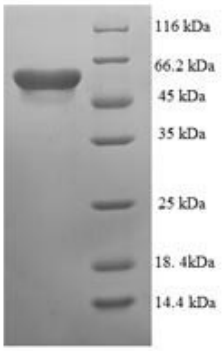
Recombinant Escherichia coli Cytosine deaminase (codA)

Product Code	CSB-EP340707ENV
Relevance	Catalyzes the hydrolytic deamination of cytosine to uracil. Is involved in the pyrimidine salvage pathway, which allows the cell to utilize cytosine for pyrimidine nucleotide synthesis. Is also able to catalyze deamination of isoguanine, a mutagenic oxidation product of adenine in DNA, and of isocytosine. To a lesser extent, also catalyzes the conversion of 5-fluorocytosine (5FC) to 5-fluorouracil (5FU); this activity allows the formation of a cytotoxic chotherapeutic agent from a non-cytotoxic precursor.
Abbreviation	Recombinant E.coli codA protein
Storage	The shelf life is related to many factors, storage state, buffer ingredients, storage temperature and the stability of the protein itself. Generally, the shelf life of liquid form is 6 months at -20°C/-80°C. The shelf life of lyophilized form is 12 months at -20°C/-80°C.
Uniprot No.	P25524
Alias	Cytosine aminohydrolaseIsoguanine deaminase1
Product Type	Recombinant Protein
Immunogen Species	Escherichia coli (strain K12)
Purity	Greater than 90% as determined by SDS-PAGE.
Sequence	SNNALQTIINARLPGEEGLWQIHLQDGKISAIDAQSGVMPITENSLDAEQGLVIP PFVEPHIHLDTTQTAGQPNWNQSGTLFEGIERWAERKALLTHDDVKQRAWQT LKWQIANGIQHVRTHVDVSDATLTALKAMLEVKQEVAPWIDLQIVAFPQEGILS YPNGEALLEEALRLGADVVGAIPHFEFTREYGVESLHKTFALAQKYDRLIDVHC DEIDDEQSRFVETVAALAHHEGMGARVTASHTTAMHSYNGAYTSRLFRLLKM SGINFVANPLVNIHLQGRFDTYPKRRGITRVKEMLESGINVCFGHDDVFDPWY PLGTANMLQVLHMGLHVCQLMGYGQINDGLNLITHHSARTLNLQDYGIAAGNS ANLIILPAENGFDALRRQVPVRYSVRGGKVIASTQPAQTTVYLEQPEAIDYKR
Research Area	Others
Source	E.coli
Target Names	codA
Expression Region	2-427aa
Notes	Repeated freezing and thawing is not recommended. Store working aliquots at 4°C for up to one week.
Tag Info	N-terminal 6xHis-SUMO-tagged
Mol. Weight	63.5kDa
Protein Length	Full Length of Mature Protein

Image



(Tris-Glycine gel) Discontinuous SDS-PAGE (reduced) with 5% enrichment gel and 15% separation gel.

Description

Cytosine deaminase (CodA) is a protein that plays a crucial role in pyrimidine metabolism. It catalyzes the deamination of cytosine and its analog, 5-fluorocytosine (5-FC), to uracil and 5-fluorouracil (5-FU), respectively [1]. This conversion is significant as 5-FU is highly toxic and has been utilized in counterselection strategies due to the ability of CodA to convert the innocuous 5-FC into the toxic 5-FU [2]. The gene encoding CodA has been used as a negative selection marker in various organisms, including plants and bacteria, for genetic modification and mutant strain isolation [3] [4] [5]. Furthermore, CodA has been employed in therapeutic applications, where its expression in bacteria such as Salmonella has led to improved cytotoxic effects in tumor cells [6].

The substrate specificity of CodA is noteworthy, as it can also convert cytosine to uracil, expanding its role beyond 5-FC metabolism [7]. Additionally, the relaxed substrate specificity of CodA allows it to function in pyrimidine metabolism, making it a valuable tool in genetic engineering and metabolic engineering applications [2] [8]. The protein's ability to catalyze the conversion of 5-FC to 5-FU has been exploited in markerless gene deletion techniques, enabling precise manipulation of bacterial chromosomes [1] [3].

References:

[1] L. Wang, J. Hoffmann, H. Watzlawick, & J. Altenbuchner, "Markerless gene deletion with cytosine deaminase in thermus thermophilus strain hb27", Applied and Environmental Microbiology, vol. 82, no. 4, p. 1249-1255, 2016. https://doi.org/10.1128/aem.03524-15
[2] R. Joseph, N. Kim, & N. Sandoval, "Recent developments of the synthetic biology toolkit for clostridium", Frontiers in Microbiology, vol. 9, 2018. https://doi.org/10.3389/fmicb.2018.00154
[3] M. Al-Hinai, A. Fast, & E. Papoutsakis, "Novel system for efficient isolation of clostridium double-crossover allelic exchange mutants enabling markerless chromosomal gene deletions and dna integration", Applied and Environmental Microbiology, vol. 78, no. 22, p. 8112-8121, 2012. https://doi.org/10.1128/aem.02214-12
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[5] M. Shao, J. Michno, S. Hotton, A. Blechl, & J. Thomson, "A bacterial gene coda encoding cytosine deaminase is an effective conditional negative

selectable marker in glycine max", Plant Cell Reports, vol. 34, no. 10, p. 1707-1716, 2015. https://doi.org/10.1007/s00299-015-1818-5
[6] B. Mesa-Pereira, C. Medina, E. Camacho, A. Flores, & E. Santero, "Improved cytotoxic effects of salmonella?producing cytosine deaminase in tumour cells", Microbial Biotechnology, vol. 8, no. 1, p. 169-176, 2014. https://doi.org/10.1111/1751-7915.12153
[7] S. Cartman, M. Kelly, D. Heeg, J. Heap, & N. Minton, "Precise manipulation of the clostridium difficile chromosome reveals a lack of association between the tcdc genotype and toxin production", Applied and Environmental Microbiology, vol. 78, no. 13, p. 4683-4690, 2012. https://doi.org/10.1128/aem.00249-12
[8] R. Wheatley, V. Ramachandran, B. Geddes, B. Perry, C. Yost, & P. Poole, "Role of o2 in the growth of rhizobium leguminosarum bv. viciae 3841 on glucose and succinate", Journal of Bacteriology, vol. 199, no. 1, 2017. https://doi.org/10.1128/jb.00572-16

Reconstitution

We recommend that this vial be briefly centrifuged prior to opening to bring the contents to the bottom. Please reconstitute protein in deionized sterile water to a concentration of 0.1-1.0 mg/mL.We recommend to add 5-50% of glycerol (final concentration) and aliquot for long-term storage at -20°C/-80°C. Our default final concentration of glycerol is 50%. Customers could use it as reference.

Shelf Life

The shelf life is related to many factors, storage state, buffer ingredients, storage temperature and the stability of the protein itself.
Generally, the shelf life of liquid form is 6 months at -20°C/-80°C. The shelf life of lyophilized form is 12 months at -20°C/-80°C.