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ProductInformation

Matrix Metalloproteinase-2 (MMP-2)
from mouse fibroblast cells

Product Number **M 7942**
Storage Temperature –70 °C

Synonyms: Gelatinase-A, 72-kDa Gelatinase, Type-IV Collagenase; EC 3.4.24.24

Product Description
Mouse Matrix Metalloproteinase-2 (MMP-2) is a matrix metalloproteinase that has been substrate-affinity purified from mouse fibroblast cells. MMP-2 is essentially free of other matrix metalloproteinases and tissue inhibitors of metalloproteinases (TIMPs).

Matrix Metalloproteinase-2 may be used as a control for immunoblotting and ELISA as well as for enzyme kinetics assays, and substrate assays. This product is a mixture of zymogen and active enzyme. By immunoblotting, bands are detected at approximately 72 kDa (zymogen) and 68 kDa (active). The purity is >95% by SDS-PAGE visualized by silver staining.

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.[1-3] 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 that 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.

The tissue inhibitors of metalloproteinases (TIMPs) are naturally occurring proteins that specifically inhibit matrix metalloproteinases and regulate extracellular matrix turnover and tissue remodeling by forming tightly bound inhibitory complexes with the MMPs. Thus, TIMPs maintain the balance between matrix destruction and formation. An imbalance between MMPs and the associated TIMPs may play a significant role in the invasive phenotype of malignant tumors. MMPs and TIMPs can be divided into two groups with respect to gene expression: the majority exhibit inducible expression and a small number are produced constitutively or are expressed at very low levels and are not inducible. Among agents that induce MMP and TIMP production are the inflammatory cytokines TNF-α and IL-1β. A marked cell type specificity is a hallmark of both MMP and TIMP gene expression (i.e., a limited number of cell types can be induced to make these proteins).

Matrix Metalloproteinase-2 was first discovered in rheumatoid synovial tissue,[7] rabbit bone cultures,[8] and cultures of human skin.[9] MMP-2 is also known as type-IV collagenase and gelatinase-A. MMP-2 may have a role in processes such as host defense, cell proliferation, and protein turnover as well as tissue remodeling. Unlike other MMPs, the gelatinases MMP-2 and MMP-9 have a fibronectin-like insert in the catalytic

domain, which enhances substrate binding and may help unfold collagen molecules. Like the other MMPs, MMP-2 is secreted as a zymogen and then activated. This activation step differs from the other MMPs in requiring TIMP-2 binding, and the cleavage is performed by membrane-bound MMPs (primarily MMP-14). The 72 kDa zymogen is reduced to 68 kDa by enzymatic cleavage after the conserved cysteine switch.

Most cells of normal and diseased tissues in culture express MMP-2, although there is some debate about whether MMP-2 is produced by normal tissue *in-vivo*. Unlike most other MMPs, MMP-2 is constitutively produced along with the endogenous inhibitor TIMP-2. MMP-2 substrate specificity is broad, most closely resembling the activity of MMP-9. MMP-2 degrades gelatin, collagen IV, V, VII, X, XI, fibronectin, vitronectin, tenascin, casein, laminin, aggrecan, entactin, elastin, versican, and fibrinogen. Activation of MMP-2 at wound sites removes denatured ECM (extracellular matrix) and connective tissue components, and helps tumor cells spread in pathological conditions. MMP-2 is frequently elevated in various types of cancer including colon, stomach, prostate, and brain cancers.[10] MMP-2 is overexpressed in 80% of human colorectal cancers and is known to be an important factor for early tumor growth with potential function in tumor progression, invasion, and metastasis. MMP-2 regulation differs form most other MMPs, and few known agonists stimulate MMP-2 production.

The mouse MMP-2 gene is located on chromosome 8.

Reagent

Mouse Matrix Metalloproteinase-2 (MMP-2) is supplied in a phosphate solution, pH 7.4, containing 0.15 sodium chloride, 0.25% Brij-35, and 50% glycerol (v/v). Each vial contains approximately 5 µg of mouse MMP-2.

Storage/Stability

Store at –70 °C in aliquots. Repeated freezing and thawing is not recommended. Storage in frost-free freezers is not recommended.

References

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