

DESCRIPTION

Source *E. coli*-derived human Nodal protein
His238-Leu347, with an N-terminal Met
Accession # Q96S42

N-terminal Sequence Analysis Met

Structure / Form Disulfide-linked homodimer

Predicted Molecular Mass 12.9 kDa (monomer)

SPECIFICATIONS

Activity Measured by its ability to induce Smad2 phosphorylation in P19 mouse embryonal carcinoma cells. Yeo, C. *et al.* (2001) *Mol. Cell.* 7:949. Approximately 100 ng/mL of Recombinant Human Nodal can effectively induce Smad2 phosphorylation.

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

Purity >97%, by SDS-PAGE under reducing conditions and visualized by silver stain.

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 sterile 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.**

- 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.

BACKGROUND

Nodal is a 13 kDa member of the TGF-β superfamily of molecules (1-3). Its name derives from the fact that it is expressed in the primitive node of the developing embryo. In human, it is synthesized as a 347 amino acid (aa) preproprecursor that contains a 26 aa signal sequence, a 211 aa prodomain, and a 110 aa mature region (4, 5). Consistent with its TGF-β superfamily membership, it exists as a disulfide-linked homodimer and would be expected to demonstrate a cysteine-knot motif (1, 5, 6). Mature human Nodal is 99%, 98%, 96% and 98% aa identical to mature canine, rat, bovine and mouse Nodal, respectively. Nodal signals through two receptor complexes, both of which contain members of the TGF-β family of Ser/Thr kinase receptors. The first receptor complex is composed of ActRIB/ALK4 and ActRIIB. Nodal interaction with the ligand-binding subunit ALK4 requires the participation of fucosylated Cripto, a member of the EGF-CFC gene family. The second complex is composed of ALK7 and ActRIIB, and does not require Cripto interaction (7-9). Nodal signaling is regulated by a number of inhibitors. Nodal is reported to form non-signaling disulfide-linked heterodimers with BMP-3, -4 and -7 (2, 6). There are also at least three secreted factors that block Nodal activation of its receptor. The first is Cerberus, a member of the DAN family of proteins. The last two are TGF-β family members named Lefty-A and B (2, 11). The exact mechanisms employed are unclear, but Leftys are apparently induced by nodal and can work at a considerable distance from their origin (2). Nodal is known to induce both mesoderm and endoderm, participate in anterior-posterior positioning, and through ALK7, induce apoptosis in susceptible cell populations (2, 8, 12).

References:

1. Kishigami, S. and Y. Mishina (2005) *Cytokine Growth Factor Rev.* 16:265.
2. Schier, A.F. (2003) *Annu. Rev. Cell Dev. Biol.* 19:589.
3. Whitman, M. and M. Mercola (2001) *Sci. STKE.* Jan 9;(64):RE1.
4. Gebbia, M. *et al.* (1997) *Nat. Genet.* 17:305.
5. Hart, A.H. *et al.* (2005) *Biochem. Biophys. Res. Commun.* 333:1361.
6. Yeo, C-Y. and M. Whitman (2001) *Mol. Cell.* 7:949.
7. Yan, Y-T. *et al.* (2002) *Mol. Cell. Biol.* 22:4439.
8. Munir, S. *et al.* (2004) *J. Biol. Chem.* 279:31277.
9. Shen, M.M. and A.F. Schier (2000) *Trends Genet.* 16:303.
10. Lah, M. *et al.* (1999) *Genomics* 55:364.
11. Kosaki, K. *et al.* (1999) *Am. J. Hum. Genet.* 64:712.
12. Zhou, X. *et al.* (1993) *Nature* 361:543.