

Product Data Sheet

Product Name: PHYSALIEN

Cat. No.: GC19245

Chemical Properties

Cas. No. 144-67-2

Formula C72H116O4

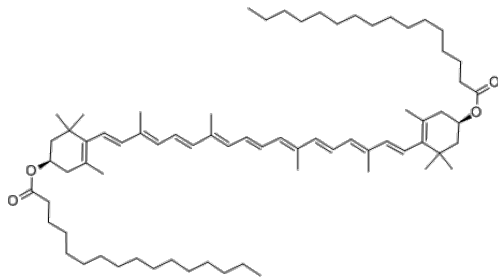
M.Wt 1045.69

Solubility Ethanol : 1 mg/mL (0.96 mM; Need ultrasonic and warming) Storage Store at -20°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 Rat normal hepatocyte BRL-3A cell line

Preparation Method BRL-3A cells were cultured in DMEM with 10%(v/v) fetal bovine serum at 37°C with 5% CO₂. Cells were pretreated with PHYSALIEN (1µM) for 2 hours prior to the addition of 250mM ethanol for 24 hours.

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

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Reaction
Conditions 1 μ M; 2-hour pretreatment.

Applications PHYSALIEN significantly counteracted ethanol-induced downregulation of key autophagy proteins (Atg5, beclin-1, LC3A/B) and upregulation of the autophagy substrate p62 in BRL-3A cells. PHYSALIEN also partially reversed ethanol-suppressed mitophagy, as evidenced by restored mitochondrial morphology (reduced swelling and disrupted cristae) and an increased percentage of intact mitochondria. Furthermore, PHYSALIEN attenuated ethanol-evoked NLRP3 inflammasome activation, reducing the expression levels of cleaved caspase-1 and secretion of IL-1 β and IL-18.

Animal experiment [2]:

Animal models Female Sprague-Dawley rats (Alcoholic fatty liver disease model)

Preparation Method Rats were intragastrically administered ethanol (4.0g/kg) for 10 weeks. PHYSALIEN was orally administered (25mg/kg/day) from the 5th week to the 10th week. Rats were sacrificed 8 hours after the last administration.

Dosage form 25mg/kg/day; Oral gavage; Daily administration for 5 weeks.

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Applications

PHYSALIEN treatment significantly alleviated alcoholic fatty liver disease (AFLD) symptoms, including reduced body weight loss, hepatic fat droplet deposition, and inflammatory cell infiltration. PHYSALIEN improved liver function by lowering serum ALT levels and triglycerides (TG). PHYSALIEN also attenuated hepatic oxidative stress (reducing CYP2E1 expression, MDA, and 8-isoprostane; restoring CAT and SOD1), diminished inflammation (reducing TNF- α , IL-1 β , IL-6, MCP-1), and reduced hepatic apoptosis.

References:

- [1] Gao H, Lv Y, Liu Y, et al. Wolfberry-Derived Zeaxanthin Dipalmitate Attenuates Ethanol-Induced Hepatic Damage. *Mol Nutr Food Res*. 2019 Jun;63(11):e1801339.
- [2] Xiao J, Wang J, Xing F, et al. Zeaxanthin dipalmitate therapeutically improves hepatic functions in an alcoholic fatty liver disease model through modulating MAPK pathway. *PLoS One*. 2014 Apr 16;9(4):e95214.

Background

PHYSALIEN is a lipophilic carotenoid compound^[1-2]. PHYSALIEN exhibits antioxidant and anti-inflammatory properties, which contribute to its hepatoprotective effects by mitigating oxidative stress and alleviating hepatic fibrosis. PHYSALIEN is utilized in research related to liver diseases and ocular disorders^[3-4].

In vitro, BRL-3A rat normal hepatocytes were pretreated with PHYSALIEN (1 μ M) for 2 hours before co-incubation with ethanol for 24 hours. The treatment restored the ethanol-suppressed expression of key autophagy-related proteins (Atg5, Beclin-1, and LC3A/B) and reduced the accumulation of the autophagy substrate p62. The pretreatment with PHYSALIEN targeted the cell membrane receptors P2X7 and AdipoR1, thereby modulating the AMPK/FoxO3a and PI3K/Akt signaling pathways, which restored ethanol-inhibited mitophagy and attenuated the activation of the NLRP3 inflammasome^[5].

In vivo, in a murine model of alcoholic fatty liver disease (AFLD) using male C57BL/6 mice, oral administration of PHYSALIEN (25mg/kg/day) from weeks 5 to 10 of the experiment. PHYSALIEN significantly alleviated typical AFLD symptoms induced by ethanol consumption. This included

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amelioration of liver histopathology (reduced lipid droplet deposition and inflammatory foci), lowered serum alanine aminotransferase (ALT) levels, and mitigation of hepatic oxidative stress and inflammation. The hepatoprotective effect was mediated through the regulation of the CYP2E1, NF- κ B, and MAPK (p38 and ERK) signaling pathways^[6]. In N-methyl-N-nitrosourea (MNU)-induced photoreceptor degeneration in adult male C57BL/6J mice, daily oral administration of PHYSALIEN (approximately 0.27mg/kg), starting one week before injury and continuing for a total of two weeks. PHYSALIEN significantly improved photoreceptor survival, enhanced retinal electrophysiological responses to light, and increased visual acuity in the injured mice^[7].

References:

- [1] Long JT, Fan HX, Zhou ZQ, et al. The major zeaxanthin dipalmitate derivatives from wolfberry. J Asian Nat Prod Res. 2020 Aug;22(8):746-753.
- [2] Liu F, Liu X, Zhou Y, et al. Wolfberry-derived zeaxanthin dipalmitate delays retinal degeneration in a mouse model of retinitis pigmentosa through modulating STAT3, CCL2 and MAPK pathways. J Neurochem. 2021 Sep;158(5):1131-1150.
- [3] Kan X, Zhou W, Xu W, et al. Zeaxanthin Dipalmitate-Enriched Emulsion Stabilized with Whey Protein Isolate-Gum Arabic Maillard Conjugate Improves Gut Microbiota and Inflammation of Colitis Mice. Foods. 2022 Nov 16;11(22):3670.
- [4] Bahaji Azami NL, Sun M. Zeaxanthin Dipalmitate in the Treatment of Liver Disease. Evid Based Complement Alternat Med. 2019 Aug 21;2019:1475163.
- [5] Gao H, Lv Y, Liu Y, et al. Wolfberry-Derived Zeaxanthin Dipalmitate Attenuates Ethanol-Induced Hepatic Damage. Mol Nutr Food Res. 2019 Jun;63(11):e1801339.
- [6] Xiao J, Wang J, Xing F, et al. Zeaxanthin dipalmitate therapeutically improves hepatic functions in an alcoholic fatty liver disease model through modulating MAPK pathway. PLoS One. 2014 Apr 16;9(4):e95214.
- [7] Chen X, Zhang S, Yang L, et al. Zeaxanthin dipalmitate-enriched wolfberry extract improves vision in a mouse model of photoreceptor degeneration. PLoS One. 2024 May 20;19(5):e0302742.

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