Product Data Sheet

Product Name: Cyclophosphamide
Cat. No.: GC11145

Chemical Properties

Cas. No.	50-18-0		
Chemical Name	N,N-bis(2-chloroethyl)-2-oxo-1,3,2λ5-oxazaphosphinan-2-amine		
SMILES	C1CNP(=O)(OC1)N(CCCl)CCCl		
Formula	$C_7H_{15}Cl_2N_2O_2P$	M.Wt	261.09
Solubility	≥ 13.05 mg/mL in DMSO, ≥ 11.85 mg/mL in Water with ultrasonic and warming, ≥ 50.8 mg/mL in EtOH. This product is unstable in solution and it is recommended to prepare and use it immediately.	Storage	4°C, protect from light ,unstable in solution, ready to use.
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.		

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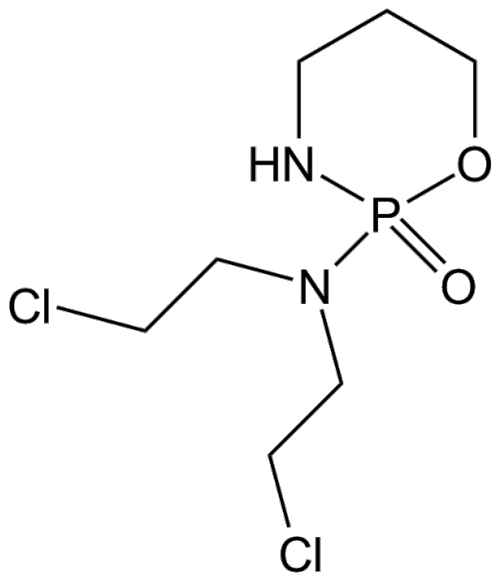
Structure



Protocol

Cell experiment [1]:

Cell lines	Multiple Myeloma cell line (MM1.S)
Preparation Method	MM1.S cells were treated with low dose concentrations of cyclophosphamide over a 48 hour time course, after which in vitro cell death was quantified by flow cytometry.

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Reaction Conditions	2.5, 5, 10, 20μM Cyclophosphamide for 48h.
Applications	Low-dose cyclophosphamide treatment increased MM cell death in a dose-dependent manner, inducing moderate levels of cell death at 20μM cyclophosphamide after 24 hours and from 10μM cyclophosphamide after 48 hours.

Animal experiment [2]:

Animal models	C57BL/6 mice
Preparation Method	C57BL/6 mice were subcutaneously injected with B16F10 cells and daily treated in a low-dose Cyclophosphamide, Paclitaxel and Docetaxel Animals were monitored every 3 days for tumor growth.
Dosage form	10 mg/kg Cyclophosphamide, intraperitoneal(i.p.) injection
Applications	Cyclophosphamide chemotherapy significantly delays tumor growth as compared to the control group. At day 19, when all animals in both experimental groups were still alive and comparable, mice treated with metronomic chemotherapy showed a 70% reduction in tumor dimension.Such effect was directly correlated with reduction of CD4+ Tcells and parallel increase of CD8+ Tcells

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References:
[1]. Naicker SD, Feerick CL, et al. Cyclophosphamide alters the tumor cell secretome to potentiate the anti-myeloma activity of daratumumab through augmentation of macrophage-mediated antibody dependent cellular phagocytosis. Oncoimmunology. 2021 Jan 25;10(1):1859263.
[2]. Tagliamonte M, Petrizzo A, et al. A novel multi-drug metronomic chemotherapy significantly delays tumor growth in mice. J Transl Med. 2016 Feb 24;14:58.

Background

Cyclophosphamide is a frequently used chemotherapy, often in combination with other chemotherapy types, for the treatment of breast cancer, malignant lymphomas, multiple myeloma, and neuroblastoma[1].

Cyclophosphamide's immunomodulatory function was investigated by conditioning macrophages with tumor cell secretome collected from cyclophosphamide treated MM cell lines. CTX-TCS conditioning augmented the migratory capacity of macrophages and increased CD32 and CD64 Fcγ receptor expression on their cell surface. Daratumumab-specific tumor clearance was increased by conditioning macrophages with CTX-TCS in a dose-dependent manner[2]

In vivo，Cyclophosphamide induces early nonapoptotic death of superficial cells, followed by apoptotic death of deeper layers. H&E staining was performed over several days to determine the global urothelial injury and regeneration pattern after cyclophosphamide injection. Compared with uninjured mice, significant sloughing of urothelial cell layers as well as submucosal hemorrhage and inflammation were observed 1 day after cyclophosphamide. cyclophosphamide induces nonapoptotic death of superficial cells starting at 2 hours, followed by apoptotic loss of intermediate and basal cells starting at 4 hours[3]

References:
[1]. Gernaat SAM, von Stedingk H, et al. Cyclophosphamide exposure assessed with the biomarker phosphoramide mustard-hemoglobin in breast cancer patients: The TailorDose I study. Sci Rep. 2021 Feb 1;11(1):2707.
[2]. Naicker SD, Feerick CL, et al. Cyclophosphamide alters the tumor cell secretome to potentiate the anti-myeloma activity of daratumumab through augmentation of macrophage-mediated antibody dependent cellular phagocytosis. Oncoimmunology. 2021 Jan 25;10(1):1859263.

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[3]. Narla ST, Bushnell DS, et al. Keratinocyte Growth Factor Reduces Injury and Leads to Early Recovery from Cyclophosphamide Bladder Injury. Am J Pathol. 2020 Jan;190(1):108-124.

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