

Product Information

Adenylyl Cyclase Toxin from *Bordetella pertussis* recombinant, expressed in *E. coli*

Catalog Number **A0847**
Storage Temperature 2–8 °C

Synonyms: ACT, CyaA

Product Description

Recombinant Adenylate Cyclase Toxin (ACT) from *Bordetella pertussis* is expressed in *E. coli*. ACT is a bifunctional endotoxin that increases intracellular cAMP levels in mammalian cells. Native ACT is produced by a very small Gram-negative aerobic coccobacillus, *Bordetella pertussis*. The organism is a pathogen in humans and higher primates.

ACT is a single polypeptide A/B type bacterial toxin characterized by its ability to penetrate and interact with target mammalian cells.¹ The primary activities are restricted to two domains of the toxin. The calmodulin-dependent catalytic domain (first 400 amino acid residues from the N-terminal) promotes non-receptor-mediated endocytosis. In the presence of calcium, the internalized toxin disrupts signal transduction mechanisms in cells via the accumulation of cAMP, a major intracellular messenger derived from host cell ATP.²

The hemolytic domain, or fatty-acetylated C-terminal domain, mediates pore formation and leads to the penetration of the toxin and hemolysis of the cells, thus, indicating the involvement of this domain in protein-protein interactions.³

Based on the carboxyl terminal, glycine-rich repeat, and calcium binding region, the cloned and sequenced ACT shares homologies with RTX family of hemolysins and leukotoxins of Gram-negative bacteria.⁴ Mass spectrometric studies of this protein have been published.⁵

Molecular mass: 177 kDa (amino acid sequence)

Adenylate cyclase toxin is supplied as a lyophilized powder.

Specific activity: ≥50 units/mg protein

Unit definition: One unit will produce 1.0 μmole cAMP from ATP per minute at pH 8.0 at 30 °C.

Purity: ≥70% (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.

Preparation Instructions

When reconstituted with 50 μl of water, the protein is in a solution of 0.05 M Tris buffer with 8 M urea and 0.002 M EDTA, pH 8.0.

Storage/Stability

Store the lyophilized product at 2–8 °C.

After reconstitution, store in frozen aliquots at –20 °C at a concentration of at least 100 μg protein/ml.

References

1. Weiss, A.A., and Hewlett, E.L., Virulence factors of *Bordetella pertussis*. Annu.Rev. Microbiol., **40**, 661-686 (1986).
2. Iwaki, M., et al., Stimulation of *Bordetella pertussis* adenylate cyclase toxin intoxication by its hemolysin domain. Infect. Immun., **68**, 3727-3730 (2000).
3. Benz, R., et al., Adenylate cyclase toxin (CyaA) of *Bordetella pertussis*. Evidence for the formation of small ion-permeable channels and comparison with HlyA of *Escherichia coli*. J. Biol. Chem., **269**, 27231-27239 (1994).
4. Glaser, P., et al., The calmodulin-sensitive adenylate cyclase of *Bordetella pertussis*: cloning and expression in *Escherichia coli*. Mol. Microbiol., **2**, 19-30 (1988).
5. Havlicek, V., et al., Mass spectrometric analysis of recombinant adenylate cyclase toxin from *Bordetella pertussis* strain. J. Mass Spectrom., **36**, 384-391 (2001).

RC,KAA,JEK,MAM 10/14-1