Product Data Sheet

Product Name: Neurokinin A TFA
Cat. No.: GC61486

Chemical Properties

Cas. No.	2828433-19-6		
Formula	$C_{52}H_{81}N_{14}F_3O_{16}S$	M.Wt	1247.34
Solubility	DMSO: 100 mg/mL (80.17 mM)	Storage	Store at -80°C
General tips	For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20°C for several months.		
Shipping Condition	Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.		
Structure			

HKTDSFVGLM-NH_2 (TFA salt)

Protocol

Cell experiment [1]:

Cell lines	K562 cells (human hematopoietic progenitor cell line)

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Preparation Method	K562 cells were maintained in RPMI 1640 medium supplemented with 10% fetal calf serum (FCS) at 37°C, 5% CO_2. K562 cells were treated with Neurokinin A TFA at 10nM for 16 hours.
Reaction Conditions	10nM; 16h
Applications	Neurokinin A TFA significantly suppressed cell cycle activators Cdk2 and Cyclin A, while upregulating inhibitors p53 and p21 in K562 cells. Neurokinin A TFA also induced TGF-β1 production at the translational level and activated Smad4 via a non-canonical pathway independent of TGF-β receptor signaling.

Animal experiment [2]:

Animal models	Sprague Dawley rats
Preparation Method	Rats were anesthetized with sodium Pentobarbital (50mg/kg; i.p.) and received intrathecal injections of Neurokinin A TFA (1.0–100μg) or Substance P (SP) between S1-S2 vertebrae. Rats were subjected to noxious thermal (hindpaw immersion in 51°C water for 2min) or mechanical (hemostat pinch for 15sec) stimulation. Inflammatory conditions were induced by subcutaneous injection of complete Freund's adjuvant (CFA) into the hindpaw 2 days prior to stimulation.
Dosage form	1.0–100μg; intrathecal injection; single administration.

Caution: Product has not been fully validated for medical applications. For research use only.
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Applications	Neurokinin A TFA induced NK-1 receptor internalization in spinal cord lamina I neurons with a dose-dependence identical to substance P (EC_{50}≈210μM). The selective NK-1 receptor antagonist GR 205171 (10mg/kg; s.c.) completely blocked Neurokinin A TFA-induced NK-1 receptor internalization but had no effect on SP-induced internalization. Under inflammatory conditions, Neurokinin A TFA mediated nearly all NK-1 receptor internalization in deep dorsal horn (laminae III-VI) neurons.

References:

[1] Ricardo M, Trzaska KA, Rameshwar P. Neurokinin-A inhibits cell cycle activators in K562 cells and activates Smad 4 through a non-canonical pathway: a novel method in neural-hematopoietic axis. J Neuroimmunol. 2008 Nov 15;204(1-2):85-91.
[2] Trafton JA, Abbadie C, Basbaum AI. Differential contribution of substance P and neurokinin A to spinal cord neurokinin-1 receptor signaling in the rat. J Neurosci. 2001 May 15;21(10):3656-64.

Background

Neurokinin A TFA is an endogenous tachykinin neuropeptide and a potent selective agonist of the neurokinin 2 receptor (NK2R)[1-2]. Neurokinin A TFA can be used in research related to gastrointestinal disorders, chronic visceral pain, asthma, and overactive bladder syndrome[3-4].

In vitro, K562 hematopoietic progenitor cells were stimulated with Neurokinin A TFA (10nM) for 16 hours. Neurokinin A TFA inhibited the expression of cell cycle activators Cdk2 and Cyclin A, upregulated p53 and p21 expression, activated Smad4 via a non-classical pathway, and induced TGF-β1 production at the translational level, primarily through NK2 receptor activation[5]. Human keratinocytes and mouse PAM 212 keratinocytes were treated with Neurokinin A TFA (0.1–100nM) for 3–48 hours. Neurokinin A TFA directly induced nerve growth factor mRNA expression and bioactive protein secretion via NK1 and NK2 receptors, promoted neurite outgrowth in PC-12 cells, and upregulated epidermal keratinocyte nerve growth factor protein expression in mouse skin through capsaicin-induced neuropeptide release[6].

In vivo, Neurokinin A TFA (1μg/site) was injected into the gingival tissue of C57BL/6 mice with

ligation-induced periodontitis (twice daily for 5 days). Neurokinin A TFA did not significantly induce osteoclast activation or immune cell infiltration[7]. Sprague Dawley rats were administered Neurokinin A TFA (1.0–100μg) via intrathecal injection (5 minutes after a single injection). Neurokinin A TFA induced NK-1 receptor internalization in spinal cord dorsal horn superficial layer (lamina I) neurons by activating the neurokinin-1 receptor (NK-1R), with an EC_{50} value of 210μM[8].

References:

[1] Gerard NP, Eddy RL Jr, Shows TB, et al. The human neurokinin A (substance K) receptor. Molecular cloning of the gene, chromosome localization, and isolation of cDNA from tracheal and gastric tissues. J Biol Chem. 1990 Nov 25;265(33):20455-62.
[2] Munekata E. Neurokinin A and B. Comp Biochem Physiol C Comp Pharmacol Toxicol. 1991;98(1):171-9.
[3] Regoli D, Rhaleb NE, Dion S, et al. Neurokinin A. A pharmacological study. Pharmacol Res. 1990 Jan-Feb;22(1):1-14.
[4] Wiesenfeld-Hallin Z, Xu XJ. The differential roles of substance P and neurokinin A in spinal cord hyperexcitability and neurogenic inflammation. Regul Pept. 1993 Jul 2;46(1-2):165-73.
[5] Ricardo M, Trzaska KA, Rameshwar P. Neurokinin-A inhibits cell cycle activators in K562 cells and activates Smad 4 through a non-canonical pathway: a novel method in neural-hematopoietic axis. J Neuroimmunol. 2008 Nov 15;204(1-2):85-91.
[6] Burbach GJ, Kim KH, Zivony AS, et al. The neurosensory tachykinins substance P and neurokinin A directly induce keratinocyte nerve growth factor. J Invest Dermatol. 2001 Nov;117(5):1075-82.
[7] Siddiqui YD, Nie X, Wang S, et al. Substance P aggravates ligature-induced periodontitis in mice. Front Immunol. 2023 Apr 14;14:1099017.
[8] Trafton JA, Abbadie C, Basbaum AI. Differential contribution of substance P and neurokinin A to spinal cord neurokinin-1 receptor signaling in the rat. J Neurosci. 2001 May 15;21(10):3656-64.