Breast|Ovarian17
Hereditary Cancer Gene Panel

including: sequencing and high resolution deletion/duplication analysis

PANEL DESCRIPTION:
Using sequencing and high resolution deletion/duplication analysis, the Hereditary Breast|Ovarian17 Cancer Panel analyzes 17 genes for genetic variants that predispose a person to breast and ovarian cancer and, in some cases, other cancers or noncancerous conditions. This is a guidelines-based panel of genes, all of which have sufficient evidence of disease risk and National Comprehensive Cancer Network (NCCN) recommendations for interventions. Identifying causative genetic variants in any of the genes included in this panel provides valuable information for a patient’s diagnosis, treatment and risk reduction options, surveillance (early screening for other associated cancers), and familial screening.

TEST DETAILS:
- This panel includes both sequencing and high resolution deletion/duplication analysis of the genes specified.
  - **Sequencing** is performed using a customized next generation sequencing library. Analysis includes the coding exons of all genes in the panel plus ten bases into the introns and untranslated regions (5' and 3'). Sanger sequencing is performed to confirm variants classified as pathogenic or suspected pathogenic.
    - Of note, deletions of EPCAM are the only known pathogenic variants in this gene; therefore, sequencing analysis of EPCAM is not performed.
  - **Deletion/duplication analysis** is performed using a high resolution, custom microarray platform designed to target the genes of interest at the exon level.
    - Note: Deletion/duplication studies of CHEK2 and PMS2 will be performed using multiplex ligation-dependent probe amplification (MLPA) because of the presence of highly homologous pseudogenes. Additionally, del/dup analysis by MLPA cannot be performed for either gene on a buccal mucosa specimen.
- Detection rates are limited to the genes specified; this test does not provide whole genome analysis.
- Gene panels are a more cost-effective approach than single gene testing to confirm or establish a diagnosis. However, if single gene testing is desired for the patient or family members of an individual with a known mutation, that must be ordered separately.

INDICATIONS FOR TESTING:
- Breast cancer diagnosed ≤ age 45
- Breast cancer diagnosed ≤ age 50 and a close relative with breast cancer at any age
- Breast cancer diagnosed ≤ age 50 with limited or unknown family history
- Bilateral breast cancer or two separate breast primary cancers with the first ≤ age 50
- Breast cancer diagnosed ≤ age 60 with triple negative pathology
- Male breast cancer diagnosed at any age
- Ovarian, fallopian tube, or primary peritoneal cancer diagnosed at any age
- Uterine or ovarian cancers and a family history of gastrointestinal cancers
- Pancreatic cancer or aggressive prostate cancer in someone who also has a family history of breast, ovarian, pancreatic, or aggressive prostate cancer
- Family history of the above indications (typically when affected family members are unavailable for testing or deceased) or limited family history
- Ashkenazi Jewish ancestry and breast or ovarian cancer
• Personal and/or family history raising concern for the syndromes included in this panel
  o Li-Fraumeni syndrome GeneReviews® http://www.ncbi.nlm.nih.gov/books/NBK1311/
  o PTEN hamartoma tumor (Cowden) syndrome GeneReviews® http://www.ncbi.nlm.nih.gov/books/NBK1488/
• Known familial variant in any of the genes included in this panel (targeted analysis)

SPECIMEN COLLECTION & TRANSPORT:
Complimentary test kits are available upon request, but are not required.

SAMPLE TYPE and REQUIREMENTS:
• blood: 3-5 ml whole blood in an EDTA tube (purple top)
• buccal mucosa swab: 5 swabs
• extracted DNA (from blood or buccal): 5 µg in a DNA microcentrifuge tube

SHIPPING:
• Maintain and ship samples at room temperature.
• Coordinate transport for sample to be received in our laboratory within 24-48 hours of collection.
  o LOCAL: Call 402-559-5070 (option 1)
  o OUT OF AREA: Prior to shipment, please fax the completed test request form to 402-559-7248, including the FedEx® airbill tracking number.
    ▪ Saturday delivery MUST be checked when sending FedEx® on Friday.
    ▪ Please include Internal Billing Reference # 3155070600 on the FedEx® airbill.
    ▪ Ship To: Human Genetics Laboratory – Zip 54400
                UNMC Shipping & Receiving Dock
                601 S. Saddle Creek Road
                Omaha, NE 68106

REQUIRED FORMS: The following forms can be downloaded via our website.
• Hereditary Cancer Test Request Form
• Informed Consent for Hereditary Cancer Genetic Testing

POTENTIAL TEST RESULTS:
• Positive for a Pathogenic Variant – Reported when a pathogenic change is identified in a gene and the change is known to increase the risk for certain cancers.
• Negative – Reported when no harmful or uncertain changes are found in any of the genes tested.
• A Variant of Uncertain Clinical Significance (UCS) – Reported when an inconclusive change in a gene is found; It is currently unclear whether the change in the gene could increase the risk for cancer or whether it is harmless. Uncertain variants may also be classified as “Likely Pathogenic” or “Likely Benign” based on the ACMG recommendations for variant classification.²

TURN-AROUND-TIME: For all sample types, results are typically available in 7-10 days.

BILLING: Our laboratory offers patient/self-pay, insurance (including Medicare/Medicaid), and client/institution billing options. Verifying coverage requirements or obtaining preauthorization PRIOR TO OR AT THE TIME OF SPECIMEN COLLECTION is often necessary. We provide preauthorization services upon request by calling 402-559-5070 (option 3); the following form is helpful for obtaining the information required by insurance providers and can be downloaded via our website.
• Insurance Preauthorization Request
In some circumstances, a test may be warranted even though insurance coverage is denied or not guaranteed. For these situations, we request the following form be signed by the patient and submitted with the sample. This helps inform patients of their potential financial responsibility, should the costs of genetic testing not be paid by their insurance provider.

- Advanced Beneficiary Notice of Noncoverage (ABN) – required when billing Medicare

**CPT CODES:** 81162

**PRICING:** For current costs contact the laboratory billing staff at 402-559-5070 (option 3).

**GENE LIST:**

<table>
<thead>
<tr>
<th>ATM</th>
<th>BRCA2</th>
<th>CDH1</th>
<th>EPCAM</th>
<th>MSH2</th>
<th>PALB2</th>
<th>PTEN</th>
<th>RAD51D</th>
<th>TP53</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRCA1</td>
<td>BRIP1</td>
<td>CHEK2</td>
<td>MLH1</td>
<td>MSH6</td>
<td>PMS2</td>
<td>RAD51C</td>
<td>STK11</td>
<td></td>
</tr>
</tbody>
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**RESOURCES:** The following resource can be downloaded via our website, or you may request brochures for your clinic by contacting our marketing specialist at 402-559-6935 | humangenetics@unmc.edu.

- PATIENT BROCHURE: Breast|Ovarian17

**REFERENCES:**


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