

## Overview

### Useful For

Supporting the diagnosis of germ cell tumors when used in conjunction with an anatomic pathology consultation

### 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.

### Reflex Tests

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

### Method Name

Fluorescence In Situ Hybridization (FISH)

### NY State Available

Yes

## Specimen

### Specimen Type

Tissue

### Shipping Instructions

Advise Express Mail or equivalent if not on courier service.

### Necessary Information

**1. A pathology report is required in order for testing to be performed.** Acceptable pathology reports include working drafts, preliminary pathology or surgical pathology reports.

**2. A reason for testing must be provided.** If this information is not provided, an appropriate indication for testing may be entered by Mayo Clinic Laboratories.

### 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:** Four 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.**Reject Due To**

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

**Specimen Minimum Volume**

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

**Specimen Stability Information**

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

**Clinical & Interpretive****Clinical Information**

Germ cell tumors (GCT) comprise a heterogeneous group of solid neoplasms that arise in midline locations including the gonads, retroperitoneum, mediastinum, and central nervous system. GCT are categorized based upon their histologic differentiation and can be separated into 2 classes. Seminomatous GCT include seminoma of the testis, dysgerminoma of the ovaries, and germinoma of the brain. Nonseminomatous GCT include yolk sac tumor, embryonal carcinoma, choriocarcinoma, immature teratoma, and mixed forms. Due to the wide spectrum of histologic features observed in these tumors, distinction from non-GCT can be difficult. GCT are often very responsive to chemotherapy and have a better outcome relative to histologically similar malignancies. Thus, distinguishing GCT from non-GCT is critical to providing the appropriate treatment for the patient. Gain of the short arm of chromosome 12, most commonly as an isochromosome 12p[i(12p)], is a highly nonrandom chromosomal marker seen in a significant percentage of GCT. While i(12p) is not 100% specific for GCT, the literature indicates it has diagnostic and possible therapeutic relevance for patients with these tumors. Testing of i(12p) should be concomitant with histologic evaluation, and positive results may support the diagnosis of GCT.

**Reference Values**

An interpretive report will be provided.

**Interpretation**

A neoplastic clone is detected when the percent of cells with an abnormality exceeds the normal cutoff for the i(12p)

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probe set.

A positive result is consistent with the diagnosis of a germ cell tumors (GCT).

A negative result suggests that the i(12p) marker is not present, but does not exclude the diagnosis of a GCT.

### Cautions

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

Fixatives other than formalin (eg, Prefer, Bouin) may not be successful for FISH assays, however nonformalin-fixed samples will not be rejected.

Paraffin-embedded tissues that have been decalcified are generally unsuccessful for FISH analysis. The pathologist reviewing the hematoxylin and eosin-stained slide may find it necessary to cancel testing.

### Supportive Data

FISH analysis was performed on 171 formalin-fixed, paraffin-embedded tissue samples from the testis, ovary, and brain. These included 22 dysgerminomas, 20 seminomas, 10 mixed germ cell tumors (GCT), 18 germinoma, 4 embryonal carcinoma, 22 GCT histological mimics, and 75 noncancerous control specimens. The normal controls were used to generate a normal cutoff for this assay. The presence of i(12p) was identified in 29% of brain, 55% of testis, and 56% of ovarian GCT.

### Clinical Reference

1. Wehle D, Yonescu R, Long PP, et al: Fluorescence in situ hybridization of 12p in germ cell tumors using a bacterial artificial chromosome clone 12p probe on paraffin-embedded tissue: clinical test validation. *Cancer Genet Cytogenet* 2008 June;183(2):99-104
2. Poulos C, Cheng L, Zhang S, et al: Analysis of ovarian teratomas for Isochromosome 12p: evidence supporting a dual histogenetic pathway for teratomatous elements. *Mod Pathology* 2006;19:766-771
3. Chaganti RS, Houldsworth J: [Genetics and biology of adult human male germ cell tumors](#). *Cancer Res.* 2000 Mar 15;60(6):1475-82.

## Performance

### Method Description

This test is performed using a commercially available chromosome 12 centromere probe (D12Z3) and a laboratory-developed probe targeted to 12p11.21. 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 set is hybridized to the appropriate target areas and 2 technologists each analyze 50 interphase nuclei (100 total) with the results expressed as the percent of abnormal nuclei. (Unpublished Mayo method)

### PDF Report

No

### 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.

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**Performing Laboratory Location**

Rochester

**Fees & Codes****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 US 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)