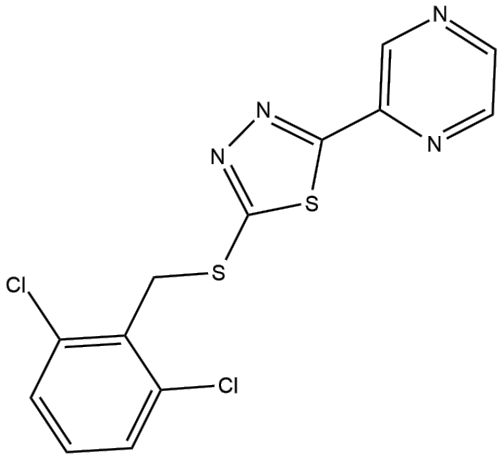
Product Data Sheet

Product Name: Yoda1
Cat. No.: GC18233

Chemical Properties

Cas. No.	448947-81-7		
Chemical Name	2-[5-[[(2,6-dichlorophenyl)methyl]thio]-1,3,4-thiadiazol-2-yl]-pyrazine		
SMILES	ClC(C=CC=C1Cl)=C1CSC2=NN=C(C3=CN=CC=N3)S2		
Formula	$C_{13}H_8Cl_2N_4S_2$	M.Wt	355.3
Solubility	DMSO：50mg/mL	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	MDA-MB-231 cells

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Preparation Method	MDA-MB-231 cells were cultured in MLO-Y4 medium supplemented with 2.5% calf serum, 2.5% fetal bovine serum, and 1% penicillin streptomycin at 37°C in an incubator with 5% CO_2. Cells were seeded in a 96-well plate at a density of 1.5×10^5 cells/well for 24h, with three replicates for each treatment. Cells were treated with different concentrations of Yoda1 (0, 1, 2, 5, and 10μM). After 48h of treatment, the cell viability was determined.
Reaction Conditions	0, 1, 2, 5, and 10μM; 48h
Applications	Yoda1 treatment inhibited the cell viability of MDA-MB-231 cells in a dose-dependent manner.
Animal experiment [2]:	
Animal models	Male C57BL/6 J mice

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Preparation Method	Male C57BL/6 J mice (8 weeks old) were maintained in a controlled environment at 21±1°C and 60% relative humidity under a 12h light/dark cycle, and were given free access to food and water. Mice were fasted for 12h before surgery, with water provided ad libitum. Following surgical site preparation, the mice were rendered unconscious through inhalation of 2% isoflurane. A 1-2cm incision was made along the abdominal midline, and then the abdominal layers were sequentially separated. The first-order branch of the superior mesenteric artery was isolated using blunt dissection techniques. Mesenteric ischemia was induced by clamping the ileal vessels with a microvascular clamp, and successful induction was verified by observing the resultant pallor of the ileum. After 30min of ischemia, the clamp was taken away, and the abdominal wound was sutured. The mice were euthanized at 48 and 72h post-reperfusion for further analysis. For Yoda1 treatment, a 50mM stock solution was prepared by dissolving Yoda1 in dimethyl sulfoxide (DMSO). For experimental use, the saline was used to dilute the stock solution to achieve a final concentration of 5μmol/kg. Mice were continuously injected with Yoda1 (5μmol/kg/day) intraperitoneally for 5 days one week before surgery.
Dosage form	5μmol/kg/day; 5 days; i.p.
Applications	Yoda1 treatment promoted angiogenesis in the intestinal ischemia/reperfusion injury of mice and alleviated intestinal damage.

References:

[1] Lin C Y, Song X, Ke Y, et al. Yoda1 enhanced low-magnitude high-frequency vibration on osteocytes in regulation of MDA-MB-231 breast cancer cell migration[J]. Cancers, 2022, 14(14): 3395.

[2] Yang Y, Tian Q, Qiu F, et al. Yoda1/Piezo1 alleviates lipopolysaccharide-induced cardiac injury via AMPK-mediated mitophagy[J]. Cardiovascular Toxicology, 2025, 25(10): 1604-1615.

Caution: Product has not been fully validated for medical applications. For research use only.
Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com
Address: 10292 Central Ave. #205, Montclair, CA, USA

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Background

Yoda1 is an effective selective agonist of Piezo1 with an EC_{50} value of 17.1μM in mice [1]. Yoda1 acts as a molecular wedge, facilitating the opening of Piezo1 when the membrane is stretched, promoting the force-induced conformational changes, thereby effectively reducing the mechanical activation threshold of the channel[2]. Yoda1 activates the Piezo1 channel, leading to Ca^{2+} influx and a subsequent increase in intracellular Ca^{2+} concentration[3]. Yoda1 has been widely used in vaccine research as an adjuvant to enhance T-cell activation[4].

In vitro, Yoda1 (1.5μM) was incubated for 10 minutes, which significantly inhibited EGF-stimulated macropinocytosis in A431 cells and prevented peripheral ruffle formation[5]. Treatment with 10μM Yoda1 for 48 hours induced apoptosis in MDA-MB-231 cells and inhibited cell migration[6]. Pretreatment with 10μM Yoda1 for 20min reduced the expression of Periostin in 3T3 cells and altered the expression pathways related to the fibrosis process[7].

In vivo, Yoda1 administration via intraperitoneal injection at a dose of 5μmol/kg/day for 5 days promoted angiogenesis in the intestinal ischemia/reperfusion injury of mice and alleviated intestinal damage[8]. Intraperitoneal injection of Yoda1 at a dose of 4μg/kg at 1 hour before and 12 hours after lipopolysaccharide (LPS) treatment alleviated LPS-induced cardiac dysfunction and oxidative stress in mice[9].

References:

[1] Syeda R, Xu J, Dubin A E, et al. Chemical activation of the mechanotransduction channel Piezo1[J]. elife, 2015, 4: e07369.

[2] Botello-Smith W M, Jiang W, Zhang H, et al. A mechanism for the activation of the mechanosensitive Piezo1 channel by the small molecule Yoda1[J]. Nature communications, 2019, 10(1): 4503.

[3] Qiao M, Penttinen R, Coli A, et al. Piezo1 Channel Activators Yoda1 and Yoda2 in the Context of Red Blood Cells[J]. Biomolecules, 2025, 15(8): 1110.

[4] Goon S, Shiu Chen Liu C, Ghosh Dastidar U, et al. Exploring the structural attributes of Yoda1 for the development of new-generation Piezo1 agonist Yaddle1 as a vaccine adjuvant targeting optimal T

cell activation[J]. Journal of Medicinal Chemistry, 2024, 67(10): 8225-8246.

[5] Kuriyama M, Hirose H, Masuda T, et al. Piezo1 activation using Yoda1 inhibits macropinocytosis in A431 human epidermoid carcinoma cells[J]. Scientific reports, 2022, 12(1): 6322.

[6] Lin C Y, Song X, Ke Y, et al. Yoda1 enhanced low-magnitude high-frequency vibration on osteocytes in regulation of MDA-MB-231 breast cancer cell migration[J]. Cancers, 2022, 14(14): 3395.

[7] Alam P, Stiens S M, Bowles H J, et al. Yoda1 inhibits TGFβ-induced cardiac fibroblast activation via a BRD4-dependent pathway[J]. Cells, 2025, 14(13): 1028.

[8] Wang C, Luo S, Yan Y, et al. Endothelial Piezo1 stimulates angiogenesis to offer protection against intestinal ischemia–reperfusion injury in mice[J]. Molecular Medicine, 2025, 31(1): 147.

[9] Yang Y, Tian Q, Qiu F, et al. Yoda1/Piezo1 alleviates lipopolysaccharide-induced cardiac injury via AMPK-mediated mitophagy[J]. Cardiovascular Toxicology, 2025, 25(10): 1604-1615.

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