

Product Data Sheet

Product Name: Acetylcysteine

Cat. No.: GC11786

Chemical Properties

Cas. No. 616-91-1

Chemical Name (2R)-2-acetamido-3-sulfanylpropanoic acid

SMILES CC(=O)NC(CS)C(=O)O

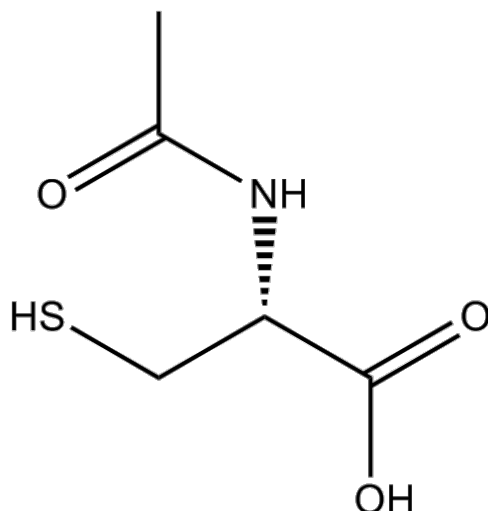
Formula $C_5H_9NO_3S$ M.Wt 163.19

Solubility DMF: 50 mg/mL, DMSO: 50 mg/mL, Ethanol: 50 mg/mL, PBS (pH 7.2): 30 mg/mL
Storage 4°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	MDA-MB468 cells (human estrogen receptor-negative breast cancer cell line)
Preparation Method	MDA-MB468 cells were cultured in RPMI-1640 medium supplemented with 10% heat-inactivated fetal bovine serum, 100U/mL penicillin and 100µg/mL streptomycin at 37°C, 5% CO ₂ . Cells were pre-incubated with 1mM Acetylcysteine for 2h, then treated with 25,-500µM CdCl ₂ for 48h. After treatment, cell viability, apoptosis, DNA fragmentation was measured.
Reaction Conditions	1mM; 2h pretreatment
Applications	Acetylcysteine reversed CdCl ₂ -induced reduction in MDA-MB468 cell viability. Acetylcysteine eliminated CdCl ₂ -induced nuclear condensation, chromatin fragmentation and apoptotic bodies. Acetylcysteine prevented CdCl ₂ -induced internucleosomal DNA ladder fragmentation.
Animal experiment [2]:	
Animal models	7-week-old male BALB/c mice (22-25g)
Preparation Method	After 1 week acclimation, mice were randomized into four groups (vehicle DMSO, BDE-209 80mg/kg, Acetylcysteine 150mg/kg, Acetylcysteine 150mg/kg + BDE-209 80mg/kg). Starting at 8 weeks of age, each mouse received 0.2mL i.p. every morning for 2 weeks; Acetylcysteine was given 2h before BDE-209 in the combination group. About 8.6 days after last administration, mice were anesthetized with chloroform and sacrificed; left testis was fixed in Bouin's/10% formalin for histology, right testis snap-frozen for MDA/GSH-Px assay, Western blot, RT-qPCR, flow cytometry, chromosome spread immunofluorescence, and epididymal sperm count/morphology.

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Dosage form	150mg/kg; i.p.; daily for 2 weeks
Applications	Acetylcysteine lowered testicular MDA level elevated by BDE-209. Acetylcysteine restored testicular weight and seminal vesicle weight reduced by BDE-209. Acetylcysteine decreased the percentage of abnormal pachytene spermatocytes and increased round spermatid percentage in BDE-209-exposed seminiferous tubules. Acetylcysteine recovered Stra8, H1T, Spo11, Sycp3, γ-H2AX, DMC1, RAD51, MLH1 protein and mRNA levels reduced by BDE-209. Acetylcysteine attenuated pachytene-stage H3K4me3 focus number increased by BDE-209. Acetylcysteine improved cauda epididymis sperm count and reduced sperm head abnormality and immature nuclear protein rate induced by BDE-209.
References: [1] Panjehpour M, Alaie SH. N-acetylcysteine prevents cadmium-induced apoptosis in human breast cancer MDA-MB468 cell line. Acta Med Iran. 2014;52(1):33-38. [2] Wei Y, Geng W, Zhang T, et al. N-acetylcysteine rescues meiotic arrest during spermatogenesis in mice exposed to BDE-209. Environ Sci Pollut Res. 2023;30:50952-50968.	

Background

Acetylcysteine is an N-acetyl derivative of L-cysteine and a glutathione precursor with mucolytic activity. Acetylcysteine breaks disulfide bonds in mucoproteins through its free sulfhydryl group to reduce sputum viscosity. Acetylcysteine acts as a glutathione precursor to increase intracellular glutathione levels and scavenge reactive oxygen species. Acetylcysteine replenishes glutathione to neutralize toxic metabolites in acetaminophen poisoning. Acetylcysteine can be used in studies related to acetaminophen poisoning, chronic obstructive pulmonary disease, idiopathic pulmonary fibrosis, and acute lung injury^[1-4].

In vitro, co-treatment of PC-9/GR cells with 5mM Acetylcysteine and 2 μ M gefitinib for 48 hours

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reduced the half-maximal inhibitory concentration value of gefitinib, decreased cell invasion and migration ability, and increased the proportion of apoptotic cells^[5]. Pretreatment of MDA-MB468 human breast cancer cells with 1mM Acetylcysteine for 2 hours, followed by treatment with 25-500μM cadmium chloride for 48 hours, reversed the cadmium chloride-induced decrease in cell viability, inhibited cadmium chloride-induced DNA ladder fragmentation, and eliminated nuclear condensation^[6]. Pretreatment of C6 astrocyte cells with 500μM Acetylcysteine for 1 hour, followed by treatment with 20mM monosodium glutamate for 12 or 24 hours, inhibited monosodium glutamate-induced reactive oxygen species generation and mitochondrial membrane potential loss, and prevented intracellular reduced glutathione depletion^[7].

In vivo, C57BL/6 mice and 129S1/SvImJ mice received 0.5mg/kg or 1.0mg/kg Warfarin in drinking water combined with 30mg/kg Acetylcysteine by oral gavage for 23 weeks, starting 3 weeks after 5/6 nephrectomy. Acetylcysteine reduced serum creatinine levels, prevented Warfarin-induced systolic blood pressure elevation, and decreased renal tubulointerstitial fibrosis area^[8]. Neonatal maternal separation (NMS) model Sprague-Dawley rats received intraperitoneal injections of 50mg/kg Acetylcysteine for 20 days. Acetylcysteine improved the prolonged immobility time in the tail suspension test and forced swim test in NMS rats, and improved the reduced sucrose preference in both male and female NMS rats^[9]. BALB/c mice received intraperitoneal injections of 150mg/kg Acetylcysteine for 2 weeks. Acetylcysteine reduced testicular MDA levels, restored testicular and seminal vesicle weights and organ coefficients, reduced the magnitude of decrease in cauda epididymis sperm count, and improved sperm head deformity and immature nuclear protein abnormalities^[10].

References:

- [1] Moldéus P, Cotgreave IA. N-acetylcysteine. Methods Enzymol. 1994;234:482-92.
- [2] Heard K, Green J. Acetylcysteine therapy for acetaminophen poisoning. Curr Pharm Biotechnol. 2012 Aug;13(10):1917-23.
- [3] Ooi SL, Green R, Pak SC. N-Acetylcysteine for the Treatment of Psychiatric Disorders: A Review of Current Evidence. Biomed Res Int. 2018 Oct 22;2018:2469486.
- [4] Singh J, Phogat A, Malik V. N-acetylcysteine: a potential therapeutic agent against toxicity of pesticides. Mol Biol Rep. 2025 Jun 3;52(1):539.

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- [5] Li J, Wang XH, Hu J, et al. Combined treatment with N-acetylcysteine and gefitinib overcomes drug resistance to gefitinib in NSCLC cell line. *Cancer Med.* 2020 Feb;9(4):1495-1502.
- [6] Panjehpour M, Alaie SH. N-acetylcysteine prevents cadmium-induced apoptosis in human breast cancer MDA-MB468 cell line. *Acta Medica Iranica.* 2014;52(1):33-38.
- [7] Park E, Yu KH, Kim DK, et al. Protective effects of N-acetylcysteine against monosodium glutamate-induced astrocytic cell death. *Food Chem Toxicol.* 2014;67:1-9.
- [8] Medipally A, Xiao M, Satoskar AA, et al. N-acetylcysteine ameliorates hematuria-associated tubulointerstitial injury in 5/6 nephrectomy mice. *Physiol Rep.* 2023;11(13):e15767.
- [9] Kim HB, Kim YJ, Lee YJ, et al. N-Acetylcysteine Alleviates Depressive-Like Behaviors in Adolescent EAAC1-/- Mice and Early Life Stress Model Rats. *Int J Biol Sci.* 2024;20(14):5450-5473.
- [10] Wei Y, Geng W, Zhang T, et al. N-acetylcysteine rescues meiotic arrest during spermatogenesis in mice exposed to BDE-209. *Environ Sci Pollut Res.* 2023;30(20):50952-50968.

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