# Comprehensive Common Cancer Panel

BioReference LABORATORIES | genpath | GeneDx
OPKO Health Companies

## Hereditary Cancer Syndromes

Genetic testing with the Comprehensive Common Cancer Panel may be appropriate if your personal and/or family history is suggestive of a hereditary predisposition to cancer. **This includes:**

- Cancer at a young age, such as breast, colon, or renal cancer
- Multiple cancers in one person, either of the same origin (such as two separate colon cancers) or of different origins (such as breast cancer and ovarian cancer)
- Diagnosis of ovarian, pancreatic, male breast or metastatic prostate cancer
- Multiple relatives diagnosed with the same or related cancers on the same side of the family and spanning multiple generations

Your healthcare provider will determine if genetic testing is medically necessary for you.

## Genes Included on the Colorectal Cancer Panel are Listed in the Table Below

**High-Risk Genes** — Well-studied • Greater than 4-fold risk of developing one or more cancers • Can cause a moderate risk for other cancers • National or expert opinion guidelines for screening and prevention are established

**Moderate-Risk Genes** — Well-studied • Approximately 2- to 4-fold risk of developing one or more cancers • May increase risk for other cancers • Limited guidelines for screening and prevention

**Newer Genes** — Not as well-studied • Precise lifetime risks and tumor spectrum not yet determined • Guidelines for screening and prevention are limited or not available

| | Gene | Lifetime Cancer and/or Tumor Risks* |
|---|---|---|
| High-Risk Genes | *APC* | Colorectal (up to 93%), Duodenal or periampullary (4-12%), Gastric, Thyroid (up to 3%), Pancreatic, Brain-medulloblastoma, Liver-hepatoblastoma, Desmoid tumors, Gastrointestinal polyps |
| | *BMPR1A* | Colorectal (up to 68%), Gastric (up to 21% if gastric polyps), Small bowel, Pancreatic, Gastrointestinal polyps |
| | *BRCA1* | Female breast (55-87%), Ovarian (39-59%), Prostate, Male breast, Pancreatic, Fallopian tube, Primary peritoneal, Endometrial-serous |
| | *BRCA2* | Female breast (33-84%), Prostate (up to 34%), Ovarian (11-27%), Pancreatic (up to 7%), Male breast (up to 7%), Melanoma, Fallopian tube, Primary peritoneal, Endometrial-serous |
| | *CDH1* | Gastric-diffuse, Female breast-lobular (39-55%), Colorectal |
| | *CDKN2A* | Melanoma (28-67%), Pancreatic (17%), Brain-astrocytoma |
| | *EPCAM*** | Colorectal (69-75%), Endometrial (12-55%), Ovarian, Gastric, Pancreatic, Biliary tract, Urinary tract-transitional cell, Small bowel, Brain, Sebaceous neoplasms, Prostate |
| | *FH* | Renal-type II papillary (10-19%), Paraganglioma/Pheochromocytoma, Leiomyomas-cutaneous and uterine |
| | *FLCN* | Renal cancer and tumors (6-41%) |
| | *MLH1* | Colorectal (34-46%), Endometrial (18-54%), Ovarian (10-20%), Gastric (6-20%), Urinary tract-transitional cell (1-4%), Pancreatic (1-4%), Biliary tract (2-3%), Small bowel (4-12%), Brain, Sebaceous neoplasms, Prostate |
| | *MSH2* | Colorectal (37-48%), Endometrial (21-57%), Ovarian (10-24%), Urinary tract-transitional cell (8-20%), Gastric (<1-9%), Pancreatic (1-4%), Biliary tract, Small bowel (1%), Brain, Sebaceous neoplasms, Prostate |
| | *MSH6*** | Colorectal (20-44%), Endometrial (16-71%), Ovarian (1-13%), Gastric, Pancreatic, Biliary tract, Urinary tract-transitional cell, Small bowel, Brain, Sebaceous neoplasms, Prostate |
| | *MUTYH* | Colorectal (up to 80%), Duodenal (up to 4%), Gastrointestinal polyps |
| | *NF1* | Neurofibromas, Optic nerve gliomas (15%), Pheochromocytomas (1-13%), Malignant peripheral nerve sheath tumors (6-16%), Brain tumors (2-3%), Female breast (up to 26%), Gastrointestinal stromal tumor (GIST) |
| | *PALB2* | Female breast (up to 58%), Male breast, Pancreatic, Ovarian, Prostate |
| | *PMS2*** | Colorectal (11-20%), Endometrial (12-26%), Ovarian, Gastric, Pancreatic, Biliary tract, Urinary tract-transitional cell, Small bowel, Brain, Sebaceous neoplasms, Prostate |
| | *PTEN* | Female breast (25-85%), Thyroid (3-38%), Endometrial (5-28%), Colorectal, Renal, Melanoma, Gastrointestinal polyps, Lhermitte-Duclos disease |
| | *SDHB* | Paraganglioma/Pheochromocytoma, Renal, Gastrointestinal stromal tumor (GIST) |
| | *SDHD* | Paraganglioma/Pheochromocytoma, Renal, Gastrointestinal stromal tumor (GIST) |
| | *SMAD4* | Colorectal (up to 68%), Gastric (up to 21% if gastric polyps), Small bowel, Pancreatic, Gastrointestinal polyps |
| | *STK11* | Female breast (up to 54%), Colorectal (39%), Pancreatic (11-36%), Gastric (29%), Ovarian tumors (21%), Lung (7-17%), Small bowel (13%), Cervical (10%), Testicular tumors (9%), Endometrial (9%), Gastrointestinal polyps |
| | *TP53* | Female breast (85%), Soft tissue sarcoma, Osteosarcoma, Brain, Hematologic malignancies-Acute leukemias among others, Adrenocortical carcinoma, among others.<br>Overall risk for cancer: up to 95% in females, 88% in males |
| | *TSC1* | Renal cancer (5%) and tumors, Benign central nervous system tumors-subependymal nodules and subependymal giant cell astrocytomas, Hamartomatous tumors-cardiac rhabdomyomas and angiomyolipomas |
| | *TSC2* | Renal cancer (5%) and tumors, Benign central nervous system tumors-subependymal nodules and subependymal giant cell astrocytomas, Hamartomatous tumors-cardiac rhabdomyomas and angiomyolipomas |
| | *VHL* | Renal-clear cell (up to 69%), Hemangioblastomas-retinal and central nervous system (50-80%), Pheochromocytomas (11-19%), Pancreatic neuroendocrine tumors (8-17%), Endolymphatic sac tumors (up to 10%) |
| Moderate-Risk Genes | *ATM* | Female breast (27-33%), Colorectal, Ovarian, Pancreatic, Prostate |
| | *BRIP1* | Ovarian, Prostate, Female Breast |
| | *CHEK2* | Female breast, Male breast, Colorectal, Gastric, Prostate, Renal, Thyroid |
| | *RAD51C* | Ovarian, Female breast, Prostate |
| | *RAD51D* | Ovarian, Female breast, Prostate |

| | Gene | Lifetime Cancer and/or Tumor Risks* |
|---|---|---|
| Newer Genes | *AXIN2* | Colorectal, Colon polyps |
| | *BAP1* | Renal, Melanoma-cutaneous and uveal, Mesothelioma, Basal cell carcinoma |
| | *BARD1* | Female breast |
| | *CDK4* | Melanoma |
| | *FANCC* | Female breast |
| | *FANCM* | Female breast |
| | *HOXB13* | Prostate |
| | *MET* | Renal-type I papillary |
| | *MITF* | Renal, Melanoma |
| | *NBN* | Female breast, Non-Hodgkin lymphoma, Prostate |
| | *NTHL1* | Colorectal, Colon polyps |
| | *POLD1* | Colorectal, Endometrial, Colon polyps |
| | *POLE* | Colorectal, Colon polyps |
| | *POT1* | Melanoma, Brain-glioma |
| | *RECQL* | Female breast |
| | *SCG5/ GREM1* | Colorectal, Colon polyps |
| | *SDHC* | Paraganglioma/Pheochromocytoma, Renal, Gastrointestinal stromal tumor (GIST) |

*Most commonly associated cancer/tumors listed; lifetime risks provided when available. Risks relate to carriers of a single pathogenic variant with the exception of the *MUTYH* and *NTHL1* genes.
**Tumor spectrum is representative of Lynch syndrome; data are limited with regard to the association of certain cancers with pathogenic variants in *MSH6, PMS2* and *EPCAM*.

## Possible Outcomes of Genetic Testing

### Positive

- Pathogenic or likely pathogenic variant identified
- Medical management recommendations may be available
- Family member testing may be recommended

### Negative

- No significant genetic changes identified
- Medical management based on personal and/ or family history

### Variant of Unknown Significance (VUS)

- A genetic change identified, but its association with disease is unclear
- Medical management based on personal and/or family history

## Medical Management Based on Genetic Test Results

Clinical guidelines may be available which provide options and recommendations for patients who have a **positive** (pathogenic or likely pathogenic variant) test result indicating an increased risk for cancer and/or tumors. Guidelines and recommendations for early detection and/or risk reduction are specific to the gene in which the pathogenic variant was found.

## Recommendations may include:

- Clinical exams, such as breast, skin or eye exams
- Blood or urine analysis
- Imaging exams, such as a mammogram, MRI, CT and/or ultrasound
- Screening procedures, such as a colonoscopy or endoscopy
- Risk-reducing medications or surgery

In some cases, guidelines for screening and prevention are limited or not available for a positive result. Once your test results are available, a discussion with your healthcare provider is recommended to determine the most appropriate medical management options for you and your family.

### Resources

**General**
American Cancer Society
www.cancer.org

GeneDx
www.genedx.com/oncology

National Cancer Institute
www.cancer.gov

**Find a Genetic Counselor**
Canadian Association of Genetic Counsellors
www.cagc-accg.ca

National Society of Genetic Counselors
www.nsgc.org