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Product Information

Collagen solution from bovine skin
BioReagent

Catalog Number **C4243**
Storage Temperature 2–8 °C

Product Description

Type I collagen is a major structural component of skin, bone, tendon, and other fibrous connective tissues, and differs from other collagens by its low lysine hydroxylation and low carbohydrate composition. Although a number of types of collagen have been identified, all are composed of molecules containing three polypeptide chains arranged in a triple helical conformation. Slight differences in the primary structure (amino acid sequence) establish differences between the types. The amino acid sequence of the primary structure is mainly a repeating motif with glycine in every third position with proline or 4-hydroxyproline frequently preceeding the glycine residue.[1,2] Type I collagen is a heterotrimer composed of two α1(I) chains and one α2(I) chain, which spontaneously form a triple helix scaffold at neutral pH and 37 °C.

Control of cell growth, differentiation, and apoptosis in multicellular organisms is dependent on adhesion of cells to the ECM. Given that Type I collagen is an abundant component of the extracellular matrix (ECM), cells cultured in three dimensional (3D) collagen gels simulate the *in vivo* cell physiology better than traditional 2D systems. This has been shown for a number of cell types including cardiac and corneal fibroblasts, hepatic stellate cells (HSCs), and neuroblastoma cells.[3-6]

Several diseases can affect the mechanical properties of the ECM while other disease states may be caused by changes in the density or rigidity of the ECM. Since Type I collagen is a key determinant of tensile properties of the ECM, 3D collagen gels are useful in studies of mechanotransduction, cell signaling involving the transformation of mechanical signals into biochemical signals.[6-9]

3D gels allow for the study of the effects of the mechanical properties of the ECM, such as density and rigidity, on cell development, migration, and morphology. Unlike 2D systems, 3D environments allow cell extensions to simultaneously utilize integrins on both the dorsal and ventral cell surfaces, resulting in the activation of specific signaling pathways.

Gel stiffness or rigidity also affects cell migration differently in 3D versus 2D environments. Furthermore, integrin-independent mechanical interactions resulting from the entanglement of matrix fibrils with cell extensions are possible in 3D systems, but not in 2D systems where the cells are attached to a flat surface.[10-12]

Different collagen subtypes are recognized by a structurally and functionally diverse group of cell surface receptors, which recognize the collagen triple helix. The best known collagen receptors are integrin $\alpha_1\beta_1$ and $\alpha_2\beta_1$. $\alpha_1\beta_1$ is the major integrin on smooth muscle cells, while $\alpha_2\beta_1$ is the major form on epithelial cells and platelets. Both forms are expressed on many cell types including fibroblasts, endothelial cells, osteoblasts, chondrocytes, and lymphocytes.[13-15] Some cell types may also express other collagen receptors such as glycoprotein VI (GPVI), which mediates both adhesion and signaling in platelets.[16] Other collagen receptors include discoidin domain receptors, leukocyte-associated IG-like receptor-1, and members of the mannose receptor family.[17,18]

This product is prepared from purified type I bovine collagen extracted from tendon and skin, and contains a high monomer content. It is supplied as an ~3 mg/ml (0.3%) aqueous solution in 0.01 M HCl (pH ~2.0).

Starting material was isolated from a closed herd and purified using a cGMP manufacturing process. This process contains built-in, validated steps to ensure inactivation of possible prion and/or viral contaminants. The product is sterilized by membrane filtration and has been tested, and confirmed negative, for bacterial and fungal contamination. The sterility test was carried out according to the current BP, Ph Eur, and USP procedures. The sample is also negative with respect to mycoplasma contamination.

Purity: ≥99.9% (SDS-PAGE) on powder base
(~97% Type I with remainder Type III collagen)
SDS-PAGE shows the typical band pattern. Gradual breakdown may occur over long periods of time thus creating atypical banding patterns.

Endotoxin: ≤1.0 EU/ml (LAL assay)

Precautions and Disclaimer
This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Storage/Stability
The product ships on wet ice and storage at 2–8 °C is recommended.

Expiration date: 2 years

Collagen denatures when exposed to high temperatures or irradiation. Prior to pH adjustment store stock or diluted solutions refrigerated. Following adjustment of pH to 7, solutions should not exceed 40 °C. Do not freeze.

Procedure
3-D Gel Preparation
1. Mix 8 parts of chilled collagen solution with 1 part of 10× PBS (Catalog Number P5493 or P5368) or 10× culture medium. (cells may be added following this step)
2. Adjust pH of mixture (step 1) to 7.2–7.6. Use of 0.1 M NaOH (10-fold dilution of Catalog Number S2770) or 0.01 M HCl (100-fold dilution of Catalog Number H9892) is recommended. Monitor pH adjustment carefully (pH meter, phenol red, or pH paper).
3. To prevent gelation, maintain temperature of mixture at 2–8 °C.
4. To form gel, warm to 37 °C. For best results allow 45 minutes to 1 hour for gel formation.
5. The gels can be dried under a laminar flow hood.

References

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