DNMT1

DNA (cytosine-5)-methyltransferase 1 is an enzyme that catalyzes the transfer of methyl groups to specific CpG structures in DNA, a process called DNA methylation. In humans, it is encoded by the DNMT1 gene.

DNMT1 forms part of the family of DNA methyltransferase enzymes, which consists primarily of DNMT1, DNMT3A, and DNMT3B.

This enzyme is responsible for maintenance DNA methylation which ensures the fidelity of replication of inherited epigenetic patterns. It has a very distinguishable preference of methylating CpGs on hemimethylated DNA.

Aberrant methylation patterns are associated with certain human tumors and developmental abnormalities.

DNMT1 knockdown induced the demethylation of Dok7 promoter, and enhanced the expression of Dok7 in gliomas. These results suggest that epigenetic silencing of Dok7 may provide a novel glioma treatment strategy [1].

miR 152-3p can inhibit glioma cell proliferation and invasion activities by decreasing DNMT1. The restoration of miR-152-3p may have therapeutic application in the treatment of GBM [2].

Guo et al. showed that Transforming growth factor Beta induced the downregulation of MST1 expression in U87 and U251 glioma cells. Treatment of glioma cells with the DNA methylation inhibitor 5-aza-2'-deoxycytidine (5-AzadC) prevented the loss of MST1 expression. Addition of 5-AzadC also reduced the TGF-β-stimulated proliferation, migration and invasiveness of glioma cells. Furthermore, Knockdown of DNMT1 upregulated MST1 expression in gliomas cells. In addition, the inhibition of DNMT1 blocked TGF-β-induced proliferation, migration and invasiveness in glioma cells. These results suggest that TGF-β promotes glioma malignancy through DNMT1-mediated loss of MST1 expression [3].

1)
Hua CD, Bian EB, Chen EF, Yang ZH, Tang F, Wang HL, Zhao B. Repression of Dok7 expression mediated by DNMT1 promotes glioma cells proliferation. Biomed Pharmacother. 2018 Jul 4;106:678-685. doi: 10.1016/j.biopha.2018.06.156. [Epub ahead of print] PubMed PMID: 29990858.
2)
Sun J, Tian X, Zhang J, Huang Y, Lin X, Chen L, Zhang S. Regulation of human glioma cell apoptosis and invasion by miR-152-3p through targeting DNMT1 and regulating NF2 : MiR-152-3p regulate glioma cell apoptosis and invasion. J Exp Clin Cancer Res. 2017 Aug 1;36(1):100. doi: 10.1186/s13046-017-0567-4. PubMed PMID: 28764788.
3)
Guo Z, Li G, Bian E, Ma CC, Wan J, Zhao B. TGF-β-mediated repression of MST1 by DNMT1 promotes glioma malignancy. Biomed Pharmacother. 2017 Aug 9;94:774-780. doi: 10.1016/j.biopha.2017.07.081. [Epub ahead of print] PubMed PMID: 28802229.