Test Definition: GLIOF

1p/19q Deletion, Glioma, FISH, Ts

Overview

Useful For

Aids in diagnosing oligodendroglioma tumors and predicting the response of an oligodendroglioma to therapy

May be useful in tumors with a complex "hybrid" morphology requiring differentiation from pure astrocytomas to support the presence of oligodendroglial differentiation/lineage

Indicated when a diagnosis of oligodendroglioma, both low-grade World Health Organization (WHO, grade II) and anaplastic (WHO, grade III) is rendered

Strongly recommended when a diagnosis of mixed oligoastrocytomas is rendered

Reflex Tests

Test ID	Reporting Name	Available Separately	Always Performed
_I099	Interphases, 25-99	No, (Bill Only)	No
_I300	Interphases, >=100	No, (Bill Only)	No
_IL25	Interphases,	No, (Bill Only)	No
_PADD	Probe, +1	No, (Bill Only)	No
_PB02	Probe, +2	No, (Bill Only)	No
_PB03	Probe, +3	No, (Bill Only)	No
_PBCT	Probe, +2	No, (Bill Only)	No

Testing Algorithm

This test does not include a pathology consult. If a pathology consultation is requested, PATHC / Pathology Consultation should be ordered and the appropriate FISH test will be ordered and performed at an additional charge.

This test includes a charge for application of the first probe set (2 FISH probes) and professional interpretation of results. Additional charges will be incurred for all reflex probes performed. Analysis charges will be incurred based on the number of cells analyzed per probe set. If no cells are available for analysis, no analysis charges will be incurred.

Chromosomal microarray (CMAPT / Chromosomal Microarray, Tumor, Formalin-Fixed Paraffin-Embedded), rather than FISH, may be of benefit to evaluate for acquired alterations associated with the molecular classification of glioma.(1) See Cytogenetic Analysis of Glioma in Special Instructions.

Special Instructions

- Incidence of 1p and 19q Losses versus Glioma Subtype and Primary Status
- Cytogenetic Analysis of Glioma

Method Name

Fluorescence In Situ Hybridization (FISH) Using DNA Probes

NY State Available

Yes

Specimen

Specimen Type

Tissue

Shipping Instructions

Advise Express Mail or equivalent if not on courier service.

Necessary Information

A reason for referral and pathology report are required in order for testing to be performed. Send information with specimen. Acceptable pathology reports include working drafts, preliminary pathology or surgical pathology reports.

Specimen Required

Submit only 1 of the following specimens:

Specimen Type: Tissue

Preferred: Tissue block

Collection Instructions: Submit a formalin-fixed, paraffin-embedded (FFPE) tumor tissue block. Blocks prepared with alternative fixation methods may be acceptable; provide fixation method used.

Acceptable: Slides

Collection Instructions: Six consecutive, unstained, 5 micron-thick sections placed on positively charged slides, and 1 hematoxylin and eosin-stained slide.

Forms

If not ordering electronically, complete, print, and send an Oncology Test Request (T729) with the specimen.

Specimen Minimum Volume

Four consecutive, unstained, 5-micron-thick sections placed on positively charged slides and 1 hematoxylin and eosin-stained slide

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Tissue	Ambient (preferred)		
	Refrigerated		

Clinical and Interpretive

Clinical Information

Astrocytomas, oligodendrogliomas, and mixed oligoastrocytomas are the major histologic types of human gliomas; histologic differentiation among these tumors can be difficult. It has been shown that specific genetic alterations are highly associated with specific morphologic types of gliomas. In addition, specific genetic alterations seem to predict prognosis (survival), as well as response to specific chemotherapeutic and radiotherapeutic regimens, irrespective of tumor morphology.

Deletions of the short arm of chromosome 1(1p) and long arm of chromosome 19 (19q), are strongly correlated with gliomas of oligodendroglial morphology. Approximately 70%, 50%, and 50% of oligodendrogliomas have deletions of 19q, 1p, and of both 19q and 1p, respectively.

Combined 1p and 19q loss is infrequent in gliomas of astrocytic origin. Thus, the presence of combined 1p/19q loss is strongly suggestive that a glioma is of oligodendroglioma lineage.

Gains of chromosome 19 and of the 19 q-arm are associated with gliomas of astrocytic origin.

Deletions of 1p and of both 1p and 19q also have been associated with response to various chemotherapeutic and radiotherapeutic regimens. These responses have been especially associated with high-grade oligodendrogliomas (anaplastic oligodendrogliomas).

Chromosomal microarray (CMAPT / Chromosomal Microarray, Tumor, Formalin-Fixed Paraffin-Embedded), rather than FISH, may be of benefit to evaluate for acquired alterations associated with the molecular classification of glioma.(1) See Cytogenetic Analysis of Glioma in Special Instructions.

Reference Values

An interpretive report will be provided.

Interpretation

The presence of 1p deletion and combined 1p and 19q deletion supports a diagnosis of oligodendroglioma may indicate that the patient may respond to chemotherapy and radiation therapy.

The presence of gain of chromosome 19 supports a diagnosis of high-grade astrocytoma (glioblastoma multiforme).

A negative result does not exclude a diagnosis of oligodendroglioma or high-grade astrocytoma.

Cautions

This test is not approved by the US FDA, and it is best used as an adjunct to existing clinical and pathologic information.

Supportive Data

See Incidence of 1p and 19q Losses Versus Glioma Subtype and Primary Status in Special Instructions. The table summarizes the incidence of 1p deletion, 19q deletion, and combined 1p and 19q deletion in a series of tumors from Mayo Clinic and Johns Hopkins University. The laboratory also has detected a similar incidence of 1p and 19q deletions in a series of 189 high-grade oligodendrogliomas from patients enrolled in a Radiation Therapy Oncology Group (RTOG) trial.

Clinical Reference

1. Eckel-Passow JE, Lachance DH, Molinaro AM, et al: Glioma Groups Based on 1p/19q, IDH, and TERT Promoter Mutations in Tumors. N Engl J Med 2015 Jun 25;372(26):2499-2508

2. James CD, Smith JS, Jenkins RB: Genetic and molecular basis of primary central nervous system tumors. In Cancer in the Nervous System. Edited by VA Levine. New York, Oxford University Press, 2002, pp 239-251

3. Cairncross JG, Ueki K, Zlatescu MC, et al: Specific genetic predictors of chemotherapeutic response and survival in patients with anaplastic oligodendrogliomas. J Natl Cancer Inst 1998 October 7;90(19):1473-1479

4. Ino Y, Zlatescu MC, Sasaki H, et al: Long survival and therapeutic responses in patients with histologically disparate high-grade gliomas demonstrating chromosome 1p loss. J Neurosurg 2000 June;92(6):983-990

5. Smith JS, Tachibana I, Passe SM, et al: PTEN mutation, EGFR amplification, and outcome in patients with anaplastic astrocytoma and glioblastoma multiforme. J Natl Cancer Inst 2001 August 15;93(16):1246-1256

6. Smith JS, Alderete B, Minn Y, et al: Localization of common deletion regions on 1p and 19q in human gliomas and their association with histological subtype. Oncogene 1999 July 15;18(28):4144-4152

7. Smith JS, Perry A, Borell TJ, et al: Alterations of chromosome arms 1p and 19q as predictors of survival in oligodendrogliomas, astrocytomas, and mixed oligoastrocytomas. J Clin Oncol 2000 February;18(3):636-645

8. Jenkins RB, Curran W, Scott CB, et al: Pilot evaluation of 1p and 19q deletions in anaplastic oligodendrogliomas collected by a national cooperative cancer treatment group. Am J Clin Oncol 2001 October;24(5):506-508

9. Burger PC: What is an oligodendroglioma? Brain Pathol 2002;12:257-259

Performance

Method Description

The test uses 2 commercially available enumeration strategy probe sets: 1p36(*TP73*)/1q25(*ABL2*) and 19p13(D19S221)/19q13.3(*EHD2*). Formalin-fixed paraffin-embedded tissues are cut at 5 microns and mounted on positively charged glass slides. The selection of tissue and the identification of target areas on the hematoxylin and eosin (H and E)-stained slide is performed by a pathologist. Using the H and E-stained slide as a reference, target areas are etched with a diamond-tipped etcher on the back of the unstained slide to be assayed. The probe sets are hybridized to the appropriate target areas. For each probe set, 2 technologists each analyze 50 interphase nuclei (100 total for each probe set) with the results expressed as a ratio of the total number of 1p36:1q and 19q13.3:19p signals.(Unpublished Mayo method)

PDF Report

No

Day(s) and Time(s) Test Performed

Samples processed Monday through Sunday.

Results reported Monday through Friday; 8 a.m.-5 p.m.

Analytic Time

8 days

Maximum Laboratory Time

12 days

Specimen Retention Time

Slides and H&E used for analysis are retained by the laboratory in accordance to CAP and NYS requirements. Client provided paraffin blocks and extra unstained slides (if provided) will be returned after testing is complete.

Performing Laboratory Location

Rochester

Fees and Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact Customer Service.

Test Classification

This test was developed using an analyte specific reagent. Its performance characteristics were determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information

88271x2, 88291- DNA probe, each (first probe set), Interpretation and report

88271x2- DNA probe, each; each additional probe set (if appropriate)

88271x1- DNA probe, each; coverage for sets containing 3 probes (if appropriate)

88271x2- DNA probe, each; coverage for sets containing 4 probes (if appropriate)

88271x3- DNA probe, each; coverage for sets containing 5 probes (if appropriate)

88274- w/modifier 52- Interphase in situ hybridization, <25 cells, each probe set (if appropriate)

88274- Interphase in situ hybridization, 25 to 99 cells, each probe set (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
GLIOF	1p/19q Deletion, Glioma, FISH, Ts	In Process

Result ID	Test Result Name	Result LOINC Value
52107	Result Summary	50397-9
52109	Interpretation	69965-2
52108	Result	62356-1
CG739	Reason For Referral	42349-1
52110	Specimen	31208-2
52111	Source	31208-2
52112	Tissue ID	80398-1
52113	Method	49549-9
54579	Additional Information	48767-8
53836	Disclaimer	62364-5

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Result ID	Test Result Name	Result LOINC Value
52114	Released By	18771-6