SouthernBiotech

# Reagents for Extracellular Matrix Research

SouthernBiotech offers a wide range of purified proteins, antibodies and conjugates for use in extracellular matrix research.

- Collagens
- Fibronectin
- Laminin
- MMPs
- TIMPs
- Fibrillin

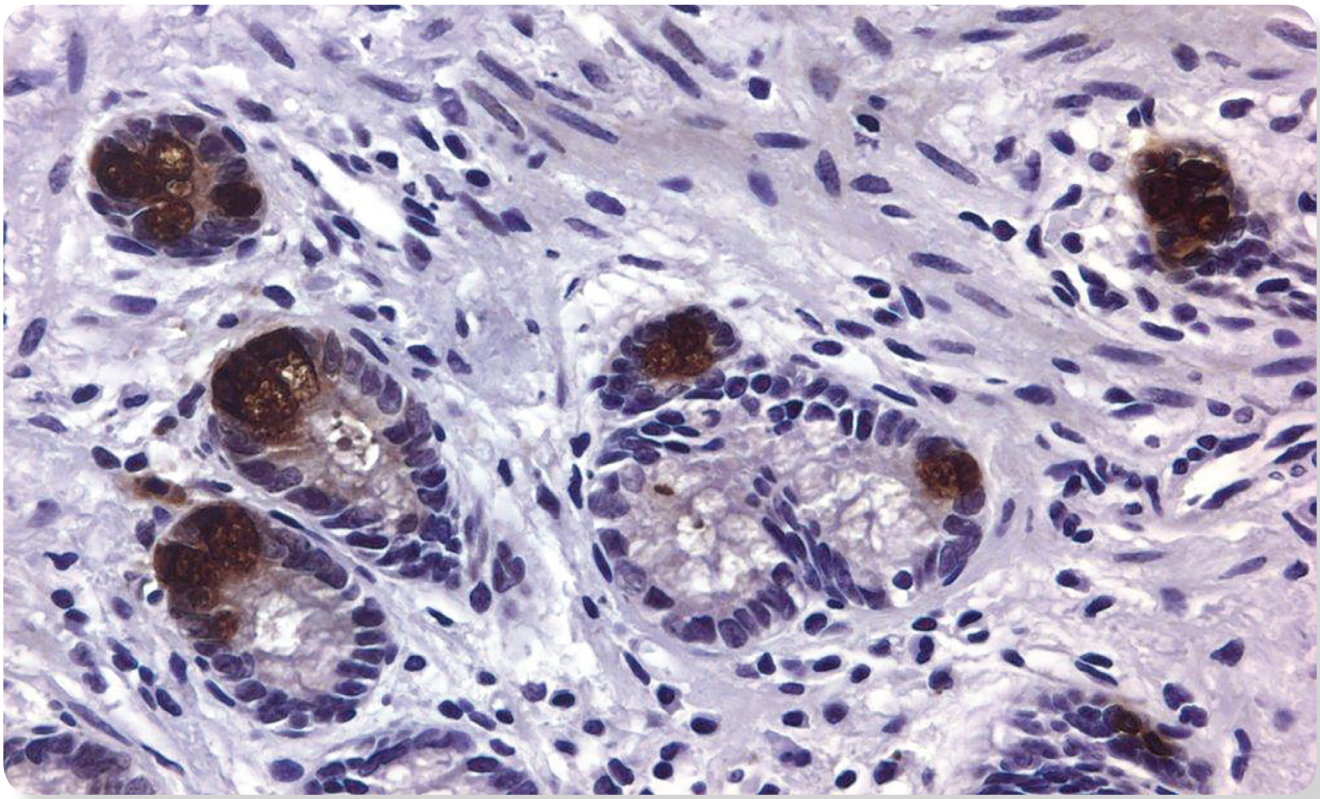

Figure - Paraffin embedded sections of human colon were stained with Mouse Anti-Human MMP-9-UNLB (SB Cat. No. 12025-01) followed by Goat Anti-Mouse $IgG_{2a}$, Human ads-BIOT (SB Cat. No. 1080-08) and Streptavidin-HRP (SB Cat. No. 7100-05). Sections were visualized with DAB substrate.

## Matrix Metalloproteinases (MMPs)

Matrix metalloproteinases (MMPs) are a family of approximately 25 members of secreted and membrane bound endopeptidases that require zinc ions for their enzymatic activity and share a common domain structure. Together, they are capable of degrading various extracellular matrix and non-matrix components and can be classified based on their substrate specificity and homology as collagenases, gelatinases, stromelysins, matrilysins, membrane-type MMPs, and other MMPs. MMPs play critical roles in many normal, pathological, physiological, and biological processes such as wound healing, embryogenesis, normal tissue remodeling, angiogenesis, arthritis, and cancer tumor progression. Most MMPs are secreted from cells into their extracellular environment in their latent form and require extracellular activation by proteinases or *in vitro* by chemical agents, low pH or heat treatment. Once activated, MMPs are subject to endogenous inhibition by tissue inhibitors of metalloproteinases (TIMPs) by forming a 1:1 complex with the catalytic zinc in the MMPs site. To date, four TIMPs have been identified – TIMP-1, TIMP-2, TIMP-3, and TIMP-4 – and their expression is regulated during development and tissue remodeling as well as under pathological conditions.

| Cat. No. | Description | Clone | Size |
|---|---|---|---|
| 12011-01 | Mouse Anti-Human MMP-1-UNLB | SB12e | 0.1 mg |
| 12011-05 | Mouse Anti-Human MMP-1-HRP | SB12e | 1.0 mL |
| 12011-08 | Mouse Anti-Human MMP-1-BIOT | SB12e | 0.1 mg |
| 12015-01 | Mouse Anti-Human MMP-2-UNLB | SB13a | 0.1 mg |
| 12015-05 | Mouse Anti-Human MMP-2-HRP | SB13a | 1.0 mL |
| 12020-01 | Mouse Anti-Human MMP-3-UNLB | SB14d | 0.1 mg |
| 12020-05 | Mouse Anti-Human MMP-3-HRP | SB14d | 1.0 mL |
| 12025-01 | Mouse Anti-Human MMP-9-UNLB | SB15c | 0.1 mg |
| 12025-05 | Mouse Anti-Human MMP-9-HRP | SB15c | 1.0 mL |

## Tissue Inhibitors of Metalloproteinases (TIMPs)

Tissue inhibitors of metalloproteinases (TIMPs) are specific inhibitors of matrix metalloproteinases (MMPs) that participate in controlling the local activities of MMPs in tissues. By inhibiting MMP activity, they contribute to turnover, tissue remodeling, and cellular behavior of extracellular matrix (ECM). In addition to the inhibition of MMPs, TIMPs have been found to inhibit several of the disintegrin-metalloproteinases, ADAMs, and ADAM-TSs and have biological effects on cell migration, cell growth and differentiation, anti-angiogenesis, synaptic plasticity, and anti- and pro-apoptosis activities many of which are independent of MMP inhibition. Currently four TIMPs have been identified in humans all of which have two distinct domains, an N-terminal domain with approximately 125 amino acid residues and a C-terminal domain with approximately 65 residues.

| Cat. No. | Description | Clone | Size |
|---|---|---|---|
| 12035-01 | Mouse Anti-Human TIMP-4-UNLB | SB30c | 0.1 mg |
| 12035-05 | Mouse Anti-Human TIMP-4-HRP | SB30c | 1.0 mL |

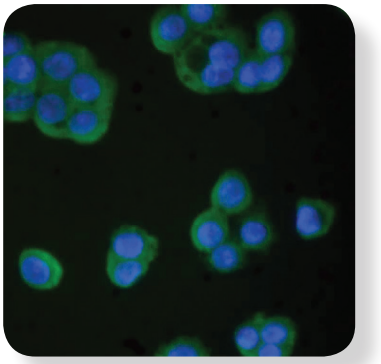

Figure - Human pancreatic carcinoma cells were stained with Mouse Anti-Human TIMP-4-UNLB (SB Cat. No. 12035-01) and DAPI followed by Goat Anti-Mouse Ig, Human ads-FITC (SB Cat. No. 1010-02).

# Extracellular Matrix Proteins (ECMs)

## Collagen

Collagen is the main protein component of connective tissues and basement membrane, and occurs in a number of types (Type I-XVIII) that vary in their tensile strength and tissue localization. Rigid or flexible structure and structural changes in many body tissues are often a result of changes in collagen composition, as is cellular restriction and compartmentalization. One area of intense interest is the basement membrane surrounding the blood vessel endothelium, a thin specialized network of extracellular matrix (ECM) proteins that serves many functions. Comprised of proteins and proteoglycans, such as collagen, laminin, entactin, fibronectin, heparin sulfate, and perlecan, this membrane acts as a physical barrier between the epithelium and underlying tissues. It provides cell surface anchorage (via integrins, receptor kinases, and cell surface proteoglycans), induces cellular differentiation, gives architectural support, and limits the migration of normal cells. The ability of tumor cells to degrade the ECM components of the basement membrane and surrounding tissues is directly correlated with metastatic potential. By releasing proteolytic enzymes (e.g. MMP collagenases, plasminogen activators, cathepsins), cancer cells are able to breach the membrane and penetrate the blood vessel wall. Collagen, the primary structural element of the basement membrane and tissue scaffolding protein, represents the main deterrent in the migration of tumor cells.

### Purified Collagens

#### Preparation

Collagens are prepared by controlled and limited pepsin digestion of either placental villi (human and bovine types I, III, IV, V and VI), nasal cartilage (bovine type II), tendons (bovine I and rat I), or mouse EHS sarcoma followed by selective salt precipitation to yield the various collagen types.

#### Purity

To ensure lot-to-lot consistency, the purity of each collagen preparation is assessed by SDS-PAGE analysis for conformance with characteristics of a standard reference reagent.

#### Applications

- Collagen standards
- Antigen for antibody production
- Coating material for cell culture studies
- Formation of collagen gels

| Cat. No. | Description | Size |
|---|---|---|
| 1200-01S | Human Type I Collagen-Solution | 0.5 mg |
| 1200-02S | Bovine Type I Collagen-Solution | 0.5 mg |
| 1200-02 | Bovine Type I Collagen-Lyophilized | 0.25 mg |
| 1200-03S | Rat Type I Collagen-Solution | 0.5 mg |
| 1200-03 | Rat Type I Collagen-Lyophilized | 0.25 mg |
| 1220-02S | Bovine Type II Collagen-Solution | 0.5 mg |
| 1220-02 | Bovine Type II Collagen-Lyophilized | 0.25 mg |
| 1230-01S | Human Type III Collagen-Solution | 0.5 mg |
| 1240-02S | Bovine Type III Collagen-Solution | 0.5 mg |
| 1250-01S | Human Type IV Collagen-Solution | 0.5 mg |
| 1250-04S | Mouse Type IV Collagen-Solution | 0.5 mg |
| 1260-02S | Bovine Type IV Collagen-Solution | 0.5 mg |
| 1260-02 | Bovine Type IV Collagen-Lyophilized | 0.25 mg |
| 1270-01S | Human Type V Collagen-Solution | 0.25 mg |
| 1270-01 | Human Type V Collagen-Lyophilized | 0.1 mg |
| 1280-02S | Bovine Type V Collagen-Solution | 0.25 mg |
| 1290-01S | Human Type VI Collagen-Solution | 0.25 mg |
| 1300-02S | Bovine Type VI Collagen-Solution | 0.25 mg |
| 1300-02 | Bovine Type VI Collagen-Lyophilized | 0.1 mg |

Note - Harsh chemicals or procedures involving heat may denature collagen epitopes needed for proper binding.

### Collagen Antibodies

#### Purification

Goat anti-collagen antibodies are immunoaffinity purified then cross adsorbed to remove undesirable reactivity to other collagen types. Monoclonal antibodies specific for ECM proteins are purified from mouse ascites fluid or supernatant by ion exchange chromatography or other chromatography techniques.

#### Specificity and Quality Assurance

Antibodies are tested by ELISA and/or IHC compared with a standard reference reagent.

#### Applications

- ELISA
- Immunoblotting
- Immunohistochemstry (Paraffin and Frozen Sections)
- Immunocytochemistry

| Cat. No. | Description | Clone | Size |
|---|---|---|---|
| 1310-01 | Goat Anti-Type I Collagen-UNLB | | 0.2 mg |
| 1310-08 | Goat Anti-Type I Collagen-BIOT | | 0.2 mg |
| 1440-01 | Mouse Anti-Human Type I Collagen-UNLB | 2A3 | 0.1 mg |
| 1441-01 | Mouse Anti-Human Type I Collagen-UNLB | 4F6 | 0.1 mg |
| 1441-02 | Mouse Anti-Human Type I Collagen-FITC | 4F6 | 0.1 mg |
| 1441-05 | Mouse Anti-Human Type I Collagen-HRP | 4F6 | 1.0 mL |
| 1441-08 | Mouse Anti-Human Type I Collagen-BIOT | 4F6 | 0.1 mg |
| 1320-08 | Goat Anti-Type II Collagen-BIOT | | 0.2 mg |
| 1330-01 | Goat Anti-Type III Collagen-UNLB | | 0.2 mg |
| 1330-08 | Goat Anti-Type III Collagen-BIOT | | 0.2 mg |
| 1340-01 | Goat Anti-Type IV Collagen-UNLB | | 0.2 mg |
| 1340-08 | Goat Anti-Type IV Collagen-BIOT | | 0.2 mg |
| 1350-01 | Goat Anti-Type V Collagen-UNLB | | 0.2 mg |
| 1350-08 | Goat Anti-Type V Collagen-BIOT | | 0.2 mg |
| 1360-01 | Goat Anti-Type VI Collagen-UNLB | | 0.2 mg |
| 1360-08 | Goat Anti-Type VI Collagen-BIOT | | 0.2 mg |
| 1460-01 | Mouse Anti-Human Type IV Collagen-UNLB | 2F11 | 0.1 mg |
| 1460-02 | Mouse Anti-Human Type IV Collagen-FITC | 2F11 | 0.1 mg |
| 1460-08 | Mouse Anti-Human Type IV Collagen-BIOT | 2F11 | 0.1 mg |
| 1460-09 | Mouse Anti-Human Type IV Collagen-PE | 2F11 | 0.1 mg |

## Extracellular Matrix Proteins (ECMs)

### Fibronectin

Fibronectin is an important high molecular weight glycoprotein that binds integrins as well as components of the extracellular matrix (ECM) including collagen, fibrin, and heparin. Fibronectin can be found in the blood plasma in its soluble form which is composed of two 250 kDa subunits joined together by disulfide bonds. The insoluble form that was formerly called cold insoluble globulin is a large complex of cross-linked subunits. There are several main isoforms of fibronectin all of which are the product of a single gene. The structure of these isoforms is made of three types of repeated internal regions called I, II, and III which exhibit different lengths and the presence or absence of disulfide bonds. Alternative splicing of the pre-mRNA leads to the combination of these three types of regions but also to a variable region. Fibronectin is involved in the wound healing process and so can be used as a therapeutic agent. It is also one of the few proteins for which production increases with age without any associated pathology. In addition, polymeric forms of fibronectin inhibit tumor growth, angiogenesis, and metastasis.

| Cat. No. | Description | Size |
|---|---|---|
| 1430-01 | Goat Fibronectin | 1.0 mg |

### Laminin

Laminins are a family of glycoproteins found predominantly in basement membranes that are essential for early embryonic development and organogenesis as well as having crucial functions in several tissues including muscle, nerve, skin, kidney, lung, and the vasculature. The protein consists of three different polypeptide chains – $\alpha$ chain, $\beta$ chain, and $\gamma$ chain – found in five, four, and three genetic variants, respectively. The trimeric proteins intersect to form a cross-like structure that can bind to cell membranes and extracellular matrix molecules. The shorter arms being apt at binding other laminin molecules, allowing them to form sheets, and the long arm being capable of binding to cells allowing for tissue anchoring to the membrane. Laminin chain mutations can cause a number of congenital diseases including muscular dystrophy, Pierson syndrome, epidermolysis bullosa, and malignant disorders. Laminin has proven useful in the promotion of epithelial differentiation; the modulation of cell attachment, cell spreading, cell growth, and motility; the modification of leukocyte function; and the stimulation of neurite outgrowth.

| Cat. No. | Description | Size |
|---|---|---|
| 1415-01 | Mouse Laminin | 1.0 mg |

### Fibrillin

The fibrillins are extracellular matrix glycoproteins which occur as a major component of a subset of connective tissue microfibrils. These microfibrils have a beaded appearance and a cross-sectional diameter of 10-12 nm. In elastic tissues, these structures are thought to provide the scaffold onto which elastin is assembled to form elastic fibers, although their function in non-elastic tissues is unclear. In immunohistochemical staining of paraformaldehyde-fixed human skin, mAb 11C1.3 labels the elastic framework and more specifically the oxytalantic network close to the epidermis. The antibody also exhibits discrete staining of normal fibroblasts in culture and of extracellular (elastin) fibrils in a variety of tissues. There is an aberrant expression of fibrillin in Marfan syndrome.

| Cat. No. | Description | Clone | Size |
|---|---|---|---|
| 1405-01 | Mouse Anti-Fibrillin-UNLB | 11C1.3 | 0.2 mg |
| 1405-02 | Mouse Anti-Fibrillin-FITC | 11C1.3 | 0.2 mg |
| 1405-08 | Mouse Anti-Fibrillin-BIOT | 11C1.3 | 0.2 mg |

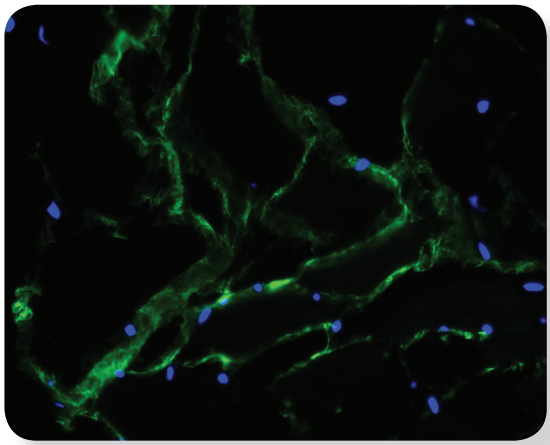

Figure - Bovine muscle was stained with Mouse Anti-Fibrillin-UNLB (SB Cat. No. 1405-01) and DAPI followed by Goat Anti-Mouse $IgG_1$, Human ads-FITC (SB Cat. No. 1070-02).