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ProductInformation

Matrix Metalloproteinase-11 (MMP-11)
from human fibroblast cells

Product Number **M 7692**
Storage Temperature –70 °C
Synonyms: Stromelysin-3; EC 3.4.24.

Product Description
Human Matrix Metalloproteinase-11 (MMP-11) is a matrix metalloproteinase that has been substrate-affinity purified from human fibroblasts. MMP-11 is essentially free of other matrix metalloproteinases and tissue inhibitors of metalloproteinases (TIMPs).

Matrix Metalloproteinase-11 (MMP-11) 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 58 kDa (zymogen) and 48 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.[1-4] 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 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.[4] 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-11 was first discovered in media from breast carcinoma cells.[8] It is also known as Stromelysin-3, due to structural similarities. Originally thought to be tumor specific, MMP-11 is also expressed by normal cells when stimulated. Unlike the other secreted MMPs, MMP-11 is secreted as an activated enzyme, cleaved by furin. The 58 kDa form is reduced to 48 kDa by enzymatic cleavage after the furin cleavage site.[10]

MMP-11 is expressed in epithelial cells of normal and diseased tissues. It is not constitutively produced, but rather, its synthesis is induced in specific tissues. The substrate specificity of MMP-11 is more limited than stromelysin-1 and -2. MMP-11 degrades serpins such as alpha-1 proteinase inhibitor, alpha-2 antiplasmin and plasminogen activator inhibitor-2, collagen IV, and laminin.[6] It is frequently expressed in various types of cancer including colon, stomach, prostate, and brain.[8,11] MMP-11 is over-expressed in human breast cancers and is known to be an important factor for early tumor growth, with potential function also in tumor progression, invasion, and metastasis. MMP-11 is up regulated by the tumor promoter, phorbol 12-myristate 13-acetate (PMA), TNF-α, EGF, and IL-1. Unlike many other MMPs, MMP-11 is regulated by retinoic acid.[11]

The human MMP-11 gene has the chromosomal location of 22q11.2.

Reagent

Matrix Metalloproteinase-11 (MMP-11) is supplied in a buffer, containing 12 mM TRIS, pH 7.4, 0.15 M sodium chloride, 5 mM calcium chloride, 0.025% Brij-35, 50% glycerol (v/v), with 0.01% sodium azide as preservative. Each vial contains approximately 5 µg of human MMP-11.

Precautions and Disclaimer

Due to the sodium azide content a material safety data sheet (MSDS) for this product has been sent to the attention of the safety officer of your institution. Consult the MSDS for information regarding hazards and safe handling practices.

Storage/Stability

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

References

1. Borkakoti, N., Matrix metalloproteases: variations on a theme. Prog. Biophy. Mol. Biol., **70**, 73 (1998).
2. Yong, V.W., et al., Matrix metalloproteinases and diseases of the CNS. Trends in Neuroscience, **21**, 75 (1998).
3. Kähäri, V.M., and Saarialho-Kere, U., Matrix metalloproteinases in skin. Exp. Dermatol., **6**, 199 (1997).
4. Barrett, A.J., et al, Handbook of Proteolytic Enzymes. Academic Press, 1998.
5. Chandler, S., et al., Matrix metalloproteinases, tumor necrosis factor and multiple sclerosis: an overview. J. Neuroimmunol., **72**, 155 (1997).
6. Parks, W.C. and Meecham, R.P., Matrix Metalloproteinases. Academic Press, 1998.
7. Woessner, J.F. and Nagase, H., Matrix Metalloproteinases and TIMPs. Oxford University Press, 2000.
8. Basset, P., et al, A novel Metalloproteinase gene specifically expressed in stromal cells of breast carcinoma cells. Nature, **348,** 699-704 (1990).
9. Birkedal-Hansen, H., et al., Matrix metallo-proteinases: a review. Crit. Rev. Oral. Biol. Med., **4**, 197 (1993).
10. Pei, D., et al., Furin-dependent intracellular activation of human stromelysin-3 zymogen. Nature, **375,** 244-247 (1995).
11. Anderson, I.C., et al., Stromelysin-3 is over-expressed by stromal elements in primary non-small cell lung cancers and regulated by retinoic acid in pulmonary fibroblasts. Cancer Research, **55,** 4120-4126 (1995).

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