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Product Information

Isocitrate Dehydrogenase 1 (NADP$^+$), human
recombinant, expressed in *Escherichia coli*

Catalog Number **I5036**
Storage Temperature –20 °C

CAS RN 9028-48-2
EC 1.1.1.42
Systematic name: Isocitrate:NADP$^+$ oxidoreductase (decarboxylating)

Synonyms: IDH1, cytosolic NADP(+)-dependent isocitrate dehydrogenase, isocitrate:NADP$^+$ oxidoreductase (decarboxylating), Isocitric Dehydrogenase, ICD1, PICD, IDPC, ICDC, oxalosuccinate decarboxylase

Product Description
Isocitrate dehydrogenase (NADP$^+$) [EC 1.1.1.42] is a Krebs cycle enzyme, which converts isocitrate to α-ketoglutarate. The flow of isocitrate through the glyoxylate bypass is regulated by phosphorylation of isocitrate dehydrogenase, which competes for a common substrate (isocitrate) with isocitrate lyase.[1] The activity of the enzyme is dependent on the formation of a magnesium or manganese-isocitrate complex.[2]

Of the five *IDH* genes in the human genome, *IDH1* encodes for the NADP$^+$-dependent enzyme, which is found in cytoplasm, peroxisomes, and endoplasmic reticulum. The IDH2 enzyme is found in mitochondria. Recurrent mutations in IDH1 and IDH2 have been shown to be present in 70% of low grade gliomas (the most common form of brain tumors) and secondary glioblastomas.[4] IDH1 regulates HIF-1α (hypoxia inducible factor 1α) levels by controlling the level of α-ketoglutarate, and is a strong predictor and highly selective marker for secondary glioblastomas. It has been suggested that drugs mimicking α-ketoglutarate might be used as a therapy for gliomas harboring an IDH1 mutation.[5]

IDH1 and IDH2 have frequent genetic alterations in acute myeloid leukemia[4] and better understanding of these mutations may lead to an improvement of individual cancer risk assessment.[6] In addition other studies have shown loss of IDH1 in bladder cancer patients during tumor development suggesting this may be involved in tumor progression and metastasis.[7]

This product is lyophilized from a solution containing Tris-HCl, pH 8.0, with trehalose, ammonium sulfate, and DTT.

Purity: ≥90% (SDS-PAGE)

Specific activity: ≥80 units/mg protein

Unit definition: 1 unit corresponds to the amount of enzyme, which converts 1 μmole of DL-isocitrate to α-ketoglutarate per minute at pH 7.4 and 37 °C (NADP as cofactor). The activity is measured by observing the reduction of NADP to NADPH at 340 nm in the presence of 4 mM DL-isocitrate and 2 mM $MnSO_4$.[7]

Predicted molecular mass: 46,658 Da

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

Preparation Instructions
Dissolve the contents of the vial in 0.1–0.5 ml of ultrapure water.

Storage/Stability
Store the product at –20 °C.

After reconstitution, freeze in working aliquots at –20 °C for extended storage. Repeated freezing and thawing is not recommended.

References

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3. Dang, L. et al., IDH mutations in glioma and acute myeloid leukemia. Trends Mol. Med., **16**, 387-397 (2010).
4. Fu, Y. et al., Glioma-derived mutations in IDH: from mechanism to potential therapy. Biochem. Biophys. Res. Commun., **397**, 127-130 (2010).
5. Paschka, P. et al., IDH1 and IDH2 mutations are frequent genetic alterations in acute myeloid leukemia and confer adverse prognosis in cytogenetically normal acute myeloid leukemia with NPM1 mutation without FLT3 internal tandem duplication. J. Clin. Oncol., **28**, 3636-3643 (2010).
6. Memon A.A., et al., Identification of differentially expressed proteins during human urinary bladder cancer progression, Cancer Detect. Prev., **29**, 249-255 (2005).
7. Xu, X. et al., Structures of human cytosolic NADP-dependent isocitrate dehydrogenase reveal a novel self-regulatory mechanism of activity. J. Biol. Chem., **279**, 33946-33957 (2004)

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