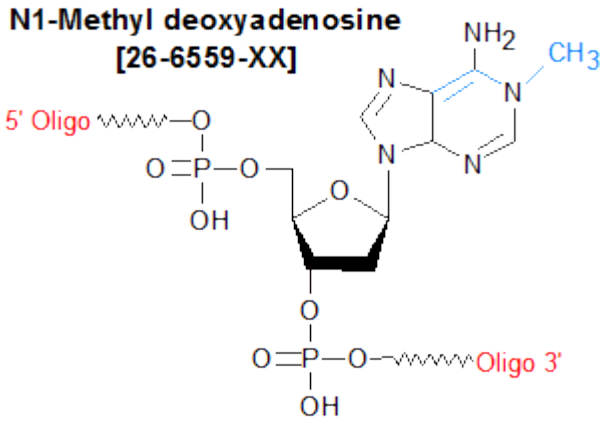
N1-Methyl dA (m1dA)

Category	Structural Studies
Modification Code	m1dA
Reference Catalog Number	26-6559
5 Prime	Y
3 Prime	Y
Internal	Y
Molecular Weight(mw)	328.24



N1-Methyl-deoxyadenosine (N1-Me-dA, m1 dA) is a methylated nucleoside base, and is primarily used in the study of DNA damage and repair mechanisms related to alkylation damage. The N1-Me-dA lesion is primarily generated by SN2 alkylating reagents such as methyl methanesulfonate and dimethylsulfate, which react with the N1 position of adenine (1). In cells, N1-methyl-dA acts as a lethal DNA replication block, but is not very mutagenic (1% A to T transversion in E. coli), and is repaired by the enzyme AlkB by direct reversal (2,3). Because the N1 position of adenine is involved in hydrogen bonding of A : T Watson-Crick base pairing, methylation of this site was expected to disrupt hydrogen bonding. However, NMR analysis revealed that N1-methylation actually alters the A:T base-pairing interactions from Watson-Crick to (syn)N1-methyl-A : (anti)T Hoogsteen, thus providing insight into why AlkB repair of N1-Methyl-dA lesions is 10X more efficient on ssDNA over dsDNA (4). **References**

(1) Sedgwick, B., Lindahl, T. Recent progress on the Ada response for inducible repair of DNA alkylation damage. *Oncogene* (2002), **21**: 8886-8894.
(2) 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.
(3) 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.
(4) Yang, H., Zhan, Y., Fenn, D., Chi, L.M., Lam, S.K. Effect of 1-methyladenine on double-helical DNA structures. *FEBS Letters* (2008), **582**: 1629-1633.