Methyl-β-cyclodextrin

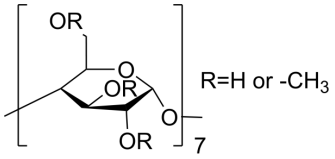
Cat. No.: HY-101461

CAS No.: 128446-36-6

Target: Biochemical Assay Reagents

Pathway: Others

Storage: Powder -20°C 3 years
4°C 2 years



SOLVENT & SOLUBILITY

In Vitro

DMSO : ≥ 100 mg/mL
H_2O : ≥ 50 mg/mL
* "≥" means soluble, but saturation unknown.

BIOLOGICAL ACTIVITY

Description

Methyl-β-cyclodextrin (Methyl-beta-cyclodextrin) is a cyclic heptasaccharide used to deliver hydrophobic agents based on its property of solubilizing non-polar substances. Methyl-β-cyclodextrin is also extensively used as a cholesterol-depleting reagent[1]. Methyl-β-cyclodextrin strongly reduces clathrin-dependent endocytosis[2]. Methyl-β-cyclodextrin blocks cell migrasome formation[3].

In Vitro

Methyl-β-cyclodextrin is extensively used to increase the permeability of cells, and thereby increase the uptake of small molecules such as glucose and nano-particles[4].
Cyclodextrins are a family of cyclic oligosaccharides with a hydrophilic outer surface and a lipophilic central cavity. Cyclodextrins molecules are relatively large with a number of hydrogen donors and acceptors and, thus in general, they do not permeate lipophilic membranes. In the pharmaceutical industry, cyclodextrins have mainly been used as complexing agents to increase aqueous solubility of poorly soluble drugs and to increase their bioavailability and stability. Cyclodextrins are used in pharmaceutical applications for numerous purposes, including improving the bioavailability of drugs[4].
Methyl-β-cyclodextrin quickly induces caspase-dependent apoptosis in PEL cells via cholesterol depletion from the plasma membrane. Methyl-β-cyclodextrin inhibits the growth of all PEL cell lines in a dose-dependent manner. The IC_{50} is 3.33-4.23 mM in each cell line[5].
Methyl-β-cyclodextrin is a highly water soluble cyclic heptasaccharide consisting of a β-glucopyranose unit, has been reported as the most effective agent for the depletion of cholesterol from cells among the various cholesterol-depleting agents[5].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

In Vivo

In a PEL xenograft mouse model, Methyl-β-cyclodextrin significantly inhibits the growth and invasion of PEL cells without apparent adverse effects. Methyl-β-cyclodextrin-treated mice appears to be healthy, whereas non-treated mice has a distended abdominal region. The body weights of control are significantly higher than those of Methyl-β-cyclodextrin treated mice. Methyl-β-cyclodextrin-treated mice has a significantly lower volume of ascites than that of non-treated mice[4].

Studies in both humans and animals have shown that cyclodextrins can be used to improve drug delivery from almost any type of drug formulation. Currently, there are approximately 30 different pharmaceutical products worldwide containing drug/cyclodextrins complexes in the market[6].

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PROTOCOL

Cell Assay [1]

PEL cells are incubated in triplicate in a 96-well microculture plate in the presence of different concentrations of methyl-β-cyclodextrin (0-10 mM) in a final volume of 0.1 mL for 24 h at 37°C. Subsequently, MTT (0.5 mg/mL final concentration) is added to each well. After 3 h of additional incubation, 100 µL of a 0.04 N HCl is added to dissolve the crystals. Absorption values at 570 nm are determined[1].

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Animal Administration [1]

Mice: Female NRJ mice are intraperitoneally inoculated with BCBL-1 cells suspended in PBS. The mice are then treated with intraperitoneal injections of PBS or methyl-β-cyclodextrin (500 mg/kg per day). Tumor burdens are evaluated by measuring body weights and ascites[1].

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CUSTOMER VALIDATION

- Nature. 2024 Feb;626(7998):411-418.
- Nature. 2022 Mar;603(7899):159-165.
- Cell Res. 2021 Sep;31(9):980-997.
- Adv Mater. 2022 Jul 28;e2204287.
- Nat Metab. 2022 Oct 10.

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REFERENCES

[1]. Yuwei Huang, et al. Migrasome formation is mediated by assembly of micron-scale tetraspanin macrodomains. Nat Cell Biol. 2019 Aug;21(8):991-1002.

[2]. Gotoh K, et al. The antitumor effects of methyl-β-cyclodextrin against primary effusion lymphoma via the depletion of cholesterol from lipid rafts. Biochem Biophys Res Commun. 2014 Dec 12;455(3-4):285-9.

[3]. Tiwari G, et al. Cyclodextrins in delivery systems: Applications. J Pharm Bioallied Sci. 2010 Apr;2(2):72-9.

[4]. Mundhara N, et al. Methyl-β-cyclodextrin, an actin depolymerizer augments the antiproliferative potential of microtubule-targeting agents. Sci Rep. 2019 May 21;9(1):7638.

[5]. Chen X, et al. Cholesterol depletion from the plasma membrane triggers ligand-independent activation of the epidermal growth factor receptor. J Biol Chem. 2002 Dec 20;277(51):49631-7.

[6]. Rodal SK, et al. Extraction of cholesterol with methyl-beta-cyclodextrin perturbs formation of clathrin-coated endocytic vesicles. Mol Biol Cell. 1999;10(4):961-974.

Caution: Product has not been fully validated for medical applications. For research use only.

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