Salivary Gland Cancer

What is cancer?

The body is made up of trillions of living cells. Normal body cells grow, divide to make new cells, and die in an orderly way. 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 named (and treated) based on the place where it started. For example, breast cancer that has spread to the liver is still breast cancer, not liver cancer. Likewise, prostate cancer that has spread to the bone is still prostate cancer, not bone cancer.

Different types of cancer can behave very differently. 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 is salivary gland cancer?

Salivary gland cancer starts in one of the salivary glands. It's not just a single disease. There are actually several different salivary glands found inside and near your mouth. Many types of cancer and benign (non-cancerous) tumors can develop in these glands.

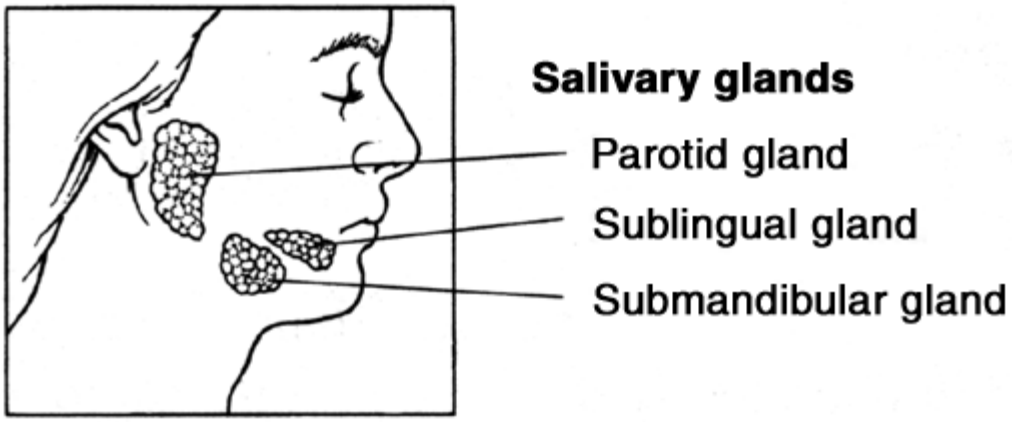
About the salivary glands

Salivary glands make saliva – the lubricating fluid found in the mouth and throat. Saliva contains enzymes that begin the process of digesting food. It also contains antibodies and other substances that help prevent infections of the mouth and throat.

The 2 main types of salivary glands are the *major salivary glands* and *minor salivary glands*.

There are 3 sets of **major salivary glands** on each side of the face:

- The **parotid glands**, the largest salivary glands, are just in front of the ears. About 7 out of 10 salivary gland tumors start here. Most of these tumors are benign (not cancer), but the parotid glands still are where most malignant (cancerous) salivary gland tumors start.
- The **submandibular glands** are smaller and are below the jaw. They secrete saliva under the tongue. About 1 or 2 out of 10 tumors start in these glands, and about half of these tumors are cancer.
- The **sublingual glands**, which are the smallest, are under the floor of the mouth and below either side of the tongue. Tumors starting in these glands are rare.



There are also several hundred **minor salivary glands** that are too small to see without a microscope. These glands are beneath the lining of the lips, tongue, in the roof of the mouth, and inside the cheeks, nose, sinuses, and larynx (voice box). Tumors in these glands are uncommon, but they are more often cancerous than benign. Cancers of the minor salivary glands most often start in the roof of the mouth.

Benign salivary gland tumors

Most salivary gland tumors are benign – that is, they are not cancer and will not spread to other parts of the body. These tumors are almost never life threatening.

There are many types of benign salivary gland tumors, with names such as adenomas, oncocytomas, Warthin tumors, and benign mixed tumors (also known as *pleomorphic adenomas*).

Benign tumors are almost always cured by surgery. Very rarely, they may become cancer if left untreated for a long time or if they are not completely removed and grow back. It's not clear exactly how benign tumors become cancers.

Only salivary gland cancers will be discussed further in this document.

Salivary gland cancers (malignant salivary gland tumors)

There are many types of salivary gland cancers. Normal salivary glands are made up of several different types of cells, and tumors can start in any of these cell types. Salivary gland cancers are named according to which of these cell types they most look like when seen under a microscope. The main types of cancers are described below.

Doctors usually give salivary cancers a **grade** (from 1 to 3, or from low to high), based on how abnormal the cancers look under a microscope. The grade gives a rough idea of how quickly it is likely to grow and spread.

- **Grade 1** cancers (also called *low grade* or *well differentiated*) look very much like normal salivary gland cells. They tend to grow slowly and have a good outcome (prognosis).
- **Grade 2** cancers (also called intermediate grade or moderately differentiated) have an appearance and outlook that is between grade 1 and grade 3 cancers.
- **Grade 3** cancers (also called *high grade* or *poorly differentiated*) look very different from normal cells and often grow and/or spread quickly. The outlook for these cancers is usually not as good as for lower grade cancers.

Mucoepidermoid carcinoma

Mucoepidermoid carcinomas are the most common type of salivary gland cancer. Most start in the parotid glands. They develop less often in the submandibular glands or in minor salivary glands inside the mouth. These cancers are usually low grade, but they can also be intermediate or high grade. Low-grade tumors have a much better prognosis than high-grade ones.

Adenoid cystic carcinoma

Adenoid cystic carcinoma is usually slow growing and often appears to be low-grade when looked at under the microscope. Still, it's very hard to get rid of completely because it tends to spread along nerves. These tumors tend to come back after treatment (generally surgery and radiation), sometimes many years later. The outlook for patients is better for smaller tumors.

Adenocarcinomas

Adenocarcinoma is a term used to describe cancers that start in gland cells (cells that normally secrete a substance). There are many types of salivary gland adenocarcinomas.

Acinic cell carcinoma: Most acinic cell carcinomas start in the parotid gland. They tend to be slow growing and tend to occur at a younger age than most other salivary gland cancers. They are usually low grade, but how far they have grown into nearby tissue is probably a better predictor of a patient's prognosis (outlook).

Polymorphous low-grade adenocarcinoma (PLGA): These tumors tend to start in the minor salivary glands. They usually (but not always) grow slowly and are mostly curable.

Adenocarcinoma, not otherwise specified (NOS): When seen under a microscope, these cancers have enough features to tell that they are adenocarcinomas, but not enough detail to

classify them further. They are most common in the parotid glands and the minor salivary glands. These tumors can be any grade.

Rare adenocarcinomas: Several types of adenocarcinoma are quite rare.

Some of these tend to be low grade and usually have a very good outcome:

- Basal cell adenocarcinoma
- Clear cell carcinoma
- Cystadenocarcinoma
- Sebaceous adenocarcinoma
- Sebaceous lymphadenocarcinoma
- Mucinous adenocarcinoma

Other rare adenocarcinomas are more likely to be high grade and may have a less favorable outcome:

- Oncocytic carcinoma
- Salivary duct carcinoma

Malignant mixed tumors

There are 3 types of malignant mixed tumors:

- Carcinoma ex pleomorphic adenoma
- Carcinosarcoma
- Metastasizing mixed tumor

Nearly all of these cancers are carcinoma ex pleomorphic adenomas. The other 2 types are very, very rare.

Carcinoma ex pleomorphic adenoma develops from a benign mixed tumor (also known as a *pleomorphic adenoma*). This tumor occurs mainly in the major salivary glands. Both the grade of the cancer and how far it has spread (its stage) are important in predicting outcome.

Other rare salivary gland cancers

Several other types of cancer can develop in the salivary glands.

Squamous cell carcinoma: This cancer occurs mainly in older men. It can develop after radiation therapy for other cancers in the area. This type of cancer tends to have a poorer outlook.

Epithelial-myoepithelial carcinoma: This rare tumor tends to be low grade, but it can come back after treatment or spread to other parts of the body.

Anaplastic small cell carcinoma: The cells in these tumors have nerve cell-like features. These tumors are most often found in minor salivary glands and tend to grow quickly.

Undifferentiated carcinomas: This group of cancers includes small cell undifferentiated carcinoma, large cell undifferentiated carcinoma, and lymphoepithelial carcinoma. These are high-grade cancers that often spread. Overall, the survival outlook tends to be poor. Lymphoepithelial carcinoma, which is much more common in Eskimo and Inuit people, has a slightly better outcome.

Other cancers that can affect the salivary glands

These types of cancer are typically not thought of as true salivary gland cancers, either because they start more often in other parts of the body, or because they start elsewhere and then grow into or spread to the salivary glands.

Non-Hodgkin lymphoma: Most non-Hodgkin lymphomas start in lymph nodes. Rarely, these cancers start in immune system cells within the salivary glands. They behave and are treated differently from other types of cancers in the salivary glands. Most lymphomas that start in the salivary glands affect people with Sjögren's syndrome (a disorder that causes the immune system to attack salivary gland cells). For more information on lymphomas, see our document *Non-Hodgkin Lymphoma*.

Sarcomas: The salivary glands contain blood vessels, muscle cells, and cells that make connective tissue. Cancers that start in these types of cells are called *sarcomas*. These rarely occur in the salivary gland. For more information on sarcomas, see our document *Sarcoma – Adult Soft Tissue Cancer*.

Secondary salivary gland cancers: Cancers that start elsewhere and spread to the salivary glands are called secondary salivary gland cancers. These cancers are treated based on where the cancer started.

What are the key statistics about salivary gland cancer?

Salivary gland cancers are not very common, making up less than 1% of cancers in the United States. They occur at a rate of about 1 case per 100,000 people per year in the United States.

These cancers can occur in people of almost any age, but they become more common as people get older. The average age at the time of diagnosis is 64.

Overall, about 72% of people diagnosed with salivary gland cancer are still alive at least 5 years after being diagnosed. (This includes people with all types and stages of salivary gland cancer, but the outlook for some people might be better or worse than this.) For more statistics related to survival, see the section “Survival rates for salivary gland cancer by stage.”

What are the risk factors for salivary gland cancer?

A risk factor is anything that affects your chance of getting a disease such as cancer. Different cancers have different risk factors. Some risk factors, like smoking, can be changed. Others, like a person’s age or family history, can’t be changed.

But having a risk factor, or even many risk factors, does not mean that you will get the disease. And many people who get the disease may have few or no known risk factors.

A few risk factors are known to make a person more likely to develop salivary gland cancer.

Older age

The risk of salivary gland goes up as people get older.

Male gender

Salivary gland cancers are more common in men than in women.

Radiation exposure

Radiation treatment to the head and neck area for other medical reasons increases your risk of salivary gland cancer.

Workplace exposure to certain radioactive substances may also increase the risk of salivary gland cancer.

Family history

Very rarely, members of some families seem to have a higher than usual risk of developing salivary gland cancers. But most people who get salivary gland cancer do not have a family history of this disease.

Other possible risk factors

Certain workplace exposures

Some studies have suggested that people who work with certain metals (nickel alloy dust) or minerals (silica dust), and people who work in asbestos mining, plumbing, rubber products manufacturing, and some types of woodworking may be at increased risk for salivary gland cancer, but these links are not certain. The rarity of these cancers makes this hard to study.

Tobacco and alcohol use

Tobacco and alcohol can increase the risk for several cancers of the head and neck area, but they have not been strongly linked to salivary gland cancers in most studies.

Diet

Some studies have found that a diet low in vegetables and high in animal fat may increase the risk of salivary gland cancer, but more research is needed to confirm this possible link.

Cell phone use

One study has suggested an increased risk of parotid gland tumors among heavy cell phone users. In this study, most of the tumors seen were benign (not cancer). Other studies looking at this issue have not found such a link. Research in this area is still in progress.

Do we know what causes salivary gland cancer?

Although we know a few things that can raise a person's risk of salivary gland cancer, it's not clear exactly what causes most of these cancers.

Cancer is caused by changes in the DNA inside of cells. 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. It also can influence our risk for developing certain diseases, such as some kinds of cancer.

Some genes help control when cells grow, divide into new cells, and die. Genes that help cells grow, divide, and stay alive 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. Changes in several different genes are usually needed for a cell to become cancer.

Researchers don’t yet know all of the DNA changes that result in salivary gland cancer, but they have found some gene changes that are often found in these cancers.

Salivary gland cancer does not usually run in families, so most of the DNA changes that lead to this cancer are not likely to be inherited from a person’s parents. Instead, these changes probably take place during a person’s lifetime. Sometimes these changes might just be random events that happen inside cells, without having an outside cause. But sometimes the cause might be something specific, like exposure to radiation or certain carcinogens (cancer-causing chemicals).

Can salivary gland cancer be prevented?

Because we don’t know what causes most salivary gland cancers, we don’t yet know how to prevent many of them.

Avoiding some of the possible risk factors (such as tobacco, excess alcohol use, and unhealthy diets) *might* slightly lower the likelihood of developing salivary gland cancer, but no one knows for sure. However, we do know that avoiding these factors can help reduce your risk of other, more common cancers, as well as many other diseases.

For people who work in certain industries linked with an increased risk of salivary gland cancer, taking precautions to protect themselves might help lower their risk.

Can salivary gland cancer be found early?

Salivary gland cancer is not common, so doctors do not recommend testing for it unless someone has symptoms. Still, because of its location, in many cases salivary gland cancer can be found early. Often patients, their dentists, or their doctors notice a lump within one of the salivary glands (usually on the sides of the face or in the mouth). Checking the salivary glands for tumors is often a routine part of general medical and dental check-ups.

Being alert to possible signs and symptoms of salivary gland cancers and not ignoring them might help find these cancers early, when treatment is likely to be most effective.

Signs and symptoms of salivary gland cancer

The major salivary glands are on each side of the face and below the tongue. Several important nerves and other structures run through or near salivary glands and can be affected by salivary tumors.

Possible signs and symptoms of salivary gland cancer include:

- A lump or swelling in your mouth, cheek, jaw, or neck

- Pain in your mouth, cheek, jaw, ear, or neck that does not go away
- A difference between the size and/or shape of the left and right sides of your face or neck
- Numbness in part of your face
- Weakness of the muscles on one side of your face
- Trouble opening your mouth widely
- Fluid draining from an ear
- Trouble swallowing

Many of these signs and symptoms can also be caused by benign (non-cancerous) salivary gland tumors or by other conditions. Still, if you have any of these problems, it's important to see your doctor right away so the cause can be found and treated, if needed.

How is salivary gland cancer diagnosed?

Salivary gland cancer is most often diagnosed when a person goes to a doctor because of symptoms he or she is having.

If you have signs or symptoms that might be caused by a salivary gland tumor, your doctor will do exams and tests to find out if it's cancer or some other condition. If cancer is found, other tests may be done to find out if it has spread.

Medical history and physical exam

Usually the first step is to take your medical history. The doctor will ask about your symptoms and when they first appeared. You might also be asked about possible risk factors for salivary gland cancer and about your general health.

During the physical exam, your doctor will carefully examine your mouth and the areas on the sides of your face and around your ears and jaw, and will feel for enlarged lymph nodes (lumps under the skin) in your neck area, since these could be signs of cancer spread.

The doctor will also check for numbness or weakness in part of your face (which can happen when cancer spreads into nerves) and any other related problem that you may be having.

If the results of this exam are abnormal, your doctor may order imaging tests or refer you to an ear, nose, and throat (ENT) doctor, also known as an *otolaryngologist*, who will do a more thorough exam of the head and neck area.

Imaging tests

Imaging tests use x-rays, magnetic fields, or radioactive particles to create pictures of the inside of your body. Imaging tests may be done for a number of reasons, including to help find a suspicious area that might be cancer, to learn how far cancer may have spread, and to help find out if treatment has been effective.

X-rays

If you have a lump or swelling near your jaw, your doctor may order x-rays of the jaws and teeth to look for a tumor.

If you have been diagnosed with cancer, an x-ray of your chest may be done to see if the cancer has spread to your lungs. This also provides other information about your heart and lungs that might be useful if surgery is planned.

Computed tomography (CT or CAT) scan

A CT scan uses x-rays to produce detailed cross-sectional images of your body. Unlike a regular x-ray, CT scans can show the detail in soft tissues (such as internal organs). A CT scan can show the size, shape, and position of a tumor and can help find enlarged lymph nodes that might contain cancer. If needed, CT scans can also be used to look for tumors in other parts of the body.

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

Before the scan, you may be asked to drink 1 to 2 pints of a liquid called oral contrast. This helps outline the intestine so that certain areas are not mistaken for tumors. This is most often needed for CT scans of the abdomen or pelvis.

You may also receive an IV (intravenous) line through which a different kind of contrast dye (IV contrast) is injected. This helps better outline structures in your body. The injection can cause some flushing (redness and warm feeling). Some people are allergic and get hives or, rarely, more serious reactions like trouble breathing and low blood pressure. Be sure to tell the doctor if you have any allergies or have ever had a reaction to any contrast material used for x-rays.

A CT scanner has been described as a large donut, with a narrow table that slides in and out of the middle opening. You 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 you have to lie in while the pictures are being taken.

Magnetic resonance imaging (MRI) scan

Like CT scans, MRI scans make detailed images of soft tissues in the body. But 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 body tissue and by certain diseases. A computer translates the pattern into very detailed images of parts of the body. A contrast material called *gadolinium* is often injected into a vein before the scan to better see details.

MRI scans can help determine the exact location and extent of a tumor. Sometimes they can help a doctor tell a benign tumor from a malignant one. They can also help tell if any lymph nodes are enlarged or if other organs have suspicious spots, which might be due to the spread of cancer.

MRI scans take longer than CT scans – often up to an hour – and are a little more uncomfortable. You may have to lie on a table that slides into a narrow tube, which is confining and can upset people who have a fear of enclosed spaces. Newer, more open MRI machines can sometimes be used instead if needed. The MRI machine makes buzzing and clicking noises that you may find disturbing. Some places will provide earplugs or headphones to help block this noise out.

Positron emission tomography (PET) scan

A PET scan looks for areas of high cellular activity (which might be a sign of cancer), rather than just showing if areas look abnormal based on their size or shape. This test can help show whether an abnormal lump or tumor seen on another imaging test may be cancer. If you have been diagnosed with cancer, your doctor may use this test to see if the cancer has spread to lymph nodes or other parts of the body. A PET scan can also be useful if your doctor thinks the cancer might have spread but doesn’t know where.

For this test, you receive an injection of a radioactive substance (usually a type of sugar known as *FDG*). The amount of radioactivity used is very low and will pass out of the body over the next day or so. Because cancer cells in the body are growing quickly, they absorb more of the radioactive sugar. After about an hour, you are moved onto a table in the PET scanner. You lie on the table for about 30 minutes while a special camera creates a picture of areas of radioactivity in the body. The picture is not finely detailed like a CT or MRI scan, but it can provide helpful information about your whole body.

Some machines are able to do both a PET and CT scan at the same time (PET/CT scan). This lets the doctor compare areas of higher radioactivity on the PET scan with the more detailed picture of that area on the CT scan.

Biopsy

Symptoms and the results of exams or imaging tests may strongly suggest you have salivary gland cancer, but the actual diagnosis is made by removing cells from an abnormal area and looking at them under a microscope. This is known as a *biopsy*. Different types of biopsies might be done, depending on the situation.

Fine needle aspiration (FNA) biopsy

An FNA biopsy is used to remove a small amount of cells and fluid from a lump or tumor for testing. This type of biopsy can be done in a doctor's office or clinic. It's done with a thin, hollow needle much like those used for routine blood tests.

Your doctor may first numb the area over the tumor with local anesthesia. The doctor then puts the needle directly into the tumor and pulls cells and a few drops of fluid into a syringe. The sample is then sent to a lab, where it's checked under a microscope to look for cancer cells.

Doctors may use FNA if they are not sure whether a lump is a salivary gland cancer. The FNA might show the lump is due to an infection, a benign (non-cancerous) salivary tumor, or a salivary gland cancer. In some cases this type of biopsy can help a person avoid unnecessary surgery.

An FNA biopsy is only helpful if enough cells are taken out to be able to tell for certain what a tumor is made of. But sometimes not enough cells are removed, or the biopsy is read as negative (normal) even when the tumor is cancer. If the doctor is not sure about the FNA results, a more extensive type of biopsy might be needed.

Incisional biopsy

This type of biopsy may sometimes be done if the FNA biopsy does not get a large enough sample to examine. In this procedure, the surgeon numbs the area over the tumor, makes a small incision (cut) with a scalpel and takes out a tiny part of the tumor. The specimen is sent to the lab to be looked at by the pathologist. These types of biopsies are not done often for salivary gland tumors.

Surgery

As mentioned above, FNA biopsy of a suspected salivary gland cancer may not always provide a clear answer. If this is the case but the physical exam and imaging tests suggest that cancer may be present, the doctor may advise surgery to remove the tumor completely. This can both provide enough of a sample for a diagnosis and treat the tumor at the same time (see the "Surgery for salivary gland cancer" section for more information).

In some cases if the exams and tests suggest cancer is likely, the doctor may skip the FNA biopsy altogether and go directly to surgery to remove the tumor. The specimen is then sent to the lab to confirm the diagnosis.

How is salivary gland cancer staged?

The stage of a cancer is a description of how widespread it is. The stage of salivary gland cancer is one of the most important factors in planning treatment and estimating a patient's outlook for recovery (prognosis).

The stage of a cancer is determined from the results of physical exams, imaging tests (CT or MRI scan, etc.) and other tests, which are described in the section "How is salivary gland cancer diagnosed?," and by the results of surgery if it has been done.

The American Joint Committee on Cancer (AJCC) TNM system

A staging system is a standard way for the cancer care team to sum up how far a cancer has spread. The most common system for cancers in the major salivary glands is the TNM system of the American Joint Committee on Cancer (AJCC). This system contains 3 key pieces of information:

- **T** describes the size of the primary **tumor** and whether it has grown into nearby organs or tissues.
- **N** describes whether the cancer has spread to nearby (regional) lymph **nodes** (bean-sized collections of immune system cells throughout the body).
- **M** indicates whether the cancer has **metastasized** (spread) to other organs of the body (The most common site of distant salivary gland cancer spread is the lungs).

Numbers or letters appear after T, N, and M to provide more details about each of these factors:

- The numbers 0 through 4 indicate increasing severity.
- The letter X means "cannot be assessed" because the information is not available.

T groups for major salivary gland cancers

TX: The main (primary) tumor cannot be assessed; information not known.

T0: No evidence of a primary tumor. (For example, the cancer was first found in the lymph nodes, but the main tumor itself can't be found.)

T1: Tumor is 2 cm (about ¾ inch) across or smaller. It's not growing into nearby tissues.

T2: Tumor is larger than 2 cm but no larger than 4 cm (about 1½ inch) across. It's not growing into nearby tissues.

T3: Tumor is larger than 4 cm across and/or is growing into nearby soft tissues.

T4a: Tumor is any size and is growing into nearby structures such as the jaw bone, skin, ear canal, and/or facial nerve. This is known as *moderately advanced disease*.

T4b: Tumor is any size and is growing into nearby structures such as the base of the skull or other bones nearby, or it surrounds the carotid artery. This is known as *very advanced disease*.

N groups for major salivary gland cancers

NX: Nearby (regional) lymph nodes cannot be assessed; information not known.

N0: No spread to regional lymph nodes.

N1: The cancer has spread to 1 lymph node on the same side of the head or neck as the primary tumor. The lymph node is no larger than 3 cm (about 1¼ inch) across.

N2: This group includes 3 subgroups:

- **N2a:** The cancer has spread to 1 lymph node on the same side as the primary tumor. The lymph node is larger than 3 cm but not larger than 6 cm (about 2½ inches) across.
- **N2b:** The cancer has spread to more than 1 lymph node on the same side as the primary tumor, but none of the lymph nodes are larger than 6 cm across.
- **N2c:** The cancer has spread to 1 or more lymph nodes, none larger than 6 cm across, either on the side opposite the primary tumor or on both sides of the neck.

N3: The cancer has spread to a lymph node that is larger than 6 cm across.

M groups for major salivary gland cancers

M0: The cancer has not spread to tissues or organs far away from the salivary glands.

M1: The cancer has spread to tissues or organs far away from the salivary glands.

Stage grouping

Once the T, N, and M categories have been assigned, this information is combined in a process called *stage grouping* to assign an overall stage. The stage is expressed in Roman numerals from I (the least advanced) to IV (the most advanced). Some stages are subdivided with letters.

Stage I: T1, N0, M0: The tumor is no more than 2 cm across and is not growing into nearby tissues (T1). It has not spread to nearby lymph nodes (N0) or distant sites (M0).

Stage II: T2, N0, M0: The tumor is larger than 2 cm but is no larger than 4 cm across and is not growing into nearby tissues (T2). It has not spread to nearby lymph nodes (N0) or distant sites (M0).

Stage III: Either of the following:

T3, N0, M0: The tumor is larger than 4 cm across and/or is growing into nearby soft tissues (T3). It has not spread to nearby lymph nodes (N0) or to distant sites (M0).

OR

T1 to T3, N1, M0: The tumor is any size and may have grown into nearby soft tissues (T1 to T3). The cancer has spread to one lymph node on the same side of the head or neck as the primary tumor, but the lymph node is no larger than 3 cm across (N1). The cancer has not spread to distant sites (M0).

Stage IVA: Either of the following:

T4a, N0 or N1, M0: The tumor is any size but has grown into nearby structures such as the jaw bone, skin, ear canal, and/or facial nerve (T4a). It may or may not have spread to one lymph node (no larger than 3 cm across) on the same side of the head or neck as the primary tumor (N0 or N1). The cancer has not spread to distant sites (M0).

OR

T1 to T4a, N2, M0: The tumor is any size and may or may not have grown into nearby soft tissues or structures such as the jaw bone, skin, ear canal, and/or facial nerve (T1 to T4a). The cancer has spread to more than one lymph node, to a lymph node larger than 3 cm across, or to lymph nodes on the other or both sides of the neck. None of the lymph nodes are larger than 6 cm across (N2). The cancer has not spread to distant sites (M0).

Stage IVB: Either of the following:

T4b, Any N, M0: The tumor is any size and has grown into nearby structures such as the base of the skull or other bones nearby, or it surrounds the carotid artery (T4b). The cancer may or may not have spread to nearby lymph nodes (any N). It has not spread to distant sites (M0).

OR

Any T, N3, M0: The tumor is any size and may or may not have grown into nearby soft tissues or other structures (any T). The cancer has spread to at least 1 lymph node that’s larger than 6 cm across (N3). It has not spread to distant sites (M0).

Stage IVC: Any T, Any N, M1: The tumor is any size and may or may not have grown into nearby soft tissues or other structures (any T). The cancer may or may not have spread to nearby lymph nodes (any N). It has spread to distant sites (M1).

If you have any questions about the stage of your cancer or how it affects your treatment, be sure to ask your cancer care team.

Survival rates for salivary gland cancer by stage

Survival rates are often used by doctors 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 don't want to read about the survival numbers for salivary gland cancer, stop reading here and skip to the next section.

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 people live much longer than 5 years (and many are cured). 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 better outlook for people now being diagnosed with salivary gland cancer.

5-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 more accurate way to describe the prognosis for patients with a particular type and stage of cancer.

The rates below are based on the stage of the cancer *at the time of diagnosis*. 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 spreads or comes back is still referred to by the stage it was given when it was first found, 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 numbers below come from the National Cancer Database, and are based on people diagnosed with cancer of the major salivary glands between 1998 and 1999.

Stage	**5-year Relative Survival Rate**
I	91%
II	75%
III	65%

IV	39%

Again, these numbers include people who were diagnosed and treated many years ago, so the outlook for people now being diagnosed might be better.

Survival rates are based on previous outcomes of large numbers of people who had the disease, but they can't predict what will happen in any person's case. The stage of the cancer is important, but many other factors can also affect a person's outlook, such as their age, the type and grade of the cancer, and how well the cancer responds to treatment. Even when taking these factors into account, survival rates are at best rough estimates. Your doctor is familiar with the aspects of your particular situation and can tell you how the numbers above might apply to you.

How is salivary gland cancer 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 cancer is diagnosed and staged, your cancer care team will discuss your treatment options (choices) with you. Depending on your situation, you may have different types of doctors on your treatment team:

- An otolaryngologist (also known as an *ear, nose, and throat*, or *ENT* doctor): a surgeon who treats certain diseases of the head and neck
- 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 physician assistants, nurse practitioners, nurses, nutrition specialists, speech therapists, occupational therapists, social workers, and other health professionals.

Common treatment options for salivary gland cancer include:

- Surgery

- Radiation therapy
- Chemotherapy

Sometimes more than one type of treatment is used.

Which treatment option(s) might be best for you depends on many factors, including the type, grade, and stage of the cancer; your overall health; the chances of curing the disease; the impact of the treatment on functions like speech, chewing, and swallowing; and your own personal preferences.

It's important to discuss all of your treatment options as well as their possible side effects with your treatment team to help make the decision that best fits your needs. If there's anything you don't understand, ask to have it explained. (See the section "What should you ask your doctor about salivary gland cancer?" for some questions to ask.)

If time permits, getting a second opinion from a doctor experienced with salivary gland cancer is often a good idea. It can give you more information and help you feel more confident about the treatment plan you choose.

The next few sections describe the types of treatments used for salivary gland cancer. This is followed by a description of the most common approaches used based on the stage of the cancer, and information on treatment options for recurrent salivary gland cancer.

Surgery for salivary gland cancer

Surgery is often the main treatment for salivary gland cancers. Your cancer will probably be treated with surgery if the doctor believes that he or she can remove it completely (that is, if the cancer is *resectable*). Whether or not a cancer is resectable depends largely on how far it has grown into nearby structures, but it also depends on the skill and experience of the surgeon. Being treated by a surgeon who has treated many patients with salivary gland cancer gives you the best chance of having your cancer removed completely. This, in turn, gives you the best chance of being cured.

In most cases, the cancer and some or all of the surrounding salivary gland will be removed. Nearby areas of soft tissue may be removed as well. If the cancer is high grade (more likely to grow and spread quickly) or if it has already spread to lymph nodes, the surgeon will usually remove lymph nodes from the same side of the neck in an operation called a *neck dissection* (described below).

Before surgery, ask your surgeon exactly what will be done during the operation, what the goals of the surgery are, whether there are other options, and what side effects you can expect.

The type of surgery will depend on which salivary gland is affected.

Parotid gland surgery

Most salivary gland tumors occur in the parotid gland. Surgery here is complicated by the fact that the *facial nerve*, which controls movement on the same side of the face, passes through the gland. For these operations, an incision (cut) is made in the skin in front of the ear and may extend down to the neck.

Most parotid gland cancers start in the outside part of the gland, called the superficial lobe. These can be treated by removing only this lobe, which is called a *superficial parotidectomy*. This usually leaves the facial nerve intact and does not affect facial movement.

If your cancer has spread into deeper tissues, the surgeon will remove the entire gland. This operation is called a *total parotidectomy*. If the cancer has grown into the facial nerve, it will have to be removed as well. If your surgeon has mentioned this surgery as a possibility, ask about operations to repair the nerve and ways to treat side effects caused by removing the nerve. If the cancer has grown into other tissues near your parotid gland, these tissues might also need to be removed.

Submandibular or sublingual gland surgery

If your cancer is in the submandibular or sublingual glands, the surgeon will make a cut in the skin to remove the entire gland and perhaps some of the surrounding tissue or bone. Nerves that pass through or near these glands control movement of the tongue and the lower half of the face, as well as sensation and taste. Depending on the size and location of the cancer, the surgeon may need to remove some of these nerves.

Minor salivary gland surgery

Minor salivary gland cancers can occur in your lips, tongue, palate (roof of the mouth), mouth, throat, voice box (larynx), nose, and sinuses. The surgeon usually removes some surrounding tissue along with the cancer. The exact details of surgery depend on the size and location of the cancer.

Possible risks and side effects of salivary gland surgery

All surgery has some risks, including complications from anesthesia, bleeding, blood clots, and infections. These risks are generally low but are higher with more complicated operations.

For any salivary gland cancer surgery, the surgeon may need to cut through your skin or your mouth. Most people will have some pain after the operation, although this can usually be controlled with medicines.

If your facial nerve is damaged during surgery, you might lose control of your facial muscles on the side where the surgery was done. That side of your face may droop. If the injury to the

facial nerve is related to retraction (pulling) of the nerve during surgery and/or swelling from the operation, the damage might just be temporary.

Sometimes, nerves cut during surgery grow back abnormally and become connected to the sweat glands of the face. This condition, called *Frey syndrome* or *gustatory sweating*, results in flushing or sweating over areas of your face when you chew. Frey syndrome can be treated with medicines or with additional surgery.

Damage to other nerves in the face or mouth might cause problems with tongue movement, speech, or swallowing.

Depending on the extent of the operation, your appearance may be changed as a result of surgery. This can range from a simple scar on the side of the face or neck 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 changes in appearance or other side effects you might expect, to help prepare you for them. He or she can also give you an idea about what corrective options might be available afterward, such as reconstructive surgery.

Lymph node removal (neck dissection)

Surgery to remove lymph nodes is called a *lymph node dissection* or *lymphadenectomy*. Salivary gland cancers sometimes spread to lymph nodes in the neck (cervical lymph nodes), and these may need to be removed as a part of treating the cancer. This is called a *neck dissection*.

A neck dissection may be done if:

- Lymph nodes in the neck are enlarged (as felt by physical exam or seen on a CT or MRI scan)
- A PET (positron emission tomography) scan suggests the lymph nodes may contain cancer
- The cancer is high grade (looks very abnormal under the microscope) or has other features that mean it has a high risk of spreading

The lymph nodes that are removed are looked at under the microscope to see if they contain cancer cells. Removing the lymph nodes can help ensure all of the cancer is removed. It can also be important for staging and deciding on the need for further treatment.

There are many types of neck dissections, but their major purpose is to remove lymph nodes that might contain cancer. In doing this, the surgeon may need to remove connective tissue, muscles, nerves, and blood vessels from one side of your neck. This type of surgery is usually done through an incision (cut) across the side of the neck, but sometimes a longer incision going down the neck might be needed.

Possible risks and side effects of lymph node removal

The general risks with a neck dissection are similar to those with any other type of surgery, including problems with anesthesia, bleeding, blood clots, infections, and poor wound healing. Most people will have some pain after the operation, although this can usually be controlled with pain medicines.

Because this surgery can affect nerves that run through the neck, it can sometimes lead to ear numbness, weakness in raising your arm above your head, and weakness of the lower lip. These may get better with time. You can be helped by physical therapists who can teach you exercises to improve your neck and shoulder movement.

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

Radiation therapy for salivary gland cancer

Radiation therapy uses high-energy x-rays or particles to destroy cancer cells or slow their growth.

Radiation therapy may be used:

- As the main treatment (alone or with chemotherapy) for some salivary gland cancers that can’t be removed by surgery because of the size or location of the tumor, or if a person can’t have (or doesn’t want) surgery
- After surgery (alone or with chemotherapy) to try to kill any cancer cells that might have been left behind, if the cancer has a higher chance coming back
- In people with advanced salivary gland cancer to help with symptoms such as pain, bleeding, or trouble swallowing

External beam radiation therapy, which focuses radiation from outside the body on the cancer, is the type of radiation therapy used most often to treat salivary gland cancer.

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. This may take a couple of hours or more on the first visit.

Most often, radiation treatments are given 5 days a week for 6 or 7 weeks. The length of treatment might be shorter if it’s only being used to relieve symptoms from cancer spread.

Getting radiation treatment is much like getting an x-ray, but the radiation dose is stronger and aimed more precisely at the cancer. The procedure itself is painless. Each treatment lasts only a few minutes, but the setup time – getting you into place for treatment – takes longer.

In recent years, doctors have found that newer forms of radiation therapy may work better than the standard treatment.

Accelerated hyperfractionated radiation therapy: In this approach, radiation is given twice a day over a shorter total length of time.

Three-dimensional conformal radiation therapy (3D-CRT): 3D-CRT uses the results of imaging tests such as MRI and special computers to precisely map the location of the tumor. 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.

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 limit the dose reaching the most sensitive nearby normal tissues. This may let the doctor give a higher dose to the tumor. Many major hospitals and cancer centers now use IMRT as the standard way to deliver external beam radiation.

Fast neutron beam radiation: Instead of using x-rays, neutron radiation therapy uses a beam of high-energy neutrons. Neutrons are neutral particles in atoms. Some studies have suggested that this type of radiation may be more effective, but it may also lead to more side effects. Neutron therapy machines are available in only a handful of cancer centers in the United States at this time.

Possible side effects

Radiation therapy may cause sunburn-like skin changes, nausea, vomiting, and fatigue. Often these go away after treatment.

Radiation therapy of the salivary glands can cause specific problems, because important structures in the head and neck might also get some radiation during treatment. The most common side effect is reduced saliva, which can lead to a dry mouth. Radiation can also cause a sore throat, sores in the mouth and throat, hoarseness, trouble swallowing, temporary loss of taste, bone pain, and bone damage. Radiation can make tooth problems worse, too. Most doctors advise that you have your teeth checked by a dentist before starting radiation therapy to the head or neck area. In some cases, the dentist may even recommend removing some teeth before treatment to lessen the chance you will have problems later.

For most major salivary gland cancers, radiation is only given to the side of the face and neck with the cancer, which reduces the risk of serious long-term side effects. But in rare instances, both sides of your face and neck might need to be treated with radiation. This may damage other salivary glands, resulting in permanently dry mouth. This often causes problems with eating and swallowing and can lead to tooth decay.

Some of the damage to the salivary glands may be lessened if a drug called amifostine (Ethyol®) is given before each radiation treatment. This drug can be hard to tolerate, so it's not helpful for everyone.

Radiation therapy might also damage your thyroid gland, which might not show up until months or even years later. Blood tests to check thyroid function will be done during follow up (after treatment is complete). Some patients might need to take pills to replace thyroid hormone at some point.

It's important to discuss the possible side effects of radiation therapy with your doctor before starting treatment, and to make sure everything is being done to try to limit these side effects as much as possible. If you do have side effects, there are ways to relieve many of them, so be sure 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 salivary gland cancer

Chemotherapy (chemo) is treatment with 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 cancers that have spread beyond the head and neck. Some chemo drugs may also make cancer cells more vulnerable to radiation.

Chemo is not often used to treat salivary gland cancers. Some doctors may use it along with radiation therapy to try to make the radiation more effective, but it's not yet clear how helpful this is. More often, chemo is used in patients whose cancer has spread (metastasized) to distant organs and in patients whose cancers could not be controlled by surgery and radiation therapy. Chemo sometimes shrinks tumors in these patients, but it's not likely to cure this type of cancer.

Doctors give chemo in cycles, with each period of treatment followed by a rest period to give the body time to recover. Chemo cycles generally last about 3 to 4 weeks. Chemo is often not recommended for patients in poor health, but advanced age by itself is not a barrier to getting chemo.

Some of the chemo drugs used to treat salivary gland cancers include:

- Cisplatin
- Carboplatin
- Doxorubicin (Adriamycin®)
- 5-fluorouracil (5-FU)
- Cyclophosphamide (Cytoxan®)

- Paclitaxel (Taxol®)
- Vinorelbine (Navelbine®)
- Methotrexate

These drugs may be used alone, but are more often given in combinations of 2 or more drugs. Because salivary gland cancers are not common, no large studies have been done to prove one regimen is better than the others. The situation is also complicated by the fact that there are different types of salivary gland cancers. New chemo drugs and combinations of drugs are now being studied in clinical trials.

If you'd like more information on a drug used in your treatment or a specific drug mentioned in this section, see our Guide to Cancer Drugs , or call us with the names of the medicines you're taking.

Possible 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, like 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.

The side effects of chemo depend on the type and dose of drugs given and the length of time they are taken. These side effects can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea or constipation
- Increased chance of infections (from having too few white blood cells)
- Easy bruising or bleeding (from having too few blood platelets)
- Fatigue (from having too few red blood cells)

There are often ways to lessen these side effects, and they usually go away after treatment is finished. Be sure to ask your doctor or nurse about medicines to help reduce side effects, and let him or her know when you do have side effects so they can be managed effectively. For example, drugs can be given to help prevent or reduce nausea and vomiting.

Some drugs can have other side effects. For example, cisplatin, carboplatin, and paclitaxel can damage nerves (called *neuropathy*). This can sometimes lead to hearing loss or symptoms in the hands and feet such as pain, burning or tingling sensations, sensitivity to cold or heat, or weakness. In most cases this improves or goes away once treatment stops, but it can last a long time in some people. You should report this to your medical team, as well as any other side effects while getting chemo, so that they can be treated right away. In some cases, the doses of the chemo drugs may need to be reduced or treatment may need to be delayed or stopped to prevent the effects from getting worse.

For more information on chemo, see the Chemotherapy section of our website, or our document *Understanding Chemotherapy: A Guide for Patients and Families*.

Clinical trials for salivary gland cancer

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 salivary gland cancer. Or maybe someone on your health care team has mentioned a clinical trial to you.

Clinical trials are carefully controlled research studies that are done with patients who volunteer for them. They are done to get a closer look at promising new treatments or procedures.

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

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of studies 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 at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials website at www.cancer.gov/clinicaltrials. Salivary gland cancers are not common, so there might not be many clinical trial opportunities for patients with these cancers, and they might not be available in all parts of the country.

You must meet certain requirements to take part in any clinical trial, but if you do qualify for a clinical trial, it's up to you whether or not to take part (enroll in) it.

For more information on clinical trials, see our document *Clinical Trials: What You Need to Know*. You can read it on our website or call us at 1-800-227-2345 to have it sent to you.

Complementary and alternative therapies for salivary gland cancer

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 to 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 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 to learn more about complementary and alternative methods in general and to find out about the specific methods you are looking at. You can also read about them in the Complementary and Alternative Medicine section of our website.

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 stage of salivary gland cancer

The treatment options for salivary gland cancer depend largely on the stage (extent) of the cancer. But other factors, such as the grade of the cancer (how likely it is to grow and spread quickly) and a person's overall health, can also be important.

Stage I

These cancers are small and still within the salivary gland. If you have stage I salivary gland cancer, your doctors will probably recommend surgery to remove the cancer and part or all of the salivary gland.

Radiation therapy may be advised after surgery if you have an intermediate- or high-grade cancer or an adenoid cystic carcinoma, if the cancer could not be removed completely, or if the edges of the removed area contain cancer cells (a sign that some cancer may have been left behind).

Stage II

Stage II salivary gland cancers are larger but are still confined within the salivary gland. They are also treated mainly with surgery, but it may be more extensive (covering a wider area) than for stage I cancers. The surgeon may also remove lymph nodes in your neck on the same side to see if they contain cancer.

Radiation therapy may be given after surgery if your cancer is intermediate- or high-grade or an adenoid cystic carcinoma, if the cancer could not be removed completely, or if the edges of the removed specimen contain cancer cells. There is a greater chance that some cancer may have been left behind than with stage I cancers.

Radiation therapy might be an option as the main treatment if surgery would result in serious problems with eating, speech, or appearance, or for people who refuse surgery. But it's not

clear if this offers the same chance to cure the cancer as surgery, so not all doctors agree that this is a good approach for stage II cancers.

Stage III

These cancers are even larger and/or have started to grow outside the salivary gland. They might have also reached lymph nodes in the neck.

Doctors generally recommend extensive surgery (removing the salivary gland containing the tumor, nearby tissues, and all lymph nodes in your neck on the same side) if it's possible. For low-grade tumors with no concerning features, this might be the only treatment needed if all of the cancer is removed. But in many cases, surgery is followed by radiation therapy. Chemotherapy (chemo) may be added as well, but it's not clear how helpful this is. This is still being studied.

Radiation therapy (with or without chemo) may be used as the main treatment if surgery is not a good option (for example, if surgical removal of the cancer would cause serious problems with eating, speech, or appearance).

Stage IV

Stage IV salivary gland cancers are very hard to cure, particularly if the cancer has spread to distant organs.

Some of these cancers might be treated with surgery if the doctor feels all of the cancer can be removed. (This would be followed by radiation therapy and possibly chemo.)

But most often, radiation therapy is used as the main treatment in this situation to try to shrink the tumor(s) and relieve pain, bleeding, or other symptoms. This may be combined with chemo. If the cancer has spread to other parts of the body, chemo may shrink or slow the growth of the cancer for a time and may help relieve symptoms.

Because these cancers can be hard to treat, taking part in a clinical trial of newer treatments may be a good option.

Treatment of recurrent salivary gland cancer

Cancer is called *recurrent* if it comes back after treatment. Recurrence can be local (in or near the same place it started) or distant (spread to organs such as the lungs or liver).

If cancer returns after treatment, the choices available depend on the location and the extent of the cancer and what treatment was used the first time around. It's important to understand the goal of further treatment – whether it's to try to cure the cancer or to help relieve symptoms – as well as the likelihood of benefits and risks.

If the cancer is thought to be resectable (able to be removed completely), surgery is usually the treatment of choice when possible. This is often followed by radiation therapy if it wasn't given before.

If the cancer returns in the area where it started but is not resectable, radiation therapy may be an option. Chemotherapy (chemo) may be used along with the radiation or by itself (especially if radiation therapy was already used as part of the initial treatment).

Cancers that come back in distant parts of the body are usually treated with chemo. In selected cases, other treatments such as surgery or radiation therapy may be used to help relieve symptoms from the spread of the cancer. Because these cancers can be hard to treat, clinical trials of newer treatment approaches may be a good option.

More treatment information for salivary gland cancer

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 salivary gland cancers is found in the NCCN Head and Neck Cancers guideline.)

The NCI, part of the US National Institutes of Health, provides treatment information by phone (1-800-4-CANCER) and on its website (www.cancer.gov). Detailed information intended for use by cancer care professionals are also available on www.cancer.gov.

What should you ask your doctor about salivary gland cancer?

It's important to have honest, open discussions with your doctor. Ask any question, 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 salivary gland cancer do I have?
- Which salivary gland is affected?
- Is my cancer high grade (likely to grow and spread quickly) or low grade?
- Has my cancer spread beyond where it started?
- What is my cancer's stage, and what does that mean?

- Will I need other tests before we can decide on treatment?
- Will I need to see other doctors?
- How much experience do you have treating this type of cancer?
- Should I get a second opinion? Can you recommend a doctor or cancer center?
- What are my treatment choices?
- What treatment do you recommend and why?
- What's 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 it be like? Where will it be done?
- What risks or side effects should I expect? How long are they likely to last?
- Is treatment likely to affect my speech or swallowing?
- Will treatment affect the way I look?
- How will treatment affect my daily activities?
- What will we do if the treatment doesn't work or if the cancer recurs?
- What type of follow-up might I need after treatment?
- Where can I find more information and support?

Along with these sample questions, be sure to write down some of your own. For instance, you might want more information about your recovery time so you can plan your work schedule. Or you might want to ask about clinical trials for which you may qualify. You can find more information about communicating with your health care team in our document *Talking With Your Doctor*.

What happens after treatment for salivary gland cancer?

For some people, treatment may remove or destroy the salivary gland 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 coming back. (When cancer comes back after treatment, it's 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 might help to know that many cancer survivors have learned to live with this uncertainty and are living full lives. Our document *Living With Uncertainty: The Fear of Cancer Recurrence* gives more detailed information on this topic. You can read it online, or call us to have a free copy sent to you.

For other people, the cancer may never go away completely. These people may get regular treatments with chemotherapy, radiation therapy, or other therapies to try to help keep the cancer in check. Learning to live with cancer that does not go away 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 (see the section "Additional resources for salivary gland cancer").

Follow-up care

If you have completed treatment, your doctors will still want to watch you closely. It's very important to go to all of your follow-up appointments. During these visits, your doctors will ask questions about any problems you are having and may do exams and tests to look for signs of cancer or treatment side effects. Almost any cancer treatment can have side effects. Some may last for a few weeks to months, but others can last the rest of your life. This is the time for you to tell your cancer care team about any changes or problems you notice and any questions or concerns you have.

Most doctors recommend follow-up exams every few months for the first couple of years, and then less often after that if nothing abnormal is found. If you had radiation therapy to the neck, your doctor will probably want to get blood tests as well to check your thyroid function.

Imaging tests such as CT scans may be done after treatment to get a baseline idea of what the head and neck area look like. Further imaging tests may be done if you later develop any signs or symptoms that might be due to a return of the cancer.

You may be advised to see your dentist after treatment to check on the health of your teeth. Your doctor will also want to keep a close eye on your hearing, speech, and swallowing, which can be affected by treatment. If you are having problems with any of these, your doctor may refer you to a therapist for help with rehabilitation.

It's important to keep 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.

Should your cancer come back, treatment will depend on where the cancer is, what treatments you've had before, and your overall health. For more information on how recurrent cancer is treated, see the section "Recurrent salivary gland cancer." Our document *When Your Cancer Comes Back: Cancer Recurrence* can also give you information on how to manage and cope with this phase of your treatment.

Your appearance and other changes

Surgery or other treatments can affect nerves and other structures in the face and neck. This can affect how you look. Ask your doctor about reconstructive surgery options that might be available for you.

Surgery around the jaw or neck can sometimes lead to ear numbness, weakness in raising your arm above your head, and weakness of the lower lip. If this happens, your doctor can refer you to a physical therapist, who can teach you exercises to improve your neck and shoulder movement.

Treatment of salivary gland cancer can sometimes cause problems such as trouble speaking or swallowing, dry mouth, or even tooth loss. 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 or may need nutritional supplements to help make sure they get the nutrition they need. A team of doctors and nutritionists can work with you to help you manage your individual nutritional needs. This can help you maintain your weight and get the nutrients you need.

If treatment affects how you speak, there might be both surgical and non-surgical options that can help. Your doctor will probably refer you to a speech therapist, a professional who is trained in helping people with speech problems. Some people might need to learn new ways of speaking. The speech therapist can play a major role in helping with this.

Dental care is often very important at this time as well, especially if you your mouth is dry as a result of surgery. If needed, your doctor can refer you to a dentist, who can help you care for your teeth and offer ways to help with dry mouth, such as using artificial saliva.

Tell your doctor or nurse about any other problems you are having. There are also groups that can provide support and help teach you how to manage any lingering problems you may have. Some of these groups are listed in the “Additional resources for salivary gland cancer” section of this document.

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 during and 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
- If you had surgery, a copy of your operative report(s)

- If you stayed in the hospital, a copy of the discharge summary that doctors prepare when patients are sent home
- If you had radiation therapy, a copy of your treatment summary
- If you had chemotherapy, a list of your drugs, drug doses, and when you took them
- Copies of any imaging tests, such as x-rays and CT scans (which can usually be stored digitally on a DVD, etc.)

Lifestyle changes during and after treatment for salivary gland cancer

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.

What can I do to 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's 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.

At this time, not enough is known about salivary gland cancers to say for sure if there are things you can do that will be helpful. Avoiding some of the possible risk factors (such as tobacco, excess alcohol use, and unhealthy diets) *might* be helpful, but no one knows for sure.

Adopting other healthy behaviors such as getting regular physical activity and staying at a healthy weight might help as well, but again 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.

Making 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 may 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 hard 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 salivary gland cancer. The cancer or its treatment may affect how you swallow or cause dry mouth, tooth loss, or other problems. Nausea can be a problem from some treatments. You may not feel like eating and lose weight when you don't want to.

If treatment causes weight changes or eating problems, do the best you can and keep in mind that these problems usually get better over time. You may find it helps to eat small portions every 2 to 3 hours until you feel better. You may also want to ask your cancer team about seeing 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.

You can get more information in 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 often 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's normal for your fitness, endurance, and muscle strength to decline. Any plan for physical activity should fit your own situation. A person who has never exercised will not be able to take on the same amount of exercise as someone 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 learn 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 "Additional resources for salivary gland cancer" section.)

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.

How might having salivary gland cancer affect your emotional health?

During and after treatment, you might 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 relationship with those around you. Unexpected issues may also cause concern. For instance, if your appearance or the way you talk has changed as a result of your treatment, this might take some time to get used to. You might be stressed by financial concerns resulting from your treatment. You might also 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 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's 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 salivary gland cancer stops working

If cancer keeps growing or comes back after one kind of treatment, it's possible that another treatment plan might still cure the cancer, or at least keep it in check enough to help you live longer and feel better. Clinical trials also might offer chances to try newer treatments that could be helpful. But when a person has tried many different treatments and the cancer has not gotten any better, even newer treatments might no longer be helpful. If this happens, it's important to weigh the possible limited benefits of trying 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 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. Your doctor can estimate how likely it is the cancer will respond to treatment you're 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's important to have realistic expectations if you do choose this plan.

Palliative care

No matter what you decide to do, it's important to 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 goal 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 pain caused by a large tumor. 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.

Hospice care

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's 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 the 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 *Hospice Care*.

Staying hopeful is important, too. Your hope for a cure may not be as bright, but there's 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.

You can learn more about the changes that occur when treatment stops working, and about planning ahead for yourself and your family, in our documents *Advanced Cancer* and *Nearing the End of Life*. You can read them online or call us at 1-800-227-2345 to have free copies mailed to you.

What's new in salivary gland cancer research and treatment?

Medical centers throughout the world are researching the causes and treatment of salivary gland cancer. This is a challenging disease to study because it's not common and there are many types of salivary gland cancer. But each year, scientists find out more about what causes the disease and how to better treat it.

Biology of salivary gland cancers

Recent studies have found certain changes in chromosomes and genes of various types of salivary gland cancers. Researchers are learning more about how these changes can cause salivary gland cells to become cancerous. In some salivary gland cancer cells, 2 chromosomes have swapped parts of their DNA, which is known as a *translocation*. These changes often activate genes that affect cell growth. For example, adenoid cystic carcinomas often have translocations between chromosomes 6 and 9, and mucoepidermoid carcinomas often have translocations between chromosomes 11 and 19. The exact genes involved in these translocations are now being studied.

As scientists learn more about these and other changes in salivary gland cancer cells, they hope to use this information to develop new treatments that work better and cause fewer side effects.

Treatment

Surgery

Advances in surgical techniques now allow teams of head and neck surgeons and neurosurgeons to remove cancers that have spread near the base of the skull. These operations were not thought possible a few years ago but are becoming more common and successful.

Reconstructive surgery is becoming more sophisticated and successful, too. This lets surgeons do more extensive surgery to remove the cancer and improves patients' quality of life after treatment.

Radiation therapy

Advances in radiation therapy now permit more precise targeting of radiation. Some types of radiation, such as fast neutron beam radiation, have been found to be particularly useful, but they require specialized equipment that's not available in many hospitals.

Chemotherapy

Advanced salivary gland cancer is rare, so knowledge about treating these cancers with chemotherapy (chemo) is still evolving. Chemo drugs such as gemcitabine, capecitabine, and oxaliplatin are now being tested in clinical trials and may provide more options for people with advanced salivary gland cancer.

Targeted therapy

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. These targeted drugs work differently from standard chemotherapy drugs. They sometimes work when chemo drugs don't, and they often have different (and less severe) side effects.

Studies have identified changes in several proteins in salivary gland cancer cells that help these cancers grow and spread. Some of these changes affect proteins that can be blocked by targeted therapies that are already used to treat other types of cancer. Clinical trials are now looking at whether these targeted therapies can be helpful for salivary gland cancers.

Additional resources for salivary gland cancer

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)

Living with cancer

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

Living With Uncertainty: The Fear of Cancer Recurrence

When Your Cancer Comes Back: Cancer Recurrence

Understanding cancer treatments

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

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

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

Clinical Trials: What You Need to Know

Cancer treatment side effects

Nausea and Vomiting

Anemia in People With Cancer

Fatigue in People With Cancer

Guide to Controlling Cancer Pain (also in Spanish)

Pain Diary

Peripheral Neuropathy Caused by Chemotherapy

Family and caregiver concerns

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

What It Takes to Be a Caregiver

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

Work, insurance, and finances

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

Working During Cancer Treatment

Returning to Work After Cancer Treatment

When treatment isn’t working

Nearing the End of Life

Hospice Care

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 place an order.

National organizations and websites*

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

Let's Face It
Website: www.dent.umich.edu/faceit

> A free online resource about, by, and for people with facial differences, including facial disfigurement as a result of cancer; offers information on dealing with diagnosis, finding a good doctor, health insurance, research articles, and lifestyle tips

Oral Cancer Foundation
Phone number: 1-949-646-8000
Website: www.oralcancerfoundation.org

> Has information about oral cancer treatments, current research, and current oral cancer related news; also has a patient/survivor discussion forum where those currently fighting oral cancer can get support, insights, and inspiration from those who have been there before them (postings are real time)

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

> 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

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

> Offers free phone 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: Salivary gland cancer detailed guide

American Joint Committee on Cancer. Major salivary glands. In: AJCC Cancer Staging Manual. 7th ed. New York, Springer; 2010: 79-82.

Howlader N, Noone AM, Krapcho M, et al (eds). SEER Cancer Statistics Review, 1975-2010, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2010/, based on November 2012 SEER data submission, posted to the SEER website, April 2013.

Laurie SA, Licitra L. Systemic therapy in the palliative management of advanced salivary gland cancers. *J Clin Oncol*. 2006;24:2673-2678.

Locati LD, Perrone F, Losa M, et al. Treatment relevant target immunophenotyping of 139 salivary gland carcinomas (SGCs). *Oral Oncol.* 2009;45:986-990.

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

National Cancer Institute. Physician Data Query (PDQ). Salivary Gland Cancer: Treatment. 2012. Accessed at www.cancer.gov/cancertopics/pdq/treatment/salivarygland/HealthProfessional on October 14, 2013.

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Head and Neck Cancers. v.2.2013. Accessed at www.nccn.org/professionals/physician_gls/pdf/head-and-neck.pdf on October 14, 2013.

Quon H. Cancer of the head and neck. In: Abeloff MD, Armitage JO, Niederhuber JE. Kastan MB, McKenna WG, eds. *Abeloff's Clinical Oncology*. 4th ed. Philadelphia, Pa: Elsevier; 2008:1177-1228.

Sadetzki S, Chetrit A, Jarus-Hakak A, et al. Cellular phone use and risk of benign and malignant parotid gland tumors--a nationwide case-control study. *Am J Epidemiol*. 2008;167:457-467.

Last Medical Review: 1/13/2014
Last Revised: 1/13/2014

2014 Copyright American Cancer Society

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