

Product Information

Cholera Toxin A Subunit from *Vibrio cholerae*

Product Number **C 2398**

Storage Temperature 2-8 °C

Product Description

Molecular Weight: Approximately 27.2 kDa

Cholera toxin is a protein secreted during growth in the animal gut by some strains of the bacterium *Vibrio cholerae*.¹ This product is obtained from *Vibrio cholerae* strain Inaba 569B El-tor biotype. Cholera toxin, an enterotoxin (the bowel is the target organ), is the fundamental cause of cholera symptoms.^{1,2}

Cholera toxin consists of two structurally and functionally distinct types of subunits (subunit A and subunit B).³ Subunit A is combined with one to five identical B subunits. The holotoxin consists of a single central A subunit surrounded by a ring of five identical noncovalently associated B subunits with apparent five-fold symmetry.³ Only the holotoxin has efficient biologic activity because subunit A by itself does not cross the cell membrane of target cells.²

Subunit B binds to a cell surface receptor G_{M1} followed by transmembrane transport and subsequent internalization of the entire toxin.² Subunit B by itself does not adversely affect target cells.

Subunit A is initially a single folded peptide with internal disulfide bridges. During secretion, the folded peptide is proteolytically nicked producing two disulfide-linked peptides: A1 (21.8 kDa) and A2 (5.4 kDa). Peptide A2 connects subunit A to the pentameric ring (B subunits) by a single disulfide bridge.² Once Subunit A enters the cytoplasm of a target cell, peptide A1 is released from peptide A2 by disulfide reduction.

Peptide A1 functions enzymatically as an ADP-ribosyltransferase within the target cell. A1 irreversibly activates adenylate cyclase, resulting in many metabolic alterations.^{2,3} Although these cellular metabolic alterations can lead to host death (massive diarrhea and dehydration), they do not kill individual target cells.² Tissue culture cells treated with the toxin are not killed and host tissues do not become necrotic.

Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

Preparation Instructions

This product is soluble in water (1 mg/ml at room temperature and 0.25 mg/ml at 2-8 °C). When this product is reconstituted with water to a final concentration of 0.5 mg protein per ml, the solution will also contain 50 mM Tris buffer, 200 mM NaCl, 3 mM NaN₃, and 1 mM Na₂EDTA, pH 7.5.

Storage/Stability

Do not freeze solutions. Solutions should be stored at 2-8 °C for up to 1 year.

References

1. Rappaport, R. S., et al., Development of a purified cholera toxoid. I. Purification of toxin. Infect. Immun., **9(2)**, 294-303 (1974).
2. Middlebrook, J. L., and Dorland, R. B., Bacterial toxins: cellular mechanisms of action. Microbiol. Rev., **48(3)**, 199-221 (1984).
3. Janicot, M., et al., Activation of rat liver adenylate cyclase by cholera toxin requires toxin internalization and processing in endosomes. J. Biol. Chem., **266(20)**, 12858-12865 (1991).

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