**Cholera Toxin A subunit from Vibrio cholerae**

**Catalog Number C8180**  
**Storage Temperature 2–8 °C**

**Product Description**

Cholera toxin is the virulent factor from *Vibrio cholerae* that leads to severe diarrhea followed by dehydration in humans.\(^1\)\(^2\) Several bacterial toxins are ADP-ribosyltransferases with protein substrates. Many of the substrates ADP-ribosylated by bacterial protein toxins are G-proteins, which are involved in signal transduction and ADP-ribosylation is one of the more significant post translational modifications of proteins. The ADP-ribosylation activity of cholera toxin activates adenylate cyclase, resulting in the production of cyclic AMP by adenylate cyclase, which causes many metabolic alterations.\(^1\)\(^2\)

Cholera toxin belongs to the AB\(_5\)-subunit family of toxins.\(^1\) The native hexameric protein has a molecular mass of ∼85 kDa and contains two subunits. It consists of a single A subunit (∼27.2 kDa), responsible for the ADP-ribosylation activity, and five B subunits (∼11.6 kDa each), which are arranged as a pentameric ring with an apparent 5-fold symmetry and are associated with the cell surface receptor binding and subsequent internalization (transmembrane transport) of the enzymatic component.\(^3\)\(^4\)

A single isoelectric variant of the cholera toxin has been isolated, which crystallizes readily and reproducibly.\(^5\) Cholera toxin has an isoelectric point (pI) of 6.6. Chromatographic properties, however, suggest a cationic surface is exposed at pH 7.0, which apparently resides in the B subunit.\(^6\)

The entire hexameric complex is required for toxic behaviour. Choleragenoid, the intact pentamer of B subunits, interacts with a ganglioside G\(_{M1}\) membrane receptor, but cannot activate adenyl cyclase; whereas, the A subunit alone does not enter the cell.\(^7\)

Due to the effect on adenylate cyclase, cholera toxin and its purified A subunit are frequently used for the study of signal transduction mechanisms. In addition, cholera toxin acts as an adjuvant through the stimulation of B lymphocytes.

The A subunit, synthesized as a single polypeptide, is proteolytically cleaved during secretion from the bacterium to give rise to two disulfide-linked polypeptides, A1 (∼21.8 kDa) and A2 (∼5.4 kDa). It is the A1 fragment of A subunit, released by disulfide reduction, that acts enzymatically within the target cells as an ADP-riboyltransferase.

This product is the cholera toxin A subunit. The product was prepared and packaged using aseptic technique, and sealed under vacuum. The lyophilized powder contains ≤0.5% (SDS-PAGE). When reconstituted with water to a final concentration of 1 mg cholera toxin A subunit per ml, the solution will contain 0.05 M Tris buffer, pH 7.5, 0.2 M NaCl, 3 mM NaN\(_3\), and 1 mM sodium EDTA.

ADP-ribosylation activity is measured by ADP-ribosylation of synthetic poly-L-arginine, following the incorporation of ADP-ribose from [U-\(^14\)C] adenine NAD to TCA precipitable material. One µg of cholera toxin A subunit causes the incorporation of at least 2 pmole of ADP-ribose in 30 minutes at 30 °C.\(^6\)

**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.

**Preparation Instructions**

Cholera toxin is soluble in water at a concentration of 10 mg/ml. Swirl bottles gently during reconstitution. Avoid vigorous pipetting of solutions that may lead to foaming. Solutions can be filtered through a 0.2 µm filter.
**Storage/Stability**

Store the lyophilized product at 2–8 °C. The product, as supplied, is stable 2 years when stored properly.

Store reconstituted solutions at 2–8 °C. The free A subunit precipitates in aqueous solutions at protein concentrations above 10 mg/ml and neutral pH. DO NOT FREEZE.

**References**