Omni Matrigel

Background

In vivo, the basement membrane is a thin layer of cell-based extracellular matrix. Matrigel is a soluble basement membrane preparation extracted from the Engelbreth-Holm-Swarm (EHS) mouse sarcoma, a tumor rich in extracellular matrix proteins. Its primary components are laminin, followed by collagen IV, heparan sulfate proteoglycan, and nidogen 1, 2. Matrigel also contains transforming growth factor β (TGF-β), epidermal growth factor (EGF), insulin-like growth factor (IGF), fibroblast growth factor (FGF), tissue plasminogen activator 3, 4, and other growth factors naturally present in EHS tumors. Matrigel effectively promotes the attachment and differentiation of normal and transformed anchorage-dependent epithelial cells and other cell types, including neurons5,6, hepatocytes7, Sertoli cells8,9, chick lens epithelial cells10, and vascular endothelial cells11. In three-dimensional cultures of adult rat hepatocytes12,13, vascular endothelial cells14, and mouse15-18 and human19,20 mammary epithelial cells, matrigel influences gene expression. It serves as the basis for invasion assays of several tumor cell types21,22, supports in vivo peripheral nerve regeneration23-25, and provides an essential substrate for in vitro26,27 and in vivo25,28-30 angiogenesis studies. Matrigel also supports the proliferation of human tumors in immunocompromised mice31-33. It can be used for transplantation of unsorted mammary cells34 and embedding of sorted epithelial cell subsets in matrigel35,36. This matrix is also utilized as a cancer stem cell model and has been shown to enhance tumor growth rates in vivo37.
Source: Engelbreth-Holm-Swarm (EHS) mouse tumor.

Product Description

Omni Matrigel is a soluble basement membrane preparation extracted from EHS mouse tumors rich in extracellular matrix proteins. Its main components include laminin, collagen type IV, heparan sulfate proteoglycan (HSPG), and nidogen, along with growth factors such as TGF-β, EGF, IGF, FGF, tissue plasminogen activator, and other growth factors inherent to EHS tumors. At room temperature, it polymerizes to form a biologically active three-dimensional matrix that mimics the structure, composition, physical properties, and functions of the in vivo cellular basement membrane, facilitating in vitro cell culture and differentiation. It can be used to study cell morphology, biochemical functions, migration, invasion, and gene expression.
The three-dimensional culture matrix formed by matrigel promotes the attachment and differentiation of epithelial cells, hepatocytes, Sertoli cells, melanoma cells, vascular endothelial cells, thyroid cells, and hair follicle cells. Omni Matrigel affects the gene expression of three-dimensional cultures of adult rat hepatocytes and human mammary epithelial cells. Additionally, Omni Matrigel serves as a fundamental scaffold for invasion studies of various tumor cells, an indispensable matrix for in vitro and in vivo angiogenesis research, and a

three-dimensional scaffold for the growth of transplanted tumor cells in animal models. Omni Matrigel also supports peripheral nerve neogenesis and differentiation of bovine oviduct epithelial cells.

Matrigel is a sterile product with a concentration of 8–12 mg/mL, suitable for various experimental needs, including angiogenesis research and tumor cell migration studies.

Product Applications

1. Thawing and Storage of Omni Basement Membrane/Matrigel

Note: Omni Matrigel is highly temperature-sensitive and must never be repeatedly frozen and thawed. All procedures for aliquoting and pre-gel preparation must be performed on ice (4°C), as slight temperature increases may cause gel formation, leading to uneven matrigel or affecting subsequent gelation. Tubes and pipette tips used for handling must be pre-cooled.

a) Upon receipt, if not in use immediately, store the entire vial at -20°C (do not place in a frost-free refrigerator).

b) For first use, place the entire vial of Omni Matrigel in an ice box and transfer to 4°C overnight for complete thawing.

2. Special Usage Considerations for Omni Basement Membrane/Matrigel

Matrigel rapidly gels at 22–35°C. To ensure gel performance and stability, the final dilution concentration should not be lower than 3 mg/mL (the concentration of undiluted Omni Matrigel may vary between batches). It can be diluted with serum-free medium and must be used immediately after dilution.

A. Thin Gel Preparation Method

1. After thawing, mix Omni Matrigel thoroughly with a pre-cooled pipette tip.
2. Place the culture plate on ice and add Omni Matrigel at a concentration of 50 μL/cm^2 growth area.
3. Incubate at 37°C for 30 minutes, after which the plate is ready for use.

B. Thick Gel Preparation Method

1. After thawing, mix Omni Matrigel thoroughly with a pre-cooled pipette tip.
2. Place the culture plate on ice, mix the cultured cells with Omni Matrigel, and suspend the cells evenly with a pre-cooled pipette tip. Add Omni Matrigel at a concentration of 150–200 μL/cm^2 growth area.
3. Incubate at 37°C for 30 minutes, then add cell culture medium. Cells can also grow on the surface of this thick gel.

C. Thin Layer Coating Method

1. After thawing, mix Omni Matrigel thoroughly with a pre-cooled pipette tip.
2. Dilute Omni Matrigel to the desired concentration with serum-free medium. A gradient experiment is recommended to determine the optimal coating concentration for specific assays.
3. Add the diluted Omni Matrigel to the culture vessel to be coated, ensuring it covers all cell growth surfaces. Incubate at room temperature for 1 hour.
4. Remove unbound, ungelled Omni Matrigel and gently rinse with serum-free medium. The plate is then ready for use.

Note: Plates coated with Omni Basement Membrane/Matrigel are best used on the same day but can be stored at 37°C for up to 1 week after adding medium, depending on the application.

Product Characteristics

Omni Matrigel may exhibit color variations (from light yellow to deep red) due to the interaction of phenol red and bicarbonate with CO_2, but the color difference decreases after equilibration with 5% CO_2. After freezing and thawing, gently shake the reagent bottle to ensure uniform dispersion of Omni Matrigel. All operations must be performed under aseptic conditions. The bottle cap can be wiped with 70% ethanol and air-dried. Pre-cooled pipettes should be used to maintain Omni Matrigel in a homogeneous state. Cells can grow on the surface of a 0.5 mm-thick Omni Matrigel layer or within a 1 mm-thick three-dimensional matrix of Omni Matrigel. Excessively diluted Omni Matrigel forms a non-gelatinous protein layer, which can be used for cell attachment but not for cell differentiation studies.

Note: Thawed Omni Matrigel can be aliquoted into multiple small tubes using pre-cooled cryotubes, which should be rapidly frozen to avoid repeated freeze-thaw cycles. Omni Matrigel rapidly gels at 22–35°C, so thawing should be done overnight at 4°C on ice (partial gelling may occur as the temperature rises at 4°C). All equipment must be pre-cooled on an ice bath before use, and pre-cooled pipettes, tips, and tubes must be used for handling. Gelled Omni Matrigel can re-liquefy after 24–48 hours at 4°C.

Precautions

1. All procedures involving product aliquoting and use must be performed under aseptic conditions, and experimental equipment in contact with the product (e.g., pipette tips, tubes) must be pre-cooled.
2. For safety and health, wear a lab coat and disposable gloves during operation.
3. This product is for research use only and is not intended for human use.

Warning

Since matrigel begins to gel above 10°C, it is critical that matrigel and all culture dishes or media in contact with it are pre-cooled/frozen. Keep Omni Basement Membrane Matrigel on ice throughout the experiment.

Reconstitution and Use

Color changes may occur during freezing and thawing of matrigel vials due to the interaction of carbon dioxide, bicarbonate buffer, and phenol red, resulting in a shift from light yellow to deep red. These color changes are normal and do not affect product efficacy; the color will disappear after equilibration with 5% CO_2. Submerge the vial in ice and thaw overnight at 4°C. Once thawed, vortex the vial to ensure uniform dispersion. Keep matrigel on ice at all times. Handle using aseptic techniques: place the thawed matrigel in a sterile area, spray the vial cap with 70% ethanol, and air-dry. Use a pre-cooled pipette to gently aspirate matrigel for homogeneity. Aliquot matrigel into centrifuge tubes and replace tips if clogging or inaccurate measurement occurs. Gelled matrigel can be rehydrated after 24–48 hours on ice at 4°C. Matrigel can be used as a thin gel layer (0.5 mm) with cells seeded on top or as a 1 mm gel layer for culturing cells within the matrix. Excessive dilution results in a thin, non-gelatinous protein layer suitable for cell attachment but not for differentiation studies.