Paranasal Sinus and Nasal Cavity Cancer Treatment
General Information about Paranasal Sinus and Nasal Cavity Cancer

Paranasal sinus and nasal cavity cancer is a disease in which cancer cells form in the tissues of the paranasal sinuses and nasal cavity.

Paranasal Sinuses

“Paranasal" means near the nose. The para sinuses are hollow, air-filled spaces in the bones around the nose. The sinuses are lined with cells that make mucus, which keeps the inside of the nose from drying out during breathing. There are several para sinuses named after the bones that surround them:

- The frontal sinuses are in the lower forehead above the nose.
• The maxillary sinuses are in the cheekbones on either side of the nose.
• The ethmoid sinuses are beside the upper nose, between the eyes.
• The sphenoid sinuses are behind the nose, in the center of the skull.
Nasal cavity

The nose opens into the **nasal cavity**, which is divided into two nasal passages. Air moves through these passages during breathing. The nasal cavity lies above the bone that forms the roof of the mouth (**palate**) and curves down at the back to join the throat. The area just inside the nostrils is called the **nasal vestibule**. A small area of special cells in the roof of each nasal passage sends signals to the brain to give the sense of smell.

Together the paranasal sinuses and the nasal cavity filter and warm the air, and make it moist before it goes into the lungs. The movement of air through the sinuses and other parts of the respiratory system help make sounds for talking.

Paranasal sinus and nasal cavity cancer is a type of head and neck cancer.

**Different types of cells in the paranasal sinus and nasal cavity may become malignant.**

The most common type of paranasal sinus and nasal cavity cancer is squamous cell carcinoma. This type of cancer forms in the thin, flat cells lining the inside of the paranasal sinuses and the nasal cavity.

Other types of paranasal sinus and nasal cavity cancer include the following:

- **Melanoma**: Cancer that starts in cells called melanocytes, the cells that give skin its natural color.
• Sarcoma: Cancer that starts in muscle or connective tissue.

• Inverting papilloma: Benign tumors that form inside the nose. A small number of these change into cancer.

• Midline granulomas: Cancer of tissues in the middle part of the face. Anything that increases your risk of getting a disease is called a risk factor.

**Being exposed to certain chemicals or dust in the workplace can increase the risk of paranasal sinus and nasal cavity cancer.**

Anything that increases your chance of getting a disease is called a risk factor. Having a risk factor does not mean that you will get cancer; not having risk factors doesn’t mean that you will not get cancer. Talk with your doctor if you think you may be at risk. Risk factors for paranasal sinus and nasal cavity cancer include the following:

• Being exposed to certain workplace chemicals or dust, such as those found in the following jobs:
  • Furniture-making.
  • Sawmill work.
  • Woodworking (carpentry).
  • Shoemaking.
  • Metal-plating.
  • Flour mill or bakery work.
  • Being infected with human papillomavirus (HPV).
  • Being male and older than 40 years.
  • Smoking.
Signs of paranasal sinus and nasal cavity cancer include sinus problems and nosebleeds.

These and other signs and symptoms may be caused by paranasal sinus and nasal cavity cancer or by other conditions. There may be no signs or symptoms in the early stages. Signs and symptoms may appear as the tumor grows. Check with your doctor if you have any of the following:

- Blocked sinuses that do not clear, or sinus pressure.
- Headaches or pain in the sinus areas.
- A runny nose.
- Nosebleeds.
- A lump or sore inside the nose that does not heal.
- A lump on the face or roof of the mouth.
- Numbness or tingling in the face.
- Swelling or other trouble with the eyes, such as double vision or the eyes pointing in different directions.
- Pain in the upper teeth, loose teeth, or dentures that no longer fit well.
- Pain or pressure in the ear. These and other signs and symptoms may be caused by nasopharyngeal cancer or by other conditions.

Tests that examine the sinuses and nasal cavity are used to find and diagnose paranasal sinus and nasal cavity cancer.

The following tests and procedures may be used:
• **Physical exam and history**: An exam of the body to check general signs of health, including checking for signs of disease, such as lumps or anything else that seems unusual. A history of the patient’s health habits and past illnesses and treatments will also be taken.

• **Physical exam of the nose, face, and neck**: An exam in which the doctor looks into the nose with a small, long-handled mirror to check for abnormal areas and checks the face and neck for lumps or swollen lymph nodes.

• **X-rays of the head and neck**: An x-ray is a type of energy beam that can go through the body and onto film, making a picture of areas inside the body.

• **MRI (magnetic resonance imaging)**: A procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of areas inside the body. This procedure is also called nuclear magnetic resonance imaging (NMRI).

• **CT scan (CAT scan)**: A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles. The pictures are made by a computer linked to an x-ray machine. A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly. This procedure is also called computed tomography, computerized tomography, or computerized axial tomography.

• **Biopsy**: The removal of cells or tissues so they can be viewed under a microscope by a pathologist to check for signs of cancer. There are three types of biopsy:
  
  o Fine-needle aspiration (FNA) biopsy: The removal of tissue or fluid using a thin needle.
Incisional biopsy: The removal of part of an area of tissue that doesn’t look normal.

Excisional biopsy: The removal of an entire area of tissue that doesn’t look normal.

- **Nasoscopy or Nasal Endoscopy**: A procedure to look inside the nose for abnormal areas. A nasoscope is inserted into the nose. A nasoscope is a thin, tube-like instrument with a light and a lens for viewing. A special tool on the nasoscope may be used to remove samples of tissue. The tissues samples are viewed under a microscope by a pathologist to check for signs of cancer.

- **Laryngoscopy**: A procedure in which the doctor checks the larynx (voice box) with a mirror or a fiberoptic laryngoscope to check for abnormal areas. A laryngoscope is a thin, tube-like instrument with a light and a lens for viewing the inside of the throat and voice box. It may also have a tool to remove tissue samples, which are checked under a microscope for signs of cancer.

**Certain factors affect chance of recovery and treatment options.**

**Prognosis** (chance of recovery) depends on the following:

- Where the tumor is in the paranasal sinus or nasal cavity and whether it has spread.
- The size of the tumor.
- The type of cancer.
- The patient's age and general health.
• Whether the cancer has just been diagnosed or has recurred (come back).

Paranasal sinus and nasal cavity cancers often have spread by the time they are diagnosed and are hard to cure. After treatment, a lifetime of frequent and careful follow-up is important because there is an increased risk of developing a second kind of cancer in the head or neck.

**Stages of Paranasal Sinus and Nasal Cavity Cancer**

After paranasal sinus and nasal cavity cancer has been diagnosed, tests are done to find out if cancer cells have spread within the paranasal sinuses and nasal cavity or to other parts of the body.

The process used to find out if cancer has spread within the paranasal sinuses and nasal cavity or to other parts of the body is called **staging**. The information gathered from the staging process determines the stage of the disease. It is important to know the stage in order to plan treatment. The following tests and procedures may be used in the staging process:

- **Endoscopy**: A procedure to look at organs and tissues inside the body to check for abnormal areas. An endoscope is inserted through an opening in the body, such as the nose or mouth. An endoscope is a rigid rod or a thin, tube-like instrument with a light and a lens for viewing. It may also have a tool to remove tissue or lymph node samples, which are checked under a microscope for signs of disease.

- **CT scan (CAT scan)**: A procedure that makes a series of detailed pictures of areas inside the body, taken from different
angles. The pictures are made by a computer linked to an x-ray machine. A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly. This procedure is also called computed tomography, computerized tomography, or computerized axial tomography.

- **Chest x-ray**: An x-ray of the organs and bones inside the chest. An x-ray is a type of energy beam that can go through the body and onto film, making a picture of areas inside the body.

- **MRI (magnetic resonance imaging) with gadolinium**: A procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of areas inside the body. Sometimes a substance called gadolinium is injected into a vein. The gadolinium collects around the cancer cells so they show up brighter in the picture. This procedure is also called nuclear magnetic resonance imaging (NMRI).

- **PET scan (positron emission tomography scan)**: A procedure to find malignant tumor cells in the body. A small amount of radioactive glucose (sugar) is injected into a vein. The PET scanner rotates around the body and makes a picture of where glucose is being used in the body. Malignant tumor cells show up brighter in the picture because they are more active and take up more glucose than normal cells do.

- **Bone scan**: A procedure to check if there are rapidly dividing cells, such as cancer cells, in the bone. A very small amount of radioactive material is injected into a vein and travels through the bloodstream. The radioactive material collects in the bones with cancer and is detected by a scanner.
There are three ways that cancer spreads in the body.

Cancer can spread through tissue, the lymph system, and the blood:

- **Tissue.** The cancer spreads from where it began by growing into nearby areas.

- **Lymph system.** The cancer spreads from where it began by getting into the lymph system. The cancer travels through the lymph vessels to other parts of the body.

- **Blood.** The cancer spreads from where it began by getting into the blood. The cancer travels through the blood vessels to other parts of the body.

Cancer may spread from where it began to other parts of the body.

When cancer spreads to another part of the body, it is called **metastasis.** Cancer cells break away from where they began (the primary tumor) and travel through the lymph system or blood.

- **Lymph system.** The cancer gets into the lymph system, travels through the lymph vessels, and forms a tumor (metastatic tumor) in another part of the body in lymph nodes.

- **Blood.** The cancer gets into the blood, travels through the blood vessels, and forms a tumor (metastatic tumor) in another part of the body.
The metastatic tumor is the same type of cancer as the primary tumor. For example, if nasopharyngeal cancer spreads to the lung, the cancer cells in the lung are actually nasopharyngeal cancer cells. The disease is metastatic nasopharyngeal cancer, not lung cancer.

There is no standard staging system for cancer of the sphenoid and frontal sinuses.

The staging described below for the maxillary and ethmoid sinuses and the nasal cavity is only used for patients who have not had lymph nodes in the neck removed and checked for signs of cancer.

The following stages are used for maxillary sinus cancer:

**Stage 0 (Carcinoma in Situ)**
In stage 0, abnormal cells are found in the mucous membranes lining the maxillary sinus. These abnormal cells may become cancer and spread into nearby normal tissue. Stage 0 is also called carcinoma in situ.

**Stage I**
In stage I, cancer has formed in the mucous membranes of the maxillary sinus.

**Stage II**
In stage II, cancer has spread to bone around the maxillary sinus, including the roof of the mouth and the nose, but not to bone at the back of the maxillary sinus or the part of the sphenoid bone behind the upper jaw.
Tumor sizes are often measured in centimeters (cm) or inches. Common food items that can be used to show tumor size in cm include: a pea (1 cm), a peanut (2 cm), a grape (3 cm), a walnut (4 cm), a lime (5 cm or 2 inches), an egg (6 cm), a peach (7 cm), and a grapefruit (10 cm or 4 inches).
Stage III

In stage III, cancer has spread to any of the following:

- The bone at the back of the maxillary sinus.
- The tissues under the skin.
- The part of the eye socket near the nose or the bottom of the eye socket.
- The area behind the cheek bone.
- The ethmoid sinus.

or

Cancer is found in the maxillary sinus and may have spread to any of the following:

- The bones around the maxillary sinus, including the roof of the mouth and the nose.
- The tissues under the skin.
- The part of the eye socket near the nose or the bottom of the eye socket.
- The area behind the cheek bone.
- The ethmoid sinus.

Cancer has also spread to one lymph node on the same side of the neck as the cancer, and the lymph node is 3 centimeters or smaller.

Stage IV

Stage IV is the most advanced stage.
The following stages are used for nasal cavity and ethmoid sinus cancer:

**Stage 0 (Carcinoma in Situ)**

In stage 0, abnormal cells are found in the mucous membranes lining the nasal cavity or ethmoid sinus. These abnormal cells may become cancer and spread into nearby normal tissue. Stage 0 is also called carcinoma in situ.

**Stage I**

In stage I, cancer has formed and is found in only one area of either the nasal cavity or the ethmoid sinus and may have spread into bone.

**Stage II**

In stage II, cancer is found in two areas of either the nasal cavity or the ethmoid sinus that are near each other, or cancer has spread to an area next to the sinuses. Cancer may also have spread into bone.

**Stage III**

In stage III, cancer has spread to any of the following:

- The part of the eye socket near the nose or the bottom of the eye socket.
- The maxillary sinus.
• The roof of the mouth.
• The bone between the eyes.

or

Cancer is found in the nasal cavity or ethmoid sinus and may have spread to any of the following:

• The part of the eye socket near the nose or the bottom of the eye socket.
• The maxillary sinus.
• The roof of the mouth.
• The bone between the eyes.

Cancer has also spread to one lymph node on the same side of the neck as the cancer, and the lymph node is 3 centimeters or smaller.

**Stage IV**

Stage IV is the most advanced stage.

**Treatment Option Overview**

Patients with paranasal sinus and nasal cavity cancer should have their treatment planned by a team of doctors with expertise in treating head and neck cancer.

Treatment will be overseen by a head and neck surgical oncologist, a doctor who specializes in treating people with cancer. The surgeon works with other doctors who are experts in treating patients with head and neck cancer and who specialize in certain areas of medicine and rehabilitation. Patients who have paranasal
sinus and nasal cavity cancer may need special help adjusting to breathing problems or other side effects of the cancer and its treatment. If a large amount of tissue or bone around the paranasal sinuses or nasal cavity is taken out, plastic surgery may be done to repair or rebuild the area. The treatment team may include the following specialists:

- Radiation oncologist
- Medical Oncologist
- Neurologist
- Oral surgeon or head and neck surgeon
- Reconstructive head and neck surgeon
- Dentist
- Nutritionist
- Speech and language pathologist
- Rehabilitation specialist or prosthodontist

Three types of standard treatment are used:

**Surgery** is a common treatment for all stages of paranasal sinus and nasal cavity cancer. A doctor may remove the cancer and some of the healthy tissue and bone around the cancer. If the cancer has spread, the doctor may remove lymph nodes and other tissues in the neck.

After the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given chemotherapy or radiation therapy after surgery to kill any cancer cells that are left.
Treatment given after the surgery, to lower the risk that the cancer will come back, is called adjuvant therapy. **Radiation therapy** is a cancer treatment that uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing. There are two types of radiation therapy:

- **External radiation therapy** uses a machine outside the body to send radiation toward the cancer. The total dose of radiation therapy is sometimes divided into several smaller, equal doses delivered over a period of several days. This is called fractionation.

- **Internal radiation therapy** uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer.

The way the radiation therapy is given depends on the type and stage of the cancer being treated. External and internal radiation therapy are used to treat paranasal sinus and nasal cavity cancer.

External radiation therapy to the thyroid or the pituitary gland may change the way the thyroid gland works. The thyroid hormone levels in the blood may be tested before and after treatment.
External-beam radiation therapy of the head and neck. A machine is used to aim high-energy radiation at the cancer. The machine can rotate around the patient, delivering radiation from many different angles to provide highly conformal treatment. A mesh mask helps keep the patient’s head and neck from moving during treatment. Small ink marks are put on the mask. The ink marks are used to line up the radiation machine in the same position before each treatment.
Chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing. When chemotherapy is taken by mouth or injected into a vein or muscle, the drugs enter the bloodstream and can reach cancer cells throughout the body (systemic chemotherapy). When chemotherapy is placed directly into the cerebrospinal fluid, an organ, or a body cavity such as the abdomen, the drugs mainly affect cancer cells in those areas (regional chemotherapy). Combination chemotherapy is treatment using more than one anticancer drug.

The way the chemotherapy is given depends on the type and stage of the cancer being treated.