Shiga Toxin Type 1 Toxoid, Recombinant from *Escherichia coli*

**Catalog No. NR-858**
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**For research use only. Not for human use.**

**Contributor and Manufacturer:**
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**Product Description:**
The Shiga toxin (Stx) family refers to two types of related toxins: Shiga toxin type 1 (Stx1, Shiga-like toxin 1, or verotoxin 1) and Shiga toxin type 2 (Stx2, Shiga-like toxin 2, or verotoxin 2). Stx1 is almost identical to Shiga toxin produced by *Shigella dysenteriae* at the nucleotide sequence level, while Stx2 shares approximately 55% overall nucleotide sequence homology with Stx1 and Shiga toxin. Shiga toxins are multimeric molecules that are comprised of two polypeptide subunits, A and B. The B subunit is a pentamer that binds the toxin to glycolipids on host cell membranes and the entire toxin molecule can then enter the cell via endocytosis. Once inside the cell, the A subunit undergoes proteolytic cleavage and the reduction of an internal disulfide bond to generate Stx A₁ and Stx A₂. Stx A₁ is an N-glycosidase that catalytically inactivates the 28S ribosomal RNA subunit to inhibit protein synthesis.

The sequences of the structural genes for Shiga toxin from *Shigella dysenteriae* and Shiga toxin type 1 from *E. coli* have been determined. The crystal structure of Shiga toxin from *Shigella dysenteriae* has been solved (PDB: 1DM0). NR-858 is a recombinant toxoid of Shiga toxin type 1 (Stx1) with genetic mutations in the catalytic A subunit which render the protein non-toxic. The recombinant A subunit includes an N-terminal hexa-histidine tag. The recombinant B subunit contains a C-terminal hexa-histidine tag. The recombinant protein was expressed in *Escherichia coli* and purified by nickel affinity chromatography. NR-858 has a theoretical molecular weight of approximately 33534 daltons for subunit A and 8513 daltons for subunit B. The predicted amino acid sequence of NR-858 is shown below in Table 1 (Subunit A) and Table 2 (Subunit B).

**Material Provided:**
Each vial of NR-858 contains approximately 50 µg of recombinant Stx1 toxoid suspended in phosphate buffered saline (pH 7.4). The concentration, expressed as mg per mL, is shown on the Certificate of Analysis.

**Packaging/Storage:**
NR-858 was packaged aseptically in plastic cryovials. The product is provided frozen on dry ice and should be stored at -70°C or colder immediately upon arrival. Note: The label for lot 57680169 incorrectly indicates that it should be stored at -20°C or colder. Repeated freeze-thaw cycles should be avoided.

**Functional Activity:**
NR-858 reacts with rabbit polyclonal antibody to Shiga toxin type 1 and is not toxic to Vero cells.

**Citation:**
Acknowledgment for publications should read “The following reagent was obtained through the NIH Biodefense and Emerging Infections Research Resources Repository, NIAID, NIH: Shiga Toxin Type 1 Toxoid, Recombinant from *Escherichia coli*, NR-858.”

**Biosafety Level:** 1

**Disclaimers:**
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References:

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Table 1 – Predicted Protein Sequence for Stx1 Subunit A

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<th>MRGSHHHHHH GSKEFTLDFS TAKTYVDSLN VIRSAIGTPL QTISSGGTSL</th>
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*Mutagenized catalytic residues Y89S and E179Q (based on the recombinant sequence above).
Non-shiga toxin residues are underlined. The recombinant protein does not contain signal peptide residues.

Table 2 – Predicted Protein Sequence for Stx1 Subunit B

<table>
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<tr>
<th></th>
<th>TPDCVTGKVE YTKYNNDDTTF TVKVGDKELF TNRWNLQSLL LSAQITGMTV</th>
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<tr>
<td>51</td>
<td>TIKTNAHNG GGFSEVIRHR HHHHH</td>
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Non-shiga toxin residues are underlined. The recombinant protein does not contain signal peptide residues.