Nasal Cavity and Paranasal Sinus Cancers

What is cancer?

The body is made up of trillions of living cells. Normal body cells grow, divide into new cells, and die in an orderly fashion. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries.

Cancer begins when cells in a part of the body start to grow out of control. There are many kinds of cancer, but they all start because of out-of-control growth of abnormal cells.

Cancer cell growth is different from normal cell growth. Instead of dying, cancer cells continue to grow and form new, abnormal cells. Cancer cells can also invade (grow into) other tissues, something that normal cells cannot do. Growing out of control and invading other tissues are what makes a cell a cancer cell.

Cells become cancer cells because of damage to DNA. DNA is in every cell and directs all its actions. In a normal cell, when DNA gets damaged the cell either repairs the damage or the cell dies. In cancer cells, the damaged DNA is not repaired, but the cell doesn’t die like it should. Instead, this cell goes on making new cells that the body does not need. These new cells will all have the same damaged DNA as the first cell does.

People can inherit damaged DNA, but most DNA damage is caused by mistakes that happen while the normal cell is reproducing or by something in our environment. Sometimes the cause of the DNA damage is something obvious, like cigarette smoking. But often no clear cause is found.

In most cases the cancer cells form a tumor. Some cancers, like leukemia, rarely form tumors. Instead, these cancer cells involve the blood and blood-forming organs and circulate through other tissues where they grow.

Cancer cells often travel to other parts of the body, where they begin to grow and form new tumors that replace normal tissue. This process is called *metastasis*. It happens when the cancer cells get into the bloodstream or lymph vessels of our body.

No matter where a cancer may spread, it is always named for the place where it started. For example, breast cancer that has spread to the liver is still called breast cancer, not liver cancer. Likewise, prostate cancer that has spread to the bone is metastatic prostate cancer, not bone cancer.

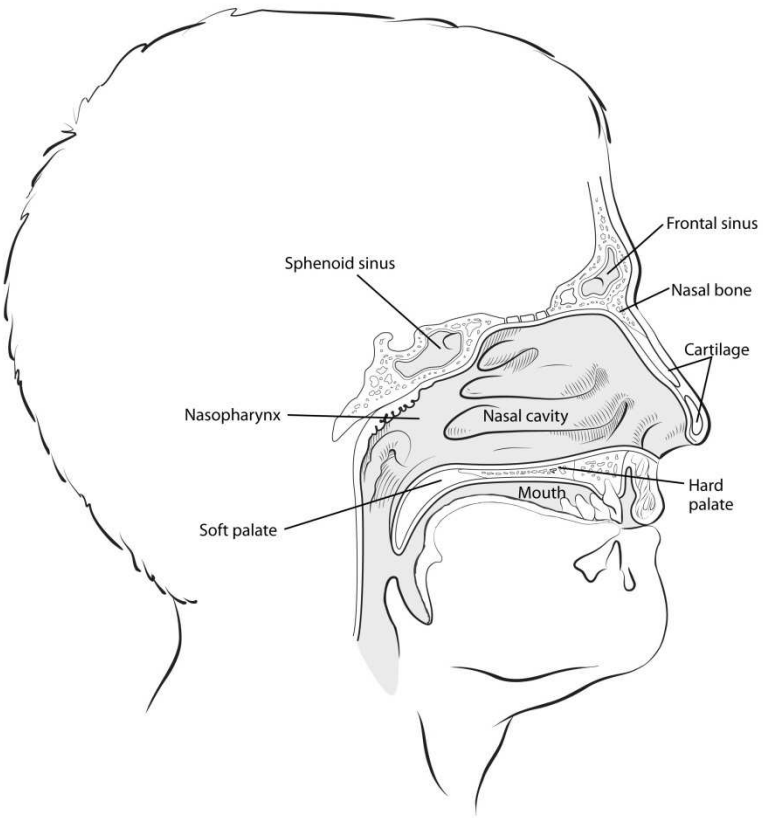
Different types of cancer can behave very differently. For example, lung cancer and breast cancer are very different diseases. They grow at different rates and respond to different treatments. That is why people with cancer need treatment that is aimed at their particular kind of cancer.

Not all tumors are cancerous. Tumors that aren't cancer are called *benign*. Benign tumors can cause problems – they can grow very large and press on healthy organs and tissues. But they cannot grow into (invade) other tissues. Because they can't invade, they also can't spread to other parts of the body (metastasize). These tumors are almost never life threatening.

What are nasal cavity and paranasal sinus cancers?

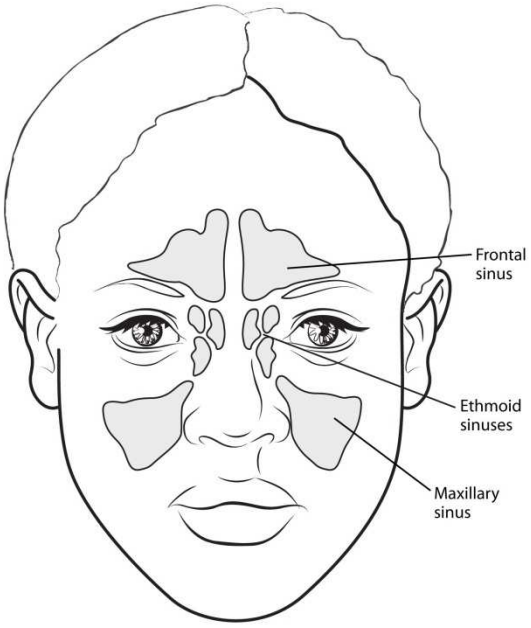
To understand these cancers, it helps to know a little about the nasal cavity and paranasal sinuses.

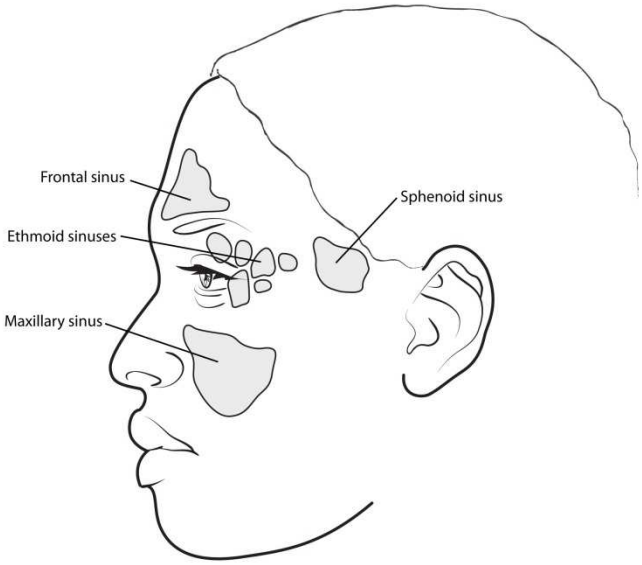
The nasal cavity



The nose opens into the nasal passageway, or cavity. This cavity is a space that runs along the top of the roof of the mouth (the *palate*, which separates your nose from your mouth) and then turns downward to join the passage from the mouth to the throat.

The paranasal sinuses





Sinuses are cavities (spaces) or small tunnels. They are called *paranasal* because they are around or near the nose. The nasal cavity opens into a network of paired sinuses:

- Maxillary sinuses are in the cheek area, below the eyes on either side of the nose.
- Frontal sinuses are above the inner eye and eyebrow area.
- Sphenoid sinuses are situated deep behind the nose, between the eyes.

- Ethmoid sinuses are made up of many sieve-like sinuses formed of thin bone and mucous tissues. They are above the nose, between the eyes.

Normally, these sinuses are filled with air. When you have a cold or sinus infection the sinuses can become blocked (obstructed) and fill with mucus and pus, which can be uncomfortable.

The nasal cavity and paranasal sinuses have several functions:

- They help filter, warm, and moisten the air you breathe.
- They give your voice resonance.
- They lighten the weight of the skull.
- They provide a bony framework for the face and eyes.

The nasal cavity and the paranasal sinuses are lined by a layer of mucus-producing tissue called *mucosa*. The mucosa has many types of cells, including:

- Squamous epithelial cells, which are flat cells that line the sinuses and make up most of the mucosa
- Glandular cells such as minor salivary gland cells, which produce mucus and other fluids
- Nerve cells, which are responsible for sensation and the sense of smell in the nose
- Infection-fighting cells (which are part of the immune system), blood vessel cells, and other supporting cells

Other types of cells in the nasal cavity and paranasal sinuses, including bone and cartilage cells, can also become cancerous.

Nasal cavity and paranasal sinus cancers

Any of the cells that make up the mucosa can become cancerous, and each type of cancer behaves or grows differently.

- Squamous epithelial cells can become squamous cell carcinomas. This is the most common type of cancer in the nasal cavity and paranasal sinuses. It makes up a little over half of cancers of these areas.
- Minor salivary gland cells can turn into adenocarcinomas, adenoid cystic carcinomas, and mucoepidermoid cancers. These are the next most frequent type of nasal and paranasal sinus cancers.
- Undifferentiated carcinoma is another type of cancer that can come from mucosa cells. This is a fast-growing cancer in which the cells look so abnormal that it’s hard to tell what type of cell the cancer started in.

- Cells that give the skin its tan or brown color are called *melanocytes*. These cells give rise to a type of cancer called *melanoma*. This is typically a cancer that can grow and spread quickly. These cancers usually are found on sun-exposed areas of the skin but can form on the lining of the nasal cavity and sinuses or other areas inside the body.

- Esthesioneuroblastoma is a cancer that starts in the olfactory nerve (the nerve for the sense of smell). This tumor is also known as *olfactory neuroblastoma*. This type of cancer usually occurs on the roof of the nasal cavity and involves a structure called the *cribriform plate*. The cribriform plate is a bone deep in the skull, between the eyes, and above the ethmoid sinuses. These tumors can sometimes be mistaken for other types of tumors, like undifferentiated carcinoma or lymphoma.

- Lymphomas (cancers arising from immune system cells called *lymphocytes*) can also occur in the nasal cavity and paranasal sinuses. One type of lymphoma seen in this area, T-cell/natural killer cell nasal-type lymphoma, was previously called *lethal midline granuloma*. Information about the diagnosis and treatment of lymphomas can be found in our document *Non-Hodgkin Lymphoma*.

- Sarcomas are cancers of muscle, bone, cartilage, and fibrous cells that can start anywhere in the body, including the nasal cavity and paranasal sinuses. Information about sarcomas can be found in some of our other documents.

Each of these types of cancer has a distinct behavior and outlook. They cannot all be treated the same way. Many of these cancers rarely affect the nasal cavity and paranasal sinuses, so they have been hard to study thoroughly. Because of this, doctors must base treatment decisions on their experience with similar cancers elsewhere in the head and neck area.

Other growths that can be found in nasal cavity and paranasal sinuses

Some growths in the nasal cavity and paranasal sinuses are not cancers, but they may still cause problems.

Nasal polyps

Nasal polyps are abnormal growths inside the nasal cavity or paranasal sinuses. Polyps usually have a teardrop shape and tend to have a smooth surface. Most nasal polyps are benign (non-cancerous) and are caused by some type of chronic inflammation in the nose. Using standard exams and tests, doctors can often tell benign polyps from cancer, but in some cases polyps may need to be evaluated more thoroughly to be sure. Small polyps that cause no symptoms may not need treatment, but larger polyps that cause problems may need to be treated with medicine or surgery.

Papillomas

Papillomas are warts that can grow inside the nasal cavity or paranasal sinuses and destroy healthy tissue. They usually have a bumpy surface. Papillomas are not cancer, but sometimes a squamous cell carcinoma will start in a papilloma. Because of the risk of cancer, papillomas in the nasal cavity and paranasal sinuses are removed by surgery.

Inverting papilloma. This is a type of papilloma that is officially classified as a benign tumor, but it tends to act more like a cancer. It has a tendency to recur (come back) and can grow into surrounding tissues. The treatment of inverting papilloma often includes the same type of surgery that is used for cancer.

What are the key statistics about nasal cavity and paranasal sinus cancers?

Cancers of the nasal cavity and paranasal sinuses are rare, with about 2,000 people in the United States developing these cancers each year.

These tumors are more common with age, with about 4 out of 5 cases occurring in people who are at least 55 years old.

Men are more likely than women to get these cancers. They occur much more often in certain areas of the world such as Japan and South Africa.

Most cancers of the nasal cavity and paranasal sinuses occur in the maxillary sinuses or in the nasal cavity. They are less common in the ethmoid sinuses, and are rare in the frontal and sphenoid sinuses.

Survival statistics for these cancers are discussed in the section “Survival rates for nasal cavity and paranasal sinus cancers, by stage.”

What are the risk factors for nasal cavity and paranasal sinus cancers?

A risk factor is anything that changes your chances of getting a disease like cancer. Different cancers have different risk factors. For example, too much exposure to sunlight is a risk factor for skin cancer, and smoking is a risk factor for many different kinds of cancers.

But risk factors don’t tell us everything. Having a risk factor, or even several, does not mean that you will get the disease. Many people with risk factors never develop these cancers, while people with these cancers may have few or no known risk factors.

Researchers have found a few risk factors that make a person more likely to develop nasal cavity and paranasal sinus cancer. Most of these are exposures to inhaled substances in the workplace.

Workplace exposures

People who work in certain jobs are more likely to develop nasal cavity and paranasal sinus cancer. The increased risk seems to be related to breathing in certain substances while at work, such as:

- Wood dusts from carpentry (such as furniture and cabinet builders), sawmills, and other wood-related industries
- Dusts from textiles (textile plants)
- Leather dusts (shoemaking)
- Flour (baking and flour milling)
- Nickel and chromium dust
- Mustard gas (a poison used in chemical warfare)
- Radium (a radioactive element rarely used today)

These workplace exposures have less clear links to nasal and paranasal sinus cancer:

- Glues
- Formaldehyde
- Organic solvents

Smoking

Some studies have found that smoking might increase the risk of nasal cavity cancer.

Human papilloma virus infection

The human papilloma virus (HPV) is a group of over 100 related viruses. They are called *papilloma viruses* because some of them cause a type of benign growth called a *papilloma*, which is more commonly known as a wart. Some types of HPV can cause cancers of the cervix, vagina, anus, vulva, penis, mouth, and throat. HPV has been detected in some cancers of the nasal cavity and paranasal sinuses. These cancers are linked to a better outcome. However, cancers of the nasal cavity or sinuses linked to HPV are rare.

Retinoblastoma

People with the inherited form of retinoblastoma, a type of eye cancer that typically develops in children, have an increased risk of nasal cavity cancer if their retinoblastoma was treated with radiation.

Do we know what causes nasal cavity and paranasal sinus cancers?

We don't know what causes each case of nasal cavity or paranasal sinus cancer. But we do know some of the risk factors for these cancers (see "What are the risk factors for nasal cavity and paranasal sinus cancers?"). Scientists believe that some risk factors, such as workplace exposure to certain chemicals, may cause these cancers by damaging the DNA of cells that line the inside of the nose and sinuses.

DNA is the chemical in each of our cells that makes up our genes – the instructions for how our cells function. We usually look like our parents because they are the source of our DNA. However, DNA affects more than how we look. Some genes have instructions for controlling when cells grow and divide. Genes that promote cell division are called *oncogenes*. Genes that slow down cell division or cause cells to die at the right time are called *tumor suppressor genes*. Cancers can be caused by DNA changes that turn on oncogenes or turn off tumor suppressor genes.

Some people inherit DNA mutations (changes) from a parent that increase their risk for developing certain cancers. But inherited changes in oncogenes or tumor suppressor genes are not believed to cause very many cancers of the nasal cavity or paranasal sinuses.

Gene changes related to these cancers usually occur during life rather than before birth like inherited mutations do. These *acquired* mutations are likely cause most nasal cavity and paranasal sinus cancers. They may result from events such as exposure to radiation or cancer-causing chemicals. Sometimes they occur for no apparent reason.

Not all cancers have the same gene changes. So far, few specific gene changes have been found in nasal cavity and paranasal sinus cancers. Several different types of cancer can start in these areas, each of which may have different changes.

Can nasal cavity and paranasal sinus cancers be prevented?

Not all nasal cavity and paranasal sinus cancers can be prevented, but the risk of developing these cancers can be greatly reduced by avoiding certain risk factors, such as workplace exposures to certain substances. Fortunately, awareness of the possible danger from these exposures has increased, and workplace safety measures to help protect people from them have improved. Still, if you are working with any of the substances listed in the section "What are the risk factors for nasal cavity and paranasal sinus cancers?," it's important for you to find out if you are being protected from harmful exposure.

Cigarette smoking is another avoidable risk factor for cancers of the nasal cavity and sinuses.

Most people with cancer of the nasal cavity and paranasal sinuses have no known risk factors, so there is currently no way to prevent most of these cancers.

Can nasal cavity and paranasal sinus cancers be found early?

Small cancers of the nasal cavity and paranasal sinuses usually do not cause any specific symptoms that help doctors find them early. Many of the symptoms of nasal cavity and paranasal sinus cancers can also be caused by benign conditions like infections. Because of this, many of these cancers are not found until they have grown large enough to block the nasal airway or sinuses, or until they have spread to nearby tissues or even to distant areas of the body.

Still, some nasal cavity and paranasal sinus cancers can be found early. Talk to your doctor if you have symptoms such as those described in the section “Signs and symptoms of cavity and paranasal sinus cancers” Most of these symptoms are much more likely to be caused by less serious problems. Still, it’s important to see a doctor so that the cause can be found and treated, if needed.

Screening

Screening refers to tests and exams used to detect a disease, such as cancer, in people who do not have any symptoms. Screening can find some types of cancer early, when treatment is most likely to be effective. But at this time there is no simple screening test that can routinely find nasal cavity and paranasal sinus cancers early. These cancers are also fairly rare. Because of this, neither the American Cancer Society nor any other group recommends routine screening for these cancers.

Signs and symptoms of nasal and paranasal sinus cancers

In most cases, nasal and paranasal sinus cancers are found because of the symptoms they cause. Diagnosis in people without symptoms is rare and usually accidental (because of tests done to check other medical problems). Possible symptoms of these cancers include:

- Nasal congestion and stuffiness that doesn’t get better or even worsens
- Pain above or below the eyes
- Blockage of one side of the nose
- Post-nasal drip (nasal drainage in the back of the nose and throat)
- Nosebleeds
- Pus draining from the nose

- Decreased sense of smell
- Numbness or pain in parts of the face
- Loosening or numbness of the teeth
- Growth or mass of the face, nose, or palate
- Constant watery eyes
- Bulging of one eye
- Loss or change in vision
- Pain or pressure in one of the ears
- Trouble opening the mouth
- Lymph nodes in the neck getting larger (seen or felt as lumps under the skin)

Having one or more of these symptoms does not mean you have nasal cavity or paranasal sinus cancer. In fact, many of these symptoms are more likely to be caused by other conditions (although with cancer they don't get better over time). Still, if you have any of these symptoms, it is important to have them checked by a doctor so that the cause can be found and treated, if needed.

How are nasal cavity and paranasal sinus cancers diagnosed?

Nasal cavity and paranasal sinus cancers are usually found because of signs or symptoms a person is having. The doctor will take a history and examine the patient. If cancer is suspected, the patient will be referred to a specialist and tests will be done to confirm the diagnosis.

Medical history and physical exam

When your doctor takes your medical history, you will be asked a series of questions about your symptoms and possible risk factors. A physical exam will provide other information about signs of nasal cavity and paranasal sinus cancer and other health problems.

During your physical exam, your doctor will pay special attention to the areas of your nose and sinuses that are causing symptoms. He or she will also pay attention to areas of numbness or pain, swelling and firmness in areas of the face or lymph nodes in the neck, changes in the symmetry of your eyes and face, visual changes, and any other problems you may be having.

Your doctor may also examine the nasal cavity with a headlight or even look inside your nose with a special instrument called a *nasal endoscope* (a thin tube designed to allow the doctor to see into the nasal passages).

If your doctor suspects you might have cancer of the nasal cavity or paranasal sinuses, you will be referred to an otolaryngologist (a doctor who specializes in diseases of the ear, nose, and throat; also known as an *ENT doctor*), who will more thoroughly examine your nasal passages and the rest of your head and neck area. This might include an exam of your throat, which can be done with small mirrors or with a fiber-optic scope – a thin, flexible, lighted tube that is passed down through the mouth or nose.

Imaging tests

Imaging tests use x-rays, magnetic fields, or other means to create pictures of the inside of your body. Imaging tests are not used to diagnose nasal cavity or paranasal sinus cancers, but they may be done for a number of reasons both before and after a cancer diagnosis, including:

- To help look for a tumor if one is suspected
- To learn how far cancer may have spread
- To help determine if treatment has been effective
- To look for possible signs of cancer recurrence after treatment

X-rays of the sinuses

X-rays can show if the sinuses are not filled by air as they should be. This would suggest that something is wrong, but it may not be a tumor. Most of the time, an abnormal-looking sinus x-ray means there is an infection. If treatment for infection doesn't work, then other more specialized x-ray tests may be done. Sinus x-rays are not done often any more, as many doctors prefer to order a computed tomography (CT) scan instead. A CT scan provides much more detail about the anatomy of the sinuses.

Computed tomography (CT) scan

The CT scan uses x-rays to produce detailed cross-sectional images of your body. This test is very useful in identifying cancers of the nasal cavity and paranasal sinuses. It may also be done to see if the cancer has spread to the lungs.

A CT scanner has been described as a large donut, with a narrow table in the middle opening. You will need to lie still on the table while the scan is being done. CT scans take longer than regular x-rays, and you might feel a bit confined by the ring while the pictures are being taken.

Instead of taking one picture like a standard x-ray, a CT scanner takes many pictures of the part of your body being studied as it rotates around you. A computer then combines

these pictures into an image of a slice of your body. Unlike a regular x-ray, a CT scan creates detailed images of the soft tissues and organs in the body.

Often after the first set of pictures is taken, you may receive an injection of a “dye” or radiocontrast agent into an intravenous (IV) line. This dye helps to better outline structures in your body. A second set of pictures is then taken. Some people are allergic to the dye and get hives, a flushed feeling, or, rarely, more serious reactions like trouble breathing and low blood pressure. Be sure to tell your doctor if you have any allergies or have ever had a reaction to any contrast material used for x-rays.

Magnetic resonance imaging (MRI) scan

MRI scans use radio waves and strong magnets instead of x-rays. The energy from the radio waves is absorbed and then released in a pattern formed by the type of tissue and by certain diseases. A computer translates the pattern of radio waves given off by the tissues into a very detailed image of parts of the body. A contrast material might be injected, but this is different from the one used for CT scans, so being allergic to one doesn’t mean you are allergic to the other.

MRI scans are very helpful in looking at cancers of the nasal cavities and paranasal sinuses. They are better than CT scans in distinguishing fluid from tumor, and sometimes they can help the doctor tell the difference between a benign tumor and a cancerous one.

MRI scans are a little more uncomfortable than CT scans. First, they take longer – often up to an hour. Second, you have to lie inside a narrow tube, which is confining and can upset people with claustrophobia (a fear of enclosed spaces). Special, more open MRI machines can sometimes help with this if needed, although the images may not be as sharp in some cases. MRI machines make buzzing and clicking noises that you may find disturbing. Some centers provide earplugs to help block this noise out.

Both CT and MRI help identify cancers of the nasal cavities and paranasal sinuses and their characteristics. The CT scan can tell if the cancer is growing into bone, but the MRI is better at evaluating the kind and size of the cancer. Both can tell if it has spread to lymph nodes in the neck.

Chest x-ray

If you have been diagnosed with nasal cavity or paranasal sinus cancer, this test might be done to find out if the cancer has spread to your lungs, which is the most common site of spread other than lymph nodes.

Biopsy

A biopsy is a procedure in which a doctor removes a sample of tissue to be looked at under a microscope. It is the only way to confirm the diagnosis of nasal cavity or paranasal sinus cancer. If cancer is found, the biopsy can also help the doctor tell what

type of cancer it is and how aggressive it is. This is important to help plan the most effective treatment.

Often, biopsies are done in the doctor's office or clinic. If the tumor is in a hard-to-reach area, the biopsy will be done in the operating room. Several types of biopsies can be used to diagnose nasal cavity or paranasal sinus cancer.

Fine needle aspiration (FNA) biopsy

In this type of biopsy, the doctor places a thin, hollow needle directly into a tumor or lymph node to take out cells and a few drops of fluid. The doctor may repeat this procedure 2 or 3 times during the same appointment to take several samples. The cells can then be viewed under a microscope to see if they look cancerous or benign.

This type of biopsy is often used in patients with enlarged lymph nodes in the neck. In these patients, fine needle biopsy can be useful in deciding if the lymph node swelling is from cancer or if it is a response to an infection. If someone who has already been diagnosed with nasal cavity or paranasal sinus cancer has enlarged neck lymph nodes, a fine needle biopsy can help determine if the lymph node swelling is caused by the spread of cancer.

Incisional and excisional biopsies

These types of biopsies remove more of the tumor using a minor surgical procedure. They are the more common types of biopsies for nasal and paranasal sinus tumors. Biopsies of tumors in the nose may be done using special instruments placed into the nose. Biopsies of tumors that are deeper within the skull may require a more involved procedure (see below).

For an *incisional* biopsy, the surgeon cuts out a small piece of the tumor. For an *excisional* biopsy, the entire tumor is removed. In either case, the biopsy sample is then sent to the lab for analysis.

Endoscopic versus open biopsy

For tumors deeper within the skull, how the biopsy is obtained depends on where it is and how large it is.

Endoscopic biopsy: Some tumors that are deep in the nasal passages may be reached using an endoscope – a thin, flexible lighted tube. Long, thin surgical instruments can be passed down the endoscope to get a biopsy sample.

Open (surgical) biopsy: For tumors inside the sinuses, it may be necessary to cut through the skin next to the nose and through the underlying bones to reach them. These operations are discussed in greater detail in the section "Surgery for nasal cavity and paranasal sinus cancer."

Anesthesia for biopsies

The type of anesthesia used depends on which biopsy method is used.

Local anesthesia (numbing medicine) is often used for an incisional biopsy or needle biopsy. The anesthetic can be injected into the skin and nearby tissues or even applied directly on the inside of the nose to numb the area for the biopsy.

Sedation (where you are made very drowsy) or general anesthesia (where you are asleep) may be required for endoscopic biopsies. General anesthesia is needed for procedures that cut through the sinus bones.

See Testing Biopsy and Cytology Specimens for Cancer to learn more about different types of biopsies, how the tissue is used in the lab for disease diagnosis, and what the results will tell you.

How are nasal cavity and paranasal sinus cancers staged?

Staging is a process that tells the doctor how widespread a cancer may be. It will show if the cancer has spread and how far. The stage (extent) of the cancer is a main factor in determining the treatment and prognosis (outlook) for people with nasal cavity or paranasal sinus cancers. Other important factors include the type of cancer and a person's general health.

Cancers of the nasal cavity and paranasal sinuses first grow and spread into nearby areas and then may spread to nearby lymph nodes. Lymph nodes are bean-sized collections of immune cells scattered throughout the head and neck (and the rest of the body). Cancers that continue to grow may then spread to other parts of the body, such as the lungs.

The most common system used to describe the stages of cancers is the American Joint Committee on Cancer (AJCC) TNM system. For nasal and paranasal sinus cancers, the TNM system is based on 3 key pieces of information:

- **T** stands for **tumor** (how far it has grown into nearby skull bones or other structures).
- **N** stands for spread to nearby lymph **nodes** in the head and neck.
- **M** is for **metastasis** (spread to distant organs). The most common site of spread for these cancers is to the lungs, although they may also spread to distant bones.

T categories

The T group of nasal cavity and paranasal sinus cancers is based on the results of head and neck exams and on any imaging tests of the area, such as CT or MRI scans. Higher T group numbers indicate more growth within the nasal cavity or paranasal sinuses or

spread to other nearby areas. The T groups for cancers that start in the maxillary sinuses differ from those for cancers that start in the nasal cavity or ethmoid sinuses.

T categories for maxillary sinus cancer

TX: Primary (main) tumor cannot be assessed.

T0: No evidence of primary tumor.

Tis: Cancer cells are limited to the innermost layer of the mucosa (epithelium). These cancers are known as *carcinoma in situ*.

T1: Tumor is only in the tissue lining the sinus (the mucosa) and does not invade bone.

T2: Tumor has begun to grow into some of the bones of the sinus, other than into the bone of the back part of the sinus.

T3: Tumor has begun to grow into the bone at the back of the sinus (called the *posterior wall*) or the tumor has grown into the ethmoid sinus, the tissues under the skin, or the side or bottom of the eye socket.

T4a: Tumor is growing into other structures such as the skin of the cheek, the front part of the eye socket, the bone at the top of the nose (cribriform plate), the sphenoid sinus, the frontal sinus, or certain parts of the face (the pterygoid plates or the infratemporal fossa). This is also known as *moderately advanced local disease*.

T4b: Tumor has grown into the throat behind the nasal cavity (called the *nasopharynx*), the back of the eye socket, the brain, the tissue covering the brain (the dura), some parts of the base of the skull (middle cranial fossa or clivus), or certain nerves. This is also known as *very advanced local disease*.

T categories for nasal cavity and ethmoid sinus cancer

TX: Primary (main) tumor cannot be assessed.

T0: No evidence of primary tumor.

Tis: Cancer cells are only in the innermost layer of the mucosa (epithelium). These cancers are known as *carcinoma in situ*.

T1: Tumor is only in the nasal cavity or one of the ethmoid sinuses, although it may have grown into the bones of the sinus.

T2: Tumor has grown into other nasal or paranasal cavities, and may or may not have grown into nearby bones.

T3: Tumor has grown into the side or bottom of the eye socket, the roof of the mouth (palate), the cribriform plate (the bone that separates the nose from the brain), and/or the maxillary sinus.

T4a: Tumor has grown into other structures such as the front part of the eye socket, the skin of the nose or cheek, the sphenoid sinus, the frontal sinus, or certain bones in the face (pterygoid plates). This is also known as *moderately advanced local disease*. Cancers that are T4a are usually resectable (meaning they can be removed with surgery).

T4b: Tumor is growing into the back of the eye socket, the brain, the dura (the tissue covering the brain), some parts of the skull (the clivus or the middle cranial fossa), certain nerves, or the nasopharynx (throat behind the nasal cavity). This is also known as *very advanced local disease*. These tumors are not resectable (they cannot be removed with surgery).

N categories

The N groups are based on spread of the cancer to nearby (regional) lymph nodes and on the size of the nodes. These groups are the same for all nasal cavity and paranasal sinus cancers:

NX: Nearby (regional) lymph nodes cannot be assessed.

N0: Cancer has not spread into the lymph nodes.

N1: Cancer has spread to a single lymph node that is on the same side as the tumor and is no larger than 3 centimeters (cm) across (slightly larger than 1 inch).

N2: Cancer has spread to a single lymph node on the same side as the tumor that is larger than 3 cm but no larger than 6 cm (slightly larger than 2 inches) across; or cancer has spread to more than one lymph node on the same side as the tumor, all of which are no larger than 6 cm across; or cancer is in at least one lymph node that is not on the same side as the tumor (but none are larger than 6 cm across).

N3: Cancer has spread to at least one nearby lymph node that is larger than 6 cm across.

M categories

The M groups for all nasal cavity and paranasal sinus cancers are the same:

M0: No cancer spread (metastasis) distant organs or tissues

M1: The cancer has spread to distant organs such as the lung or distant bones.

Stage groupings

Once the T, N, and M groups have been assigned, this information is combined to assign an overall stage for the cancer. This process is called stage grouping. Stage grouping rules are the same for all cancers of the nasal cavity and paranasal sinuses.

Stage	**T**	**N**	**M**

Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
Stage II	T2	N0	M0
Stage III	T3	N0	M0
	T1, T2, or T3	N1	M0
Stage IVA	T1, T2, or T3	N2	M0
	T4a	N0, N1, or N2	M0
Stage IVB	Any T	N3	M0
	T4b	Any N	M0
Stage IVC	Any T	Any N	M1

In general, patients with lower stage cancers tend to have a better outlook for a cure or long-term survival.

Survival rates for nasal cavity and paranasal sinus cancers, by stage

Doctors often use survival rates as a standard way of discussing a person's prognosis (outlook). Some patients with cancer may want to know the survival statistics for people in similar situations, while others may not find the numbers helpful, or may even not want to know them. If you do not want to know the survival statistics for nasal and paranasal sinus cancers, stop reading here and skip to the next section.

The rates below are based on the stage of the cancer *when it is first diagnosed*. When looking at survival rates, it's important to understand that the stage of a cancer does not change over time, even if the cancer progresses. A cancer that comes back or spreads is still referred to by the stage it was given when it was first found and diagnosed, but more information is added to explain the current extent of the cancer. (And of course, the treatment plan is adjusted based on the change in cancer status.)

The 5-year survival rate refers to the percentage of patients who live *at least* 5 years after their cancer is diagnosed. Of course, many of these people live much longer than 5 years.

Five-year *relative* survival rates, such as the numbers below, assume that some people will die of other causes and compare the observed survival with that expected for people without the cancer. This is a better way to describe the impact on survival for a particular type and stage of cancer.

To get 5-year survival rates, doctors have to look at people who were treated at least 5 years ago. Improvements in treatment since then may result in a more favorable outlook for people now being diagnosed with these cancers.

The following statistics were published in 2010 in the 7th edition of the AJCC Staging Manual. They come from the National Cancer Data Base and are based on nasal and paranasal sinus cancers diagnosed between 1998 and 1999. They include people with all types of nasal and paranasal sinus cancers.

Stage	**5-year relative survival rate**
I	63%
II	61%
III	50%
IV	35%

Survival rates are often based on previous outcomes of large numbers of people who had the disease, but they cannot predict what will happen in any particular person's case. Many other factors may affect a person's outlook, such as their general state of health, the exact type and location of the cancer, the treatment received, and how well the cancer responds to treatment. Your doctor can tell you how the numbers above may apply to the aspects of your particular situation.

How are nasal cavity and paranasal sinus cancers treated?

This information represents the views of the doctors and nurses serving on the American Cancer Society's Cancer Information Database Editorial Board. These views are based on their interpretation of studies published in medical journals, as well as their own professional experience.

The treatment information in this document is not official policy of the 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.

General treatment information

After your cancer is diagnosed and staged, your cancer care team will discuss your treatment options with you. Choosing a treatment plan is an important decision, so it is important to take time and think about all of the choices.

In creating your treatment plan, the most important factors to consider are the type, location, and the stage (extent) of the cancer. Your cancer care team will also take into account your general state of health and your personal preferences.

Treatment for nasal cavity or paranasal sinus cancer may include:

- Surgery
- Radiation therapy
- Chemotherapy
- Targeted therapy
- Palliative treatment

Depending on the stage of the cancer and your general medical condition, different treatment options may be used alone or in combination. For early stage cancer, surgery may be all that is needed. For more advanced cancer, other treatments like radiation therapy, chemotherapy, or targeted therapy may be needed in addition to or instead of surgery. Be sure to ask your doctor to explain the stage of your cancer so that you can make the best choice about your treatment.

Based on the treatment options, you may have different types of doctors on your treatment team. These doctors may include:

- An otolaryngologist: a doctor who specializes in certain diseases of the head and neck (also known as an ear, nose, and throat, or ENT doctor)
- A neurosurgeon: a doctor who specializes in surgery on the brain, spine, and other parts of the nervous system.
- A radiation oncologist: a doctor who treats cancer with radiation therapy.
- A medical oncologist: a doctor who treats cancer with medicines such as chemotherapy.

Many other specialists may be involved in your care as well, including nurse practitioners, nurses, nutrition specialists, social workers, and other health professionals.

It is 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. If time permits, it is often a good idea to get a second opinion. A second opinion can give you more information and help you feel confident about your chosen treatment plan. These are uncommon cancers, and not all hospitals and doctors have a lot of experience in treating them.

If the cancer is too advanced to be cured, the goal may be to remove or destroy as much of the cancer as reasonable to keep the tumor from growing, spreading, or returning for as long as possible. Some of the treatments above can also be used as palliative treatment if

all the cancer cannot be removed. Palliative treatment is meant to relieve symptoms such as pain, but it is not expected to cure the cancer.

The next few sections describe the different types of treatment for nasal cavity and paranasal sinus cancers. This is followed by a discussion of the most common treatment options based on the location and stage of the cancer.

Surgery for nasal cavity and paranasal sinus cancers

For most nasal cavity or paranasal sinus cancers, surgery to remove the cancer (and some of the surrounding bone or other nearby tissues) is an essential part of treatment. If the cancer has spread to the lymph nodes in the neck, the surgeon may also remove lymph nodes with an operation called a *neck dissection*. Often, surgery is combined with other treatments such as radiation therapy to get the best result.

The area around the nasal cavity and paranasal sinuses has many important nerves, blood vessels, and other structures. The brain, eyes, mouth, and carotid arteries (arteries that supply blood to the brain) are also close by, making surgical planning and surgery itself difficult. The surgeon must also take into account how the face will look and function after surgery.

The goal of surgery in these areas is to remove the entire tumor and a small amount of normal tissue around it while keeping appearance and function (such as breathing, speech, chewing, and swallowing) as normal as possible.

Unfortunately, these cancers often involve the eye or orbit (the bone and tissue surrounding the eye) by the time they are noticed or cause symptoms. Most of the time the eye can be saved, but sometimes the entire orbit and eye may need to be removed to give the best chance for cure.

Depending on the extent of the operation needed, your appearance may change as a result of surgery. This can range from a simple scar on the side of the nose to more extensive changes if nerves, parts of bones, or other structures need to be removed. It’s important to talk with your doctor before the surgery about what these changes might be to help prepare you for them. He or she can also give you an idea about what options might be available afterward, such as reconstructive surgery.

Because of the complex nature of these operations and the fact that these cancers are not common, it’s very important to have a surgeon who has experience treating these cancers.

When cancers are removed, the surgeon also tries to take out a rim of surrounding normal tissue. After a cancer surgery, the tissue that is removed will be looked at under the microscope to see if the edges contain cancer cells. If the edges don’t contain cancer cells, the cancer is said to have been removed with “negative” or “clear” margins. Negative margins mean that it is less likely that any cancer was left behind. If the edges do contain cancer cells, the margins are said to be “positive.” Positive margins make it more likely that some cancer was left behind. Often this means further treatment, such as more surgery or radiation.

Nasal cavity cancers

Nasal cavity cancers are often removed by a procedure called *wide local excision*. This means removing the tumor plus an area of normal tissue surrounding it. The goal is to remove enough tissue so that no cancer cells remain.

If the tumor is in the middle dividing wall of the nasal cavity (the nasal septum), sometimes the entire septum or a large portion of it will be removed.

If the tumor is in the lateral (side) wall of the nasal cavity, often this wall must be removed by a procedure called a *medial maxillectomy*. For this operation, the surgeon will usually cut through the skin along the side or edge of the nose and fold the external nose toward the opposite side to see and work on the tumor. Then the side of the nasal cavity can be removed by cutting the bone and soft tissue as needed. Sometimes, if the cancer is in a certain spot, the surgeon can reach the tumor by cutting under the upper lip instead. This approach has the advantage of avoiding any skin incisions. Ask your head and neck surgeon about which approach or incision you may need.

If the cancer has reached the skin or deeply invades the tissue of the external nose, part (or all) of the nose may need to be removed. There are many ways to rebuild a nose using tissue from the face or other areas. Or a cosmetic prosthesis (made of artificial materials) may be used to make a new nose.

Paranasal sinus cancers

Operations for paranasal sinus tumors vary, depending on its specific type, location, size, and growth into other structures.

If the tumor is very small and/or benign and is only in the ethmoid sinuses, an *external ethmoidectomy* may be done. The surgeon performing this operation will cut through the skin on the upper side of the nose next to the upper eyelid. Bone on the inner side of the orbit (eye socket) and nose will be removed to reach tumors inside the ethmoid sinuses.

If the tumor also has grown into the maxillary sinus, a *maxillectomy* may be done. The type of maxillectomy depends on where the tumor is and whether it also has grown into nearby tissues. The surgeon may make an incision along the side of the nose from the eyebrow or upper eyelid down to or through the upper lip. Or the incision may be made under the upper lip as discussed above. The bones around the maxillary sinus are cut so that the entire tumor and some surrounding tissue can be removed in one piece. This operation may remove bone from the hard palate (the roof of the mouth), upper teeth on one side of the mouth, part or all of the orbit (eye socket), part of the cheekbone, and/or the bony part of the upper nose.

If the cancer is in the ethmoid sinuses, frontal sinuses, and/or the sphenoid sinuses, an operation called a *craniofacial resection* may be done. This operation is similar to a maxillectomy except that the surgeon may also remove upper parts of the eye socket and the front of the skull base. This is an extensive operation that is done by a surgical team

that usually includes an otolaryngologist (head and neck surgeon) and a neurosurgeon (a surgeon who operations on the brain, spinal cord, and other nerves).

Endoscopic surgery

In this type of surgery, the surgeon uses an endoscope (a thin, flexible lighted tube inserted into the nose to reach the nasal cavity or sinus) to see and remove the tumor. That way, the surgeon does not have to cut through bone to open up the whole cavity. This reduces the actual amount of normal tissue destroyed. In general, recovering from this type of surgery takes less time.

Endoscopic surgery is most often used for smaller tumors. For larger tumors, it may be used to help try to control the tumor in people who are not healthy enough for a bigger operation. Usually it is combined with radiation treatment.

Endoscopic approaches to remove nasal and sinus cancers are being used more commonly as an increasing number of surgeons are trained in these techniques. These approaches might be less invasive but are best performed by teams of experienced surgeons at specialized centers. Some medical centers (and surgeons) have more experience than others with endoscopic surgery for nasal and sinus cancers. If you are considering endoscopic surgery as a part of your treatment, be sure to ask about your surgeon's training and experience, which are key to successful endoscopic surgery.

Removing lymph nodes

Cancers of the nasal cavity or paranasal sinuses sometimes spread to the lymph nodes in the neck. Depending on the stage and location of the cancer, these lymph nodes may need to be removed in an operation called a *neck dissection*.

There are several types of neck dissection procedures. Their goals are to remove lymph nodes proven or likely to contain cancer. The amount of tissue removed depends on the primary cancer's size and the extent of spread to lymph nodes.

- A *partial* or *selective neck dissection* removes only a few lymph nodes.
- A *modified radical neck dissection* removes most lymph nodes on one side of the neck between the jawbone and collarbone, as well as some muscle and nerve tissue.
- A *radical neck dissection* removes nearly all nodes on one side of the neck as well as even more muscles, nerves, and veins.

The most common side effects of any neck dissection are numbness of the ear, weakness in raising the arm above the head, and weakness of the lower lip. These occur when nerves that reach these areas are damaged. After a selective neck dissection, the weakness of the arm and lower lip usually go away after a few months. But if a nerve is removed as part of a radical neck dissection or because of tumor spread then the weakness will be permanent. After any type of neck dissection, physical therapists can teach the patient exercises to improve neck and shoulder movement.

For more information on surgery, see our document *Understanding Cancer Surgery: A Guide for Patients and Families.*

Radiation therapy for nasal cavity and paranasal sinus cancers

Radiation therapy uses high-energy radiation to kill cancer cells. It may be used in several ways for nasal and paranasal sinus cancers:

- As the main (primary) treatment. People with small nasal cavity tumors can often be cured with radiation alone with less change in their facial appearance than if they had surgery. People whose general health is too poor for surgery may also receive radiation therapy as their only treatment.
- After surgery to try to kill any small areas of cancer that were not seen but may remain. This is called *adjuvant* treatment.
- Before surgery to try to shrink the tumor so it is easier to remove. This is called *neoadjuvant* treatment.
- To help with symptoms like pain, bleeding, and trouble swallowing. This is known as *palliative* treatment.
- When the cancer has spread to the brain or spinal cord.

There are 2 major types of radiation therapy: external beam radiation therapy and brachytherapy.

External beam radiation therapy

The most common way to deliver radiation to a paranasal or nasal tumor is to focus a beam of radiation from a machine outside of the body. This is known as external beam radiation.

Before your treatments start, the radiation team will take careful measurements to determine the correct angles for aiming the radiation beams and the proper dose of radiation. Radiation therapy 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.

External beam radiation therapy usually means having treatments 5 days a week for about 6 to 7 weeks. Other schedules for radiation doses have been studied in clinical trials.

Hyperfractionation refers to giving the total radiation dose in a larger number of doses (2 smaller doses per day instead of 1 larger dose, for example). *Accelerated fractionation* means that the radiation treatment is completed faster (6 weeks instead of 7 weeks, for instance).

Several newer techniques help doctors focus the radiation more precisely, and may be helpful in some situations.

Three-dimensional conformal radiation therapy (3D-CRT): 3D-CRT uses the results of imaging tests such as MRI and special computers to map the location of the tumor precisely. Several radiation beams are then shaped and aimed at the tumor from different directions. Each beam alone is fairly weak, which makes it less likely to damage normal tissues, but the beams converge at the tumor to give a higher dose of radiation there. Patients are fitted with a mold or cast to keep the body part still so the radiation can be aimed more accurately.

Intensity modulated radiation therapy (IMRT): IMRT is an advanced form of 3D therapy. It uses a computer-driven machine that actually moves around the patient as it delivers radiation. In addition to shaping the beams and aiming them at the tumor from several angles, the intensity (strength) of the beams can be adjusted to minimize the dose reaching the most sensitive nearby normal tissues. This may let the doctor deliver a higher dose to the tumor. Many major hospitals and cancer centers now use IMRT as the standard way to deliver external beam radiation.

Stereotactic radiosurgery (SRS): SRS is not really surgery, but a type of radiation treatment that gives a large dose of radiation to a small tumor area in one session. It is mostly used for brain tumors and other tumors inside the head. In some cases, a head frame or shell may be used to help keep the patient's head still and aim the radiation beams precisely. Once the exact location of the tumor is known from the CT or MRI scans, radiation is sent to the area from a machine. The radiation is very precise and nearby tissues are affected as little as possible. Most of the time, stereotactic radiosurgery treatment gives the whole radiation dose in one session. The main advantage of SRS over IMRT is the shortened treatment time.

Brachytherapy

Another way to deliver radiation is to insert (implant) very thin metal rods containing radioactive materials in or near the cancer. The radiation travels only a very short distance, which limits its effects on nearby normal tissues. This method is called *internal radiation*, *interstitial* radiation, or *brachytherapy*. This is sometimes done if the cancer comes back after external beam radiation therapy.

The implant is usually left in place for several days while the patient stays in a private hospital room. The length of time that visitors, nurses, and other caregivers can spend with the patient may be limited because of potential radiation exposure, but this depends on the type of radiation. The implants are removed before the patient goes home. Sometimes, internal and external beam radiation therapy are used together. With more modern approaches to delivering radiation such as IMRT and SRS, brachytherapy is less commonly performed.

Side effects of radiation therapy

Common side effects include:

- Skin problems (like a sunburn)
- Nausea
- Loss of appetite
- Feeling tired or weak
- Mouth/throat pain and sores in the mouth (called *mucositis*)
- Trouble swallowing
- Hearing loss
- Hoarseness
- Problems with taste
- Bone pain
- Bone damage

Problems with mucositis can be severe enough that patients have trouble eating and drinking. This can lead to weight loss and malnutrition. Some people need to rely on tube feedings during treatment to keep up their strength. With tube feedings, a liquid food is given through a tube that is placed directly into the stomach through a small hole in the belly.

Most of these symptoms will go away shortly after the radiation is finished, but some side effects can be permanent. For example, if an eye is in the path of the radiation beam, vision could be damaged.

Radiation therapy to the head or neck area often damages the salivary (spit) glands, making the mouth very dry. This can lead to problems eating and swallowing. This is a very common side effect of radiation to the head and neck areas, and is often permanent. This side effect can be lessened if a drug called amifostine (Ethyol®) is given before each radiation treatment. There are also fewer problems with dry mouth if IMRT is used.

Along with discomfort and problems swallowing, a dry mouth can lead to tooth decay. Radiation can worsen any tooth problems that already exist. You may be advised to see a dentist to check your teeth before treatment. Depending on the expected radiation plan and the condition of your teeth, some of your teeth may need to be removed before starting treatment. People with dry mouth after radiation must pay close attention to their oral health.

If the pituitary or thyroid glands are exposed to radiation, their production of hormones may decrease over time. This can lead to problems with metabolism that may need to be corrected with medicine.

Sometimes chemotherapy is given with radiation to help it work better. This is called *chemoradiation*, and it has more severe side effects than when radiation is given by itself.

However, there are ways to relieve many of the side effects caused by radiation, so it's important to discuss any symptoms with your cancer care team.

For more information on radiation therapy, see the "Radiation Therapy" section of our website, or our document *Understanding Radiation Therapy: A Guide for Patients and Families*.

Chemotherapy for nasal cavity and paranasal sinus cancers

Chemotherapy (chemo) uses anti-cancer drugs that are given into a vein or by mouth. These drugs enter the bloodstream and reach all areas of the body, making this treatment useful for cancer that has spread metastasized (spread) to organs beyond the nasal cavity and paranasal sinuses.

Chemo may be used in different situations for nasal cavity and paranasal sinus cancers:

- Before surgery (often along with radiation therapy) to try to shrink the tumor and make surgery easier. This is called *neoadjuvant* chemotherapy.
- After surgery (often along with radiation therapy) to help lower the chance the cancer will come back later. This is called *adjuvant* chemotherapy.
- As the main treatment (often along with radiation therapy) for cancers that are too large or have spread too far to be completely removed with surgery.

Chemo for nasal cavity and paranasal sinus cancers may include a combination of several anti-cancer drugs. Nasal and paranasal sinus cancers are rare, so there aren't many studies to help doctors decide the best way to treat them. Often, doctors treat them with the same drugs that are used for other, more common, cancers of the head and neck.

The most common types of nasal cavity and paranasal sinus cancers, squamous cell carcinoma, adenocarcinoma, and adenoid cystic carcinoma, can be grouped together as *carcinomas*. Some of the chemo drugs used to treat carcinomas include:

- Carboplatin
- Cisplatin
- 5-fluorouracil (5-FU)
- Docetaxel (Taxotere®)
- Paclitaxel (Taxol®)
- Bleomycin
- Cyclophosphamide (Cytoxan®)
- Vinblastine
- Methotrexate

Chemo drugs may be used alone, but more often they are used in combination with one another. The drugs used depend on several factors, including the extent of the cancer, the person's overall health, and whether chemo is combined with radiation therapy. Cisplatin (sometimes combined with 5-FU) is the drug most often given with radiation. Some studies have shown that giving docetaxel with these 2 drugs may work even better.

New chemo drugs and combination treatments are also being studied. Some doctors give the drugs directly into arteries leading to the tumor. This concentrates the chemotherapy into the area that needs it to try to reduce side effects.

Different chemo drugs are used for sarcomas and melanomas. Information about chemotherapy for sarcomas may be found in our document *Sarcoma: Adult Soft Tissue Cancer*. Drug therapy for melanoma is covered in our document *Melanoma Skin Cancer*.

Side effects of chemotherapy

Chemo drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow (where new blood cells are made), the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are also likely to be affected by chemo, which can lead to side effects. Side effects depend on the specific drugs used, their dose, and the length of treatment. Common temporary side effects of chemo include:

- Nausea and vomiting
- Loss of appetite
- Loss of hair
- Mouth sores
- Diarrhea
- Low blood counts

Chemo often affects the blood-forming cells of the bone marrow, this can lead to:

- Increased chance of infection (from a shortage of white blood cells)
- Bleeding or bruising after minor cuts or injuries (from a shortage of blood platelets)
- Fatigue (from low red blood cell counts)

If the blood counts get too low, treatment may need to be delayed for a time so that they return to a safe level.

Most side effects improve once treatment is stopped. Hair will grow back after treatment ends, though it may look different. There are remedies for many of the temporary side effects of chemotherapy. For example, there are very good drugs to prevent or reduce nausea and vomiting.

Some side effects continue long after treatment is stopped. For example, cisplatin can cause nerve damage (neuropathy), which can lead to numbness in the hands and feet or hearing loss. These symptoms usually improve after the drug is stopped, but may not go away completely.

If your doctor plans treatment with chemo you should be sure to discuss which drugs will be used and the possible side effects. Once chemo is started, let your health care team know if you have side effects, so they can be treated.

For more information on chemotherapy, see the “Chemotherapy” section on our website, or our document *A Guide to Chemotherapy*.

Targeted therapy for nasal cavity and paranasal sinus cancers

As researchers have learned more about the changes in cells that cause cancer, they have been able to develop newer drugs that specifically target these changes. Targeted drugs work differently from standard chemo drugs. They often have different (and less severe) side effects. This type of drug has not been well studied for treating nasal cavity and paranasal sinus cancers.

Cetuximab (Erbitux®) is a monoclonal antibody (a man-made version of an immune system protein) that targets epidermal growth factor receptor (EGFR), a protein on the surface of certain cells that helps them grow and divide. Nasal cavity and paranasal sinus cancer cells often have higher than normal amounts of EGFR. By blocking EGFR, cetuximab can slow or stop cell growth.

Cetuximab may be combined with radiation therapy for some earlier stage cancers. For more advanced cancers, it may be combined with standard chemotherapy drugs such as cisplatin, or it may be used by itself.

Cetuximab is given by infusion into a vein (IV), usually once a week. A rare but serious side effect of cetuximab is an allergic reaction during the first infusion, which could cause breathing problems and low blood pressure. You may be given medicine before treatment to help prevent this. Many people develop skin problems such as an acne-like rash on the face and chest during treatment, which in some cases can lead to infections. Other side effects may include headache, tiredness, fever, and diarrhea.

Other targeted therapy drugs to treat nasal cavity and paranasal sinus cancers are being studied now.

For more information on drugs considered targeted therapy, see our document *Targeted Therapy*.

Palliative treatment for nasal cavity and paranasal sinus cancers

Most of this document discusses ways to remove or to destroy cancer cells or to slow their growth. But it is important to realize that maintaining a patient's quality of life is another important goal. This is true regardless of whether a person is being treated to try to cure the cancer or if the cancer is too advanced to be cured. If the goal of treatment is a cure, palliative treatments can help ease symptoms from the main cancer treatment itself. If the cancer is advanced, palliative treatment may play an even larger role, helping to keep the person comfortable and maintain quality of life for as long as possible.

For example, pain is a significant concern for many patients with cancer. It can almost always be treated effectively with milder drugs like ibuprofen or acetaminophen or, if needed, with stronger medicines like morphine or similar drugs (known as *opioids*). Taking these drugs does not mean a person will become addicted. Many studies have shown that people with cancer who take opioids for pain as their doctor directed typically do not become addicted.

Nutrition is another important concern for people with head and neck cancers such as nasal cavity or paranasal sinus cancers. Both the cancer and its treatment can make it hard to swallow. If this affects how a person eats or drinks, they may need to have a feeding tube inserted into the stomach. Often, this is placed with an endoscope (a flexible tube that goes into the stomach through the throat) and is known as a PEG (percutaneous endoscopic gastrostomy). This tube will most likely be needed for a short time during treatment, but in some cases it may need to be left in longer.

There are many other ways your doctor can help maintain your quality of life and control your symptoms. But this means that you have to tell your doctor how you are feeling and what symptoms you are having. Some people don't like to disappoint their doctors by telling them they are not feeling well. This does no one any good. Your doctor wants to know how you really feel. Talking about the symptoms you are having allows your doctor to give treatments that can relieve the symptoms. Getting effective treatment can help you feel better and let you concentrate on the things that are important in your life.

Clinical trials for nasal cavity and paranasal sinus cancers

You may have had to make a lot of decisions since you've been told you have cancer. One of the most important decisions you will make is choosing which treatment is best for you. You may have heard about clinical trials being done for your type of cancer. Or maybe someone on your health care team has mentioned a clinical trial to you.

Clinical trials are one way to get state-of-the art cancer treatment. In some cases they may be the only way to get access to newer treatments. They are also the only way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

If you would like to take part in a clinical trial, you should start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of clinical trials that meet your medical needs. You can reach

this service at 1-800-303-5691 or on our website at www.cancer.org/clinicaltrials. You can also get a list of current clinical trials by calling the National Cancer Institute's Cancer Information Service toll-free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials website at www.cancer.gov/clinicaltrials.

There are requirements you must meet to take part in any clinical trial. If you do qualify for a clinical trial, it is up to you whether or not to enter (enroll in) it.

Clinical trials are one way to get state-of-the art cancer treatment. Sometimes they may be the only way to get access to some newer treatments. They are also the only way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

You can get a lot more information on clinical trials in our document called *Clinical Trials: What You Need to Know*.

Complementary and alternative therapies for nasal cavity and paranasal sinus cancers

When you have cancer you are likely to hear about ways to treat your cancer or relieve symptoms that your doctor hasn't mentioned. Everyone from friends and family to Internet groups and websites may offer ideas for what might help you. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

What exactly are complementary and alternative therapies?

Not everyone uses these terms the same way, and they are used to refer to many different methods, so it can be confusing. We use *complementary* to refer to treatments that are used *along with* your regular medical care. *Alternative* treatments are used *instead of* a doctor's medical treatment.

Complementary methods: Most complementary treatment methods are not offered as cures for cancer. Mainly, they are used to help you feel better. Some methods that are used along with regular treatment are meditation to reduce stress, acupuncture to help relieve pain, or peppermint tea to relieve nausea. Some complementary methods are known to help, while others have not been tested. Some have been proven not be helpful, and a few have even been found harmful.

Alternative treatments: Alternative treatments may be offered as cancer cures. These treatments have not been proven safe and effective in clinical trials. Some of these methods may pose danger or have life-threatening side effects. But the biggest danger in most cases is that you may lose the chance to be helped by standard medical treatment. Delays or interruptions in your medical treatments may give the cancer more time to grow and make it less likely that treatment will help.

Finding out more

It is easy to see why people with cancer think about alternative methods. You want to do all you can to fight the cancer, and the idea of a treatment with few or no side effects sounds great. Sometimes medical treatments like chemotherapy can be hard to take, or they may no longer be working. But the truth is that most of these alternative methods have not been tested and proven to work in treating cancer.

As you consider your options, here are 3 important steps you can take:

- Look for “red flags” that suggest fraud. Does the method promise to cure all or most cancers? Are you told not to have regular medical treatments? Is the treatment a “secret” that requires you to visit certain providers or travel to another country?
- Talk to your doctor or nurse about any method you are thinking about using.
- Contact us at 1-800-227-2345 or see the “Complementary and Alternative Medicine” section of our website to learn more about complementary and alternative methods.

The choice is yours

Decisions about how to treat or manage your cancer are always yours to make. If you want to use a non-standard treatment, learn all you can about the method and talk to your doctor about it. With good information and the support of your health care team, you may be able to safely use the methods that can help you while avoiding those that could be harmful.

Treatment options by type, location, and stage of nasal cavity and paranasal sinus cancer

Most of the time, the treatment of nasal cavity or paranasal sinus cancer is based on its location and its stage – how far it has spread in the body. But other factors, such as a person’s overall health, may also affect treatment options. Talk to your doctor if you have any questions about the treatment plan he or she recommends.

The staging of nasal cavity and paranasal sinus cancer is very complex, and thus far staging systems have only been agreed upon for the most common cancers – maxillary sinus and nasal cavity/ethmoid sinus cancers. (See “How are nasal cavity and paranasal sinus cancers staged?”) Treatment choices for less common cancers of the nasal cavity and paranasal sinuses are tailored to suit each patient depending on the tumor type, size, location, and the patient’s general medical condition and desires.

Maxillary sinus cancer

Stages I and II: The first step in treating most stage I or II maxillary sinus cancers is surgery to remove the cancer. Usually a maxillectomy (removal of bone and mucosa of the maxillary sinus) is done. Surgery to remove lymph nodes in the neck is not needed.

After surgery, most people with these cancers are treated with radiation. Radiation may not be needed for people with stage I cancers if the cancer was removed completely with negative margins (meaning that there are no cancer cells at the edge of the removed specimen), and the cancer was not growing into the area around the nerves (called *perineural invasion*).

For stage II cancers and stage I cancers that couldn't be removed completely, had positive margins (cancer cells were found in the edges of the tissue removed), or perineural invasion, radiation is often given after surgery. Some doctors may recommend chemotherapy (chemo) or targeted therapy along with the radiation.

Radiation is often recommended for cancers that are the type called *adenoid cystic*, even if the margins are negative and there is no perineural invasion.

In situations where surgery to remove the cancer would be risky because of other medical problems, treatment may be radiation therapy alone. Sometimes chemo is given with the radiation.

Stages III and IVA: People with these stages of maxillary sinus cancer are also treated with surgery to remove the tumor. If there are signs that the cancer has spread to the lymph nodes in the neck, these lymph nodes are removed as well (a neck dissection).

After surgery, the area where the tumor had been is treated with radiation therapy. Sometimes the lymph nodes in the neck are also treated with radiation. This is more likely if the cancer has spread to a neck lymph node. Chemo (or targeted therapy) may be given along with the radiation therapy. This has more side effects than giving either treatment alone, but it may also reduce the risk that the cancer will grow back after treatment. Sometimes the radiation (and chemo) are given before the surgery to try to shrink the tumor so that it can be more easily or more completely removed.

Stage IVB: Some cancers are in this stage because the main tumor is not resectable (it cannot be removed completely with surgery). People with these cancers are usually treated with radiation therapy. They may also receive chemo (or targeted therapy). Surgery is sometimes done before radiation therapy to help relieve sinus blockage, but it is not meant to cure or completely remove the cancer on its own.

Stage IVB also includes some cancers where the main tumor can be removed with surgery (is resectable) but the cancer has spread to lymph nodes, making them larger than 6 cm (about 2½ inches, across). These cancers are treated like stage IVA cancers – surgery to remove the tumor and neck lymph nodes, followed by radiation and maybe chemo. Again, sometimes radiation and chemo are given before the operation to try to shrink the tumor and make it easier to remove.

Stage IVC: These cancers have spread to organs beyond the head and neck. Cancers in this stage are extremely hard to cure, so the goal of treatment is usually to stop or slow the growth of the cancer for as long as possible and to help relieve any symptoms it may be causing.

Treatment for this stage varies, depending on where the cancer is, the problems it is causing, and a person's general health. Chemo (or targeted therapy) is often the main

form of treatment if a person can tolerate it because it reaches all parts of the body. Radiation therapy may be directed at areas of cancer that are causing problems. Because these cancers are hard to treat, clinical trials of newer treatments may be a good option for some people.

Nasal cavity cancers

Stages I and II: These cancers are in the nasal cavity without spread to lymph nodes. They can be treated with surgery or radiation. Radiation is often recommended after surgery.

Stages III and IV: These cancers can be treated with surgery, with radiation often given after surgery. If the cancer has spread to lymph nodes in the neck, these will be removed as well (a *neck dissection*).

Another option is to treat with radiation, sometimes combined with chemo or targeted therapy.

Ethmoid sinus cancer

Because the ethmoid sinuses are close to the eye sockets and the skull base, operations for cancers in this area are generally more difficult and more extensive than operations for maxillary sinus cancers.

Stages I and II: These cancers can be treated with surgery to remove the tumor. Surgery is typically followed by radiation therapy (sometimes with chemo or targeted therapy). This is to try to kill any tiny bits of cancer cells that couldn't be seen and removed during surgery, which may lower the chance of the cancer coming back later. Sometimes chemo and radiation therapy are given before surgery to shrink the tumor and make it easier to remove.

For some very small cancers that are unlikely to spread, some doctors may recommend surgery only, although not all doctors agree with this.

Radiation therapy instead of surgery may also be an option for some patients. Radiation often results in less change in the facial appearance than surgery.

Stages III and IVA: These cancers are usually treated with surgery as well. If lymph nodes in the neck are enlarged, they will also be removed in an operation called a *neck dissection*. Surgery is typically followed by radiation therapy (sometimes along with chemo or targeted therapy).

Another option may be to start treatment with radiation therapy and chemo (or targeted therapy). This might be followed by surgery if the tumor shrinks enough.

More advanced cancers: for tumors that are unresectable or for people who are unable or don't want surgery, the first treatment is usually radiation therapy. Sometimes chemo is given with the radiation treatments.

Cancers that have spread to distant parts of the body are extremely hard to cure, so the goal of treatment is usually to stop or slow the growth of the cancer for as long as possible and to help relieve any symptoms it may be causing.

Treatment depends on where the cancer is, the problems it is causing, and a person's general health. Chemo (or targeted therapy) is often the main treatment if a person can tolerate it because it reaches all parts of the body. Radiation therapy may be directed at areas of cancer that are causing problems. Because these cancers are hard to treat, clinical trials of newer treatments may be a good option for some people.

Sphenoid sinus cancer

The sphenoid sinuses are very difficult to reach surgically. Cancers in this location are generally treated with radiation therapy. Chemo (or targeted therapy) may be added as well.

Melanomas

Most melanomas of the nasal cavity or paranasal sinuses are treated with surgery to remove the tumor and a surrounding area of normal tissue. Lymph nodes in the neck may also be removed in an operation called a *neck dissection*. Radiation therapy is usually given after surgery.

For cancers that can't be removed, radiation therapy, chemo, or other treatments (immunotherapy or targeted therapy) may be used. Although a melanoma that forms in the nasal cavity or a paranasal sinus is different in many ways from a melanoma skin cancer, it is often treated the same way when it is advanced. For more information about the treatment of advanced melanomas, see our document *Melanoma Skin Cancer*.

Sarcomas

Like with other cancers of the nasal cavity and the paranasal sinuses, surgery is the main treatment for most types of sarcoma. In some cases radiation and/or chemo may also be used.

Rhabdomyosarcoma is a type of sarcoma that is most common among infants and young children. It is usually treated with a combination of surgery, radiation therapy, and chemo. For more information about the treatment of rhabdomyosarcoma, please see our document *Rhabdomyosarcoma*.

For other types of sarcoma, please see our document *Sarcoma: Adult Soft Tissue Cancer*.

Recurrent nasal cavity or paranasal sinus cancer

Cancer is called *recurrent* when it comes back after treatment. Recurrence can be local (in or near the same place it started), regional (in nearby lymph nodes), or distant (spread to distant organs such as the lungs). Options for treating recurrences depend on the location and type of cancer, as well as the initial treatment.

For a local recurrence, if radiation was the first treatment for the cancer, surgery may be used. If the first treatment was surgery without radiation, radiation therapy may be tried. Chemo (or targeted therapy) may be used with radiation, or it may be used by itself to treat recurrences that are not controlled by radiation therapy or surgery.

Recurrences of sphenoid sinus cancer are usually treated with chemotherapy (or targeted therapy).

In a regional recurrence, the cancer comes back in the lymph nodes in the neck. This is often treated with surgery to remove many lymph nodes in the neck (a neck dissection) that are on the same side as the cancer. This may be followed with radiation to the neck, sometimes combined with chemo and/or targeted therapy.

Recurrent melanomas or sarcomas of the nasal cavity or paranasal sinuses are treated by surgery, if possible. Depending on the exact type of cells forming the cancers, chemo or other treatments may also be given.

When a nasal cavity or paranasal sinus cancer comes back in other organs, it is often treated with chemo and/or targeted therapy, although radiation could also be an option if it wasn't given before.

Treatments for recurrent nasal cavity or paranasal sinus cancer may temporarily shrink cancers and help relieve symptoms, but these cancers are very difficult to cure. If further treatment is recommended, it's important to talk to your doctor so that you understand what the goal of treatment is – whether it is to try to cure the cancer or to keep it under control for as long as possible and relieve symptoms. This can help you weigh the pros and cons of each treatment. Because these cancers are hard to treat, clinical trials of newer treatments could be a good option for some people.

More treatment information for nasal cavity and paranasal sinus cancers

For more details on treatment options – including some that may not be addressed in this document – the National Comprehensive Cancer Network (NCCN) and the National Cancer Institute (NCI) are good sources of information.

The NCCN, made up of experts from many of the nation's leading cancer centers, develops cancer treatment guidelines for doctors to use when treating patients. These are available on the NCCN website (www.nccn.org). (Information on nasal cavity and paranasal sinus cancers is found in the NCCN Head and Neck Cancers guideline.)

The NCI provides treatment guidelines via its telephone information center (1-800-4-CANCER) and its website (www.cancer.gov). Detailed guidelines intended for use by cancer care professionals are also available on www.cancer.gov.

What should you ask your doctor about nasal cavity or paranasal sinus cancer?

As you cope with cancer and cancer treatment, we encourage you to have honest, open discussions with your doctor. Ask any question on your mind, no matter how small it might seem. Here are some questions you might want to ask. Nurses, social workers, and other members of the treatment team may also be able to answer many of your questions.

- What kind of nasal cavity or paranasal sinus cancer do I have?
- Where is my cancer located?
- Has my cancer spread beyond the primary site?
- What is the stage of my cancer, and what does that mean?
- Do I need to have other tests before we can decide on treatment?
- Are there other doctors I need to see?
- How much experience do you have treating this type of cancer?
- What treatment choices do I have?
- What do you recommend and why?
- What is the goal of the treatment?
- What are the chances my cancer can be cured with treatment?
- How quickly do we need to decide on treatment?
- What should I do to be ready for treatment?
- How long will treatment last? What will be done? Where will it be done?
- How would treatment affect my daily activities?
- What risks or side effects should I expect? How long are they likely to last?
- How will this treatment affect my appearance?
- What options for reconstruction of the defects do I have?
- What if the treatment doesn’t work or if the cancer recurs?
- What type of follow-up will I need after treatment?
- Where can I find more information and support?

In addition to these sample questions, be sure to write down some of your own. For instance, you might want more information about recovery times so you can plan your

work or activity schedule. Or you may want to ask about second opinions or about clinical trials for which you may qualify.

What happens after treatment for nasal cavity or paranasal sinus cancer?

For some people with nasal cavity or paranasal sinus cancer, treatment may remove or destroy the cancer. Completing treatment can be both stressful and exciting. You may be relieved to finish treatment, but find it hard not to worry about cancer growing or coming back. (When cancer comes back after treatment, it is called *recurrence*.) This is a very common concern in people who have had cancer.

It may take a while before your fears lessen. But it may help to know that many cancer survivors have learned to live with this uncertainty and are leading full lives. Our document *Living With Uncertainty: The Fear of Cancer Recurrence* gives more detailed information on this.

For other people, the cancer may never go away completely. These people may get regular treatments with chemotherapy, radiation therapy, or other therapies to help keep the cancer in check for as long as possible. Learning to live with cancer as a more of a chronic disease can be difficult and very stressful. It has its own type of uncertainty. Our document *When Cancer Doesn't Go Away* talks more about this.

Follow-up care

If you have completed treatment, your doctors will still want to watch you closely. It is very important to go to all follow-up appointments. People with cancer of the nasal cavity or paranasal sinuses are at risk for developing recurrences, so they must be observed closely after treatment. Your health care team will discuss which tests should be done and how often based on the type and initial stage of your cancer, the type of treatment you received, and the response to that treatment.

Experts typically recommend a doctor's exam at least every 3 months for the first year after treatment. After a year, the exams can occur less often. For someone who was treated with radiation to the neck, blood tests to look at thyroid function may be needed.

The cancer care team will recommend which other tests should be done and how often. CT or MRI scans of the head and neck and other imaging tests may be ordered shortly after you finish treatment and if new symptoms develop to check for a recurrence or for a new tumor.

Almost any cancer treatment can have side effects. Some may last for a few weeks to several months, but others can last the rest of your life. Don't hesitate to tell your cancer care team about any symptoms or side effects that bother you so they can help you manage them.

It’s very important to report any new symptoms to the doctor right away, because they may prompt your doctor to do tests that could help find recurrent cancer as early as possible, when the likelihood of successful treatment is greatest.

It’s important to keep your health insurance. Tests and doctor visits cost a lot, and even though no one wants to think of their cancer coming back, this could happen.

If cancer does recur, treatment will depend on the location of the cancer and what treatments you’ve had before. For more information on how recurrent cancer is treated, see the section “Treatment options by type, location, and stage for nasal cavity and paranasal sinus cancers.” For more general information on dealing with a recurrence, you may also want to see the document *When Your Cancer Comes Back: Cancer Recurrence*.

Help for trouble swallowing and nutrition problems

Cancers of the nasal cavity and paranasal sinuses and their treatments can sometimes cause problems such as trouble swallowing, dry mouth, or even loss of teeth. This can make it hard to eat, which can lead to weight loss and weakness due to poor nutrition.

Some people may need to adjust what they eat during and after treatment. Some may even need a feeding tube placed into the stomach for a short time after treatment. A team of doctors and nutritionists can work with you to provide nutritional supplements and information about your individual nutritional needs. This can help you maintain your weight and nutritional intake.

Seeing a new doctor

At some point after your cancer diagnosis and treatment, you may find yourself seeing a new doctor who does not know anything about your medical history. It’s important that you be able to give your new doctor the details of your diagnosis and treatment. Gathering these details soon after treatment may be easier than trying to get them at some point in the future. Make sure you have the following information handy:

- A copy of your pathology report(s) from any biopsies or surgeries
- Copies of imaging tests (CT or MRI scans, etc.), which can usually be stored on a CD, DVD, etc.
- If you had surgery, a copy of your operative report(s)
- If you were in the hospital, a copy of the discharge summary that doctors prepare when patients are sent home
- If you had radiation therapy, a summary of the type and dose of radiation and when and where it was given
- If you had drug treatment, such as chemotherapy or targeted therapy, a list of the drugs, drug doses, and when you took them

The doctor may want copies of this information for his records, but always keep copies for yourself.

Can I get another cancer after having nasal cavity or paranasal sinus cancer?

Cancer survivors can be affected by a number of health problems, but often their greatest concern is facing cancer again. If a cancer comes back after treatment it is called a "recurrence." But some cancer survivors may develop a new, unrelated cancer later. This is called a "second cancer." No matter what type of cancer you have had, it is still possible to get another (new) cancer, even after surviving the first.

Unfortunately, being treated for cancer doesn't mean you can't get another cancer. People who have had cancer can still get the same types of cancers that other people get. In fact, certain types of cancer and cancer treatments can be linked to a higher risk of certain second cancers.

Survivors of nasal cavity and paranasal sinus cancer can get any second cancer, but they have an increased risk of:

- Cancers of the mouth and throat
- Cancer of the larynx (voicebox)
- Cancer of the lung
- Soft-tissue sarcoma

Most of these cancers are linked to tobacco.

Follow-up after treatment

After completing treatment for cancer of the nasal cavity or paranasal sinus, you should still see your doctor regularly. Your doctor may order tests to look for signs that the cancer has come back or spread. These tests are also useful in finding some second cancers, particularly a new lung cancer or cancer of the mouth or throat. Experts don't recommend any other tests to look for second cancers in patients who don't have symptoms. Let your doctor know about any new symptoms or problems, because they could be caused by the cancer coming back or by a new disease or second cancer.

Survivors of laryngeal cancer should follow the American Cancer Society guidelines for the early detection of cancer and stay away from tobacco products. Smoking increases the risk of getting certain second cancers as well as other health problems.

To help maintain good health, survivors should also:

- Achieve and maintain a healthy weight
- Adopt a physically active lifestyle

- Consume a healthy diet, with an emphasis on plant foods
- Limit consumption of alcohol to no more than 1 drink per day for women or 2 per day for men

These steps may also lower the risk of some cancers.

See *Second Cancers in Adults* for more information about causes of second cancers.

Lifestyle changes after nasal cavity and paranasal sinus cancers

You can't change the fact that you have had cancer. What you can change is how you live the rest of your life – making choices to help you stay healthy and feel as well as you can. This can be a time to look at your life in new ways. Maybe you are thinking about how to improve your health over the long term. Some people even start during cancer treatment.

Make healthier choices

For many people, a diagnosis of cancer helps them focus on their health in ways they may not have thought much about in the past. Are there things you could do that might make you healthier? Maybe you could try to eat better or get more exercise. Maybe you could cut down on alcohol, or give up tobacco. Even things like keeping your stress level under control might help. Now is a good time to think about making changes that can have positive effects for the rest of your life. You will feel better and you will also be healthier.

You can start by working on those things that worry you most. Get help with those that are harder for you. For instance, if you are thinking about quitting smoking and need help, call the American Cancer Society at 1-800-227-2345. A tobacco cessation and coaching service can help increase your chances of quitting for good.

Eating better

Eating right can be a challenge for anyone, but it can get even tougher during and after cancer treatment. This is especially true for cancers of the head and neck, such as nasal cavity or paranasal sinus cancer. The cancer or its treatment may affect how you swallow or cause other problems. Nausea can be a problem from some treatments. You may lose your appetite for a while and lose weight when you don't want to.

If you are losing weight or have taste problems during treatment, do the best you can with eating and remember that these problems usually improve over time. You might find it helps to eat small portions every 2 to 3 hours until you feel better and can go back to a more normal schedule. You might also want to ask your cancer team for a referral to a dietitian, an expert in nutrition who can give you ideas on how to deal with these treatment side effects.

One of the best things you can do after cancer treatment is put healthy eating habits into place. You may be surprised at the long-term benefits of some simple changes, like increasing the variety of healthy foods you eat. Getting to and staying at a healthy weight, eating a healthy diet, and limiting your alcohol intake may lower your risk for a number of types of cancer, as well as having many other health benefits.

For more information, see our document *Nutrition and Physical Activity During and After Cancer Treatment: Answers to Common Questions*.

Rest, fatigue, and exercise

Extreme tiredness, called *fatigue*, is very common in people treated for cancer. This is not a normal tiredness, but a "bone-weary" exhaustion that doesn't get better with rest. For some people, fatigue lasts a long time after treatment, and can make it hard for them to be active and do other things they want to do. But exercise can help reduce fatigue. Studies have shown that patients who follow an exercise program tailored to their personal needs feel better physically and emotionally and can cope better, too.

If you were sick and not very active during treatment, it is normal for your fitness, endurance, and muscle strength to decline. Any plan for physical activity should fit your own situation. An older person who has never exercised will not be able to take on the same amount of exercise as a 20-year-old who plays tennis twice a week. If you haven't exercised in a few years, you will have to start slowly – maybe just by taking short walks.

Talk with your health care team before starting anything. Get their opinion about your exercise plans. Then, try to find an exercise buddy so you're not doing it alone. Having family or friends involved when starting a new exercise program can give you that extra boost of support to keep you going when the push just isn't there.

If you are very tired, you will need to balance activity with rest. It's OK to rest when you need to. Sometimes it's really hard for people to allow themselves to rest when they are used to working all day or taking care of a household, but this is not the time to push yourself too hard. Listen to your body and rest when you need to. For more information on dealing with fatigue and other treatment side effects, please see the "Physical Side Effects" section of our website or "Additional resources for nasal cavity and paranasal sinus cancer" to get a list of available information.

Keep in mind exercise can improve your physical and emotional health.

- It improves your cardiovascular (heart and circulation) fitness.
- Along with a good diet, it will help you get to and stay at a healthy weight.
- It makes your muscles stronger.
- It reduces fatigue and helps you have more energy.
- It can help lower anxiety and depression.
- It can make you feel happier.

- It helps you feel better about yourself.

And long term, we know that getting regular physical activity plays a role in helping to lower the risk of some cancers, as well as having other health benefits.

Can I lower my risk of the cancer progressing or coming back?

Most people want to know if there are specific lifestyle changes they can make to reduce their risk of their cancer progressing or coming back. For many cancers there is little solid evidence to guide people. This doesn't mean that nothing will help – it's just that for the most part this is an area that hasn't been well studied. Most studies have looked at lifestyle changes as ways of preventing cancer in the first place, not slowing it down or preventing it from coming back.

Some studies have shown that people with head and neck cancers who continue to smoke during treatment don't do as well as those who quit before treatment starts. Nasal cavity and paranasal sinus cancers have not been linked as strongly to smoking as some other head and neck cancers, so it's not clear how this may apply. We do know that quitting may reduce your chance of developing other new cancers (especially other head and neck or lung cancers). Quitting can also help improve your appetite and your overall health. If you want to quit smoking and need help, call the American Cancer Society at 1-800-227-2345.

Adopting other healthy behaviors such as eating well, getting regular physical activity, and maintaining a healthy weight may help as well, but no one knows for sure. However, we do know that these types of changes can have positive effects on your health that can extend beyond your risk of cancer.

How might having nasal cavity or paranasal sinus cancer affect your emotional health?

During and after treatment, you may find yourself overcome with many different emotions. This happens to a lot of people.

You may find yourself thinking about death and dying. Or maybe you're more aware of the effect the cancer has on your family, friends, and career. You may take a new look at your relationships with those around you. Unexpected issues may also cause concern. For instance, you might be stressed by financial concerns resulting from your treatment. You might also you may see your health care team less often after treatment and have more time on your hands. These changes can make some people anxious.

Almost everyone who is going through or has been through cancer can benefit from getting some type of support. You need people you can turn to for strength and comfort. Support can come in many forms: family, friends, cancer support groups, church or spiritual groups, online support communities, or one-on-one counselors. What's best for you depends on your situation and personality. Some people feel safe in peer-support groups or education groups. Others would rather talk in an informal setting, such as

church. Others may feel more at ease talking one-on-one with a trusted friend or counselor. Whatever your source of strength or comfort, make sure you have a place to go with your concerns.

The cancer journey can feel very lonely. It is not necessary or good for you to try to deal with everything on your own. And your friends and family may feel shut out if you do not include them. Let them in, and let in anyone else who you feel may help. If you aren't sure who can help, call your American Cancer Society at 1-800-227-2345 and we can put you in touch with a group or resource that may work for you. You can also read our document *Distress in People with Cancer* or see the "Emotional Side Effects" section of our website for more information.

If treatment for nasal cavity and paranasal sinus cancer stops working

If cancer keeps growing or comes back after one kind of treatment, it may be possible to try another treatment plan that might still cure the cancer, or at least shrink the tumors enough to help you live longer and feel better. But when a person has tried many different treatments and the cancer has not gotten any better, the cancer tends to become resistant to all treatment. If this happens, it's important to weigh the possible limited benefits of a new treatment against the possible downsides, including treatment side effects. Everyone has their own way of looking at this.

This is likely to be the hardest part of your battle with cancer – when you have been through many medical treatments and nothing's working anymore. Your doctor may offer you new options, but at some point you may need to consider that treatment is not likely to improve your health or change your outcome or survival.

If you want to continue to get treatment for as long as you can, you need to think about the odds of treatment having any benefit and how this compares to the possible risks and side effects. In many cases, your doctor can estimate how likely it is the cancer will respond to treatment you are considering. For instance, the doctor may say that more treatment might have about a 1 in 100 chance of working. Some people are still tempted to try this. But it is important to think about and understand your reasons for choosing this plan.

No matter what you decide to do, it's important that you feel as good as you can. Make sure you are asking for and getting treatment for any symptoms you might have, such as nausea or pain. This type of treatment is called palliative care.

Palliative care helps relieve symptoms, but is not expected to cure the disease. It can be given along with cancer treatment, or can even be cancer treatment. The difference is its purpose – the main purpose of palliative care is to improve the quality of your life, or help you feel as good as you can for as long as you can. Sometimes this means using drugs to help with symptoms like pain or nausea. Sometimes, though, the treatments used to control your symptoms are the same as those used to treat cancer. For instance, radiation might be used to help relieve bone pain caused by cancer that has spread to the

bones. Or chemo might be used to help shrink a tumor and keep it from blocking the bowels. But this is not the same as treatment to try to cure the cancer.

You can learn more about the changes that occur when curative treatment stops working, and about planning ahead for yourself and your family, in our documents *Nearing the End of Life* and *Advance Directives*.

At some point, you may benefit from hospice care. This is special care that treats the person rather than the disease; it focuses on quality rather than length of life. Most of the time, it is given at home. Your cancer may be causing problems that need to be managed, and hospice focuses on your comfort. You should know that while getting hospice care often means the end of treatments such as chemo and radiation, it doesn't mean you can't have treatment for the problems caused by your cancer or other health conditions. In hospice the focus of your care is on living life as fully as possible and feeling as well as you can at this difficult time. You can learn more about hospice in our document called *Hospice Care*.

Staying hopeful is important, too. Your hope for a cure may not be as bright, but there is still hope for good times with family and friends – times that are filled with happiness and meaning. Pausing at this time in your cancer treatment gives you a chance to refocus on the most important things in your life. Now is the time to do some things you've always wanted to do and to stop doing the things you no longer want to do. Though the cancer may be beyond your control, there are still choices you can make.

What's new in nasal cavity and paranasal sinus cancer research and treatment?

There is always research going on in the area of nasal cavity and paranasal sinus cancers. Scientists are looking for ways to prevent nasal cavity and paranasal sinus cancers. Research on better treatment for nasal cavity and paranasal sinus cancers is now being done at many medical centers, university hospitals, and other institutions across the nation. Doctors and patients are urged to contact the nearest cancer center to find out what clinical trials are going on in their community.

Genetics

There are no known inherited tendencies for nasal cavity and paranasal sinus cancer, but scientists are finding some of the changes in the genes in these cancers that occur during the patient's lifetime. These changes are what transform normal cells into cancer cells.

Understanding these gene changes may help doctors develop better methods of diagnosing this disease as well as treatments that are more effective and have fewer side effects than ones currently available.

For example, researchers have found that many head and neck cancers have mutations (changes) of the tumor suppressor gene *TP53*. These changes lead to additional mutations of other genes, which make the cells better able to grow and spread. Scientists have tried

gene therapies to give good copies of this gene, but so far the results have been disappointing.

Treatment

Surgery

Surgeons are looking at newer ways of removing these cancers while trying to do as little damage as possible to nearby normal tissues. One example of a newer technique is endoscopic surgery, in which certain tumors can be removed using long, thin instruments passed through the nose. It may be useful only for certain tumors, but if it can be used it may significantly reduce some of the side effects a person has.

Radiation therapy

Doctors are always looking at newer ways of focusing radiation on tumors more precisely to help them get more radiation to the tumor while limiting side effects to nearby areas. This is especially important for head and neck tumors like nasal cavity and paranasal sinus cancers, where there are often many important structures very close to the tumor. With more powerful computers and newer radiation techniques, doctors are now able to plan and deliver radiation therapy more precisely than ever before.

Clinical trials are also studying ways to make radiation therapy more effective by using radiosensitizers. These drugs make cancer cells more sensitive to radiation therapy. Other studies are testing radioprotective agents. These drugs protect normal cells from damage by radiation and thereby reduce side effects of radiation therapy. Reducing side effects not only helps people feel better during treatment, but may also help people tolerate higher radiation doses that can kill more cancer cells.

Targeted therapies

Clinical trials are studying several targeted therapies that block the action of the substances (such as growth factors and growth factor receptors) that cause head and neck cancers to grow and spread. Some of the drugs being studied include erlotinib, sunitinib, sorafenib, lapatinib, and nimotuzumab. Many of these studies are testing combinations of targeted therapies plus chemo or radiation.

Because nasal cavity and paranasal sinus cancers are rare, nearly all of these clinical trials include patients with other types of head and neck cancer as well. Although these studies are not specific to nasal cavity and paranasal sinus cancers, doctors will be able to apply their results to choosing treatment for patients with nasal cavity and paranasal sinus cancers.

Additional resources for nasal cavity and paranasal sinus cancers

More information from your American Cancer Society

Here is more information you might find helpful. You also can order free copies of our documents from our toll-free number, 1-800-227-2345, or read them on our website, www.cancer.org.

Dealing with diagnosis and treatment

Health Professionals Associated With Cancer Care

Talking With Your Doctor (also in Spanish)

After Diagnosis: A Guide for Patients and Families (also in Spanish)

Nutrition for the Person With Cancer During Treatment: A Guide for Patients and Families (also in Spanish)

Coping With Cancer in Everyday Life (also in Spanish)

Family and caregiver concerns

Talking With Friends and Relatives About Your Cancer (also in Spanish)

Helping Children When A Family Member Has Cancer: Dealing With Diagnosis (also in Spanish)

What It Takes to Be a Caregiver

Insurance and financial issues

In Treatment: Financial Guidance for Cancer Survivors and Their Families (also in Spanish)

Health Insurance and Financial Assistance for the Cancer Patient (also in Spanish)

More on cancer treatments

Understanding Cancer Surgery: A Guide for Patients and Families (also in Spanish)

A Guide to Chemotherapy (also in Spanish)

Understanding Radiation Therapy: A Guide for Patients and Families (also in Spanish)

Targeted Therapy

Cancer treatment side effects

Caring for the Patient with Cancer at Home: A Guide for Patients and Families (also in Spanish)

Distress in People With Cancer

Anxiety, Fear, and Depression

Nausea and Vomiting

Guide to Controlling Cancer Pain (also in Spanish)

Get Relief From Cancer Pain

Pain Diary

Anemia in People With Cancer

Fatigue in People With Cancer

Books

Your American Cancer Society also has books that you might find helpful. Call us at 1-800-227-2345 or visit our bookstore online at cancer.org/bookstore to find out about costs or to place an order

National organizations and websites*

Along with the American Cancer Society, other sources of information and support include:

National Cancer Institute (NCI)
Toll-free number: 1-800-422-6237 (1-800-4-CANCER)
TTY: 1-800-332-8615
Website: www.cancer.gov

> Their "Cancer Information Service" offers a wide variety of free, accurate, up-to-date information about cancer to patients, their families, and the general public; also can help people find clinical trials in their area

National Coalition for Cancer Survivorship (NCCS)
Toll-free number: 1-888-650-9127
Website: www.canceradvocacy.org

> Has publications on many cancer-related topics; also offers the Cancer Survival Toolbox – a free program that teaches skills that can help people with cancer meet the challenges of their illness, which can be ordered at 1-877-NCCS-YES (1-877-622-7937)

Support for People with Oral and Head and Neck Cancer (SPOHNC)
Toll-free number: 1-800-377-0928
Website: www.spohnc.org

> Offers free telephone support for survivors and their families, as well as resources and referrals on all aspects of oral and head and neck cancer; also has a "survivor-to-survivor network;" and resource and product information, including a free resource guide called "We Have Walked in Your Shoes"

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at **1-800-227-2345** or visit www.cancer.org.

References: Nasal cavity and paranasal sinus cancers detailed guide

Alos L, Moyano S, Nadal A, et al. Human papillomaviruses are identified in a subgroup of sinonasal squamous cell carcinomas with favorable outcome. *Cancer*. 2009;115:2701-2709.

American Joint Committee on Cancer. Nasal cavity and paranasal sinuses. In: *AJCC Cancer Staging Manual*. 7th ed. New York, NY: Springer; 2010: 69-73.

Bonner JA, Harari PM, Giralt J, et al. Radiotherapy plus cetuximab for squamous-cell carcinoma of the head and neck. *N Engl J Med*. 2006;354:567-578.

Caporaso N, Dodd KW, Tucker MA. New Malignancies Following Cancer of the Respiratory Tract. In: Curtis RE, Freedman DM, Ron E, Ries LAG, Hacker DG, Edwards BK, Tucker MA, Fraumeni JF Jr. (eds). New Malignancies Among Cancer Survivors: SEER Cancer Registries, 1973-2000. National Cancer Institute. NIH Publ. No. 05-5302. Bethesda, MD, 2006. Accessed on 4/18/2014 at http://seer.cancer.gov/archive/publications/mpmono/MPMonograph_complete.pdf.

Dulguerov P, Jacobsen MS, Allal AS, et al. Nasal and paranasal sinus carcinoma: Are we making progress? *Cancer*. 2001;92:3012-3029.

Easton DF, Peto J, Doll R. Cancers of the respiratory tract in mustard gas workers. *Br J Ind Med*. 1988;45:652-659.

Howlader N, Noone AM, Krapcho M, et al (eds). SEER Cancer Statistics Review, 1975-2009 (Vintage 2009 Populations), National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2009_pops09/, based on November 2011 SEER data submission, posted to the SEER website, April 2012.

Kleinerman RA, Tucker MA, Tarone RE, et al. Risk of new cancers after radiotherapy in long-term survivors of retinoblastoma: An extended follow-up. *J Clin Oncol*. 2005;23:2272-2279.

Luce D, Gérin M, Leclerc A, et al. Sinonasal cancer and occupational exposure to formaldehyde and other substances. *Int J Cancer*. 1993;53:224-231.

Menedenhall WM, Werning JW, Pfister DG. Treatment of head and neck cancers. In: DeVita VT, Hellman S, Rosenberg SA, eds. *Cancer: Principles and Practice of Oncology*, 9th ed. Philadelphia, Pa: Lippincott Williams & Wilkins; 2011: 729-780.

National Cancer Institute. PDQ database: Paranasal Sinus and Nasal Cavity Cancer Treatment. Accessed at www.cancer.gov/cancertopics/pdq/treatment/paranasalsinus/HealthProfessional on April 1, 2014

National Comprehensive Cancer Network (NCCN). NCCN Clinical Practice Guidelines in Oncology: Head and Neck Cancers. V.2.2013. Accessed at www.nccn.org on April 2, 2014.

Perske MS, Tabaee A. Cancer of the nasal vestibule, nasal cavity, and paranasal sinus: Surgical management. In: Harrison LB, Sessions RB, Hong WK, eds. *Head and Neck Cancer: A Multidisciplinary Approach*, 3rd ed. Philadelphia, Pa: Lippincott Williams & Wilkins; 2009: 454-474.

Turner JH, Reh DD. Incidence and survival in patients with sinonasal cancer: a historical analysis of population-based data. *Head Neck*. 2012;34(6):877-885. Epub 2011 Aug 24.

Romesser PB, Riaz N, Ho AL, Wong RJ, Lee NY. Cancer of the head and neck. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE. *Abeloff's Clinical Oncology*, 5th ed. Philadelphia, Pa: Elsevier; 2014: 1037-1070.

Salama JK, Seiwert TY, Vokes EE. Chemotherapy for locally advanced head and neck cancer. *J Clin Oncol*. 2007;25:4118-4126.

Stebbings JH. Health risks from radium in workplaces: An unfinished story. *Occup Med*. 2001;16:259-270.

Vermorken JB, Mesia R, Rivera F, et al. Platinum-based chemotherapy plus cetuximab in head and neck cancer. *N Engl J Med*. 2008;359:1116-1127.

Last Medical Review: 4/22/2014
Last Revised: 3/2/2015

2014 Copyright American Cancer Society

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