# Test Definition: NUT1F

NUTM1 (15q14), FISH, Ts

## Overview

### Useful For

Identifying *NUTM1* gene rearrangements in patients with nuclear protein in testis midline carcinoma to aid in confirming or excluding the diagnosis

### Reflex Tests

| Test ID | Reporting Name | Available Separately | Always Performed |
|---|---|---|---|
| _PBCT | Probe, +2 | 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 |
| _IL25 | Interphases, | No, (Bill Only) | No |
| _I099 | Interphases, 25-99 | No, (Bill Only) | No |
| _I300 | Interphases, >=100 | 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 fluorescence in situ hybridization (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.

### 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

**Container/Tube:** Formalin-fixed, paraffin-embedded tumor tissue block

**Specimen Type:** Slides

**Specimen Volume:** 4 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

2 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

Nuclear protein in testis (NUT) midline carcinomas (NMC) are rare aggressive tumors with rapid onset. Although NMC has been described in several anatomic sites, it is commonly observed in the head, neck, or thorax. These tumors are poorly differentiated and defined by rearrangement of the *NUTM1* gene on chromosome 15q14. In the majority of cases, *NUTM1* is rearranged in an apparently balanced translocation with the *BRD4* gene on chromosome 19p13.1; however, other partners for *NUTM1* rearrangement have been reported. *NUTM1* rearrangement has not been identified in other midline malignancies. Therefore, a separation of *NUTM1*, in the proper clinical and histologic context, is diagnostic for NMC and can be confirmed by fluorescence in situ hybridization with NUT break-apart probes.

## Reference Values

An interpretive report will be provided.

## Interpretation

The presence of *NUTM1* rearrangement confirms the diagnosis of nuclear protein in testis midline carcinomas (NMC) in the proper clinical and histologic context.

The absence of *NUTM1* rearrangement rules out the diagnosis of NMC in the proper clinical and histologic context.

A positive result is detected when the percent of cells with an abnormality exceeds the normal cutoff for the probe set.

A positive result suggests rearrangement of the *NUTM1* locus which, in conjunction with the proper clinical and histologic features, is diagnostic of NMC. A negative result suggests no rearrangement of the *NUTM1* gene region at 15q14. A confirmed diagnosis of NMC results in specific clinical management that may be distinct from the management of other carcinomas.

## 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.

This test is only intended to be used in the diagnosis of nuclear protein in testis midline carcinomas (NMC). The results of this test are intended to be interpreted in association with the pathologic and clinical findings.

Fixatives other than formalin (eg, Prefer, Bouin) may not be successful for fluorescence in situ hybridization (FISH) assays, however non-formalin 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

Fluorescence in situ hybridization analysis was performed on 26 paraffin-embedded tissue samples and 25 noncancerous lymph node control specimens. Rearrangement of *NUTM1* was verified in 4 samples previously identified as nuclear protein in testis midline carcinomas (NMC) by a pathologist. The normal controls were used to generate a normal cutoff for this assay.

## Clinical Reference

11. Bauer DE, Mitchell CM, Strait KM, et al: Clinicopathologic features and long-term outcomes of NUT midline carcinoma. Clin Cancer Res. 2012 Oct;18(20):5773-5779

2. Ziai J, French CA, Zambrano E: NUT gene rearrangement in a poorly-differentiated carcinoma of the submandibular gland. Head Neck Pathol. 2010 June;4(2):163-168

3. Herbert H, Johnson LA, Fry CJ, et al: Diagnosis of NUT midline carcinoma using a NUT-specific monoclonal antibody. Am J Surg Pathol. 2009 July;33(7):984-991

4. Stelow EB, Bellizzi AM, Taneja K, et al: NUT rearrangement in undifferentiated carcinomas of the upper aerodigestive tract. Am J Surg Pathol. 2008 Jun;32(6):828-834

5. French CA: NUT midline carcinoma. NatRev Cancer. 2014 Jan;14:149-150

# Performance

## Method Description

The test is performed using a laboratory-developed *NUTM1* (15q14) dual-color break-apart strategy probe (BAP). 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

### Day(s) and Time(s) Test Performed

Specimens are processed Monday through Sunday.

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

### Analytic Time

7 days

### Maximum Laboratory Time

10 days

### Specimen Retention Time

Slides and H and 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 and its performance characteristics 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

88271 x 2, 88291-DNA probe, each (first probe set), Interpretation and report

88271 x 2-DNA probe, each; each additional probe set (if appropriate)

88271 x 1-DNA probe, each; coverage for sets containing 3 probes (if appropriate)

88271 x 2-DNA probe, each; coverage for sets containing 4 probes (if appropriate)

88271 x 3-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)

88275-Interphase in situ hybridization, 100 to 300 cells, each probe set (if appropriate)

## LOINC® Information

| Test ID | Test Order Name | Order LOINC Value |
|---|---|---|
| NUT1F | NUTM1 (15q14), FISH, Ts | In Process |

| Result ID | Test Result Name | Result LOINC Value |
|---|---|---|
| 92323 | Result Summary | 50397-9 |
| 92324 | Interpretation | 69965-2 |
| 92325 | Result | 62356-1 |
| CG997 | Reason For Referral | 42349-1 |
| 92326 | Specimen | 31208-2 |
| 92327 | Source | 31208-2 |
| 92328 | Tissue ID | 80398-1 |
| 92329 | Method | 49549-9 |
| 92330 | Additional Information | 48767-8 |
| 92331 | Disclaimer | 62364-5 |
| 92339 | Released By | 18771-6 |