MAYO CLINIC LABORATORIES

Test Definition: MAMLF

MAML2 (11q21) Rearrangement, Mucoepidermoid Carcinoma (MEC), FISH, Tissue

Overview

Useful For

Identifying *MAML2* rearrangements

Supporting the diagnosis of mucoepidermoid carcinoma when used in conjunction with an anatomic pathology consultation

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, <25	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 consultation. 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 the probe application, analysis, and professional interpretation of results for one probe set (2 individual FISH probes). 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.

Appropriate ancillary probes may be performed at consultant discretion to render comprehensive assessment. Any additional probes will have the results included within the final report and will be performed at an additional charge.

Method Name

Fluorescence In Situ Hybridization (FISH)

NY State Available

Yes

Specimen

Specimen Type
Tissue

Ordering Guidance
This test does not include a pathology consultation. If a pathology consultation is requested, order PATHC / Pathology Consultation, and appropriate testing will be added at the discretion of the pathologist and performed at an additional charge.

Multiple oncology (cancer) gene panels are also available. For more information see Hematology, Oncology, and Hereditary Test Selection Guide.

Shipping Instructions
Advise Express Mail or equivalent if not on courier service.

Necessary Information
1. A pathology report is required for testing to be performed. If not provided, appropriate testing and interpretation may be compromised or delayed. Acceptable pathology reports include working drafts, preliminary pathology, or surgical pathology reports.
2. **The following information must be included in the report provided**:
-Patient name
-Block number - must be on all blocks, slides, and paperwork
-Date of collection
-Tissue source
3. 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:

Preferred
Specimen Type: Tissue block
Collection Instructions:
1. Submit a formalin-fixed, paraffin-embedded tumor tissue block. Blocks prepared with alternative fixation methods will be attempted but are less favorable for successful results by fluorescence in situ hybridization testing.
2. Provide fixation method used.
Additional Information:
1. Paraffin-embedded specimens can be from any anatomic location (skin, soft tissue, lymph node, etc).
2. Bone specimens that have been decalcified will be attempted for testing, but the success rate is approximately 50%.

Acceptable
Specimen Type: Tissue slides
Slides: 1 Hematoxylin and eosin-stained and 4 unstained
Collection Instructions: Submit 1 slide stained with hematoxylin and eosin and 4 consecutive unstained, positively

charged, unbaked slides with 5 micron-thick sections of the tumor tissue.

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

Specimen Minimum Volume
Slides: 1 Hematoxylin and eosin-stained and 2 unstained

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 & Interpretive

Clinical Information
Mucoepidermoid carcinoma (MEC) is the most common malignant salivary gland neoplasm, representing over 30% of all malignant salivary gland tumors. MEC can arise in other locations such as the lung and airways. The diagnosis can be quite challenging due to the degree of histologic overlap with other tumors. *MAML2* rearrangements are detectable in 80% to 85% of mucoepidermoid carcinomas but not in morphologic mimics.

MAML2 rearrangements can be identified in numerous neoplasms in addition to MEC, including, but not limited to, hidradenoma, poroma, porocarcinoma, and hemangioendothelioma.

Reference Values
An interpretive report will be provided.

Interpretation
MAML2 will be clinically interpreted as positive, negative, or equivocal.

A neoplastic clone is detected when the percent of cells with an abnormality exceeds the normal cutoff for the MAML2 probe set.

A positive result is consistent with rearrangement of the *MAML2* gene and likely reflects *MAML2* fusion with a partner gene. A positive result may support a diagnosis of mucoepidermoid carcinoma. The significance of this finding is dependent on the clinical and pathologic features.

A negative result suggests a *MAML2* gene rearrangement is not present. A negative result does not exclude the diagnosis of mucoepidermoid carcinoma.

Cautions

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

This fluorescence in situ hybridization (FISH) assay does not rule out other chromosome abnormalities.

Fixatives other than formalin (eg, Prefer, Bouin's) may not be successful for FISH assays. Non-formalin fixed specimens will not be rejected.

Paraffin-embedded tissues that have been decalcified may not be successful for FISH analysis. The success rate of FISH studies on decalcified tissue is approximately 50%, but FISH will be attempted if sufficient tumor is present for analysis.

Fluorescence in situ hybridization studies will be attempted if sufficient tumor is present for analysis. The pathologist reviewing the hematoxylin and eosin-stained slide may find it necessary to cancel testing if insufficient tissue/tumor is available for testing.

If no FISH signals or a lack of sufficient tumor tissue are observed post-hybridization, the case will be released indicating a lack of FISH results.

Clinical Reference

1. Seethala RR, Dacic S, Cieply K, Kelly LM, Nikiforova MN. A reappraisal of the MECT1/MAML2 translocation in salivary mucoepidermoid carcinomas. Am J Surg Pathol. 2010;34(8):1106-1121
2. Behboudi A, Enlund F, Winnes M, et al. Molecular classification of mucoepidermoid carcinomas-prognostic significance of the MECT1-MAML2 fusion oncogene. Genes Chromosomes Cancer. 2006;45(5):470-481
3. Salem A, Bell D, Sepesi B, et al. Clinicopathologic and genetic features of primary bronchopulmonary mucoepidermoid carcinoma: the MD Anderson Cancer Center experience and comprehensive review of the literature. Virchows Archiv. 2017;470(6):619-26
4. Kuma Y, Yamada Y, Yamamoto H, et al. A novel fusion gene CRTC3-MAML2 in hidradenoma: histopathological significance. Hum Pathol. 2017;70:55-61
5. Sekine S, Kiyono T, Ryo E, et al. Recurrent YAP1-MAML2 and YAP1-NUTM1 fusions in poroma and porocarcinoma. J Clin Invest. 2019;129(9):3827-3832
6. Antonescu CR, Dickson BC, Sung YS, et al. Recurrent YAP1 and MAML2 gene rearrangements in retiform and composite hemangioendothelioma. Am J Surg Pathol. 2020;44(12):1677-1684

Performance

Method Description

The test is performed using a laboratory-developed MAML2 dual-color, break-apart strategy fluorescence in situ hybridization (FISH) probe set (BAP). Paraffin-embedded tissue specimens 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 are performed by a pathologist. Using the H and E-stained slide as a reference, target areas are etched with a diamond-tipped engraving tool on the back of the unstained slide to be assayed. Each probe set is hybridized to the appropriate target areas, as indicated on the H and E, and 100 interphase nuclei are scored within the targeted areas. The results are expressed as the percent of abnormal nuclei.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday through Friday

Report Available
7 to 10 days

Specimen Retention Time
Slides used for analysis are retained by the laboratory in accordance with regulatory requirements. Client provided paraffin blocks and extra unstained slides (if provided) will be returned after testing is complete.

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

Fees & 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 account representative. 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. It 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)

LOINC® Information

MAYO CLINIC LABORATORIES

Test Definition: MAMLF

MAML2 (11q21) Rearrangement, Mucoepidermoid Carcinoma (MEC), FISH, Tissue

Test ID	Test Order Name	Order LOINC® Value
MAMLF	MAML2 (11q21), FISH, Ts	74034-0

Result ID	Test Result Name	Result LOINC® Value
54689	Result Summary	50397-9
54692	Interpretation	69965-2
54691	Result	62356-1
54918	Specimen	31208-2
54694	Source	31208-2
54695	Tissue ID	80398-1
54696	Released By	18771-6
CG930	Reason For Referral	42349-1
55136	Method	85069-3
55137	Additional Information	48767-8
53394	Disclaimer	62364-5