

Product data sheet



MedKoo Cat#: 406835 Name: RK-33 CAS#: 1070773-09-9 Chemical Formula: C ₂₃ H ₂₀ N ₆ O ₃ Exact Mass: 428.1597 Molecular Weight: 428.45	
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:

RK-33 is a potent and selective DDX3 inhibitor. RK-33 binds to DDX3 and abrogates its activity. Inhibition of DDX3 by RK-33 caused G1 cell cycle arrest, induced apoptosis, and promoted radiation sensitization in DDX3-overexpressing cells. Overall, inhibition of DDX3 by RK-33 promotes tumor regression, thus providing a compelling argument to develop DDX3 inhibitors for lung cancer therapy. RK-33 radiosensitizes prostate cancer cells by blocking the RNA helicase DDX3.

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	40	93.36

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	1 mg	5 mg	10 mg
1 mM	2.33 mL	11.67 mL	23.34 mL
5 mM	0.47 mL	2.33 mL	4.67 mL
10 mM	0.23 mL	1.17 mL	2.33 mL
50 mM	0.05 mL	0.23 mL	0.47 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

- Vesuna F, Akhrymuk I, Smith A, Winnard PT Jr, Lin SC, Panny L, Scharpf R, KeHN-Hall K, Raman V. RK-33, a small molecule inhibitor of host RNA helicase DDX3, suppresses multiple variants of SARS-CoV-2. *Front Microbiol.* 2022 Aug 25;13:959577. doi: 10.3389/fmicb.2022.959577. PMID: 36090095; PMCID: PMC9453862.
- Xie M, Vesuna F, Tantravedi S, Bol GM, Heerma van Voss MR, Nugent K, Malek R, Gabrielson K, van Diest PJ, Tran PT, Raman V. RK-33 Radiosensitizes Prostate Cancer Cells by Blocking the RNA Helicase DDX3. *Cancer Res.* 2016 Nov 1;76(21):6340-6350. doi: 10.1158/0008-5472.CAN-16-0440. Epub 2016 Sep 12. PMID: 27634756; PMCID: PMC5576499.

In vivo study

- Tantravedi S, Vesuna F, Winnard PT Jr, Martin A, Lim M, Eberhart CG, Berlinicke C, Raabe E, van Diest PJ, Raman V. Targeting DDX3 in Medulloblastoma Using the Small Molecule Inhibitor RK-33. *Transl Oncol.* 2019 Jan;12(1):96-105. doi: 10.1016/j.tranon.2018.09.002. Epub 2018 Oct 3. PMID: 30292066; PMCID: PMC6171097.
- Chen W, Pilling D, Gomer RH. The mRNA-binding protein DDX3 mediates TGF-β1 upregulation of translation and promotes pulmonary fibrosis. *JCI Insight.* 2023 Apr 10;8(7):e167566. doi: 10.1172/jci.insight.167566. PMID: 36821384; PMCID: PMC10132153.

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7. Bioactivity

Biological target:

RK-33 is an inhibitor of DDX3 and causes G1 cell cycle arrest, induces apoptosis, and promotes radiation sensitization in DDX3-overexpressing cells.

In vitro activity

This study supports the use of RK-33 as a host-targeted antiviral strategy to control SARS-CoV-2 infection. Targeting DDX3 with RK-33 reduced the viral load in four isolates of SARS-CoV-2 by one to three log orders in Calu-3 cells. Proteomics and RNA-seq analyses indicated that most SARS-CoV-2 genes were downregulated by RK-33 treatment.

Reference: Front Microbiol. 2022 Aug 25;13:959577. <https://pubmed.ncbi.nlm.nih.gov/36090095/>

In vivo activity

RK-33 inhibits DDX3 activity and down-regulates WNT/ β -catenin signaling. It could be used as a therapeutic strategy for DDX3-expressing medulloblastomas in combination with radiation. The combination of RK-33 and 5 Gy radiation caused tumor regression in a mouse xenograft model of medulloblastoma. The researchers observed DDX3 expression in both pediatric (55%) and adult (66%) medulloblastoma patients.

Reference: Transl Oncol. 2019 Jan;12(1):96-105. <https://pubmed.ncbi.nlm.nih.gov/30292066/>

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.