

**DESCRIPTION**

**Source** *E. coli*-derived human Activin A protein  
Gly311-Ser426, F368A  
Accession # P08476.2

**N-terminal Sequence Analysis** Gly311

**Structure / Form** Disulfide-linked homodimer

**Predicted Molecular Mass** 13 kDa

**SPECIFICATIONS**

**SDS-PAGE** 12-14 kDa, under reducing conditions.

**Activity** Measured by its ability to induce cytotoxicity using MPC-11 mouse B lymphocyte cells. The ED<sub>50</sub> for this effect is <5.00 ng/mL.

**Endotoxin Level** <0.10 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.

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

**PREPARATION AND STORAGE**

**Reconstitution** Reconstitute 10 µg/mL size at 100 µg/mL in water. Reconstitute all other sizes at 500 µg/mL in water.

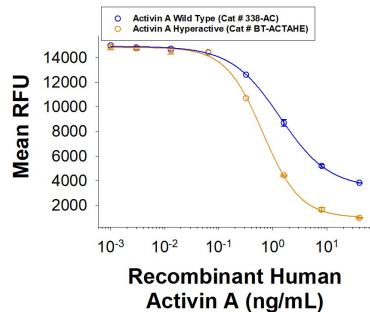
**Shipping** The product is shipped at ambient temperature. Upon receipt, store it immediately at the temperature recommended below.

**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.

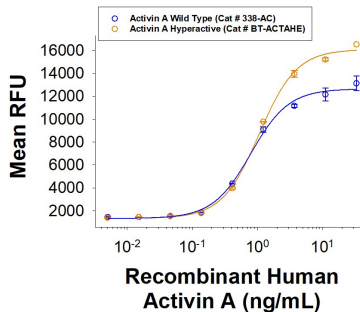
**DATA**

**Bioactivity**



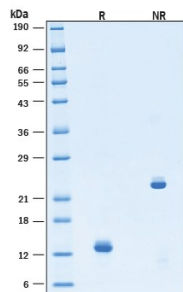
**Recombinant Human Activin A Hyperactive Protein Bioactivity.** Human Activin A Hyperactive Protein (Catalog # BT-ACTAHE) induces cytotoxicity on MCP-11 cells. The ED<sub>50</sub> for this effect is <5.00 ng/mL. The hyperactive Activin A protein has greater bioactivity than Wild Type Activin A (Catalog # 338-AC).

**Bioactivity**



**Recombinant Human Activin A Hyperactive Protein Bioactivity.** Human Activin A Hyperactive Protein (Catalog # BT-ACTAHE) induces SBE (SMAD-binding element) reporter activity in HEK293 human embryonic kidney cells. The hyperactive Activin A protein has greater bioactivity than Wild Type Activin A (Catalog # 338-AC).

**SDS-PAGE**



**Recombinant Human Activin A Hyperactive Protein SDS-PAGE.** 2 µg/lane of Recombinant Human Activin A Hyperactive Protein (Catalog # BT-ACTAHE) was resolved with SDS-PAGE under reducing (R) and non-reducing (NR) conditions and visualized by Coomassie® Blue staining, showing bands at 12-14 kDa under reducing conditions.

**BACKGROUND**

Activin and Inhibin are members of the TGF- $\beta$  superfamily of cytokines and are involved in a wide range of biological processes including tissue morphogenesis and repair, fibrosis, inflammation, neural development, hematopoiesis, reproductive system function, and carcinogenesis (1-7). Activin and Inhibin are produced as precursor proteins. Their amino terminal propeptides are proteolytically cleaved and facilitate formation of disulfide-linked dimers of the bioactive proteins (8, 9). Activins are nonglycosylated homodimers or heterodimers of various  $\beta$  subunits ( $\beta$ A,  $\beta$ B,  $\beta$ C, and  $\beta$ E in mammals), while Inhibins are heterodimers of a unique  $\alpha$  subunit and one of the  $\beta$  subunits. Activin A is a widely expressed homodimer of two  $\beta$ A chains. The  $\beta$ A subunit can also heterodimerize with a  $\beta$ B or  $\beta$ C subunit to form Activin AB and Activin AC, respectively (10). The 14 kDa mature human  $\beta$ A chain shares 100% amino acid sequence identity with bovine, feline, mouse, porcine, and rat  $\beta$ A.

Activin A exerts its biological activities by binding to the type 2 serine/threonine kinase Activin RIIA which then noncovalently associates with the type 1 serine/threonine kinase Activin RIB/ALK-4 (7, 11). Signaling through this receptor complex leads to SMAD activation and regulation of activin-responsive gene transcription (7, 11). The bioactivity of Activin A is regulated by a variety of mechanisms (11). BAMBI, Betaglycan, and Cripto are cell-associated molecules that function as decoy receptors or limit the ability of Activin A to induce receptor complex assembly (12-14). The intracellular formation of Activin A can be prevented by the incorporation of the  $\beta$ A subunit into Activin AC or Inhibin A (3, 10). And the bioavailability of Activin A is restricted by its incorporation into inactive complexes with  $\alpha$ 2-Macroglobulin, Follistatin, and FLRG (15, 16).

Activin A is involved in the differentiation of various cell and tissue types. The induction of definitive endoderm by Activin A is required in differentiation protocols of induced pluripotent stem cells (iPSCs) (17, 18). In vitro models of human gametogenesis use prolonged Activin A supplementation to human embryonic stem cells for differentiation into human primordial germ cell-like cells (19). Activin A can also be used to maintain cells in vitro, as is the case for iPSC-derived nephron cells that can then be used in disease modeling, drug screening and in regenerative medicine (20).

Activin A is an important factor for tumor cells to evade the immune system as Activin A can act on surrounding immune cells to decrease their antitumor activity (21). Activin A also promotes migration and growth of tumors, making it a target for cancer therapies (22). Specifically, research has shown that interfering with Activin A activity can assist in overcoming CD8 T-cell exclusion and immunotherapy resistance (23). In bone marrow-derived stem cell transplants for treatment of diabetes, Activin A enhances migration and homing of stem cells towards pancreatic lineage (24).

**References:**

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