Treating Pancreatic Cancer

If you've been diagnosed with pancreatic cancer, your cancer care team will discuss your treatment options with you. It's important that you think carefully about your choices. You will want to weigh the benefits of each treatment option against the possible risks and side effects.

Which treatments are used for pancreatic cancer?

Depending on the type and stage of the cancer and other factors, treatment options for people with pancreatic cancer can include:

- Surgery
- Ablation or embolization treatments
- Radiation therapy
- Chemotherapy and other drugs

Pain control is also an important part of treatment for many patients.

Sometimes, the best option might include more than one type of treatment. To learn about the most common approaches to treating these cancers, see Treating Pancreatic Cancer, Based on the Extent of the Cancer.

For **pancreatic neuroendocrine tumors (NETs)**, treatment options might include surgery, ablation or embolization treatments, radiation therapy, or different types of medicines. For more on how these tumors are treated, see Treating Pancreatic Neuroendocrine Tumors, Based on the Extent of the Tumor.

Which doctors treat pancreatic cancer?

Depending on your options, you can have different types of doctors on your treatment team. The doctors on your cancer treatment team might include:

- A **surgeon**: a doctor who uses surgery to treat cancers or other problems
- An **endocrinologist**: a doctor who treats diseases in glands that secrete hormones
- A **radiation oncologist**: a doctor who uses radiation to treat cancer
- A **medical oncologist**: a doctor who uses chemotherapy and other medicines to treat cancer

Many other specialists might be part of your treatment team as well, including physician assistants (PAs), nurse practitioners (NPs), nurses, psychologists, social workers, nutritionists, and other health professionals. See Health Professionals Associated With Cancer Care for more on this.

Making treatment decisions

It's important to discuss all of your treatment options, including their goals and possible side effects, with your doctors to help make the decision that best fits your needs. Some important things to consider include:

- Your age and expected life span
- Any other serious health conditions you have
- The stage (extent) of your cancer
- Whether or not surgery can remove (resect) the cancer
- The likelihood that treatment will cure the cancer (or help in some other way)
- Your feelings about the possible side effects from treatment

You may feel that you must make a decision quickly, but it's important to give yourself time to absorb the information you have just learned. It's also very important to ask questions if there is anything you're not sure about. See What Should You Ask Your Health Care Team About Pancreatic Cancer? for ideas.

Getting a second opinion

If time allows, you may also want to get a second opinion from another doctor or medical team. This can give you more information and help you feel more certain about the treatment plan you choose. If you aren't sure where to go for a second opinion, ask your doctor for help.

Thinking about taking part in a clinical trial

Clinical trials are carefully controlled research studies that are done to get a closer look at promising new treatments or procedures. Clinical trials are one way to get state-of-

the art cancer treatment. Sometimes they may be the only way to get access to newer treatments. They are also the best way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials. See Clinical Trials to learn more.

Considering complementary and alternative methods

You may hear about complementary or alternative methods that your doctor hasn't mentioned to treat your cancer or relieve symptoms. These methods can include vitamins, herbs, and diets, or other methods such as acupuncture or massage, to name a few.

Complementary methods refer to treatments that are used *along with* your regular medical care. *Alternative treatments* are used *instead of* a doctor's medical treatment. Although some of these methods might be helpful in relieving symptoms or helping you feel better, many have not been proven to work. Some might even be dangerous.

Be sure to talk to your cancer care team about any method you are thinking about using. They can help you learn what is known (or not known) about the method, which can help you make an informed decision.

Choosing to stop treatment or choosing no treatment at all

For some people, when treatments have been tried and are no longer controlling the cancer, it could be time to weigh the benefits and risks of continuing to try new treatments. Whether or not you continue treatment, there are still things you can do to help maintain or improve your quality of life. Learn more in If Cancer Treatments Stop Working.

Some people, especially if the cancer is advanced, might not want to be treated at all. There are many reasons you might decide not to get cancer treatment, but it's important to talk this through with your doctors before you make this decision. Remember that even if you choose not to treat the cancer, you can still get help for pain or other symptoms.

Help getting through treatment

Your cancer care team will be your first source of information and support, but there are other resources for help when you need it. Hospital- or clinic-based support services are an important part of your care. These might include nursing or social work services, financial aid, nutritional advice, rehab, or spiritual help.

We also have programs and services – including rides to treatment, lodging, and more – to help you get through treatment. Call our National Cancer Information Center at 1-800-227-2345 and speak with one of our trained specialists.

The treatment information in this document is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.

Surgery for Pancreatic Cancer

Two general types of surgery can be used for pancreatic cancer:

- **Potentially curative surgery** is used when the results of exams and tests suggest that it's possible to remove (resect) all the cancer.
- **Palliative surgery** may be done if imaging tests show that the cancer is too widespread to be removed completely. This surgery is done to relieve symptoms or to prevent certain complications like a blocked bile duct or intestine, but the goal is not to try to cure the cancer.

Staging laparoscopy

To determine which type of surgery might be best, it's important to know the stage (extent) of the cancer. But it can be hard to stage pancreatic cancer accurately just using imaging tests. Sometimes laparoscopy is done first to help determine the extent of the cancer and if it can be resected.

For this procedure, the surgeon makes a few small incisions (cuts) in the abdomen (belly) and inserts long, thin instruments. One of these has a small video camera on the end so the surgeon can see inside the abdomen. The surgeon can look at the pancreas and other organs for tumors and take biopsy samples of abnormal areas to learn how far the cancer has spread.

Potentially curative surgery

Studies have shown that removing only part of a pancreatic cancer doesn't help patients live longer, so potentially curative surgery is only done if the surgeon thinks all of the cancer can be removed.

This is very complex surgery, and it can also be very hard for patients. It can cause complications and can take weeks to months to recover from. If you're thinking about having this type of surgery, it's important to weigh the potential benefits and risks carefully.

Fewer than 1 in 5 pancreatic cancers appear to be confined to the pancreas at the time they are found. Even then, not all of these cancers turn out to be truly resectable (can be completely removed) once the surgery is started. Sometimes after the surgeon starts the operation it becomes clear that the cancer has grown too far to be completely taken out. If this happens, the operation may be stopped, or the surgeon might continue with a smaller operation with a goal of relieving or preventing symptoms (see "Palliative surgery" below). This is because the planned operation would be very unlikely to cure the cancer and could still lead to major side effects. It would also lengthen the recovery time, which could delay other treatments.

Surgery offers the only realistic chance to cure exocrine pancreatic cancer, but it doesn't always lead to a cure. Even if all visible cancer is removed, often some cancer cells have already spread to other parts of the body. These cells can grow into new tumors over time, which can be very hard to treat.

Long-term success rates for surgery on pancreatic neuroendocrine tumors (NETs) are often much better. These tumors are more likely to be cured with surgery.

Curative surgery is done mainly to treat cancers in the head of the pancreas. Because these cancers are near the bile duct, they often cause jaundice, which sometimes allows them to be found early enough to be removed. Surgeries for other parts of the pancreas are mentioned below, but these are only done when it's possible to remove all of the cancer.

Three procedures can be used to remove tumors of the pancreas:

Whipple procedure (pancreaticoduodenectomy)

This is the most common operation to remove a cancer of the exocrine pancreas. It also sometimes is used to treat pancreatic NETs.

During this operation, the surgeon removes the head of the pancreas and sometimes the body of the pancreas as well. Nearby structures such as part of the small intestine, part of the bile duct, the gallbladder, lymph nodes near the pancreas, and sometimes part of the stomach are also removed. The remaining bile duct and pancreas are then attached to the small intestine so that bile and digestive enzymes can still go into the small intestine. The pieces of the small intestine (or the stomach and small intestine) are then reattached so that food can pass through the digestive tract.

Most often, this operation is done through a large incision (cut) down the middle of the belly. Some doctors at major cancer centers also do the operation laparoscopically, which is sometimes known as *keyhole surgery* (see What's New in Pancreatic Cancer Research?).

A Whipple procedure is a complex operation that requires a surgeon with a lot of skill and experience. It carries a relatively high risk of complications that can be life threatening. When the operation is done in small hospitals or by doctors with less experience, as many as 15% of patients may die as a result of surgical complications. In contrast, when the operation is done in cancer centers by surgeons experienced in the procedure, less than 5% of patients die as a direct result of surgery.

To have the best outcome, it's important to be treated by a surgeon who does many of these operations and to have the surgery at a hospital where many of them are done. In general, people having this type of surgery do better when it's done at a hospital that does at least 15 to 20 Whipple procedures per year.

Still, even under the best circumstances, many patients have complications from the surgery. These can include:

- Leaking from the various connections among organs that the surgeon has to make
- Infections
- Bleeding
- Trouble with the stomach emptying after eating
- Trouble digesting some foods (which might require taking pancreatic enzymes in pill form to help with digestion)
- Weight loss
- Changes in bowel habits
- Diabetes

Distal pancreatectomy

In this operation, the surgeon removes only the tail of the pancreas or the tail and a portion of the body of the pancreas. The spleen is usually removed as well. This operation is used more often to treat pancreatic NETs found in the tail and body of the pancreas. It's seldom used to treat cancers of the exocrine pancreas because these tumors have usually already spread by the time they are found.

The spleen helps the body fight infections, so if it’s removed you’ll be at increased risk of infection with certain bacteria. To help with this, doctors recommend that patients get certain vaccines before this surgery.

Total pancreatectomy

This operation removes the entire pancreas, as well as the gallbladder, part of the stomach and small intestine, and the spleen. This surgery might be an option if the cancer has spread throughout the pancreas but can still be removed. But this type of surgery is used less often than the other operations because there doesn’t seem to be a major advantage in removing the whole pancreas, and it can have major side effects.

It’s possible to live without a pancreas. But when the entire pancreas is removed, people are left without the cells that make insulin and other hormones that help maintain safe blood sugar levels. These people develop diabetes, which can be hard to manage because they are totally dependent on insulin shots. People who have had this surgery also need to take pancreatic enzyme pills to help them digest certain foods.

Before you have this operation, your doctor will recommend that you get certain vaccines because the spleen will be removed.

Palliative surgery

If the cancer has spread too far to be removed completely, any surgery being considered would be palliative (intended to relieve or prevent symptoms). Because pancreatic cancer can spread quickly, most doctors don’t advise major surgery for palliation, especially for people who are in poor health.

Sometimes surgery might be started with the hope it will cure the patient, but once it begins the surgeon discovers this is not possible. In this case, the surgeon might do a less extensive, palliative operation known as *bypass surgery* instead to help prevent or relieve symptoms.

Cancers growing in the head of the pancreas can block the common bile duct as it

passes through this part of the pancreas. This can cause pain and digestive problems because bile can't get into the intestine. The bile chemicals will also build up in the body, which can cause jaundice, nausea, vomiting, and other problems.

There are 2 main options for relieving bile duct blockage.

Stent placement

The most common approach to relieving a blocked bile duct does not involve actual surgery. Instead, a stent (small tube, usually made of metal) is put inside the duct to keep it open. This is usually done through an endoscope (a long, flexible tube) while you are sedated. Often this is part of an endoscopic retrograde cholangiopancreatography (ERCP). The doctor passes the endoscope down the throat and all the way into the small intestine. The doctor can then insert the stent into the bile duct through the endoscope. The stent can also be put in place through the skin during a percutaneous transhepatic cholangiography (PTC). (These tests are described in Tests for Pancreatic Cancer.)

The stent helps keep the bile duct open even if the surrounding cancer presses on it. But after several months, the stent may become clogged and may need to be cleared or replaced. Larger stents can also be used to keep parts of the small intestine open if they are in danger of being blocked by the cancer.

A bile duct stent can also be put in to help relieve jaundice before curative surgery is done (which would typically be a couple of weeks later). This can help lower the risk of complications from surgery.

Bypass surgery

In people who are healthy enough, another option for relieving a blocked bile duct is surgery to reroute the flow of bile from the common bile duct directly into the small intestine, bypassing the pancreas. This typically requires a large incision (cut) in the abdomen, and it can take weeks to recover from this. Sometimes surgery can be done through several small cuts in the abdomen using special long surgical tools. (This is known as *laparoscopic* or *keyhole surgery*.)

Having a stent placed is often easier and the recovery is much shorter, which is why this is done more often than bypass surgery. But surgery can have some advantages, such as:

- It can often give longer-lasting relief than a stent, which might need to be cleaned

out or replaced.
- It might be an option if a stent can't be placed for some reason.
- During surgery, the surgeon may be able to cut some of the nerves around the pancreas or inject them with alcohol. This may reduce or get rid of any pain caused by the cancer. (Pancreatic cancer often causes pain if it reaches these nerves.)

Sometimes, the end of the stomach is disconnected from the duodenum (the first part of the small intestine) and attached farther down the small intestine during this surgery as well. (This is known as a *gastric bypass*.) This is done because over time the cancer might grow large enough to block the duodenum, which can cause pain and vomiting and often requires urgent surgery. Bypassing the duodenum before this happens can sometimes help avoid this.

Bypass surgery can still be a major operation, so it's important that you are healthy enough to withstand it and that you talk with your doctor about the possible benefits and risks before you have the surgery.

Surgery to treat pancreatic neuroendocrine tumors

Along with the operations described above, sometimes a less extensive procedure can be used to remove pancreatic NETs.

Enucleation (removing just the tumor)

Sometimes if a pancreatic NET is small, just the tumor itself is removed. This is called *enucleation*. This operation may be done using a laparoscope, so that only a few small cuts on the belly are needed.

This operation may be all that is needed to treat an insulinoma, since this type of tumor is often benign (not cancer). Small gastrinomas and some other pancreatic NETs may also be treated with enucleation, but sometimes the duodenum (the first part of the small intestine) is removed as well.

The lymph nodes around the pancreas might also be removed so that they can be checked for cancer cells.

Whipple procedure or distal pancreatectomy

For larger gastrinomas and other types of pancreatic NETs, a Whipple procedure (pancreaticoduodenectomy) or a distal pancreatectomy is often needed, depending on

the location of the tumor. These operations are described above.

The lymph nodes around the pancreas are often removed as well so that they can be checked for cancer cells.

Surgery for cancer that has spread

Surgery may be used to remove metastases if a pancreatic NET has spread to the liver (the most common site of spread) or the lungs. Removing metastases can improve symptoms and prolong life in patients with pancreatic NETs. In rare cases, a liver transplant might be used to treat pancreatic NETs that have spread to the liver.

For more about surgery as a treatment for cancer, see Cancer Surgery.

- References

See all references for Pancreatic Cancer

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Ablation or Embolization Treatments for Pancreatic Cancer

These treatments are different ways of destroying tumors, rather than removing them with surgery.

When might one of these treatments be used?

Ablation or embolization can sometimes be used to help treat pancreatic cancer that has spread to other organs, especially the liver. But these treatments are very unlikely to cure cancers on their own. They are more likely to be used to help prevent or relieve symptoms, and are often used along with other types of treatment.

- **Pancreatic neuroendocrine tumors (NETs):** When NETs have spread to other

sites, these treatments can often improve symptoms and help people live longer.
- **Exocrine pancreas cancers:** These treatments are used much less often for exocrine cancers (which account for most pancreatic cancers), but they might sometimes be used when there are only a few areas of spread to treat.

Ablative treatments

Ablation refers to treatments that destroy tumors, usually with extreme heat or cold. Typically, with this type of treatment you will not need to stay in the hospital. There are different kinds of ablative treatments:

Radiofrequency ablation (RFA): This procedure uses high-energy radio waves for treatment. The doctor puts a thin, needle-like probe through the skin and into the tumor. An electric current then passes through the tip of the probe, which heats the tumor and destroys the cancer cells. This treatment is used mainly for small tumors.

Microwave thermotherapy: This procedure is similar to RFA, except microwaves are used to heat and destroy the tumor.

Cryosurgery (also known as cryotherapy or cryoablation): This procedure destroys a tumor by freezing it. A thin metal probe is guided into the tumor, and very cold gasses pass through the probe to freeze the tumor, killing the cancer cells. This method can be used to treat larger tumors than the other ablation techniques, but it sometimes requires general anesthesia (where you are put into a deep sleep and not able to feel pain).

Side effects of ablation treatments

Possible side effects after ablation therapy include abdominal pain, infection, and bleeding inside the body. Serious complications are uncommon, but they are possible.

Embolization

During embolization, the doctor injects substances into an artery to try to block the blood flow to cancer cells, causing them to die. This can sometimes be used for tumors in the liver that are too large to be treated with ablation. This type of treatment typically does not require a hospital stay.

There are 3 main types of embolization:

Arterial embolization: This is also known as trans-arterial embolization (or TAE). In this procedure a catheter (a thin, flexible tube) is put into an artery through a small cut in the inner thigh and threaded up into the artery feeding the tumor. A dye is usually injected into the blood at this time to help the doctor monitor the path of the catheter with angiography, a special type of x-ray. Once the catheter is in place, small particles are injected into the artery to plug it up.

Chemoembolization: This approach, also known as trans-arterial chemoembolization (or TACE) combines embolization with chemotherapy. Most often, this is done by using tiny beads that give off a chemotherapy drug for the embolization. TACE can also be done by giving chemotherapy through the catheter directly into the artery, then plugging up the artery.

Radioembolization: This technique combines embolization with radiation therapy.In the United States, this is done by injecting small radioactive beads (called *microspheres*) into the artery. The beads lodge in the blood vessels near the tumor, where they give off small amounts of radiation to the tumor site for several days. The radiation travels a very short distance, so its effects are limited mainly to the tumor.

Side effects of embolization

Possible complications after embolization include abdominal pain, fever, nausea, infection, and blood clots in nearby blood vessels. Serious complications are not common, but they can happen.

- References

See all references for Pancreatic Cancer

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Radiation Therapy for Pancreatic Cancer

Radiation therapy uses high-energy x-rays (or particles) to kill cancer cells.

When might radiation therapy be used?

Radiation therapy can be helpful in treating some **exocrine pancreatic cancers** (the most common type of pancreatic cancer). It can be used in different situations to treat these cancers:

- Radiation might be given after surgery (known as *adjuvant* treatment) to try to lower the chance of the cancer coming back. The radiation is typically given along with chemotherapy, which is together known as *chemoradiation* or *chemoradiotherapy.*
- For borderline resectable tumors, radiation might be given (along with chemotherapy) before surgery to try to shrink the tumor and make it easier to remove.
- Radiation therapy (combined with chemotherapy) may be used as part of the main treatment in people whose cancers have grown beyond the pancreas and can't be removed by surgery (locally advanced/unresectable cancers).
- Radiation is sometimes used to help relieve symptoms such as pain in people with advanced cancers or in people who aren't healthy enough for other treatments like surgery.

Pancreatic neuroendocrine tumors (NETs) don't respond well to radiation, so it's not often used to treat these tumors. Radiation is sometimes used to treat pancreatic NETs that have spread to the bone and are causing pain. It may also be used in the form of radioembolization to treat NETs that have spread to the liver, which was discussed in Ablation or Embolization Treatments for Pancreatic Cancer.

How is radiation therapy given?

The type of radiation most often used to treat pancreatic cancer, known as *external beam radiation therapy*, focuses radiation from a source outside of the body on the cancer.

Before your treatment starts, your radiation team will take careful measurements to find the correct angles for aiming the radiation beams and the proper dose of radiation. This planning session, called *simulation*, usually includes getting imaging tests such as CT or MRI scans.

The treatment is much like getting an x-ray, but the radiation is stronger. The procedure itself is painless. Each treatment lasts only a few minutes, although the setup time – getting you into place for treatment – usually takes longer. Most often, radiation treatments are given 5 days a week for several weeks.

Possible side effects

Some of the more common side effects of radiation therapy include:

- Skin changes in areas getting radiation, ranging from redness to blistering and peeling
- Nausea and vomiting
- Diarrhea
- Fatigue
- Loss of appetite
- Weight loss

Radiation can also lower blood counts, which can increase the risk of serious infection.

Usually these effects go away within a few weeks after the treatment is complete. Ask your doctor what side effects to expect and how to prevent or relieve them.

To learn more about radiation therapy, see the Radiation Therapy section of our website.

- References

See all references for Pancreatic Cancer

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Chemotherapy and Other Drugs for Pancreatic Cancer

Chemotherapy (chemo) uses anti-cancer drugs injected into a vein or taken by mouth. These drugs enter the bloodstream and reach all areas of the body, making this treatment potentially useful for cancers that have spread beyond the organ they started in.

When might chemotherapy be used?

Chemo is often part of the treatment for exocrine pancreatic cancer (the most common type of pancreatic cancer), but for pancreating neuroendocrine tumors (NETs), other types of medicines are used more often.

Chemo may be used at any stage of pancreatic cancer:

- Chemo can be given before surgery (sometimes along with radiation) to try to shrink the tumor. This is known as *neoadjuvant* treatment.
- Chemo can be used after surgery (sometimes along with radiation) to try to kill any cancer cells that have been left behind (but can't be seen). This type of treatment, called *adjuvant* treatment, might lower the chance that the cancer will come back later.
- Chemo is commonly used when the cancer is advanced and can't be removed completely with surgery, or if surgery isn't an option for some other reason.

When chemo is given along with radiation, it is known as *chemoradiation* or *chemoradiotherapy*. It can help the radiation work better, but can also have more severe side effects.

Which chemo drugs are used to treat pancreatic cancer?

Many different chemo drugs can be used to treat pancreatic cancer, including:

- Gemcitabine (Gemzar)
- 5-fluorouracil (5-FU)
- Irinotecan (Camptosar)
- Oxaliplatin (Eloxatin)
- Albumin-bound paclitaxel (Abraxane)
- Capecitabine (Xeloda)
- Cisplatin
- Paclitaxel (Taxol)
- Docetaxel (Taxotere)
- Irinotecan liposome (Onivyde)

In people who are healthy enough, 2 or more drugs are usually given together. For people who are not healthy enough for combined treatments, a single drug (usually

gemcitabine, 5-FU, or capecitabine) can be used.

Doctors give chemo in cycles, with each period of treatment followed by a rest period to allow the body time to recover. Each chemo cycle typically lasts for a few weeks.

Possible side effects

Chemo drugs can cause side effects. These depend on the type and dose of drugs given and how long treatment lasts. Common short-term side effects include:

- Nausea and vomiting
- Loss of appetite
- Hair loss
- Mouth sores
- Diarrhea or constipation
- Increased chance of infection (from a shortage of white blood cells)
- Bleeding or bruising after minor cuts or injuries (from a shortage of platelets)
- Fatigue and shortness of breath (from too few red blood cells)

Some chemo drugs can cause other side effects. For example:

- Drugs such as cisplatin, oxaliplatin, and paclitaxel can damage nerves, which can lead to symptoms of numbness, tingling, or even pain in the hands and feet (called peripheral neuropathy). For a day or so after treatment, oxaliplatin can cause nerve pain that gets worse with exposure to cold, including when swallowing cold foods or liquids.
- Cisplatin can damage the kidneys. Doctors try to prevent this by giving the patient lots of fluid before and after the drug is given.

If you will be getting chemo, ask your cancer care team about the drugs being used and what side effects to expect. Most side effects go away once treatment is stopped.

Be sure to tell your doctor or nurse if you do have side effects, as there are often ways to help with them. For example, drugs can be given to prevent or reduce nausea and vomiting.

To learn more about chemo, see the Chemotherapy section of our website.

Targeted therapy for pancreatic cancer

As researchers have learned more about the changes in pancreatic cancer cells that help them grow, they have developed newer drugs to specifically target these changes. These targeted drugs work differently from standard chemo drugs. Sometimes they work when standard chemo drugs don't, and they often have different (and less severe) side effects. (See What's New in Pancreatic Cancer Research? for more information.)

Erlotinib (Tarceva) is a drug that targets a protein on cancer cells called *EGFR*, which normally helps the cells grow. In people with advanced pancreatic cancer, this drug can be given along with the chemo drug gemcitabine. Some people may benefit more from this combination than others. Common side effects of erlotinib include an acne-like rash on the face and neck, diarrhea, loss of appetite, and feeling tired.

- References

See all references for Pancreatic Cancer

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Drugs Used to Treat Pancreatic Neuroendocrine Tumors

The drugs used to treat pancreatic neuroendocrine tumors (NETs) tend to be different from those used to treat exocrine pancreatic cancer (the most common type of pancreatic cancer. These drugs are used mainly when the tumor can't be removed with surgery.

Somatostatin analogs

Drugs that are similar to somatostatin, a natural hormone in the body, can be very helpful for some patients with pancreatic NETs. These drugs stop tumors from releasing hormones into the bloodstream, which can often relieve symptoms and help patients feel better. They also seem to help slow the growth of some tumors.

These drugs can be expected to help anyone with a tumor that can be seen on

somatostatin receptor scintigraphy (see “Imaging tests” in Tests for Pancreatic Cancer). They can help reduce diarrhea in patients with VIPomas, glucagonomas, and somatostatinomas, and can also help the rash of glucagonomas.

The somatostatin analogs currently available include:

- **Octreotide (Sandostatin):** The standard version of octreotide is short-acting and is injected 2 to 4 times a day. There is also a long-acting form of the drug (called Sandostatin LAR Depot) that only needs to be given once a month, which may help patients more than the short-acting version.
- **Lanreotide (Somatuline Depot):** This is a newer somatostatin analog, which is injected under the skin about once a month. It has been shown to help slow the growth of pancreatic NETs.
- **Pasireotide (Signifor, Signifor LAR):** Another newer somatostatin, this drug is injected either twice a day or about once a month. Pasireotide is being studied for use in pancreatic NETs, although the other drugs are used more often.

Possible side effects

The main side effects of these drugs are pain at the site of the injection, and rarely, stomach cramps, nausea, vomiting, headaches, dizziness, and fatigue. These drugs can also cause sludge to build up in the gallbladder, which can lead to gallstones. They can also make the body resistant to the action of insulin, which can raise blood sugar levels and make pre-existing diabetes harder to control. These drugs are not often used to treat insulinomas, because the effects on the release of other hormones can cause worse problems with blood sugars.

Chemotherapy for pancreatic neuroendocrine tumors

Chemotherapy (chemo) uses anti-cancer drugs injected into a vein or taken by mouth. Chemo is most often used to treat NETs that are large or growing quickly and are causing symptoms. When chemo is used it often includes a combination of 2 or more drugs.

The most commonly used drugs for pancreatic NETs include:

- Doxorubicin (Adriamycin) or liposomal doxorubicin (Doxil)
- Streptozocin
- Fluorouracil (5-FU)

- Dacarbazine (DTIC)
- Temozolomide (Temodar)
- Capecitabine (Xeloda)
- Oxaliplatin (Eloxatin)

For poorly differentiated (high-grade) NETs (sometimes called *neuroendocrine carcinomas*), a combination of a platinum drug (either cisplatin or carboplatin) plus etoposide is often used.

To learn more about chemo (including possible side effects), see the Chemotherapy section of our website.

Targeted therapy for pancreatic neuroendocrine tumors

Targeted drugs work differently from standard chemo drugs. They attack specific changes in tumor cells that help them grow. Some targeted drugs can be helpful in treating advanced pancreatic NETs.

Sunitinib (Sutent) attacks new blood vessel growth and other targets that help cancer cells grow. In advanced pancreatic NETs, it has been shown to slow tumor growth and help patients live longer. This drug is taken as pills once a day. The most common side effects are nausea, diarrhea, changes in skin or hair color, mouth sores, weakness, and low blood cell counts. Other possible effects include tiredness, high blood pressure, heart problems, bleeding, hand-foot syndrome (redness, pain, and skin peeling of the palms of the hands and the soles of the feet), and low thyroid hormone levels.

Everolimus (Afinitor) works by blocking a cell protein known as *mTOR*, which normally helps cells grow and divide. This drug has been shown to slow tumor growth, but it's not yet clear if it helps patients live longer. Everolimus is a pill taken once a day. Common side effects of this drug include mouth sores, infections, nausea, loss of appetite, diarrhea, skin rash, feeling tired or weak, fluid buildup (usually in the legs), and increases in blood sugar and cholesterol levels. A less common but serious side effect is damage to the lungs, which can cause shortness of breath or other problems.

Other drugs that treat pancreatic neuroendocrine tumors

Other types of drugs are sometimes useful in treating people with pancreatic NETs as

well.

Diazoxide: This drug can block insulin release from the pancreas. It can be used to prevent low blood sugar (hypoglycemia) in patients with insulinomas. This drug is often used before surgery, to make the operation safer for the patient.

Proton pump inhibitors: These drugs block acid secretion from the stomach. They are often very helpful in preventing ulcers in patients with gastrinomas, although they might need to be taken in higher than usual doses. Examples of these drugs include omeprazole (Prilosec), esomeprazole (Nexium), and lansoprazole (Prevacid).

Systemic Radiation Therapy

For adults with somatostatin (a type of hormone) receptor-positive pancreatic neuroendocrine tumors, a radioactive drug, called Lutathera (lutetium Lu 177 dotatate), has been approved for treatment. Lutathera, also called a radiopharmaceutical, works by attaching to the somatostatin receptor (protein), which is part of the cancer cell, allowing radiation to enter the cell and cause damage. It can be given alone or in combination with octreotide.

Common side effects of Lutathera include low levels of white blood cells, high levels of enzymes in certain organs, nausea and vomiting, high levels of blood sugar, and low levels of potassium in the blood.

Serious side effects of Lutathera include low levels of blood cells, development of certain blood or bone marrow cancers, kidney damage, liver damage, abnormal levels of hormones in the body, and infertility. Women who are pregnant or might become pregnant should be advised that Lutathera can cause harm to a developing fetus.

Lutathera is given intravenously and does expose those taking it to radiation. Other patients, medical personnel, and household members should limit their radiation exposure in accordance with radiation safety practices.

- References

See all references for Pancreatic Cancer

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Pain Control in Pancreatic Cancer

Pain can be a major problem for people with pancreatic cancer. These cancers can invade and press on nerves near the pancreas, which can cause pain in the abdomen (belly) or back.

Treatment is available to help relieve this pain. If you are having any pain, please be sure to tell your doctor or nurse. Pain is easier to control if the treatment is started when you first have it. You and your doctor or nurse can talk about the best ways to treat your pain. A pain specialist can also help develop a treatment plan.

There are proven ways to relieve pain from pancreatic cancer.

Pain medicines

For most patients, morphine or similar drugs (opioids) can help control the pain. Many people are worried about these drugs because they fear becoming addicted, but studies have shown that the risk of this is low if the patient takes the drug for pain as directed by the doctor.

Pain medicines work best when they are taken on a regular schedule. They do not work as well if they are only used when the pain becomes severe. Several long-acting forms of morphine and other opioids are in pill form and only need be taken once or twice a day. There is even a long-acting form of the drug fentanyl that is applied as a patch every 3 days.

Common side effects of these drugs are nausea and feeling sleepy, which often get better over time. Constipation is a common side effect that does not get better on its own, so it needs to be treated. Most people need to take laxatives daily.

Other treatments

Sometimes certain procedures might be needed to treat pain. For example, cutting or injecting alcohol into some of the nerves near the pancreas that carry pain sensations can often improve pain and allow you to use lower doses of pain medicines. If you are having surgery for some reason (such as to remove the cancer or relieve bile duct

blockage), this can be done as part of the same operation.

This can also be done as a separate procedure. For example, the doctor might do a *nerve block* by injecting the nerves near the pancreas with either an anesthetic or a medicine that destroys the nerves. This can be done either by passing a needle through the skin or by using an endoscope (a long, flexible tube that is passed down the throat and past the stomach).

Treating the cancer with chemotherapy and/or radiation therapy can also sometimes relieve pain by shrinking the size of the cancer.

For more information on pain and what can be done about it, see Cancer Pain.

- References

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Treating Pancreatic Cancer, Based on Extent of the Cancer

Treating exocrine pancreatic cancer, the most common type of pancreatic cancer, is different from treating pancreatic neuroendocrine tumors (NETs), which is discussed elsewhere.

Most of the time, pancreatic cancer is treated based on its stage – how far it has spread in the body. But other factors, such as your overall health, can also affect treatment options. Talk to your doctor if you have any questions about the treatment plan he or she recommends.

It can be hard to stage pancreatic cancer accurately using imaging tests. Doctors do their best to figure out before treatment if there is a good chance the cancer is resectable – that is, if it can be removed completely. But sometimes cancers turn out to have spread farther than was first thought.

Treating resectable cancer

Surgeons usually consider pancreatic cancer to be resectableif it looks like it is still just in the pancreas or doesn't extend far beyond the pancreas, and has not grown into nearby large blood vessels. A person must also be healthy enough to withstand surgery to remove the cancer, which is a major operation.

If imaging tests show a reasonable chance of removing the cancer completely, surgery is the preferred treatment if possible, as it offers the only realistic chance for cure. Based on where the cancer started, usually either a Whipple procedure (pancreaticoduodenectomy) or a distal pancreatectomy is used.

Sometimes even when a cancer is thought to be resectable, it becomes clear during the surgery that not all of it can be removed. If this happens, continuing the operation might do more harm than good. The surgery might be stopped, or the surgeon might continue with a smaller operation with a goal of relieving or preventing problems such as bile duct blockage.

Even when the surgeon thinks all of the cancer has been removed, the cancer might still come back. Giving chemotherapy (chemo), either alone or with radiation therapy (chemoradiation), after surgery (known as *adjuvant treatment*) might help some patients live longer. The chemo drugs most often used are gemcitabine (Gemzar) or 5-FU.

Treating borderline resectable cancer

A small number of pancreatic cancers have reached nearby blood vessels but have not grown deeply into them or surrounded them. These cancers might still be removable by surgery, but the odds of removing all of the cancer are lower, so they are considered *borderline resectable*.

These cancers are often treated first with neoadjuvant chemotherapy (sometimes along with radiation therapy) to try to shrink the cancer and make it easier to remove. Imaging tests (and sometimes laparoscopy) are then done to make sure the cancer hasn't grown too much to be removed. As long as it hasn't, surgery is then done to remove it. This might be followed by more chemotherapy.

Another option might be to have surgery first, followed by adjuvant chemotherapy (and possibly radiation). If, during the surgery, it becomes clear that not all of the cancer can be removed, continuing the operation might do more harm than good. The surgery might be stopped, or the surgeon might continue with a smaller operation with a goal of

relieving or preventing problems such as bile duct blockage.

Treating locally advanced (unresectable) cancer

Locally advanced cancers have grown too far into nearby blood vessels or other tissues to be removed completely by surgery, but have not spread to the liver or distant organs and tissues. Surgery to try to remove these cancers does not help people live longer. Therefore, if surgery is done, it is to relieve bile duct blockage or to bypass a blocked intestine caused by the cancer pressing on other organs.

Chemotherapy, sometimes followed by chemoradiation, is the standard treatment option for locally advanced cancers. This may help some people live longer even if the cancer doesn't shrink. Giving chemo and radiation therapy together may work better to shrink the cancer, but this combination has more side effects and can be harder on patients than either treatment alone.

Treating metastatic (widespread) cancer

Pancreatic cancers often first spread within the abdomen (belly) and to the liver. They can also spread to the lungs, bone, brain, and other organs.

These cancers have spread too much to be removed by surgery. Even when imaging tests show that the spread is only to one other part of the body, it has to be assumed that small groups of cancer cells (too small to be seen on imaging tests) have already reached other organs of the body.

Chemotherapy is the main treatment for these cancers. It can sometimes shrink or slow the growth of these cancers for a time and might help people live longer, but it is not expected to cure the cancer.

Gemcitabine is the drug used most often. It can be used alone (especially for people in poor health), or it can be combined with other drugs like albumin-bound paclitaxel (Abraxane), erlotinib (Tarceva), or capecitabine (Xeloda).

Another option, especially for people who are otherwise in good health, is a combination of chemo drugs called FOLFIRINOX. This consists of 4 drugs: 5-FU, leucovorin, irinotecan (Camptosar), and oxaliplatin (Eloxatin). This treatment might help people live longer than getting gemcitabine alone, but it can also have more severe side effects.

Other treatments might also be used to help prevent or relieve symptoms from these

cancers. For example, radiation therapy or some type of nerve block might be used to help relieve cancer pain, or a stent might be placed during an endoscopy to help keep the bile duct open.

Because the treatments now available don't work well for many people, you may want to think about taking part in a clinical trial of new drugs or combinations of drugs.

Treating pancreatic cancer that progresses or recurs

If cancer continues to grow during treatment (progresses) or comes back (recurs), your treatment options will depend on where and how much the cancer has spread, what treatments you have already had, and on your health and desire for more treatment. It's important that you understand the goal of any further treatment, as well as the likelihood of benefits and risks.

When pancreatic cancer recurs, it most often shows up first in the liver, but it may also spread to the lungs, bone, or other organs. This is usually treated with chemotherapy if you are healthy enough to get it. If you have had chemo before and it kept the cancer away for some time, the same chemo might be helpful again. Otherwise, different chemo drugs might be tried. Other treatments such as radiation therapy or stent placement might be used to help prevent or relieve symptoms from the cancer.

If the cancer progresses while you are getting chemotherapy, another type of chemotherapy might be tried if you are healthy enough.

At some point, it might become clear that standard treatments are no longer controlling the cancer. If you want to continue getting treatment, you might think about taking part in a clinical trial of a newer pancreatic cancer treatment. While these are not always the best option for every person, they may benefit you, as well as future patients.

Treating cancer of the ampulla of Vater

The ampulla of Vater is the area where the pancreatic duct and the common bile duct empty into the duodenum (the first part of the small intestine). Cancer at this site (known as *ampullary cancer*) can start in the pancreatic duct, the duodenum, or the common bile duct. In many patients, ampullary cancer can't be distinguished from pancreatic cancer until surgery has been done.

These cancers often cause early symptoms such as jaundice, so they are often found while they are still resectable. Surgery with the Whipple procedure is often successful in

treating these early stage cancers. Adjuvant chemoradiotherapy is often recommended after surgery.

More advanced ampullary cancers are treated like pancreatic cancer.

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- References

See all references for Pancreatic Cancer

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Treating Pancreatic Neuroendocrine Tumors, Based on Extent of the Tumor

Treatment of pancreatic neuroendocrine tumors (NETs) depends to a large extent on whether they can be removed (resected) completely or not. But other factors, such as your overall health, can also affect treatment options. Talk to your doctor if you have any questions about the treatment plan he or she recommends.

Sometimes it can be hard to determine if cancer is resectable – that is, if it can be removed completely – using just imaging tests. A staging laparoscopy might be done before surgery to help determine if the tumor can be removed. But even then, cancers sometimes turn out to have spread farther than was first thought.

Pancreatic NETs are more likely to be resectable than exocrine pancreas cancers (the most common type of pancreatic cancer). Most NETs that have not spread to distant parts of the body are resectable. Even some NETs that have spread might be resectable if they have not spread too far (such as only to a small extent in the liver).

Treating resectable tumors

If the tumor is resectable, surgery will be done. The procedure used depends on the type of tumor, its size, and its location in the pancreas. Surgery can range from as little as enucleation (removing just the tumor) to as much as a Whipple procedure (pancreaticoduodenectomy). Lymph nodes are often removed to check for tumor spread.

Before any surgery, medicines are often given to control any symptoms caused by the tumor. For example, drugs to block stomach acid (like proton pump inhibitors) are used for gastrinomas. Often, people with insulinomas are treated with diazoxide to keep blood sugar from getting too low. If the tumor was visible on somatostatin receptor scintigraphy (OctreoScan), a somatostatin analog such as octreotide (Somatostatin) may be used to control any symptoms.

Surgery alone is all that is needed for many pancreatic NETs, but after surgery, close monitoring is important to look for signs that the cancer may have come back or spread.

Treating unresectable tumors

These tumors can't be removed completely with surgery. Pancreatic NETs are often slow growing, so lab and imaging tests are used to monitor the tumor(s) and look for signs of growth.

People with NETs that have spread outside the pancreas often have symptoms like diarrhea or hormone problems. These can often be helped with medicines like octreotide, lanreotide, diazoxide, and proton pump inhibitors. Some of these might also slow the growth of the tumor.

If further treatment is needed, chemotherapy or targeted drugs (such as sunitinib or everolimus) might be used, but this is usually delayed until a person is having symptoms that can't be controlled with other drugs or has signs of tumor growth on scans. Surgery or ablative techniques might also be used to treat cancer spread to the liver.

For people with poorly differentiated tumors (neuroendocrine carcinomas), chemotherapy is typically the first treatment.

For adults with somatostatin (a type of hormone) receptor-positive pancreatic neuroendocrine tumors, a radiopharmaceutical drug, called Lutathera (lutetium Lu 177

dotatate), is also an option for treatment.

If treatment is no longer working at some point, you might want to think about taking part in a clinical trial testing a newer treatment. While these are not always the best option for every person, they may benefit you as well as future patients.

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For additional assistance please contact your American Cancer Society
1-800-227-2345 or www.cancer.org