1p/19q Deletion (FISH) in Oligodendrogliomas

Indications for Ordering
- Diagnose oligodendroglioma brain tumors
  - Indicated in both low-grade and high-grade (anaplastic) oligodendrogliomas
- Predict response to therapy in oligodendrogliomas

Test Description
Fluorescent in situ hybridization (FISH)

Tests to Consider
- 1p/19q Deletion by FISH 2008604
  - Use when oligodendrogliomas are suspected
- IDH1 R132 by Immunohistochemistry 2005857
  - Use when morphology indicates tumor may be a glioma
  - Use to differentiate tumor from reactive gliosis
- IDH1 R132H Point Mutation with Interpretation by Immunohistochemistry 2007357
  - Includes pathologist interpretation

Disease Overview
Prevalence
- 2nd most common glioma in adults
- Accounts for 2% of central nervous system (CNS) tumors

Diagnostic issues
- Malignant gliomas are the most common type of primary brain tumors (>70% of all CNS tumors)
  - Subtypes – astrocytoma, oligodendroglioma, mixed glioma
- Differentiating astrocytoma from oligodendroglioma is crucial
  - Treatment and prognosis differ between tumors
  - Combined loss of chromosomal arms 1p and 19q is characteristic of oligodendrogliomas
  - Gain of chromosome 19 supports diagnosis of high-grade astrocytoma (glioblastoma multiforme)
  - Loss of 1p may identify treatment-sensitive high grade oligodendroglioma (for both chemotherapy and radiotherapy)
  - Prognostic relevance in low-grade tumors less well characterized

Genetics
- Gene – chromosomes 1 and 19 involved
- Structure/function
  - Deletion is short arm of 1p and long arm of 19q
  - Results in loss of mediators of resistance to therapy

Variants
- 1p/19q codeletion is mutually exclusive for TP53 and EGFR amplification
- 1p/19q codeletion is frequently associated with IDH1 or IDH2 variants

Test Interpretation
Results
- Positive
  - Tumors with 1p/1q ratio <0.80 and ≥25% deleted cells are deemed deleted for 1p
  - Tumors with 19q/19p ratio <0.80 and ≥35% deleted cells are deemed deleted for 19q
  - Both deletions are associated with a better prognosis
  - Codeletion has better prognosis than single deletion
  - Presence of codeletion establishes diagnosis of oligodendroglioma
- Negative
  - Does not exclude diagnosis of oligodendroglioma

Limitations
- Test should not be used alone for the diagnosis of malignancy