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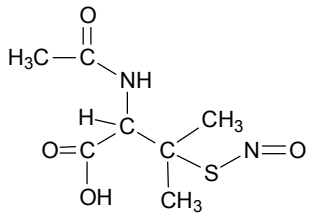
ProductInformation

S-Nitroso-N-acetyl-DL-penicillamine

Catalog Number **N3398**
Storage Temperature –20°C

CAS RN: 67776-06-1
Synonym: SNAP

Product Description
Molecular Formula: $C_7H_{12}N_2O_4S$
Molecular Weight: 220.25



Purity: ≥97%
Molar extinction coefficients:[1](in 0.1 M citrate/HCl Buffer, pH 2.0, or 0.5 M HCl) E_{335} = 519 M^{-1} cm^{-1}; E_{591} = 7.0 M^{-1} cm^{-1}

S-Nitroso-N-acetyl-DL-penicillamine is synthetically prepared and is a racemic mixture of the D and L isomers. Methods of preparation [1-3] and quantitative methods of analysis of SNAP[1], including biological samples[4], have been reported.

SNAP, a nitrosothiol derivative, releases nitric oxide (NO) under physiological conditions, thus making it a useful tool for studying pharmacological and physiological actions of NO. Because of its NO releasing properties, SNAP is a potent vasodilator *in vitro*[5,6] and *in vivo*[7,8] and is less prone to produce pharmacological tolerance.[5-8] SNAP inhibited cultured rat vascular smooth muscle cell mitogenesis and proliferation at about 0.1 mM.[9] It inhibited the dioxygenase activity of lipoxygenase (lipoxidase) in human platelets and in human CHP100 neuroblastoma cells. The effect of the inhibition on the dioxygenase activity was also studied using the model soybean lipoxygenase Type II (LOX-2). SNAP is a competitive inhibitor of the enzyme (K_I = 710 µM) and inactivated the enzyme by the reduction of the catalytic iron to the inactive Fe(II) form and inhibited the hydrogen peroxide mediated activation of the lipoxygenase catalyzed dioxygenase reaction.[10]

SNAP use in tissue samples resulted in nitric oxide mediated inhibition of lipoxygenase, and inhibition of superoxide anion- and peroxynitrite-dependent liposomal, lipoprotein, and fatty acid oxidation.[11] It was shown to have a reproducible vasorelaxant effect on isolated canine coronary arteries (IC_{50} =113 nM).[12] Denitrosation of SNAP and the subsequent release of NO may not be spontaneous but may be due to catalysis by specific enzymes located at external vascular cell membranes.[6]

SNAP (10^{-5} M) caused a decrease in the calcium ion concentration in rat vascular smooth muscle cells.[13] It inhibited *in vitro* clot formation and formation of γ dimers of fibrin at 10 mM, both of which are catalyzed by Factor 13 (F13), a transglutaminase. SNAP inhibited F13 activity (IC_{50}=230 µM) in the presence of dithiothreitol. These effects are presumably due to the S-nitrosylation of the highly reactive cysteine residue of the F13 enzyme.[14] It decreased α-Tumor Necrosis factor induced apoptosis (which is partly mediated through the cGMP pathway) maximally (60%) at 250 µM in endothelial cells. In contrast, high concentrations (1 mM) induced endothelial apoptosis via cGMP-independent pathways.[15] SNAP (10^{-4} M) stimulated human colonic ion transport *in vitro*[16]; inhibited (5-500 µM) aggregation of thrombin induced human platelets[17] and increased (EC_{50} ~50 µM) cGMP levels in rat cerebellar slices up to 300 fold.[18]

In resting human peripheral blood mononuclear cells, SNAP enhanced the rate of glucose transport, induced TNF-α secretion and NF-Kβ binding activity and enhanced activity (10 µM) of membrane-associated protein tyrosine phosphatase.[19] It induced a loss of about 90% cell viability of cultivated endothelial cells under hypoxic conditions compared to 45% under normoxic conditions at 5 mM .[20] it induced manganese superoxide dismutase (MnSOD) mRNA in rat vasicular smooth muscle cells [21] and MnSOD and copper zinc SOD in a murine macrophage cell line at 100 µM.[22] Through an S-nitrosylation mediated inhibition of phosphosdiesterase, SNAP increased basal lipolysis in white adipose tissue.[23]

Precautions and Disclaimer
This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Storage/Stability
Stable for at least one year if stored desiccated at −20°C and protected from exposure to light.[24] Soluble in DMSO (57.5 mg/ml) and in water (2.1 mg/ml). Solutions of SNAP (10 mg/ml) have been prepared in methanol. The half life of SNAP in aqueous media is about 5 hours.[25] Stock solutions should be made fresh using deoxygenated citrate/HCl buffer, pH 2.0 or 0.5-1 M HCl. Solutions can be kept on ice protected from light for several hours.[6,24] Stock and working solutions were freshly prepared before use.[6,26]

Controlled studies of solutions in oxygenated Krebs buffer showed degradation of SNAP at a concentration of 4.4 µM to about 3 µM on incubation at 37°C for 10 min.[6] For application of SNAP to thymic cells, a 25 mM stock solution (1.10 mg/194 µL of PBS + 6 µL of 1 M sodium hydroxide) on ice was prepared and diluted right before use.[2] The decomposition of 1 mM SNAP (absorbance at 340 nm) in PBS, pH 7.2, at 37°C in the absence and presence of 0.1-1 mM cysteine (which enhances decomposition) and the effect of cysteamine on the rate of NO-release from SNAP have been reported.[2,27] NO formation from SNAP is high (100 µM gives about 1.4 µM NO/minute at 37°C) and is linear over a wide concentration range[28]. Metal chelators, such as EDTA, may stabilize SNAP solutions.[1,24] The effects of trace metals and EDTA on the decomposition of SNAP was reported.[28] It is an effector releaser of NO in the pH range studies (pH 5-8).[26]

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