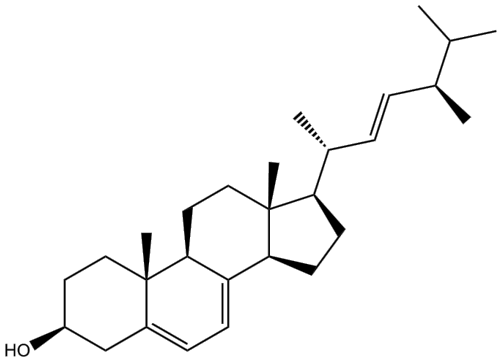
Product Data Sheet

Product Name: Ergosterol
Cat. No.: GN10349

Chemical Properties

Cas. No.	57-87-4		
Chemical Name	(3S,9S,10R,13R,14R,17R)-17-[(E,2R,5R)-5,6-dimethylhept-3-en-2-yl]-10,13-dimethyl-2,3,4,9,11,12,14,15,16,17-decahydro-1H-cyclopenta[a]phenanthren-3-ol		
SMILES	CC(C)C(C)C=CC(C)C1CCC2C1(CCC3C2=CC=C4C3(CCC(C4)O)C)C		
Formula	$C_{28}H_{44}O$	M.Wt	396.66
Solubility	<2.95mg/mL in DMSO	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	MCF-7 human breast cancer cells, MDA-MB-231 human triple-negative breast cancer cells

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Preparation Method	MCF-7 and MDA-MB-231 cells were maintained in Dulbecco's Modified Eagle Medium (DMEM) supplemented with 10% fetal bovine serum (FBS), 1% penicillin-streptomycin and 1% sodium pyruvate at 37°C, 5% CO_2. Cells were treated with Ergosterol at concentrations of 2.5-40μM for 24, 48 or 96h.
Reaction Conditions	2.5-40μM; 24-96h
Applications	Ergosterol inhibited the viability of both cell lines in a dose-dependent manner, with IC_{50} values of 6.70±1.51μM (MCF-7, 24h) and 15.55±6.84μM (MDA-MB-231, 48h). Ergosterol (20μM, 24h) induced G_0/G_1 phase cell cycle arrest and suppressed spheroid formation in the presence or absence of Matrigel. Ergosterol downregulated c-Myc and cyclin D1 expression, inhibited β-catenin nuclear translocation, suppressed AKT(S473) and GSK-3β phosphorylation to promote β-catenin degradation, reduced global protein synthesis via downregulating phosphorylated 4EBP1, and suppressed deubiquitinases USP47 and USP9x expression. Ergosterol ltered metabolic pathways in MDA-MB-231 cells including steroid hormone biosynthesis, nitrogen metabolism, sphingolipid metabolism, pyrimidine metabolism and glycosaminoglycan biosynthesis.

Animal experiment [2]:

Animal models	Streptozotocin (STZ)-induced diabetic nephropathy mice, with normal mice as negative control

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Preparation Method	Diabetic nephropathy model was established by intraperitoneal injection of STZ at 30mg/kg once a week for 3 weeks, mice with serum glucose of 11-18mM 5 days after the last STZ injection were enrolled as successful models. Enrolled model mice were randomized into model control (received vehicle), 50mg/kg Ergosterol group and 100mg/kg Ergosterol group, Ergosterol was administered via daily oral gavage for 5 weeks, normal control group received corresponding vehicle.
Dosage form	50mg/kg, 100mg/kg; oral gavage; once a day for 5 weeks
Applications	Ergosterol treatment reduced fasting blood glucose, total cholesterol, triglyceride, low-density lipoprotein cholesterol levels, increased serum insulin, high-density lipoprotein cholesterol and HOMA-β levels in diabetic nephropathy mice. Ergosterol attenuated renal injury as evidenced by decreased blood urea nitrogen, serum creatinine, urinary albumin and albumin/creatinine ratio, and relieved renal mesangial proliferation. Ergosterol downregulated IL-6, TNF-α, MCP-1 mRNA and protein expressions in serum and renal tissues, and inhibited renal p-NF-κB(p65), COX-2, iNOS protein expressions.

References:

[1] Li X, Wu Q, Xie Y, et al. Ergosterol purified from medicinal mushroom Amauroderma rude inhibits cancer growth in vitro and in vivo by up-regulating multiple tumor suppressors. Oncotarget. 2015 Jul 10;6(19):17832-46.
[2] Liu C, Zhao S, Zhu C, et al. Ergosterol ameliorates renal inflammatory responses in mice model of diabetic nephropathy. Biomed Pharmacother. 2020 Aug;128:110252.

Background

Ergosterol is a sterol unique to fungal cell membranes with antioxidant and antiproliferative activities. Ergosterol activates mitochondrial ACSL1 to promote fatty acid β-oxidation, thereby alleviating fatty liver and insulin resistance, while reducing inflammation through inhibition of the NF-κB pathway. Ergosterol can be used in research related to metabolic diseases and antifungal drugs[1-4].

In vitro, Ergosterol (2.5–40μM) was applied to human breast cancer cells MCF-7 and MDA-MB-231

for 24–96h. Ergosterol inhibited cell viability, induced G0/G1 phase cell cycle arrest, suppressed spheroid formation, downregulated c-Myc and cyclin D1 expression, blocked β-catenin nuclear translocation, inhibited AKT and GSK-3β phosphorylation, promoted β-catenin degradation, suppressed protein synthesis, and downregulated USP47 and USP9x expression[5]. Ergosterol (0–300μM) was applied to MDA-MB-231, MDA-MB-468, SK-BR-3, MCF-7 human breast cancer cells and 4T1 mouse breast cancer cells for 24–48h. Ergosterol dose-dependently inhibited the viability, migration, and invasion of breast cancer cells, reduced colony number and size, induced apoptosis in MDA-MB-231 cells, and upregulated the mRNA and protein expression of Foxo3 and its downstream targets BimL, BimS, Fas, and FasL[6].

In vivo, Ergosterol (50mg/kg and 100mg/kg) was administered once daily by oral gavage to Streptozotocin (STZ)-induced diabetic nephropathy mice and normal mice for 5 weeks. Ergosterol reduced fasting blood glucose and blood lipids, elevated serum insulin levels and HOMA-β, alleviated kidney injury, and downregulated the mRNA and protein expression of IL-6, TNF-α, and MCP-1 in serum and renal tissue, while inhibiting p-NF-κB(p65), COX-2, and iNOS expression in renal tissue[7]. Ergosterol (0, 2, 7mg/kg) was incorporated into the diet and fed daily to wild-type C57BL/6NCrl male mice for 6 weeks. Ergosterol (7mg/kg) increased vitamin D3 levels in serum, liver, and kidney[8].

References:
[1] Yao M, Li C, Dang M, et al. Ergosterol: Biological Activities, Mechanistic Evidence, Pharmacokinetic Barriers, and Delivery Strategies. Int J Mol Sci. 2026 May 8;27(10):4198.
[2] Stefaniak-Skorupa J, Milewska MJ. Ergosterol and Lanosterol Derivatives: Synthesis and Possible Biomedical Applications. ChemMedChem. 2025 May 19;20(10):e202400948.
[3] Jordá T, Puig S. Regulation of Ergosterol Biosynthesis in Saccharomyces cerevisiae. Genes (Basel). 2020 Jul 15;11(7):795.
[4] Suárez Y, Fernández C, Ledo B, et al. Differential effects of ergosterol and cholesterol on Cdk1 activation and SRE-driven transcription. Eur J Biochem. 2002 Mar;269(6):1761-71.
[5] Li X, Wu Q, Xie Y, et al. Ergosterol purified from medicinal mushroom Amauroderma rude inhibits cancer growth in vitro and in vivo by up-regulating multiple tumor suppressors. Oncotarget. 2015 Jul 10;6(19):17832-46.
[6] Nilkhet S, Vongthip W, Lertpatipanpong P, et al. Ergosterol inhibits the proliferation of breast cancer cells by suppressing AKT/GSK-3beta/beta-catenin pathway. Sci Rep. 2024 Aug 24;14(1):19664.

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[7] Liu C, Zhao S, Zhu C, et al. Ergosterol ameliorates renal inflammatory responses in mice model of diabetic nephropathy. Biomed Pharmacother. 2020 Aug;128:110252.
[8] Zheng ZG, Zhang YP, Zhang XY, et al. Ergosterol alleviates hepatic steatosis and insulin resistance via promoting fatty acid β-oxidation by activating mitochondrial ACSL1. Cell Rep. 2025 Jan 28;44(1):115203.

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