Breast Cancer Panel: This panel screens for variants in 19 genes associated with breast, ovarian, and other related types of cancer. These mutations can occur in both women and men across all ethnic groups, though some groups are more likely to be affected. Breast cancer is the second leading cause of death in women, and 1 in 8 women are affected by breast cancer in their lifetime.

Breast and Gynecological Cancer Panel: This panel screens 33 genes associated with breast cancer AND cancers affecting the gynecological tract (ovaries, endometrium, uterus, and cervix) for women of all ages and ethnicities. About 20-25% of women diagnosed with ovarian cancer have an inherited risk of developing cancer, and 1 in 71 women develop ovarian cancer in their lifetime.

Common Hereditary Cancer Panel: This panel screens 41 genes associated with a high risk of developing many different types of familial cancers. Along with HBOC and Lynch Syndrome, this test includes genes associated with other syndromes which are also associated with a higher risk of cancer, such as Cowden Syndrome, Li-Frauneni Syndrome, Peutz-Jeghers Syndrome, Familial Adenomatous Polyposis (FAP), and ataxia-telangiectasia.

Colorectal and Gastric Cancer Panel: This panel screens 43 genes associated with an increased risk of developing gastrointestinal, colorectal, and pancreatic cancers. In the United States, colorectal cancer is the fourth most common cancer diagnosed each year in adults [4]. Mutations in genes screened by this panel are known to be associated with Li-Fraumeni Syndrome, Peutz-Jeghers Syndrome, Cowden Syndrome, FAP, MUTYH-Associated Polyposis (MAP), and Lynch Syndrome [1,2]. Individuals affected with these cancer syndromes have an increased risk of developing certain gastrointestinal cancers such as pancreatic, gastric, small intestine, bile duct cancers, and others [1,2,3].

Renal/Urinary Tract Cancer Panel (Includes Prostate and Kidney Cancer): This panel screens 39 genes associated with cancers of the kidney, urinary bladder, prostate, and other cancers of the urinary tract. Kidney cancer is twice as common in men compared to women and the average age of kidney cancer diagnosis is 64 years [5]. About 90% of people with bladder cancer are over the age of 55, and the average age of diagnosis is 73. Other than skin cancer, prostate cancer is the most common cancer in American men-- 1 in 8 men will be diagnosed with prostate cancer during their lifetime. About 60% of cases are diagnosed in men older than 65, and the average age at diagnosis is sixty-six [6].

Nervous System and Endocrine Cancer Panel: This panel screens 44 genes associated with adrenal, brain and spinal cord, neuroendocrine, neuroblastoma, pituitary, thyroid, and other cancers of the nervous/endocrine systems. The rate of new cases of brain and other nervous system cancer is 6.3 per 100,000 men and women per year, and the death rate is 4.4 per 100,000 individuals per year. Overall, it is estimated that more than 12,000 people in the United States are diagnosed with a neuroendocrine tumor (NET) each year. NETs develop most commonly in the GI tract, specifically in the large intestine (20%), small intestine (19%), and appendix (4%) [7]. The lung is the second most common location of NETs, and about 30% of NETs occur in the bronchial system. Some NETs may develop in the pancreas, adrenal glands, thyroid gland, and pituitary gland [7].

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GENESYS Diagnostics INC.

CAP ACCREDITED COLLEGE of AMERICAN PATHOLOGISTS

Clinical Laboratory Improvement Amendments

HEREDITARY CANCER
NEXT GENERATION SEQUENCING

KNOWLEDGE IS **POWER**

Genesys Diagnostics hereditary cancer panels screen 99 genes known to be involved in cancer development. These panels aim to detect cancer-causing mutations in the genes tested, and can determine whether an individual or their family members are at high risk of developing hereditary cancers.

Early detection is the key towards preventative and/or proper treatment. Based on results, your healthcare provider may order further diagnostic testing, such as colonoscopies or mammograms, to provide you with the most information about your health.

Genetic testing can help you and your family make the best-informed health decisions.

HOW GENETIC TESTING CAN HELP

Cancer Syndromes are genetic disorders caused by inherited mutations that result in a predisposition to cancer development. Typically, these cancers will cluster at higher than normal rates in families and result in a cancer diagnosis at an earlier age. Cancer syndromes include hereditary breast and ovarian cancer syndrome (HBOC), Lynch syndrome (formerly known as hereditary non-polyposis colorectal cancer), and several others.

(860) 574-9172 www.gdilabs.com info@gdilabs.com 8 Enterprise Ln. Oakdale, CT 06370

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GENESYS HEREDITARY CANCER SCREENING PANELS

Breast Cancer Panel	ATM, BARD1, BRCA1, BRCA2, BRIP1, CDH1, CHEK2, FANCC, FANCM, MUTYH, NF1, PALB2, PTEN, RAD51C, RAD51D, SDHB, SDHD, STK11, TP53
Breast & Gynecological Cancer Panel	ATM, BARD1, BLM, BRCA1, BRCA2, BRIP1, CDC73, CDH1, CHEK2, DICER1, EPCAM, EZH2, FANCC, FANCM, FH, MLH1, MSH2, MSH6, MUTYH, NBN, NF1, PALB2, PMS2, POLD1, PRKAR1A, PTEN, RAD50, RAD51C, RAD51D, SDHB, SDHD, STK11, TP53
Colorectal & Gastric Cancer Panel	APC, ATM, BLM, BMPR1A, BUB1B, BRCA1, BRCA2, CDC73, CDH1, CDK4, CDKN1B, CDKN1C, CDKN2A, CEP57, CHEK2, EPCAM, FANCC, FLCN, GNAS, GPC, KIT, MEN1, MLH1, MSH2, MSH6, MUTYH, NBN, NF1, NSD1, PALB2, PMS2, POLD1, POLE, PTEN, RHBDF2, SDHA, SDHB, SDHC, SDHD, SMAD4, STK11, TP53, VHL
Renal/ Urinary Tract Cancer Panel	ATM, BAP1, BRCA1, BRCA2, BRIP1, BUB1B, CDC73, CDKN1C, CEP57, CHEK2, DICER1, DIS3L2, EPCAM, FANCA, FH, FLCN, GPC3, HRAS, MET, MLH1, MSH2, MSH6, NBN, NSD1, PALB2, PMS2, PTEN, RAD51D, SDHA, SDHB, SDHC, SDHD, SMARCB1, TMEM127, TP53, TSC1, TSC2, VHL, WT1
Common Hereditary Cancer Panel	APC, ATM, BAP1, BARD1, BMPR1A, BRCA1, BRCA2, BRIP1, CDH1, CDK4, CDKN2A, CHEK2, DICER1, EPCAM, KIT, MEN1, MLH1, MSH2, MSH6, MUTYH, NBN, NF1, PALB2, PMS2, POLD1, POLE, PTEN, RAD50, RAD51C, RAD51D, RET, SDHA, SDHB, SDHC, SDHD, SMAD4, STK11, TP53, TSC1, TSC2, VHL
Nervous System & Endocrine Cancer Panel	AIP, ALK, APC, BAP1, CDC73, CDKN1B, CDKN1C, CHEK2, DICER1, EPCAM, EZH2, FH, GNAS, GPC3, HRAS, MAX, MEN1, MLH1, MSH2, MSH6, NBN, NF1, NF2, NSD1, PHOX2B, PMS2, PRKAR1A, PTCH1, PTEN, RB1, RET, SDHA, SDHAF2, SDHB, SDHC, SDHD, SMARCB1, SUFU, TMEM127, TP53, TSC1, TSC2, VHL, WRN
Full Hereditary Cancer Panel	All genes mentioned are targeted.

WHO SHOULD BE TESTED?

Test results may affect you and your family. As such, screening/cancer treatment guidelines are in place to determine who should be tested. Only *high-risk* patients should be tested. *High-risk* patients can be established using the below criteria:

INDICATORS FOR HEREDITARY CANCER

An individual with personal *or* family history of **any one of the following**:

MULTIPLE
A combination of cancer on the same side of the family:

2 or more:
- Breast, ovarian, prostate, pancreatic cancer.
- Colorectal, endometrial, ovarian, gastric, pancreatic, other cancers (i.e. ureter, renal pelvis, biliary tract, small bowel, brain, sebaceous adenomas).
- Melanoma, pancreatic cancer.

YOUNG
Any 1 of the following cancers at age 50 or younger:

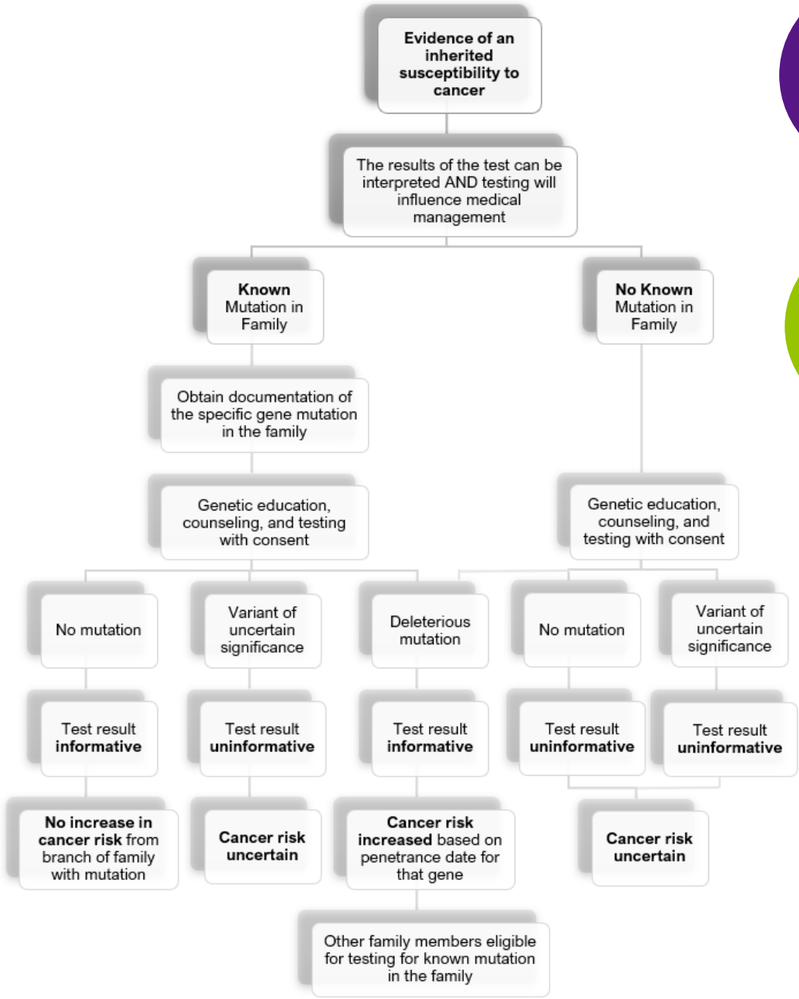
- Breast cancer
- Colorectal cancer
- Endometrial cancer

RARE
Any 1 of these rare presentations, at any age:

- Ovarian cancer
- Breast: male breast cancer or triple negative breast cancer
- 10 or more gastrointestinal polyps*
- Endometrial cancer with abnormal MSI/IHC
- Colorectal cancer with abnormal MSI/IHC, MSI assoc. with histology**

* Adenomatous type.
** Presence of tumor infiltrating lymphocytes. Crohn's-like lymphocytic reaction, mucinous/signet-ring differentiation, or medullary growth pattern.
Family members include first, second and third degree relatives on mother and father's side. www.facingourrisk.org.

GENETIC TESTING ALGORITHM FOR CANCER SUSCEPTIBILITY



KNOWING YOUR RISK MEANS EARLY DETECTION AND PREVENTION

DIFFERENT CANCERS

Cancer Syndromes are genetic disorders caused by inherited mutations that result in a predisposition to cancer development. Typically, these cancers will cluster at higher than normal rates in families and result in a cancer diagnosis at an earlier age. Cancer syndromes include hereditary breast and ovarian cancer syndrome (HBOC), Lynch syndrome (formerly known as hereditary non-polyposis colorectal cancer), and several others.