Frequently Asked Questions About Genetic Testing

Q: Will genetic testing be covered by my insurance?
A: When patients meet specific indications, testing may be covered by insurance. Your costs will also depend on your deductible and co-insurance. The Human Genetics Laboratory works with insurance companies to obtain prior authorization. An estimate of your out-of-pocket costs will be provided before you decide whether or not to have testing.

Q: Will genetic testing results affect my health insurance coverage?
A: Federal law protects your genetic information. The Genetic Information Nondiscrimination Act (GINA) of 2008 (Public Law 110-233) prohibits health insurance companies and employers from discriminating based on genetic test results, in most cases. However, at this time, laws do not protect against discrimination for long term care, disability, or life insurance.

Q: If I have already had cancer, do I need genetic testing?
A: It is most informative to first provide genetic testing to the family member with a personal history of cancer. Results from genetic testing can help explain why the cancer occurred, and, more importantly, can give information about future cancer risks. These results may change your care and can help family members understand their chance of getting cancer.

Q: What if I previously had genetic testing for hereditary cancer and no mutation was identified?
A: The Endocrine|Paraganglioma-Pheochromocytoma17 Panel may include genes that were not previously tested and if a mutation is present in one of these genes it could provide risk and screening information for you and your family.

Patient Resources

American Society of Clinical Oncology (ASCO)
• www.cancer.net

Hereditary paraganglioma-pheochromocytoma syndrome (SDHA, SDHB, SDHC, SDHD)
• www.pheo-para-alliance.org
• www.pheoparatroopers.org/conditions/eighty-five-per-year
• www.chop.edu/conditions/diseases/hereditary-paraganglioma-pheochromocytoma-syndrome#
• https://ghr.nlm.nih.gov/condition/hereditary-paraganglioma-pheochromocytoma

Hyperparathyroidism jaw tumor syndrome (CDC73)
• www.niddk.nih.gov/health-information/health-topics/kidney-disease/kidney-cysts/Pages/facts.aspx

Li-Fraumeni syndrome (TP53)
• www.lfsassociation.org/

Multiple endocrine neoplasia type 1 (MEN1)
• www.amensupport.org

National Cancer Institute
• www.cancer.gov

Neurofibromatosis type 1 (NF1)
• http://www.ctf.org/

PTEN-hamartoma tumor syndrome (PTEN)
• https://rarediseases.org/rare-diseases/pten-hamartoma-tumor-syndrome/

Tuberous sclerosis complex (TSC1, TSC2)
• www.tsalliance.org/

von Hippel-Lindau syndrome (VHL)
• www.vhl.org/
What is Hereditary Cancer?
Cancer is common. Most cancers occur by chance, and it is not uncommon to have family members with cancer. These sporadic cancers are likely caused by a combination of genes and environment. However, a portion of all cancer is hereditary, meaning a person had a predisposition to develop the cancer. Hereditary cancers are caused by a change in a single gene, which is present in a person before they are born. Single gene changes that predispose a person to cancer are often passed from generation to generation in a family, but they may also be brand new in an individual. Not everyone who inherits a genetic predisposition to cancer will develop cancer in their lifetime, but they are at an increased risk and there are often recommendations for high-risk screening and management. A personal and family history may be suggestive of hereditary cancer, depending on certain types of cancer present, certain clustering of cancers, early age of onset, and other unique features.

Is This Panel Appropriate for Me?
This test may be right for you if you have a personal or family history of:
- Pheochromocytoma
- Paraganglioma
- Well-differentiated neuroendocrine tumor in the gastrointestinal system
- Carcinoid tumor
- Medullary thyroid cancer
- Neuroendocrine or endocrine tumor and other tumors or other findings suggestive of a hereditary syndrome

What is the Endocrine|Paraganglioma-Pheochromocytoma17 Panel?
At least 25% of pheochromocytomas and paragangliomas are caused by an inherited genetic predisposition.1 Individuals with a history of paraganglioma or pheochromocytoma may be at an increased risk for additional tumors. *Endocrine|Paraganglioma-Pheochromocytoma17* is a genetic test that looks for changes in 17 genes associated with certain types of cancer or tumors of the thyroid or parathyroid, pituitary gland, neuroendocrine tumors, including carcinoid tumors, and pheochromocytomas, a tumor of the adrenal gland.2-15 Most of these gene changes are associated with risks for adults, but some mutations may cause risks for children. Your health care provider can discuss the features related to each gene.

<table>
<thead>
<tr>
<th>GENE</th>
<th>SYNDROME</th>
<th>ASSOCIATED CANCERS AND FINDINGS</th>
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<tbody>
<tr>
<td>CDC73</td>
<td>Hyperparathyroidism jaw tumor syndrome</td>
<td>parathyroid carcinoma, renal cysts, hamartomas</td>
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<tr>
<td>MEN1</td>
<td>Multiple endocrine neoplasia type 1</td>
<td>parathyroid and pituitary tumors, endocrine/</td>
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<td></td>
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<td>neuroendocrine tumors, skin findings</td>
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<tr>
<td>NF1</td>
<td>Neurofibromatosis type I</td>
<td>pheochromocytomas, breast cancer, and other features</td>
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<td>PRKAR1A</td>
<td>Carney complex</td>
<td>endocrine tumors, schwannomas</td>
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<td>PTEN</td>
<td>Cowden syndrome (PTEN-hamartoma tumor</td>
<td>breast, thyroid, endometrial, kidney, and others</td>
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<td>syndrome)</td>
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<td>RET</td>
<td>Multiple endocrine neoplasia type 2 (MEN2A</td>
<td>medullary thyroid carcinoma, C-cell hyperplasia,</td>
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<td></td>
<td>MEN2B), familial medullary thyroid cancer</td>
<td>pheochromocytoma, parathyroid tumors</td>
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<td>(FMTC)</td>
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<td>SDHA</td>
<td>Hereditary paraganglioma-pheochromocytoma</td>
<td>paraganglioma, pheochromocytoma, renal cell carcinoma, GIST</td>
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<td>TMEM127</td>
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<td>pheochromocytoma</td>
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<td>MAX</td>
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<td>TP53</td>
<td>Li-Fraumeni syndrome</td>
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<td>TSC2</td>
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<td>VHL</td>
<td>von Hippel-Lindau syndrome</td>
<td>hemangioblastomas of (multiple organs), pheochromocytoma, central nervous system tumors</td>
</tr>
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Potential Test Results

Positive for a Pathogenic Variant
A pathogenic (disease-causing) change in a gene was identified and this change is known to increase the risk for certain cancers. Another name for this type of change is a “mutation”. Targeted genetic testing for this pathogenic change is available for at-risk family members.

Negative
No harmful or uncertain changes were found in any of the genes tested.

A Variant of Uncertain Clinical Significance (UCS)
An inconclusive change in a gene was identified. This means that the change may increase the risk for cancer or be harmless. Variants of uncertain significance may also be classified as “Likely Pathogenic” or “Likely Benign”.

References available on the Human Genetics Laboratory website: www.unmc.edu/mmi/geneticslab/resources/reference-articles.html

Test Details
This test is performed on a blood sample sent to the Human Genetics Laboratory at the University of Nebraska Medical Center.

Talking to a health care provider before and after your test will help you understand which test is best for you and what the results of the test mean. It usually takes less than 14 days to get results from the test.

Your health care provider can discuss cancer risks and cancer screening and prevention strategies based on your personal and family history and your genetic testing results.

Your health care provider can discuss whether further genetic testing is reasonable for you and/or your family members.