

Product Data Sheet

Product Name: 9-cis Retinal

Cat. No.: GC18389

Chemical Properties

Cas. No. 514-85-2

Chemical Name 9-cis-retinal

SMILES CC1=C/C=C/C(C)=C\C=C\C(C)=C\C([H])=O)C(C)(C)CCC1

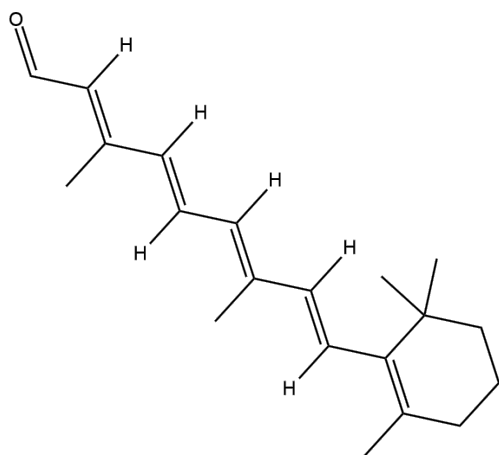
Formula $C_{20}H_{28}O$ M.Wt 284.4

Solubility DMF: 25 mg/ml, DMSO: 16 mg/ml, Ethanol: 25 mg/ml, Ethanol: PBS (pH 7.2) (1:2): 0.3 mg/ml
Storage Store at -80°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]:

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Cell lines LRDHSN/MCF7 cells

Cells were seeded into T25 tissue culture flasks at a density of 100,000 cells per square millimeter and cultured in complete tumor culture medium

Preparation Method supplemented with either 1 μ M 9-cis Retinal or an equal volume of solvent (ethanol). The culture medium was changed every 48h. Cell counts were performed using a hemocytometer on days 1, 3, 5, and 7.

Reaction
Conditions 1 μ M; 1, 3, 5, 7 days

Applications Within 24h of treatment, approximately 75% of the 9-cis Retinal was taken up and metabolized by LRDHSN/MCF7 cells.

Animal experiment [2]:

Animal models $Irbp^{-/-}$ mice

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Mice were anesthetized with xylazine (20mg/kg) and ketamine (80mg/kg), and pupils were dilated with phenylephrine hydrochloride (2.5%) and atropine sulfate (1%). Contact lens electrodes were placed on both eyes with a drop of methylcellulose. Electroretinogram (ERGs) were recorded with the UTAS E-2000 system (LKC Technologies) using 10ms flashes of increasing light intensities under scotopic or photopic conditions. Cone recordings were made in the presence of a 30cd/m² background light after 3min of light adaptation.

Preparation Method Preparation and injection of 9-cis Retinal. 9-cis Retinal was prepared for injection under dim red light. The retinal was dissolved in ethanol (10% final injection volume) before adding the vehicle solution (10% BSA in 0.9% NaCl). After recording baseline ERGs, mice were rested 12h, administered 0.375mg of 9-cis Retinal intraperitoneally, and dark-adapted 12h before recordings were repeated. Photopic ERG responses of aging *Irpb*^{-/-} mice were analyzed by one-way ANOVA. Kruskal-Wallis and Mann-Whitney U tests were used for cone density analysis.

Dosage form 0.375mg; i.p.

Applications Treatment with 9-cis Retinal produced a significant recovery of the cone response in *Irpb*^{-/-} mice.

References:

- [1] Paik J, Blaner W S, Swisshelm K. Cis-retinol dehydrogenase: 9-cis-retinol metabolism and its effect on proliferation of human MCF7 breast cancer cells[J]. Experimental cell research, 2005, 303(1): 183-196.
- [2] Parker R O, Fan J, Nickerson J M, et al. Normal cone function requires the interphotoreceptor retinoid binding protein[J]. Journal of Neuroscience, 2009, 29(14): 4616-4621.

Background

9-cis Retinal is a naturally occurring retinoid, produced by the oxidation of 9-cis Retinol by cis-retinol dehydrogenase (cRDH), and can bind to retinol-binding protein (CRBP)^[1, 2]. 9-cis Retinal can

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accelerate the differentiation and maturation of rod photoreceptor cells in retinal organoids^[3].

In vitro, treatment of MCF7 human breast cancer cells transfected with cRDH cDNA (LRDHsn/MCF7) with 9-cis Retinal (1 μ M) for 1-7 days significantly inhibited cancer cell growth, with an inhibition rate of 75% after 24h^[4].

In vivo, treatment of *Irbp*^{-/-} mice with 9-cis Retinal (0.375mg) via intraperitoneal injection significantly restored cone photoreceptor function in the mice^[5]. Treatment of retinitis pigmentosa model mice with 9-cis Retinal (2.5mg) once a week via gavage for 4 weeks significantly improved the visual function of both rod and cone photoreceptor cells in the mice^[6].

References:

- [1] Cascella M, Bärfuss S, Stocker A. Cis-retinoids and the chemistry of vision[J]. Archives of biochemistry and biophysics, 2013, 539(2): 187-195.
- [2] Tuvendal P. Short-chain retinol dehydrogenases/reductases: Involvement in retinoid metabolism and expression in embryonic and adult mouse[D]. Acta Universitatis Upsaliensis, 2000.
- [3] Kelley R A, Chen H Y, Swaroop A, et al. Accelerated development of rod photoreceptors in retinal organoids derived from human pluripotent stem cells by supplementation with 9-cis retinal[J]. STAR protocols, 2020, 1(1): 100033.
- [4] Paik J, Blaner W S, Swisshelm K. Cis-retinol dehydrogenase: 9-cis-retinol metabolism and its effect on proliferation of human MCF7 breast cancer cells[J]. Experimental cell research, 2005, 303(1): 183-196.
- [5] Parker R O, Fan J, Nickerson J M, et al. Normal cone function requires the interphotoreceptor retinoid binding protein[J]. Journal of Neuroscience, 2009, 29(14): 4616-4621.
- [6] Maeda A, Maeda T, Palczewski K. Improvement in rod and cone function in mouse model of Fundus albipunctatus after pharmacologic treatment with 9-cis-retinal[J]. Investigative ophthalmology & visual science, 2006, 47(10): 4540-4546.

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