Hereditary Breast and Ovarian Cancer Syndrome: \textit{BRCA1}/\textit{BRCA2} Deletion/Duplication Panel

\textbf{Test Code: MM072}  
\textbf{Turnaround time: 7 days}  
\textbf{CPT Codes: 81213 x1, 81228 x1}

\section*{Condition Description}

Mutations in the genes \textit{BRCA1} and \textit{BRCA2} cause hereditary breast and ovarian cancer syndrome (HBOC), an autosomal dominant cancer predisposition syndrome. Mutations in these genes are rare and account for only a small percentage of cancers; about 5-10\% of all breast cancers and 10-15\% of ovarian cancers are due to mutations in the \textit{BRCA1} or \textit{BRCA2} genes. Individuals with mutations in these genes, however, are at a significantly increased risk for developing breast, ovarian, and other cancers than those in the general population.

In families with HBOC syndrome, there is typically a pattern of early onset breast cancer (before the age of 50 or premenopausal). Additionally, the family history may show more than one primary breast cancer in an individual, breast cancer in two or more generations, breast cancer in a male relative, and ovarian cancer, with or without a breast cancer diagnosis. Females with a \textit{BRCA1} mutation have a 50-85\% risk of developing breast cancer and up to a 44\% risk of developing ovarian cancer. Females with a \textit{BRCA2} mutation have a 40-70\% risk of developing breast cancer and up to a 27\% risk of developing ovarian cancer. Males with a \textit{BRCA1} or \textit{BRCA2} mutation can have up to a 5-10\% lifetime risk for male breast cancer and an elevated risk of prostate cancer. Additionally, both males and females with \textit{BRCA1} or \textit{BRCA2} mutations may be at elevated risks for other cancers. Individuals with a mutation in the \textit{BRCA1} or \textit{BRCA2} gene have a 50\% risk of passing on the mutation to their children.

According to the National Comprehensive Cancer Network (NCCN) recommendations, \textit{BRCA1} and \textit{BRCA2} testing is suggested for individuals with a personal or family history of any of the following:

- Early-onset breast cancer (<50 years of age), bilateral breast cancer or triple negative (PR/ER/HER2 negative) breast cancer (<60 years of age)
- Two primary breast cancers or a diagnosis of both breast and ovarian cancer in one individual
- Personal or family history of male breast cancer
- Ovarian cancer at any age
- Ethnicity with a higher mutation frequency (eg. Ashkenazi Jewish)

EGL offers the following for \textit{BRCA1} and \textit{BRCA2} testing:

- \textit{BRCA1}/\textit{BRCA2} Full Gene Sequencing and Deletion/Duplication Panel
- \textit{BRCA1}/\textit{BRCA2} Full Gene Sequencing Panel
- \textit{BRCA1}/\textit{BRCA2} Deletion/Duplication Panel

This test is for the \textit{BRCA1}/\textit{BRCA2} Deletion/Duplication Panel.


\section*{Genes}

\textbf{\textit{BRCA1}, \textit{BRCA2}}

\section*{Indications}

This test is indicated for:

- Confirmation of a clinical diagnosis of HBOC.
- Carrier testing in adults with a family history of HBOC.

\section*{Methodology}

DNA isolated from peripheral blood is hybridized to a CGH array to detect deletions and duplications. The targeted CGH array has overlapping probes which cover the entire genomic region.

Please note that a “backbone” of probes across the entire genome are included on the array for analytical and quality control purposes. Rarely, off-target copy number variants causative of disease may be identified that may or may not be related to the patient’s phenotype. Only known pathogenic off-target copy number variants will be reported. Off-target copy number variants of unknown clinical significance will not be reported.

\section*{Detection}

Detection is limited to duplications and deletions. The CGH array will not detect point or intronic mutations. Results of molecular analysis must be interpreted in the context of the patient’s clinical and/or biochemical phenotype.

\section*{Specimen Requirements}

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Submit only 1 of the following specimen types

* Preferred specimen type: Whole Blood

**Type: Whole Blood**

Specimen Requirements:

In EDTA (purple top) tube:
- Infants (2 years): 3-5 ml
- Older Children & Adults: 5-10 ml

Specimen Collection and Shipping: Refrigerate until time of shipment. Ship sample within 5 days of collection at room temperature with overnight delivery.

**Type: Saliva**

Specimen Requirements:

Oragene™ Saliva Collection kit (available through EGL) used according to manufacturer instructions.

Specimen Collection and Shipping: Store sample at room temperature. Ship sample within 5 days of collection at room temperature with overnight delivery.

**Special Instructions**

- Sequence analysis is required before deletion/duplication analysis by targeted CGH array. If sequencing is performed outside of EGL Genetics, please submit a copy of the sequencing report with the test requisition.

**Related Tests**

- **BRCA1/BRCA2 Full Gene Sequencing and Deletion/Duplication Panel**
- **BRCA1/BRCA2 Sequencing Panel**
- Sequencing and deletion/duplication analysis is also available for other breast/ovarian cancer syndromes, including: *TP53, PTEN, STK11, MLH1, PMS2, MSH6, and MSH2.*
- Custom diagnostic mutation analysis (KM) is available to family members if mutations are identified by targeted mutation testing or sequencing analysis.
- Prenatal testing is available only for known familial mutations to individuals who are confirmed carriers of mutations. Please contact the laboratory genetic counselor to discuss appropriate testing prior to collecting a prenatal specimen.