

**DESCRIPTION**

**Source** Mouse myeloma cell line, NS0-derived  
Cys25-Phe222, with a C-terminal 10-His tag  
Accession # CAC05586

**N-terminal Sequence Analysis** Cys25

**Predicted Molecular Mass** 23.5 kDa

**SPECIFICATIONS**

**SDS-PAGE** 25-35 kDa, reducing conditions

**Activity** Measured by its ability to inhibit BMP-6-induced alkaline phosphatase production by ATDC5 mouse chondrogenic cells.  
The ED<sub>50</sub> for this effect is 1-4 µg/mL in the presence of 150 ng/mL of Recombinant Human BMP-6 (Catalog # 507-BP).

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

**Purity** >95%, by SDS-PAGE under reducing conditions and visualized by silver stain.

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

**PREPARATION AND STORAGE**

**Reconstitution** Reconstitute at 100 µg/mL in sterile PBS.

**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**

Twisted Gastrulation-1 (TSG or TWSG1) is a cysteine-rich 24 kDa secreted glycoprotein that regulates BMP signaling (1, 2). It was initially identified for its role in dorsal/ventral patterning in *Drosophila* and *Xenopus* (1). Mouse TSG cDNA encodes 223 amino acids (aa) including a 25 aa signal peptide and a 198 aa mature protein with a cysteine-rich region (aa 26 - 77) that interacts with BMPs and a C-terminal binding site for chordin (1, 3). Mouse TSG shares 98% aa identity with human, rat, canine, equine, bovine and porcine TSG. TSG can act as either an antagonist or an agonist for BMP signaling (1 - 10). As an antagonist, the N-terminal domain of TSG can bind and inhibit BMP proteins directly, interfering with BMP receptor binding and activity (1, 4). Formation of a complex of TSG with chordin further enhances BMP inhibition (1, 4). As a BMP agonist, TSG promotes TLL-1 metalloproteinase cleavage of chordin to fragments that no longer inhibit BMP activity (3, 5). TSG effects on chordin are influenced by its concentration (2). TSG is widely expressed in the mouse embryo, and is co-expressed with chordin and BMPs 2, 4 and 7 in the developing limbs (1). Mice lacking TSG show varying degrees of abnormality in bone, cartilage, forebrain, thymus and spleen, in part dependent on the mouse background (2, 5 - 8). In bone, TSG participates with crossveinless-2 (CV-2) to create BMP activity gradients and limit osteoclast differentiation (6, 7). Postnatally, TSG is strongly expressed in growth plate cartilage where it limits collagen expression and enhances osteoblast differentiation and endochondral ossification (2, 4). TSG also modulates BMP and TGF-β signaling in thymocytes, T cells and early erythrocytes (9 - 11).

**References:**

1. Scott, I.C. *et al.* (2001) *Nature* **410**:475.
2. Gazzerro, E. *et al.* (2006) *Bone* **39**:1252.
3. Oelgeschlager, M. *et al.* (2003) *Development* **130**:4047.
4. Schmidl, M. *et al.* (2006) *J. Biol. Chem.* **281**:31790.
5. Zakin, L. and E.M. De Robertis (2004) *Development* **131**:413.
6. Sotillo Rodriguez, J.E. (2009) *J. Bone Miner. Res.* **24**:1917.
7. Zakin, L. *et al.* (2008) *Dev. Biol.* **323**:6.
8. Nosaka, T. *et al.* (2003) *Mol. Cell. Biol.* **23**:2969.
9. Graf, D. *et al.* (2002) *J. Exp. Med.* **196**:163.
10. Tzachanis, D. *et al.* (2007) *Blood* **109**:2944.
11. Tanno, T. *et al.* (2009) *Blood* **114**:181.