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SHMT1 Antibody (N-term)

Affinity Purified Rabbit Polyclonal Antibody (Pab)
Catalog # AP14423a

Product Information

Application	WB, IHC-P, E
Primary Accession	P34896
Other Accession	Q5E9P9, NP_004160.3, NP_683718.1
Reactivity	Human
Predicted	Bovine, Mouse, Rat, Canine, Rabbit
Host	Rabbit
Clonality	Polyclonal
Isotype	Rabbit IgG
Clone Names	RB34397
Calculated MW	53083
Antigen Region	19-47

Additional Information

Gene ID	6470
Other Names	Serine hydroxymethyltransferase, cytosolic, SHMT, Glycine hydroxymethyltransferase, Serine methylase, SHMT1
Target/Specificity	This SHMT1 antibody is generated from rabbits immunized with a KLH conjugated synthetic peptide between 19-47 amino acids from the N-terminal region of human SHMT1.
Dilution	WB~~1:1000 IHC-P~~1:100~500 E~~Use at an assay dependent concentration.
Format	Purified polyclonal antibody supplied in PBS with 0.09% (W/V) sodium azide. This antibody is purified through a protein A column, followed by peptide affinity purification.
Storage	Maintain refrigerated at 2-8°C for up to 2 weeks. For long term storage store at -20°C in small aliquots to prevent freeze-thaw cycles.
Precautions	SHMT1 Antibody (N-term) is for research use only and not for use in diagnostic or therapeutic procedures.

Protein Information

Name	SHMT1 (HGNC:10850)
Function	Pyridoxal phosphate (PLP)-dependent enzyme that catalyzes the reversible conversion of serine and tetrahydrofolate (THF) to glycine and 5,10-methylene

	THF, serving as a critical component of the folate cycle and facilitating one-carbon biosynthetic reactions essential for methionine, purine, and pyrimidine synthesis (PubMed:24698160, PubMed:30035852, PubMed:38996576). While its central activity involves serine cleavage, the detailed catalytic mechanisms remain under study, including both retro-aldol cleavage of the PLP-serine C(alpha)-C(beta) bond followed by formaldehyde condensation with THF, and alternative nucleophilic displacement mechanisms of the C(alpha) atom of PLP-serine aldimine involving THF's N5 atom (By similarity). Also catalyzes the cleavage of various 3-hydroxy amino acids, such as L-allo-threonine, L- threonine and 3-phenylserine, forming glycine and the corresponding aldehyde through a retro-aldol process; additionally, it catalyzes the formation of 5-formyltetrahydrofolate from 5,10-methenyltetrahydrofolate (PubMed:38615009). Also functions as a hydroxytrimethyllysine aldolase (HTMLA) catalyzing the second step of the carnitine biosynthesis pathway and exhibits substrate preference with the erythro (S,S) configuration, and more efficiency with L-allo- threonine (PubMed:38615009). In the nucleus, first functions as a lamin-binding scaffold protein that is essential for assembling the de novo thymidylate synthesis complex by co-localizing DHFR and TYMS with the nuclear lamina and anchoring the complex to DNA replication sites (PubMed:22235121). Subsequently, provides one-carbon substrates, specifically (6R)-5,10-methylene-5,6,7,8-tetrahydrofolate, in situ for de novo dTMP synthesis to sustain DNA replication and repair during cell proliferation (PubMed:30035852). Importantly, possesses RNA- binding capability, forming complexes that selectively regulate SHMT2 mRNA translation and dynamically modulate cytosolic and mitochondrial serine and glycine concentrations, thus influencing cellular metabolic status (PubMed:38996576).
Cellular Location	Cytoplasm. Nucleus. Note=Nuclear translocation is RAN- dependent and is independent from both the oligomerization state and the catalytic activity (PubMed:30035852). In the cytoplasm, SHMT1 degradation is facilitated by 'Lys-48'-linked ubiquitination, whereas in the nucleus, 'Lys-63'-linked ubiquitination prevents degradation (PubMed:22194612). Predominantly sumoylated and localized to the nucleus in S phase cells and remains in the nucleus during the G2/M phase of the cell cycle (PubMed:17446168). Sumoylation occurs at the nuclear pore and is linked to nuclear import (PubMed:17446168). As a component of the de novo thymidylate synthesis complex, localizes specifically to replication forks during DNA synthesis (PubMed:22235121).

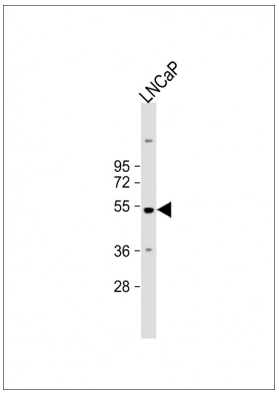
Background

This gene encodes the cellular form of serine hydroxymethyltransferase, a pyridoxal phosphate-containing enzyme that catalyzes the reversible conversion of serine and tetrahydrofolate to glycine and 5,10-methylene tetrahydrofolate. This reaction provides one carbon units for synthesis of methionine, thymidylate, and purines in the cytoplasm. This gene is located within the Smith-Magenis syndrome region on chromosome 17. Alternative splicing of this gene results in 2 transcript variants encoding 2 different isoforms. Additional transcript variants have been described, but their biological validity has not been determined.

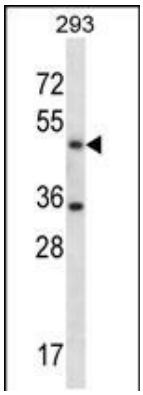
References

Porter, K.E., et al. Environ. Res. 110(6):580-587(2010)
Summers, C.M., et al. Birth Defects Res. Part A Clin. Mol. Teratol. 88(8):679-688(2010)
Vijayakrishnan, J., et al. Haematologica 95(8):1405-1414(2010)
Levine, A.J., et al. Cancer Epidemiol. Biomarkers Prev. 19(7):1812-1821(2010)
Jugessur, A., et al. PLoS ONE 5 (7), E11493 (2010) :

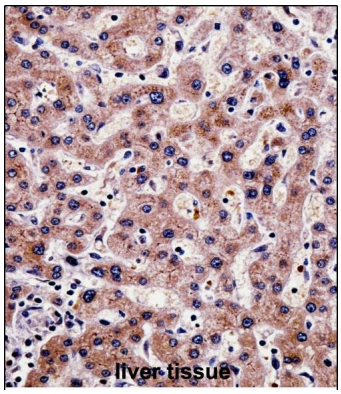
Images



Anti-SHMT1 Antibody (N-term) at 1:1000 dilution + LNCaP whole cell lysate Lysates/proteins at 20 µg per lane. Secondary Goat Anti-Rabbit IgG, (H+L), Peroxidase conjugated at 1/10000 dilution. Predicted band size : 53 kDa Blocking/Dilution buffer: 5% NFDM/TBST.



SHMT1 Antibody (N-term) (Cat. #AP14423a) western blot analysis in 293 cell line lysates (35ug/lane).This demonstrates the SHMT1 antibody detected the SHMT1 protein (arrow).



SHMT1 Antibody (N-term) (AP14423a)immunohistochemistry analysis in formalin fixed and paraffin embedded human liver tissue followed by peroxidase conjugation of the secondary antibody and DAB staining.This data demonstrates the use of SHMT1 Antibody (N-term) for immunohistochemistry. Clinical relevance has not been evaluated.

Citations

- cMyc-mediated activation of serine biosynthesis pathway is critical for cancer progression under nutrient deprivation conditions.

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