

Abrin Toxin, B Subunit with N-Terminal Histidine Tag, Recombinant from *Escherichia coli*

Catalog No. NR-51637

This reagent is the tangible property of the U.S. Government.

For research use only. Not for use in humans.

Contributor and Manufacturer:

BEI Resources

Product Description:

A recombinant form of the abrin subunit linker and abrin-a toxin subunit B (GenPept: [AAB25434](#)) was produced in *Escherichia coli* and purified under denaturing conditions using immobilized metal affinity chromatography. NR-51637 contains an N-terminal hexa-histidine tag and TEV protease cleavage site, as well as the abrin subunit linker and abrin-a B subunit (268 residues). The predicted protein sequence is shown in Figure 1. NR-51637 has a theoretical molecular weight of 33,154 daltons. The crystal structure of abrin-a has been solved at 2.14 Å resolution (PDB: [1ABR](#)).¹

Abrus precatorius (*A. precatorius*) is commonly known by a variety of names including: rosary pea, jequirity, Crab's eye, precatory pea or bean, John Crow Bead, Indian licorice, Akar Saga, gidee gidee or Jumbie bead. It is a vine, native to the Old World tropics, but now known to grow throughout the tropical and subtropical areas of the world. The plant is best known for its seeds, which are toxic due to the presence of abrin toxin.² Abrin toxin is a member of the ribosome inactivating protein (RIP) family of toxins, which specifically and irreversibly inhibit protein synthesis in eukaryotic cells by enzymatically altering the 28S rRNA of the large 60S ribosomal subunit. Most RIPs are produced by plants and are thought to represent a defense mechanism against viral or parasitic attacks.³

Abrin is a type II RIP comprised of a catalytically active A subunit and a disulfide-linked lectin-like B subunit. There are four isoforms of abrin produced by *A. precatorius*: abrin-a, -b, -c and -d.¹ The abrin polypeptide is translated with the A and B subunits linked by approximately 10 residues that are removed by proteolytic cleavage during post-translational processing.⁴ The A subunit harbors the RNA N-glycosidase activity and the B subunit is responsible for the binding and trafficking of the toxin in cells.⁵ The overall protein fold is similar to ricin, but the secondary structure of the A subunit shows some differences. The B subunit displays the positions of several sugar residues linked to predicted glycosylation sites.^{1,6}

Material Provided:

Each vial contains purified recombinant abrin B subunit in 20 mM Tris, pH 8.0, 500mM NaCl, 9% glycerol, 0.45% CHAPS, 0.9 mM dithiothreitol (DTT) and 0.8 M urea. The concentration and volume are shown on the Certificate of Analysis.

Packaging/Storage:

NR-51637 was packaged aseptically in screw-capped plastic cryovials. The product is shipped frozen on dry ice and should be stored at -20°C or colder immediately upon arrival.

Functional Activity:

NR-51637 is reactive with anti-ricin polyclonal antiserum, BEI Resources NR-862, on western blots. Abrin shares some similarities to ricin and cross-reactivity is expected.⁶

Citation:

Acknowledgment for publications should read "The following reagent was obtained through BEI Resources, NIAID, NIH: Abrin Toxin, B Subunit with N-Terminal Histidine Tag, Recombinant from *Escherichia coli*, NR-51637."

Biosafety Level: 1

Appropriate safety procedures should always be used with this material. Laboratory safety is discussed in the following publication: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health. Biosafety in Microbiological and Biomedical Laboratories. 6th ed. Washington, DC: U.S. Government Printing Office, 2020; see www.cdc.gov/biosafety/publications/bmb15/index.htm.

Disclaimers:

You are authorized to use this product for research use only. It is not intended for human use.

Use of this product is subject to the terms and conditions of the BEI Resources Material Transfer Agreement (MTA). The MTA is available on our Web site at www.beiresources.org.

While BEI Resources uses reasonable efforts to include accurate and up-to-date information on this product sheet, neither ATCC® nor the U.S. Government makes any warranties or representations as to its accuracy. Citations from scientific literature and patents are provided for informational purposes only. Neither ATCC® nor the U.S. Government warrants that such information has been confirmed to be accurate.

This product is sent with the condition that you are responsible for its safe storage, handling, use and disposal. ATCC® and the U.S. Government are not liable for any damages or injuries arising from receipt and/or use of this product. While reasonable effort is made to ensure authenticity and reliability of materials on deposit, the U.S. Government, ATCC®, their suppliers and contributors to BEI Resources are not liable for damages arising from the misidentification or misrepresentation of products.

Use Restrictions:

This material is distributed for internal research, non-commercial purposes only. This material, its product or its derivatives may not be distributed to third parties. Except as performed under a U.S. Government contract, individuals contemplating commercial use of the material, its products or

its derivatives must contact the contributor to determine if a license is required. U.S. Government contractors may need a license before first commercial sale.

References:

1. Tahirov, T. H., et al. "Crystal Structure of Abrin-a at 2.14 Å." *J. Mol. Biol.* 250 (1995): 354-67. PubMed: 7608980. Erratum in *J. Mol. Biol.* 252 (1995): 154.
2. Gul, M. Z. et al., "Antioxidant and Antiproliferative Activities of *Abrus precatorius* Leaf Extracts - An *in vitro* Study." *BMC Complement. Altern. Med.* 13 (2013): 53. PubMed: 23452983.
3. Walsh, M. J., J. E. Dodd and G. M. Hautbergue. "Ribosome-Inactivating Proteins: Potent Poisons and Molecular Tools." *Virulence* 4 (2013): 774-784. PubMed: 24071927.
4. Hung, C.-H., et. al. "Primary Structure of Three Distinct Isoabrinins Determined by cDNA Sequencing." *J. Mol. Biol.* 229 (1993): 263-267. PubMed: 8421313.
5. Bagaria, S., et al. "Mechanistic Insights into the Neutralization of Cytotoxic Abrin by the Monoclonal Antibody D6F10." *PLoS One* 29 (2013): e70273. PubMed: 23922965.
6. Kimura, M., T. Sumizawa and G. Funatsu. "The Complete Amino Acid Sequences of the B-Chains of Abrin-a and Abrin-b, Toxic Proteins from the Seeds of *Abrus precatorius*." *Biosci. Biotechnol. Biochem.* 57 (1993): 166-169. PubMed: 7763422.

ATCC® is a trademark of the American Type Culture Collection.



Figure 1: Predicted Protein Sequence

```

1  MHHHHHHEENL YFQGAIANQS PLLIRSIIVEK SKICSSRYEP TVRIGGRDGM CVDVYDNGYH
61  NGNRIIMWKC  KDRLEENQLW  TLKSDKTIRS  NGKCLTTYGY  APGSYVMIYD  CTSAVAEATY
121 WEIWDNGTII  NPKSALVLSA  ESSSMGGTLT  VQTNEYLMRQ  GWRTGNNTSP  FVTSISGYSD
181 LCMQAQGSNV  WMADCDSNKK  EQQWALYTDG  SIRSVQNTNN  CLTSKDHKQG  STILLMGCSN
241 GWASQRWVFK  NDGSIYSLYD  DMVMDVKGSD  PSLKQIILWP  YTGKPNQIWL  TLF
    
```

Hexa-histidine tag – Residues 2 to 7

TEV cleavage site – Residues 8 to 13

Plasmid-based residues – Residues 14 to 16

Abrin subunit linker – Residues 17 to 25

Abrin B subunit – Residues 26 to 293 (representing residues 1 to 268)