

DESCRIPTION

Source *E. coli*-derived human Noggin protein
Gln28 - Cys232 with an N-terminal Met
Accession # Q13253.1
Produced using non-animal reagents in an animal-free laboratory.

N-terminal Sequence Analysis Met-Gln28

Structure / Form Disulfide-linked homodimer

Predicted Molecular Mass 23 kDa (monomer)

SPECIFICATIONS

SDS-PAGE 27 kDa, under reducing conditions.

Activity Measured by its ability to inhibit BMP-4-induced alkaline phosphatase production by ATDC5 mouse chondrogenic cells. The ED₅₀ for this effect is 0.0200-0.240 µg/mL.

Endotoxin Level <0.10 EU per 1 µg of the protein by the LAL method.

Purity >97%, by SDS-PAGE visualized with Silver Staining and quantitative densitometry by Coomassie® Blue Staining.

Formulation Lyophilized from a 0.2 µm filtered solution in Sodium Acetate with Trehalose. See Certificate of Analysis for details.

PREPARATION AND STORAGE

Reconstitution Reconstitute at 500 µg/mL in water.

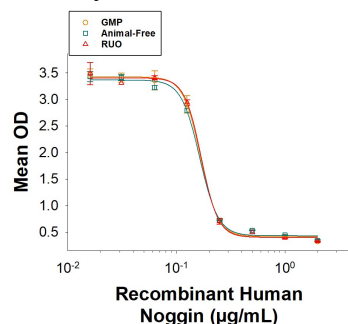
Shipping The product is shipped with polar packs. Upon receipt, store it immediately at the temperature recommended below.

Stability & Storage Use a manual defrost freezer and avoid repeated freeze-thaw cycles.

- 12 months from date of receipt, -20 to -70 °C as supplied.
- 1 month, 2 to 8 °C under sterile conditions after reconstitution.
- 3 months, -20 to -70 °C under sterile conditions after reconstitution.

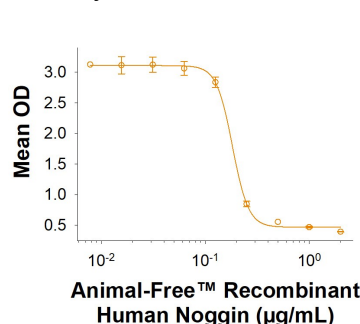
DATA

Bioactivity



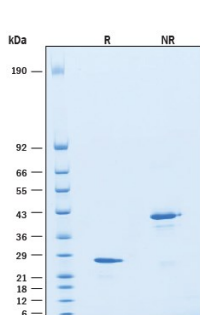
Equivalent Bioactivity of GMP, Animal-Free, and RUO grades of Recombinant Human Noggin. Equivalent bioactivity of GMP (Catalog # BT-NOG-GMP), Animal-Free (Catalog # BT-NOG-AFL) and RUO (Catalog # BT-NOG) grades of Recombinant Human Noggin as measured by their ability to inhibit BMP-4-induced alkaline phosphatase production by ATDC5 mouse chondrogenic cells (orange, green, red, respectively).

Bioactivity



Animal-Free™ Recombinant Human Noggin Protein Bioactivity. Animal-Free™ Recombinant Human Noggin Protein (Catalog # BT-NOG-AFL) inhibits Recombinant Human BMP-4 (Catalog # 314-BP) induced alkaline phosphatase production in the ATDC5 mouse chondrogenic cell line. The ED₅₀ for this effect is 0.0200-0.240 µg/mL.

SDS-PAGE



Animal-Free™ Recombinant Human Noggin Protein SDS-PAGE. 2 µg/lane of Animal-Free™ Recombinant Human Noggin Protein (Catalog # BT-NOG-AFL) was resolved with SDS-PAGE under reducing (R) and non-reducing (NR) conditions and visualized by Coomassie® Blue staining, showing bands at 27 kDa and 43 kDa, respectively.

BACKGROUND

Noggin is a secreted homodimeric glycoprotein that is an antagonist of bone morphogenetic proteins (BMPs) (1, 2). Human Noggin cDNA encodes a 232 amino acid (aa) precursor protein; cleavage of a 19 aa signal peptide generates the 213 aa mature protein which contains an N-terminal acidic region, a central basic heparin-binding segment and a C-terminal cysteine-knot structure (2). Secreted Noggin probably remains close to the cell surface due to its binding of heparin-containing proteoglycans (3). Noggin is very highly conserved among vertebrates, such that mature human Noggin shares 99%, 99%, 98%, 97% and 89% aa sequence identity with mouse, rat, bovine, equine and chicken Noggin, respectively. Noggin binds some BMPs such as BMP-4 with high affinity and others such as BMP-7 with lower affinity. It antagonizes BMP bioactivities by blocking epitopes on BMPs that are needed for binding to both type I and type II receptors (2, 4). During embryogenesis, Noggin antagonizes specific BMPs at defined times, for example, during neural tube, somite and cardiomyocyte growth and patterning (5-7). During skeletal development, Noggin prevents chondrocyte hyperplasia, thus allowing proper formation of joints (4). Mutations within the cysteine-knot region of human Noggin are linked to multiple types of skeletal dysplasias that result in apical joint fusions (8). Noggin is expressed in defined areas of the adult central nervous system and peripheral tissues such as lung, skeletal muscle and skin (1). During culture of human embryonic stem cells (hESC) or neural stem cells under certain conditions, addition of Noggin to antagonize BMP activity may allow stem cells to proliferate while maintaining their undifferentiated state, or alternatively, to differentiate into dopaminergic neurons (6, 9-13). Noggin also appears to maintain adult stem cell populations *in-vivo*, for example, maintaining neural stem cells within the hippocampus (13).

References:

1. Valenzuela, D.M. *et al.* (1995) J. Neurosci. **15**:6077.
2. Groppe, J. *et al.* (2002) Nature **420**:636.
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4. Brunet, L. J. *et al.* (1998) Science **280**:1455.
5. McMahon, J. A. *et al.* (1998) Genes Dev. **12**:1438.
6. Itsykson, P. *et al.* (2005) Mol. Cell. Neurosci. **30**:24.
7. Yuasa, S. *et al.* (2005) Nat. Biotechnol. **23**:607.
8. Gong, Y. *et al.* (1999) Nat. Genet. **21**:302.
9. Xu, R.-H. *et al.* (2005) Nat. Methods **2**:185.
10. Wang, G. *et al.* (2005) Biochem. Biophys. Res. Commun. **330**:934.
11. Chaturvedi, G. *et al.* (2009) Cell Prolif. **42**:425.
12. Chiba, S. *et al.* (2008) Stem Cells **26**:2810.
13. Bonaguidi, M.A. *et al.* (2008) J. Neurosci. **28**:9194.

MANUFACTURING SPECIFICATIONS

Animal-Free Manufacturing Conditions

Our dedicated controlled-access animal-free laboratories ensure that at no point in production are the products exposed to potential contamination by animal components or byproducts. Every stage of manufacturing is conducted in compliance with R&D Systems' stringent Standard Operating Procedures (SOPs). Production and purification procedures use equipment and media that are confirmed animal-free.

Production

- All molecular biology procedures use animal-free media and dedicated labware.
- Dedicated fermentors are utilized in committed animal-free areas.

Purification

- Protein purification columns are animal-free.
- Bulk proteins are filtered using animal-free filters.
- Purified proteins are stored in animal-free containers in a dedicated cold storage room.

Quality Assurance

- Low Endotoxin Level.
- No impairment of biological activity.
- High quality product obtained under stringent conditions.
- For *ex vivo* research or bioproduction, [additional documentation](#) can be provided.

[Please read our complete Animal-Free Statement](#)