

Overview

Useful For

Detecting molecular markers associated with response or resistance to specific cancer

Additional Tests

Test Id	Reporting Name	Available Separately	Always Performed
SLIRV	Slide Review in MG	No, (Bill Only)	Yes

Testing Algorithm

When this test is ordered, slide review will always be performed at an additional charge.

Special Instructions

- [Molecular Genetics: Inherited Cancer Syndromes Patient Information](#)

Method Name

Digital Droplet Polymerase Chain Reaction (ddPCR)

NY State Available

Yes

Specimen

Specimen Type

Varies

Necessary Information

Pathology report (final or preliminary) **must accompany specimen in order for testing to be performed.** At minimum, it should contain the following information:

- Patient name
- Block number-must be on all blocks, slides and paperwork (can be handwritten on the paperwork)
- Tissue collection date
- Source of the tissue

Specimen Required

Preferred:

Specimen Type: Tissue

Container/Tube: Tissue block

Collection Instructions: Submit a formalin-fixed, paraffin-embedded tissue block.

Acceptable:

Specimen Type: Tissue

Container/Tube: Slides

Specimen Volume: 1 stained and 5 unstained

Collection Instructions: Submit 1 slide stained with hematoxylin and eosin and 5 unstained, nonbaked slides with 5-micron thick sections of the tumor tissue.

Specimen Type: Cytology slide (direct smears or ThinPrep)

Slides: 1 to 3 slides

Collection Instructions: Submit 1 to 3 slides stained and coverslipped with a preferred total of 5000 nucleated cells or a minimum of at least 3000 nucleated cells.

Note: Glass coverslips are preferred; plastic coverslips are acceptable but will result in longer turnaround times.

Additional Information: Cytology slides will not be returned.

Forms

1. [Molecular Genetics: Inherited Cancer Syndromes Patient Information](#) (T519) in Special Instructions.
2. If not ordering electronically, complete, print, and send a [Oncology Test Request](#) (T729) with the specimen.

Specimen Minimum Volume

Formalin-fixed, paraffin-embedded (FFPE) tissue block (preferred) or 1 slide stained with hematoxylin and eosin and 5 unstained, nonbaked slides (5-microns thick sections) of the tumor tissue.

Reject Due To

Specimens that have been decalcified (all methods) Specimens that have not been formalin- fixed, paraffin-embe dded	Reject
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Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

Strategies that focus on early detection and prevention effectively decrease the risk of mortality associated with cancer. In addition, an increase in survival rate for individuals with advanced stage disease has been observed as a result of advancements in standard chemotherapeutic agents and the development of specialized targeted therapies. Monoclonal antibodies against epidermal growth factor receptor (EGFR), such as cetuximab and panitumumab, represent an area of targeted therapy for patients

with colorectal and non-small cell lung cancer (NSCLC). However, studies have shown that not all individuals with colorectal cancer or NSCLC respond to EGFR targeted molecules. Because the combination of targeted therapy and standard chemotherapy leads to an increase in toxicity and cost, strategies that help to identify the individuals most likely to benefit from such targeted therapies are desirable.

EGFR is a growth factor receptor that is activated by the binding of specific ligands (epiregulin and amphiregulin), resulting in activation of the RAS/MAPK pathway. Activation of this pathway induces a signaling cascade ultimately regulating a number of cellular processes including cell proliferation. Dysregulation of the RAS/MAPK pathway is a key factor in tumor progression. Targeted therapies directed to EGFR, which inhibit activation of the RAS/MAPK pathway, have demonstrated some success (increased progression-free and overall survival) in patients with cancer, in particular, colorectal cancer and NSCLC.

One of the most common somatic alterations in colon cancer and NSCLC is the presence of activating variants in the protooncogene *KRAS*. *KRAS* is recruited by ligand-bound (active) EGFR to initiate the signaling cascade induced by the RAS/MAPK pathway. Because altered *KRAS* constitutively activates the RAS/MAPK pathway downstream of EGFR, agents such as cetuximab and panitumumab, which prevent ligand-binding to EGFR, do not appear to have any meaningful inhibitor activity on cell proliferation in the presence of altered *KRAS*. Current data suggest that the efficacy of EGFR-targeted therapies in colon cancer and NSCLC is confined to patients with tumors lacking *KRAS* mutations. An exception is the *KRAS* G12C variant that is targetable with variant-specific inhibitors.

This test uses DNA extracted from tumor tissue to evaluate for the presence of *KRAS* (G12A, G12C, G12D, G12R, G12S, G12V, G13D, Q61K, Q61L, Q61R, Q61H, and A146T) variants. A positive result indicates the presence of an activating *KRAS* mutation and can be a useful marker by which patients are selected for EGFR-targeted therapy.

Reference Values

An interpretive report will be provided.

Interpretation

An interpretative report will be provided.

Cautions

Not all patients whose tumors have wild-type *KRAS* respond to epidermal growth factor receptor (EGFR)-targeted therapies.

Rare alterations (ie, polymorphisms) exist that could lead to false-negative or false-positive results.

Test results should be interpreted in context of clinical findings, tumor sampling, and other laboratory data. If results obtained do not match other clinical or laboratory findings, please contact the laboratory for possible interpretation. Misinterpretation of results may occur if the information provided is inaccurate or incomplete.

This assay was designed to detect variants in *KRAS* codons 12, 13, 61, and 146 (G12A, G12C, G12D, G12R, G12S, G12V, G13D, Q61K, Q61L, Q61R, Q61H, and A146T).

This test has not been clinically validated for use as a tool to monitor response to therapy or for early detection of tumors.

This test cannot differentiate between somatic and germline alterations.

Clinical Reference

- 1.Allegre CJ, Rumble BR, Hamilton SR, et al: Extended RAS gene mutation testing in metastatic colorectal carcinoma to predict response to anti-epidermal growth factor receptor monoclonal antibody therapy: ASCO Provisional Clinical Opinion update 2015. J Clin Oncol. 2016 Jan 10;34(2):179-185
- 2.Spano JP, Milano G, Vignot S, Khayat D: Potential predictive markers of response to EGFR-targeted therapies in colorectal cancer. Crit Rev Oncol Hematol. 2008;66:21-30
- 3.Lam DC: Clinical testing for molecular targets for personalized treatment in lung cancer. Respirology

2013Feb;18(2):233-237

4.Hong DS, Fakih MG, Strickler JH, et al: KRAS G12C inhibition with sotorasib in advanced solid tumors. N Engl J Med. 2020 Sep 24;383(13):1207-1217

Performance

Method Description

A pathology review and macrodissection to enrich for tumor cells is performed prior to DNA extraction.

Digital droplet polymerase chain reaction is used to test for the presence of *KRAS* codon 12, 13, 61, and 146 variants. (Unpublished Mayo method).

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

8 to 12 days

Specimen Retention Time

Unused slides: 5 years;. Extracted DNA: 3 months. Unused portions of blocks will be returned.

Performing Laboratory Location

Rochester

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

81275-KRAS (v-Ki-ras2 Kirsten rat sarcoma viral oncogene) (eg, carcinoma) gene analysis, variants in codons 12 and 13
81276-KRAS additional variant(s)
88381-Microdissection, manual

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
KRASP	KRAS Somatic Mutation Analysis	103955-1

Result ID	Test Result Name	Result LOINC® Value
610680	Result Summary	50397-9
610681	Result	82939-0
610682	Interpretation	69047-9
610683	Specimen	31208-2
610684	Source	31208-2
610685	Tissue ID	80398-1
610686	Released By	18771-6
610687	Method	85069-3
610688	Disclaimer	62364-5
614165	Additional Information	48767-8