# MGMT promoter methylation in glioma

- Epigenetic Alterations in Glioblastoma Multiforme as Novel Therapeutic Targets: A Scoping Review
- Role of Amide Proton Transfer Weighted MRI in Predicting MGMTp Methylation Status, p53-Status, Ki-67 Index, IDH-Status, and ATRX Expression in WHO Grade 4 High Grade Glioma
- O(6)-Methylguanine-DNA Methyltransferase (MGMT) Promoter Methylation Analysis in Glioblastoma Patients
- Regulatory mechanisms of O6-methylguanine methyltransferase expression in glioma cells
- Automated feature learning and survival prognostication in grade 4 glioma using supervised machine learning models
- Beyond the Promoter: Total MGMT Gene Methylation Modulates Response to DNA Alkylating Agents in Glioma
- Defining the recommended gray zone in O6-methylguanine-DNA methyltransferase promoter methylation pyrosequencing reporting: A robust, translatable method to implement new EANO guidelines
- Tracking Daily Variations in Rest-Wake to Guide Personalized Timing of Temozolomide for High-Grade Glioma Patients

MGMT promoter methylation in glioma is a critical and well-studied molecular characteristic with significant implications for the diagnosis, prognosis, and treatment of gliomas, which are a type of brain tumor.

Methylation and Gene Silencing: In many gliomas, there is a high frequency of methylation in the promoter region of the MGMT gene. This promoter methylation leads to the silencing of the MGMT gene, meaning that the MGMT protein is not produced in significant quantities in these tumor cells.

MGMT Function: MGMT is a DNA repair enzyme responsible for removing alkyl groups from the O-6 position of guanine in DNA. By repairing this type of DNA damage, MGMT helps protect the cell's DNA from mutations caused by alkylating agents, including chemotherapy drugs.

Treatment Implications: MGMT promoter methylation in glioma has a significant impact on treatment outcomes. Glioma patients with MGMT promoter methylation tend to have a better response to alkylating chemotherapy agents, such as temozolomide, commonly used in the treatment of gliomas. This is because the loss of MGMT activity in the tumor cells makes them more sensitive to the DNA-damaging effects of these chemotherapy drugs.

Prognosis: Glioma patients with MGMT promoter methylation often have a more favorable prognosis compared to those without methylation. This is due to their improved response to chemotherapy, which can result in better tumor control and longer survival.

Diagnostic Testing: To determine the MGMT promoter methylation status, molecular techniques like methylation-specific PCR (polymerase chain reaction) and bisulfite sequencing are used. These methods can assess whether the promoter region of the MGMT gene is methylated or not in the tumor tissue.

Personalized Treatment: MGMT promoter methylation status is an essential factor in personalized medicine for glioma patients. Oncologists use this information to tailor treatment plans, selecting the most appropriate chemotherapy regimen based on the patient's likelihood of responding to alkylating agents.

Resistance in Unmethylated Tumors: Gliomas with an unmethylated MGMT promoter tend to be more resistant to alkylating chemotherapy, and the prognosis for such patients may not be as favorable. In these cases, alternative treatment strategies may be considered.

In summary, MGMT promoter methylation status is a critical biomarker in glioma treatment. It plays a significant role in predicting the response to alkylating chemotherapy and has implications for the prognosis and treatment decisions in patients with glioma, helping oncologists make more informed choices for their care.

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A study suggests that MGMT promoter methylation is associated with response to alkylating chemotherapy for low-grade and anaplastic gliomas and may be considered as a stratification factor in future clinical trials of patients with IDH-wild-type and IDH-mutant and codeleted tumors [1)]

# MGMT promoter methylation in Glioblastoma

MGMT promoter-methylated glioblastoma.

# MGMT promoter methylation in Gliosarcoma

MGMT promoter methylation in Gliosarcoma

1)
Kinslow CJ, Mercurio A, Kumar P, Rae AI, Siegelin MD, Grinband J, Taparra K, Upadhyayula PS, McKhann GM, Sisti MB, Bruce JN, Canoll PD, Iwamoto FM, Kachnic LA, Yu JB, Cheng SK, Wang TJC. Association of MGMT Promoter Methylation With Survival in Low-grade and Anaplastic Gliomas After Alkylating Chemotherapy. JAMA Oncol. 2023 Jul 1;9(7):919-927. doi: 10.1001/jamaoncol.2023.0990. Erratum in: JAMA Oncol. 2023 Jul 1;9(7):1009. PMID: 37200021; PMCID: PMC10196932.