

Product Data Sheet

Product Name: DAMGO
Cat. No.: GC10803

Chemical Properties

Cas. No. 78123-71-4

Chemical Name (S)-2-amino-N-((R)-1-((2-(((S)-1-((2-hydroxyethyl)amino)-1-oxo-3-phenylpropan-2-yl)(methyl)amino)-2-oxoethyl)amino)-1-oxopropan-2-yl)-3-(4-hydroxyphenyl)propanamide

SMILES O=C([C@H](CC1=CC=CC=C1)N(C)C(CNC([C@@H](C)NC([C@H](CC(C=C2)=CC=C2O)N)=O)=O)=O)NCCO

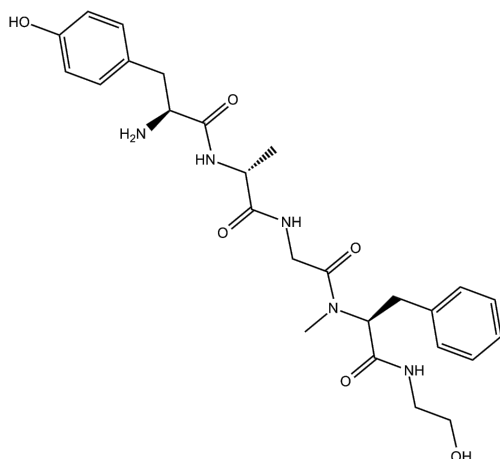
Formula $C_{26}H_{35}N_5O_6$ M.Wt 513.7

Solubility H₂O: >50mg/mL; DMSO: 20mg/mL Storage -20°C, protect from light

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



Protocol

Cell experiment [1]:

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Cell lines	TF-1 human bone marrow progenitor cells (CD34+CD38+ hematopoietic progenitor cell line)
Preparation Method	TF-1 cells were cultured in RPMI-1640 medium supplemented with 10% heat-inactivated fetal bovine serum (FBS), penicillin (100U/ml), streptomycin (100µg/ml), and recombinant human granulocyte/macrophage colony-stimulating factor (2ng/ml) at 37°C in 5% CO ₂ . TF-1 cells were treated with DAMGO (1µM and 10µM) for 24 hours.
Reaction Conditions	1µM and 10µM; 24h.
Applications	DAMGO treatment significantly altered the surface expression profile of CXCR4 on TF-1 cells, shifting the relative proportion of CXCR4+ cells toward a low-expressing phenotype. This effect correlated with a >3-fold reduction in replication of the X4 HIV-1 strain IIIB.
Animal experiment [2]:	
Animal models	C57BL/6J mice (young male and female mice at postnatal days 6, 8, and 10)
Preparation Method	Mice received stereotaxic microinjections of DAMGO (10ng) into the anterior cingulate cortex (ACC) at postnatal days 6, 8, and 10. Behavioral tests including three-chamber social preference, elevated plus maze, grooming behavior, and open-field test were performed from postnatal days 30-32.

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Dosage form 10ng; stereotaxic intracerebral injection; administered three times at P6, P8, and P10.

Applications DAMGO injection into the ACC induced autism-like behaviors in young mice, including social interaction deficits, anxiety-like behaviors, and increased stereotyped behaviors. DAMGO treatment significantly downregulated Grin2b expression and GluN2B protein amounts in the ACC through hypermethylation of the Grin2b gene promoter region.

References:

- [1] Strazza M, Banerjee A, Alexaki A, et al. Effect of μ -opioid agonist DAMGO on surface CXCR4 and HIV-1 replication in TF-1 human bone marrow progenitor cells. BMC Res Notes. 2014 Oct 23;7:752.
- [2] Sheng Z, Liu Q, Cheng C, et al. Fentanyl induces autism-like behaviours in mice by hypermethylation of the glutamate receptor gene Grin2b. Br J Anaesth. 2022 Oct;129(4):544-554.

Background

DAMGO is a highly selective peptide agonist for the μ -opioid receptor (MOR) with a K_d of 3.46nM [1-2]. DAMGO activates G protein-coupled receptors, inhibits adenylate cyclase to reduce intracellular cAMP levels, and modulates ion channel activity, thereby suppressing neuronal excitability and neurotransmitter release. DAMGO can be used for pain mechanism research, neural signaling pathway analysis, and opioid receptor function studies[3-4].

In vitro, rat dorsal root ganglion sensory neurons were pretreated with DAMGO (1 μ M) for 2-3min, followed by stimulation with prostaglandin E₂ (PGE₂; 1 μ M) for 120s. DAMGO significantly inhibited PGE₂-induced enhancement of tetrodotoxin-resistant sodium currents (TTX-R I_{Na}) [5]. TF-1 human bone marrow progenitor cells were pretreated with DAMGO (1 μ M and 10 μ M) for 24 hours. DAMGO reduced the expression level of the CXCR4 receptor on the cell surface and significantly inhibited the replication of the X4-tropic HIV-1 strain IIIB in cells [6].

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In vivo, DAMGO (10ng) was stereotactically injected into the anterior cingulate cortex of young male mice (administered on postnatal days 6, 8, and 10). DAMGO induced autism-like behaviors in mice, including social interaction deficits, anxiety-like behaviors, and stereotyped behaviors, while downregulating Grin2b expression and GluN2B protein levels in the anterior cingulate cortex^[7]. DAMGO (5–15µg) was administered via local (surgical site) or lumbar (L3–L5) intrathecal injection to adult (3–6 months old) and aged (24 months old) mice (administered on day 1 or days 1–3 postoperatively). DAMGO dose-dependently attenuated heat- and mechanical-induced postoperative hyperalgesia in an incision model. The inhibitory effect on incision-induced spontaneous pain by intrathecal DAMGO (5µg) or systemic intraperitoneal injection (1mg/kg) was more pronounced in adult mice^[8].

References:

- [1] Onogi T, Minami M, Katao Y, et al. DAMGO, a mu-opioid receptor selective agonist, distinguishes between mu- and delta-opioid receptors around their first extracellular loops. FEBS Lett. 1995 Jan 2;357(1):93-7.
- [2] Eisenberg RM. DAMGO stimulates the hypothalamo-pituitary-adrenal axis through a mu-2 opioid receptor. J Pharmacol Exp Ther. 1993 Aug;266(2):985-91.
- [3] Minami M, Onogi T, Nakagawa T, et al. DAMGO, a mu-opioid receptor selective ligand, distinguishes between mu-and kappa-opioid receptors at a different region from that for the distinction between mu- and delta-opioid receptors. FEBS Lett. 1995 May 1;364(1):23-7.
- [4] Koganezawa T, Okada Y, Terui N, et al. A µ-opioid receptor agonist DAMGO induces rapid breathing in the arterially perfused in situ preparation of rat. Respir Physiol Neurobiol. 2011 Jul 31;177(2):207-11.
- [5] Gold MS, Levine JD. DAMGO inhibits prostaglandin E2-induced potentiation of a TTX-resistant Na⁺ current in rat sensory neurons in vitro. Neurosci Lett. 1996 Jul 12;212(2):83-6.
- [6] Strazza M, Banerjee A, Alexaki A, et al. Effect of µ-opioid agonist DAMGO on surface CXCR4 and HIV-1 replication in TF-1 human bone marrow progenitor cells. BMC Res Notes. 2014 Oct 23;7:752.
- [7] Sheng Z, Liu Q, Cheng C, et al. Fentanyl induces autism-like behaviours in mice by hypermethylation of the glutamate receptor gene Grin2b. Br J Anaesth. 2022 Oct;129(4):544-554.
- [8] Mecklenburg J, Patil MJ, Koek W, et al. Effects of local and spinal administrations of mu-opioids on postoperative pain in aged versus adult mice. Pain Rep. 2017 Jan;2(1):e584.

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