



FISH (fluorescent in situ hybridization) for Differential Diagnosis and Prognosis in Glioma Is Introduced

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Astrocytoma, anaplastic astrocytoma, glioblastoma, oligodendrogliomas, and mixed oligodendroglioma/astrocytomas (MOA) comprise a subset of brain tumors that derive from a glial cell origin. Differential diagnosis of the tumors can be difficult, but since both response to chemotherapy and overall patient survival differs between the different types, accurate diagnosis is important for clinical decision making.^{1,2} Additionally, the presence of specific genetic aberrations has an impact on patient prognosis, independent of tumor morphology.³

Genetic evidence indicates that the astrocytomas, anaplastic astrocytomas, and glioblastoma multiformae tumors are related and that each subsequently higher grade of tumor is caused by an accumulation of relatively specific genetic changes. For example, trisomy 7 (+7) or gain of 7q is found in all tumor types, loss of chromosomes 22 and 9p, in addition to +7, are found more frequently in the anaplastic astrocytomas, and all these changes, plus loss of chromosome 10 and gene amplification, are found preferentially in patients with glioblastoma. The accumulated cytogenetic aberrations, therefore are associated with disease progression.⁴

FISH (fluorescent in situ hybridization), using the following probes, can provide diagnostic information for cases with uncertain morphological classification and can provide additional prognostic information.

Probe	Use	Results
1p/19q	Diagnosis / Prognosis	Combined deletion is consistent with oligodendroglioma/ oligodendroglioma lineage. Deletion of 1p or 1p/19q is associated with chemo/radiotherapeutic response. Gain of 19q is associated with astrocytic tumor.
p16	Prognosis	Homozygous deletion is found in aggressive astrocytoma, MOA, and glioblastoma.
PTEN	Prognosis	Heterozygous deletion is found in astrocytoma, MOA, and glioblastoma.
EGFR	Prognosis	Amplification indicates aggressive astrocytoma, MOA, and glioblastoma.

References

1. "Temozolomide as initial treatment for adults with low-grade oligodendrogliomas or oligoastrocytomas and correlation with chromosome 1p deletions" J. Clin. Oncol. 15: 3133, '04.
2. "Detection of chromosomal changes by interphase cytogenetics in biopsies of recurrent astrocytomas and oligodendrogliomas" J. Neuropath. and Exper. Neurol. 56:1125, '97.
3. "Long survival and therapeutic responses in patients with histologically disparate high-grade gliomas demonstrating chromosome 1p loss" J. Neurosurg. 92:983, '00.
4. "Cytogenetic and molecular abnormalities in astrocytic gliomas" Oncology Reports 7: 401, '00.
5. "Alterations of chromosome arms 1p and 19q as predictors of survival in oligodendrogliomas, astrocytomas and mixed oligoastrocytomas" J. Clin. Oncol. 18: 636, '00.

Quick Facts

- ▶ Differential diagnosis of glial tumors can be difficult, but accurate diagnosis is important for clinical decision making.
- ▶ Specific genetic aberrations have an impact on patient prognosis – independent of tumor morphology.
- ▶ Accumulated cytogenetic aberrations are associated with disease progression.

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Test Information

- DESCRIPTION** FISH (fluorescent in situ hybridization) using DNA probes to the following genes/ chromosome regions: 1p/19q(1p36/19q13), PTEN(10q23), P16 (9p21),EGFR(7p11-12). Each assay is performed independently as a dual-color hybridization on unstained tissue sections, with the control probe for each assay labeled in spectrum green and the test locus labeled in spectrum orange. The test has been validated for performance on paraffin-embedded brain tissue specimens.
- ORDER CODE** GLIOFISH
- CPT CODE** 88365 × number of probes chosen
88274 × number of probes chosen
88291
- SPECIMEN** Formalin-fixed, paraffin-embedded tumor tissue block. Please note that other tumor fixation methods may cause the specimen to be unusable for FISH hybridization. Identifiable tumor should be present in the block and documented by other methods. Patient demographic data and pathological interpretation should be included with the specimen block. If the desired probes are not specified, only 1p/19q will be hybridized and reported.
- Please specify which DNA probes are desired from the offered menu: 1p/19q, p16, PTEN, or EGFR.
- SCHEDULE** Weekly
- TURNAROUND** Up to 7 days

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