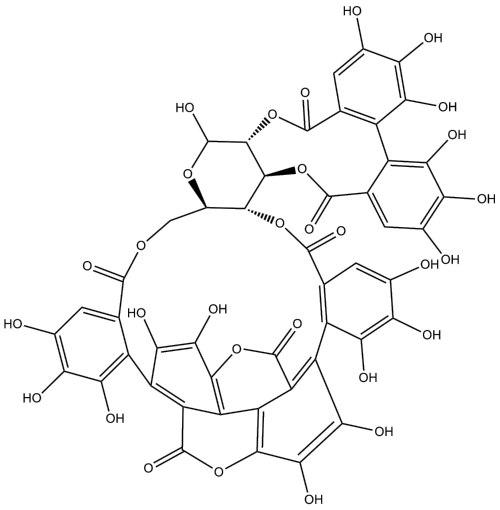
Product Data Sheet

Product Name: Punicalagin
Cat. No.: GN10047

Chemical Properties

Cas. No.	65995-63-3		
SMILES	O=C1OC2=C(C3=C(C(C(C(OC[C@H]4OC5O)=O)=CC(O)=C6O)=C6O)C(O)=C2O)C(C1=C(C(C(O)=C7O)=C(C=C7O)C(O[C@H]4[C@@H]([C@H]5OC8=O)OC(C(C(C(C(O)=C9O)=C8C=C9O)=C%10O)=CC(O)=C%10O)=O)=O)C(O)=C%11O)=C%11OC3=O		
Formula	$C_{48}H_{28}O_{30}$	M.Wt	1084.72
Solubility	≥ 108.4mg/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



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

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Protocol

Cell experiment [1]:

Cell lines	PC-3, LNCaP, BPH-1 cells
Preparation Method	PC-3, LNCaP and BPH-1 cells were cultured in a 96-well microtiter plate containing 0.1mL of RPMI growth media/well for 24h. Cells were incubated with Punicalagin dissolved in DMSO, and Punicalagin concentrations of 10, 50 and 100μM were used with incubation period of 24-96h. Cells were evaluated for their viability using the XTT assay.
Reaction Conditions	10, 50, 100μM; 24h
Applications	Punicalagin concentration-dependently inhibited viability in PC-3 and LNCaP cells, while viability in BPH-1 cells was insignificantly affected.

Animal experiment [2]:

Animal models	DBA/1 mice

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Preparation Method	DBA/1 mice (male, 8–9 weeks) were intradermally injected at the tail base with 200mg of bovine type II collagen emulsified at a 1:1 ratio (vol/vol) in Freund's complete adjuvant (day 0), and then boosted 21 days later using bovine type II collagen emulsified at a 1:1 ratio in incomplete Freund's adjuvant (day 21). Mice were randomly treated daily by intraperitoneal injection of DMSO (n=8) or Punicalagin (50mg/kg/day, n=8) for 14 days, which was initiated on the second day of booster immunization (day 22). Set up a normal control group including 8 mice without any treatment. Hindlimb samples were collected and fixed in 10% formalin for 48h. After a series of dehydration, waxing, and embedding, the joints were cut into 5μm thick sections for subsequent analysis.
Dosage form	50mg/kg/day for 14 days; i.p.
Applications	Punicalagin alleviated arthritis severity and bone destruction, and decreased serum IL-6 and TNF-α in collagen-induced arthritis (CIA) mice.

References:

[1]Adaramoye O, Erguen B, Nitzsche B, et al. Punicalagin, a polyphenol from pomegranate fruit, induces growth inhibition and apoptosis in human PC-3 and LNCaP cells[J]. Chemico-biological interactions, 2017, 274: 100-106.
[2]Huang M, Wu K, Zeng S, et al. Punicalagin inhibited inflammation and migration of fibroblast-like synoviocytes through NF-κB pathway in the experimental study of rheumatoid arthritis[J]. Journal of inflammation research, 2021: 1901-1913.

Background

Punicalagin is a ellagitannin, a phenolic compound with antioxidant, anti-inflammatory and anticancer effects[1, 2]. Punicalagin is a reversible and non-competitive 3-chymotrypsin-like protease ($3CL^{pro}$) inhibitor that inhibits SARS-CoV-2 replication in vitro[3].

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In vitro, PC-3, LNCaP, and BPH-1 cells were treated with Punicalagin (10, 50, 100μM) for 24h. Punicalagin inhibited the viability of PC-3 and LNCaP cells in a dose-dependent manner, but had no significant effect on the viability of BPH-1 cells. Punicalagin (100μM) increased the expression of enrichment factors in PC-3 and LNCaP cells[4]. Punicalagin (12.5-100μM) treatment of thyroid cancer cell line BCPAP cells for 24h-48h inhibited cell viability in a time- and dose-dependent manner and increased the number of autophagic vacuoles (AVO) in cells, but did not induce apoptosis[5].

In vivo, Punicalagin (50mg/kg) was intraperitoneally injected into mice with collagen-induced arthritis (CIA) for 14 days, which reduced the severity of arthritis and bone destruction in mice and decreased serum IL-6 and TNF-α levels[6]. Punicalagin (25, 50, 100mg/kg) was orally administered to pregnant rats with L-NAME-induced preeclampsia (PE) for 7 days, which significantly reduced diastolic blood pressure, systolic blood pressure and mean arterial pressure, restored angiogenesis balance, and enhanced placental antioxidant capacity[7].

References:
[1] Venusova E, Kolesarova A, Horky P, et al. Physiological and immune functions of punicalagin[J]. Nutrients, 2021, 13(7): 2150.
[2] Rozadi N, Oktavia S, Fauziah F. Pharmacological Activities of Punicalagin: A Review[J]. Journal of Drug Delivery and Therapeutics, 2022, 12(2): 148-155.
[3] Du R, Cooper L, Chen Z, et al. Discovery of chebulagic acid and punicalagin as novel allosteric inhibitors of SARS-CoV-2 3CLpro[J]. Antiviral research, 2021, 190: 105075.
[4] Adaramoye O, Erguen B, Nitzsche B, et al. Punicalagin, a polyphenol from pomegranate fruit, induces growth inhibition and apoptosis in human PC-3 and LNCaP cells[J]. Chemico-biological interactions, 2017, 274: 100-106.
[5] Cheng X, Gao Y, Yao X, et al. Punicalagin induces apoptosis-independent autophagic cell death in human papillary thyroid carcinoma BCPAP cells[J]. RSC advances, 2016, 6(72): 68485-68493.
[6] Huang M, Wu K, Zeng S, et al. Punicalagin inhibited inflammation and migration of fibroblast-like synoviocytes through NF-κB pathway in the experimental study of rheumatoid arthritis[J]. Journal of inflammation research, 2021: 1901-1913.
[7] Wang Y, Huang M, Yang X, et al. Supplementing punicalagin reduces oxidative stress markers and restores angiogenic balance in a rat model of pregnancy-induced hypertension[J]. The Korean journal of physiology & pharmacology, 2018, 22(4): 409-417.

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