Genetic Testing in Pancreatic Cancer

You won't always know what caused your pancreatic cancer. It can be caused by gene changes that are inherited (passed from a family member) or by environmental exposures. While most cases of pancreatic cancer are not inherited (also called sporadic), about 10 out of 100 cases are hereditary (passed down from generation to generation) or familial (seen in families with many cases of pancreatic cancer).

If you or a close family member have been diagnosed with "exocrine" pancreatic cancer, you may be offered genetic testing. Exocrine pancreatic cancer may also be called adenocarcinoma or just "pancreatic cancer." This is different than a neuroendocrine tumor (NET) in the pancreas.

How do genetic changes happen?

Genetic changes can happen in two ways:

- A mutated (changed) gene can be passed down, or inherited, from parent to child (called a *germline mutation).* Germline mutations are in every cell in your body. Certain mutations can raise a person's risk of pancreatic cancer. About 10 out of 100 cases of pancreatic cancer are linked to a germline mutation.
- Genes can also be changed or damaged during a person's life, often due to environmental exposures such as smoking, or health issues such as diabetes. Sometimes these mutated genes are only in the cancer cells and can control tumor growth.

When you have genetic testing, the test is looking for a germline mutation. In some cancers, the tumor is tested for specific mutated genes because there are medications that can target those mutations. This article will focus on genetic testing for germline mutations.

Who should have genetic testing related to pancreatic cancer?

The National Comprehensive Cancer Network states that any person diagnosed with exocrine pancreatic cancer should have genetic counseling and testing. If a genetic mutation is found, relatives may also be tested for the mutation. If the person with pancreatic cancer cannot be tested, first-degree relatives (parents, siblings, children) may still be tested. In some cases, people with second-degree relatives (grandparents, aunts/uncles, nieces/nephews) with pancreatic cancer may be eligible for testing.

For testing, you should see a genetic counselor. The genetic counselor will talk with you about your family's history, what tests you can have, how testing for genetic mutations is done, and what those results might mean for you and your family. They can also help you understand the test results once you get them.

What genes are linked to an increased risk of pancreatic cancer?

There are many gene mutations linked to a higher risk of pancreatic cancer. Some also lead to other types of cancers. Studies have found that even with no family history of pancreatic cancer, a person with pancreatic cancer may be found to have a genetic mutation. Below are the genes that are now being tested for and the cancers or cancer syndromes that may be linked to them.

Gene(s)	Associated Syndrome	Associated Cancer(s)

ATM	Familial breast cancer	Breast, pancreatic
BRCA1	Hereditary breast & ovarian cancer syndrome	Breast, ovarian, pancreatic
BRCA2	Hereditary breast & ovarian cancer syndrome	Breast, ovarian, prostate, pancreatic, melanoma
CDKN2A	Melanoma pancreatic cancer syndrome	Pancreatic, melanoma, and possibly lung, head & neck cancers.
Mismatch repair (MLH1, MSH2, MSH6, PMS2, EPCAM)	Lynch Syndrome (Hereditary nonpolyposis colorectal cancer, HNPCC)	Colon, rectum, endometrial, ovarian, stomach, pancreatic, small bowel, urinary or biliary tract, glioblastoma
PALB2	Familial breast cancer	Breast and pancreatic
TP53	Li-Fraumeni Syndrome	Multiple types of cancer
STK11	Peutz Jeghers Syndrome	Colon, rectum, small bowel, stomach, breast, gynecologic, pancreatic

How will genetic testing help me or my family?

If you and your care team decide to do genetics testing, the results could help find similar genetic mutations in family members. If a mutation is found, it does not mean you will develop cancer. If a genetic mutation is not found, it may mean that the certain gene has not been found yet by researchers.

If you have pancreatic cancer, genetics testing can sometimes help guide your treatment. If family members are tested and found to have genetic mutations, research studies are being done to screen these family members for pancreatic cancer. The studies aim to find any cancers in these people early when treatments are most successful. The age at which screening is started depends on the genetic mutation that was found and the age at which the relative was diagnosed with pancreatic cancer.

Researchers have learned a lot about the genetics of pancreatic cancer in the past 5-10 years and will keep learning more. If your family or personal history includes pancreatic cancer, meeting with a genetic counselor can help you better understand the choices you and your family have.