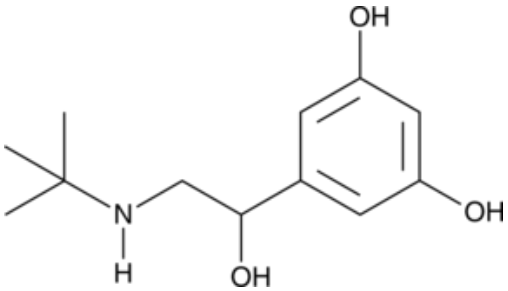
Product Data Sheet

Product Name: Terbutaline
Cat. No.: GC45993

Chemical Properties

Cas. No.	23031-25-6		
Chemical Name	5-[2-[(1,1-dimethylethyl)amino]-1-hydroxyethyl]-1,3-benzenediol		
SMILES	OC1=CC(O)=CC(C(O)CNC(C)(C)C)=C1		
Formula	C12H19NO3	M.Wt	225.3
Solubility	DMSO: slightly soluble,Methanol: slightly soluble,Water: 100 mM	Storage	Store at -20°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



Protocol

Cell experiment [1]:

Cell lines	J774 mouse macrophages
Preparation Method	J774 macrophages were incubated with Terbutaline (0.1nM-10μM) for the indicated times.

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Reaction Conditions	0.1nM-10μM; pre-incubation for 30 minutes before LPS (10ng/mL) stimulation
Applications	Terbutaline significantly increased intracellular cAMP levels in J774 macrophages. Terbutaline also enhanced MKP-1 mRNA and protein expression in a dose-dependent manner. Terbutaline markedly inhibited LPS-induced p38 MAPK phosphorylation and suppressed both mRNA expression and protein production of TNF.

Animal experiment [2]:

Animal models	Male DBA1/J mice (8-10 weeks old, weighing 20-25g)
Preparation Method	Mice were intradermally injected with type II collagen (CII) emulsion at the tail base on day 0, followed by an intraperitoneal injection of CII emulsions on day 21, and a lipopolysaccharide boost on day 28 to induce the collagen-induced arthritis (CIA) model. Terbutaline (500μg/kg/day) administration for 16 days.
Dosage form	500μg/kg/day; i.p.; twice a day
Applications	Terbutaline administration significantly alleviated arthritis symptoms in the CIA mice, including markedly reducing the histopathological injuries of the ankle joints, notably decreasing the arthritis score of the four limbs, and significantly reducing the thickness of the ankle joints and rear paws.

Caution: Product has not been fully validated for medical applications. For research use only.
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References:
[1] Keränen T, Hömmö T, Hämäläinen M, et al. Anti-Inflammatory Effects of β2-Receptor Agonists Salbutamol and Terbutaline Are Mediated by MKP-1. PLoS One. 2016 Feb 5;11(2):e0148144.
[2] Lu JH, Rui XX, Wang TT, et al. Activation of β2-adrenergic Receptor Alleviates Collagen-induced Arthritis by Ameliorating Th17/Treg Imbalance. Iran J Immunol. 2023 Mar 14;20(1):16-25.

Background

Terbutaline is a novel selective β2-adrenergic receptor agonist. Terbutaline can dilate bronchial smooth muscle by activating adenylate cyclase to increase intracellular cyclic adenosine monophosphate (cAMP) levels. Terbutaline reduces smooth muscle contraction and inflammation by activating protein kinase A (PKA) and inhibiting myosin light chain kinase (MLCK). Terbutaline is used for research on asthma, chronic obstructive pulmonary disease (COPD), and preterm labor[1-4].

In vitro, Terbutaline (10μM) repeatedly activated CD3+ T cells (for 48h each time; 4 times in total). Terbutaline had no significant effect on the expression of T cell exhaustion markers ($CD4^+TIM\text{-}3^+CD38^+$ and $CD8^+TIM\text{-}3^+CD38^+$) or cytotoxicity[5]. Terbutaline (0.1nM–10μM) was pretreated on J774 mouse macrophages for 30min, followed by stimulation with LPS (10ng/mL) for 1h. Terbutaline significantly inhibited the phosphorylation of p38 MAPK and reduced TNF production[6].

In vivo, Terbutaline (1–10μg; 5μL) was administered to male Hsd: CD-1 (ICR) mice via intrathecal injection (i.t.; single dose). Terbutaline significantly increased blood glucose levels and plasma corticosterone levels[7]. Terbutaline (500μg/kg/day; twice daily) was intraperitoneally injected into collagen-induced arthritis (CIA) DBA1/J mice for 16 days. Terbutaline significantly alleviated arthritis symptoms in CIA mice, reduced the histopathological injuries of the ankle joints, decreased the arthritis score of the four limbs, and reduced the thickness of the ankle joints and rear paws[8].

References:
[1] Mohamed Ismail NA, Ibrahim M, Mohd Naim N, et al. Nifedipine versus terbutaline for tocolysis in external cephalic version. Int J Gynaecol Obstet. 2008 Sep;102(3):263-6.
[2] Loureiro JA, Andrade S, Ramalho MJ, et al. The interaction of a β2 adrenoceptor agonist drug with biomimetic cell membrane models: The case of terbutaline sulphate. Life Sci. 2021 Nov 15;285:119992.

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[3] Karni R, Mizrachi S, Reiss-Sklan E, et al. The pp60c-Src inhibitor PP1 is non-competitive against ATP. FEBS Lett. 2003 Feb 27;537(1-3):47-52.
[4] Choucair-Jaafar N, Salvat E, Freund-Mercier MJ, et al. The antiallodynic action of nortriptyline and terbutaline is mediated by β(2) adrenoceptors and δ opioid receptors in the ob/ob model of diabetic polyneuropathy. Brain Res. 2014 Feb 10;1546:18-26.
[5] Hajiaghayi M, Gholizadeh F, Rahbari N, et al. Nebivolol prevents exhausted T cells and enhances cytotoxicity against MCF-7 breast cancer cells in a β2-adrenergic receptor-dependent manner. Clin Exp Immunol. 2026 Jan 6;220(1):uxag018.
[6] Keränen T, Hömmö T, Hämäläinen M, et al. Anti-Inflammatory Effects of β2-Receptor Agonists Salbutamol and Terbutaline Are Mediated by MKP-1. PLoS One. 2016 Feb 5;11(2):e0148144.
[7] Sim YB, Park SH, Kim SS, et al. Spinal β-adrenergic receptors' activation increases the blood glucose level in mice. Anim Cells Syst (Seoul). 2017 Jul 10;21(4):278-285.
[8] Lu JH, Rui XX, Wang TT, et al. Activation of β2-adrenergic Receptor Alleviates Collagen-induced Arthritis by Ameliorating Th17/Treg Imbalance. Iran J Immunol. 2023 Mar 14;20(1):16-25.

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