Cholera Toxin, B subunit recombinant, expressed in HEK 293 cells

Product Information

Product Number SAE0069
Storage Temperature –20 °C

CAS RN 131096-89-4
Synonyms: CTxB, ToxB, CTB, Cholera enterotoxin subunit B, Cholera enterotoxin B chain, Cholera enterotoxin gamma chain

Product Description
Cholera toxin is the virulent factor from *Vibrio cholera* that leads to severe diarrhea, followed by dehydration, in humans.\(^1,2\) Several bacterial toxins are ADP-ribosyltransferases with protein substrates. Many substrates that are ADP-ribosylated by bacterial protein toxins are G-proteins, which are involved in signal transduction. 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 distinct subunits:

- The single A subunit (~27.2 kDa) is responsible for the ADP-ribosylation activity.
- Five B subunits (~11.6 kDa each) are arranged as a pentameric ring with an apparent 5-fold symmetry. These 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 that a cationic surface is exposed at pH 7.0, which apparently resides in the B subunit.\(^9\)

The entire hexameric complex is required for toxic behavior. 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.\(^7\) Because of its 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 cholera toxin B (CTxB) subunit alone is used for track tracing in neurological research, taking advantage of G\(_{M1}\) ganglioside binding and retrograde transport. Tissue culture cells treated with CTxB are not killed, and animal tissues treated with CTxB do not become necrotic.

CTxB is non-toxic to cells and possesses no intrinsic adenylate cyclase activity. CTxB attaches to cells by binding to ganglioside G\(_{M1}\).\(^8\) As a result, CTxB has been shown to be a good label for microglial cells (because of the enrichment of ganglioside G\(_{M1}\) on their cell surface), but not for oligodendrocytes nor astrocytes.\(^9\)

CTxB has been reported to be an excellent tracer for the study of axonal transport by immunohistochemical methods. CTxB has been widely used as a marker of membrane lipid rafts (membrane microdomains enriched with cholesterol and sphingolipids). These lipid rafts have an important role in cell signaling and protein trafficking.\(^10\)
Recombinant CTxB is expressed in human HEK 293 cells with a C-terminal histidine-tag, with a calculated molecular mass of 13 kDa (amino acids Thr\textsuperscript{22}-Asn\textsuperscript{124}). The advantage of this product over the native CTxB is that it has no traces of Vibrio cholera, and no contamination of the highly toxic Cholera toxin A subunit.

This product is supplied as an aseptically-filled, lyophilized powder. When reconstituted with water to a final concentration of 1 mg of CTxB per mL, the solution will contain 1× PBS.

**Purity**: ≥95% (SDS-PAGE)

The activity is measured by ELISA using G\textsubscript{M1}-coated plates, anti-rabbit CTxB primary antibodies, and peroxidase-labeled goat anti-rabbit IgG as the secondary antibody. Binding saturation of 50% is achieved with ≤1 μg/mL of CTxB.

**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.

**Preparation Instructions**

Briefly centrifuge the vial before opening. Reconstitute in water to a concentration of 0.5–10 mg/mL. Do not vortex. Instead, swirl the vial gently during reconstitution. Avoid vigorous pipetting of solutions, which may lead to foaming. Solutions can be filtered through a 0.2 μm filter.

This solution can be stored at 2–8 °C for up to 1 week. For extended storage, it is recommended to store reconstituted solutions in working aliquots at −20 °C.

**Storage/Stability**

Store the lyophilized product at −20 °C. The product is stable for at least 2 years as supplied.

**References**