-related protein) and Frizzled receptors, activating Dishevelled (Dsh). Dsh activation prompts the recruitment of a protein complex containing the adapter protein axin, GSK3-β and β-catenin to LRP. LRP is then phosphorylated by GSK3-β and casein kinase 1-γ, allowing axin binding to LRP, β-catenin stabilization and nuclear translocation. In the absence of Wnt ligand, β-catenin is bound to axin and is phosphorylated by GSK3-β. Then β-catenin is continuously targeted for destruction via the β-catenin destruction complex.

Negative regulators of wnt signaling include secreted factors, which directly interact with wnt, such as the Wnt inhibitory factor (Wif), Frizzled related protein (Frp) and Cerberus as well as LRP binding factors, such as Dickkopf (Dkk) and the Wnt-modulator-in-surface-ectoderm (Wise) protein. Mutations in wnt genes and pathway have been linked to various genetic diseases and cancer.

Hedgehog signaling
Hedgehog signaling is essential for areas of development including neural tube pattern formation and limb development. Three Hedgehog (Hh) proteins exist: Sonic Hh, Desert Hh and Indian Hh. In this pathway, a modified Hh is released from the cell and binds the 12-transmembrane receptor Patched1 (Ptch1), resulting in transcription of Cyclins D and E, Myc, and a series of Hh regulatory genes. The Ptch1-Hh interaction also triggers movement of the transmembrane protein Smoothened (Smo) to the cytoplasmic membrane, inducing the glioma-associated (Gli) zinc-finger transcription factors 1-3. Gli1/2 proteins are activators of Hh-mediated transcription, while Gli3 is a repressor.

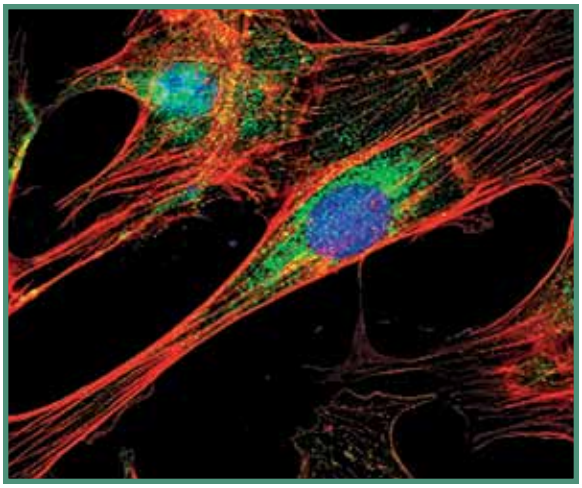
Deregulated Hh signaling is found in various cancers and mutations of Hh signaling components are associated with the development of basal cell carcinomas, lung cancer, pancreatic cancer, breast cancer and liver cancer.

Notch signaling
Notch proteins are transmembrane receptors involved in the regulation of embryonic developmental signaling events and play a major role in pattern formation, including boundary formation, lateral inhibition and asymmetric cell fate determination. Notch proteins can function as transmembrane receptors and as transcription factors.

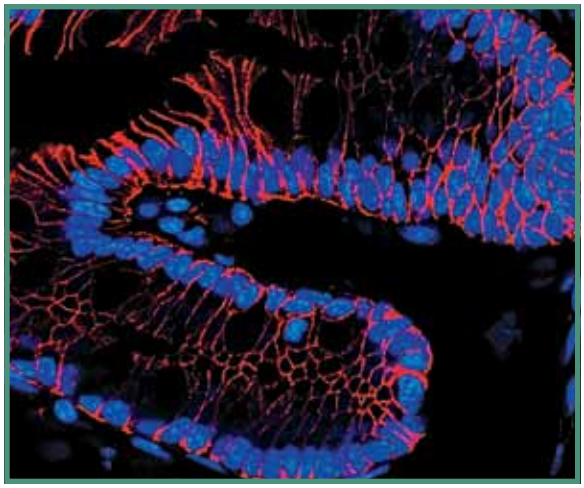
Four Notch proteins (Notch 1-4) and five Notch ligands (Delta 1, Delta 3, Delta 4, Jagged 1 and Jagged 2) exist, all harboring conserved epidermal growth factor (EGF)-like and Delta-Serrate-Lag2 (DSL) motifs. The intracellular region of Notch consists of nuclear localization motifs, transactivation domain, Ankyrin repeats and proline-glutamine-serine-threonine (PEST) domain.

Notch ligands expressed on a cell's surface interact and activate Notch receptors expressed on the surface of neighboring cells. In the signaling pathway, Notch ligands associate with Notch which leads to a series of site-specific cleavages to Notch resulting in the nuclear translocation of the Notch intracellular domain (NCID). In the nucleus, NCID binds to transcriptional co-activator CBF1/Su(H)/LAG1 (CSL). Next, CSL and NCID form a complex with Mastermind (Mam), which promotes the transcription of Notch target genes.

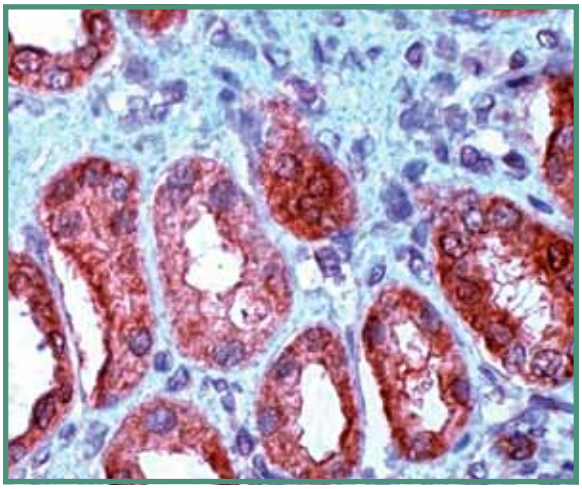
Notch signaling can be inhibited through ligand-ligand interaction, decreasing free ligand-notch binding. At the receptor level, Notch can be attenuated by the Delta-like 3 ligand. Intracellular Notch is degraded by several ubiquitin ligases, while in the nucleus the CSL-Mam complex-bound NCID can be phosphorylated and ubiquitinated, marking it for degradation. Notch mutations have been associated with developmental disorders and T-cell acute lymphoblastic leukemia.



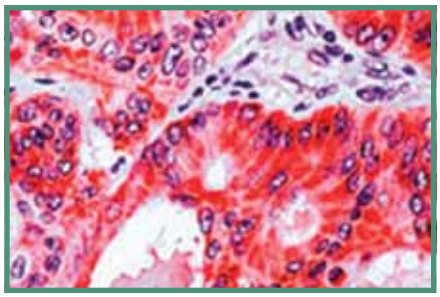
Phospho-GSK-3β Rabbit Monoclonal (Ser9) (C.363.3) #MA5-14873



β-Catenin Rabbit Polyclonal #PA5-17469



Wnt1 Rabbit Polyclonal #PA1-38869



APC Rabbit Polyclonal (Adenomateous Polyposis Coli) #PA5-16883

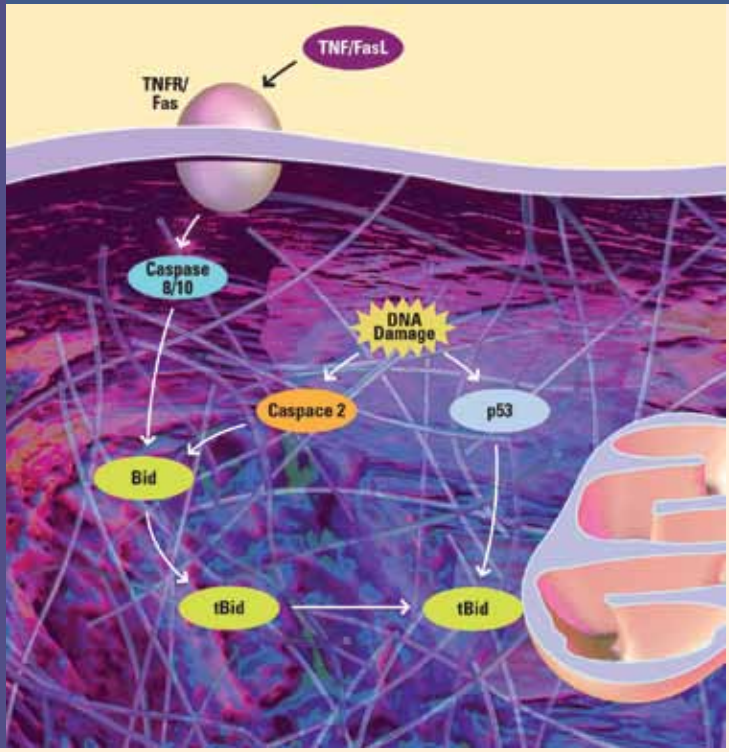
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
APC (Adenomateous Polyposis Coli) Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	500µL	PA5-16883
Axin1 Monoclonal Antibody (K.53.7)	Hu, Ms	IHC (P), IP, WB	100µL	MA5-14854
β-Catenin Polyclonal Antibody	Hu, Ms, Nhp, Rt	IF, IP, WB	100µL	PA5-17469
CK1 α Polyclonal Antibody	Hu, Ms, Rt	ELISA, IF, IHC, IP, WB	100µL	PA1-10006
Frizzled 2 Polyclonal Antibody	Hu	IHC (P)	25µg	PA1-32857
Frizzled 5 Polyclonal Antibody	Hu	IHC (P)	25µg	PA1-32554
Frizzled 6 Polyclonal Antibody	Hu	ICC, IHC (P)	25µg	PA1-32780
Frizzled 7 Polyclonal Antibody	Hu	IHC (P)	25µg	PA1-32790
Frizzled 9 Polyclonal Antibody	Hu	IHC (P)	25µg	PA1-32796
FZD1 Polyclonal Antibody	Hu	WB, IHC	100µg	PA5-12341
GSK-3β Monoclonal Antibody (E.948.2)	Hu, Ms, Nhp, Rt	IHC (P), IP, WB	100µL	MA5-15109
LRP5 Polyclonal Antibody	Hu, Ms	WB, IHC	100µg	PA5-13144
Phospho-Catenin Sigma-1 (Tyr228) Polyclonal Antibody	Hu	ICC, WB	100µL	PA5-17171
Phospho-GSK-3β (Ser9) Monoclonal Antibody (C.367.3)	Hu, Ms, Nhp, Rt	ICC, IHC (P), WB	100µL	MA5-14873
Phospho-LPR1-S452 Polyclonal Antibody	Hu	IHC, DB	100µg	PA5-12617
Wnt1 Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-38869

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Biological Processes

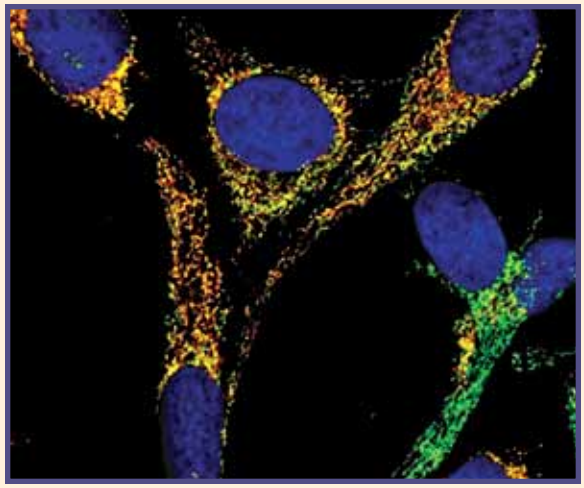


Programmed cell death or apoptosis is an essential biological process important to organism development, tissue homeostasis and the immune response. Two central pathways regulate the process of apoptosis: intrinsic and extrinsic cascades. The intrinsic pathway, as its name implies, activates in response to intracellular events such as DNA damage, deregulation of the cell cycle, hypoxia and/or decreased expression of cell survival factors.

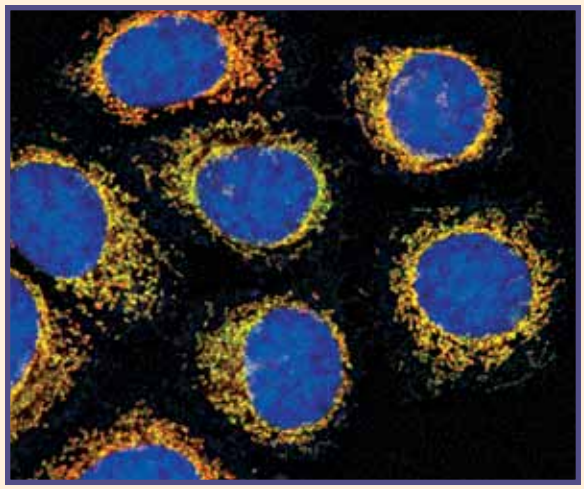
The mitochondrial-dependent intrinsic pathway involves numerous proteins which influence mitochondrial integrity in both a positive and negative manner. The intrinsic pathway begins by triggering transcriptional activation of the tumor suppressor protein p53 which perturbs the balance between pro-apoptotic BH3 domain-containing proteins (Bim, Bad, PUMA, Bax) and anti-apoptotic proteins (Bcl-2, Bcl-xL, Mcl-1). Changes in expression levels in favor of the pro-apoptotic proteins destabilizes the mitochondrial membrane, which results in subsequent release of mitochondrial proteins cytochrome-c and SMAC/DIABLO. The release of both SMAC/DIABLO and cytochrome-c into the cytoplasm neutralizes the Inhibitor of Apoptosis (IAP) proteins and activates cysteine proteases called Caspases. IAPs and Caspases complete the process of cell death.

In contrast to the intrinsic pathway, the mitochondrial-independent extrinsic pathway is activated by external signals mediated through death receptors, such as TRAILR1/2 and FAS. Unlike the intrinsic pathway, the extrinsic pathway triggers apoptosis independently of the p53 protein. Death receptor activation results in formation of the death-inducing signaling complex (DISC) consisting of the adaptor protein Fas-associated death domain (FADD) and initiator Caspases 8 and 10. Activation of DISC results in downstream activation of effector Caspases 3, 6 and 7, which subsequently converge onto the intrinsic death pathway downstream of the mitochondria.

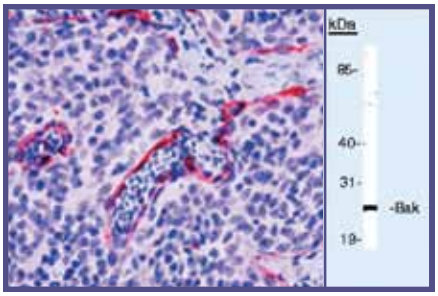
Deregulation of both the intrinsic and extrinsic apoptosis pathways is associated with many human diseases, including cancer. Current research is focused on restoring the apoptotic response through delivery of BH3 mimetics into cancer cells.



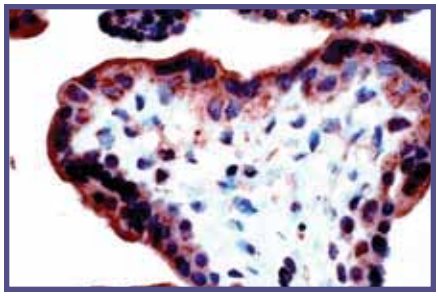
AIF Rabbit Polyclonal #PA5-17638

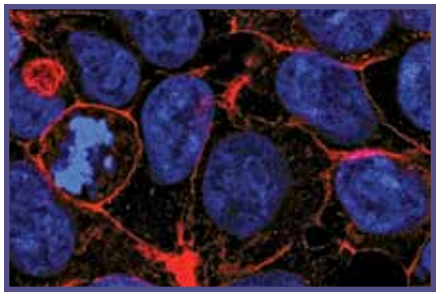


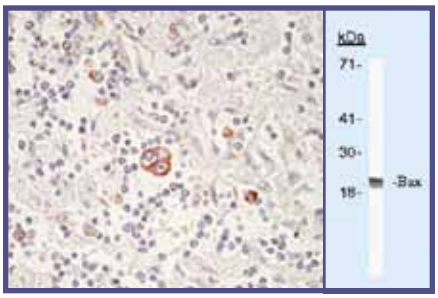
Bim Rabbit Monoclonal (K.912.7) #MA5-14848



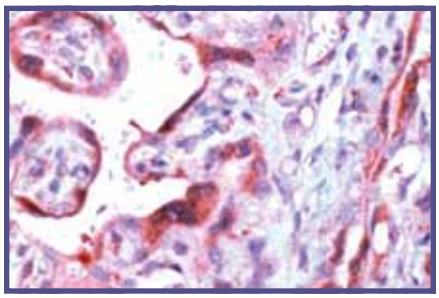
Bak Rabbit Polyclonal #PA5-16470

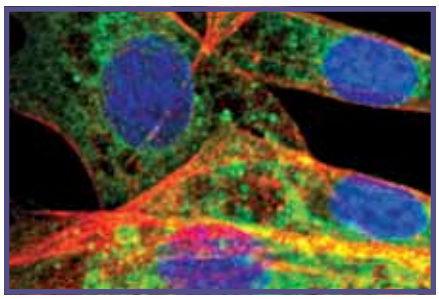

Bim Rabbit Polyclonal #PA1-37171


TRAF1 Rabbit Monoclonal (K.915.10) #MA5-15043



Bax Mouse Monoclonal (2D2) #MA5-13994


Caspase 1 Rabbit Polyclonal #PA1-37232


Atg12 Rabbit Polyclonal #PA5-17218

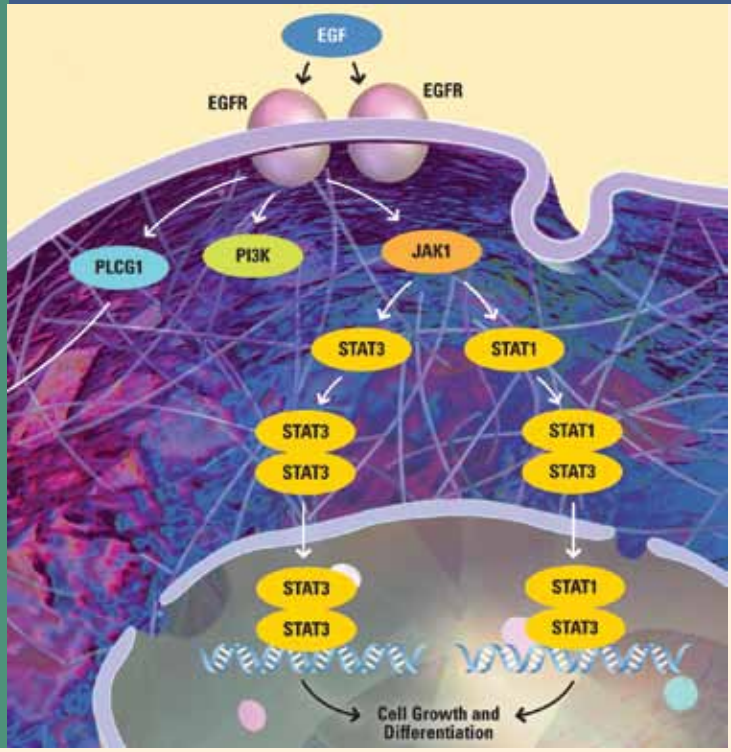
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
AIF Polyclonal Antibody	Hu, Ms, Rt	ICC, IHC (P), IP, WB	100µL	PA5-17638
Atg12 Polyclonal Antibody	Ms	ICC, IP, WB	100µL	PA5-17218
ATG5 Polyclonal Antibody	Hu, Ms	IHC, WB	150µL	OSA00030W
BAK Polyclonal Antibody	Hm, Hu, Ms	IHC (P)	1mL	PA1-37130
Bak Polyclonal Antibody	Hu, Ms, Hm	IHC (P), WB	500µL	PA5-16470
Bax Monoclonal Antibody (2D2)	Hu	IF, IHC (P), WB	500µL	MA5-13994
Bim Monoclonal Antibody (K.912.7)	Hu, Ms, Rt, Nhp, Bv, Ca	FACS, ICC, IHC (P), IP, WB	100µL	MA5-14848
BID Polyclonal Antibody	Hu	IHC (F), IP, WB	50µg	PA1-26454
Bim Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-37171
Caspase 1 Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-37232
Caspase 3 Monoclonal Antibody (3CSP01 (7.1.44))	Hu	IHC (P), IP, WB	500µL	MA5-11516
Caspase 9 Polyclonal Antibody	Hu, Ms, Rt, Bv, Ov	IHC (P), IP, WB	500µL	PA5-16355
Cytochrome c Monoclonal Antibody (R.521.5)	Hu, Ms, Nhp, Rt	IHC (P), WB	100µL	MA5-15091
DIABLO Monoclonal Antibody (78-1-118)	Hu, Ms, Rt	ICC, IP, WB	200µL	MA1-16846
Fas Ligand Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-37680
Granzyme B Monoclonal Antibody (GZB01)	Hu	IHC (P)	500µL	MA5-11587
LAMP1 Polyclonal Antibody	Hu	IF	100µg	PA1-654A
LAMP2 Polyclonal Antibody	Hu, Ms, Rt	IF, WB	100µL	PA1-655
LC3 Polyclonal Antibody	Hu, Ms, Rt	IF, IHC (P), IP, WB	100µL	PA1-16930
LC3B Polyclonal Antibody	Bv, Ck, Hu, Ms, Nhp, Rt, Xl	FACS, ICC, WB	100µL	PA5-17224
PARP Monoclonal Antibody (C.384.8)	Hu, Ms, Nhp, Rt	ICC, IF, IP, WB	100µL	MA5-15031
Phospho-Bad (Ser112) Monoclonal Antibody (G.445.9)	Hu, Ms, Nhp, Rt	FACS, IHC (P), WB	100µL	MA5-15085
RGS19 Polyclonal Antibody	Hu, Ms, Rt	IHC, WB	150µL	OSR00248W
SUMO-1 Monoclonal Antibody (T.243.0)	Hu, Ms, Rt	IHC (P), IP, WB	100µL	MA5-14877
Survivin Monoclonal Antibody (8E2)	Hu, Rt	IF	500µL	MA5-11680
TRAF1 Monoclonal Antibody (K.915.10)	Hu, Nhp	FACS, ICC, IHC (P), IP, WB	100µL	MA5-15043
Ubiquitin Polyclonal Antibody	Hu	IHC (P)	500µL	PA5-16829

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Biological Processes

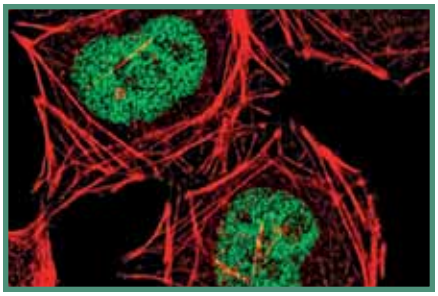


The cell cycle is a highly orchestrated event in which the DNA content of the cell is duplicated and segregated into two daughter cells. The cell cycle can be divided into five distinct phases: Gap0 (G_0), Gap1 (G_1), Synthesis (S), Gap2 (G_2) and Mitosis (M). Multiple cellular events coordinate the proper transitioning through each phase of the cell cycle, including temporal expression of cyclins, degradation of positive and negative checkpoint regulators, nuclear-cytoplasmic shuttling of proteins, protein-protein interactions, and post-translational modifications.

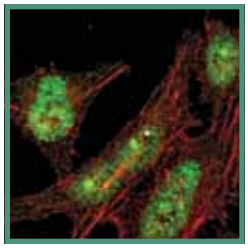
G_0 is marked by cells which have undergone growth factor withdrawal, placing them in a resting or quiescent state. Transition from G_0 to G_1 requires the cell to overcome a sequence of events termed the "restriction point." Reentry is marked by strong signals emanating from two essential signal transduction cascades, Ras-MAPK and PI3K-Akt. Signaling from these pathways triggers accumulation of proteins required for entry into G_1. One of the major classes of proteins expressed at this time are D-type cyclins. During early G_1 D-type cyclins pair with cyclin-dependent-kinases 4/6 to form active cyclinD:cdk4/6 complexes. The goal of G_1 is to prime the cell for entry into S-phase (DNA synthesis). cyclinD:cdk4/6 complexes achieve this goal by phosphorylating the Retinoblastoma protein Rb. Phosphorylation of the tumor suppressor protein Rb is a critical cellular event as hypophosphorylated Rb maintains the transcription factor E2F in a repressed state through formation of a heterotrimeric protein complex consisting of E2F, Rb and HDACs. CyclinD:cdk4/6 phosphorylation of Rb results in partial release of E2F. Accumulation of free E2F and binding to its transcriptional partner DP1 promotes entry into late G_1/S by transcriptionally regulating genes required for DNA synthesis. One of the major transcriptional targets of E2F-DP1 is cyclin E. E2F-DP1 induced expression of cyclin E results in the formation of active cyclinE:cdk2 complexes which function to complete the phosphorylation of Rb resulting in complete liberation of E2F.

Regulation of the G_1/S transition is carried out by multiple proteins including the cyclin dependent kinase inhibitors (CKIs) $p21^{WAF1/Cip1}$, $p27^{KIP1}$, $p16^{Ink4a}$, $p15^{Ink4b}$, $p18^{Ink4c}$, and $p19^{Ink4d}$ (ARF). The CKI's p21 and p27 function by blocking cyclin:cdk complex kinase activity while Ink4 members p15, p16, and p18 block formation of active cyclinD:cdk4/6 complexes. Additional regulation occurs at the level of the G_1/S CDK checkpoint. Proteins involved at this level include the Cdc25 protein phosphatase family. The primary Cdc25 family member involved during the G_1/S transition is Cdc25A which functions to activate cdk2 through removal of inhibitory phosphates on amino acids Thr14 and Tyr15 (Wee1 and Myt1 targets) of cdks. Furthermore, Cdc25 activity is regulated by both activating and inhibitory phosphorylations. TAK1 (TGF-β activating kinase-1) has been shown to inhibit Cdc25 function through phosphorylation of Ser216. Phosphorylation of Ser216 by TAK1 results in cytoplasmic sequestration of Cdc25 through interactions with 14-3-3 proteins. Inhibitory phosphorylation of Cdc25 is overcome by phosphorylation of neighboring Ser214 by PLK1 (polo-like-kinase-1). In addition to regulation by reversible phosphorylation timely degradation of G_1/S cyclins and regulators are critical for proper cell cycle transitioning.

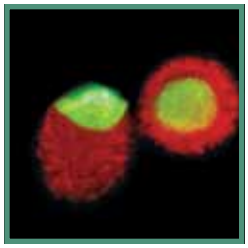
The payoff of a successful G_1 is entry into S phase. At this time the DNA content doubles from 2N to 4N. Accumulation of A-type cyclins occurs during S phase and when paired with cdk2 primes the cell for entry into G2. During late synthesis B-type cyclin levels also rise. Together cyclinA:cdk1/2 and cyclinB:cdk1 complexes drive the cell into Gap 2 (G_2). During early to mid G_2, the appearance of active nuclear Cdc25B/C is also apparent and promotes cyclin:cdk activity. The major driving force for entry into mitosis is cyclinB:cdk1 complexes also know as MPF (M-phase promoting factor). CyclinB:cdk1 complexes trigger mitosis through phosphorylation of lamins and histones. These events promote progression from prophase through anaphase by stimulating spindle assembly, chromatin condensation and nuclear envelope breakdown. Successful mitosis also requires degradation of cyclin B. This event is coordinated through phosphorylation by the Anaphase Promoting Complex (APC)/cyclosome. A variety of stimuli control both the G_1/S and G_2/M checkpoints, including DNA damage, contact inhibition, replicative senescence and growth factor withdrawal. Deregulation in cell cycle transitioning and checkpoint control through an imbalance of tumor suppressor proteins (Rb, p53) with proto-oncoproteins (E2F, MDM2) is a common theme with nearly all human cancers. Development of therapeutics to restore tumor suppressor protein expression and/or function in combination with pharmacological agents targeting cell proliferation and survival pathways is under intense research focus.



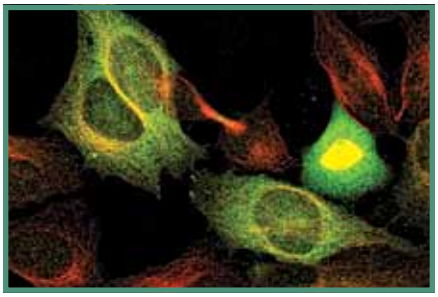
CDK9 Rabbit Monoclonal (K.513.1) #MA5-14912



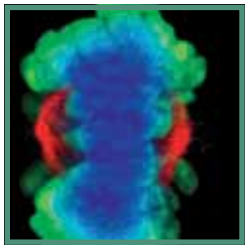
53BP1 Rabbit Polyclonal
#PA5-17578



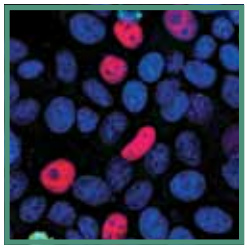
Phospho-cdc25C Rabbit
Polyclonal (Thr48)
#PA5-17777



Cyclin B1 Rabbit Polyclonal #PA5-17220



Aurora A-AIK Rabbit
Monoclonal (J.458.1)
#MA5-15075



p21 Waf1-Cip1 Rabbit
Monoclonal (R.229.6)
#MA5-14949

Ordering Information for Select Thermo Scientific Pierce Antibodies

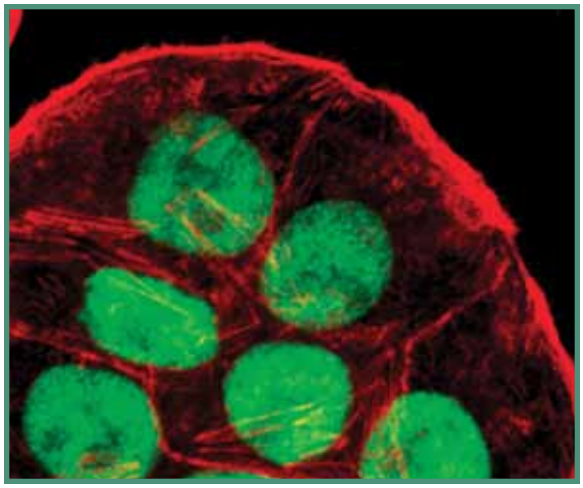
Product Description	Target Species	Applications	Size	Product #
53BP1 Polyclonal Antibody	Hu, Nhp	ICC, IHC (P), WB	100µL	PA5-17578
AP2 Monoclonal Antibody (3B5)	Ck, Hu, Ms	IF, IP, WB	100µL	MA1-872
APE1 Monoclonal Antibody (13B 8E5C2)	Hu	IHC (P), IP, WB	100µL	MA1-440
Aurora A/AIK Monoclonal Antibody (J.458.1)	Hu, Nhp	ICC, IP, WB	100µL	MA5-15075
BrdU Monoclonal Antibody (BU-1)	All	FACS, IF, IHC	100µL	MA3-071
Cdc37 Monoclonal Antibody (C1)	Hm, Hu, Ms, Rt	ICC, IP, WB	100µL	MA3-029
Cdk1 Monoclonal Antibody (A17.1.1)	Hu, Ms, Rt, Ck, Gp, Xl	IF, IHC (P), IP, WB	500µL	MA5-11469
Cdk2 Monoclonal Antibody (2B6)	Hu, Ms, Rt	IF, IHC (P), WB	500µL	MA5-13476
Cdk4 Monoclonal Antibody (DCS-35)	Hu, Ms, Rt, Po	IF, IP, WB	500µL	MA5-12981
Cdk5 Monoclonal Antibody (DC17 + DC34)	Hu, Ms, Rt	IF, IP, WB	500µL	MA5-11291
Cdk6 Monoclonal Antibody (K6.83 (DCS-83))	Hu, Ms, Rt	IF, IHC (F), IP, WB	500µL	MA5-13330
CDK9 Monoclonal Antibody (K.513.1)	Bv, Ca, Hm, Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), IP, WB	100µL	MA5-14912
c-Myc Monoclonal Antibody (9E10)	Hu, Ms	IHC, IP, WB	100µg	MA1-980
Cyclin B1 Monoclonal Antibody (V152)	Hu, Ms, Rt, Hm	FACS, IHC (P), WB	500µL	MA5-13128
Cyclin B1 Polyclonal Antibody	Hm, Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17220
Cyclin D1/Bcl-1 Monoclonal Antibody (DCS-6)	Hu, Ms, Rt, Ca, Nhp	FACS, IF, IHC, IP, WB	500µL	MA5-12699
Cyclin D2 Monoclonal Antibody (DCS-3.1)	Hu, Ms, Rt	FACS, IF, IHC, IP, WB	500µL	MA5-12712
Cytokeratin 18	Hu	IF, IHC (P), WB	500µL	MA5-12104
HIF-1 α Monoclonal Antibody (mgc3)	Bv, Hu, Ms, Nhp, Po	GS, ICC, IF, IP, WB	100µL	MA1-516
HIF-1 β Monoclonal Antibody (2B10)	Hu, Ms, Nhp, Rt	GS, ICC, IF, IP, WB	100µL	MA1-515
Ki-67 Monoclonal Antibody (SP6)	Hu, Ms, Rt	IHC (P)	1mL	MA1-39550
Lamin A/C Monoclonal Antibody (mab636)	Bv, Hu, Po	IF, IHC (F), WB	200µL	MA3-1000
LAP2 Monoclonal Antibody (RL29)	Rt	IF, IP, WB	200µL	MA1-075
MDM2 Polyclonal Antibody	Hu, Ms, Rt	IHC	500µL	PA5-16840
p15INK4b Monoclonal Antibody (15P06)	Hu, Ca	IF, IHC (P), IP, WB	500µL	MA5-11256
p18INK4c Monoclonal Antibody (18P118 (DCS-118))	Hu, Ms	IF, IHC (P), IP, WB	500µL	MA5-14282

For species and application abbreviations, see page 77.

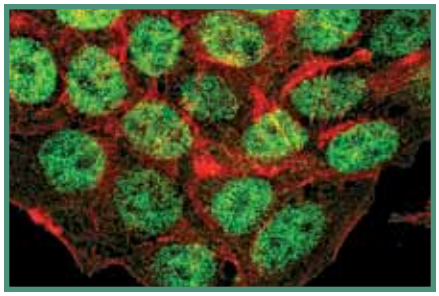
Designates product with photo.

More antibodies on next page

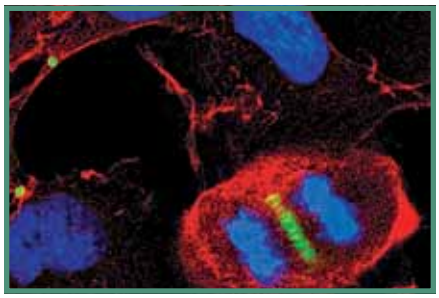
Primary Antibodies by Biological Processes



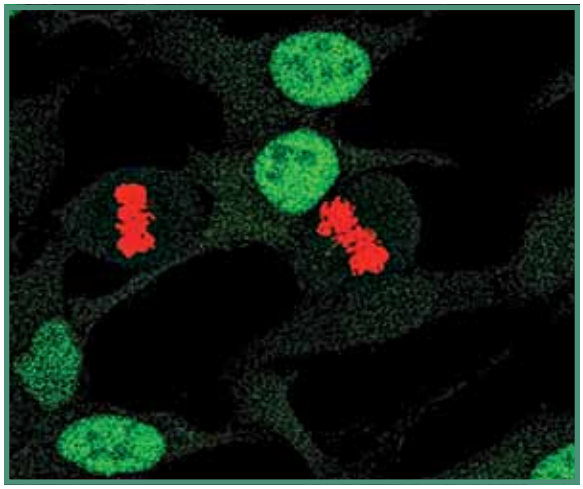
p53 Rabbit Monoclonal (S.18.9) #MA5-15152



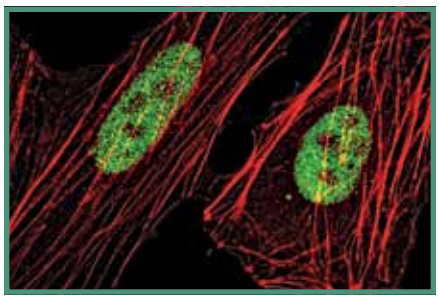
Phospho-p53 Rabbit Polyclonal (Ser46) #PA5-17817



PLK4 Rabbit Polyclonal #PA5-17272



Phospho-cdc2 Rabbit Monoclonal (Tyr15) (E.658.6) #MA5-15062



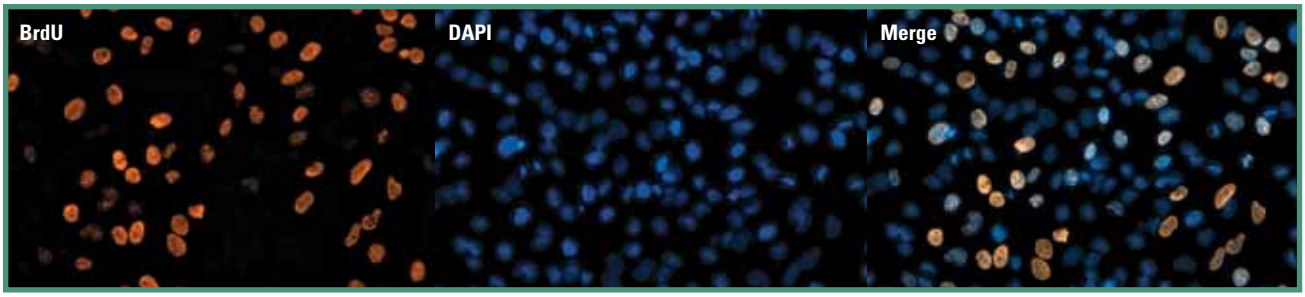
Skp2 Rabbit Polyclonal #PA5-17009

Ordering Information for Select Thermo Scientific Pierce Antibodies

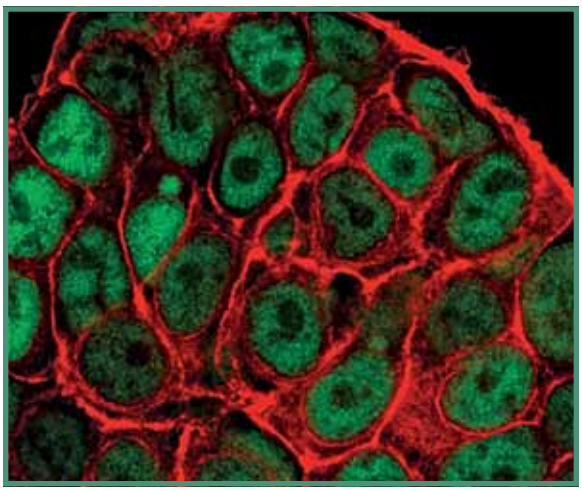
Product Description	Target Species	Applications	Size	Product #
p21 Waf1/Cip1 Monoclonal Antibody (R.229.6)	Hu, Nhp	FACS, ICC, IHC (P), IP, WB	100µL	MA5-14949
p27Kip1 Monoclonal Antibody (DCS-72.F6)	Hu, Ms, Rt, Ca	FACS, IF, IP, WB	500µL	MA5-12832
p53 Monoclonal Antibody (S.18.9)	Hu, Nhp	FACS, ICC, IHC (P), WB	100µL	MA5-15152
p57Kip2 Monoclonal Antibody (57P06 (KP10))	Hu, Ms	IHC (P), IP	500µL	MA5-11309
PDGF Receptor β Monoclonal Antibody (R.140.4)	Hu, Ms, Rt	FACS, IHC (P), WB	100µL	MA5-14851
Peroxiredoxin 1 Polyclonal Antibody	Hu, Ms, Rt	ICC, WB	100µL	PA3-750
Peroxiredoxin 2 Polyclonal Antibody	Hu	ICC, WB	100µL	PA3-751
Peroxiredoxin 3 Polyclonal Antibody	Hu	ICC, WB	100µL	PA3-752
Peroxiredoxin 4 Polyclonal Antibody	Hu	ICC, WB	100µL	PA3-753
Phospho-Aurora A (Thr288) Monoclonal Antibody (F.131.2)	Hu	ICC, WB	100µL	MA5-14904
Phospho-cdc2 (Tyr15) Monoclonal Antibody (E.658.6)	Hu, Ms, Nhp, Rt	FACS, ICC, IP, WB	100µL	MA5-15062
Phospho-cdc25C (Thr48) Polyclonal Antibody	Hu, Nhp	ICC, IHC (P), WB	100µL	PA5-17777
Phospho-Chk2 (Thr68) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17818
Phospho-EGF Receptor (Tyr1173) Monoclonal Antibody (S.331.5)	Hu, Ms, Rt	IHC (P), IP, WB	100µL	MA5-15158
Phospho-H2AX (Ser140) Monoclonal Antibody (3F2)	Hu, Ms	ELISA, IF, WB	100µg	MA1-2022

For species and application abbreviations, see page 77.

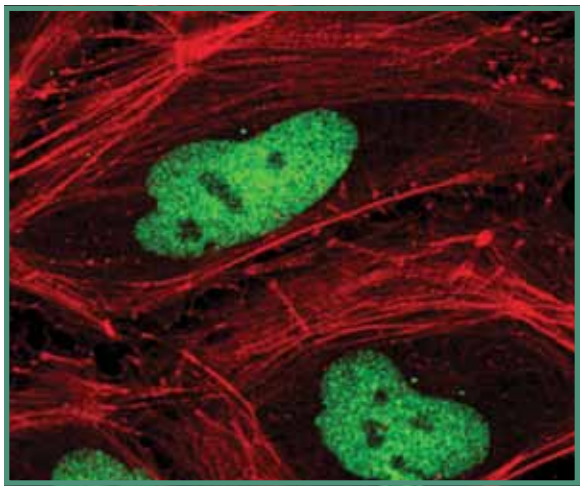
Designates product with photo.



BrdU Mouse Monoclonal (BU-1) #MA3-071



Phospho-p53 Mouse Monoclonal (Ser15) (C.381.0) #MA5-15229



Phospho-Chk2 (Thr68) Rabbit Polyclonal #PA5-17818

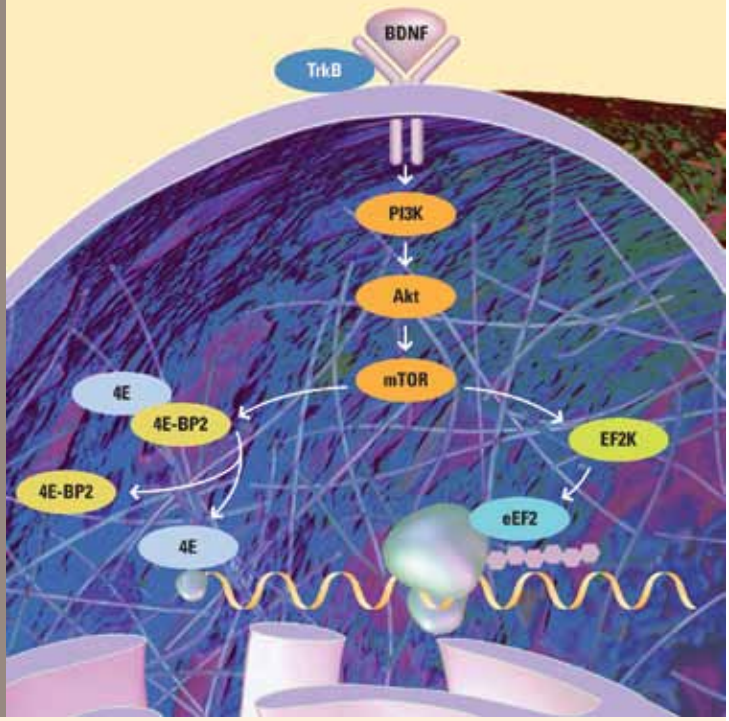
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Phospho-p53 (Ser15) Monoclonal Antibody (C.381.0)	Hu	FACS, ICC, WB	100µL	MA5-15229
Phospho-p53 (Ser46) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17817
Phospho-Rb (Ser608) Polyclonal Antibody	Ca, Hu, Nhp, Rt	IHC (P), IP, WB	100µL	PA5-17585
Phospho-Rb (Ser807/811) Polyclonal Antibody	Hu, Nhp, Rt	IHC (P), IP, WB	100µL	PA5-17897
Phospho-Stat3 (Tyr705) Monoclonal Antibody (R.263.6)	Bv, Hu, Ms, Rt	FACS, IP, WB	100µL	MA5-15193
Phospho-Wee1 (Ser642) Monoclonal Antibody (T.870.10)	Bv, Hu, Ms, Nhp, Rt, Xl, Zf	IP, WB	100µL	MA5-14806
PLK1 Monoclonal Antibody (13E8)	Hu, Ms, Rt	IF, IP, WB	100µg	MA1-848
PLK4 Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17272
RB1 Monoclonal Antibody (R.232.9)	Bv, Hu, Nhp, Po	FACS, IF, IHC (P), IP, WB	100µL	MA5-15203
SCD1 Monoclonal Antibody (G.545.10)	Ms	ICC, IHC (P), IP, WB	100µL	MA5-14885
Skp2 Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17009
TIF1 β Monoclonal Antibody (20C1)	Hu, Ms	IF, WB	100µg	MA1-2023
TIF1 γ Monoclonal Antibody (16G9)	Hu, Ms, Rt	IF, IP, WB	100µg	MA1-801
TIF1 β Monoclonal Antibody (F.373.5)	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), WB	100µL	MA5-14824
UBC3B Polyclonal Antibody	Hu, Ms, Rt	FACS, IHC (P), WB	100µL	PA5-17579
UBE1a Polyclonal Antibody	Hu, Ms, Rt	FACS, ICC, IHC (P), IP, WB	100µL	PA5-17262

For species and application abbreviations, see page 77.

Designates product with photo.

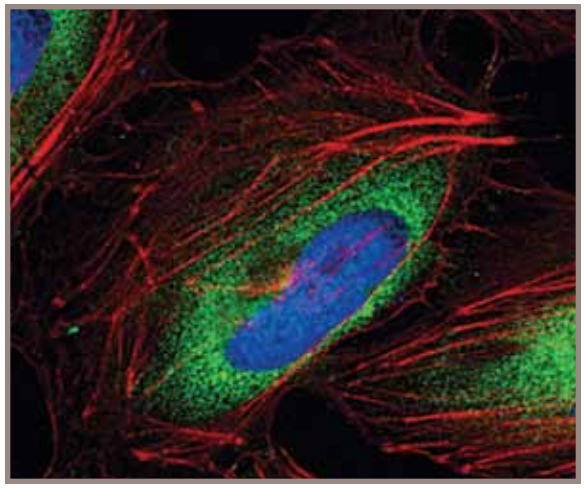
Primary Antibodies by Biological Processes



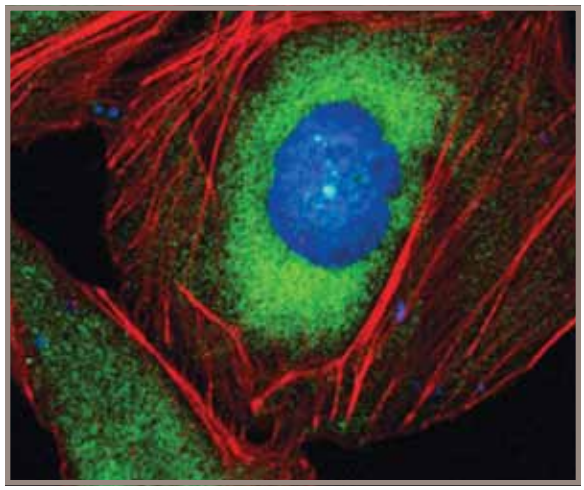
Translation is the intricate process of decoding messenger RNA (mRNA) into an amino acid polypeptide which will fold into a functional protein. Translation occurs in the cytoplasm with four distinct phases: activation, initiation, elongation and termination.

During the activation stage, amino acids are linked to transfer RNA (tRNA) through peptide bonds. Initiation begins when newly transcribed mRNA is transported to ribosomes located on the rough endoplasmic reticulum. With the aid of translation initiation factors (eIFs), the ribosome scans the mRNA for the start site of translation, identified by a unique triplet ribonucleotide sequence, AUG, coding for the amino acid methionine. Elongation proceeds with the formation of amino acid linkages based on the complementary mRNA codon sequence. When the ribosome reaches a triplet code which the tRNA does not recognize (UAA, UAG, UGA), the polypeptide chain is terminated and released from the ribosome.

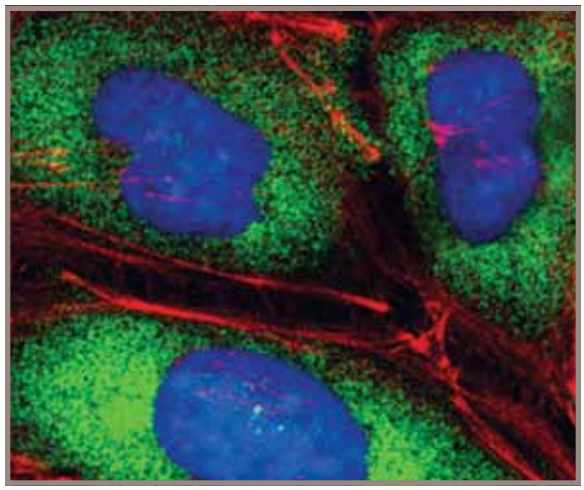
The entire process of protein synthesis requires numerous regulatory factors and upstream signaling events. Of intense research focus is the role the PI3K-Akt-mTOR kinase cascade plays in the control of eukaryotic translation. In response to growth factors, the PI3K-Akt-mTOR pathway becomes activated. Kinase activation via phosphorylation of Akt at Thr308 and Ser473 triggers downstream phosphorylation and subsequent activation of the mammalian target of rapamycin (mTOR). Activated mTOR integrates extracellular signals with amino acid availability to control the rate of protein synthesis. mTOR then stimulates translation through phosphorylation of two key translation components, the eIF4E inhibitory binding protein 4E-BP1 and the S6 ribosomal protein p70S6 kinase. Deregulation in mTOR signaling via aberrant activation of the PI3K-Akt cascade has been observed in numerous human cancers. Recent studies using a combinatorial drug approach targeting at the levels of PI3K and mTOR (rapalogs) may be a viable therapeutic option to combat cancer.



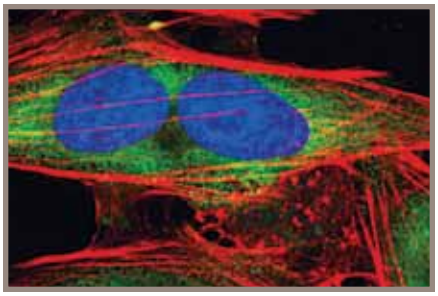
eIF3A Rabbit Polyclonal #PA5-17212



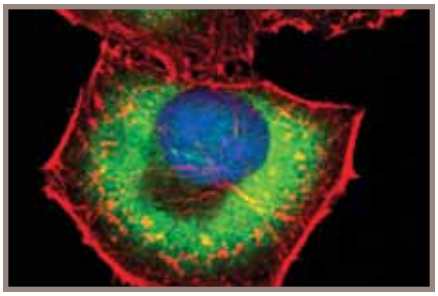
eIF4A1 Rabbit Polyclonal #PA5-17313



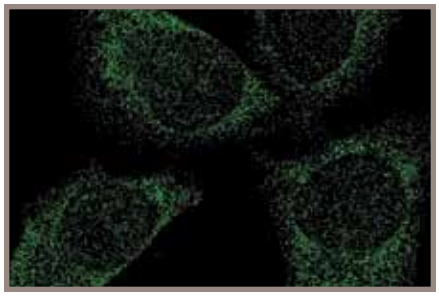
eIF4G Rabbit Monoclonal (G.689.9) #MA5-14971



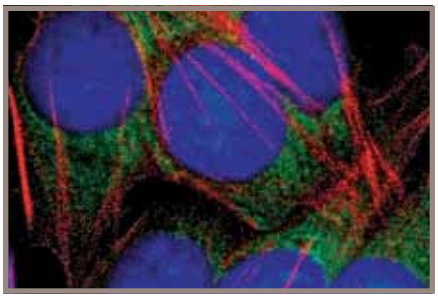
eIF4GI Rabbit Polyclonal #PA5-17140



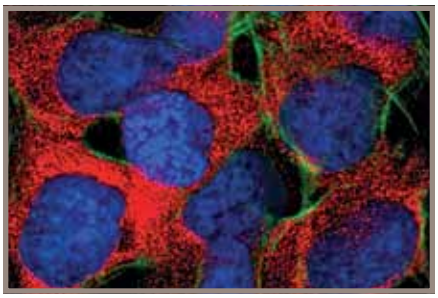
eIF4H Rabbit Polyclonal #PA5-17211



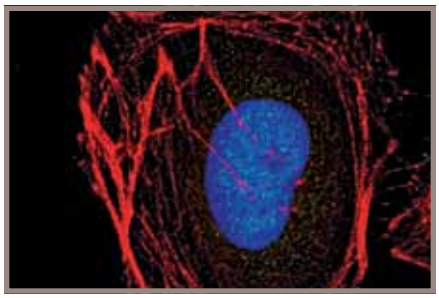
Phospho-eIF2-α Rabbit Monoclonal (Ser51) (S.674.5) #MA5-15133



Phospho-eIF4G Rabbit Polyclonal (Ser1108) #PA5-17824



Phospho-S6 Ribosomal Protein Rabbit Monoclonal (Ser235-236) (G.22.6) #MA5-15140



Phospho-S6 Ribosomal Protein Rabbit Monoclonal (Ser240-244) (T.540.2) #MA5-15034

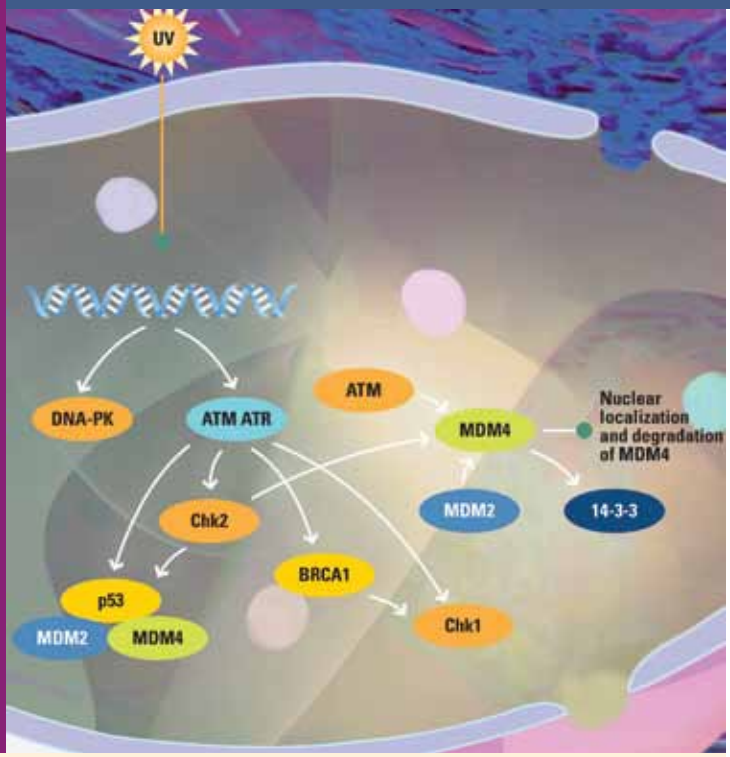
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Acetyl Lysine Monoclonal Antibody (1C6)	Hu, Ms	ICC, IF, WB	100µg	MA1-2021
Calnexin Monoclonal Antibody (AF18)	Hu, Ms	ICC, IF, IP, WB	100µL	MA3-027
CHOP Monoclonal Antibody (B.84.2)	Hu, Ms, Rt	ICC, IP, WB	100µL	MA5-14819
CREB Monoclonal Antibody (LB9)	Hu, Ms, Rt	ELISA, WB	100µg	MA1-083
eEF1A Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17213
eEF2k Polyclonal Antibody	Hu, Nhp, Rt	ICC, IP, WB	100µL	PA5-17720
eIF2-α Monoclonal Antibody (J.633.8)	Hu, Ms, Nhp, Rt	IHC (P), WB	100µL	MA5-14938
eIF3A Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, IP, WB	100µL	PA5-17212
eIF3j Polyclonal Antibody	Hu, Ms, Rt	IP, WB	100µL	PA5-17062
eIF4A1 Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17313
eIF4G Monoclonal Antibody (G.689.9)	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), WB	100µL	MA5-14971
eIF4G Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), WB	100µL	PA5-17422
eIF4GI Polyclonal Antibody	Hu, Ms, Rt	ICC, IHC (P), WB	100µL	PA5-17140
eIF4H Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, WB	100µL	PA5-17211
ERp29 Polyclonal Antibody	Bv, Ca, GP, Hm, Hu, Ms, Nhp, Rt	IF, IP, WB	100µL	PA3-011
HIF-1 α Monoclonal Antibody (mgc3)	Bv, Hu, Ms, Nhp, Po	GS, ICC, IF, IP, WB	100µL	MA1-516
HIF-1 β Monoclonal Antibody (2B10)	Hu, Ms, Nhp, Rt	GS, ICC, IF, IP, WB	100µL	MA1-515
Mist1 Monoclonal Antibody (6E8/A12/C11P1)	Hu, Ms	IHC (P, F), WB	100µg	MA1-517
PDI Monoclonal Antibody (RL90)	Hm, Hu, Ms, Po, Rt	FACS, IF, IHC (P, F), IP, WB	100µL	MA3-019
Phospho-eIF2-α (Ser51) Monoclonal Antibody (S.674.5)	Dm, Hu, Ms, Nhp, Rt	IHC (P), IP, WB	100µL	MA5-15133
Phospho-eIF4G (Ser1108) Polyclonal Antibody	Bv, Hm, Hu, Ms, Nhp, Rt	ICC, IP, WB	100µL	PA5-17824
Phospho-S6 Ribosomal Protein (Ser235/236) Monoclonal Antibody (G.22.6)	Hu, Ms, Rt	ICC, IHC (F), IHC (P), WB	100µL	MA5-15140
Phospho-S6 Ribosomal Protein (Ser240/244) Monoclonal Antibody (T.540.2)	Hu, Ms, Nhp, Rt	FACS, ICC, WB	100µL	MA5-15034
SERCA1 ATPase Monoclonal Antibody (IIH11)	Ca, GP, Ms, Rb, Rt	IF, IHC (F), WB	100µL	MA3-911
SERCA2 ATPase Monoclonal Antibody (2A7-A1)	Ca, GP, Hu, Ms, Po, Rb, Rt	ICC, IP, WB	100µL	MA3-919
SERCA2 ATPase Monoclonal Antibody (IID8)	Bv, Ca, Hu, Po, Rb, Rt	ICC, IF, IHC (F), WB	100µL	MA3-910

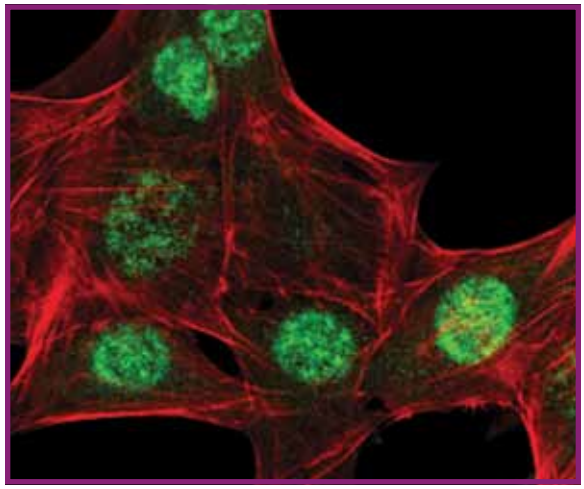
For species and application abbreviations, see page 77.

Designates product with photo.

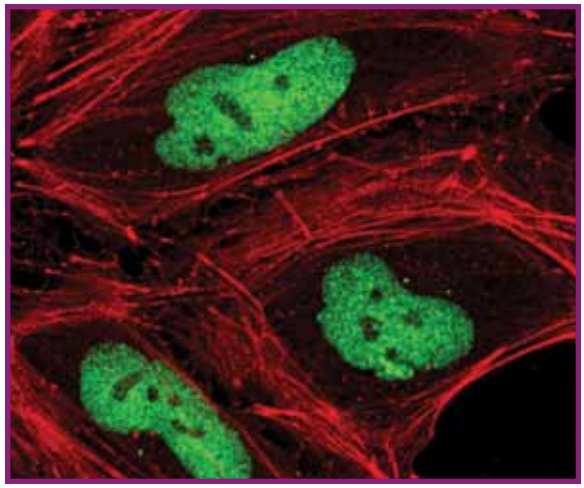
Primary Antibodies by Biological Processes



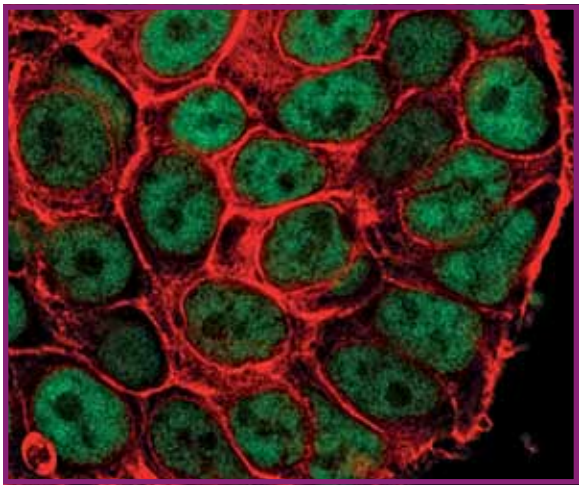
DNA damage caused by extracellular signals such as ultraviolet (UV) irradiation and chemotherapeutic drugs are a major cause of genomic instability. This damage results in the formation of single- and double-strand DNA breaks. To control for these genomic insults, the cell has evolved elaborate mechanisms to sense the level of DNA damage and decide whether to repair or activate a cellular program leading to cell death. During DNA damage, multiple key cell cycle checkpoint proteins become activated, including Histone H2AX, ATM/ATR kinases, Chk1/2 kinases, Ku 70/80 complexes, BRCA1 and the tumor suppressor protein p53. The transcription factor p53, considered the "gatekeeper" of the genome, controls responses to genotoxic stress by inducing either DNA repair processes or apoptosis. Increased p53 levels in stressed cells induce both $p21^{Waf1/Cip1}$-mediated cell cycle arrest and DNA repair. If the level of genotoxic stress is too severe, p53 may trigger a transcriptional program resulting in an increase in pro-apoptotic proteins Bax, PUMA and NOXA which function to disrupt mitochondrial integrity. Release of cytochrome-c in response to mitochondrial perturbations activates the caspase cascade, ultimately resulting in protein degradation and cell death. Deregulation in cell cycle checkpoints, DNA repair and/or apoptotic pathways is a hallmark of nearly all human cancers. A major contributor to genomic instability is the loss of p53 expression and/or functionality in many tumors. Cells which harbor mutations in p53 have evolved a mechanism to elude the effects of chemotherapeutic agents which target the p53 pathway to induce their anti-tumor effects.



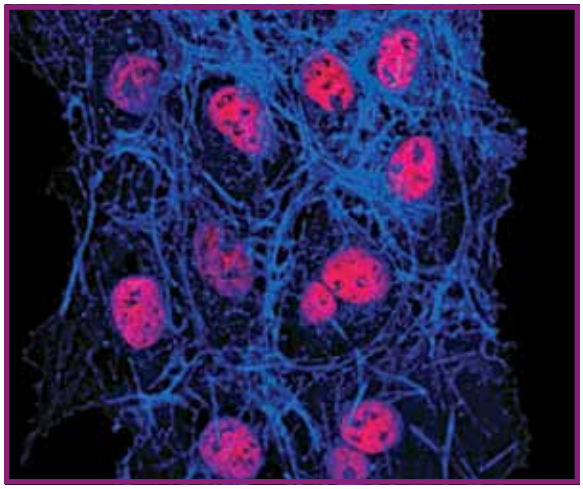
Phospho-Chk1 Rabbit Monoclonal (Ser 345) (S.48.4) #MA5-15145



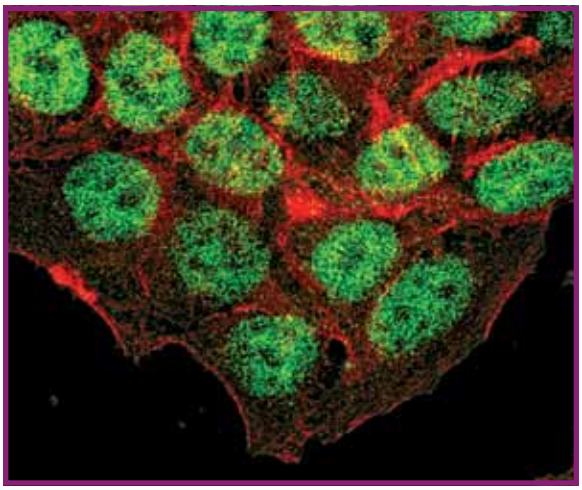
Phospho-Chk2 Rabbit Polyclonal (Thr68) #PA5-17818



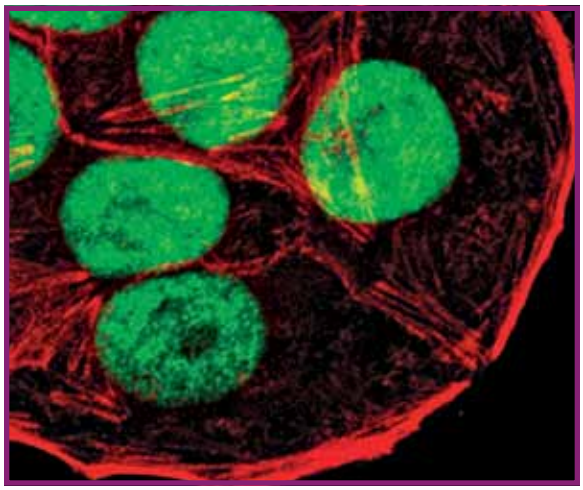
Phospho-p53 Mouse Monoclonal (Ser15) (C.381.0) #MA5-15229



Phospho-p53 Rabbit Polyclonal (Ser37) #PA5-17866



Phospho-p53 Rabbit Polyclonal (Ser46) #PA5-17817



p53 Rabbit Monoclonal (S.18.9) #MA5-15152

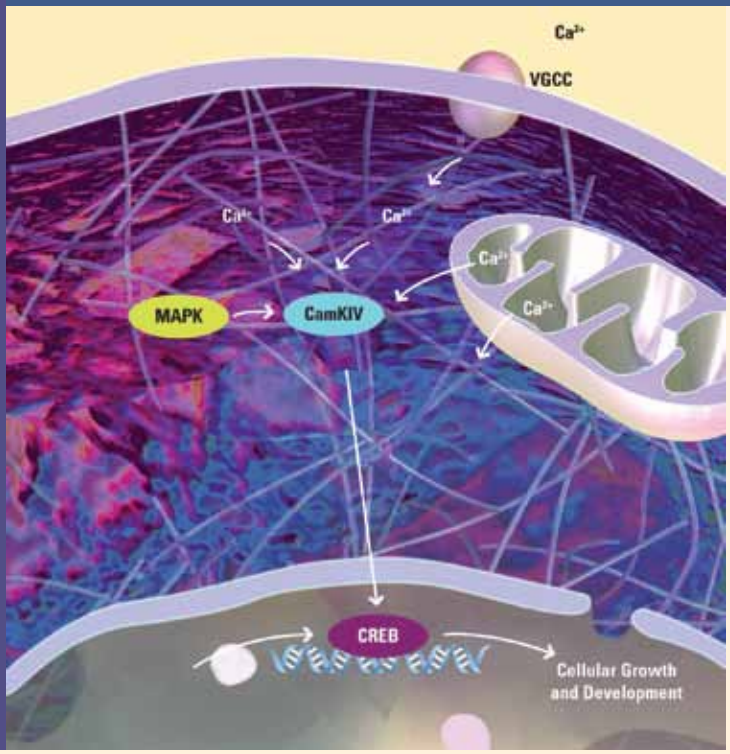
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
APE1 Monoclonal Antibody (13B 8E5C2)	Hu	IHC (P), IP, WB	100µL	MA1-440
Ku80 Monoclonal Antibody (S.669.4)	Hu, Nhp	ICC, IHC (F), IHC (P), IP, WB	100µL	MA5-14953
Mre11 Monoclonal Antibody (F.519.4)	Hu	FACS, IHC (F), IHC (P), IP, WB	100µL	MA5-15081
p21WAF1 Monoclonal Antibody (DCS-60.2)	Hu	IF, IHC (P), IP	500µL	MA5-12764
p53 Monoclonal Antibody (S.18.9)	Hu, Nhp	FACS, ICC, IHC (P), WB	100µL	MA5-15152
Phospho-53BP1 (Ser1778) Polyclonal Antibody	Hu, Nhp	FACS, ICC, WB	100µL	PA5-17462
Phospho-ATM (Ser1981) Monoclonal Antibody (10H11)	Hu, Ms	IF, IP, WB	200µg	MA1-2020
Phospho-Chk1 (Ser345) Monoclonal Antibody (S.48.4)	Hu, Ms, Nhp, Rt	FACS, ICC, WB	100µL	MA5-15145
Phospho-Chk2 (Ser19) Polyclonal Antibody	Hu	IHC (P), WB	100µL	PA5-17731
Phospho-Chk2 (Thr68) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17818
Phospho-H2AX (Ser140) Monoclonal Antibody (3F2)	Hu, Ms	ELISA, IF, WB	100µg	MA1-2022
Phospho-p53 (Ser15) Monoclonal Antibody (C.381.0)	Hu	FACS, ICC, WB	100µL	MA5-15229
Phospho-p53 (Ser37) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17866
Phospho-p53 (Ser46) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17817
Phospho-TLK1 (Ser695) Polyclonal Antibody	Hu, Ms, Rt	IHC (P), IP, WB	100µL	PA5-17572
RPA70 Polyclonal Antibody	Hu, Nhp, Rt	FACS, ICC, IP, WB	100µL	PA5-17377

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Biological Processes



The transport of ions across biological membranes requires the presence of integral membrane proteins that form channels across the membrane's phospholipid bilayer. Ion channels allow for the transfer of specific ions from the cytosol to the extracellular matrix or cell compartment space and vice versa. The transfer of ions to and from the cellular matrix can be done through either active transport channels (ion transporters) or passive diffusion channels (passive ion channels).

Ion transporters are essential for many biological processes, including ATP generation across the electrochemical gradient and maintenance of the cell's membrane potential. Ion transporters are also necessary for the normal function of the nervous system, muscle contraction, nutrient transport, immunity (e.g., via activation of the inflammasome), and cell integrity.

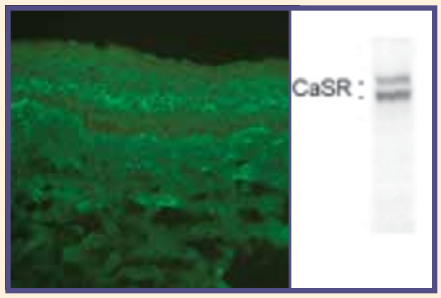
The three common types of ion transporters are uniporters, symporters and antiporters. Uniporters allow for unidirectional ion transport following an ion gradient or are ATP-driven transporters transporting ions against a concentration gradient. Typical ion uniporters include P-Class, F-Class and V-Class ATP-powered ion pumps.

A well known symporter is the sodium-glucose symporter in the microvilli membranes of epithelial cells. The sodium-glucose symporter actively transports glucose against a concentration gradient from the intestinal lumen into epithelial cells by coupling "uphill" glucose transport with "downhill" sodium transport.

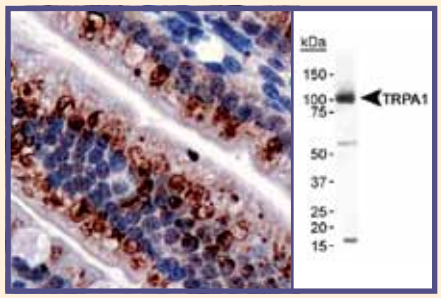
Many symporters and antiporters are involved in cytosolic pH regulation. In parietal cells of the stomach, protons are actively exported into the acidic lumen against a concentration gradient via potassium-antiport and ATP hydrolysis. Another important example for ATP-driven ion transport is the regulation of calcium uptake by cardiac muscle cells. Cardiac sodium-calcium antiporters require the import of three sodium ions to power the export one calcium ion against a steep concentration gradient. This process is tightly regulated since the timely increase and release of intracellular calcium results in the periodic contraction and relaxation of heart muscle cells.

Ion channels can also be grouped based on the nature of the species or signal needed for their induction, a process known as "gating." For example, ligand-gated channels are active upon ligand binding and voltage-gated channels are active in response to changes in the membrane potential. Other gated channels include mechanosensitive, light-gated and temperature-gated ion channels.

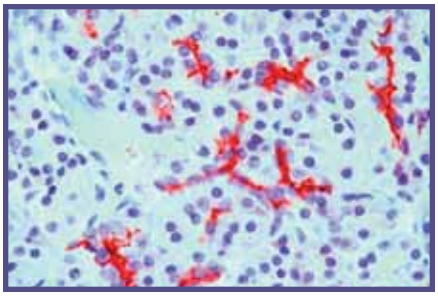
Several human conditions exist and are associated with mutations affecting ion transport. These include cystic fibrosis (chloride channel defect), episodic ataxia (voltage-gated potassium channel) and Timothy syndrome (calcium channel defect). Finally, since ion channel function is so crucial for homeostasis, defensive ion channel-targeting toxins have evolved in several venomous species. For example, tetrodotoxin is a Na^+-channel targeting toxin used by puffer fish. K^+-channel targeting toxins include dendrotoxin (mamba snake), iberiotoxin (Indian red scorpion) and heteropodatoxin (huntsman spider).



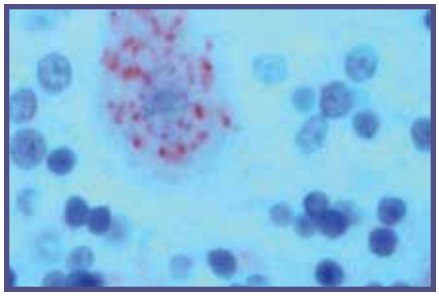
Calcium Sensing Receptor Mouse Monoclonal (5C10, ADD) #MA1-934



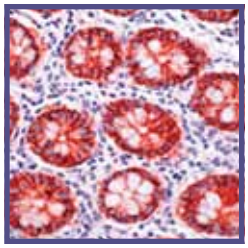
TRPA1 Rabbit Polyclonal #PA1-46159



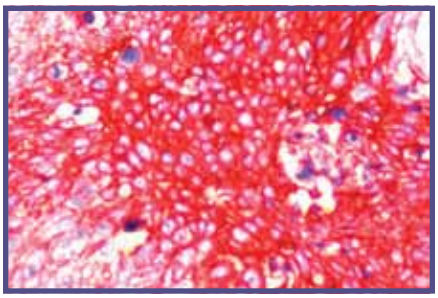
Cystic Fibrosis Transmembrane Regulator Mouse Monoclonal (M3A7) #MA5-11768



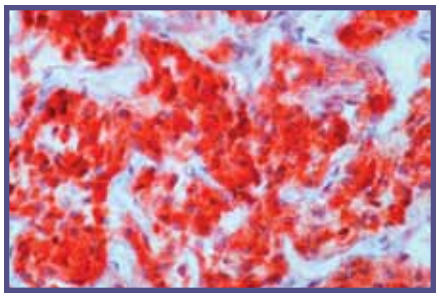
Pan Sodium Channel Rabbit Polyclonal #PA1-38631



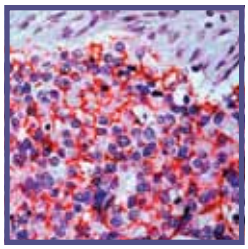
Claudin 3 Rabbit Polyclonal #PA5-16867



GLUT-1 Mouse Monoclonal (SPM498) #MA5-11315



GnRH Receptor Mouse Monoclonal (GNRH03) #MA5-11538



Claudin 4 Rabbit Polyclonal #PA5-16875

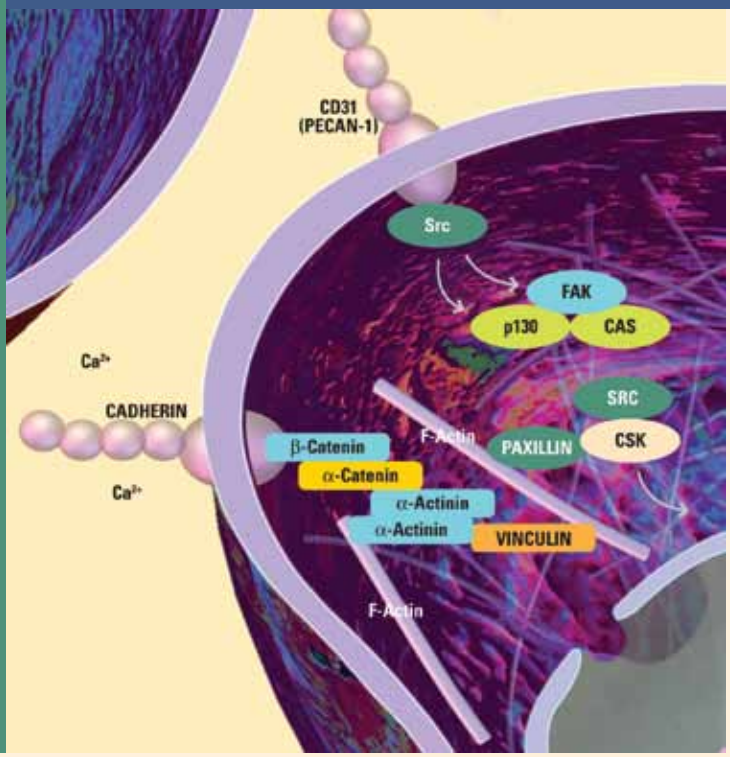
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Calcium Sensing Receptor Monoclonal Antibody (5C10, ADD)	Bv, Hu, Rt	ELISA, IF, IHC (F), WB	100µg	MA1-934
Claudin 3 Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	500µL	PA5-16867
Claudin 4 Polyclonal Antibody	Hu, Ms	IHC (P)	500µL	PA5-16875
CNG Channel Monoclonal Antibody (CNC 9C1)	Hu, Ms, Rt	IHC, WB	100µL	MA3-901
CREB Monoclonal Antibody (LB9)	Hu, Ms, Rt	ELISA, WB	100µg	MA1-083
Cystic Fibrosis Transmembrane Regulator Monoclonal Antibody (M3A7)	Hu, Ms, Rt	IF, IHC (P), IP, WB	500µL	MA5-11768
Glucocorticoid Receptor Monoclonal Antibody (BuGR2)	GP, Hu, Ms, Ov, Rb, Rt, Ys	FACS, GS, ICC, IF, IHC (P), IP, WB	100µg	MA1-510
Glucocorticoid Receptor Polyclonal Antibody	Hu, Rt	GS, ICC, IP, WB	200µL	PA1-510A
GLUT-1 Monoclonal Antibody (SPM498)	Hu, Rt	IHC (P)	500µL	MA5-11315
GnRH Receptor Monoclonal Antibody (GNRH03)	Hu	FACS, IF, IHC (P)	500µL	MA5-11538
HCN3 Monoclonal Antibody (TLL6C5)	Hu, Ms, Rt	IHC, WB	100µL	MA3-902
HCN4 Monoclonal Antibody (SHG 1E5)	Hu, Ms, Rt	IHC, WB	100µL	MA3-903
KCNQ2 Polyclonal Antibody	Hu, Ms, Rt	ICC, IF, IHC (F), WB	100µg	PA1-929
KCNQ3 Polyclonal Antibody	Hu, Ms, Rt	ICC, IF, IHC (F)	100µg	PA1-930
Pan Sodium Channel Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-38631
Potassium Channel kv3.2 Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-38480
Renal Cell Carcinoma Marker Monoclonal Antibody (PN-15)	Hu, Rt	IHC (P), WB	500µL	MA5-13365
Sodium/Calcium Exchanger Monoclonal Antibody (C2C12)	Ca, GP, Hu, Ms, Rb, Rt	IF, IHC, IP, WB	100µL	MA3-926
Sodium/Potassium ATPase α Monoclonal Antibody (M7-PB-E9)	Bv, Ca, Ck, Hu, Ms, Ov, Po, Rt	ELISA, ICC, IHC, IP, WB	400µL	MA3-928
Sodium/Potassium ATPase α-1 Monoclonal Antibody (M8-P1-A3)	Ca, Hu, Ov, Po, Rt	IHC (F), WB	200µL	MA3-929
Sodium/Potassium ATPase α-3 Monoclonal Antibody (XVIF9-G10)	Bv, Ca, GP, Hu, Ms, Nhp, Ov, Rb, Rt	IF, IHC (F), WB	100µg	MA3-915
Sodium/Potassium ATPase β Monoclonal Antibody (M17-P5-F11)	Ca, Hu, Ms, Ov, Po	ICC, IHC, IHC (P), IP, WB	200µL	MA3-930
Sodium/Potassium ATPase Monoclonal Antibody (9-A5)	Ca, Ck, Hu, Rt	ELISA, ICC, IF, IHC, IP	100µL	MA3-924
TRPA1 Polyclonal Antibody	Hu, Ms	IHC, IHC (P), WB	100µL	PA1-46159

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Biological Processes

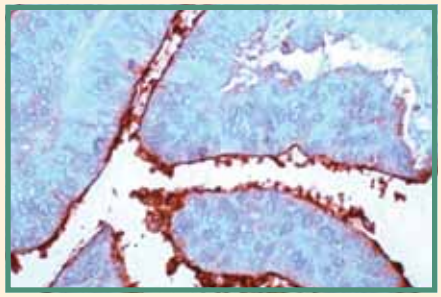


Cell adhesion is a critical biological process which mediates communication between neighboring cells and interactions with the extracellular matrix (ECM). These biological events are essential for regulating intracellular signaling networks involved in cell proliferation, cell survival and cell differentiation. Three families of cell adhesion molecules (CAMs) exist and include integrins, cadherins and selectins.

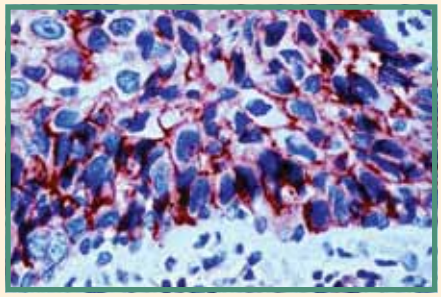
Integrins are transmembrane glycoproteins that are expressed on the surface of cells. All integrins are heterodimeric complexes consisting of an approximately 120-170kDa α-subunit and a 90-100kDa β-subunit. Integrins function to bridge the gap between distinct cells and the extracellular matrix (ECM). Integrins mediate both "outside-in" signaling events in response to changes in extracellular conditions and "inside-out" signaling events which alter cell interactions with the ECM. A very well characterized integrin is the αVβ5 complex which is implicated in human cancer development by mediating growth factor-induced proliferation of endothelial cells resulting in new blood vessel growth into the tumor.

Cadherins are transmembrane glycoproteins that function to mediate cell-cell adhesion through their extracellular cadherin domains. Cell-cell adhesion triggers an intracellular cascade of signaling events through interactions of the cadherin cytoplasmic domains with various signaling proteins such as β-catenin and γ-catenin. Cadherins are dependent upon calcium for proper function. In addition to mediating cell-cell contact, cadherins play an essential role in the cell development and tissue formation. The cadherin superfamily includes cadherins, protocadherins, desmogleins and desmocollins, which structurally share the cadherin repeats (extracellular calcium-binding domains). There are multiple classes of the cadherin molecule which are classified by the type of tissue with which it is associated (i.e., E-cadherins are found in epithelial tissue, N-cadherins are found in neurons and P-cadherins are found in placenta). Changes in expression levels of various forms of cadherins, most notably N- and E-cadherins, have been implicated in the development of human cancer.

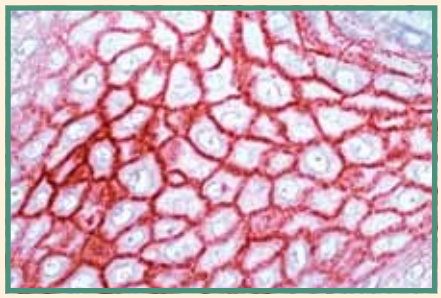
Selectins are a family of transmembrane glycoproteins involved in cell adhesion. Selectins share amino acid homology and calcium-dependent binding properties with C-type lectins. Selectins exist in three forms, E-Selectin, L-Selectin, and P-Selectin, which function to mediate cell-cell contacts on endothelial, leukocytes and platelet cells, respectively. In leukocytes they are responsible for the initial attachment of leukocytes during inflammation and migration along the endothelium through transient, reversible, adhesive interactions termed "leukocyte rolling."



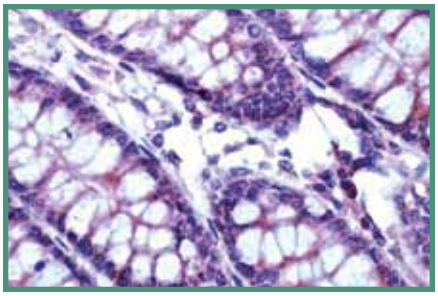
Carcino Embryonic Antigen Rabbit Polyclonal
#PA1-37416



Catenin γ Rabbit Polyclonal #PA1-37257



Claudin 1 Rabbit Polyclonal #PA1-37465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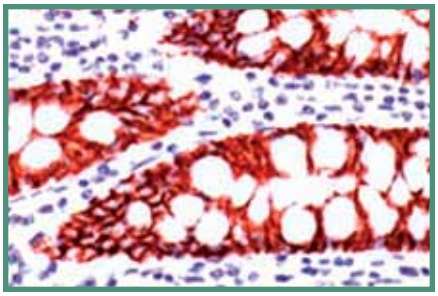
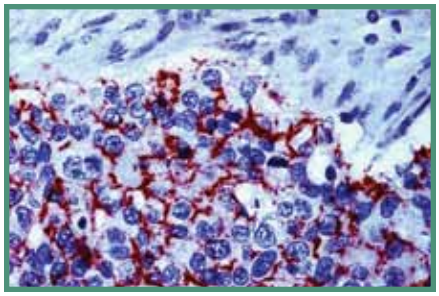
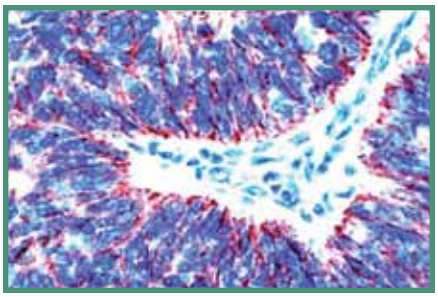

Claudin 3 Rabbit Polyclonal #PA1-37469


Claudin 4 Rabbit Polyclonal #PA1-37471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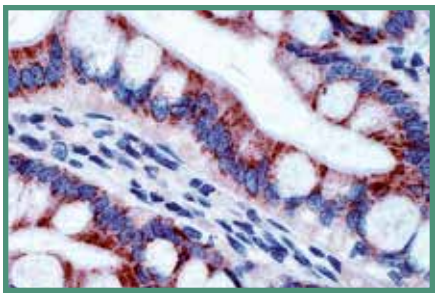
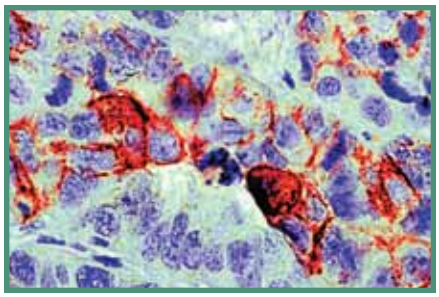

Integrin β-5 Rabbit Polyclonal #PA1-37932


CA-125 Monoclonal (Ov185:1) #MA5-11579

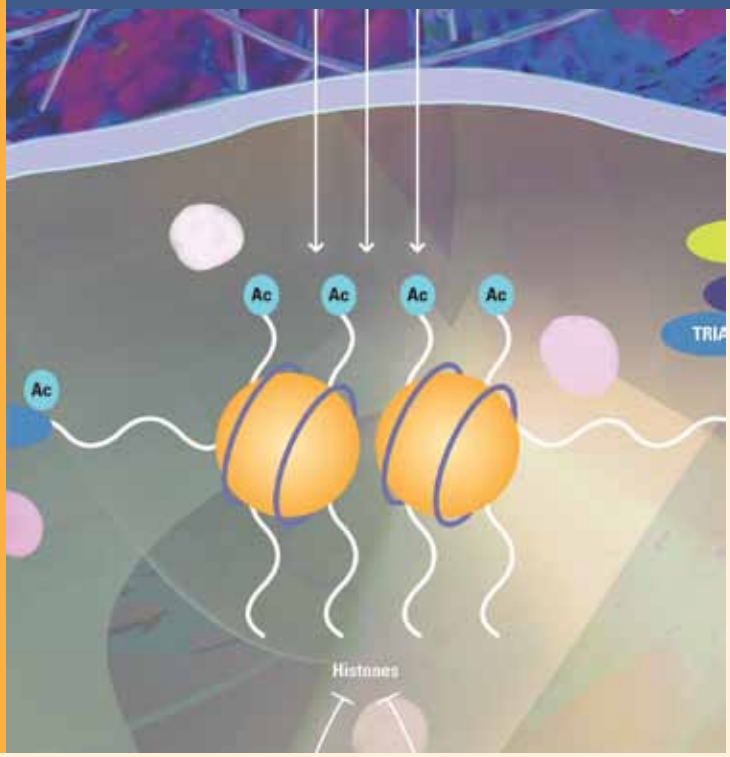
Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
CA-125 Monoclonal Antibody (Ov185:1)	Hu	IHC (P)	1mL	MA5-11579
Cadherin E Monoclonal Antibody (SPM471)	Hu	IHC (P)	1mL	MA1-37201
Carcino Embryonic Antigen Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37416
Catenin β Monoclonal Antibody (9F2)	Hu, Ms	IF, IP, WB	100µg	MA1-2001
Catenin γ Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-37257
Claudin 1 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37465
Claudin 2 Polyclonal Antibody	Hu, Ms	IHC (P)	1mL	PA1-37467
Claudin 3 Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-37469
Claudin 4 Polyclonal Antibody	Hu, Ms	IHC (P)	1mL	PA1-37471
Claudin 7 Polyclonal Antibody	Hu, Ms, Rt	IHC (P)	1mL	PA1-37474
Collagen II Monoclonal Antibody (2B1.5)	Hu, Ms, Rt, Bv, Ck	FACS, IF, IHC (P), WB	500µL	MA5-12789
Collagen IV Monoclonal Antibody (PHM-12)	Hu	IHC (P)	500µL	MA5-13255
Collagen Type X Monoclonal Antibody (X-AC9)	Ck	IF, IHC (P, F)	500µL	MA5-14265
Collagen VII Monoclonal Antibody (LH7.2)	Hu, Bv, Gp, Gt, Nhp, Ov, Po	IF, IHC (F), IM	500µL	MA5-13432
Cytokeratin 10 Monoclonal Antibody (DE-K10)	Hu, Rt, Ca	IF, IHC (P), WB	500µL	MA5-13702
Cytokeratin 14 Monoclonal Antibody (LL002)	Hu, Rt	IHC (P), WB	500µL	MA5-11596
Cytokeratin 15 Monoclonal Antibody (LHK15)	Hu, Ms, Rt, Bv	IF	500µL	MA5-11344
Cytokeratin 16 Monoclonal Antibody (LL025)	Hu	IF, IHC (P)	500µL	MA5-13730
Cytokeratin 17 Monoclonal Antibody (E3)	Hu, Rt	IF, IHC (P)	500µL	MA5-13539
Cytokeratin 18 Monoclonal Antibody (DC10)	Hu	IF, IHC (P), WB	500µL	MA5-12101
Cytokeratin 19 Monoclonal Antibody (BA17)	Hu	IHC (P), WB	500µL	MA5-12319
Cytokeratin 20 Monoclonal Antibody (Q2)	Hu	IHC (P), WB	500µL	MA5-12514
Cytokeratin 5 Monoclonal Antibody (XM26)	Hu	IHC (P)	500µL	MA5-12596
Cytokeratin 5/6 Monoclonal Antibody (D5/I6 B4)	Hu	IHC (P)	500µL	MA5-12429
Cytokeratin 7 Monoclonal Antibody (OV-TL 12/30)	Hu	IHC (P)	500µL	MA5-11986
Cytokeratin 8 Monoclonal Antibody (TS1)	Hu	IHC (P), IP	500µL	MA5-14428
Cytokeratin Pan Monoclonal Antibody (AE1/AE3)	Hu, Ms, Rt, Bv, Ck, Nhp, Rb	IF, IHC (P)	500µL	MA5-13156
Integrin β-5 Polyclonal Antibody	Hm, Hu, Ms, Rt	IF, IHC (P), IP, WB	1mL	PA1-37932
Pan Cadherin Polyclonal Antibody	Hu	IHC (P), IP	1mL	PA1-37199
Tenascin Monoclonal Antibody (T2H5)	Hu	IHC (P)	500µL	MA5-11848

For species and application abbreviations, see page 77.

Designates product with photo.

Primary Antibodies by Biological Processes



The processes of chromatin remodeling, transcription and translation are tightly linked biological processes essential for organism survival. The transmission of genetic information from DNA into protein involves multiple steps and numerous regulatory proteins. At the most basic level gene expression occurs when local chromatin structure relaxes allowing access of transcription factors and other regulatory proteins to the target gene's promoter. Transcription proceeds through an enzymatic reaction involving RNA polymerase which transcribes the DNA sequence into a complementary product, termed messenger RNA (mRNA). Processed mRNA is transported into the cytoplasm where it is translated into protein.

Chromatin Remodeling

A major epigenetic mechanism to control gene expression involves the modification of chromatin, a higher-ordered nucleoprotein-DNA complex. Chromatin serves three main biological purposes: to compact DNA within the nucleus, to regulate gene expression and to control DNA replication.

Compaction of genomic DNA occurs through a highly organized repeating nucleoprotein complex termed the nucleosome. Each nucleosome unit consists of approximately 200 base pairs of DNA wrapped around four pairs of core histone proteins: H2A, H2B, H3 and H4. The nucleosome also acts as a regulatory mechanism to control gene expression and DNA replication by creating a physical barrier between the DNA and regulatory proteins.

To overcome this regulatory barrier a series of post-translational modifications occur on the amino-terminal tails of the four core histone proteins, specifically at lysine, arginine, serine, threonine and tyrosine. Methylation of arginine and lysine residues is an important marker for transcriptionally active or inactive genomic regions. The protein arginine methyltransferase (PRMT) family of co-activators, including PRMT1 and PRMT4, play key roles in promoting transcription through methylation of arginine residues on histone H3 and histone H4, whereas methylation of lysines can both stimulate (histone H3) and repress (histone H3 and H4) transcription. The DNA methyltransferases DNMT1, DNMT2 and DNMT3 counteract the PRMT methyltransferase activity. DNMT1, DNMT2 and DNMT3 are overexpressed in numerous human tumors. Interestingly, hypomethylation of promoters of essential tumor suppressor proteins has been implicated in tumor formation.

Histone acetylation on lysines also plays a critical role in modulating transcriptional activity. Histone acetylation through histone acetyltransferase (HAT) activity promotes a relaxed chromatin conformation, allowing access of transcription factors and other regulatory proteins to the DNA and stimulating transcription. Histone deacetylases (HDACs) counteract the effects of HATs on the local chromatin structure. Disruption of the balance between HATs and HDACs has been implicated in a variety of human diseases including cancer. More recently HDAC inhibitors have become an attractive target for development of anti-cancer therapeutics. Recent evidence suggests that HDAC inhibitors promote a state of hyperacetylation and subsequent transcriptional activation of genes involved in cell cycle arrest and apoptosis .

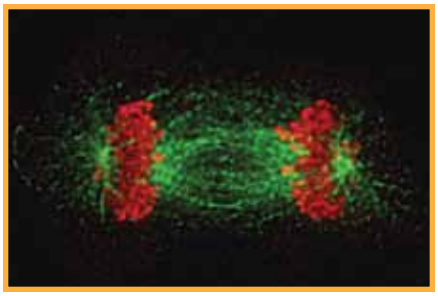
Transcription

Eukaryotic transcription is a highly evolved process involving numerous regulatory proteins called transcription factors that act in concert to initiate the production of RNA from DNA. These transcription factors bind to upstream promoter sequences which are non-protein coding regions of a specific gene.

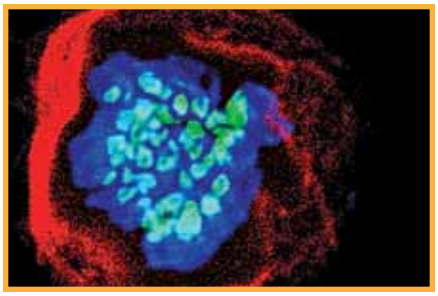
Transcription begins with the binding of mega-protein complexes containing core transcription factors (TFIIA, TFIIB, TFIID, TFIIE, TFIIF, TFIIH), gene-specific transcription factors (e.g., c-myc, E2F, c-Fos, c-Jun, NFκB, STAT, SMAD, FOXM1), and transcriptional co-activators (CBP/p300, PCAF) to specific DNA consensus sequences within the promoter of a particular gene. Formation of the transcriptional activation complex guides RNA polymerase (I, II, III) to the DNA coding sequence where it enzymatically transcribes the DNA sequence into an intermediate RNA species [e.g., messenger RNA (mRNA) in the case of RNA polymerase II]. Newly synthesized RNA is then processed and exported into the cytoplasm where it interacts with ribosomes, initiating translation into protein.

Regulation of transcription occurs at multiple levels including DNA modification (methylation), post-translational modification of histones and post-translational modification of transcription factors. In many cases the level of regulation is a dictated by upstream signaling events in response to internal and external cellular cues.

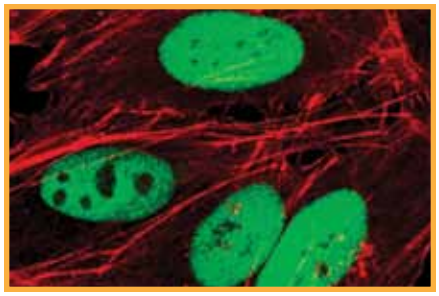
Hypermethylation of CpG islands located within promoter sequences is a key regulatory mechanism to silence gene expression. Post-translational modifications to core histones are also an essential regulatory mechanism governing accessibility of transcriptional regulatory proteins to DNA. Likewise, post-translational modification of transcription factors regulates transcription through multiple effects, including cellular localization, DNA binding and protein-protein interactions.



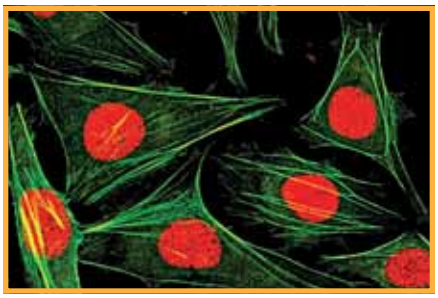
Phospho-Histone H3 Mouse Monoclonal (Ser10) (K.872.3) #MA5-15220



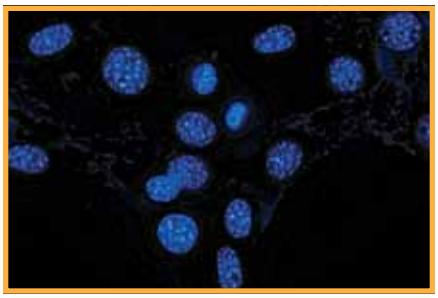
Phospho-Histone H3 Rabbit Polyclonal (Ser28) #PA5-17318



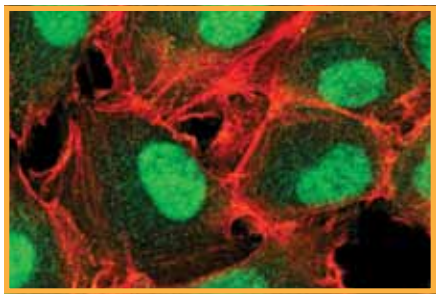
c-Jun Rabbit Monoclonal (C.238.2) #MA5-15172



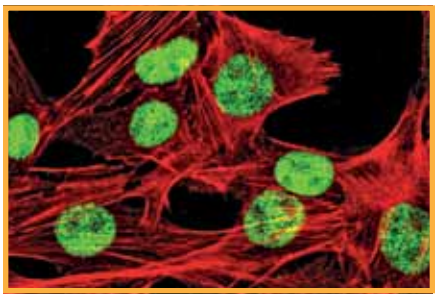
Histone H3 Rabbit Polyclonal #PA5-17697



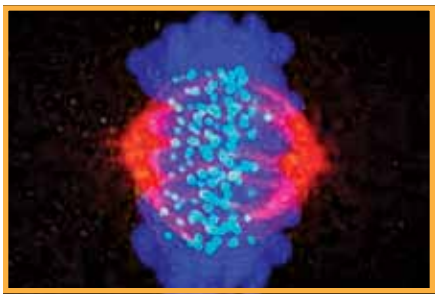
Pan-Methyl-Histone H3 Rabbit Polyclonal (Lys9) #PA5-17367



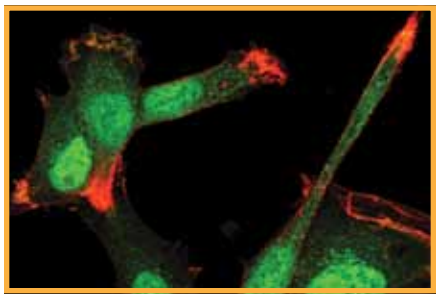
Phospho-SMAD1-5 Rabbit Monoclonal (Ser463-465) (E.239.4) #MA5-15124



SirT1 Rabbit Polyclonal #PA5-17074



Phospho-CENP-A (Ser7) Rabbit Polyclonal #PA5-17195



SMAD3 Rabbit Monoclonal (E.980.9) #MA5-14939

Ordering Information for Select Thermo Scientific Pierce Antibodies

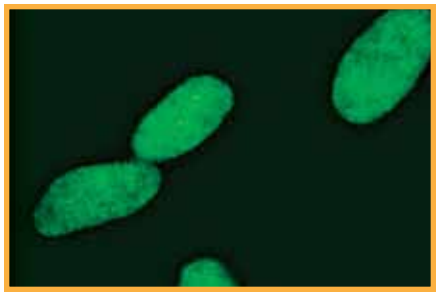
Product Description	Target Species	Applications	Size	Product #
Acetyl Lysine Monoclonal Antibody (1C6)	Hu, Ms	ICC, IF, WB	100µg	MA1-2021
Acetyl-CoA Carboxylase Monoclonal Antibody (B.800.8)	Hm, Hu, Ms, Rt	FACS, ICC, IHC (P), WB	100µL	MA5-15025
Acetyl-Histone H2A (Lys5) Polyclonal Antibody	Hu, Ms, Nhp, Rt	IHC (P), IP, WB	100µL	PA5-17763
Acetyl-Histone H2B (Lys20) Polyclonal Antibody	Hu, Ms, Rt	ICC, IHC (P), IP, WB	100µL	PA5-17821
Acetyl-Histone H2B (Lys5) Polyclonal Antibody	Hu, Ms, Nhp, Rt	IHC (P), IP, WB	100µL	PA5-17779
Acetyl-Histone H3 (Lys18) Polyclonal Antibody	Hu, Ms, Rt	ChIP, IHC (P), WB	100µL	PA5-17801
Acetyl-Histone H3 (Lys9) Monoclonal Antibody (T.69.2)	Hu, Ms, Nhp, Rt, Zf	ChIP, FACS, ICC, IHC (P), WB	100µL	MA5-14970
Acetyl-Histone H3 (Lys9) Polyclonal Antibody	Dm, Hu, Ms, Nhp, Rt, Ys	ChIP, IHC (P), IP, WB	100µL	PA5-17868
Acetyl-Histone H4 (Lys12) Polyclonal Antibody	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), WB	100µL	PA5-17773
CENP-A Polyclonal Antibody	Hu	ICC, WB	100µL	PA5-17194
c-Fos Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37437
c-Jun Monoclonal Antibody (C.238.2)	Hu, Ms, Nhp, Rt	ICC, IHC (F), IHC (P), IP, WB	100µL	MA5-15172
CREB Monoclonal Antibody (C.480.4)	Hu, Ms, Rt, Nhp, Dm	ChIP, FACS, ICC, IF, IHC (F), IHC (P), IP, WB	100µL	MA5-15154
Di-Methyl-Histone H3 (Lys36) Monoclonal Antibody (T.571.7)	Hu, Ms, Nhp, Rt	ICC, IHC (P), WB	100µL	MA5-14867
Di-Methyl-Histone H3 (Lys36) Polyclonal Antibody	Hu, Ms, Nhp, Rt	ICC, IP, WB	100µL	PA5-17341

For species and application abbreviations, see page 77.

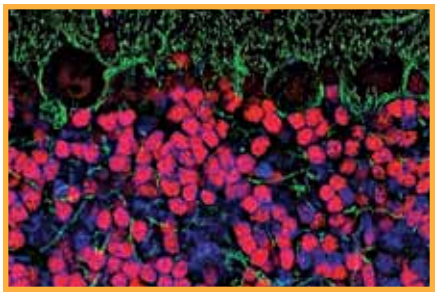
Designates product with photo.

More antibodies on next page

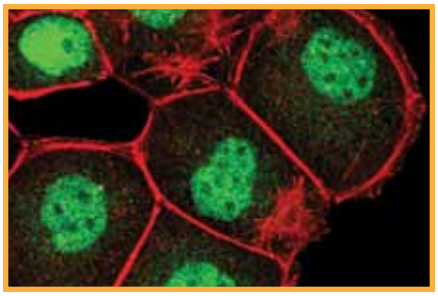
Primary Antibodies by Biological Processes



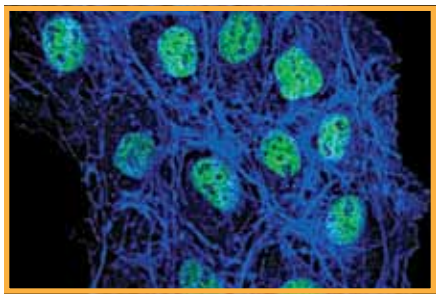
HDAC2 Rabbit Polyclonal #PA1-861



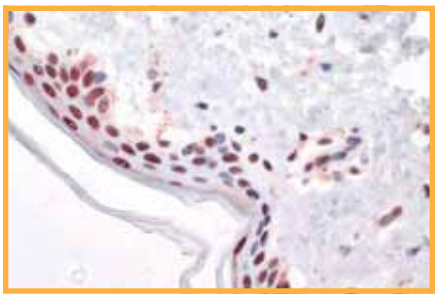
CREB Rabbit Monoclonal (C.480.4) #MA5-15154



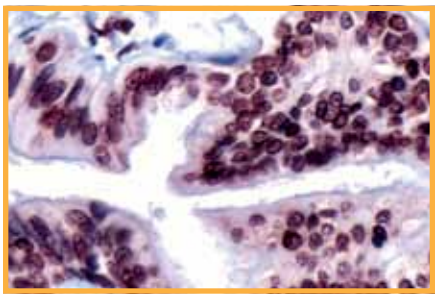
FoxO1 Rabbit Monoclonal (S.502.4) #MA5-14846



Phospho-p53 Rabbit Polyclonal (Ser37) #PA5-17866



c-Fos Rabbit Polyclonal #PA1-37437



FOXP4 Rabbit Polyclonal #PA1-37716

Ordering Information for Select Thermo Scientific Pierce Antibodies

Product Description	Target Species	Applications	Size	Product #
Di-Methyl-Histone H3 (Lys4) Monoclonal Antibody (T.767.5)	Hu, Ms, Nhp, Rt	ChIP, ICC, IHC (P), IP, WB	100µL	MA5-14977
Di-Methyl-Histone H3 (Lys4) Polyclonal Antibody	Hu, Ms, Nhp, Rt, Xl, Zf	ChIP, ICC, IHC (P), IP, WB	100µL	PA5-17174
Di-Methyl-Histone H3 (Lys9) Polyclonal Antibody	Dm, Hu, Ms, Nhp, Rt, Ys	ChIP, ICC, IF, IHC (P), IP, WB	100µL	PA5-17370
FoxO1 Monoclonal Antibody (S.502.4)	Hu, Ms, Rt, Nhp	ICC, IHC (P), WB	100µL	MA5-14846
FOXP4 Polyclonal Antibody	Hu	IHC (P)	1mL	PA1-37716
γ Tubulin Monoclonal Antibody (4D11)	Hu, Ms, Rt	IF, IP, WB	100µg	MA1-850
HDAC1 Polyclonal Antibody	Ca, Hm, Hu, Ms, Rt	ChIP, ICC, IF, IHC (F), IP, WB	100µg	PA1-860
HDAC2 Polyclonal Antibody	Ca, Hm, Hu, Ms, Rt	ICC, IF, IHC, IP, WB	100µg	PA1-861
Histone H3 Polyclonal Antibody	Bv, Dm, Hu, Ms, Nhp, Po, Rt, Zf	ICC, IHC (P), WB	100µL	PA5-17697
Methyl CpG Binding Protein 2 Polyclonal Antibody	Hu, Ms, Rt	IF, IP, WB	100µg	PA1-887
Mono-Methyl-Histone H3 (Lys4) Polyclonal Antibody	Hu, Ms, Nhp, Rt, Xl, Zf	ICC, IP, WB	100µL	PA5-17418
Pan-Methyl-Histone H3 (Lys9) Polyclonal Antibody	Hu, Ms, Nhp, Rt, Zf	ChIP, ICC, IP, WB	100µL	PA5-17367
Phospho-CENP-A (Ser7) Polyclonal Antibody	Hu, Nhp	ICC, IP, WB	100µL	PA5-17195
Phospho-Histone H2A.X (Ser139) Monoclonal Antibody (G.327.3)	Hu, Ms, Nhp, Rt	FACS, ICC, IHC (P), WB	100µL	MA5-15130
Phospho-Histone H3 (Ser10) Monoclonal Antibody (K.872.3)	Hu, Ms, Rt	FACS, ICC, IF, WB	100µL	MA5-15220
Phospho-Histone H3 (Ser10) Polyclonal Antibody	Ck, Dm, Hu, Ms, Nhp, Rt, Xl, Ys, Zf	FACS, ICC, IHC (F), IHC (P), IP, WB	100µL	PA5-17869
Phospho-Histone H3 (Ser28) Polyclonal Antibody	Bv, Ck, Dm, Hm, Hu, Ms, Rt, Xl, Zf	FACS, ICC, IF, IP, WB	100µL	PA5-17318
Phospho-Histone H3 (Thr11) Polyclonal Antibody	Hu, Ms, Rt, Xl	FACS, ICC, IP, WB	100µL	PA5-17360
Phospho-Histone H3 (Thr3) Polyclonal Antibody	Hu, Ms, Rt	IHC (P), WB	100µL	PA5-17502
Phospho-p53 (Ser37) Polyclonal Antibody	Hu, Nhp	FACS, ICC, IP, WB	100µL	PA5-17866
Phospho-SMAD1/5 (Ser463/465) Monoclonal Antibody (E.239.4)	Hu, Ms, Rt	FACS, ICC, WB	100µL	MA5-15124
RbAp46 Polyclonal Antibody	Hu	IHC, WB	100µg	PA1-868
SirT1 Polyclonal Antibody	Ms	ICC, IP, WB	100µL	PA5-17074
SMAD3 Monoclonal Antibody (E.980.9)	Bv, Hu, Ms, Nhp, Rt, Xl, Zf	ChIP, FACS, ICC, IP, WB	100µL	MA5-14939
Tri-Methyl-Histone H3 (Lys27) Polyclonal Antibody	Hu, Ms, Nhp, Rt, Xl	ChIP, ICC, IHC (P), IP, WB	100µL	PA5-17173
Tri-Methyl-Histone H3 (Lys4) Monoclonal Antibody (S.840.3)	Dm, Hu, Ms, Nhp, Rt, Xl, Ys, Zf	ChIP, ICC, IHC (P), WB	100µL	MA5-14933
Tri-Methyl-Histone H3 (Lys4) Polyclonal Antibody	Hu, Ms, Nhp, Rt, Xl, Zf	ChIP, ICC, IHC (P), IP, WB	100µL	PA5-17420

For species and application abbreviations, see page 77.

Designates product with photo.

Also Available: Target-Specific ELISA Kits

Thermo Scientific Pierce Cytokine ELISA Technology Handbook

Includes a complete listing of our ELISA kits and reagents.

Thermo Scientific Pierce ELISA Kits are standard 96-well microplate assays for quantitative measurement of individual cytokine, chemokine and other markers using the enzyme-linked immunosorbent assay (ELISA) technique. The kits are optimized to provide the best possible performance for the testing range most often needed for each analyte while requiring a minimal volume of sample (usually 50µL).

- **Precision and accuracy** – lot-specific testing ensures precision and accuracy
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- **Complete kit** – from the pre-coated plate to the substrate, we provide all of the reagents you need to detect your target

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Guide to Abbreviations

Target Species Abbreviations

Am	amphibian	**Ck**	chicken	**Hm**	hamster	**Po**	porcine
Ar	antropod	**Dm**	Drosophila	**Hu**	human	**Pz**	protozoa
Av	avian	**Eq**	equine	**Mn**	mink	**Rb**	rabbit
Ba	bacteria	**Fe**	feline	**Ms**	murine	**Rt**	rat
Bv	bovine	**Fs**	fish	**Nhp**	non-human primate	**Xl**	Xenopus laevis
Ca	canine	**GP**	guinea pig	**Ov**	ovine	**Ys**	yeast
Ce	C. elegans	**Gt**	goat	**Pl**	plant	**Zf**	zebrafish

Validated Applications Abbreviations

DB	Dot blot	**ICC**	Immunocytochemistry	**IHC(P)**	Immunohistochemistry (Paraffin)
ELISA	ELISA	**IF**	Immunofluorescence	**IP**	Immunoprecipitation
FACS	Flow cytometry	**IHC**	Immunohistochemistry	**Neu**	Neutralization
GS	Gel shift	**IHC(F)**	Immunohistochemistry (Frozen)	**WB**	Western blot

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