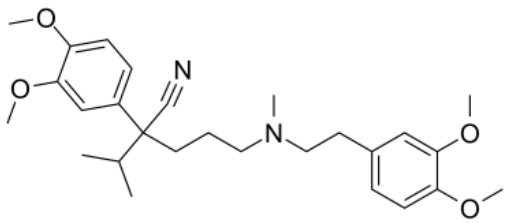
Product Data Sheet

Product Name: Verapamil
Cat. No.: GC61811

Chemical Properties

Cas. No.	52-53-9		
SMILES	COC1=CC=C(C(C#N)(C(C)C)CCCN(CCC2=CC=C(OC)C(OC)=C2)C)C=C1OC		
Formula	$C_{27}H_{38}N_2O_4$	M.Wt	454.6
Solubility	DMSO: 100 mg/mL (219.97 mM)	Storage	4°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]:

Cell lines SHSY5Y cells

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Preparation Method	SHSY5Y cells were seeded into 24-well plates . 2% FBS medium containing Verapamil at a concentration range from 1nM to 0.5mM was added to the cells for 1, 6, 24 and 48h. Cell viability was assessed using the MTT reduction assay.
Reaction Conditions	Verapamil: 1nM -0.5mM; 6, 24 and 348h.
Applications	A highly statistical reduction in cell viability was observed under 0.5mM Verapamil treatment and was still not recovered after 48h; the other tested concentrations failed to produce any significant effects after 1, 6, and 24h.

Animal experiment [2]:

Animal models	Myotonic dystrophy mouse model
Preparation Method	Mice were provided Verapamil via ingestion of Nutra-Gel Complete Nutrition food to a final dose of 200mg/kg/day Verapamil. Mice that did not receive verapamil, were provided Nutra-Gel Complete Nutrition food that had 1mL ddH_2O added to serve as a vehicle control.
Dosage form	Verapamil (200mg/kg; po; 10weeks)
Applications	Long-term administration of the calcium channel blocker Verapamilto mice rescued the life of mice with myotonic dystrophy type 1 and improved force production, muscle stiffness, and respiratory function.

Caution: Product has not been fully validated for medical applications. For research use only.
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References:
[1]. Williams J, Siramshetty V, Nguy?n ĐT, Padilha EC, Kabir M, Yu KR, Wang AQ, Zhao T, Itkin M, Shinn P, Mathé EA, Xu X, Shah P. Using in vitro ADME data for lead compound selection: An emphasis on PAMPA pH 5 permeability and oral bioavailability. Bioorg Med Chem. 2022 Feb 15;56:116588.
[2]. Cisco LA, Sipple MT, Edwards KM, Thornton CA, Lueck JD. Verapamil mitigates chloride and calcium bi-channelopathy in a myotonic dystrophy mouse model. J Clin Invest. 2024 Jan 2;134(1):e173576.

Background

Verapamil is an L-type calcium channel blocker and adrenergic receptor antagonist commonly used in studies of hypertension, arrhythmias and angina pectoris[1].

Verapamil (5μM-5mM; 1h) affects human erythrocytes, where the normal disc-like shape of the erythrocytes changes to oropharyngeal cysts, small cells, spherical oropharyngeal cysts and haemolysis occurs at a concentration of Verapamil of 5mM. As the concentration of Verapamil was increased from 5μM, the morphology of the erythrocytes changed [2].The survival and proliferation rates of PC-3, A549, and COLO 205 cells were decreased after treatment with Verapamil (50–200μM; 6–48h)[3] .

In the neuroinflammatory model, pretreatment with Verapamil (10mg/kg; ip; 7days) in the morning reduced $CD11b^+$, $CD68^+$ and Iba1 by 54.33%, 24.68% and 41.33%, respectively. The above markers were also reduced in evening pretreated mice by 41.01%, 18.3% and 24.06%, respectively [4].Long-term administration of Verapamil (200mg/kg; po; 10weeks) to mice rescued the lives of mice with myotonic dystrophy type 1 and improved myogenesis, muscle stiffness and respiratory function [5].Verapamil (1.0, 2.5, 5.0 and 10mg/kg; ip; 48h) impaired memory consolidation in a parameter- and dose-dependent manner in an absent-field habituation task in rats [6].

References:
[1] Kania E, Pająk B, O'Prey J, Sierra Gonzalez P, Litwiniuk A, Urbańska K, Ryan KM, Orzechowski A. Verapamil treatment induces cytoprotective autophagy by modulating cellular metabolism. FEBS J. 2017 May;284(9):1370-1387.

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[2] Suwalsky M, Munoz M, Mennickent S, et al. Structural effects of verapamil on cell membranes and molecular models[J]. Journal of the Chilean Chemical Society, 2010, 55(1): 1-4.
[3] Mosalam EM, Elberri AI, Sallam AS, Salem HR, Metwally EM, Abdallah MS, Shaldam MA, Mansour HEA. Chronotherapeutic neuroprotective effect of verapamil against lipopolysaccharide-induced neuroinflammation in mice through modulation of calcium-dependent genes. Mol Med. 2022 Nov 26;28(1):139.
[4] Rattis BAC, Freitas AC, Oliveira JF, Calandrini-Lima JLA, Figueiredo MJ, Soave DF, Ramos SG, Celes MRN. Effect of Verapamil, an L-Type Calcium Channel Inhibitor, on Caveolin-3 Expression in Septic Mouse Hearts. Oxid Med Cell Longev. 2021 Apr 8;2021:6667074.
[5]Cisco LA, Sipple MT, Edwards KM, Thornton CA, Lueck JD. Verapamil mitigates chloride and calcium bi-channelopathy in a myotonic dystrophy mouse model. J Clin Invest. 2024 Jan 2;134(1):e173576.
[6]Popović N, Giménez de Béjar V, Caballero-Bleda M, Popović M. Verapamil Parameter- and Dose-Dependently Impairs Memory Consolidation in Open Field Habituation Task in Rats. Front Pharmacol. 2017 Jan 10;7:539.

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