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Technical Data Sheet

For research use only

Not intended or approved for
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MEP Synthase (DXR)

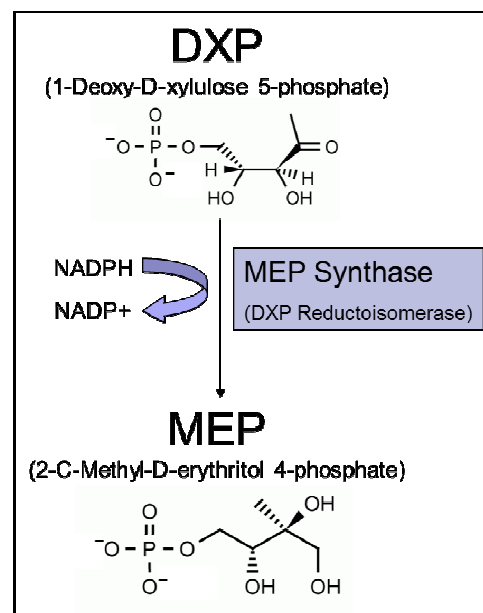
(2-C-methyl-D-erythritol-4-phosphate synthase)

Catalog #:	E-2000C	Size:	50 µg	250 µg
Description:	Recombinant C-terminal His-tagged fusion protein purified from <i>E. coli</i> using Ni-NTA column chromatography.			
Size:	45.0 kDa			
Purity:	> 90% by SDS-PAGE			
Specificity:	MEP Synthase catalyzes the conversion of DXP to MEP in the first committed step of the MEP pathway.			
Specific Activity:	> 2 Units / mg* (1 Unit of DXR activity is defined as the oxidation of 1 µmol of β-NADPH / minute using 120 µM DXP (Cat.# I-M050) as substrate with 10 nM DXR for two minutes at 37 °C.)			
Formulation:	Recombinant protein is in storage buffer (50 mM HEPES, pH 7.6, 300 mM NaCl, 10 mM βME and 50% glycerol v/v).			
Storage:	Store product at -20 °C. Enzyme will be stable for at least 6 months at -20 °C as undiluted stock.			
QA / Product Testing:	Enzyme purity is determined by SDS-PAGE. * (* See Certificate of Analysis for lot specific information)			

Background:

In the first pathway-specific reaction of the methylerythritol phosphate (MEP) pathway for isoprenoid biosynthesis, MEP Synthase (DXR) catalyzes the rearrangement of 1-deoxy-D-xylulose-5-phosphate (DXP) to generate 2-C-methyl-D-erythritol-4-phosphate (MEP) in the presence of β-nicotinamide adenine dinucleotide phosphate (NADPH) and a divalent cation [1]. Fosmidomycin inhibits MEP synthase in many organisms and has validated the MEP pathway as a potential antibiotic pathway.

The MEP pathway is used by most bacteria, including all Gram-negative bacteria, for isoprenoid biosynthesis. Isoprenoids comprise one of the most diverse classes of compounds found in nature. With over 50,000 different isoprenoids identified to date, they exhibit a broad range of structural complexity and are involved in a variety of biological functions [2]. Electron transport (quinones), stabilization of cell membranes (hopanoids and sterols), cell wall biosynthesis (dolichols), signal transduction (prenylated proteins), photosynthesis (chlorophylls) and modification of tRNAs are among the processes that involve isoprenoids [3]. Isopentenyl diphosphate (IPP) and dimethylallyl diphosphate (DMAPP) are the precursors for all isoprenoid compounds and two unrelated essential pathways exist in nature for their biosynthesis. These two precursors are produced by either the mevalonate (MVA) or MEP pathway. The MVA pathway is found primarily in eukaryotes, including humans, plant cytosol, Archaea, and some Gram-positive bacteria, while the MEP pathway is utilized by most bacteria and plant chloroplasts. Due to this natural distribution, the MEP pathway represents a promising target for development of novel antibacterial agents and herbicides [4].



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References:

- [1] Koppisch, A.T.; Fox, D.T.; Blagg, B.; Poulter, C.D. (2002), Jan 8;**41**(1), 236-43.
 [2] Bochar, D.A.; Freisen, J.A.; Stauffacher, C.V. and Rodwell, V.W.(1999) in *Comprehensive Natural Products Chemistry*, (Cane, D. Ed.) Pergamon Press, Oxford, pp. 15-44.
 [3] Sacchettini, J.C. and Poulter, C.C. (1997) *Science*, **277**(5333), 1788-9.
 [4] Testa, C.A.; Brown, M.J. (2003) *Current Pharmaceutical Biotechnology*, **4**, 248-259.

MEP Related Products:

	Product	General Description	Detection Mode	Cat. No.
Purified Enzymes	DXP Synthase MEP Synthase IspD Enzyme IspE Enzyme IspF Enzyme	Recombinant His-tagged fusion proteins. Purified from <i>E.coli</i> using Ni-NTA column chromatography.		E-20DXS E-2000C E-2000D E-2000E E-2000F
MEP Pathway Substrates and Related Substrates	MEP Pathway Intermediates	1-Deoxy-D-xyulose 5-phosphate (DXP) 1-Deoxy-D-xyulose (DX) 2-C-Methyl-erythritol 4-phosphate (MEP) 2-C-Methyl-erythritol (ME) 4-Diphosphocytidyl-2-C-methyl-D-erythritol (CDP-ME) 2-C-Methyl-D-erythritol 2,4-cyclophosphate (cMEPP) 1-Hydroxy-2-methyl-2-buten-4-yl 4-diphosphate (HDMAPP)		I-M050 I-M050A I-M051 I-M051A I-M052 I-M054 I-M055
	CDP-MEP Synthesis Kit	4-diphosphocytidyl-2-C-methyl-D-erythritol-2-phosphate (CDP-MEP)	Luminescence	K-2000E
	Isoprenoid Diphosphate Reagents	Isopentenyl Diphosphate (IPP) Dimethylallyl Diphosphate (DMAPP) (see our website for additional reagents)		I-0050 I-0051
MEP Pathway Activity Assays	IspD Assay	Detects CDP-ME synthase activity through detection of free phosphate (side product of coupled synthase assay)	Absorbance 620 nm	K-2000D
Antibacterial Screening Service		Whole-Cell MEP Pathway-Selective Antibacterial Screening Assay Service: MEP Pathway Inhibitor Identification Assay	Absorbance 600 nm	T-2000
Phosphatase Activity Assays	Malachite Green	Detection of free phosphate	Absorbance 620 nm	K-1500
MEP Pathway Inhibitors	Fosmidomycin	Fosmidomycin is a naturally occurring antibiotic that inhibits 1-deoxy-D-xyulose-5-phosphate reductoisomerase (DXR)		B-4201
	FR-900098	FR900098, an analog of the naturally occurring antibiotic Fosmidomycin, inhibits 1-deoxy-D-xyulose-5-phosphate reductoisomerase (DXR)		B-4202
	5-Ketoclofazone	5-Ketoclofazone inhibits 1-deoxy-D-xyulose-5-phosphate (DXP) synthase		B-4101
	IspF Inhibitor 1	IspF Inhibitor 1 inhibits 2-C-methyl-D-erythritol 2,4-cyclodiphosphate (cMEPP) synthase		B-4102

Check Echelon's website (www.echelon-inc.com) for additional MEP activity assays, purified enzymes, and substrates.