

**DESCRIPTION**

**Source** *E. coli*-derived GDF-11/BMP-11 protein  
Asn299-Ser407, with an N-terminal Met  
Accession # O95390  
Manufactured and tested under cGMP guidelines.

**N-terminal Sequence Analysis** Met-Asn<sub>299</sub>-Leu-Gly-Leu-Asp-(Cys)-Asp-Glu-His

**Structure / Form** Disulfide-linked homodimer

**Predicted Molecular Mass** 12.6 kDa (monomer)

**SPECIFICATIONS**

**SDS-PAGE** 12 kDa, reducing conditions

**Activity** Measured by its ability to induce hemoglobin expression in K562 human chronic myelogenous leukemia cells. Schwall, R.H. *et al.* (1991) *Method Enzymol.* **198**:340.  
The ED<sub>50</sub> for this effect is 0.8-4.8 ng/mL.

**Endotoxin Level** <0.01 EU per 1 µg of the protein by the LAL method.

**Purity** >95%, by SDS-PAGE visualized with Silver Staining and quantitative densitometry by Coomassie® Blue Staining.

**Host Cell Protein** < 0.5 ng per µg of protein when tested by ELISA.

**Mycoplasma** Negative when tested in a ribosomal RNA hybridization assay.

**Formulation** Lyophilized from a 0.2 µm filtered solution in Acetonitrile and TFA. See Certificate of Analysis for details.

**PREPARATION AND STORAGE**

**Reconstitution** Reconstitute at 100 µg/mL in 4 mM HCl.

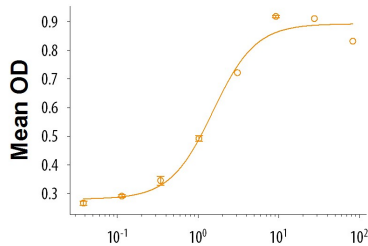
**Shipping** The product is shipped at ambient temperature. Upon receipt, store it immediately at the temperature recommended below.

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

- A minimum of 12 months when stored at ≤ -20 °C as supplied. Refer to lot specific COA for the Use by Date.
- 1 month, 2 to 8 °C under sterile conditions after reconstitution.
- 3 months, ≤ -20 °C under sterile conditions after reconstitution.

**DATA**

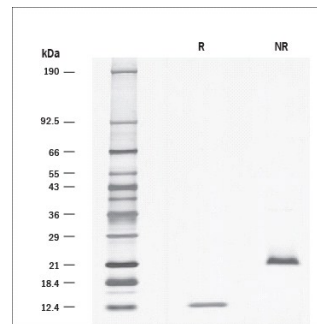
**Bioactivity**



Human/Mouse/Rat GDF-11/BMP-11 (ng/mL)

GMP-grade Recombinant Human/Mouse/Rat GDF-11/BMP-11 (Catalog # 1958-GMP) induces hemoglobin expression in the K562 human chronic myelogenous leukemia cell line. The ED<sub>50</sub> for this effect is 0.8-4.8 ng/mL.

**SDS-PAGE**



1 µg/lane of GMP-grade Recombinant Human/Mouse/Rat GDF-11/BMP-11 (Catalog # 1958-GMP) was resolved with SDS-PAGE under reducing (R) and non-reducing (NR) conditions and visualized by silver staining, showing R band at 13 kDa and NR band at 22 kDa, respectively.

## BACKGROUND

Growth Differentiation Factor 11 (GDF-11), also known as BMP-11, is a member of the TGF- $\beta$  superfamily and is highly related to GDF-8. GDF-11 encodes a 407 amino acid (aa) prepropeptide which contains a signal sequence for secretion and an RXXR proteolytic processing site to yield a 109 aa residue carboxy-terminal mature protein (1). Mature GDF-11 contains the canonical 7-cysteine motif common to other TGF- $\beta$  superfamily members; however, like the TGF- $\beta$ s, Activins and GDF-8, GDF-11 also contains one extra pair of cysteine residues. At the amino acid sequence level, mature human, mouse, rat and chicken GDF-11 are 99-100% identical. GDF-11 and GDF-8 share 90% amino acid sequence identity within the mature protein. As detected by in situ hybridization, GDF-11 is expressed in diverse regions of the mouse embryo: tailbud, somitic precursors, limbs, mandibular and branchial arches, dorsal neural tube, odontoblasts, nasal epithelium, and particular regions of the brain (1, 2). Targeted deletion of GDF-11, in mice, results in a spectrum of abnormalities including palatal malformation, vertebral defects, elongated trunks with a reduced or absent tail, missing or malformed kidneys, and an increased number of neurons in the olfactory epithelium (2-5). GDF-11 signals through the Activin type II receptors and induces phosphorylation of Smad2 to mediate axial patterning (6). Systemic GDF-11 levels decline with age and administration of higher levels of GDF-11 can reverse age-related cardiac hypertrophy (7). In addition, systemic administration of recombinant GDF-11 protein restores genomic integrity and health of muscle stem cells, neurovasculature and enhances neurogenesis (8, 9). R&D Systems recombinant GDF-11 preparations have been shown to act similarly to GDF-8 in both the Xenopus animal cap and the K562 assays.

## References:

1. Gamer, L.W. *et al.* (1999) *Dev. Biol.* **208**: 222.
2. Nakashima, M. *et al.* (1999) *Mech. Dev.* **80**:185.
3. Gad, J.M. and P.P.L. Tam (1999) *Curr. Biol.* **9**:R783.
4. McPherron, A.C. *et al.* (1999) *Nat. Genet.* **22**:260.
5. Esquela, A.F. and S.J. Lee (2003) *Dev. Biol.* **257**:356.
6. Oh, S.P. *et al.* (2002) *Genes & Dev.* **16**:274.
7. Loffredo, F.S. *et al.* (2013) *Cell.* **153**:828.
8. Katsimpardi, L. *et al.* (2014) *Science* (ahead of print).
9. Sinha, M. *et al.* (2014) *Science* (ahead of print).

## MANUFACTURING SPECIFICATIONS

### GMP Proteins

R&D Systems, a Bio-Techne Brand's GMP proteins are produced according to relevant sections of the following documents: WHO TRS, No. 822, 1992 Annex 1, Good Manufacturing Practices for Biological Products; USP Chapter 1043, Ancillary Materials for Cell, Gene and Tissue-Engineered Products and USP Chapter 92, Growth Factors and Cytokines Used in Cell Therapy Manufacturing.

R&D Systems' quality focus includes:

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- Personnel training programs
- Raw material testing and vendor qualification/monitoring
- Fully validated equipment, processes and test methods
- Equipment calibration schedules using a computerized calibration program
- Facility maintenance, safety programs and pest control
- Material review process for variances
- Monitoring of stability over product shelf-life

R&D Systems strives to provide our customers with the analytical characteristics of each product so that customers may determine whether our products are appropriate for their research. The Certificate of Analysis provided contains the following lot specific information:

- N-terminal amino acid analysis, SDS-PAGE analysis, and endotoxin level (as determined by LAL assay) performed on each bulk QC lot, not on individual bottlings of each QC lot
- Post-bottling lot-specific bioassay results (compliance with an established range) and results of microbial bioburden testing (using broth culture, Sabourand's dextrose and blood agar plates with results reported at 3 days and at 7 days)
- Host Cell Protein testing performed by ELISA
- Mycoplasma testing by ribosomal RNA hybridization assay

Additional testing and documentation requested by the customer can be arranged at an additional cost. Testing may include, but is not limited to, USP< 61> bioburden testing, positive identity testing, testing for adventitious agents and testing for residual host cell content.

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