Overview

Useful For
Assisting in the clinical management of patients with metastatic breast cancer by identifying tumors with evolving resistance to endocrine therapy
Stratifying prognosis of metastatic breast cancer
This test is not useful for hematological malignancies.

Additional Tests

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Reporting Name</th>
<th>Available Separately</th>
<th>Always Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLIRV</td>
<td>Slide Review in MG</td>
<td>No, (Bill Only)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

Method Name
Polymerase Chain Reaction (PCR)-Based Next-Generation Sequencing

NY State Available
Yes

Specimen

Specimen Type
Varies

Necessary Information
Pathology report (final or preliminary) at minimum containing the following information must accompany specimen in order for testing to be performed:

1. Patient name
2. Block number—must be on all blocks, slides and paperwork (can be handwritten on the paperwork)
3. Tissue collection date
4. Source of the tissue

Specimen Required
This assay requires at least 20% tumor nuclei.

-Preferred amount of tumor area with sufficient percent tumor nuclei: tissue 144 mm²
-Minimum amount of tumor area: tissue 36 mm².
Test Definition: ESR1
ESR1 Mutation Analysis, Tumor

- These amounts are cumulative over up to 10 unstained slides and must have adequate percent tumor nuclei.

- Tissue fixation: 10% neutral buffered formalin, not decalcified

- For specimen preparation guidance, see Tissue Requirement for Solid Tumor Next-Generation Sequencing in Special Instructions. In this document, the sizes are given as 4mm x 4mm x 10 slides as preferred: approximate/equivalent to 144 mm(2) and the minimum as 3mm x 1mm x 10 slides: approximate/equivalent to 36mm(2).

Preferred:

**Specimen Type:** Tissue block

**Collection Instructions:** Submit a formalin-fixed, paraffin-embedded tissue block with acceptable amount of tumor tissue.

Acceptable:

**Specimen Type:** Tissue slide

**Slides:** 1 stained and 10 unstained

**Collection Instructions:** Submit 1 slide stained with hematoxylin and eosin and 10 unstained, nonbaked slides with 5-micron thick sections of the tumor tissue.

Note: The total amount of required tumor nuclei can be obtained by scraping up to 10 slides from the same block.

**Specimen Type:** Cytology slide (direct smears or ThinPrep)

**Slides:** 1 to 3 slides

**Collection Instructions:** Submit 1 to 3 slides stained and cover slipped with a preferred total minimum of 5000 total nucleated cells, minimum of 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**
If not ordering electronically, complete, print, and send an Oncology Test Request (T729) with the specimen.

**Specimen Minimum Volume**
See Specimen Required

**Reject Due To**

<table>
<thead>
<tr>
<th>Other</th>
<th>Specimens that have been decalcified (all methods)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Specimens that have not been formalin-fixed, paraffin-embedded</td>
</tr>
</tbody>
</table>

Document generated September 14, 2020 at 8:14pm CDT
Test Definition: ESR1
ESR1 Mutation Analysis, Tumor

Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
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<tbody>
<tr>
<td>Varies</td>
<td>Ambient (preferred)</td>
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<td></td>
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<tr>
<td></td>
<td>Frozen</td>
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<tr>
<td></td>
<td>Refrigerated</td>
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Clinical and Interpretive

Clinical Information
The estrogen receptor 1 (ESR1) gene encodes an estrogen receptor that regulates cell growth through activation of downstream signaling pathways upon binding of estrogen. Tumors demonstrating estrogen receptor expression (ER-positive) are candidates for endocrine therapy such as selective estrogen receptor modulators (SERM) and aromatase inhibitors. ESR1 mutations are rarely observed in primary tumors; however, mutations in the ligand-binding domain of ESR1 have been reported at a higher frequency in ER-positive metastatic breast tumors. Preclinical data suggests that ESR1 mutations mitigate resistance to aromatase inhibitors and decrease sensitivity to SERMs and estrogen-receptor downregulators. Studies also suggest that ESR1 mutations are an independent indicator of poor prognosis.

This test assesses for somatic mutations in the ligand-binding domain of the ESR1 gene associated with acquired resistance to endocrine therapy (ie, aromatase inhibitors) in patients with ER-positive metastatic breast cancer.

Reference Values
An interpretative report will be provided.

Interpretation
An interpretative report will be provided.

Cautions
This test cannot differentiate between somatic and germline alterations. Additional testing may be necessary to clarify the significance of results if there is a potential hereditary risk.

DNA variants of uncertain significance may be identified.

A negative (wild-type) result does not rule out the presence of a mutation that may be present but below the limits of detection of this assay.

Point mutations and small insertion/deletion mutations will be detected with in the ESR1 gene only. This test does not detect large single or multiexon deletions, or duplications or genomic copy number variants.

Rare polymorphisms may be present that could lead to false-negative or false-positive results. Test results should be interpreted in the context of clinical findings, tumor sampling and other laboratory data.

If results obtained do not match other clinical or laboratory findings, contact the laboratory for updated interpretation. Misinterpretation of results may occur if the information provided is inaccurate or incomplete.

Reliable results are dependent on adequate specimen collection and processing. This test has been validated on
cytology slides and formalin-fixed, paraffin-embedded tissues; other types of fixatives are discouraged. Improper treatment of tissues, such as decalcification, may cause PCR failure.

**Supportive Data**

This next-generation sequencing assay detects somatic mutations that can be used to assist in the clinical management of metastatic breast cancer patients.

This assay has been shown to be very reproducible, having a 100% concordance for intra- and interassay reproducibility experiments. All somatic mutations that had been previously identified by various other molecular methods were detected by this assay during accuracy studies. No pathogenic variants were detected in known mutation negative samples.

**Clinical Reference**


**Performance**

**Method Description**

Next-generation sequencing is performed to test for the presence of a mutation in targeted regions of the ESR1 gene. (Unpublished Mayo method)

<table>
<thead>
<tr>
<th>Gene</th>
<th>GenBank Accession Number</th>
<th>Nucleotide Start</th>
<th>Nucleotide End</th>
<th>Chromosome</th>
<th>Exon</th>
<th>Codons</th>
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<tbody>
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**PDF Report**

No

**Day(s) and Time(s) Test Performed**
Monday through Friday; Varies

**Analytic Time**
12 days

**Maximum Laboratory Time**
20 days

**Specimen Retention Time**
Unused portions of blocks will be returned to the client. Unused slides are stored indefinitely.

**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**
81479
88381

**LOINC® Information**

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<th>Test Order Name</th>
<th>Order LOINC Value</th>
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<td>ESR1</td>
<td>ESR1 Mutation Analysis, Tumor</td>
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<table>
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