ALBERTA PRECISION LABORATORIES
Leaders in Laboratory Medicine

Breast/Ovarian/Prostate Cancer Panel: Information for Ordering Providers

In general, individuals assigned female at birth have a 1 in 8 (13%) risk of breast cancer and a 1 in 75 (1.3%) risk of ovarian cancer during their lifetime.[1] Individuals assigned male at birth have a 1 in 8 (13%) chance of being diagnosed with prostate cancer in their lifetime.[1] Approximately 5-10% of breast cancers, up to 25% of ovarian cancers and up to 10% of prostate cancers are associated with a pathogenic variant in a single cancer predisposition gene.[2,3,4] Features suggestive of a hereditary cancer predisposition include:

- younger age at diagnosis
- multiple primary cancers in a single individual
- several relatives affected with related cancers spanning multiple generations

Individuals who carry a pathogenic variant in a hereditary cancer gene have an increased risk of certain cancers compared to the general population. Cancer risks depend on the gene(s) in which the variant(s) is identified. These individuals are eligible for increased cancer screening and/or risk reducing surgeries and therapeutic interventions. In addition, results may influence treatment plans for individuals with cancer.

If a pathogenic variant is identified in one of these genes, the patient and/or their family members may be at increased risk for specific cancers or other conditions. Genetic counselling is recommended for these families.

Indications for Testing

Patients with a personal and/or family history suggestive of a predisposition to breast and/or ovarian and/or prostate cancer may be eligible for testing.

Ordering Privileges

Please refer to the APL Test Directory (http://ahsweb.ca/lab/apl-td-lab-test-directory) for ordering restrictions.

The genes included on the Breast/Ovarian/Prostate Cancer Panel are:

ATM	*BARD1*	*BRCA1*	*BRCA2*	*BRIP1*	*CDH1*
CHEK2	*EPCAM*	*MLH1*	*MSH2*	*MSH6*	*PALB2*
PMS2	*PTEN*	*RAD51C*	*RAD51D*	*STK11*	*TP53*

Associated Disorders[4]

Hereditary cancer predispositions are typically inherited in an autosomal dominant fashion. Some of the genes on these panels are associated with other rare disorders including:

Ataxia telangiectasia is an autosomal recessive disorder caused by pathogenic variants in the *ATM* gene. It is characterized by progressive cerebellar ataxia, telangiectasias, immunodeficiency and an increased risk for malignancy.

Constitutional mismatch repair deficiency syndrome is a rare autosomal recessive condition that occurs in individuals who have two pathogenic variants in one of the following genes: *EPCAM, MLH1, MSH2, MSH6* or *PMS2*. Affected individuals often have onset of colon/intestinal cancer before the age of 20 years and may have a cutaneous phenotype similar to that seen in neurofibromatosis type I.

Fanconi anemia (FA) can be inherited in an autosomal recessive, autosomal dominant or X-linked fashion. It is characterized by variable physical anomalies including short stature and skeletal limb malformations, bone marrow failure and an increased risk for malignancy. FA-associated genes on these panels include: *BRCA2, BRIP1, PALB2, RAD51C*.

Lynch syndrome is an autosomal dominant hereditary cancer syndrome caused by pathogenic variants in *EPCAM*, *MLH1*, *MSH2*, *MSH6* or *PMS2*. It is characterized by an increased risk for multiple

cancers including colon, ovarian, and uterine. Approximately 2-4% of colon cancers and 2.5% of uterine cancers are due to Lynch syndrome."

***PTEN* hamartoma tumor syndrome (PHTS)** is characterized by hamartomatous tumors and a germline *PTEN* pathogenic variant. PHTS includes Cowden syndrome, Bannayan-Riley-Ruvalcaba syndrome, *PTEN*-related Proteus syndrome and Proteus-like syndrome.

When can I expect results?
Results may take up to 4 months.

How are results reported?
Results are sent to the ordering provider and available in Netcare and Connect Care.

Contact Information
Genetic Counsellors, Genetics & Genomics
Edmonton: 780-407-1015
Calgary: 403-955-3097

Resources
Genetic testing for hereditary cancer - https://myhealth.alberta.ca/genetics/genetic-testing/genetic-testing-for-hereditary-cancer

Screening for life - https://screeningforlife.ca/

**Requisition forms, contact information and other resources can be found at:
http://ahsweb.ca/lab/if-lab-genetics-and-genomics**

References

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2. American Cancer Society. Breast Cancer Risk Factors You Cannot Change. https://www.cancer.org/cancer/breast-cancer/risk-and-prevention/breast-cancer-risk-factors-you-cannot-change.html#:~:text=About%205%25%20to%2010%25%20of,the%20BRCA1%20or%20BRCA2%20gene. (accessed [2022 July])
3. American Cancer Society. Ovarian Cancer Risk Factors. https://www.cancer.org/cancer/ovarian-cancer/causes-risks-prevention/risk-factors.html (accessed [2022 July])
4. American Cancer Society. What causes prostate cancer? https://www.cancer.org/cancer/types/prostate-cancer/causes-risks-prevention/what-causes.html (accessed [2024 March])
5. Adam MP, Mirzaa GM, Pagon RA, et al., editors. GeneReviews® [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2022. Available from: https://www.ncbi.nlm.nih.gov/books/NBK1116/ (accessed [2022 July])