Product Information

Caspase 3 human

C-terminal Histidine-Tagged Protein Recombinant, Expressed in *E. coli*

C1224

EC 3.4.22.56

Synonyms: CPP32, YAMA, apopain

Product Description

Caspase 3 (CPP32, YAMA, apopain) is a member of the CED-3 subfamily of the caspase family of cysteine proteases that play an essential role in the execution phase of apoptosis. These enzymes share a dominant primary specificity for cleaving bonds following aspartic acid residues. "Initiator" caspases (For example, caspase 8) activate "effector" caspases (For example, caspases 3 and 7). The effector caspases then cleave cellular substrates, ultimately leading to the morphological changes of apoptosis.[1-3]

Caspases are synthesized as inactive proenzymes. For example, caspase 3 is synthesized as an inactive 32 kDa proenzyme. The precursor proteins contain N-terminal pro-sequences of various lengths followed by the p20 and p10 subunits. Caspases are activated by cleavage at specific Asp residues to produce two subunits of approximately 20 kDa (p20) and 10 kDa (p10), which together form the heterodimeric active protease.[2-4] In some cases, these subunits are separated by a linker that may be involved in regulation of the activation of the caspase. All caspases contain an active site pentapeptide of general structure QACXG (where X is R, Q or G). The amino acids Cys^{285} and His^{237} involved in catalysis, and those involved in forming the P1 carboxylate binding pocket (Arg^{179} , Gln^{283}, Arg_{341}, and Ser^{347}) are conserved in all caspases, except for the substitution of Thr for Ser^{347} in caspase 8. This explains the absolute requirement for an Asp in the P1 position. Residues forming the P2-P4 binding pocket are not well conserved. This suggests that they may determine the substrate specificities of the caspases.[3]

Caspase 3, a cytosolic protein, is one of the key executioners of apoptosis.[4,5] Caspase 3 is activated by caspases 6 and 8 and by granzyme B. Granzyme B is a serine protease that cleaves after aspartic residues and plays an essential role in cytotoxic T lymphocyte (CTL)-mediated cell killing. It is essential for the rapid induction of DNA fragmentation and apoptosis in target cells.[6]

Many key proteins are cleaved by caspase 3 during apoptosis, including poly(ADP-ribose) polymerase (PARP),[4] sterol-regulatory element-binding proteins (SREBPs), DNA-dependent protein kinase (DNA-PK), α-fodrin, gelsolin, PKC δ, and DFF45/ICAD.[2,7-9] In some neurodegenerative diseases, such as Huntington disease (HD) and Alzheimer's disease (AD), specific neuronal caspase substrates have been identified. In Huntington disease (HD), caspase 3 specifically cleaves the HD gene product, Huntingtin.[10] High levels of caspase 3 are found in lymphocytes, suggesting it is an important mediator of apoptosis in the immune system.[7] Deletion of CASP-3 gene in mice results in hyperplasia and cell abnormalities, indicating that it may also be essential for morphogenetic cell death during normal brain development.[8] In addition, caspase 3 cleaves caspases 6, 7, and 9.[2,12]

The crystal structure of a recombinant human caspase 3 with a C-terminal His-Tag®, expressed in *E. coli* and purified, has been reported. This recombinant protein spontaneously undergoes auto processing to yield the active heterotetramer, consisting of two 17 kDa and two 12 kDa subunits.[13]

The product is supplied as a solution in 10% glycerol containing 50 mM HEPES, pH 7.4, 100 mM NaCl, 10 mM DTT, 1 mM EDTA, and 0.1% CHAPS.

Activity: ≥1 unit/mg protein
Unit Definition: One unit will hydrolyze one µmole of Ac-Asp-Glu-Val-Asp *p*-nitroanilide per minute at pH 7.4 at 25 °C.

Purity: ≥85% (SDS-PAGE).

Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the safety data sheet for information regarding hazards and safe handling practices.

Storage/Stability

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

References

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