

MGMT Promoter Methylation Detection by PCR

Indications for Ordering

Individuals with gliomas being treated or considered for treatment with alkylating agents (eg, Temozolomide)

- Recommended for WHO grade II-IV astrocytic, oligodendroglial, and gliosarcoma brain tumors

Test Description

Real-time polymerase chain reaction/fluorescence resonance energy transfer

Tests to Consider

Primary test

[MGMT Methylation Detection by PCR 2009310](#)

- Aids in therapeutic decisions in individuals with gliomas

Related tests

[IDH1 and IDH2 Mutation Analysis, exon 4 2006444](#)

- Prognostic testing for individuals with glioma

[EGFR Gene Amplification by FISH 2008605](#)

- Aids in prognostication and therapeutic decisions for neoplasms where amplification has been demonstrated

Disease Overview

Incidence

- ~2-3/100,000 people – most European and North American countries
- Glioblastoma accounts for ~15% of all brain tumors

Pathology

May develop

- de novo (primary)
- Progression from low-grade or anaplastic astrocytomas (secondary)

Age of onset – 45-70 years

Prognostic/treatment issues

MGMT promoter methylation associated with significantly increased overall and progression-free survival

- Nonelderly individuals – testing is prognostic
- Elderly individuals – testing is prognostic and can guide treatment decisions

Genetics

Gene– MGMT (*O*⁶-methylguanine-DNA methyltransferase)

Area of interest – promoter region

Function – DNA repair

Test Interpretation

Sensitivity/specificity

- Analytical sensitivity – limit of detection is methylation levels $\geq 1\%$
- Analytical specificity – 100%

Results

- Positive – MGMT promoter methylation was detected
 - Associated with improved survival in individuals with glioma and in those treated with alkylating agents
- Not detected – MGMT promoter methylation not detected

Limitations

- Methylation at locations other than those covered by the primers and probes not detected
- Results of this test must always be interpreted within the clinical context and other relevant data
- Results should not be used as a sole determinant of alkylating chemotherapy in standard clinical practice