Cerulenin

Cat. No.: HY-A0210

CAS No.: 17397-89-6

Molecular Formula: $C_{12}H_{17}NO_3$

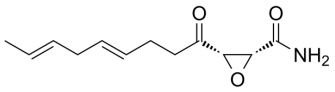
Molecular Weight: 223.27

Target: Fatty Acid Synthase (FASN); Fungal; Antibiotic

Pathway: Metabolic Enzyme/Protease; Anti-infection

Storage: -20°C, sealed storage, away from moisture

* In solvent : -80°C, 6 months; -20°C, 1 month (sealed storage, away from moisture)



SOLVENT & SOLUBILITY

In Vitro

DMSO : 100 mg/mL (447.89 mM; Need ultrasonic)

Preparing Stock Solutions	Solvent / Mass / Concentration	1 mg	5 mg	10 mg
	1 mM	4.4789 mL	22.3944 mL	44.7888 mL
	5 mM	0.8958 mL	4.4789 mL	8.9578 mL
	10 mM	0.4479 mL	2.2394 mL	4.4789 mL

Please refer to the solubility information to select the appropriate solvent.

In Vivo

1. Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 2.5 mg/mL (11.20 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (11.20 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Cerulenin, a potent, natural inhibitor of fatty acid synthase (FASN), is an epoxide produced by the fungus Cephalosporium caeruleus. Cerulenin inhibits topoisomerase I catalytic activity and augments SN-38-induced apoptosis. Cerulenin has antifungal and antitumor activies[1][2][3][4].

IC_{50} & Target

Fatty acid synthase (FASN)[1]

In Vitro

Cerulenin covalently binds to the catalytic site of FAS and disrupts the condensation reaction of acetyl-COA and malonyl-COA, inhibiting the biosynthesis of fatty acids and sterols in yeast. The Flavonoids quercetin and trans-Chalcone are effective against T. rubrum, with MICs of 125 and 7.5 μg/mL for the wild-type strain (MYA3108) and of 63 and 1.9 μg/mL for the ABC transporter mutant strain (ΔTruMDR2), respectively. The MICs of the Fluconazole and Cerulenin controls are 63 and 125 μg/mL for the wild-type strain and 30 and 15 μg/mL for the mutant strain, respectively[1]. To explore the underlying

	mechanism of Steroidogenic acute regulatory protein (StAR)'s protective effect on endothelial dysfunction model, the inhibitor of fatty acid synthase and HMG-CoA reductase, Cerulenin (5 μg/mL) and Lovastatin, are used before palmitic acid (PA) added. The mRNA expression of IL-1β, TNFα, VCAM-1 and IL-6 are reduced while NO production is recovered with inhibitor treatment[2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
In Vivo	Cerulenin treatment of ob/ob mice has obvious effects on body weight. With 2 days of treatment, body weight in treated mice is decreased compared to a 5.7% weight gain in the controls. With prolonged (7 days) treatment, no body weight loss is observed, but body weight gain is slowed. In all groups, 60 mg/kg of Cerulenin is more effective than 30 mg/kg in inhibiting weight gain. If given daily or every other day, ATP content are increased 58.1% and 61.5% respectively by 7-day treatment of 60 mg/kg Cerulenin. Significant ATP elevation is also observed with only 2 days of treatment with 60 mg/kg Cerulenin. In contrast, 30 mg/kg Cerulenin, given either 2 or 7 days, does not show any significant effect on cellular ATP content[3]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

PROTOCOL

Cell Assay [2]	Rat aortic endothelial cells (RAECs) are isolated and cultured with minor modifications. Briefly, segments of thoracic aorta are excised from male Wistar rats (150-180 g) and immediately placed in cold PBS containing 100 U/mL Penicillin and 100 mg/mL Streptomycin. The aorta is cut into 1 millimeter wide rings after the periadventitial fat is removed. Following transferred to a T-25 cm^2 flasks, the rings are cultured in Medium 199 containing 20% fetal bovine serum, 2.5 ng/mL basic fibroblast growth factors, 100U/mL Penicillin and 100 mg/mL Streptomycin. The aorta rings are placed at 37°C in a humidified atmosphere with 5% CO_2 for 72-80 h without movement. All pieces of aorta rings are removed when cells migrated. Its microvascular cytological characteristics are demonstrated by CD31 and vWF staining. In experiments involving PA treatment, M199 medium supplemented with 1% bovine serum albumin is used. All experiments are performed with RAECs up to passage 4. In the experiments with inhibitor, 5 μg/mL Cerulenin (in ethonal), or 5 μM Lovastatin (in DMSO), or 3.3 μg/mL Cerulenin plus 3.3 μM Lovastatin is added in culture media 24 hours prior to PA treatment. The same volume of solvents is added at the same time as control[2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
Animal Administration [3]	mice[3] Cerulenin is given to 6-8 week old male ob/ob mice in RPMI medium containing 20% DMSO intraperitoneally (i.p.). Controls are injected similarly with vehicle alone. The experimental groups (4 mice each) are as follows: A: 60 mg/kg/day Cerulenin, injected daily for 7 days; B: 60 mg/kg every other day for 7 days; C: 30 mg/kg/day for 7 days; D: 30 mg/kg every other day for 7 days; E: vehicle, daily for 7 days; F: 60 mg/kg/day Cerulenin for 2 days; G: 30 mg/kg/day Cerulenin for 2 days; H: vehicle, daily for 2 days; I: control. All animals are sacrificed on the same day under anesthesia. Blood is collected by portal vein puncture. Liver samples are snap-frozen in liquid N_2 and stored at -80°C until analysis, or paraformaldehyde-fixed for histological analysis. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

CUSTOMER VALIDATION

- Cell Metab. 2021 Jan 5;33(1):51-64.e9.
- J Hepatol. 2020 May;72(5):976-989.
- Cell Death Dis. 2018 May 2;9(5):505.
- Mol Ther Oncolytics. 2020 May 22;17:518-530.

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REFERENCES

[1]. Bitencourt TA, et al. Trans-chalcone and quercetin down-regulate fatty acid synthase gene expression and reduce ergosterol content in the human pathogenic dermatophyte Trichophyton rubrum. BMC Complement Altern Med. 2013 Sep 17;13:229.

[2]. Tian D, et al. Overexpression of steroidogenic acute regulatory protein in rat aortic endothelial cells attenuates palmitic acid-induced inflammation and reduction in nitric oxide bioavailability. Cardiovasc Diabetol. 2012 Nov 21;11:144.

[3]. Cheng G, et al. Cerulenin blockade of fatty acid synthase reverses hepatic steatosis in ob/ob mice. PLoS One. 2013 Sep 27;8(9):e75980.

[4]. Jeong NY, et al. Fatty acid synthase inhibitor cerulenin inhibits topoisomerase I catalytic activity and augments SN-38-induced apoptosis. Apoptosis. 2013;18(2):226-237.

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