

Product Information

Cardiotoxin I from *Naja naja atra*

Product Number **C 3987**
Storage Temperature -0°C

Synonyms: CTX1

Product Description

Cardiotoxin I from *Naja naja atra* (Chinese or Taiwan cobra) is a 60 amino acid protein isolated from the snake venom.¹ It has a molecular weight of 6,693 Da and a calculated pI of 9.0. The protein contains four intrachain disulfide bonds between C³-C²¹, C¹⁴-C³⁸, C⁴²-C⁵³, and C⁵⁴-C⁵⁹. Reducing agents cause a complete loss of activity. The E₂₈₀ of a 1 mg/ml solution is 2.51. The LD₅₀ is reported to be 2.8 μg/g in mice (i.v.).

Cardiotoxin I is the component of the snake venom that is responsible for skeletal muscle necrosis.² It also induces increases in capillary permeability that can be prevented by histamine H₁-receptor blockers, such as dephenhydramin, promethazine and cyproheptadine. This indicates that cardiotoxin may induce histamine release.^{3,4}

Structurally, the cardiotoxins in *Naja naja atra* venom are composed of three extended β-sheet loops, and are similar in structure to the venom neurotoxins. However, the cellular targets and membrane interactions of the cardiotoxins are not as well understood as those of the neurotoxins. Cardiotoxin I is an S-type cardiotoxin, defined by the serine residue at position 29. P-type cardiotoxins have a proline residue at position 31. The two types of cardiotoxins differ in their binding characteristics to lysophosphatidylcholine micelles. P-type cardiotoxins have two lipid-binding sites and exhibit higher fusion, binding and hemolytic activity than S-type cardiotoxins. S-type cardiotoxins, in general, have only one lipid-binding site and were found to have higher muscle cell depolarization activity.⁵

Precautions and Disclaimer

This product is for laboratory research use only. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions

Cardiotoxin I from *Naja naja atra* is readily soluble in water.

Storage/Stability

Cardiotoxin I is very stable and should be stored as supplied at -0°C .

References

1. Hayashi, K., et al., Amino acid sequence of cardiotoxin-analogue I from the venom of *Naja naja atra*. *Biochem Biophys Res Commun.* **64**,360-366 (1975).
2. Ownby CL., et al., Cardiotoxin 1 from cobra (*Naja naja atra*) venom causes necrosis of skeletal muscle in vivo. *Toxicon.*, **31**, 697-709 (1993).
3. Miller RA., et al., Factors in snake venoms that increase capillary permeability. *J. Pharm. Pharmacol.*, **41**, 792-4 (1989).
4. Wang., J.P., and Teng, C.M. Roles of mast cells and PMN leukocytes in cardiotoxin-induced rat paw edema. *Eur. J. Pharmacol.* **161**, 9-18 (1989).
5. Chien KY., et al., Two distinct types of cardiotoxin as revealed by the structure and activity relationship of their interaction with zwitterionic phospholipid dispersions. *J Biol Chem.*, **269**,194473-194483 (1994).

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