Pancreatic Neuroendocrine Tumors Causes, Risk Factors, and Prevention

Learn about the risk factors for pancreatic neuroendocrine tumors and what you might be able to do to help lower your risk.

Risk Factors

A risk factor is anything that affects your chance of getting a disease such as cancer. Learn more about the risk factors for pancreatic neuroendocrine tumors.

- Pancreatic Neuroendocrine Tumor Risk Factors
- What Causes Pancreatic Neuroendocrine Tumor?

Prevention

There is no way to prevent all pancreatic neuroendocrine tumors. But there are things you can do that might lower your risk. Learn more.

- Can Pancreatic Neuroendocrine Tumor Be Prevented?

Pancreatic Neuroendocrine Tumor Risk Factors

- Risk factors that can be changed
- Risk factors that can't be changed
- Factors with unclear effect on risk

A risk factor is anything that increases your chance of getting a disease such as cancer. Different cancers have different risk factors. Some risk factors, like smoking, can be changed. Others, like a person's age or family history, can't be changed.

But having a risk factor, or even many risk factors, does not mean that you will get the disease. And some people who get the disease may have few or no known risk factors.

Several factors can affect a person's chance of getting a neuroendocrine tumor (NET) of the pancreas.

Risk factors that can be changed

Smoking

Smoking[1] is a risk factor for pancreatic NETs. Most research shows that heavy smoking increases risk, but some s.86 Tm 0 0 0 rg /GS27i,.86okin

Inherited gene changes (mutations) can be passed from parent to child. Sometimes these changes result in syndromes that include increased risks of other cancers (or other health problems).

Pancreatic neuroendocrine tumors and cancers can also be caused by genetic syndromes, such as:

- **Neurofibromatosis, type 1**, which is caused by mutations in the *NF1* gene. This syndrome leads to an increased risk of many tumors, including somatostatinomas.
- **Multiple endocrine neoplasia, type I (MEN1)**, caused by mutations in the *MEN1* gene. This syndrome leads to an increased risk of tumors of the parathyroid gland, the pituitary gland, and the islet cells of the pancreas.
- **Von Hippel-Lindau (VHL) syndrome,** which is caused by mutations in the *VHL* gene. This syndrome leads to an increased risk of many tumors, including pancreatic NETs.

Changes in the genes that cause some of these syndromes can be found by genetic testing. For more information on genetic testing, see Can Pancreatic Neuroendocrine Tumor Be Found Early?[3]

Diabetes

Pancreatic NETs are more common in people with diabetes. The reason for this is not known. Most of the risk is found in people with type 2 diabetes. This type of diabetes most often starts in adulthood and is often related to being overweight or obese. It's not clear if people with type 1 (juvenile) diabetes have a higher risk.

Chronic pancreatitis

Chronic pancreatitis, a long-term inflammation of the pancreas, is linked with an increased risk of pancreatic NETs. If chronic pancreatitis is because of heavy alcohol use, then stopping alcohol may help decrease the risk of pancreatic NETs.

Factors with unclear effect on risk

Being overweight or obese

Being overweight[4] or obese could be a risk factor for pancreatic NET. Studies so far are inconclusive.

Coffee

Some older studies have suggested that drinking coffee might increase the risk of pancreatic NET, but more recent studies have not confirmed this.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/tobacco.html
2. www.cancer.org/cancer/risk-prevention/diet-physical-activity/alcohol-use-and-cancer.html
   www.cancer.org/cancer/types/pancreatic-neuroendocrine-tumor/detection-

Valente R, Hayes AJ, Haugvik SP, et al. Risk and protective factors for the occurrence of sporadic pancreatic endocrine neoplasms. *Endocr Relat Cancer*. 2017 Aug;24(8):405-414. doi: 10.1530/ERC-17-0040. Epub 2017 May 31.

Vinik A, Perry RR, Hughes MS, et al. Multiple Endocrine Neoplasia Type 1. [Updated 2017 Oct 7]. In: De Groot LJ, Chrousos G, Dungan K, et al., editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK481897/. Accessed October 9, 2018.

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What Causes Pancreatic Neuroendocrine Tumor?

- Inherited gene mutations
- Acquired gene mutations

Scientists don't know exactly what causes most pancreatic neuroendocrine tumors (NETs), but they have found several risk factors that can make a person more likely to get this disease. Some of these risk factors affect the DNA of cells in the neuroendocrine system in the pancreas, which can result in abnormal cell growth and may cause cancers to form.

DNA is the chemical in our cells that carries our genes, which control how our cells function. We look like our parents because they are the source of our DNA. But DNA affects more than just how we look.

Some genes[1] control when our cells grow, divide into new cells, and die:

- Genes that help cells grow, divide, and stay alive are called *oncogenes*.
- Genes that help keep cell division under control, repair mistakes in DNA, or cause cells to die at the right time are called *tumor suppressor genes*.

Cancers can be caused by DNA changes (mutations) that turn on oncogenes or turn off

tumor suppressor genes.

Inherited gene mutations

Although 90% of PNETs are sporadic (random), some people inherit gene changes[2] from their parents that raise their risk of pancreatic NET. Sometimes these gene changes are part of syndromes that include increased risks of other health problems as well.

Syndromes related to changes in three tumor suppressor genes are responsible for many inherited cases of pancreatic NETs:

- **Multiple Endocrine Neoplasia Type 1 (MEN1) syndrome:** Most inherited cases of PNETs are due to changes in the MEN1 gene. This syndrome can cause cancer in the pancreas, parathyroid glands, and pituitary glands[3]. These tumors usually happen at younger ages and tend to be non-functioning. Screening people with the MEN1 gene or their family members can sometimes help find pancreatic NET before symptoms appear.
- **Von Hippel-Lindau (VHL) syndrome:** Changes in the *VHL* gene cause a small number of pancreatic NETs, usually developing at earlier ages (sometimes as early as the 20s). These tumors tend to be non-functioning and slow growing.
- **Neurofibromatosis type 1 (NF1) syndrome:** A small number of pancreatic NETs (usually somatostatinomas) are caused by changes in the *NF1* gene. Other cancers are also associated with this syndrome, including brain tumors or benign tumors that form in nerves under the skin (neurofibromas),

The treatment for a pancreatic NET that's caused by a genetic syndrome might be slightly different compared to treatment for a pancreatic NET in someone without a gene mutation.

Acquired gene mutations

Most gene mutations related to neuroendocrine tumors of the pancreas are caused by random changes. These random mutations are called *acquired* if they occur after a person is born, rather than having been inherited. These acquired gene mutations sometimes result from exposure to cancer-causing chemicals (like those found in tobacco smoke[4]). But often what causes these changes is not known.

Hyperlinks

Yao JC, Evans DB. Chapter 85: Pancreatic neuroendocrine tumors. In: DeVita VT, Lawrence TS, Rosenberg SA, eds. *DeVita, Hellman, and Rosenberg's Cancer: Principles and Practice of Oncology*. 10th ed. Philadelphia, Pa: Lippincott Williams & Wilkins; 2015.

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Can Pancreatic Neuroendocrine Tumor Be Prevented?

- Don't smoke
- Limit alcohol use