Rapamycin

[53123-88-9]

NB-64-06627-10mg

NB-64-06627-25mg

NB-64-06627-50mg

NB-64-06627-100mg

NB-64-06627-200mg

NB-64-06627-500mg

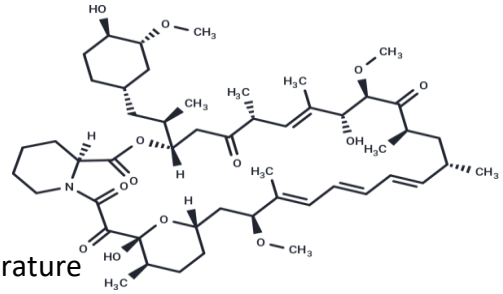
NB-64-06627-1g

NB-64-06627-1mL

Rapamycin [53123-88-9]

#Cat: NB-64-06627-10mg **Size: 10mg**
#Cat: NB-64-06627-25mg **Size: 25mg**
#Cat: NB-64-06627-50mg **Size: 50mg**
#Cat: NB-64-06627-100mg **Size: 100mg**
#Cat: NB-64-06627-200mg **Size: 200mg**
#Cat: NB-64-06627-500mg **Size: 500mg**
#Cat: NB-64-06627-1g **Size: 1g**
#Cat: NB-64-06627-1mL **Size: 1mL**

Chemical Properties



CAS No. : 53123-88-9
Formula : C51H79NO13
Molecular Weight : 914.17
Appearance : Solid
Storage : Keep away from moisture, store at low temperature
Powder: -20°C for 3 years | In solvent: -80°C for 1 year

Biological Description

Description	Rapamycin (AY 22989) is a natural product of macrolides, an mTOR inhibitor with specificity (HEK293 cells: IC50=0.1 nM). Rapamycin has immunosuppressive activity and induces autophagy.
Targets(IC50)	Endogenous Metabolite, Antibiotic, Autophagy, Antifungal, mTOR
In vitro	**METHODS:** Normal human renal epithelial cells HRECs were treated with Rapamycin (0.01-1000 nmol/L) for 6 days, and cell growth inhibition was detected using MTT. **RESULTS:** Rapamycin dose-dependently inhibited the growth of HRECs, with a 40% reduction in cell viability at a concentration of 10 nmol/L. [1] **METHODS:** Human cervical cancer cells HeLa and human prostate cancer cells PC3 were treated with Rapamycin (100 nM) for 0.5-24 h, and the expression levels of target proteins were detected by Immunoprecipitation. **RESULTS:** Rapamycin had little effect on the expression levels of mTOR, raptor and rictor. Rapamycin significantly reduced raptor binding to mTOR at 0.5h and rictor binding to Mtor at 24h. Long-term treatment of cells with Rapamycin inhibited Mtor2 assembly. [2] **METHODS:** Human vascular endothelial cells were treated with Rapamycin (1-100 ng/mL) for 48 h, and cell migration was examined using the Wound-healing method. **RESULTS:** Rapamycin dose-dependently inhibited the migration of human vascular endothelial cells. [3]
In vivo	**METHODS:** To study the effect of Rapamycin on life expectancy, Rapamycin (8 mg/kg in DMSO+5% PEG-400+5% Tween-80) was administered intraperitoneally to 20-21 month old C57BL/6J mice once daily for three months. **RESULTS:** Three months of Rapamycin treatment was sufficient to increase the life

	expectancy of middle-aged mice by 60% and improve their healthy lifespan. [4] **METHODS:** To determine the appropriate dose of Rapamycin for the treatment of epilepsy, Rapamycin (0.1-3 mg/kg in 4% ethanol + 5% Tween 80 + 5% PEG 400) was injected intraperitoneally into Sprague-Dawley rats once a day for four weeks. **RESULTS:** Only 1.0 mg/kg and 3.0 mg/kg Rapamycin inhibited p-S6. Rats treated with 0.1 and 0.3 mg/kg Rapamycin had no significant adverse effects, whereas rats treated with 1.0 and 3.0 mg/kg Rapamycin showed significant reductions in body, spleen, and thymus weights, and exhibited cognitive impairment and anxiety. The Rapamycin dose could not inhibit mTOR in the treatment of epilepsy without causing any side effects, but 1 mg/kg may be the optimal dose to inhibit mTOR in young rats with relatively few side effects. [5]
Kinase Assay	HEK293 cells were plated at 2-2.5 × 10^5 cells per well of a 12-well plate and serum-starved for 24 h in DMEM only. Cells were mock-treated or treated with rapamycin (0.05- 50 nM), iRap (0.5-500 nM), or AP21967 (0.5-500 nM) for 15 minutes at 37 °C. Serum was added to a final concentration of 20% for 30 minutes at 37 °C. Cells were lysed as described and cell lysates were separated by SDS-PAGE. Resolved proteins were transferred to a PVDF membrane and immunoblotted with a phosphospecific primary antibody against Thr389 of p70 S6 kinase. Data were analyzed using ImageQuant and KaleidaGraph [1].
Cell Research	To determine the effects of rapamycin and rapamycin plus LY294002 or UCN-01 on tumor cells, we determined cell viability after the treatments. We used a trypan blue dye exclusion assay as described previously. Tumor cells in exponential growth were harvested and seeded at 5 × 10^3 cells per well (0.1 mL) in 96-well flat-bottomed plates and incubated overnight at 37°C. The cells were then incubated for 72 hours with or without rapamycin or with rapamycin plus LY294002 or UCN-01. After the cells were collected by trypsinization, they were stained with trypan blue, and the viable cells in each well were counted. The viability of the untreated cells (the control) was considered 100%. Survival fractions were calculated from the mean cell viability of the treated cells [3].
Animal Research	Animals were randomized to treatment or vehicle groups so that the mean starting body weights of each group were equal. Drug treatment began on the day of surgery or on the first day of reloading after the 14-day suspension. Rapamycin was delivered once daily by intraperitoneal injection at a dose of 1.5 mg/kg, dissolved in 2% carboxymethylcellulose. CsA was delivered once daily by subcutaneous injection at a dose of 15 mg/kg, dissolved in 10% methanol and olive oil. FK506 was delivered once daily via subcutaneous injection at a dose of 3 mg kg?1, dissolved in 10% ethanol, 10% cremophor and saline [4].

Solubility Information

Solubility	Ethanol: 100 mg/mL (109 mM), Sonication is recommended. H_2O: Insoluble, 10% DMSO+40% PEG300+5% Tween 80+45% Saline: 10 mg/mL (10.94 mM), Solution. DMSO: 257.5 mg/mL (281.68 mM), Sonication is recommended. (< 1 mg/ml refers to the product slightly soluble or insoluble)

Preparing Stock Solutions

	1mg	5mg	10mg
1mM	1.0939 mL	5.4694 mL	10.9389 mL
5mM	0.2188 mL	1.0939 mL	2.1878 mL
10mM	0.1094 mL	0.5469 mL	1.0939 mL
50mM	0.0219 mL	0.1094 mL	0.2188 mL

Please select the appropriate solvent to prepare the stock solution, according to the solubility of the product in different solvents. Please use it as soon as possible.

Reference

Pallet N, et al. Rapamycin inhibits human renal epithelial cell proliferation: effect on cyclin D3 mRNA expression and stability. Kidney Int. 2005 Jun;67(6):2422-33.

Yan C, Zheng L, Jiang S, et al.Exhaustion-associated cholesterol deficiency dampens the cytotoxic arm of antitumor immunity.Cancer Cell.2023

Li W Y, Shi T S, Huang J, et al.Activation of the mTORC1 signaling cascade in the hippocampus and medial prefrontal cortex is required for the antidepressant actions of vortioxetine in mice.International Journal of Neuropsychopharmacology.2023: pyad017.

Zhao, Ming, et al. GCG inhibits SARS-CoV-2 replication by disrupting the liquid phase condensation of its nucleocapsid protein. Nature Communications . 12.1 (2021): 1-14.

Zhang Z, Lu Y, Zhang H, et al.Enriched environment ameliorates fear memory impairments induced by sleep deprivation via inhibiting PIEZO1/calpain/autophagy signaling pathway in the basal forebrain.CNS Neuroscience & Therapeutics.2023

Tu W, Qin M, Li Y, et al.Metformin regulates autophagy via LGMN to inhibit choriocarcinoma.Gene.2022: 147090. Hu J, Ling Z, Li W, et al.Glutamine promotes the proliferation of epithelial cells via mTOR/S6 pathway in oral lichen planus.Journal of Oral Pathology & Medicine.2022

Wu D, Sun X, Zhao Y, et al.Strontium Ranelate Inhibits Osteoclastogenesis through NF-κB-Pathway-Dependent Autophagy.Bioengineering.2023, 10(3): 365.

Qi Xiang,Pin Wan,Ge Yang,Siyu Huang,Mengying Qin. Beclin1 Binds to Enterovirus 71 3D Protein to Promote the Virus Replication. Viruses-Basel. 2020, 12(7): 756

Lu J, Wang C, Cheng X, et al. A breakdown in microglial metabolic reprogramming causes internalization dysfunction of α-synuclein in a mouse model of Parkinson's disease. Journal of Neuroinflammation. 2022, 19(1): 1- 21

Gao C, Yan Y, Chen G, et al. Autophagy Activation Represses Pyroptosis through the IL-13 and JAK1/STAT1 Pathways in a Mouse Model of Moderate Traumatic Brain Injury. ACS Chemical Neuroscience. 2020

Cao L, Zhao J, Ma L, et al. Lycopene attenuates zearalenone-induced oxidative damage of piglet sertoli cells through the nuclear factor erythroid-2 related factor signaling pathway. Ecotoxicology and Environmental Safety. 2021, 225: 112737.

Wang J L, Wang Y, Gao T T, et al. Venlafaxine protects against chronic stress-related behaviors in mice by activating the mTORC1 signaling cascade. Journal of Affective Disorders. 2020, 276: 525-536.

Cai Z, Wu X, Song Z, et al.Metformin potentiates nephrotoxicity by promoting NETosis in response to renal ferroptosis.Cell Discovery.2023, 9(1): 104.

Sarbassov DD, et al. Prolonged rapamycin treatment inhibits mTORC2 assembly and Akt/PKB. Mol Cell. 2006 Apr 21;22(2):159-68.

Lei Y, Zhang X, Xu Q, et al. Autophagic elimination of ribosomes during spermiogenesis provides energy for flagellar motility. Developmental Cell. 2021, 56(16): 2313-2328. e7

Sun S, Hu Y, Zheng Q, et al. Poly(ADP-ribose) polymerase 1 induces cardiac fibrosis by mediating mammalian target of rapamycin activity. Journal of Cellular Biochemistry. 2019, 120(4): 4813-4826
Gao C, Wang H, Wang T, et al. Platelet regulates neuroinflammation and restores blood–brain barrier integrity in a mouse model of traumatic brain injury. Journal of Neurochemistry. 2020
Guo X, Wang C, Xu T, et al. SiO 2 prompts host defense against Acinetobacter baumannii infection by mTORC1 activation. Science China Life Sciences. 2020: 1-9.
Su Q, Wang J, Liu F, et al. Blocking Parkin/PINK1-mediated mitophagy sensitizes hepatocellular carcinoma cells to sanguinarine-induced mitochondrial apoptosis. Toxicology in Vitro. 2020: 104840
Yuan, Shizhu, et al. ATF4-dependent heme-oxygenase-1 attenuates diabetic nephropathy by inducing autophagy and inhibiting apoptosis in podocyte. Renal Failure. 43.1 (2021): 968-979.
Su G, Yang W, Wang S, et al. SIRT1-autophagy axis inhibits excess iron-induced ferroptosis of foam cells and subsequently increases IL-1B and IL-18. Biochemical and Biophysical Research Communications. 2021, 561: 33-39. Wu Z, You Z, Chen P, et al. Matrine Exerts Antidepressant-Like Effects on Mice: Role of the Hippocampal PI3K/Akt/mTOR Signaling. International Journal of Neuropsychopharmacology. 2018, 21(8): 764-776
Xu D, Sun Y, Wang C, et al. Hippocampal mTOR signaling is required for the antidepressant effects of paroxetine. Neuropharmacology. 2018 Jan;128:181-195
Ni T, Gao F, Zhang J, et al. Impaired autophagy mediates hyperhomocysteinemia-induced HA-VSMC phenotypic switching. Journal of Molecular Histology. 2019 Apr 26: 1-10
Yu Q, Li C, Niu Q, et al.Hepatic COX1 loss leads to impaired autophagic flux and exacerbates nonalcoholic steatohepatitis.Acta Pharmaceutica Sinica B.2023
Si Y, et al. Concentration-dependent effects of rapamycin on proliferation, migration and apoptosis of endothelial cells in human venous malformation. Exp Ther Med. 2018 Dec;16(6):4595-4601.
Qin Q, Li M, Gu M, et al. Stk24 protects against obesity-associated metabolic disorders by disrupting the NLRP3 inflammasome. Cell Reports. 2021, 35(8): 109161.
Yang J, Li J, Guo H, et al. An Experimental Study Reveals the Protective Effect of Autophagy against Realgar-Induced Liver Injury via Suppressing ROS-Mediated NLRP3 Inflammasome Pathway. International Journal of Molecular Sciences. 2022, 23(10): 5697
Gao C, Wang H, Wang T, et al. Platelet CLEC-2 regulates neuroinflammation and restores blood brain barrier integrity in a mouse model of traumatic brain injury. Journal of Neurochemistry. 2020: e14983
Sanders D W, Jumper C C, Ackerman P J, et al. SARS-CoV-2 requires cholesterol for viral entry and pathological syncytia formation. Elife. 2021, 10: e65962.
Xu D, Wang C, Zhu X, et al. The antidepressant-like effects of fluvoxamine in mice involve the mTOR signaling in the hippocampus and prefrontal cortex. Psychiatry research. 2020 Mar;285:112708. doi: 10.1016/j.psychres.
2019.112708. Epub 2019 Nov 25.
Fu Y H, Tseng C Y, Lu J W, et al. Deciphering the Role of Pyrvinium Pamoate in the Generation of Integrated Stress Response and Modulation of Mitochondrial Function in Myeloid Leukemia Cells through Transcriptome Analysis. Biomedicines. 2021, 9(12): 1869.
Zhang T, Tian C, Wu J, et al. MicroRNA-182 exacerbates blood-brain barrier (BBB) disruption by downregulating the mTOR/FOXO1 pathway in cerebral ischemia. The FASEB Journal. 2020, 34(10): 13762-13775
Hu A, Zhang J Z, Wang J, et al. Cholesterylation of Smoothened is a calcium-accelerated autoreaction involving an intramolecular ester intermediate. Cell Research. 2022, 32(3): 288-301.
Tu W, Qin M, Li Y, et al.Metformin regulates autophagy via LGMN to inhibit choriocarcinoma.Gene.2022: 147090. Yang D L, Zhang Y, He L, et al. Demethylzeylasteral (T-96) Initiates Extrinsic Apoptosis Against Prostate Cancer cells by Inducing ROS-Mediated ER Stress and Suppressing Autophagic Flux. Biological Research. 2021, 54(1): 1- 14.

Zhuang J, Shen L, Li M, et al.Cancer-associated fibroblast-derived miR-146a-5p generates a niche that promotes bladder cancer stemness and chemoresistance.Cancer Research.2023: CAN-22-2213.
Bitto A, et al. Transient rapamycin treatment can increase lifespan and healthspan in middle-aged mice. Elife. 2016 Aug 23;5:e16351.
Han S, Zhu T, Ding S, et al. Early growth response genes 2 and 3 induced by AP-1 and NF-κB modulate TGF-β1 transcription in NK1. 1− CD4+ NKG2D+ T cells. Cellular Signalling. 2020, 76: 109800.
Qiu W Q, Ai W, Zhu F D, et al. Polygala saponins inhibit NLRP3 inflammasome-mediated neuroinflammation via SHP-2-Mediated mitophagy. Free Radical Biology and Medicine. 2022, 179: 76-94.
Li W, Luo L X, Zhou Q Q, et al. Phospholipid peroxidation inhibits autophagy via stimulating the delipidation of oxidized LC3-PE. Redox Biology. 2022: 102421.
Liu Y, Zhang Y, Zhang M, et al. Activated autophagy restored the impaired frequency and function of regulatory T cells in chronic prostatitis. The Prostate. 2021, 81(1): 29-40
Yang D, Liu H, Cai Y, et al. Branched-chain amino acid catabolism breaks glutamine addiction to sustain hepatocellular carcinoma progression. Cell Reports. 2022, 41(8): 111691.
Zhang Y, Ding Y, Li M, et al. MicroRNA-34c-5p provokes isoprenaline-induced cardiac hypertrophy by modulating autophagy via targeting ATG4B. Acta Pharmaceutica Sinica B. 2021
Wang Y, Ji L, Peng Z, et al. Silencing DAPK3 blocks the autophagosome-lysosome fusion by mediating SNAP29 in trophoblast cells under high glucose treatment. Molecular and Cellular Endocrinology. 2020, 502: 110674
Yang Z, Guo D, Zhao J, et al.Aggf1 Specifies Hemangioblasts at the Top of Regulatory Hierarchy via Npas4l and mTOR-S6K-Emp2-ERK Signaling.Arteriosclerosis, Thrombosis, and Vascular Biology.2023
Hong J H, Yong C H, Heng H L, et al.Integrative multiomics enhancer activity profiling identifies therapeutic vulnerabilities in cholangiocarcinoma of different etiologies.Gut.2023
Zhang X, Wang J, Wang M, et al.IFN-β Pretreatment Alleviates Allogeneic Renal Tubular Epithelial Cell–Induced NK Cell Responses via the IRF7/HLA-E/NKG2A Axis.The Journal of Immunology.2023
Ma W, Wu Q, Wang S, et al.A breakdown of metabolic reprogramming in microglia induced by CKLF1 exacerbates immune tolerance in ischemic stroke.Journal of Neuroinflammation.2023, 20(1): 1-23.
Bishu K, et al. Anti-remodeling effects of rapamycin in experimental heart failure: dose response and interaction with angiotensin receptor blockade. PLoS One. 2013 Dec 3;8(12):e81325.
Han Y, Wang C, Lu K, et al.Bovine parainfluenza type 3 virus induces incomplete autophagy to promote viral replication by activated beclin1 in vitro.Veterinary Microbiology.2024: 109972.
Wu A G, Yong Y Y, He C L, et al.Novel 18-Norspirostane Steroidal Saponins: Extending Lifespan and Mitigating Neurodegeneration through Promotion of Mitophagy and Mitochondrial Biogenesis in Caenorhabditis elegans. Mechanisms of Ageing and Development.2024: 111901.
Liu Y J, Wang J Y, Zhang X L, et al.Ataxin-2 sequesters Raptor into aggregates and impairs cellular mTORC1 signaling.The FEBS Journal.2024
Chen X, Cao Y, Guo Y, et al.microRNA-125b-1-3p mediates autophagy via the RRAGD/mTOR/ULK1 signaling pathway and mitigates atherosclerosis progression.Cellular Signalling.2024: 111136.
Liu S, Su L, Li J, et al.Inhibition of miR-146b-5p alleviates isoprenaline-induced cardiac hypertrophy via regulating DFCP1.Molecular and Cellular Endocrinology.2024: 112252.
Tai G J, Ma Y J, Feng J L, et al.NLRP3 inflammasome-mediated premature immunosenescence drives diabetic vascular aging dependent on the induction of perivascular adipose tissue dysfunction.Cardiovascular Research. 2024: cvae079.
Lai X, Wang M, Zhang Z, et al.ZNPs reduce epidermal mechanical strain resistance by promoting desmosomal cadherin endocytosis via mTORC1-TFEB-BLOC1S3 axis.Journal of Nanobiotechnology.2024, 22(1): 312.
Wu A, Yan J, Su T, et al.Trametinib boosts palbociclib's efficacy in breast cancer via autophagy inhibition.Oncology Research.2024, 32(7): 1197.

Ru Y, Deng X, Chen J, et al.Maternal age enhances purifying selection on pathogenic mutations in complex I genes of mammalian mtDNA.Nature Aging.2024: 1-20.
Li X, Hu M, Zhou X, et al.Hederagenin inhibits mitochondrial damage in Parkinson's disease via mitophagy induction.Free Radical Biology and Medicine.2024
Cao Y, Chen X, Pan F, et al.Xinmaikang-mediated Mitophagy Attenuates Atherosclerosis via the PINK1/Parkin Signaling Pathway.Phytomedicine.2023: 154955.
Zhang JW, et al. Metformin synergizes with rapamycin to inhibit the growth of pancreatic cancer in vitro and in vivo. Oncol Lett. 2018 Feb;15(2):1811-1816.
Wang Y, Zhang R, Huang X, et al.CD39 inhibitor (POM-1) enhances radiosensitivity of esophageal squamous cell carcinoma (ESCC) cells by promoting apoptosis through the Bax/Bcl-2/Caspase 9/Caspase 3 pathway. International Immunopharmacology.2024, 142: 113242.
Zhu Y, Li Y, Liu H, et al.Differential expression of TOR complex 1 components in Colletotrichum camelliae isolates confers natural resistance to rapamycin.Pesticide Biochemistry and Physiology.2024: 106169.
Ma Z, Wang Y, Shen J, et al.Overexpression of ALDOC Promotes Porcine Intramuscular and Intermuscular Fat Deposition by Activating the AKT-mTORC1 Signaling Pathway.Journal of Agricultural and Food Chemistry.2024 Yue Y, Chen P, Ren C.Piezo1 Modulates Neuronal Autophagy and Apoptosis in Cerebral Ischemia–Reperfusion Injury Through the AMPK-mTOR Signaling Pathway.Neurochemical Research.2025, 50(1): 32.
Yao Z, Zhang H, Huang K, et al.Niraparib perturbs autophagosome-lysosome fusion in pancreatic ductal adenocarcinoma and exhibits anticancer potential against gemcitabine-resistant PDAC.Translational Oncology. 2025, 51: 102206.
Long Y, Zhang Q, Ling L, et al.Mutations in AMBRA1 aggravate β-thalassemia by impairing autophagy-mediated clearance of free α-globin.Blood.2024
Hong W, Ma H, Yang Z, et al.Optineurin restrains CCR7 degradation to guide type II collagen-stimulated dendritic cell migration in rheumatoid arthritis.Acta Pharmaceutica Sinica B.2025
SIRT7-mediated NRF2 deacetylation promotes antioxidant response and protects against chemodrug-induced liver injury
Gao C, Wang H, Wang T, et al. Platelet CLEC-2 regulates neuroinflammation and restores blood brain barrier integrity in a mouse model of traumatic brain injury[J]. Journal of Neurochemistry. 2020: e14983.
Long T, Chen X, Zhang Y, et al.Protective effects of Radix Stellariae extract against Alzheimer's disease via autophagy activation in Caenorhabditis elegans and cellular models.Biomedicine & Pharmacotherapy.2023, 165: 115261.
Zhang T, Tian C, Wu J, et al. . MicroRNA-182 exacerbates blood-brain barrier (BBB) disruption by downregulating the mTOR/FOXO1 pathway in cerebral ischemia[J]. The FASEB Journal. 2020, 34(10): 13762-13775.
Liu X, Xi H, Han S, et al.Zearalenone induces oxidative stress and autophagy in goat Sertoli cells.Ecotoxicology and Environmental Safety.2023, 252: 114571.
Shang Z, Zhang T, Jiang M, et al. High-carbohydrate, High-fat Diet-induced Hyperlipidemia Hampers the Differentiation Balance of Bone Marrow Mesenchymal Stem Cells by Suppressing Autophagy via the AMPK/mTOR Pathway in Rat Models[J]. 2020.
Han S, Zhang H, Liu X, et al.Enhanced autophagy reversed aflatoxin B1-induced decrease in lactate secretion of dairy goat Sertoli cells.Ecotoxicology and Environmental Safety.2023, 259: 115063.