

Product Data Sheet

Product Name: 4'-Phosphopantetheine

Cat. No.: GC81603

Chemical Properties

Cas. No. 2226-71-3

Formula $C_{11}H_{23}N_2O_7PS$

M.Wt 358.35

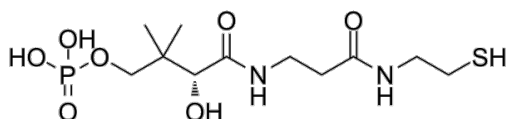
Solubility

Storage Store at -20°C, sealed storage, away from moisture and 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



Background

4'-Phosphopantetheine is an orally active coenzyme A (CoA) precursor. 4'-Phosphopantetheine is membrane-permeable and acts as a CoA precursor, a prosthetic group, and a reactive oxygen species (ROS) inhibitor. 4'-Phosphopantetheine binds covalently to rat liver fatty acid synthase, modifies the conserved serine residue in the PKS / NRPS carrier protein domain, and serves as a substrate for CoA synthase and PPAT. 4'-Phosphopantetheine undergoes non-catalytic exchange on rat liver fatty acid synthase, with a faster turnover rate than that of the enzyme complex, and restores intracellular CoA levels in cells with impaired de novo biosynthesis. 4'-Phosphopantetheine rescues

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phenotypes induced by CoA deficiency, normalizes PKAN -related biomarkers, restores mitochondrial enzyme activity, and alleviates vascular endothelial damage. 4'-Phosphopantetheine shows biological stability in serum, acts as a prosthetic group and degradation product of ACP, and inhibits the formation of atherosclerotic plaques. 4'-Phosphopantetheine can be used in the research of brain iron accumulation neurodegenerative diseases, pantothenate kinase-associated neurodegeneration, CoASY protein-associated neurodegenerative diseases, coronary heart disease, and atherosclerosis [1] [2] [3] [4] [5] [6] [7] [8].

In Vivo, 4'-Phosphopantetheine (1.1 mCi calcium-3H-pantothenate; intraperitoneal injection; single administration) serves as the prosthetic group of rat liver FAS. Its exchange rate with free pantothenate compounds is over one order of magnitude faster than the half-life (71-108 hours) of this enzyme complex, and it reaches maximal labeling within 14 hours^[1]. 4'-Phosphopantetheine (0.82-20 µg/g; p.o.; once daily; 14 days) normalizes CoA, iron, dopamine-related biomarkers, and mitochondrial enzyme activity in Pank2 knockout mice with PKAN, but its effects reverse within 7 days after discontinuation^[3]. 4'-Phosphopantetheine (10 µg; intravenous injection; once weekly; for 15 consecutive weeks) reduces vascular endothelial injury by inhibiting ROS production and ox-LDL accumulation, thereby attenuating atherosclerotic plaque formation in ApoE^{-/-} mice fed a high-fat diet and significantly reducing the plaque area ratio to approximately 3%^[8].

In Vitro, 4'-Phosphopantetheine is the prosthetic group of purified rat liver fatty acid synthetase, which accounts for over 90% of the bound label in the preparation^[1]. 4'-Phosphopantetheine (100 µM; 48 h) increases intracellular 4'-phosphopantetheine levels in HoPan-treated Drosophila S2 cells, reversing the reduction caused by PANK inhibition^[2]. 4'-Phosphopantetheine (25-800 µM; 48 h) rescues the reduced cell count phenotype in HoPan-treated Drosophila S2 cells in vitro in a concentration-dependent manner, with maximal rescue at 100-400 µM^[2]. 4'-Phosphopantetheine (100 µM; 3 d) rescues the reduced cell count phenotype and histone acetylation in dPANK/fbl RNAi-treated Drosophila S2 cells^[2]. 4'-Phosphopantetheine (25 µM; 4 d) rescues the reduced histone acetylation phenotype in HoPan-treated Drosophila S2 cells^[2]. 4'-Phosphopantetheine (25 µM; 4 d) rescues the reduced cell count phenotype and intracellular CoA levels in HoPan-treated HEK293 cells^[2]. 4'-Phosphopantetheine (100 µM; unspecified time) enters Drosophila S2 cells and is intracellularly converted to CoA, even under conditions of impaired de novo CoA biosynthesis caused

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by HoPan treatment^[2]. 4'-Phosphopantetheine (100 μ M; 10-30 min) enters *Drosophila* S2 cells via passive diffusion, as shown by temperature-independent uptake kinetics over 30 min of incubation with 100 μ M labeled 4'-phosphopantetheine^[2]. 4'-Phosphopantetheine (10-1000 μ M; unspecified time) uptake by *Drosophila* S2 cells is concentration-dependent and temperature-independent, consistent with passive diffusion^[2]. 4'-Phosphopantetheine (25-400 μ M; 24 h) normalizes COASY gene expression in primary human PKAN fibroblasts in a dose-dependent manner^[3]. 4'-Phosphopantetheine (0.23 μ moles; 30 min) isolated from hydrolyzed *Escherichia coli* ACP is enzymatically converted to CoA with 61% efficiency, confirming its identity as the prosthetic group of ACP^[4]. 4'-Phosphopantetheine components in peptides isolated from peptic hydrolysates of 14C-malonyl-labeled *Escherichia coli* ACP are present in unimolar amounts, confirming 4'-Phosphopantetheine is the substrate-binding prosthetic group of ACP^[4]. 4'-Phosphopantetheine (2.3-150 μ M; 0, 10, 20, 30, 40 min) acts as a substrate for *Staphylococcus aureus* PPAT and exhibits significant substrate inhibition of the enzyme, while the cycloalkyl pyrimidine inhibitor competes with 4'-Phosphopantetheine for binding to the enzyme^[7]. 4'-Phosphopantetheine (50-800 μ M; 0, 10, 20, 30, 40 min) acts as a substrate for *Streptococcus pneumoniae* PPAT with a Michaelis constant of 223 μ M, and the cycloalkyl pyrimidine inhibitor competes with 4'-Phosphopantetheine for binding to the enzyme and enzyme-ATP complex^[7]. 4'-Phosphopantetheine (50 μ M; 3 days, daily replenishment) normalizes complex I activity and reverses the glycolytic shift in primary human PKAN fibroblasts^[3]. 4'-Phosphopantetheine (4 μ M β -[3H]alanine; grown to late-logarithmic phase) accumulates as a major intracellular and extracellular metabolite in *Escherichia coli* strain SJ16^[5]. 4'-Phosphopantetheine (4 μ M β -[3H]alanine; up to 25 h of culture) is excreted into the growth medium of *Escherichia coli* strain SJ16 starting at 6 h of growth, accumulates continuously to 2.6 nmol/mL, and is not reutilized by the cells^[5]. 4'-Phosphopantetheine (4 μ M β -[3H]alanine, 4 μ M β -[14C]alanine; overnight growth, grown to late-logarithmic phase) produced by *Escherichia coli* strain SJ16 originates from the degradation of intracellular ACP, rather than de novo biosynthesis from β -alanine^[5]. 4'-Phosphopantetheine (0.8 μ M, 0.6 μ M; outgrowth assay, 1 h incubation at 37°C) cannot be assimilated by β -alanine-starved *Escherichia coli* strain SJ16 into CoA or ACP, nor used to support growth^[5]. 4'-Phosphopantetheine (1 μ g/mL; 24 h) inhibits ROS generation and ox-LDL accumulation in human umbilical vein vascular endothelial cells at a concentration of 1 μ g/mL after 24 h of incubation^[8].

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