Pancreatic Cancer Early Detection, Diagnosis, and Staging

Detection and Diagnosis

Catching cancer early often allows for more treatment options. Some early cancers may have signs and symptoms that can be noticed, but that is not always the case.

- Can Pancreatic Cancer Be Found Early?
- Signs and Symptoms of Pancreatic Cancer
- Tests for Pancreatic Cancer

Stages and Outlook (Prognosis)

After a cancer diagnosis, staging provides important information about the extent of cancer in the body and anticipated response to treatment.

- Pancreatic Cancer Stages
- Pancreatic Neuroendocrine Tumor Stages
- Pancreatic Cancer Survival Rates, by Stage

Questions to Ask About Pancreatic Cancer

Here are some questions you can ask your cancer care team to help you better understand your cancer diagnosis and treatment options.

- What Should You Ask Your Health Care Team About Pancreatic Cancer?

Can Pancreatic Cancer Be Found Early?

Pancreatic cancer is hard to find early. The pancreas is deep inside the body, so early
tumors can't be seen or felt by health care providers during routine physical exams. People usually have no symptoms until the cancer has already spread to other organs.

Screening tests or exams are used to look for a disease in people who have no symptoms (and who have not had that disease before). At this time, no major professional groups recommend routine screening for pancreatic cancer in people who are at average risk. This is because no screening test has been shown to lower the risk of dying from this cancer.

Sometimes when a person has pancreatic cancer, the levels of certain proteins in the blood go up. These proteins, called tumor markers, can be detected with blood tests. The tumor markers CA 19-9 and carcinoembryonic antigen (CEA) are the ones most closely tied to pancreatic cancer. But these proteins don’t always go up when a person has pancreatic cancer, and even if they do, the cancer is often already advanced by the time this happens. Sometimes levels of these tumor markers can go up even when a person doesn’t have pancreatic cancer. For these reasons, blood tests aren’t used to screen for pancreatic cancer, although a doctor might still order these tests if a person has symptoms that might be from pancreatic cancer. These tests are more often used in people already diagnosed with pancreatic cancer to help tell if treatment is working or if the cancer is progressing.

**Genetic testing for people who might be at increased risk**

Some people might be at increased risk of pancreatic cancer because of a family history of the disease (or a family history of certain other cancers). Sometimes this increased risk is due to a specific genetic syndrome.

Some of the gene changes that increase pancreatic cancer risk can be tested for. Knowing if you are at increased risk can help you and your doctor decide if you should have tests to look for pancreatic cancer early, when it might be easier to treat. But determining whether you might be at increased risk is not simple. Talking to someone with experience in hereditary cancer syndromes such as a genetic counselor, geneticist, or an oncologist (doctor who treats people with cancer) is often helpful.

The American Cancer Society strongly recommends that anyone thinking about genetic testing talk with a genetic counselor, nurse, or doctor qualified to interpret and explain the test results before they proceed with testing. It’s important to understand what the tests can and can’t tell you, and what any results might mean, before deciding to be tested.
Genetic tests look for mutations in your genes that cause inherited conditions. The tests are used to look for these inherited conditions, not pancreatic cancer itself. Your risk may be increased if you have one of these conditions, but it doesn’t mean that you have (or definitely will get) pancreatic cancer.

**Testing for pancreatic cancer in people at high risk**

For people in families at high risk of pancreatic cancer, newer tests for detecting early pancreatic cancer may help. One of these is called *endoscopic ultrasound.* (See Tests for Pancreatic Cancer.) This test is not used to screen the general public, but it might be used for someone with a strong family history of pancreatic cancer or with a known genetic syndrome that increases their risk. Doctors have been able to find early, treatable pancreatic cancers in some members of high-risk families with this test.

Doctors are also studying other new tests to try to find pancreatic cancer early. Interested families at high risk may wish to take part in studies of these new screening tests.

- References

See all references for Pancreatic Cancer

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Signs and symptoms of exocrine pancreatic cancer

Early pancreatic cancers often do not cause any signs or symptoms. By the time they do cause symptoms, they have often already spread outside the pancreas.

Jaundice and related symptoms

Jaundice is yellowing of the eyes and skin. Most people with pancreatic cancer (and nearly all people with ampullary cancer) will have jaundice as one of their first symptoms.

Jaundice is caused by the buildup of bilirubin, a dark yellow-brown substance made in the liver. Normally, the liver excretes bilirubin as part of a liquid called bile. Bile goes through the common bile duct into the intestines, where it helps break down fats. It eventually leaves the body in the stool. When the common bile duct becomes blocked, bile can’t reach the intestines, and the level of bilirubin in the body builds up.

Cancers that start in the head of the pancreas are near the common bile duct. These cancers can press on the duct and cause jaundice while they are still fairly small, which can sometimes lead to these tumors being found at an early stage. But cancers that start in the body or tail of the pancreas don’t press on the duct until they have spread through the pancreas. By this time, the cancer has often spread beyond the pancreas as well.

When pancreatic cancer spreads, it often goes to the liver. This can also lead to jaundice.

Dark urine: Sometimes, the first sign of jaundice is darker urine. As bilirubin levels in the blood increase, the urine becomes brown in color.

Light-colored or greasy stools: Bilirubin normally helps give stools their brown color. If the bile duct is blocked, stools might be pale or gray. Also, if bile and pancreatic enzymes can’t get through to the intestines to help break down fats, the stools can become greasy and might float in the toilet.

Itchy skin: When bilirubin builds up in the skin, it can start to itch as well as turning yellow.

Pancreatic cancer is not the most common cause of jaundice. Other causes, such as gallstones, hepatitis, and other liver and bile duct diseases, are much more common.
Belly or back pain

Pain in the abdomen (belly) or back is common in pancreatic cancer. Cancers that start in the body or tail of the pancreas can grow fairly large and start to press on other nearby organs, causing pain. The cancer may also spread to the nerves surrounding the pancreas, which often causes back pain. Of course, pain in the abdomen or back is fairly common and is most often caused by something other than pancreatic cancer.

Weight loss and poor appetite

Unintended weight loss is very common in people with pancreatic cancer. These people often have little or no appetite.

Nausea and vomiting

If the cancer presses on the far end of the stomach it can partly block it, making it hard for food to get through. This can cause nausea, vomiting, and pain that tend to be worse after eating.

Gallbladder or liver enlargement

If the cancer blocks the bile duct, bile can build up in the gallbladder, making it larger. Sometimes a doctor can feel this (as a large lump under the right side of the ribcage) during a physical exam. It can also be seen on imaging tests.

Pancreatic cancer can also sometimes enlarge the liver, especially if the cancer has spread to the liver. The doctor might be able to feel this below the right ribcage as well on an exam, or it might be seen on imaging tests.

Blood clots

Sometimes, the first clue that someone has pancreatic cancer is a blood clot in a large vein, often in the leg. This is called a deep vein thrombosis or DVT. Symptoms can include pain, swelling, redness, and warmth in the affected leg. Sometimes a piece of the clot can break off and travel to the lungs, which might make it hard to breathe or cause chest pain. A blood clot in the lungs is called a pulmonary embolism or PE.

Still, having a blood clot does not usually mean that you have cancer. Most blood clots are caused by other things.
Fatty tissue abnormalities

Some people with pancreatic cancer develop an uneven texture of the fatty tissue underneath the skin. This is caused by the release of the pancreatic enzymes that digest fat.

Diabetes

Rarely, pancreatic cancers cause diabetes (high blood sugar) because they destroy the insulin-making cells. Symptoms can include feeling thirsty and hungry, and having to urinate often. More often, cancer can lead to small changes in blood sugar levels that don’t cause symptoms of diabetes but can still be detected with blood tests.

Signs and symptoms of pancreatic neuroendocrine tumors

Pancreatic neuroendocrine tumors (NETs) often release excess hormones into the bloodstream. Different types of tumors make different hormones, which can lead to different symptoms.

Gastrinomas

These tumors make gastrin, a hormone that tells the stomach to make more acid. Too much gastrin causes a condition known as Zollinger-Ellison syndrome, in which the stomach makes too much acid. This leads to stomach ulcers, which can cause pain, nausea, and loss of appetite. Severe ulcers can start bleeding. If the bleeding is mild, it can lead to anemia (too few red blood cells), which can cause symptoms like feeling tired and being short of breath. If the bleeding is more severe, it can make stool black and tarry. Severe bleeding can itself be life-threatening.

If the stomach acid reaches the small intestine, it can damage the cells of the intestinal lining and break down digestive enzymes before they have a chance to digest food. This can cause diarrhea and weight loss.

Glucagonomas

These tumors make glucagon, a hormone that increases glucose (sugar) levels in the blood. Most of the symptoms that can be caused by a glucagonoma are mild and are more often caused by something else.
Excess glucagon can raise blood sugar, sometimes leading to diabetes. This can cause symptoms such as feeling thirsty and hungry, and having to urinate often.

People with these tumors can also have problems with diarrhea, weight loss, and malnutrition. The nutrition problems can lead to symptoms like irritation of the tongue and the corners of the mouth.

The symptom that brings most people with glucagonomas to their doctor is a rash called *necrolytic migratory erythema*. This is a red rash with swelling and blisters that often travels from place to place on the skin.

**Insulinomas**

These tumors make insulin, which lowers blood glucose levels. Too much insulin leads to low blood sugar, which can cause symptoms like weakness, confusion, sweating, and rapid heartbeat. When blood sugar gets very low, it can lead to a person passing out or even going into a coma and having seizures.

**Somatostatinomas**

These tumors make somatostatin, which helps regulate other hormones. Symptoms of this type of tumor can include belly pain, nausea, poor appetite, weight loss, diarrhea, symptoms of diabetes (feeling thirsty and hungry, and having to urinate often), and jaundice (yellowing of the skin and eyes).

The early symptoms of a somatostatinoma tend to be mild and are more often caused by other things, so these tumors tend to be diagnosed at an advanced stage. Often, they are not found until they spread to the liver, when they cause problems like jaundice and pain.

**VIPomas**

These tumors make a substance called *vasoactive intestinal peptide* (VIP). Too much VIP can lead to problems with diarrhea. This may be mild at first, but gets worse over time. By the time they are diagnosed, most people have severe, watery diarrhea.

Other symptoms can include nausea, vomiting, muscle cramps, feeling weak or tired, and flushing (redness and warmth in the face or neck).

People with these tumors also tend to have low levels of acid in their stomachs, which
can lead to problems digesting food.

**PPomas**

These tumors make pancreatic polypeptide (PP), which helps regulate both the exocrine and endocrine pancreas. They can cause problems such as belly pain and an enlarged liver. Some people also get watery diarrhea.

**Carcinoid tumors**

These tumors often make serotonin or its precursor, 5-HTP. When a pancreatic tumor makes these substances, they first travel to the liver. The liver breaks these substances down before they can reach the rest of the body and cause problems. Because of this, carcinoid tumors often don’t cause symptoms until they spread outside the pancreas.

When these tumors do spread, it is most often to the liver. There, the cancer cells can release hormones directly into the blood leaving the liver. This can cause the *carcinoid syndrome*, with symptoms including flushing (redness and warmth in the face or neck), diarrhea, wheezing, and a rapid heart rate. These symptoms often occur in episodes, between which the person may feel fine.

Over a long time, the hormone-like substances released by these tumors can damage heart valves, causing shortness of breath, weakness, and a heart murmur (an abnormal heart sound).

**Non-functioning neuroendocrine tumors**

These tumors don’t make excess hormones, so they don’t cause symptoms in early stages and often grow quite large before they are found. Most of these are cancers and start to cause problems as they get larger or spread outside the pancreas. Symptoms can be like those from exocrine pancreas cancers, including jaundice (yellowing of the eyes and skin), belly pain, and weight loss.

**Symptoms caused by the cancer spreading**

When pancreatic NETs spread, most often they go to the liver. This can enlarge the liver, which can cause pain and loss of appetite. It can also affect liver function, sometimes leading to jaundice (yellowing of the skin and eyes) and abnormal blood tests.
These cancers can also spread to other organs and tissues. The symptoms depend on where the cancer is growing. For example, cancer spread to the lungs can cause shortness of breath or a cough. Spread to bones can cause pain in those bones.

- References
See all references for Pancreatic Cancer

Tests for Pancreatic Cancer

If a person has signs and symptoms that might be caused by pancreatic cancer, certain exams and tests will be done to find the cause. If cancer is found, more tests will be done to help determine the extent (stage) of the cancer.

Medical history and physical exam

Your doctor will ask about your medical history to learn more about your symptoms. The doctor might also ask about possible risk factors, including your family history.

Your doctor will also examine you to look for signs of pancreatic cancer or other health problems. The exam will probably focus mostly on your belly. Pancreatic cancers can sometimes cause the liver or gallbladder to swell, which the doctor might be able to feel during the exam. Your skin and the whites of your eyes will also be checked for jaundice (yellowing).

If the results of the exam are abnormal, your doctor will probably order tests to help find the problem. You might also be referred to a gastroenterologist (a doctor who treats digestive system diseases) for further tests and treatment.

Imaging tests

Imaging tests use x-rays, magnetic fields, sound waves, or radioactive substances to
create pictures of the inside of your body. Imaging tests might be done for a number of reasons both before and after a diagnosis of pancreatic cancer, including:

- To look for suspicious areas that might be cancer
- To learn if and how far cancer has spread
- To help determine if treatment is working
- To look for signs of cancer coming back after treatment

**Computed tomography (CT) scan**

The CT scan makes detailed cross-sectional images of your body. CT scans are often used to diagnose pancreatic cancer because they can show the pancreas fairly clearly. They can also help show if cancer has spread to organs near the pancreas, as well as to lymph nodes and distant organs. A CT scan can help determine if surgery might be a good treatment option.

If your doctor thinks you might have pancreatic cancer, you might get a special type of CT known as a **multiphase CT scan** or a **pancreatic protocol CT scan**. During this test, different sets of CT scans are taken over several minutes after you get an injection of an intravenous (IV) contrast.

**CT-guided needle biopsy**: CT scans can also be used to guide a biopsy needle into a suspected pancreatic tumor. But if a needle biopsy is needed, most doctors prefer to use endoscopic ultrasound (described below) to guide the needle into place.

**Magnetic resonance imaging (MRI)**

MRI scans use radio waves and strong magnets instead of x-rays to create detailed images of parts of your body. Most doctors prefer to look at the pancreas with CT scans, but an MRI might also be done.

Special types of MRI scans can also be used in people who might have pancreatic cancer:

- **MR cholangiopancreatography (MRCP)**, which can be used to look at the pancreatic and bile ducts, is described below in the section on cholangiopancreatography.
- **MR angiography (MRA)**, which looks at blood vessels, is mentioned below in the section on angiography.
Ultrasound

Ultrasound tests use sound waves to create images of organs such as the pancreas.

**Abdominal ultrasound:** For this test, a wand-shaped probe is moved over the skin of the abdomen. It gives off sound waves and detects the echoes as they bounce off organs. If it’s not clear what might be causing a person's abdominal symptoms, this might be the first test done because it is easy to do and it doesn’t expose a person to radiation. But if signs and symptoms are more likely to be caused by pancreatic cancer, a CT scan is often more useful.

**Endoscopic ultrasound (EUS):** This test is more accurate than abdominal ultrasound and can be very helpful in diagnosing pancreatic cancer. This test is done with a small ultrasound probe on the tip of an endoscope, which is a thin, flexible tube that doctors use to look inside the digestive tract.

For this test, you will first be sedated (given medicine to make you sleepy). The scope is then passed through your mouth or nose, down through the stomach, and into the first part of the small intestine. It is then pointed toward the pancreas, which is next to the small intestine. The probe on the tip of the endoscope can get very close to the pancreas, so this is a very good way to look at the pancreas. If a tumor is seen, a small, hollow needle can be passed down the endoscope to get biopsy samples of it.

Cholangiopancreatography

This is an imaging test that looks at the pancreatic ducts and bile ducts to see if they are blocked, narrowed, or dilated. These tests can help show if someone might have a pancreatic tumor that is blocking a duct. They can also be used to help plan surgery. The test can be done in different ways, each of which has pros and cons.

**Endoscopic retrograde cholangiopancreatography (ERCP):** For this test, an endoscope (a thin, flexible tube with a tiny video camera on the end) is passed down the throat, through the esophagus and stomach, and into the first part of the small intestine. This is usually done while you are sedated (given medicine to make you sleepy).

The doctor can see through the endoscope to find the ampulla of Vater (where the common bile duct empties into the small intestine). The doctor guides a catheter (a very small tube) through the tip of the endoscope and into the common bile duct. A small amount of dye (contrast material) is then injected into the common bile duct, and x-rays are taken. This dye outlines the bile and pancreatic ducts. The x-rays can show
narrowing or blockage in these ducts that might be due to pancreatic cancer. The doctor doing this test can also put a small brush through the tube to remove cells for a biopsy (see below).

ERCP can also be used to place a stent (small tube) into a bile or pancreatic duct to keep it open if a nearby tumor is pressing on it. This is described in more detail in the section on palliative surgery in Surgery for pancreatic cancer.

**Magnetic resonance cholangiopancreatography (MRCP):** This is a non-invasive way to look at the pancreatic and bile ducts using the same type of machine used for standard MRI scans. Unlike ERCP, it does not require an infusion of a contrast dye. Because this test is non-invasive, doctors often use MRCP if the purpose is just to look at the pancreatic and bile ducts. But this test can’t be used to get biopsy samples of tumors or to place stents in ducts.

**Percutaneous transhepatic cholangiography (PTC):** In this procedure, the doctor puts a thin, hollow needle through the skin of the belly and into a bile duct within the liver. A contrast dye is then injected through the needle, and x-rays are taken as it passes through the bile and pancreatic ducts. As with ERCP, this approach can also be used to take fluid or tissue samples or to place a stent into a duct to help keep it open. Because it is more invasive (and might cause more pain), PTC is not usually used unless ERCP has already been tried or can’t be done for some reason.

**Somatostatin receptor scintigraphy (SRS)**

This test, also known as OctreoScan, can be very helpful in finding pancreatic neuroendocrine tumors (NETs). A hormone-like substance called octreotide that is bound to a radioactive substance is injected into a vein. Octreotide travels through the blood and attaches to the tumor cells of many types of NETs (although it is less helpful for insulinomas).

Several hours after the injection, a special camera can be used to show where the radioactivity is in the body. More scans may be done on the following few days as well.

This scan can also help decide on treatment. NETs that show up on SRS scans will often stop growing if treated with octreotide.

**Positron emission tomography (PET) scan**

For a PET scan, you are injected with a slightly radioactive form of sugar, which collects mainly in cancer cells. A special camera is then used to create a picture of areas of
radioactivity in the body.

This test is sometimes used to look for spread from exocrine pancreatic cancers, but because NETs grow slowly, they do not show up well on PET scans.

**PET/CT scan:** Special machines can do both a PET and CT scan at the same time. This lets the doctor compare areas of higher radioactivity on the PET scan with the more detailed appearance of that area on the CT scan. This test can help determine the stage (extent) of the cancer. It might be especially useful for spotting cancer that has spread beyond the pancreas and wouldn’t be treatable by surgery.

**Angiography**

This is an x-ray test that looks at blood vessels. A small amount of contrast dye is injected into an artery to outline the blood vessels, and then x-rays are taken.

An angiogram can show if blood flow in a particular area is blocked or compressed by a tumor. It can also show abnormal blood vessels (feeding the cancer) in the area. This test can be useful in finding out if a pancreatic cancer has grown through the walls of certain blood vessels. Mainly, it helps surgeons decide if the cancer can be removed completely without damaging vital blood vessels, and it can also help them plan the operation.

Angiography can also be used to look for pancreatic NETs that are too small to be seen on other imaging tests. These tumors cause the body to make more blood vessels to “feed” the tumor, which can often be seen on angiography.

X-ray angiography can be uncomfortable because the doctor has to put a small catheter into the artery leading to the pancreas. Usually the catheter is put into an artery in your inner thigh and threaded up to the pancreas. A local anesthetic is often used to numb the area before inserting the catheter. Once the catheter is in place, the dye is injected to outline all the vessels while the x-rays are being taken.

Angiography can also be done with a CT scanner (CT angiography) or an MRI scanner (MR angiography). These techniques are now used more often because they can give the same information without the need for a catheter in the artery. You might still need an IV line so that a contrast dye can be injected into the bloodstream during the imaging.

**Blood tests**
Several types of blood tests can be used to help diagnose pancreatic cancer or to help determine treatment options if it is found.

**Blood tests for exocrine pancreatic cancers**

**Liver function tests:** Jaundice (yellowing of the skin and eyes) is often one of the first signs of pancreatic cancer, but it can have many causes other than cancer. Doctors often get blood tests to assess liver function in people with jaundice to help determine its cause.

For example, blood tests that look at levels of different kinds of bilirubin (a chemical made by the liver) can help tell whether a patient’s jaundice is caused by disease in the liver itself or by a blockage of bile flow (from a gallstone, a tumor, or other disease).

**Tumor markers:** Tumor markers are substances that can sometimes be found in the blood when a person has cancer. Two tumor markers may be helpful in pancreatic cancer:

- **CA 19-9**
- **Carcinoembryonic antigen (CEA),** which is not used as often as CA 19-9

Neither of these tumor marker tests is accurate enough to tell for sure if someone has pancreatic cancer. Levels of these tumor markers are not high in all people with pancreatic cancer, and some people who don’t have pancreatic cancer might have high levels of these markers for other reasons. Still, these tests can sometimes be helpful, along with other tests, in figuring out if someone has cancer.

In people already known to have pancreatic cancer and who have high CA19-9 or CEA levels, these levels can be measured over time to help tell how well treatment is working. If all of the cancer has been removed, these tests can also be done to look for the cancer coming back.

**Other blood tests:** Other tests can help evaluate a person’s general health (such as kidney and bone marrow function). These tests can help determine if they’ll be able to withstand the stress of a major operation.

**Blood tests for pancreatic neuroendocrine tumors**

Blood tests looking at the levels of certain pancreatic hormones can often help diagnose pancreatic neuroendocrine tumors (NETs). Tests might be done to check blood levels of:
• Hormones made by different types of NET cells, such as insulin, gastrin, glucagon, somatostatin, pancreatic polypeptide, and VIP (vasoactive intestinal peptide)
• Chromogranin A (CgA)
• Glucose and C-peptide (for insulinomas)

**Carcinoid tumors:** For carcinoids, a blood test may be done to look for serotonin, which is made by many of these tumors. The urine might also be tested for serotonin and for related chemicals such as 5-HIAA and 5-HTP.

Other common tests to look for carcinoids include blood tests for chromogranin A (CgA), neuron-specific enolase (NSE), substance P, and gastrin.

Depending on where the tumor might be located and the patient’s symptoms, doctors might do other blood tests as well.

**Biopsy**

A person’s medical history, physical exam, and imaging test results may strongly suggest pancreatic cancer, but usually the only way to be sure is to remove a small sample of tumor and look at it under the microscope. This procedure is called a **biopsy**. Biopsies can be done in different ways.

**Percutaneous (through the skin) biopsy:** For this test, a doctor inserts a thin, hollow needle through the skin over the abdomen and into the pancreas to remove a small piece of a tumor. This is known as a *fine needle aspiration* (FNA). The doctor guides the needle into place using images from ultrasound or CT scans.

**Endoscopic biopsy:** Doctors can also biopsy a tumor during an endoscopy. The doctor passes an endoscope (a thin, flexible, tube with a small video camera on the end) down the throat and into the small intestine near the pancreas. At this point, the doctor can either use endoscopic ultrasound (EUS) to pass a needle into the tumor or endoscopic retrograde cholangiopancreatography (ERCP) to remove cells from the bile or pancreatic ducts. These tests are described in more detail above. You will be sedated (made sleepy) for these tests, but general anesthesia (being put into a deep sleep) is not usually needed. Major side effects from these types of biopsies are rare.

**Surgical biopsy:** Surgical biopsies are now done less often than in the past. They can be useful if the surgeon is concerned the cancer has spread beyond the pancreas and wants to look at (and possibly biopsy) other organs in the abdomen.

The most common way to do a surgical biopsy is to use *laparoscopy* (sometimes called
You will be sedated or asleep for this procedure. The surgeon makes several small incisions (cuts) in the abdomen and inserts long, thin instruments. One of these has a small video camera on the end to let the surgeon see inside the abdomen. The surgeon can look at the pancreas and other organs for tumors and take biopsy samples of abnormal areas.

In the past, surgeons often used a laparotomy (a large incision through the skin into the wall of the abdomen) to examine internal organs and take biopsies. But this type of surgery requires a longer recovery and is now rarely used.

Some people might not need a biopsy

Rarely, the doctor might not do a biopsy on someone who has a tumor in the pancreas if imaging tests show the tumor is very likely to be cancer and if it looks like surgery can remove all of it. Instead, the doctor will proceed with surgery, at which time the tumor cells can be looked at to confirm the diagnosis. During surgery, if the doctor finds that the cancer has spread too far to be removed completely, only a sample of the cancer may be removed to confirm the diagnosis, and the rest of the planned operation will be stopped.

If treatment (such as chemotherapy or radiation) is planned before surgery, a biopsy is needed first to be sure of the diagnosis.

See Testing Biopsy and Cytology Specimens for Cancer to learn more about different types of biopsies, how the biopsy samples are tested in the lab, and what the results will tell you.

References
See all references for Pancreatic Cancer

Pancreatic Cancer Stages

After someone is diagnosed with pancreatic cancer, doctors will try to figure out if it has
spread, and if so, how far. This process is called staging. The stage of a cancer describes how much cancer is in the body. It helps determine how serious the cancer is and how best to treat it. Doctors also use a cancer's stage when talking about survival statistics.

The earliest stage pancreas cancers are stage 0 (carcinoma in situ), and then range from stages I (1) through IV (4). As a rule, the lower the number, the less the cancer has spread. A higher number, such as stage IV, means a more advanced cancer. Cancers with similar stages tend to have a similar outlook and are often treated in much the same way.

How is the stage determined?

The staging system used most often for pancreatic cancer is the AJCC (American Joint Committee on Cancer) TNM system, which is based on 3 key pieces of information:

- The extent of the tumor (T): How large is the tumor and has it grown outside the pancreas into nearby blood vessels?
- The spread to nearby lymph nodes (N): Has the cancer spread to nearby lymph nodes? If so, how many of the lymph nodes have cancer?
- The spread (metastasized) to distant sites (M): Has the cancer spread to distant lymph nodes or distant organs such as the liver, peritoneum (the lining of the abdominal cavity), lungs or bones?

The system described below is the most recent AJCC system, effective January 2018. It is used to stage most pancreatic cancers except for well-differentiated pancreatic neuroendocrine tumors (NETs), which have their own staging system.

The staging system in the table uses the pathologic stage. It is determined by examining tissue removed during an operation. This is also known as the surgical stage. Sometimes, if the doctor's physical exam, imaging, or other tests show the tumor is too large or has spread to nearby organs and cannot be removed by surgery right away or at all, radiation or chemotherapy might be given first. In this case, the cancer will have a clinical stage. It is based on the results of physical exam, biopsy, and imaging tests (see Tests for Pancreatic Cancer). The clinical stage can be used to help plan treatment. Sometimes, though, the cancer has spread further than the clinical stage estimates, and may not predict the patient's outlook as accurately as a pathologic stage. For more information, see Cancer Staging.

Numbers or letters after T, N, and M provide more details about each of these factors. Higher numbers mean the cancer is more advanced. Once a person's T, N, and M
categories have been determined, this information is combined in a process called **stage grouping** to assign an overall stage.

Cancer staging can be complex. If you have any questions about your stage, please ask your doctor to explain it to you in a way you understand. (Additional information of the TNM system also follows the stage table below.)

### Stages of pancreatic cancer

<table>
<thead>
<tr>
<th>AJCC Stage</th>
<th>Stage grouping</th>
<th>Stage description*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Tis N0 M0</td>
<td>The cancer is confined to the top layers of pancreatic duct cells and has not invaded deeper tissues. It has not spread outside of the pancreas. These tumors are sometimes referred to as carcinoma in situ (Tis). It has not spread to nearby lymph nodes (N0) or to distant sites (M0).</td>
</tr>
<tr>
<td>IA</td>
<td>T1 N0 M0</td>
<td>The cancer is confined to the pancreas and is no bigger than 2 cm (0.8 inch) across (T1). It has not spread to nearby lymph nodes (N0) or to distant sites (M0).</td>
</tr>
<tr>
<td>IB</td>
<td>T2 N0 M0</td>
<td>The cancer is confined to the pancreas and is larger than 2 cm (0.8 inch) but no more than 4cm (1.6 inches) across (T2). It has not spread to nearby lymph nodes (N0) or to distant sites (M0).</td>
</tr>
<tr>
<td>IIA</td>
<td>T3 N0 M0</td>
<td>The cancer is confined to the pancreas and is bigger than 4 cm (1.6 inches) across (T3). It has not spread to nearby lymph nodes (N0) or to distant sites (M0).</td>
</tr>
<tr>
<td>IIB</td>
<td>T1 N1 M0</td>
<td>The cancer is confined to the pancreas and is no bigger than 2 cm (0.8 inch) across (T1) <strong>AND</strong> it has spread to no more than 3 nearby lymph nodes (N1). It has not spread to distant sites (M0).</td>
</tr>
<tr>
<td></td>
<td>T2 N1 M0</td>
<td>The cancer is confined to the pancreas and is larger than 2 cm (0.8 inch) but no more than 4cm (1.6 inches) across (T2) <strong>AND</strong> it has spread to no more than 3 nearby lymph nodes (N1). It has not spread to distant sites (M0).</td>
</tr>
<tr>
<td></td>
<td>T3 N1 M0</td>
<td>The cancer is confined to the pancreas and is bigger than 4 cm (1.6 inches) across (T3) <strong>AND</strong> it has spread to no more than 3 nearby lymph nodes (N1). It has not spread to distant sites (M0).</td>
</tr>
<tr>
<td>III</td>
<td>T1 N2 M0</td>
<td>The cancer is confined to the pancreas and is no bigger than 2 cm (0.8 inch) across (T1) <strong>AND</strong> it has spread to 4 or more nearby lymph nodes (N2).</td>
</tr>
</tbody>
</table>
It has not spread to distant sites (M0).

OR

T2
N2
M0

The cancer is confined to the pancreas and is larger than 2 cm (0.8 inch) but no more than 4cm (1.6 inches) across (T2) AND it has spread to 4 or more nearby lymph nodes (N2).

It has not spread to distant sites (M0).

OR

T3
N2
M0

The cancer is confined to the pancreas and is bigger than 4 cm (1.6 inches) across (T3) AND it has spread to 4 or more nearby lymph nodes (N2).

It has not spread to distant sites (M0).

OR

T4
Any N
M0

The cancer is growing outside the pancreas and into nearby major blood vessels (T4). The cancer may or may not have spread to nearby lymph nodes (Any N).

It has not spread to distant sites (M0).

IV
Any T
Any N
M1

The cancer has spread to distant sites such as the liver, peritoneum (the lining of the abdominal cavity), lungs or bones (M1). It can be any size (Any T) and might or might not have spread to nearby lymph nodes (Any N).

* The following additional categories are not listed on the table above:

- TX: Main tumor cannot be assessed due to lack of information.
- T0: No evidence of a primary tumor.
- NX: Regional lymph nodes cannot be assessed due to lack of information.

**Other prognostic factors**

Although not formally part of the TNM system, other factors are also important in determining a person’s prognosis (outlook).

**Tumor grade**

The grade describes how closely the cancer looks like normal tissue under a microscope.

- Grade 1 (G1) means the cancer looks much like normal pancreas tissue.
- Grade 3 (G3) means the cancer looks very abnormal.
- Grade 2 (G2) falls somewhere in between.

Low-grade cancers (G1) tend to grow and spread more slowly than high-grade (G3)
cancers. Most of the time, Grade 3 pancreas cancers tend to have a poor prognosis (outlook) compared to Grade 1 or 2 cancers.

**Extent of resection**

For patients who have surgery, another important factor is the extent of the resection — whether or not all of the tumor is removed:

- **R0**: All of the cancer is thought to have been removed. (There are no visible or microscopic signs suggesting that cancer was left behind.)
- **R1**: All visible tumor was removed, but lab tests of the removed tissue show that some small areas of cancer were probably left behind.
- **R2**: Some visible tumor could not be removed.

**Resectable versus unresectable pancreatic cancer**

The AJCC staging system gives a detailed summary of how far the cancer has spread. But for treatment purposes, doctors use a simpler staging system, which divides cancers into groups based on whether or not they can be removed (resected) with surgery:

- **Resectable**
  - Borderline resectable
  - Unresectable (either locally advanced or metastatic)

**Resectable**

If the cancer is only in the pancreas (or has spread just beyond it) and the surgeon believes the entire tumor can be removed, it is called resectable. (In general, this would include most stage IA, IB, and IIA cancers in the TNM system.)

It’s important to note that some cancers might appear to be resectable based on imaging tests, but once surgery is started it might become clear that not all of the cancer can be removed. If this happens, only some of the cancer may be removed to confirm the diagnosis (if a biopsy hasn’t been done already), and the rest of the planned operation will be stopped to help avoid the risk of major side effects.

**Borderline resectable**
This term is used to describe some cancers that might have just reached nearby blood vessels, but which the doctors feel might still be removed completely with surgery.

**Unresectable**

These cancers can’t be removed entirely by surgery.

**Locally advanced**: If the cancer has not yet spread to distant organs but it still can’t be removed completely with surgery, it is called locally advanced. Often the reason the cancer can’t be removed is because it has grown into or surrounded nearby major blood vessels. (This would include some stage III cancers in the TNM system.)

Surgery to try to remove these tumors would be very unlikely to be helpful and could still have major side effects. Some type of surgery might still be done, but it would be a less extensive operation with the goal of preventing or relieving symptoms or problems like a blocked bile duct or intestinal tract, instead of trying to cure the cancer.

**Metastatic**: If the cancer has spread to distant organs, it is called metastatic (Stage IV). These cancers can’t be removed completely. Surgery might still be done, but the goal would be to prevent or relieve symptoms, not to try to cure the cancer.

**Tumor markers (CA 19-9)**

Tumor markers are substances that can sometimes be found in the blood when a person has cancer. CA 19-9 is a tumor marker that may be helpful in pancreatic cancer. A drop in the CA 19-9 level after surgery (compared to the level before surgery) and low levels of CA 19-9 after pancreas surgery tend to predict a better prognosis (outlook).

- **References**

*See all references for Pancreatic Cancer*

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Pancreatic Neuroendocrine Tumor Stages

After someone is diagnosed with a pancreatic neuroendocrine tumor (NET), doctors will try to figure out if it has spread, and if so, how far. This process is called staging. The stage of a cancer describes how much cancer is in the body. It helps determine how serious the cancer is and how best to treat it. Doctors also use a cancer's stage when talking about survival statistics.

The stages of pancreatic NET range from I (1) through IV (4). As a rule, the lower the stage, the less the cancer has spread. A higher number, such as stage IV, means cancer has spread more. Although each person’s cancer experience is unique, cancers with similar stages tend to have a similar outlook and are often treated in much the same way.

How is the stage determined?

The staging system most often used for pancreatic NETs is the American Joint Committee on Cancer (AJCC) TNM system, which is based on 3 key pieces of information:

- The size and extent of the main tumor (T): How large is the tumor? Has it grown into nearby structures or organs?
- The spread to nearby lymph nodes (N): Has the cancer spread to nearby lymph nodes?
- The spread (metastasis) to distant sites (M): Has the cancer spread to distant organs? (The most common site of spread is the liver.)

Numbers or letters after T, N, and M provide more details about each of these factors. Higher numbers mean the cancer is more advanced. Once a person’s T, N, and M categories have been determined, this information is combined in a process called stage grouping to assign an overall stage. For more information, see Cancer Staging.

The system described below is the most recent version of the AJCC system, effective as of January 2018. It is used to stage well-differentiated pancreatic NETs, but not high-grade pancreatic NETs (known as neuroendocrine carcinomas) or other types of pancreatic cancer, which have their own staging system.

Pancreatic NETs are typically given a clinical stage based on the results of a physical
exam, biopsy, and imaging tests (as described in Tests for Pancreatic Cancer). If surgery is done, the pathologic stage (also called the surgical stage) is determined by examining tissue removed during the operation.

Staging for pancreatic NETs can be complex. If you have any questions about the stage of your cancer or what it means, please ask your doctor to explain it to you in a way you understand.

Stages of pancreatic neuroendocrine tumors

<table>
<thead>
<tr>
<th>AJCC Stage</th>
<th>Stage grouping</th>
<th>Stage description*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>T1 N0 M0</td>
<td>The tumor is less than 2 centimeters (cm) across and is still just in the pancreas (T1). The cancer has not spread to nearby lymph nodes (N0) or to distant parts of the body (M0).</td>
</tr>
<tr>
<td></td>
<td>T2 N0 M0</td>
<td>The tumor is at least 2 cm across but no more than 4 cm across, and it is still just in the pancreas (T2). The cancer has not spread to nearby lymph nodes (N0) or to distant parts of the body (M0).</td>
</tr>
<tr>
<td></td>
<td>OR T3 N0 M0</td>
<td>The tumor is more than 4 cm across and is still just in the pancreas, OR the tumor has grown into the duodenum (the first part of the small intestine) or the common bile duct (T3). The cancer has not spread to nearby lymph nodes (N0) or to distant parts of the body (M0).</td>
</tr>
<tr>
<td>III</td>
<td>T4 N0 M0</td>
<td>The tumor has grown into nearby organs (such as the stomach, spleen, colon, or adrenal gland) or it has grown into nearby large blood vessels (T4). The cancer has not spread to nearby lymph nodes (N0) or to distant parts of the body (M0).</td>
</tr>
<tr>
<td></td>
<td>OR Any T N1 M0</td>
<td>The tumor can be any size and might or might not have grown outside of the pancreas (any T). It has spread to nearby lymph nodes (N1), but not to distant parts of the body (M0).</td>
</tr>
<tr>
<td>IV</td>
<td>Any T Any N M1</td>
<td>The tumor can be any size and might or might not have grown outside of the pancreas (any T). It might or might not have spread to nearby lymph nodes (any N). The cancer has spread to distant parts of the body (M1).</td>
</tr>
</tbody>
</table>

* The following additional categories are not listed in the table above:

- **TX:** The main tumor cannot be assessed due to lack of information.
• **T0**: There is no evidence of a main tumor.
• **NX**: Nearby lymph nodes cannot be assessed due to lack of information.

**Other prognostic factors**

Although not formally part of the TNM system, other factors can also be important in determining a person’s prognosis (outlook).

**Tumor grade**

The grade describes how quickly the cancer is likely to grow and spread. For pancreatic NETs, an important part of grading is measuring how many of the cells are in the process of dividing into new cells. This is determined by:

- The **mitotic count**, which is the number of cells seen under a microscope that are in the process of splitting into two new cells (mitosis).
- The **Ki-67 index**, which is a measure of the portion of cells that are almost ready to start splitting.

Based on these tests, NETs are divided into 2 main groups:

- **Well-differentiated NETs** (which include low-grade [G1] and intermediate-grade [G2] tumors) have 20 or fewer mitoses and a Ki-67 index of 20% or lower.
- **Poorly differentiated tumors** (high-grade [G3] tumors) have more than 20 mitoses or a Ki-67 index of more than 20%. These are also called **neuroendocrine carcinomas (NECs)**, and they often grow and spread quickly.

**Tumor functionality**

The outlook for pancreatic NETs can be affected by whether the tumor is **functioning (making hormones) or non-functioning**. For functioning tumors, the type of hormone can also be important. For example, insulinomas (NETs that make insulin) tend to have a lower risk of spreading than other types of NETs.

- **References**


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Pancreatic Cancer Survival Rates, by Stage

Survival rates tell you what portion of people with the same type and stage of cancer are still alive a certain amount of time (usually 5 years) after they were diagnosed. They can’t tell you how long you will live, but they may help give you a better understanding about how likely it is that your treatment will be successful. Some people will want to know the survival rates for their cancer, and some people won’t. If you don’t want to know, you don’t have to.

What is a 5-year survival rate?

Statistics on the outlook for a certain type and stage of cancer are often given as 5-year survival rates, but many people live longer – often much longer – than 5 years. The 5-year survival rate is the percentage of people who live at least 5 years after being diagnosed with cancer. For example, a 5-year survival rate of 70% means that an estimated 70 out of 100 people who have that cancer are still alive 5 years after being diagnosed. Keep in mind, however, that many of these people live much longer than 5 years after diagnosis.

But remember, the 5-year relative survival rates are estimates – your outlook can vary based on a number of factors specific to you.

Cancer survival rates don’t tell the whole story

Survival rates are often based on previous outcomes of large numbers of people who had the disease, but they can’t predict what will happen in any particular person’s case. There are a number of limitations to remember:

- The numbers below are among the most current available. But to get 5-year survival rates, doctors have to look at people who were treated at least 5 years ago. As treatments are improving over time, people who are now being diagnosed with...
pancreatic cancer may have a better outlook than these statistics show.

- These statistics are based on the stage of the cancer when it was first diagnosed. They do not apply to cancers that later come back or spread, for example.
- The outlook for people with pancreatic cancer varies by the stage (extent) of the cancer – in general, the survival rates are higher for people with earlier stage cancers. But many other factors can affect a person’s outlook, such as age and overall health, and how well the cancer responds to treatment. The outlook for each person is specific to their circumstances.

Your doctor can tell you how these numbers may apply to you, as he or she is familiar with your particular situation.

**Survival rates for exocrine pancreatic cancer**

The numbers below come from the National Cancer Data Base and are based on people diagnosed with exocrine pancreatic cancer between 1992 and 1998. In general, people who can be treated with surgery tend to live longer than those not treated with surgery.

- The 5-year survival rate for people with stage IA pancreatic cancer is about 14%.
  For stage IB cancer, the 5-year survival rate is about 12%.
- For stage IIA pancreatic cancer, the 5-year survival rate is about 7%. For stage IIB cancer, the 5-year survival rate is about 5%.
- The 5-year survival rate for stage III pancreatic cancer is about 3%.
- Stage IV pancreatic cancer has a 5-year survival rate of about 1%. Still, there are often treatment options available for people with this stage of cancer.

Remember, these survival rates are only estimates – they can’t predict what will happen to any individual person. We understand that these statistics can be confusing and may lead you to have more questions. Talk to your doctor to better understand your specific situation.

**Survival rates for neuroendocrine pancreatic tumors (treated with surgery)**

For pancreatic neuroendocrine tumors (NETs), survival statistics by stage are only available for patients treated with surgery. These numbers come from the National Cancer Data Base and are based on patients diagnosed between 1985 and 2004.
• The 5-year survival rate for people with stage I pancreatic NETs is about 61%.
• For stage II pancreatic NETs, the 5-year survival rate is about 52%.
• The 5-year relative survival rate for stage III pancreatic NETs is about 41%.
• Stage IV pancreatic NETs have a 5-year survival rate of about 16%. Still, there are often treatment options available for people with these cancers.

In this database, the overall 5-year survival rate for people who did not have their tumors removed by surgery was 16%.

• References
See all references for Pancreatic Cancer

What Should You Ask Your Health Care Team About Pancreatic Cancer?

It’s important to have honest, open discussions with your cancer care team. You should feel free to ask any question, no matter how minor it might seem. For instance, consider these questions:

When you’re told you have pancreatic cancer

• What kind of pancreatic cancer do I have?
• Has my cancer spread beyond where it started?
• What is the stage of my cancer? Is it resectable (removable by surgery)?
• Do I need any other tests before we can decide on treatment?
• Will I need to see other doctors?
• If I’m concerned about the costs and insurance coverage for my diagnosis and treatment, who can help me?

When deciding on a treatment plan
• How much experience do you have treating this type of cancer?
• What are my treatment choices?
• What do you recommend and why?
• What is the goal of each treatment?
• Should I get a second opinion? How do I do that? Can you recommend a doctor or cancer center?
• How is treatment likely to help me?
• What risks or side effects might I expect? How long are they likely to last?
• Should I think about taking part in a clinical trial?
• How soon do I need to start treatment?
• What should I do to be ready for treatment?
• How long will treatment last? What will it be like? Where will it be done?
• What risks or side effects should I expect? How long are they likely to last?
• Will treatment affect how I eat?
• Will treatment affect my daily activities?
• What would my options be if the treatment doesn’t work or if the cancer comes back?

During treatment

Once treatment begins, you'll need to know what to expect and what to look for. Not all of these questions may apply to you, but getting answers to the ones that do may be helpful.

• How will we know if the treatment is working?
• Is there anything I can do to help manage side effects?
• What symptoms or side effects should I tell you about right away?
• How can I reach you on nights, holidays, or weekends?
• Do I need to change what I eat during treatment?
• Are there any limits on what I can do?
• Should I exercise? What should I do, and how often?
• Can you suggest a mental health professional I can see if I start to feel overwhelmed, depressed, or distressed?

After treatment

• Are there any limits on what I can do?
• What symptoms should I watch for?
• What kind of exercise should I do now?
• What type of follow-up will I need after treatment?
• How often will I need to have follow-up exams and tests?
• How will we know if the cancer has come back? What should I watch for?
• What will my options be if the cancer comes back?

Along with these sample questions, be sure to write down some of your own. Keep in mind that doctors aren’t the only ones who can give you information. Other health care professionals, such as nurses and social workers, can answer some of your questions. To find out more about speaking with your health care team, see The Doctor-Patient Relationship.

• References
See all references for Pancreatic Cancer

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