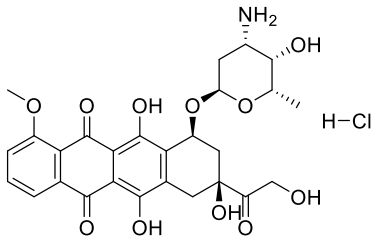
Product data sheet

MedKoo Cat#: 100280 Name: Doxorubicin hydrochloride CAS#: 25316-40-9 (HCl) Chemical Formula: $C_{27}H_{30}ClNO_{11}$ Molecular Weight: 579.98	
Product supplied as:	Powder
Purity (by HPLC):	≥ 98%
Shipping conditions	Ambient temperature
Storage conditions:	Powder: -20°C 3 years; 4°C 2 years.
	In solvent: -80°C 3 months; -20°C 2 weeks.

1. Product description:

Doxorubicin is an anthracycline antibiotic with antineoplastic activity. Doxorubicin, isolated from the bacterium Streptomyces peucetius var. caesius, is the hydroxylated congener of daunorubicin. Doxorubicin intercalates between base pairs in the DNA helix, thereby preventing DNA replication and ultimately inhibiting protein synthesis. Additionally, doxorubicin inhibits topoisomerase II which results in an increased and stabilized cleavable enzyme-DNA linked complex during DNA replication and subsequently prevents the ligation of the nucleotide strand after double-strand breakage. Doxorubicin also forms oxygen free radicals resulting in cytotoxicity secondary to lipid peroxidation of cell membrane lipids; the formation of oxygen free radicals also contributes to the toxicity of the anthracycline antibiotics, namely the cardiac and cutaneous vascular effects.

2. CoA, QC data, SDS, and handling instruction

SDS and handling instruction, CoA with copies of QC data (NMR, HPLC and MS analytical spectra) can be downloaded from the product web page under "QC And Documents" section. Note: copies of analytical spectra may not be available if the product is being supplied by MedKoo partners. Whether the product was made by MedKoo or provided by its partners, the quality is 100% guaranteed.

3. Solubility data

Solvent	Max Conc. mg/mL	Max Conc. mM
DMSO	43.68	75.31
DMSO:PBS (pH 7.2) (1:1)	0.5	0.86
Ethanol	1.0	1.72
Water	49.67	85.64

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	**1 mg**	**5 mg**	**10 mg**
1 mM	1.72 mL	8.62 mL	17.24 mL
5 mM	0.34 mL	1.72 mL	3.45 mL
10 mM	0.17 mL	0.86 mL	1.72 mL
50 mM	0.03 mL	0.17 mL	0.34 mL

5. Molarity Calculator, Reconstitution Calculator, Dilution Calculator

Please refer the product web page under section of "Calculator"

6. Recommended literature which reported protocols for in vitro and in vivo study

In vitro study

1. Botlagunta M, Kollapalli B, Kakarla L, Gajarla SP, Gade SP, Dadi CL, Penumadu A, Javeed S. In vitro anti-cancer activity of doxorubicin against human RNA helicase, DDX3. Bioinformation. 2016 Oct 18;12(7):347-353. doi: 10.6026/97320630012347. PMID: 28246464; PMCID: PMC5311078.

2. Jiang D, Lynch C, Medeiros BC, Liedtke M, Bam R, Tam AB, Yang Z, Alagappan M, Abidi P, Le QT, Giaccia AJ, Denko NC, Niwa M, Koong AC. Identification of Doxorubicin as an Inhibitor of the IRE1α-XBP1 Axis of the Unfolded Protein Response. Sci Rep. 2016 Sep 16;6:33353. doi: 10.1038/srep33353. PMID: 27634301; PMCID: PMC5025885.

In vivo study

Product data sheet

1. Bosman M, Favere K, Neutel CHG, Jacobs G, De Meyer GRY, Martinet W, Van Craenenbroeck EM, Guns PDF. Doxorubicin induces arterial stiffness: a comprehensive in vivo and ex vivo evaluation of vascular toxicity in mice. Toxicol Lett. 2021 Apr 22:S0378-4274(21)00108-9. doi: 10.1016/j.toxlet.2021.04.015. Epub ahead of print. PMID: 33895255.
2. Andersen CL, Liu M, Wang Z, Ye X, Xiao S. Chemotherapeutic agent doxorubicin alters uterine gene expression in response to estrogen in ovariectomized CD-1 adult mice†. Biol Reprod. 2019 Apr 1;100(4):869-871. doi: 10.1093/biolre/ioy259. PMID: 30561525; PMCID: PMC6483053.

7. Bioactivity

Biological target:

Doxorubicin hydrochloride is a potent human DNA topoisomerase I and topoisomerase II inhibitor with IC50s of 0.8 μM and 2.67 μM, respectively.

In vitro activity

To study the anti-cancer activity of doxorubicin on OSCC cells, the H357 cells were incubated with various concentration of doxorubicin for 48hr's and cell viability was determined by MTT assay. As shown in (Figure 5a) doxorubicin was able to decline the cell growth from 1 μM and it continues until 100 μM concentrations. The half maximal inhibitory concentration (IC50) of doxorubicin in H357 cells is 50 μM. Further, immunoblot study suggests that doxorubicin significantly reduced DDX3 protein expression levels as compared to DMSO treated cells (Figure 5b). Later, the molecular interaction of the doxorubicin with DDX3 was confirmed by molecular docking analysis. Results showed that, doxorubicin form a strong hydrogen bond interactions with Thr 198, Thr 201 (Figure 5c) and π-π stacking with Tyr 200 amino acid residues (Figure 5d). Overall, it suggests that doxorubicin directly interacts with DDX3 by forming intra and inter molecular interaction with active site amino acid residues.

Reference: Bioinformation. 2016; 12(7): 347–353. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5311078/

In vivo activity

Male C57BL/6 J mice were treated for 2 weeks with 2 mg/kg (low dose) or 4 mg/kg (high dose) of DOX (doxorubicin) weekly. Arterial stiffness was assessed in vivo with ultrasound imaging (abdominal aorta pulse wave velocity (aaPWV)) and applanation tonometry (carotid-femoral PWV) combined with ex vivo vascular stiffness and reactivity evaluation. The high dose increased aaPWV, while cfPWV did not reach statistical significance. Phenylephrine (PE)-contracted aortic segments showed a higher Peterson's modulus (Ep) in the high dose group, while Ep did not differ when vascular smooth muscle cells (VSMCs) were relaxed by a NO donor (DEANO). In addition, aortic rings of DOX-treated mice showed increased PE contraction, decreased basal nitric oxide (NO) index and impaired acetylcholine-induced endothelium-dependent relaxation. DOX treatment contributed to endothelial cell loss and reduced endothelial nitric oxide synthase (eNOS) expression in the aorta.

Reference: Toxicol Lett. 2021 Apr 22:S0378-4274(21)00108-9.
https://www.sciencedirect.com/science/article/abs/pii/S0378427421001089?via%3Dihub

Note: The information listed here was extracted from literature. MedKoo has not independently retested and confirmed the accuracy of these methods. Customer should use it just for a reference only.