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Product Information

Matrix Metalloproteinase-1, human recombinant, expressed in mouse NSO cells

Catalog Number **M9195**
Storage Temperature –70 °C

EC 3.4.24.7
Synonyms: MMP-1; Collagenase-1; Interstitial collagenase

Product Description
The matrix metalloproteinases (MMPs) are a family of at least eighteen secreted and membrane-bound zinc-endopeptidases. Collectively, these enzymes can degrade all the components of the extracellular matrix, including fibrillar and non-fibrillar collagens, fibronectin, laminin, and basement membrane glycoproteins. In general, a signal peptide, a propeptide, and a catalytic domain containing the highly conserved zinc-binding site characterize the structure of the MMPs. In addition, fibronectin-like repeats, a hinge region, and a C-terminal hemopexin-like domain allow categorization of MMPs into the collagenase, gelatinase, stomelysin, and membrane-type MMP subfamilies.[1-4] MMPs contain the motif His-Glu-X-X-His (X represents any amino acid) that binds zinc in the catalytic site, as well as another zinc ion and two calcium ions structurally. They fall within the matrixin subfamily and are EC designated 3.4.24.x. This group also contains astacin, reprolysin, and serralysin, as well as other more divergent metalloproteinases. All MMPs are synthesized as proenzymes, and most of them are secreted from the cells as proenzymes. Thus, the activation of these proenzymes is a critical step that leads to extracellular matrix breakdown.

MMPs are considered to play an important role in wound healing, apoptosis, bone elongation, embryo development, uterine involution, angiogenesis,[4] and tissue remodeling, and in diseases such as multiple sclerosis,[2,5] Alzheimer's,[2] malignant gliomas,[2] lupus, arthritis, periodontis, glomerulonephritis, athero-sclerosis, tissue ulceration, and in cancer cell invasion and metastasis.[6] Numerous studies have shown there is a close association between expression of various members of the MMP family by tumors and their proliferative and invasive behavior and metastatic potential.

Matrix Metalloproteinase-1 (MMP-1) is a true collagenase and, along with MMP-8 and MMP-13, can cleave all three strands of intact native collagen. The substrate specificity of the collagenases is variable: MMP-1 degrades type III collagen more efficiently than type I or type II collagen; whereas, MMP-8 is more active in degrading type I collagen than type III or type II collagen.[7,8] MMP-13, in turn, degrades type II collagen 6-fold more efficiently than type I or type III collagen and displays almost 50-fold stronger gelatinolytic activity than MMP-1 and MMP-8.[9,10]

MMP-1 degrades fibrillar collagens types I, II, III, VII, VIII, and X, aggrecan, serpins, and α_2-macroglobulin. All collagenases cleave fibrillar collagens at one specific site resulting in the generation of N-terminal ¾ and C-terminal ¼ fragments, which then denature to gelatin at body temperature. Structurally, MMP-1 may be divided into several distinct domains: a pro-domain, which is cleaved upon activation, a catalytic domain containing the zinc binding site, a short hinge region, and a carboxyl terminal (hemopexin-like) domain.

Increased synthesis of MMP-1 is caused by a wide variety of agents that include: TNF,[11,12] IL-1,[13] serum, EGF, and TGF-β,[14-16] the phorbol ester tumor promoter, PMA,[17] ECM (extracellular matrix) components,[18] and polyoma and RSV infections. In contrast to these activators, several well-known antagonists, dexamethasone and all-*trans*-retinoic acid (RA), block the induced gene expression.[19] MMP-1 is expressed by fibroblasts, keratinocytes, endothelial cells, monocytes, and macrophages.

This recombinant, human Matrix Metalloproteinase-1 product is a highly purified recombinant enzyme from a DNA sequence encoding pro human MMP-1[20] expressed in a mouse myeloma cell line, NSO. This MMP-1 product is supplied in a 0.2 μm filtered solution of 25 mM MES, pH 5.5, with 10 mM calcium chloride, 150 mM sodium chloride, and 0.05% Brij® L23.

The enzyme may be used to study enzyme kinetics, cleave target substrates, and screen for inhibitors.

Molecular mass (apparent): 52–55 kDa (glycosylated proforms)

Purity: >95% (SDS-PAGE, visualized by silver stain)

Specific activity: >400 pmoles/min/μg

The specific activity is measured with 10 μM of the fluorogenic substrate and 50 ng of enzyme in 100 μL of the TCNB buffer at room temperature. The fluorogenic substrate is (7-methoxycoumarin-4-yl)acetyl-Pro-Leu-Gly-Leu-(3-[2,4-dinitrophenyl]-L-2,3-diaminopropionyl)-Ala-Arg-NH_2. Cleavage of the substrate can be measured at excitation and emission wavelengths of 320 nm and 405 nm, respectively.

Endotoxin: <1.0 EU per 1 μg of the protein (LAL method)

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 dry ice and storage at –70 °C is recommended. Avoid repeated freeze/thaw cycles. Upon receipt, this enzyme can be aliquoted and stored under sterile conditions at –70 °C.

Centrifuge the vial before opening to recover the entire contents. Due to possible sublimation during storage, the buffer volume may decrease; however, the product is sold by mass and the protein amount will remain constant. For complete quantitative recovery, it is recommended to make the stock solution in the original vial.

References

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