Product Specifications

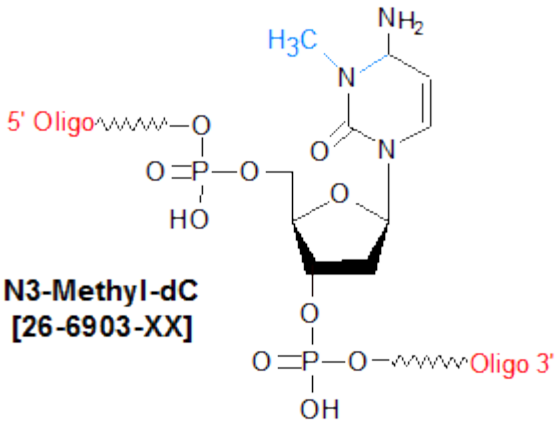
Custom Oligo Synthesis, antisense oligos, RNA oligos, chimeric oligos, Fluorescent dyes, Affinity Ligands, Spacers & Linkers, Duplex Stabilizers, Minor bases, labeled oligos, Molecular Beacons, siRNA, phosphonates Locked Nucleic Acids (LNA); 2′-5′ linked Oligos

Oligo Modifications

For research use only. Not for use in diagnostic procedures for clinical purposes.

N3-methyl-dC [m3dC]

Category	Others
Modification Code	m3dC
Reference Catalog Number	26-6903
5 Prime	Y
3 Prime	Y
Internal	Y
Molecular Weight(mw)	847.93



N3-Methyl deoxycytosine (N3-Me-dC) is a methylated nucleoside base, and is primarily used in the study of DNA damage and repair mechanisms related to alkylation damage. N3-Me-dC lesions are highly toxic and mutagenic in all three domains of life (prokaryotes, eukaryotes, and archaea) (1).The N3-Me-dC lesion is primarily generated by SN2 alkylating reagents such as methyl methane sulfonate (MMS), dimethylsulfate and methyl halides, which react with the N3 position of cytosine (2,3). In cells, N3-methyl-dC acts as a lethal DNA replication block and is highly mutagenic, being 30% mutagenic in AlkB(-) E. coli (mostly C to T and C to A), and 70% mutagenic in E. coli that is both AlkB(-) and expresses SOS bypass enzymes (4,5). N3-Methyl-dC is restored to dC by a novel direct reversal repair mechanism. This mechanism removes the N3-methyl via oxidative demethylation catalyzed by the AlkB protein, and requiring AlkB-bound non-heme Fe(2+), molecular oxygen, and alpha-ketogluterate (6,7). **References**

(1) Leiros, I., Nabong, M.P., Gresvik, K., Ringvoll, J., Haugland, G.T., et al. Structural basis for excision of N1-methyl adenine and N3-methylcytosine from DNA. *EMBO J.* (2007), **26**: 2206-2217.
(2) Sedgwick, B., Lindahl, T. Recent progress on the Ada response for inducible repair of DNA alkylation damage. *Oncogene* (2002), **21**: 8886-8894.
(3) Sedgwick, B. Repairing DNA-methylation damage. *Nat. Rev. Mol. Cell Biol.* (2004), **5**: 148-157.
(4) Delaney, J.C., Essigman, J.M. Mutagenesis, genotoxicity and repair of 1-methyladenine, 3-alkylcytosines, 1-methylguanine, and 3-methylthymine in alkB Escherichia coli. *Proc. Natl. Acad. Sci. (USA)* (2004), **101**: 14051-14056.
(5) Shrivastav, N., Li, D., Essigmann, J.M. Chemical biology of mutagenesis and DNA repair: cellular responses to DNA alkylation.*Carcinogenesis* (2010), **31**: 59-70.
(6) Chen, B.J., Carroll, P., Samson, I. The Eschericia coli alkB protein protects human cells against alkylation-induced toxicity. *J. Bacteriol.* (1994), **176**: 6255-6261.
(7) Begley, T.J., Samson, L.D. AlkB mystery solved: oxidative demethylation of N1-methyladenine and N3-methylcytosine adducts by a direct reversal mechanism. *Trends Biochem. Sci.* (2003), **28**: 2-5.