Pancreatic Cancer

Pancreatic cancer is a tumor of the pancreas, an organ that is located behind the stomach in the abdomen. Pancreatic cancer does not always cause symptoms until the tumor has spread. It is slightly more common in men and affects African-Americans at higher rates.

Your doctor may order blood, urine or tissue tests to determine whether they show certain substances that could indicate cancer. Other tests could include Body MRI, Body CT, MRCP, endoscopic ultrasound, or PET/CT to help determine if you have cancer and if it has spread. A biopsy may be necessary to confirm the diagnosis of cancer. Treatment options depend on whether the disease has spread and include surgery, radiation therapy and chemotherapy or a combination thereof.

What is pancreatic cancer?

Pancreatic cancer begins in the pancreas, an organ located deep in the abdomen behind the stomach. The pancreas releases hormones called insulin and glucagon to help the body process sugar. It also produces enzymes to help the body digest fats, carbohydrates and proteins.

Pancreatic cancer occurs when abnormal cells grow out of control and develop into a tumor. Most pancreatic tumors start in the cells that line the ducts of the pancreas and are known as adenocarcinomas. Pancreatic tumors that start in cells that produce hormones are called pancreatic neuroendocrine tumors or islet cell tumors.

Pancreatic cancer affects about 46,000 Americans a year, making it the twelfth most common type of cancer in the United States. Risk factors for the disease include smoking, being overweight, diabetes, older age, testing positive for the BRCA2 gene (http://www.radiologyinfo.org) and having a history of pancreatitis (inflammation of the pancreas) or a family history of pancreatic cancer. Pancreatic cancer is slightly more common in men than in women and affects African-Americans at higher rates.

Patients often experience no symptoms until the tumor has spread into surrounding organs. Eight out of ten patients are diagnosed after the cancer has moved beyond the pancreas. As a result, pancreatic cancer is the fourth leading cause of cancer death in the United States.

How is pancreatic cancer diagnosed and evaluated?

Patients often have some symptoms that prompt a visit to the doctor, such as severe abdominal pain extending to the back, nausea, vomiting, jaundice (yellowish skin and eyes) or unexplained weight loss.

To help determine if you have pancreatic cancer and if it has spread, your doctor may order one or more of the following tests.

- Tumor marker tests: Like many cancers, pancreatic tumors release unique substances that can be detected in blood, urine or tissue samples. Your doctor will test for elevated levels of carcinoembryonic antigens (CEA) or CA 19-9, which is a tumor marker for pancreatic cancer. Elevated CEA levels are often but not always found in patients with pancreatic cancer.
- MRI (magnetic resonance imaging): This imaging test uses a magnetic field and radio frequency pulses to produce detailed pictures of the internal organs. It is helpful for detecting diseases not easily seen on other scans and does not involve

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radiation. *See the MRI of the Body (https://www.radiologyinfo.org/en/info/bodymr) page for more information.*

- CT (CAT) Scan: Computed tomography (CT) of the body uses special x-ray equipment to help detect a variety of diseases and conditions. CT scanning is fast, painless, noninvasive and accurate. For pancreatic cancer, iodine contrast may be used to better visualize the pancreas and surrounding blood vessels. *See the CT Scan of the Body (https://www.radiologyinfo.org/en/info/bodyct) page for more information.*
- PET Scan: Positron emission tomography (PET) is a type of nuclear medicine scan that uses a small amount of radioactive material to image body functions. A PET/CT exam fuses images from PET and CT scans to detect and locate cancer and determine if it has spread. *See the PET/CT Scan (https://www.radiologyinfo.org/en/info/pet) page for more information.*
- Endoscopic Ultrasound: During this procedure, a thin tube is inserted through the esophagus into the abdomen. An ultrasound device at the end of the tube emits sound waves to produce pictures of the pancreas, blood vessels, and nearby tissues.
- Endoscopic retrograde cholangiopancreatography (ERCP): This test uses a combination of endoscopy (http://www.radiologyinfo.org) and x-ray (http://www.radiologyinfo.org) imaging to allow physicians to examine the bile duct, liver, gallbladder, and pancreas. A thin, tube-like optical instrument called an endoscope (http://www.radiologyinfo.org) is inserted through the esophagus into the small intestine to visualize the organs and ducts. A contrast material (http://www.radiologyinfo.org) is also injected into the small intestine and x-rays are taken. *See the Biliary Interventions (https://www.radiologyinfo.org/en/info/biliary) page for more information.*
- Percutaneous transhepatic cholangiography (PTC): PTC is an x-ray procedure that involves the injection of a contrast material directly into the bile ducts inside the liver to produce pictures of the bile ducts.*See the Biliary Interventions (https://www.radiologyinfo.org/en/info/biliary) page for more information.*
- Magnetic Resonance cholangiopancreatography (MRCP): MRCP uses a powerful magnetic field, radio waves and a computer to produce detailed images of the hepatobiliary (http://www.radiologyinfo.org) and pancreatic systems, including the liver, gallbladder, bile ducts, pancreas and pancreatic duct (http://www.radiologyinfo.org) . *See the Magnetic Resonance Cholangiopancreatography (https://www.radiologyinfo.org/en/info/mrcp) page for more information.*
- Biopsy: A biopsy is the removal of tissue from any part of the body to examine it for disease. Pancreatic biopsy samples are usually obtained by inserting a fine needle through the skin directly into the pancreas or by removing a sample during an endoscopic ultrasound using a special tool that is attached to the endoscope. *See the Biopsies (https://www.radiologyinfo.org/en/info/mrcp) page for more information.*

How is pancreatic cancer treated?

Pancreatic cancer is usually treated with a combination of surgery, radiation and chemotherapy. The type of treatment depends on the stage of the cancer or how far it has spread. Your physician will help you weigh the treatment options as they relate to your age, overall health and your personal preferences.

Surgery

Patients with pancreatic cancer often have some form of surgery as part of their treatment plan. The pancreas is divided into three parts: the head, the body and the tail. The location of the tumor within the pancreas and whether the tumor has affected blood vessels and other organs near the pancreas will determine which of the following surgeries is performed.

- The Whipple Procedure: This surgery is performed on tumors located in the head of the pancreas. During this surgery, the head of the pancreas is removed as well as the first part of the small intestine (also known as the duodenum), the gallbladder and part of the bile duct. Sometimes parts of the stomach and nearby lymph nodes are also removed. The remaining part of the pancreas, the stomach and the intestine are reconnected so you can still digest food.
- Distal Pancreatectomy: This surgery is performed on tumors that are located in the body or tail of the pancreas. During this surgery, the body and tail are removed. The spleen is often removed as well.
- Total Pancreatectomy: This surgery is performed on tumors located in all three areas of the pancreas. During this surgery, the entire pancreas is removed as well as the gallbladder, spleen, nearby lymph nodes and parts of the stomach, small intestine, and bile duct. It is possible to live without a pancreas but patients will need insulin treatment and enzyme

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replacement for the rest of their lives.

Sometimes, patients may have tumors blocking the gallbladder or the stomach, and surgery may be performed to bypass the blockages. While these surgeries don't eliminate the cancerous tumor, they can greatly improve quality of life for the patient.

Radiation Therapy

Radiation therapy uses high-energy x-rays or other forms of radiation to kill cancer cells or keep tumors from growing. Some patients undergo radiation therapy in order to shrink tumors before surgery. Three types of radiation are typically used to treat pancreatic cancer: external beam therapy (EBT), stereotactic body radiotherapy (SBRT) and proton therapy. Radiation therapies are often used in combination with surgery and/or chemotherapy.

- External beam therapy (EBT): During EBT, high-energy x-ray beams are delivered to the tumor. Beams are usually generated by a linear accelerator (http://www.radiologyinfo.org) and targeted to destroy cancer cells while sparing surrounding normal tissues. Most pancreatic cancer patients receive a type of external beam therapy called Intensity-Modulated Radiation Therapy (IMRT). IMRT is a type of 3-D radiation that uses linear accelerators to safely and painlessly deliver precise radiation doses to a tumor while minimizing the dose to surrounding normal tissue. EBT typically requires daily treatment over a period of three to six weeks. *See the External Beam Therapy (https://www.radiologyinfo.org/en/info/ebt) page for more information. See the Intensity-Modulated Radiation Therapy (https://www.radiologyinfo.org/en/info/imrt) page for more information about IMRT.*
- Stereotactic body radiotherapy (SBRT): SBRT is a newer type of radiation therapy which uses special equipment to deliver precisely-targeted radiation in fewer high-dose treatments than traditional EBT. The total dose of radiation is divided into smaller "fractionated" doses given over several days instead of several weeks. This helps preserve healthy tissue. The use of SBRT for pancreatic cancer is only used in specialized cancer centers. *See the Stereotactic body radiotherapy (https://www.radiologyinfo.org/en/info/stereotactic) page for more information about SBRT.*
- Proton beam radiation therapy: Proton beam radiation therapy delivers radiation to the tumor in a much more confined way than conventional radiation therapy. It allows the radiation oncologist to deliver a higher dose to the tumor while still minimizing side effects. This can be especially helpful in treating pancreatic cancer since the pancreas is located so closely to other essential organs. Proton beam radiation therapy still requires daily treatment over a period of four to five weeks and is only available at specialized cancer centers. *See the Proton therapy (https://www.radiologyinfo.org/en/info/protonthera) page for more information.*

Chemotherapy

This treatment involves the use of drugs given intravenously (by vein) or orally to kill cancer cells or to keep them from dividing and multiplying. Chemotherapy may be used alone or in combination with radiation. Like radiation therapy, chemotherapy can help ease symptoms and increase survival rates for patients with tumors that have spread (metastasized). Patients usually receive chemotherapy treatment sessions over a set period of time with breaks in between to alleviate potential side effects, such as abnormal blood-cell counts, fatigue, diarrhea, mouth sores, and a weakened immune system.

Newer, advanced chemotherapy options have recently been developed. These newer options help avoid damaging normal, healthy tissues while stopping cancer cells from spreading.

For more information, see the Pancreatic Cancer Treatment (https://www.radiologyinfo.org/en/info/pancreatic-cancer-treatment) page.

Which test, procedure or treatment is best for me?

- *Pancreatic Cyst (https://www.radiologyinfo.org/en/info/acs-pancreatic-cyst)*
- *Staging of Pancreatic Ductal Adenocarcinoma (https://www.radiologyinfo.org/en/info/acs-staging-pancreatic-ductal-adenocarcinoma)*

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