



# Oral Cavity and Oropharyngeal Cancer

## What is cancer?

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

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

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

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

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

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

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

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

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

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

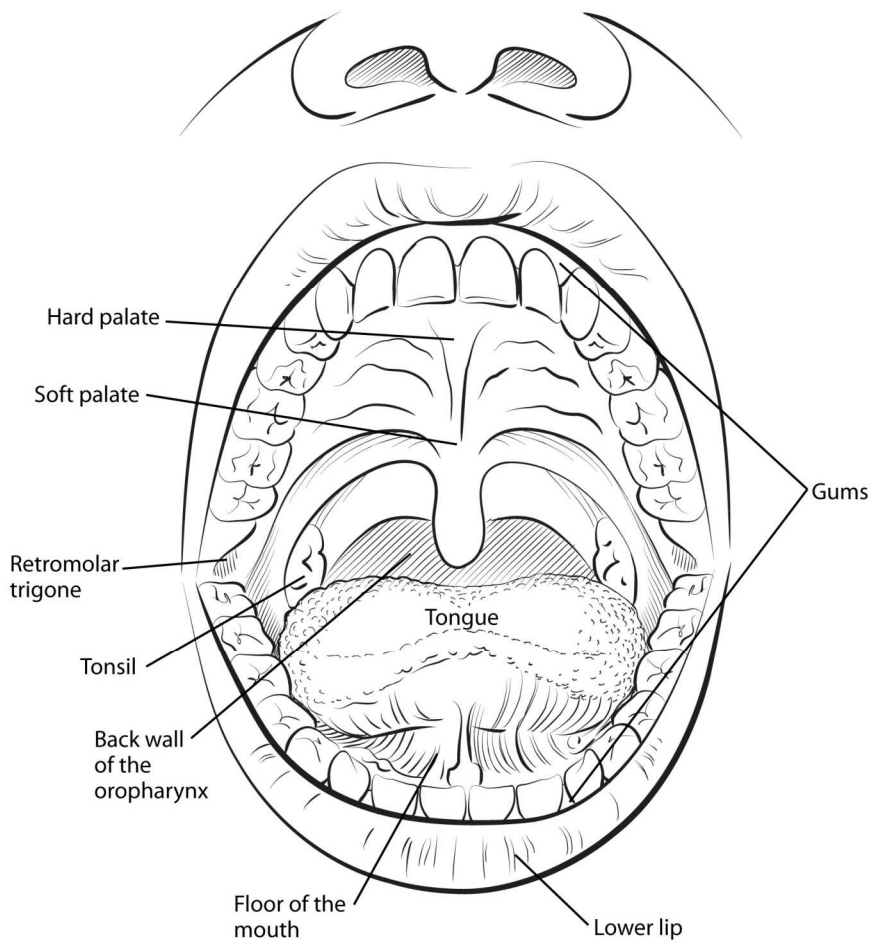
## **What are oral cavity and oropharyngeal cancers?**

Oral cavity cancer, or just oral cancer, is cancer that starts in the mouth (also called the *oral cavity*). Oropharyngeal cancer starts in the oropharynx, which is the part of the throat just behind the mouth. To understand these cancers, it helps to know the parts of the mouth and throat.

### **The oral cavity (mouth) and oropharynx (throat)**

The oral cavity includes the lips, the inside lining of the lips and cheeks (*buccal mucosa*), the teeth, the gums, the front two-thirds of the tongue, the floor of the mouth below the tongue, and the bony roof of the mouth (hard palate). The area behind the wisdom teeth (called the *retromolar trigone*) can be included as a part of the oral cavity, although it is often considered part of the oropharynx.

The oropharynx is the part of the throat just behind the mouth. It begins where the oral cavity stops. It includes the base of the tongue (the back third of the tongue), the soft palate (the back part of the roof of the mouth), the tonsils, and the side and back wall of the throat.

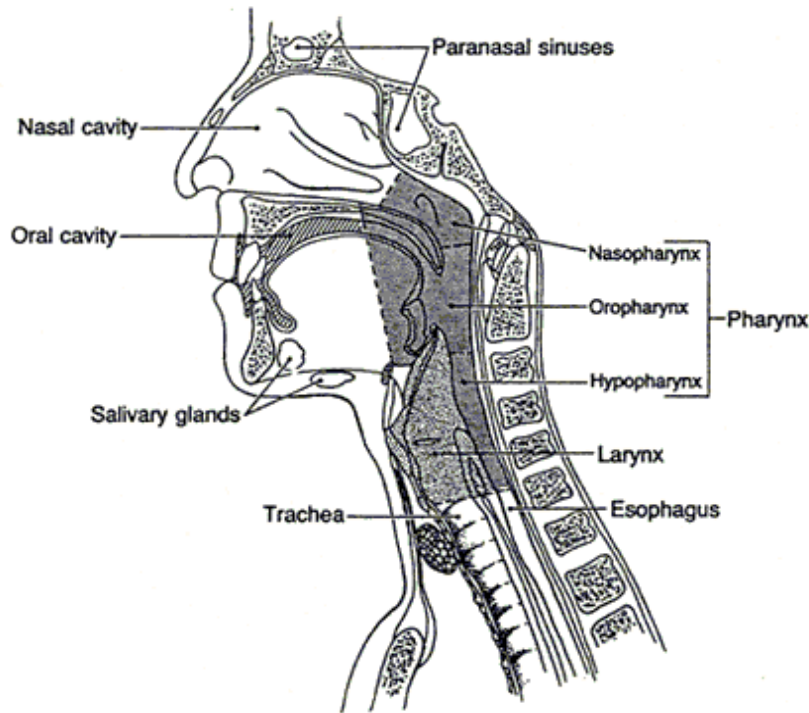


The oral cavity and oropharynx help you breathe, talk, eat, chew, and swallow. Minor salivary glands throughout the oral cavity and oropharynx make saliva that keeps your mouth moist and helps you digest food.

The different parts of the oral cavity and oropharynx are made up of several types of cells. Different cancers can develop from each type of cell. The differences are important, because they can influence a person's treatment options and prognosis (outlook).

Cancers can also start in other parts of the throat, but these cancers aren't discussed in this document:

- Cancers of the nasopharynx (the part of the throat behind the nose and above the oropharynx) are discussed in the American Cancer Society document, *Nasopharyngeal Cancer*.
- Cancers that start in the larynx (voice box) or the hypopharynx (the part of the throat below the oropharynx) are discussed in the American Cancer Society document, *Laryngeal & Hypopharyngeal Cancer*.



## Tumors and growths in the oral cavity and oropharynx

Many types of tumors (abnormal growths of cells) can develop in the oral cavity and oropharynx. They fit into 3 general categories:

- Some are benign, or non-cancerous, which means they do not invade other tissues and do not spread to other parts of the body.
- Some growths start off harmless but can later develop into cancer. These are known as pre-cancerous conditions.
- Other tumors are cancerous. They can grow into surrounding tissues and spread to other parts of the body.

## Benign (non-cancerous) tumors

Many types of benign tumors and tumor-like conditions can start in the mouth or throat:

- Eosinophilic granuloma
- Fibroma
- Granular cell tumor
- Keratoacanthoma
- Leiomyoma

- Osteochondroma
- Lipoma
- Schwannoma
- Neurofibroma
- Papilloma
- Condyloma acuminatum
- Verruciform xanthoma
- Pyogenic granuloma
- Rhabdomyoma
- Odontogenic tumors (tumors that start in tooth-forming tissues)

These non-cancerous tumors start from different kinds of cells and have a variety of causes. Some of them may cause problems, but they are not likely to be life-threatening. The usual treatment is to surgically remove them since they are unlikely to recur (come back).

## Leukoplakia and erythroplakia (possible pre-cancerous conditions)

Leukoplakia and erythroplakia are terms used to describe certain types of abnormal tissue that can be seen in the mouth or throat:

- Leukoplakia is a white or gray patch.
- Erythroplakia is a flat or slightly raised, red area that often bleeds easily if it is scraped.
- Erythroleukoplakia is a patch with both red and white areas.

Your dentist or dental hygienist may be the first person to spot these white or red areas. They may be a cancer, they may be a pre-cancerous condition called *dysplasia*, or they could be a relatively harmless condition.

Dysplasia is graded as mild, moderate, or severe, based on how abnormal the tissue looks under the microscope. Knowing the degree of dysplasia helps predict how likely it is to progress to cancer or to go away on its own or after treatment. For example, severe dysplasia is more likely to become a cancer, while mild dysplasia is more likely to go away completely.

The most frequent causes of leukoplakia and erythroplakia are smoking and chewing tobacco. Poorly fitting dentures that rub against the tongue or the inside of the cheeks can also cause these conditions. But sometimes, there may be no obvious cause. Dysplasia will often go away if the cause is removed.

A biopsy is the only way to know for certain how serious an area of leukoplakia or erythroplakia is. For a biopsy, a sample of tissue from the abnormal area is removed and then looked at under the microscope. But other tests may be used first to help determine if they might be cancers (and therefore will need a biopsy) or to choose the best area to sample for a biopsy. These tests are described in the section, "Can oral cavity and oropharyngeal cancers be found early?"

Most cases of leukoplakia do not develop into cancer. But as many as 1 out of 5 leukoplakias is either cancerous when first found or has pre-cancerous changes that eventually progress to cancer if not properly treated.

Erythroplakia and erythroleukoplakia are less common but are usually more serious. Most of these red lesions turn out to be cancer when they are biopsied or will develop into cancer later.

However, it is important to note that most oral cancers do not develop from pre-existing lesions (either leukoplakia or erythroplakia).

## Oral cavity and oropharyngeal cancers

Several types of cancers can start in the mouth or throat.

### **Squamous cell carcinomas**

More than 9 of 10 cancers of the oral cavity and oropharynx are squamous cell carcinomas, also called *squamous cell cancers*. These cancers begin in early forms of squamous cells, which are flat, scale-like cells that normally form the lining of the mouth and throat.

The earliest form of squamous cell cancer is called *carcinoma in situ*, meaning that the cancer cells are present only in the outer layer of cells called the epithelium. This is different from invasive squamous cell carcinoma, where the cancer cells have grown into deeper layers of the oral cavity or oropharynx.

### **Verrucous carcinoma**

Verrucous carcinoma is a type of squamous cell carcinoma that makes up less than 5% of all oral cancers. It is a low-grade (slow growing) cancer that rarely spreads to other parts of the body, but it can grow deeply into surrounding tissue.

If they are not treated, areas of ordinary squamous cell cancer may develop within some verrucous carcinomas. Some verrucous carcinomas may already have areas of ordinary squamous cell cancer that are not recognized in the biopsy sample. Cells from these areas of squamous cell carcinoma may then spread to other parts of the body.

For all of these reasons, verrucous carcinomas should be removed promptly, along with a wide margin of surrounding normal tissue.

## Minor salivary gland carcinomas

Minor salivary gland cancers can develop in the glands in the lining of the mouth and throat. There are several types of minor salivary gland cancers, including adenoid cystic carcinoma, mucoepidermoid carcinoma, and polymorphous low-grade adenocarcinoma. For more information about these cancers and benign salivary gland tumors, see the American Cancer Society document, *Salivary Gland Cancer*.

## Lymphomas

The tonsils and base of the tongue contain immune system (lymphoid) tissue, where cancers called lymphomas can start. For more information about these cancers refer to the American Cancer Society documents, *Non-Hodgkin Lymphoma*, *Non-Hodgkin Lymphoma in Children* and *Hodgkin disease*.

**The information in the rest of this document about oral cavity and oropharyngeal cancer refers only to squamous cell carcinoma.**

# What are the key statistics about oral cavity and oropharyngeal cancers?

The American Cancer Society's most recent estimates for oral cavity and oropharyngeal cancers in the United States are for 2012:

- About 35,000 people will get oral cavity or oropharyngeal cancer.
- An estimated 6,800 people will die of these cancers.

These cancers are more than twice as common in men as in women. They are about equally common in blacks and in whites.

The rate of new cases of this disease has been dropping overall in the past few decades. However, there has been a recent rise in cases of oropharyngeal cancer related to infection with human papilloma virus (HPV) in white men under the age of 50 .

The death rate for these cancers has been decreasing since the late 1970s.

Oral cavity and oropharyngeal cancers occur most often in the following sites:

- The tongue (about 25% to 30%)
- The tonsils (about 15% to 20%)
- The minor salivary glands (about 10% to 15%)

The rest are found in the lips, gums, the floor of the mouth, and other sites.

The average age of most people diagnosed with these cancers is 62, but they can occur in young people. They are rare in children, but about one-third occur in patients younger than 55.

The rates of these cancers vary among countries. For example, they are much more common in Hungary and France than in the United States and much less common in Mexico and Japan.

When patients newly diagnosed with oral and oropharyngeal cancers are carefully examined, a small portion will have another cancer in a nearby area such as the larynx (voice box), the esophagus (the tube that carries food from the throat to the stomach), or the lung. Some who are cured of oral or oropharyngeal cancer will develop another cancer later in the mouth, throat, or other nearby areas. For this reason, patients with oral and oropharyngeal cancer will need to have follow-up exams for the rest of their lives. They also need to avoid using tobacco and alcohol, which increase the risk for these second cancers.

For statistics related to survival, see the section "Survival rates for oral cavity and oropharyngeal cancer by stage."

## **What are the risk factors for oral cavity and oropharyngeal cancers?**

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 just because you have one or more risk factors for a disease does not mean you will get it. Some people who have oral cavity or oropharyngeal cancer have few or no known risk factors, and others who have several risk factors never develop the disease. Even if someone does have risk factors, it is impossible to know for sure how much they contributed to causing the cancer.

### **Tobacco and alcohol**

Tobacco and alcohol use are among the strongest risk factors for oral cavity and oropharyngeal cancers.

#### **Tobacco use**

Most people with oral cavity and oropharyngeal cancers use tobacco, and the risk of developing these cancers is related to how much and how long they smoked or chewed.

Smokers are many times more likely than non-smokers to develop these cancers. Tobacco smoke from cigarettes, cigars, or pipes can cause cancers anywhere in the mouth or throat, as well as causing cancers of the larynx (voice box), lungs, esophagus, kidneys, bladder, and several other organs.

Pipe smoking is a particularly significant risk for cancers in the area of the lips that touch the pipe stem.

It is important for smokers who have been treated for oral cavity or oropharyngeal cancer to quit smoking, even if their cancer seems to be cured. Continuing to smoke greatly increases their risk of developing a second cancer of the mouth, throat, or larynx (voice box).

Oral tobacco products (snuff or chewing tobacco) are linked with cancers of the cheek, gums, and inner surface of the lips. Using oral tobacco products for a long time poses an especially high risk. These products also cause gum disease, destruction of the bone sockets around teeth, and tooth loss.

## **Drinking alcohol**

Drinking alcohol increases the risk of developing oral cavity and oropharyngeal cancers. The risk goes up even more for people who use both tobacco and alcohol. About 7 out of 10 patients with oral cancer are heavy drinkers.

## **Heavy drinking and smoking**

According to some studies, the risk of these cancers in heavy drinkers and smokers may be as much as 100 times more than the risk of these cancers in people who don't smoke or drink.

## **Betel quid and gutka**

In Southeast Asia, South Asia, and certain other areas of the world, many people chew betel quid, which is made up of areca nut and lime wrapped in a betel leaf. Many people in these areas also chew gutka, a mixture of betel quid and tobacco. People who chew betel quid or gutka have an increased risk of cancer of the mouth.

## **Human papilloma virus (HPV) infection**

HPVs are a group of more than 100 related viruses. Most HPV types cause warts on various parts of the body, but a few HPV types (such as HPV16) are linked to certain cancers, including cervical cancer and some oral and oropharyngeal cancers. These HPV types seem to be spread largely through sexual contact.

The number of oropharyngeal cancers linked to HPV has risen dramatically over the past few decades. HPV DNA (a sign of HPV infection) is now found in about 2 out of 3 oropharyngeal cancers. The rising rate of HPV-linked cancers is thought to be due to changes in sexual practices in recent decades, particularly to an increase in oral sex. HPV DNA is found more often in cancers of the oropharynx (especially the tonsils) and less often in oral cavity cancers.

People with oral and oropharyngeal cancer linked with HPV infection tend to be younger and are less likely to be smokers and drinkers. Most people with HPV infections of the mouth and throat have no symptoms, and only a very small percentage develop oropharyngeal cancer.

Oropharyngeal cancers that contain HPV DNA tend to have a better outlook than those without HPV.

## Gender

Oral and oropharyngeal cancers are about twice as common in men as in women. This might be because men have been more likely to use tobacco and alcohol in the past. While this is changing, the recent rise in HPV-linked cancers has been mainly among younger men, so the difference in occurrence in genders is likely to remain in the near future.

## Age

Cancers of the oral cavity and oropharynx usually take many years to develop, so they are not common in young people. Most patients with these cancers are older than 55 when the cancers are first found. But this may be changing as HPV-linked cancers become more common. People with cancers linked to HPV infection tend to be younger.

## Ultraviolet (UV) light

Sunlight is the main source of UV light for most people. Cancers of the lip are more common in people who have outdoor jobs where they have prolonged exposure to sunlight.

## Poor nutrition

Several studies have found that a diet low in fruits and vegetables is linked with an increased risk of cancers of the oral cavity and oropharynx.

## Weakened immune system

Oral cavity and oropharyngeal cancers are more common in people who have a weak immune system. A weak immune system can be caused by certain diseases present at birth, the acquired immunodeficiency syndrome (AIDS), and certain medicines (such as those given after organ transplants).

## Graft-versus-host disease

Graft-versus-host disease (GVHD) is a condition that sometimes occurs after a stem cell transplant. During this medical procedure, blood stem cells from a donor are used to replace bone marrow that has been destroyed by disease, chemotherapy, or radiation. GVHD occurs when the donor stem cells recognize the patient's cells as foreign and launch an attack against them. GVHD can affect many tissues of the body, including those in the mouth. This increases the risk of oral cancer, which can occur as early as 2 years after GVHD.

## Genetic syndromes

People with certain syndromes caused by inherited defects (mutations) in certain genes have a very high risk of mouth and throat cancer.

- **Fanconi anemia** is a condition that can be caused by inherited defects in several genes that contribute to repair of DNA. People with this syndrome often have blood problems at an early age, which may lead to leukemia or aplastic anemia. They also have a very high risk of cancer of the mouth and throat.
- **Dyskeratosis congenita** is a genetic syndrome that can cause aplastic anemia, skin rashes, and abnormal fingernails and toenails. People with this syndrome also have a very high risk of developing cancer of the mouth and throat at an early age.

More information about Fanconi anemia and dyskeratosis congenita can be found in our document; *Aplastic Anemia*.

## Lichen planus

This disease occurs mainly in middle-aged people. Most often it affects the skin (usually as an itchy rash), but it sometimes affects the lining of the mouth and throat, appearing as small white lines or spots. A severe case may slightly increase the risk of oral cancer.

## Uncertain, unproven or controversial risk factors

### Mouthwash

Some studies have suggested that mouthwash with a high alcohol content might be linked to a higher risk of oral and oropharyngeal cancers. But recent research has questioned these results. Studying this possible link is complicated by the fact that smokers and frequent drinkers (who already have an increased risk of these cancers) are more likely to use mouthwash than people who neither smoke nor drink.

### Irritation from dentures

It has been suggested that long-term irritation of the lining of the mouth caused by poorly fitting dentures is a risk factor for oral cancer. But many studies have found no increased risk in denture wearers overall.

Since poorly fitting dentures can tend to trap agents that have been proven to cause oral cancer, such as alcohol and tobacco particles, denture wearers should have them checked by a dentist regularly to ensure a good fit. All denture wearers should remove their dentures at night and clean and rinse them thoroughly every day.

# Do we know what causes oral cavity and oropharyngeal cancers?

Doctors and scientists can't say for sure what causes each case of oral cavity or oropharyngeal cancer. But they do know many of the risk factors (see "What are the risk factors for oral cavity and oropharyngeal cancers?") and how some of them cause cells to become cancerous.

Scientists believe that some risk factors, such as tobacco or heavy alcohol use, may cause these cancers by damaging the DNA of cells that line the inside of the mouth and throat.

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

When tobacco and alcohol damage the cells lining the mouth and throat, the cells in this layer must grow more rapidly to repair this damage. The more often cells need to divide, the more chances there are for them to make mistakes when copying their DNA, which may increase their chances of becoming cancerous.

Many of the chemicals found in tobacco can damage DNA directly. Scientists are not sure whether alcohol directly damages DNA, but they have shown that alcohol helps many DNA-damaging chemicals get into cells more easily. This may be why the combination of tobacco and alcohol damages DNA far more than tobacco alone.

This damage can cause certain genes (for example, those in charge of starting or stopping cell growth) to malfunction. Abnormal cells can begin to build up, forming a tumor. With additional damage, the cells may begin to spread into nearby tissue and to distant organs.

In human papilloma virus (HPV) infections, the virus causes cells to make 2 proteins known as E6 and E7. When these are made, they turn off some genes that normally help keep cell growth in check. Uncontrolled cell growth may in some cases lead to cancer. When HPV DNA is found in the tumor cells, especially in non-smokers who drink little or no alcohol, HPV is thought to be the likely cause of the cancer.

Some people inherit DNA mutations (changes) from their parents that increase their risk for developing certain cancers. But inherited oncogene or tumor suppressor gene mutations are not believed to cause very many cancers of the oral cavity or oropharynx.

For some oral cavity and oropharyngeal cancers, there is no clear cause. Some of these cancers may be linked to other, as of yet unknown risk factors. Others may have no external cause — they may just occur because of random DNA mutations inside a cell.

# Can oral cavity and oropharyngeal cancers be prevented?

## Avoid risk factors

Not all cases of oral cavity and oropharyngeal cancer can be prevented, but the risk of developing these cancers can be greatly reduced by avoiding certain risk factors.

### **Limit smoking and drinking**

Tobacco and alcohol are among the most important risk factors for these cancers. Not starting to smoke is the best way to limit the risk of getting these cancers. Quitting tobacco also greatly lowers your risk of developing these cancers, even after many years of use. The same is true of heavy drinking. Limit how much alcohol you drink, if you drink at all.

### **Limit exposure to ultraviolet (UV) light**

Ultraviolet radiation is an important and avoidable risk factor for cancer of the lips, as well as for skin cancer. If possible, limit the time you spend outdoors during the middle of the day, when the sun's UV rays are strongest. If you are out in the sun, wear a wide-brimmed hat and use sunscreen and lip balm with a sun protection factor (SPF) of at least 15.

### **Wear properly fitted dentures**

Avoiding sources of oral irritation (such as dentures that do not fit properly) may also lower your risk for oral cancer.

### **Eat a healthy diet**

A poor diet has been linked to oral cavity and oropharyngeal cancers, although it's not exactly clear what substances in healthy foods might be responsible for reducing the risk of these cancers.

In general, eating a healthy diet is much better than adding vitamin supplements to an otherwise unhealthy diet. The American Cancer Society recommends eating a healthy diet, with an emphasis on plant foods. This includes eating at least 2½ cups of vegetables and fruits every day. Choosing whole-grain breads, pastas, and cereals instead of refined grains, and eating fish, poultry, or beans instead of processed meat and red meat may also help lower your risk of cancer.

## Avoid HPV infection

The risk of HPV infection of the mouth and throat is increased in those who have oral sex and multiple sex partners. These infections are common and rarely cause symptoms. Although HPV infection is linked to oropharyngeal cancer, most people with HPV infections of the mouth and throat do not go on to develop this cancer. In addition, many oral and oropharyngeal cancers are not related to HPV infection.

In recent years, vaccines that reduce the risk of infection with certain types of HPV have become available. These vaccines were originally meant to lower the risk of cervical cancer, but they may reduce the risk of other cancers linked to HPV as well. This may include some mouth and throat cancers, although this has not been studied directly. These vaccines are only effective if given before someone is infected with HPV, which is why they are generally recommended before a person becomes sexually active.

## Treat pre-cancerous growths

Areas of leukoplakia or erythroplakia in the mouth sometimes progress to cancer. Doctors often remove these areas, especially if a biopsy shows they contain areas of dysplasia (abnormal growth) when looked at under a microscope.

But removing areas of leukoplakia or erythroplakia does not always prevent someone from getting oral cavity cancer. Studies have found that even when these areas are completely removed, people with certain types of erythroplakia and leukoplakia still have a higher chance of developing a cancer in some other area of their mouth.

This may be because the whole lining of the mouth has probably been exposed to the same cancer-causing agents that led to these pre-cancers (like tobacco). This means that the entire area may already have early changes that can lead to cancer. This concept is called *field cancerization*.

It is important for patients who have had these areas removed to continue having checkups to look for cancer, and for new areas of leukoplakia or erythroplakia.

## Chemoprevention

In recent years, doctors have been testing medicines to try to help lower the risk of these cancers. This approach, called chemoprevention, is particularly needed for people who have a higher risk of these cancers, such as those with leukoplakia or erythroplakia.

Several kinds of drugs have been studied for oropharyngeal cancer chemoprevention, but most of the research has focused on drugs related to vitamin A (retinoids). Studies so far have shown that retinoids can cause some areas of leukoplakia to shrink or even go away temporarily. But these studies have not found a long-term benefit in preventing cancer or helping patients live longer. At the same time, most of these drugs have bothersome and even serious side effects.

Vitamin A supplements are not recommended unless prescribed by a doctor for a specific health problem. High doses of vitamin A do not decrease cancer risk and can be toxic. Vitamin A supplements may, in fact, raise the risk of some cancers. This is why researchers are studying synthetic (man-made) retinoids, which may be more effective than natural vitamin A in preventing cancer.

Research into other anti-cancer compounds that may be used as oral rinses is now under way. This is discussed further in the section, "What's new in oral cavity and oropharyngeal cancer research and treatment?"

## Can oral cavity and oropharyngeal cancers be found early?

Many pre-cancers and cancers of the oral cavity and oropharynx can be found early, during routine screening exams by a dentist, doctor, dental hygienist, or by self-exam.

Some early cancers have symptoms that cause patients to seek medical or dental attention (see "How are oral cavity and oropharyngeal cancers diagnosed?"). Unfortunately, some cancers may not cause symptoms until they've reached an advanced stage, or they may cause symptoms similar to those caused by a disease other than cancer, such as a toothache. Some dentists and doctors recommend that you look at your mouth in a mirror every month to check for any abnormal areas.

Regular dental checkups that include an exam of the entire mouth are important in finding oral and oropharyngeal cancers (and pre-cancers) early. The American Cancer Society also recommends that doctors examine the mouth and throat as part of a routine cancer-related checkup.

Along with a clinical exam of the mouth and throat, some dentists and doctors may use special dyes and/or lights to look for abnormal areas, especially if you are at higher risk for these cancers. If an abnormal area is spotted, some of these tests may also be used to help determine if they might be cancers (and therefore will need a biopsy) or to choose the best area to sample for a biopsy.

- One method uses a dye called *toluidine blue*. If the dye is spread over an abnormal area, it will stain blue.
- Another method uses laser light. When the light is reflected off abnormal tissue, it looks different from the light reflected off normal tissue.
- Another system uses a special light to view the area after the mouth has been rinsed with a solution of acetic acid (the acid in vinegar).
- If an abnormal area is found, sometimes it can be evaluated by exfoliative cytology. In this technique, the lesion is scraped with a stiff brush (brush biopsy), and the cells from the scraping can be looked at under the microscope.

# How are oral cavity and oropharyngeal cancers diagnosed?

Some cancers or pre-cancers of the mouth and throat may be found during an exam by a doctor or dentist, but many of these cancers are found because of signs or symptoms a person is having. If cancer is suspected, tests will be needed to confirm the diagnosis.

## Signs and symptoms of oral cavity or oropharyngeal cancer

Possible signs and symptoms of these cancers can include:

- A sore in the mouth that does not heal (most common symptom)
- Pain in the mouth that doesn't go away (also very common)
- A lump or thickening in the cheek
- A white or red patch on the gums, tongue, tonsil, or lining of the mouth
- A sore throat or a feeling that something is caught in the throat that doesn't go away
- Trouble chewing or swallowing
- Trouble moving the jaw or tongue
- Numbness of the tongue or other area of the mouth
- Swelling of the jaw that causes dentures to fit poorly or become uncomfortable
- Loosening of the teeth or pain around the teeth or jaw
- Voice changes
- A lump or mass in the neck
- Weight loss
- Constant bad breath

Many of these signs and symptoms can also be caused by less serious, benign problems, or even by other cancers. Still, it is very important to see a doctor or dentist if any of these conditions lasts more than 2 weeks so that the cause can be found and treated, if needed.

If you have any of the signs or symptoms that suggest cancer may be present, your doctor may recommend further exams and tests.

## Exams and tests used to find these cancers

### **Medical history and physical exam**

As a first step, your doctor will probably ask you questions about symptoms, possible risk factors, and any other medical conditions you may have.

Your doctor will examine you to look for possible signs of an oral or oropharyngeal cancer (or pre-cancer). These could be bumps or other abnormal areas on your head, face or neck, or problems with the nerves of the face and mouth. The doctor will look at the entire inside of your mouth, and may feel around in it with a gloved finger. He or she may also use other tests to look for abnormal areas in the mouth or throat, or to get a better sense of what an abnormal area might be. Some of these tests are described in the section, "Can oral cavity and oropharyngeal cancers be found early?"

If there is a reason to think you might have cancer, your doctor will refer you to a doctor who specializes in these cancers, such as an oral and maxillofacial surgeon or a head and neck surgeon (also known as an ear, nose, and throat [ENT] doctor or an otolaryngologist). This specialist will probably do other exams and tests.

### **Complete head and neck exam**

The specialist will pay special attention to the head and neck area, being sure to look and feel for any abnormal areas. This exam will include the lymph nodes of the neck, which will be felt carefully for any signs of cancer.

Because the oropharynx is deep inside the neck and some parts are not easily seen, the doctor may use mirrors or special fiber-optic scopes to examine these areas while you are in the doctor's office.

**Indirect pharyngoscopy and laryngoscopy:** For this exam, the doctor uses small mirrors placed at the back of your mouth to look at the throat, base of the tongue, and part of the larynx (voice box).

**Direct (flexible) pharyngoscopy and laryngoscopy:** For this exam, the doctor inserts a flexible fiber-optic scope (called an endoscope) through the mouth or nose to look at some areas that can't easily be seen with mirrors, such as the region behind the nose (nasopharynx) and the larynx, or to see certain areas clearer.

Both types of exams can be done in the doctor's office. For either type of exam, the doctor may spray the back of your throat with numbing medicine first to help make the exam easier.

### **Panendoscopy**

During a panendoscopy, the doctor uses different types of endoscopes passed down the mouth or nose to perform laryngoscopy, esophagoscopy, and (at times) bronchoscopy. This lets the doctor thoroughly examine the oral cavity, oropharynx, larynx (voice box),

esophagus (tube leading to the stomach), and the trachea (windpipe) and bronchi (breathing passageways in the lungs).

This exam is usually done in an operating room while you are under general anesthesia (asleep). The doctor uses a laryngoscope to look for tumors in the throat and larynx. Other parts of the mouth, nose, and throat are examined as well. If a tumor is found that is large or seems likely to spread, the doctor may also need to use an esophagoscope to look into the esophagus or a bronchoscope to look into the trachea and bronchi.

Your doctor will look at these areas through the scopes to find any tumors, see how large they are, and see how far they may have spread to surrounding areas. A small piece of tissue from any tumors or other abnormal areas may be removed (biopsied) to be looked at under a microscope to see if they contain cancer. Biopsies can be done with special instruments operated through the scopes.

## Using biopsies to diagnose these cancers

In a biopsy, the doctor removes a sample of tissue to be looked at under a microscope. The actual diagnosis of oral and oropharyngeal cancers can only be made by a biopsy. A sample of tissue or cells is always needed to confirm that cancer is really present before starting treatment. Several types of biopsies may be used, depending on each case.

### **Exfoliative cytology**

In this technique, the doctor scrapes a suspicious area and smears the collected tissue onto a glass slide. The sample is then stained with a dye so the cells can be seen under the microscope. If any of the cells look abnormal, the area can then be biopsied.

The advantage of this technique is that it is easy, and even only slightly abnormal-looking areas can be examined. This can make for an earlier diagnosis and a greater chance of cure if there is cancer. But this method does not detect all cancers. Sometimes it's not possible to tell the difference between cancerous cells and abnormal but non-cancerous cells (dysplasia) with this approach, so a biopsy would still be needed.

### **Incisional biopsy**

For this type of biopsy, the doctor cuts a small piece of tissue from an area that looks abnormal. This is the most common type of biopsy to sample areas in the mouth or throat.

The biopsy can be done either in the doctor's office or in the operating room, depending on where the tumor is and how easy it is to get a good tissue sample. If it can be done in the doctor's office, the area around the tumor will be numbed before the biopsy is taken. If the tumor is deep inside the mouth or throat, the biopsy might be done in the operating room with the patient under general anesthesia (in a deep sleep). The surgeon uses special instruments through an endoscope to remove small tissue samples.

## **Fine needle aspiration (FNA) biopsy**

For this test, the doctor uses a very thin, hollow needle attached to a syringe to draw (aspirate) some cells from a tumor or lump. These cells are then looked at under a microscope to see if cancer is present.

FNA biopsy is not used to sample abnormal areas in the mouth or throat, but is sometimes used when a patient has a neck mass that can be felt or seen on a CT scan. FNA can be helpful in several different situations, such as:

**Finding the cause of a new neck mass:** An FNA biopsy is sometimes used as the first test for someone with a newly found neck lump.

The FNA may show that the neck mass is a benign (non-cancerous) lymph node that has grown in reaction to a nearby infection, such as a sinus or tooth infection. In this case, treatment of the infection is all that is needed. Or the FNA may find a benign, fluid-filled cyst that can be cured by surgery. But even when the FNA results are benign, if the patient has symptoms suggesting cancer, more tests (such as pharyngoscopy and panendoscopy) are needed.

If the FNA finds cancer, the doctor looking at the sample can usually tell what type of cancer it is. If the cells look like a squamous cell cancer, more exams will be done to search for the source of the cancer in the mouth and throat. If the FNA shows a different type of cancer, such as lymphoma or a cancer that has spread to a lymph node in the neck from another organ (like the thyroid, stomach, or lungs) more tests will be done to find it, and specific treatment for that type of cancer will be given.

**Learning the extent of a known cancer:** FNA is often done in patients already known to have oral or oropharyngeal cancer to find out if the cancer has spread to lymph nodes in the neck. This information will help the doctor decide the best treatment for the cancer.

**Seeing if cancer has come back after treatment:** FNA may be used in patients whose cancer has been treated by surgery and/or radiation therapy, to find out if a new neck mass in the treated area is scar tissue or a cancer that has come back.

## **Lab tests of biopsy samples**

All biopsy samples are sent to a lab to be viewed under a microscope by a pathologist, a doctor who is specially trained to diagnose cancer with lab tests. The doctor can usually tell cancer cells from normal cells, as well as what type of cancer it is, by the way the cells look under the microscope. In some cases, the doctor may need to coat the cells with special stains to help tell what type of cancer it is.

**HPV testing:** For cancers of the throat, doctors may have the biopsy samples tested to see if HPV infection is the likely cause. This information can help the doctor predict the probable course of the cancer, as people whose cancers are linked to HPV tend to do better than those whose cancers are not.

This testing is not routinely used to guide treatment at this time, but in the future it might help doctors decide which patients might be able to get less aggressive treatment.

## Imaging tests

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

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

### **Chest x-ray**

An x-ray of your chest may be done to see if the cancer has spread to your lungs. Unless your cancer is far advanced, it is not likely that it will have spread. This x-ray is most often done in an outpatient setting. If the results are not normal, your doctor may order a computed tomography (CT) scan or other test to look at your lungs in more detail.

### **Computed tomography (CT) scan**

The CT scan uses x-rays to produce detailed, cross-sectional images of your body. Instead of taking one picture, like a standard x-ray, a CT scanner takes many pictures of the part of your body being studied as it rotates around you. A computer then combines these pictures into an image of a slice of your body. Unlike a regular x-ray, a CT scan creates detailed images of the soft tissues and organs in the body.

This test can help your doctor determine the size and location of a tumor, if it is growing into nearby tissues, and if it has spread to lymph nodes in the neck. The test also may be done to look for spread of cancer to the lungs.

For some scans, you might be asked to drink a contrast solution. This helps better outline the digestive tract so that tumors can be seen more clearly and certain areas are not mistaken for tumors. After the first set of pictures is taken you might also receive an intravenous (IV) injection of a contrast dye. This can also help tumors be seen more clearly. A second set of pictures is then taken.

The injection may cause some flushing (a feeling of warmth, especially in the face). Some people are allergic and get hives. Rarely, more serious reactions like trouble breathing or low blood pressure can occur. 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.

CT scans take longer than regular x-rays. You need to lie still on a table while they are being done. During the test, the table slides in and out of the scanner, a ring-shaped machine that completely surrounds the table. 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**

MRI scans use radio waves and strong magnets instead of x-rays. The energy from the radio waves is absorbed by the body and then released in a pattern formed by the type of body tissue and by certain diseases. A computer translates the pattern into a very detailed image of parts of the body. As with CT scans, a contrast material might be injected, but this is done less often.

Because it provides a very detailed picture, an MRI scan may be done to look for spread of the cancer in the neck. These scans can also be very useful in looking at other areas of the body as well, especially the brain and spinal cord.

MRI scans are a little more uncomfortable than CT scans. First, they take longer — often up to an hour. During the scan, you need to lie still inside a narrow tube, which is confining and can upset people who have claustrophobia (fear of enclosed spaces). Newer, more open MRI machines can sometimes help with this if needed, although the images may not be as sharp in some cases. The machine also makes clicking and buzzing noises that disturb some people. Some places provide earplugs to block this noise out.

### **Positron emission tomography (PET) scan**

For a PET scan, a form of radioactive sugar (known as fluorodeoxyglucose or FDG) is injected into the blood. The amount of radioactivity used is very low. Cancer cells in the body are growing rapidly, so they absorb large amounts of the radioactive sugar. After about an hour, you will be 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 provides helpful information about your whole body.

A PET scan may be used to look for possible areas of cancer spread, especially if there is a good chance that the cancer is more advanced. This test also can be used to help tell if a suspicious area seen on another imaging test is cancer or not.

Some newer machines are able to perform 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 with the more detailed appearance of that area on the CT.

### **Barium swallow**

A barium swallow (also known as an *upper GI series*) can be used to examine the lining of the upper part of the digestive system, especially the esophagus (the tube connecting the throat to the stomach). In this test, you drink a chalky liquid called *barium* to coat the

walls of the throat and esophagus. A series of x-rays of the throat and esophagus is taken as you swallow, which the barium outlines clearly.

Because patients with oral and oropharyngeal cancers are at risk for cancer of the esophagus, your doctor may order this test to check for this cancer. It is also useful to see if the cancer is causing problems with normal swallowing.

For more information on imaging tests, see our document, *Imaging (Radiology) Tests*.

## Other tests

Other types of tests may be done as part of a workup if a patient has been diagnosed with oral cavity or oropharyngeal cancer. These tests are not used to diagnose the cancer, but they may be done for other reasons, such as to see if a person is healthy enough for treatments such as surgery, radiation therapy, or chemotherapy.

### **Blood tests**

No blood tests can diagnose tumors of the oral cavity or oropharynx. However, your doctor may order routine blood tests to help determine your overall health, especially before treatment such as surgery. Such tests can help diagnose malnutrition, low red blood counts (anemia), liver disease, and kidney disease. Blood tests may also suggest the cancer has spread to the liver or bone. When this occurs, more testing is needed.

### **Other tests before surgery**

If surgery is planned, you might also have an electrocardiogram (EKG) to make sure your heart is functioning well. Some people having surgery also may need tests of their lung function. These are known as pulmonary function tests (PFTs).

### **Dental exam**

When radiation therapy will be used as part of the treatment, it is likely you will be asked to see a dentist, who will help with preventive dental care and may remove teeth, if necessary, before radiation treatment is started.

If the cancer is located in the jaw or roof of your mouth, a dentist with special training (a prosthodontist) may be asked to evaluate you. This dentist can make replacements for missing teeth or other structures of the oral cavity to help restore your appearance, comfort, and ability to chew, swallow, and speak after treatment. If part of the jaw or roof of the mouth (palate) will be removed with the tumor, the prosthodontist will work to ensure that the replacement artificial teeth and the remaining natural teeth fit together correctly. This can be done with dentures, other types of prostheses, or dental implants.

# How are oral cavity and oropharyngeal cancers staged?

Staging is the process of finding out how far a cancer has spread. The outlook (prognosis) for people with cancer depends, to a large extent, on the cancer's stage. The stage of oral cavity and oropharyngeal cancers is one of the most important factors in choosing treatment.

Cancers are staged based on the results of physical and endoscopy exams, biopsies, and imaging tests (CT scan, MRI, chest x-ray, and/or PET scans), which are described in the section, "How are oral cavity and oropharyngeal cancers diagnosed?"

## The TNM staging system

A staging system is a standard way for doctors to describe and summarize how far a patient's cancer has spread. The most common system used to describe the extent of oral cavity and oropharyngeal cancers is the TNM system of the American Joint Committee on Cancer (AJCC). The TNM system for staging describes 3 key pieces of information:

- **T** indicates the size of the main (primary) **tumor** and which, if any, tissues of the oral cavity or oropharynx it has spread to.
- **N** describes the extent of spread to nearby (regional) lymph **nodes**. Lymph nodes are small bean-shaped collections of immune system cells to which cancers often spread first.
- **M** indicates whether the cancer has spread (**metastasized**) to other organs of the body. (The most common site of spread is to the lungs. The next most common sites are the liver and bones.)

Numbers or letters appear after T, N, and M to provide 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 categories for cancers of the lip, oral cavity, and oropharynx

**TX:** Primary tumor cannot be assessed; information not known

**T0:** No evidence of primary tumor

**Tis:** Carcinoma in situ. This means the cancer is still within the epithelium (the top layer of cells lining the oral cavity and oropharynx) and has not yet grown into deeper layers

**T1:** Tumor is 2 cm (about  $\frac{3}{4}$  inch) across or smaller

**T2:** Tumor is larger than 2 cm across, but smaller than 4 cm (about 1  $\frac{1}{2}$  inch)

**T3:** Tumor is larger than 4 cm across

**T4a:** Tumor is growing into nearby structures. This is known as *moderately advanced local disease*.

- For oral cavity cancers: the tumor is growing into nearby structures, such as the bones of the jaw or face, deep muscle of the tongue, skin of the face, or the maxillary sinus.
- For lip cancers: the tumor is growing into nearby bone, the inferior alveolar nerve (the nerve to the jawbone), the floor of the mouth, or the skin of the chin or nose.
- For oropharyngeal cancers: the tumor is growing into the larynx (voice box), the tongue muscle, or bones such as the medial pterygoid, the hard palate, or the jaw.

**T4b:** The tumor has grown through nearby structures and into deeper areas or tissues. This is known as *very advanced local disease*. Any of the following may be true:

- The tumor is growing into other bones, such as the pterygoid plates and/or the skull base (for any oral cavity or oropharyngeal cancer).
- The tumor surrounds the internal carotid artery (for any oral cavity or oropharyngeal cancer).
- For lip and oral cavity cancers: the tumor is growing into an area called the *masticator space*.
- For oropharyngeal cancers: the tumor is growing into a muscle called the *lateral pterygoid muscle*.
- For oropharyngeal cancers: the tumor is growing into the nasopharynx (the area of the throat that is behind the nose).

## **N categories**

**NX:** Nearby lymph nodes cannot be assessed; information not known

**N0:** The cancer has not spread to nearby lymph nodes

**N1:** The cancer has spread to one lymph node on the same side of the head or neck as the primary tumor; this lymph node is no more than 3 cm (about 1 ¼ inch) across

**N2** includes 3 subgroups:

- **N2a:** The cancer has spread to one lymph node on the same side as the primary tumor; the lymph node is larger than 3 cm across but no larger than 6 cm (about 2 ½ inches)
- **N2b:** The cancer has spread to 2 or more lymph nodes on the same side as the primary tumor, but none are larger than 6 cm across
- **N2c:** The cancer has spread to one or more lymph nodes on both sides of the neck or on the side opposite the primary tumor, but none are larger than 6 cm across

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

## **M categories**

**M0:** No distant spread

**M1:** The cancer has spread to distant sites outside the head and neck region (for example, the lungs)

## **Stage grouping**

Once the T, N, and M categories have been assigned, this information is combined by a process called stage grouping to assign an overall stage of 0, I, II, III, or IV. Stage IV is further divided into A, B, and C.

**Stage 0: Tis, N0, M0:** Carcinoma in situ. The cancer is only growing in the epithelium, the outer layer of oral or oropharyngeal tissue (Tis). It has not yet grown into a deeper layer or spread to nearby structures, lymph nodes (N0), or distant sites (M0).

**Stage I: T1, N0, M0:** The tumor is 2 cm (about  $\frac{3}{4}$  inch) across or smaller (T1) and has not spread to nearby structures, lymph nodes (N0), or distant sites (M0).

**Stage II: T2, N0, M0:** The tumor is larger than 2 cm across but smaller than 4 cm (T2) and has not spread to nearby structures, lymph nodes (N0), or distant sites (M0).

**Stage III:** One of the following applies:

**T3, N0, M0:** The tumor is larger than 4 cm across (T3), but it hasn't grown into nearby structures or spread to the lymph nodes (N0) or distant sites (M0).

OR

**T1 to T3, N1, M0:** The tumor is any size and hasn't grown into nearby structures (T1 to T3). It has spread to one lymph node on the same side of the head or neck, which is no larger than 3 cm across (N1). The cancer hasn't spread to distant sites (M0).

**Stage IVA:** One of the following applies:

**T4a, N0 or N1, M0:** The tumor is growing into nearby structures (T4a). It can be any size. It has either not spread to the lymph nodes (N0) or has spread to one lymph node on the same side of the head or neck, which is no larger than 3 cm across (N1). The cancer hasn't spread to distant sites (M0).

OR

**T1 to T4a, N2, M0:** The tumor is any size and may or may not grow into nearby structures (T1 to T4a). It has not spread to distant sites (M0). It has spread to one of the following:

- One lymph node on the same side of the head and neck that is between 3 and 6 cm across (N2a)

- One lymph node on the opposite side of the head and neck that is no more than 6 cm across (N2b)
- 2 or more lymph nodes, all of which are no more than 6 cm across. The lymph nodes can be on any side of the neck (N2c)

**Stage IVB:** One of the following applies:

**T4b, any N, M0:** The tumor is growing into deeper areas and/or tissues (very advanced local disease - T4b). It may (or may not) have spread to lymph nodes (any N). It has not spread to distant sites (M0).

OR

**Any T, N3, M0:** The tumor is any size and it may or may not have grown into other structures (any T). It has spread to one or more lymph nodes larger than 6 cm across (N3), but it hasn't spread to distant sites (M0).

**Stage IVC: Any T, Any N, M1:** The tumor is any size, and it may or may not have spread to lymph nodes. It has spread to distant sites, most commonly the lungs.

## **Recurrent (relapsed) cancer**

This is not an actual stage in the TNM system. Recurrent (relapsed) disease means that the cancer has come back (recurred) after treatment. Recurrent oral cavity or oropharyngeal cancer may return in the mouth or throat (local recurrence), in the lymph nodes (regional relapse) or in another part of the body, such as the lungs (distant recurrence).

Talk with your doctor if you have any questions about the stage of your cancer or how it affects your treatment.

## **Survival rates for oral cavity and oropharyngeal 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 statistics below for oral cavity and oropharyngeal cancer, skip the rest of this 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 of these people live much longer than 5 years.

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

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

The following survival statistics come from the National Cancer Institute's SEER program. They are based on large numbers of patients treated between 1988 and 2001.

## **Lip**

<b>Stage</b>	<b>5-Year Relative Survival Rate</b>
I	96%
II	83%
III	57%
IV	48%

## **Tongue**

<b>Stage</b>	<b>5-Year Relative Survival Rate</b>
I	71%
II	59%
III	47%
IV	37%

## **Floor of the mouth**

<b>Stage</b>	<b>5-Year Relative Survival Rate</b>
I	73%
II	60%
III	36%
IV	30%

## **Gum and other mouth**

<b>Stage</b>	<b>5-Year Relative Survival Rate</b>
I	81%
II	62%
III	45%
IV	40%

## **Oropharynx and tonsil**

<b>Stage</b>	<b>5-Year Relative Survival Rate</b>
I	56%*
II	58%*
III	55%*
IV	43%

\* For cancers of the oropharynx and tonsil, the 5-year survival rates for stages I, II, and III are essentially the same.

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

## **How are oral cavity and oropharyngeal cancers treated?**

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

*The treatment information in this document is not official policy of the Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor.*

*Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.*

## General treatment information

After the cancer is found and staged, your doctor will discuss treatment choices with you. It is important to take time and think about all of your choices. When you choose a treatment plan, consider your overall health, the type and stage of the cancer, the chances of curing the disease, and the possible impact of the treatment on important functions like speech, chewing, and swallowing.

The main treatment options for people with oral and oropharyngeal cancers are:

- Surgery
- Radiation therapy
- Chemotherapy
- Targeted therapy

These may be used either alone or in combination, depending on the stage and location of the tumor. In general, surgery is the first treatment for cancers of the oral cavity, and may be followed by radiation or combined chemotherapy and radiation. Oropharyngeal cancers are usually treated with a combination of chemotherapy and radiation.

Based on the stage and location of the tumor, you may have different types of doctors on your treatment team. These doctors may include:

- An otolaryngologist (also known as an ear, nose, and throat, or ENT doctor): a surgeon who treats certain diseases of the head and neck.
- An oral and maxillofacial surgeon: a dental surgeon who treats diseases of the mouth, teeth, and jaws.
- A radiation oncologist: a doctor who treats cancer with radiation therapy.
- A medical oncologist: a doctor who treats cancer with medicines such as chemotherapy or targeted therapy.

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

It is important to discuss all of your treatment options, including goals and possible side effects, with your doctors to help make the decision that best fits your needs. If time permits, it is often a good idea to get a second opinion. A second opinion can provide you with more information and help you feel confident about your chosen treatment plan.

The next few sections describe the various types of treatments used for oral cavity and oropharyngeal cancers. This is followed by a description of the most common approaches used for these cancers, based on their stage and where they started.

## Surgery for oral cavity and oropharyngeal cancer

Several types of operations can be used to treat oral cavity and oropharyngeal cancers. Depending on where the cancer is and its stage, different operations may be used to remove the cancer.

After surgery to remove the cancer, reconstructive surgery may be used to help restore the appearance and function of the areas affected by the cancer or its treatment.

### **Tumor resection**

In this operation, the surgeon removes (resects) the entire tumor and an area of normal-appearing tissue around it. Removing the normal tissue lessens the chance of leaving any cancer behind.

The primary tumor can be removed using a variety of approaches depending on its size and location. For example, if a tumor is in the front of the mouth, it can be removed relatively easily. Sometimes with a larger tumor, especially when it involves the oropharynx, the cancer is removed through an incision in the neck or by cutting the jaw bone with a special saw to provide access to the tumor (mandibulotomy).

Based on the location and size of the tumor, one of the operations listed here may be needed to remove it.

### **Mohs micrographic surgery (for some cancers of the lip)**

Some cancers of the lip may be removed by Mohs surgery, also known as *micrographic surgery*. In this method, the tumor is removed in very thin slices. Each slice is looked at right away under the microscope to see if there are cancer cells. The surgeon continues to remove more slices until no cancer cells are seen.

This method can reduce the amount of normal tissue removed with the tumor, which limits the change in appearance the surgery causes. It requires a surgeon trained in the technique and may take more time than a standard tumor resection.

### **Glossectomy (removal of the tongue)**

Glossectomy may be needed to treat cancer of the tongue. For smaller cancers, only part of the tongue may need to be removed (partial glossectomy). For larger cancers, the entire tongue may need to be removed (total glossectomy).

### **Mandibulectomy (removal of the jaw bone)**

A mandibulectomy (or mandibular resection) removes all or part of the jaw bone (mandible). This operation may be needed if the tumor has grown into the jaw bone. If a tumor near the jaw is hard to move when the doctor examines the area, it is considered a sign that the cancer has grown into the jaw bone.

If the jaw bone looks normal on x-ray, and there is no evidence the cancer has spread into the jaw bone, a partial-thickness mandibular resection may be all that is needed. In this operation, also known as a *marginal mandibulectomy*, a piece of jaw bone is removed, but the bone is not cut all the way through.

If the x-ray shows the tumor has grown into the jaw bone, a whole portion of the mandible will need to be removed in an operation called a *segmental mandibulectomy*. The removed piece of the jaw can then be replaced with a piece of bone from another part of the body, such as the fibula (the smaller of the lower leg bones), hip bone, or the shoulder blade. Depending on the situation, sometimes a metal plate or a piece of bone from a deceased donor may be used instead.

## **Maxillectomy**

If cancer has grown into the hard palate (front part of the roof of the mouth), all or part of the involved bone (maxilla) will need to be removed. This operation is called a *maxillectomy* or *partial maxillectomy*.

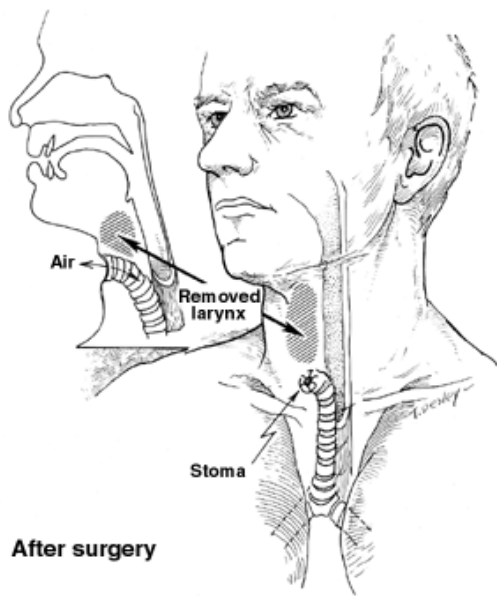
The hole in the roof of the mouth this operation creates can be filled with a special denture called a *prosthesis*. This is created by a prosthodontist, a dentist with special training.

## **Laryngectomy (removal of the voice box)**

Very rarely, surgery to remove large tumors of the tongue or oropharynx may also require removing tissue that a person needs to swallow normally. As a result, food may enter the windpipe (trachea) and reach the lungs, where it can cause pneumonia. When this is a significant risk, sometimes the voice box (larynx) is removed together with the primary tumor. This operation is called a *laryngectomy*.

When the voice box is removed, the windpipe is attached to a hole (stoma) made in the skin in the front of the neck for the patient to breathe through (instead of breathing through the mouth or nose). This is known as a *tracheostomy* (see picture).

Losing your voice box will mean that normal speech is no longer possible, but people can learn other forms of speaking. See the American Cancer Society document *Laryngeal and Hypopharyngeal Cancer* to find out more about voice restoration.



## Neck dissection

Cancers of the oral cavity and oropharynx often spread to the lymph nodes in the neck. Depending on the stage and location of the cancer, it may be necessary to remove lymph nodes (and other nearby tissues). This operation, called a *neck dissection* or *lymph node dissection*, is done at the same time as the surgery to remove the main tumor. The goal is to remove lymph nodes proven or likely to contain cancer.

There are several types of neck dissection procedures, and they differ in how much tissue is removed from the neck. The amount of tissue removed depends on the primary cancer's size and how much it has spread to lymph nodes.

- In a partial or selective neck dissection only a few lymph nodes are removed.
- For a modified radical neck dissection, most lymph nodes on one side of the neck between the jaw bone and collarbone, as well as some muscle and nerve tissue are removed.
- In a radical neck dissection, nearly all nodes on one side, as well as even more muscles, nerves, and veins are removed.

The most common side effects of any neck dissection are numbness of the ear, weakness when raising the arm above the head, and weakness of the lower lip. These side effects are caused by injury during the operation to certain nerves that supply these areas. After a selective neck dissection, the weakness of the shoulder and lower lip usually go away after a few months. But if either nerve is removed as part of a radical neck dissection or because of involvement with tumor, the weakness will be permanent.

After any neck dissection procedure, physical therapists can teach the patient exercises to improve neck and shoulder movement.

## **Reconstructive surgery**

Operations may be needed to help restore the structure or function of areas affected by more extensive surgeries to remove the cancer.

For small tumors, the narrow zone of normal tissue removed along with the tumor is usually small enough that reconstructive surgery is not needed. But removing larger tumors may cause defects in the mouth, throat, or neck that will need to be repaired. Sometimes a thin slice of skin, taken from the thigh, can be used to repair a small defect. This is called a *skin graft*.

To repair a larger defect, a piece of muscle with or without skin may be rotated from an area close by, such as the chest (pectoralis major pedicle flap) or upper part of the back (trapezius pedicle flap).

Thanks to advances in microvascular surgery (sewing together small blood vessels under a microscope), surgeons have many more options for reconstructing the oral cavity and oropharynx. Tissue from other areas of the body, such as the intestine, arm muscle, abdominal muscle, or lower leg bone, may be used to replace parts of the mouth, throat, or jaw bone.

Before you have extensive head and neck surgery, it is a good idea to ask the surgeon about your options for reconstructive surgery.

## **Tracheotomy/tracheostomy**

A tracheotomy is an incision (hole) made through the skin in the front of the neck and into the trachea (windpipe). It is done to help a person breathe. It may be used in different circumstances.

If a lot of swelling is expected in the airway after the cancer is removed, the doctor may want to do a temporary tracheotomy (using a small plastic tube) to allow the person to breathe more easily until the swelling goes down. It stays in place for a short time, and is then removed later when it is no longer needed.

If the cancer is blocking the throat and is too large to remove completely, an opening may be made to connect a lower part of the windpipe to a stoma (hole) in the front of the neck to bypass the tumor and allow the person to breathe more comfortably. This is known as a *tracheostomy*. A permanent tracheostomy is also needed after a total laryngectomy.

## **Gastrostomy tube**

Cancers in the oral cavity and oropharynx may prevent you from swallowing enough food to maintain good nutrition. This can make you weak and make it harder to complete treatment.

A gastrostomy tube (G tube) is a feeding tube that is placed through the skin and muscle of your abdomen directly into your stomach. Sometimes this tube is placed during an operation, but often it is placed endoscopically. The doctor passes a long thin tube with a camera on the end down the throat to see directly into the stomach. This is done with the patient sedated. When the feeding tube is placed through endoscopy, it is called a *percutaneous endoscopic gastrostomy*, or *PEG tube*. Once in place, it can be used to deliver nutrition directly into the stomach.

Patients are fed special liquid nutrients that are dripped through the tube. As long as they can still swallow normally, patients with these tubes can also eat normal food as well.

PEGs can be used to feed a patient for as long as needed. Sometimes these tubes are used for a short time to help keep a patient healthy and fed during treatment. They can be easily removed when the patient can eat normally.

If the swallowing problem is likely to be only short-term, another option is to place a nasogastric feeding tube (an NG tube) through the nose, down the esophagus, and into the stomach. Again, special liquid nutrients are dripped through the tube. Some patients dislike having a tube coming out of their nose, and prefer a PEG.

In either case, the patient and family are taught how to use the tube. After the patient goes home, home health nurses usually visit to make sure that the patient is comfortable with tube feedings.

## **Dental extraction and implants**

When radiation treatment is planned, a dental evaluation must be done. Depending on the radiation plan and condition of the patient's teeth, some or even all of the teeth may need to be removed before radiation can be given. The teeth may be removed either by the head and neck surgeon or an oral surgeon. If left in, teeth that are broken or infected (abscessed) are very likely to cause major problems (such as serious infections) if exposed to radiation.

If part of the jaw bone (mandible) is removed and reconstructed with bone from another part of the body, the surgeon may place dental implants (hardware to which prosthetic teeth can be attached) in the bone. This can be done either at the same time the mandible is reconstructed or at a later date.

## **Surgery risks and side effects**

All surgery carries risk, including blood clots, infections, complications from anesthesia, and pneumonia. These risks are generally low but are higher with more complicated operations.

If the surgery is not too complex, the only side effect may be some pain afterward, which can be treated with medicines if needed.

Surgery for cancers that are large or hard to reach may be very complicated, in which case side effects may include infection, wound breakdown, problems with eating and

speaking, or on very rare occasions death during or shortly after the procedure. Surgery also can be disfiguring, especially if bones in the face or jaw need to be removed. The surgeon's skill is very important in minimizing these side effects, while removing all of the cancer.

**Impact of glossectomy:** Most people can still speak if only part of the tongue is removed, but they often notice that their speech isn't as clear as it once was. The tongue is important in swallowing, so this may also be affected. Speech therapy can often help with these problems. When the entire tongue is removed, patients lose the ability to speak and swallow. With reconstructive surgery and a good rehabilitation program including speech therapy, some patients may regain the ability to swallow and speak well enough to be understood.

**Impact of laryngectomy:** Laryngectomy, the surgery that removes the voice box, leaves a person without the normal means of speech. There are several ways to restore one's voice. See the American Cancer Society document *Laryngeal and Hypopharyngeal Cancer* to find out more about voice restoration.

After a laryngectomy, the person breathes through a stoma (tracheostomy) placed in the front of the lower neck. Having a stoma means that the air you breathe in and out will no longer pass through your nose or mouth, which would normally help moisten, warm, and filter the air (removing dust and other particles). The air reaching the lungs will be dryer and cooler. This may irritate the lining of the breathing tubes and cause thick or crusty mucus to build up.

It is important to learn how to take care of your stoma. You will need to use a humidifier over the stoma as much as possible, especially soon after the operation, until the airway lining has a chance to adjust to the drier air now reaching it. You will also need to learn how to suction out and clean your stoma to help keep your airway open. Your doctors, nurses, and other health care professionals can teach you how to care for and protect your stoma, which includes precautions to keep water from entering the windpipe while showering or bathing, as well as keeping small particles out of the windpipe.

**Impact of facial bone removal:** Some cancers of the head and neck are treated by operations that remove part of the facial bone structure. Because the changes that result are so visible, they can have a major effect on how people view themselves. These surgeries can also affect speech and swallowing.

It's important to talk with your doctor before the surgery about what these changes might be to help prepare you for them. He or she can also give you an idea about what options might be available afterward. Recent advances in facial prostheses (man-made replacements) and in reconstructive surgery now give many people a more normal look and clearer speech. Ears and noses can be made out of plastic, tinted to match the skin, and attached to the face. All of these things can be a great help to a person's self-esteem.

## Radiation therapy for oral cavity and oropharyngeal cancer

Radiation therapy uses high-energy x-rays or particles to destroy cancer cells or slow their rate of growth. Radiation therapy can be used in several situations for oral and oropharyngeal cancers:

- It can be used as the main treatment for small cancers.
- Patients with larger cancers may need both surgery and radiation therapy or a combination of radiation therapy and chemotherapy or a "targeted" agent (see "Targeted Therapy").
- After surgery, radiation therapy can be used, either alone or with chemotherapy, as an additional (adjuvant) treatment to try to kill any small deposits of cancer that may not have been removed during surgery. This is known as *adjuvant radiation therapy*.
- Radiation may be used (along with chemotherapy) to try to shrink some larger cancers before surgery. This is called *neoadjuvant therapy*. In some cases this makes it possible to use less radical surgery and remove less tissue.
- Radiation therapy can also be used to relieve symptoms of more advanced cancer, such as pain, bleeding, trouble swallowing, and problems caused by bone metastases.

### External beam radiation therapy

The most common way to give radiation for these cancers is to carefully focus a beam of radiation from a machine outside the body. This is known as *external beam radiation therapy*. To reduce the risk of side effects, doctors carefully figure out the exact dose needed and aim the beam as accurately as they can to hit the carefully outlined target.

Before your treatments start, the radiation team will take careful measurements to determine the correct angles for aiming the radiation beams and the proper dose of radiation. Radiation therapy is much like getting an x-ray, but the radiation is stronger. The procedure itself is painless. Each treatment lasts only a few minutes, although the setup time — getting you into place for treatment — takes longer. Treatments are usually given 5 days a week for 6 to 7 weeks. Other schedules for radiation doses have been studied in clinical trials.

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

Hyperfractionation and accelerated fractionation schedules may reduce the risk of cancer coming back in or near the place it started (called *local recurrence*) and may help some patients live longer. The drawback is that treatments given on these schedules also tend to have more severe side effects.

Some newer techniques help doctors focus the radiation more precisely:

**Three-dimensional conformal radiation therapy (3D-CRT):** 3D-CRT uses the results of imaging tests such as MRI and special computer programs to precisely map the cancer's location. Radiation beams are then shaped and aimed at the tumor from several directions, which makes it less likely to damage normal tissues. In theory, by aiming the radiation more accurately, doctors can reduce radiation damage to important normal tissues in the area (such as nerves, blood vessels, and other organs) and may be able to cure more cancers by increasing the radiation dose to the tumor itself. Long-term study results are still needed to confirm this.

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

## **Brachytherapy**

Another way to deliver radiation is by placing radioactive materials directly into or near the cancer. This method is called *internal radiation*, *interstitial radiation*, or *brachytherapy*. The radiation travels only a very short distance, which limits its effects on nearby normal tissues.

Brachytherapy is not used often to treat oral cavity or oropharyngeal cancers because newer external radiation approaches, such as IMRT, are now very precise. When brachytherapy is used, it is most often combined with external radiation to treat early lip or mouth cancers.

Different types of brachytherapy may be used. In one form, hollow catheters (thin tubes) are placed into or around the tumor during surgery and are left in place for several days while the patient stays in the hospital. Radioactive materials are then inserted into the tubes for a short time each day.

In another form, small radioactive pellets (about the size and shape of a grain of rice) are placed directly into the tumor. The pellets give off low levels of radioactivity for several weeks and eventually lose their strength. The pellets themselves are left in place permanently and rarely cause any problems.

## **Possible side effects of radiation therapy**

Radiation of the mouth and throat area can cause several short-term side effects, including:

- Skin changes like a sunburn or suntan on the head and neck that slowly fades away
- Hoarseness
- Loss of sense of taste

- Redness and soreness of the mouth and throat

Sometimes open sores develop in the mouth and throat, making it hard to eat and drink during treatment. Liquid feeding through a tube placed into the stomach may be needed. This is known as a *gastrostomy* or *G tube* (see the "Surgery" section).

Radiotherapy may also cause long-term or permanent side effects:

**Damage to the salivary glands:** Permanent damage to the salivary (spit) glands can cause a dry mouth. This can lead to problems eating and swallowing.

The lack of saliva can also lead to tooth decay (cavities). People getting radiation to the mouth or throat area typically need to see a dentist for treatment to address any problems with their teeth. In some cases, teeth may need to be removed.

People treated with radiation to the mouth or neck need to practice careful oral hygiene to help prevent this problem. Fluoride treatments may also help. Newer radiotherapy techniques such as IMRT may help reduce this side effect. A drug called amifostine (Ethyol®) can also help reduce this side effect by limiting radiation damage to normal tissues. It is injected under the skin or into a vein a few minutes before each radiation treatment. Amifostine has side effects, such as nausea and vomiting, that can make it hard to tolerate.

**Damage to the jaw bone:** This problem, known as *osteoradionecrosis of the jaw*, can be a serious side effect of radiation treatment. This is more common after tooth infection, extraction, or trauma, and it can be hard to treat. The main symptom is pain in the jaw. In some cases, the bone actually breaks. Sometimes the fractured bone heals by itself, but often the damaged bone will have to be treated surgically.

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

Radiation side effects are likely to be more severe in people who are getting chemotherapy at the same time. These people also have to contend with the side effects of the chemotherapy itself, which can make this treatment hard to tolerate. For this reason, it's important that people getting both chemotherapy and radiation are in relatively good health before starting treatment, that they understand the potential for serious side effects, and that they are treated at a medical center with a lot of experience with this approach.

## Chemotherapy for oral cavity and oropharyngeal cancer

Chemotherapy (chemo) is the use of anti-cancer drugs that are given into a vein or taken by mouth. These drugs enter the bloodstream and can reach cancer that has spread to organs beyond the head and neck. It may be used in several different situations:

- Chemo (typically combined with radiation therapy) may be used instead of surgery as the main treatment for some cancers.

- Chemo (combined with radiation therapy) may be given after surgery to try to kill any small deposits of cancer cells that may have been left behind. This is known as *adjuvant chemotherapy*.
- Chemo may be used (sometimes with radiation) to try to shrink some larger cancers before surgery. This is called *neoadjuvant* or *induction chemotherapy*. In some cases this makes it possible to use less radical surgery and remove less tissue. This can lead to fewer serious side effects from surgery.
- Chemo (with or without radiation) can be used to treat cancers that are too large or have spread too far to be removed by surgery. The goal is to slow the growth of the cancer for as long as possible and to help relieve any symptoms the cancer is causing.

The chemo drugs used most often for cancers of the oral cavity and oropharynx are:

- Cisplatin
- 5-fluorouracil (5-FU)
- Carboplatin
- Paclitaxel (Taxol<sup>®</sup>)
- Docetaxel (Taxotere<sup>®</sup>)
- Methotrexate
- Ifosfamide (Ifos<sup>®</sup>)
- Bleomycin

A chemo drug may be used alone or combined with other drugs. Often combining drugs can help tumors shrink better, but will cause more side effects. The most commonly used combination is cisplatin and 5-FU. This combination is more effective than either drug alone in shrinking cancers of the oral cavity and oropharynx. Doctors have also seen good results when adding the drug docetaxel to these 2 drugs.

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

Chemo is often given at the same time as radiation (known as chemoradiation). Cisplatin alone is usually the preferred chemo drug when given along with radiation. Some doctors prefer to give the radiation and chemo before surgery. However, the side effects can be severe and may be too much for some patients.

In patients whose cancers are too advanced for surgery but not widespread, chemotherapy and radiation given together might produce a better outcome than radiation alone. But this combined approach is often hard for people who are in poor health to tolerate.

## Possible side effects of chemotherapy

Chemotherapy drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow, the lining of the mouth and intestines, and the hair follicles are also affected. This can lead to side effects.

The side effects of chemotherapy depend on the type and dose of drugs given and how long they are taken. These side effects can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea
- Increased chance of infections (due to low white blood cell counts)
- Easy bruising or bleeding (due to low blood platelet counts)
- Fatigue (due to low red blood cell counts)

Along with the risks above, some side effects are seen more often with certain chemo drugs. For example, 5-FU often causes diarrhea. Cisplatin can cause nerve damage (called neuropathy), leading to hearing loss as well as numbness and tingling in the hands and feet. This often improves once treatment is stopped, but it can persist a long time in some cases.

Although most side effects improve once treatment is stopped, some can last a long time or even be permanent. If your doctor plans treatment with chemo you should be sure to discuss the drugs that will be used and the possible side effects. Once chemo is started, let your health care team know if you have side effects, so they can be treated. There are ways to prevent or treat many of the side effects of chemotherapy. For example, many good drugs are available to help prevent or treat nausea and vomiting.

## Targeted therapy for oral cavity and oropharyngeal cancer

As researchers have learned more about the changes in cells that cause cancer, they have been able to develop newer drugs that specifically target these changes. Targeted drugs work differently from standard chemo drugs. They often have different (and less severe) side effects.

Cetuximab (Erbix<sup>®</sup>) is a monoclonal antibody (a man-made version of an immune system protein) that targets epidermal growth factor receptor (EGFR), a protein on the surface of certain cells that helps them grow and divide. Oral cavity and oropharyngeal

cancer cells often have more than normal amounts of EGFR. By blocking EGFR, cetuximab can slow or stop cell growth.

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

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

Several other drugs that target EGFR are now being studied as well, some of which are already being used to treat other cancers (see "What's new in oral and oropharyngeal cancer research and treatment?").

## Palliative treatment for oral cavity and oropharyngeal cancer

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

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

Nutrition is another important concern for people with head and neck cancers such as oral cavity or oropharyngeal cancers. Both the cancer and its treatment may make it hard to swallow. If this affects how a person eats or drinks, they may need to have a feeding tube inserted into the stomach through a small incision in the skin of the belly. This tube will most likely be needed for a short time during treatment, but in some cases it may need to be left in longer.

There are many other ways your doctor can help maintain your quality of life and control your symptoms. But this means that you have to tell your doctor how you are feeling and what symptoms you are having. Some people don't like to disappoint their doctors by telling them they are not feeling well. This does no one any good. Your doctor wants to know how you really feel. Talking about the symptoms you are having lets your doctor

give treatments that can relieve the symptoms. Getting effective treatment can help you feel better and let you concentrate on the things that are important in your life.

## Clinical trials for oral cavity and oropharyngeal 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 your type of 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.

If you would like to take part in a clinical trial, you should start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of clinical trials that meet your medical needs. You can reach this service at 1-800-303-5691 or on our Web site at [www.cancer.org/clinicaltrials](http://www.cancer.org/clinicaltrials). You can also get a list of current clinical trials by calling the National Cancer Institute's Cancer Information Service toll-free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials Web site at [www.cancer.gov/clinicaltrials](http://www.cancer.gov/clinicaltrials).

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

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

You can get a lot more information on clinical trials in our document called *Clinical Trials: What You Need to Know*. You can read it on our Web site or call our toll-free number (1-800-227-2345) and have it sent to you.

## Complementary and alternative therapies for oral cavity and oropharyngeal 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 Web sites 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 of these alternative methods have not been tested and proven to work in treating cancer.

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

- Look for "red flags" that suggest fraud. Does the method promise to cure all or most cancers? Are you told not to have regular medical treatments? Is the treatment a "secret" that requires you to visit certain providers or travel to another country?
- Talk to your doctor or nurse about any method you are thinking about using.
- Contact us at 1-800-227-2345 to learn more about complementary and alternative methods in general and to find out about the specific methods you are looking at.

## **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 for oral cavity and oropharyngeal cancer by stage**

The type of treatment your doctor will recommend depends on the tumor site and how far the cancer has spread. This section lists the options usually considered for each stage of oral cavity or oropharyngeal cancer. These are general comments about treatment,

because the approach to each site may be different. Your doctor may have reasons for suggesting a treatment option not mentioned here.

## **Stage 0 (carcinoma in situ)**

Although cancer in this stage has not become invasive (started to grow into deeper layers of tissue), it can do so if not treated. The usual treatment is to remove the top layers of tissue along with a small margin of normal tissue. This is known as surgical stripping or thin resection. Close follow-up to see if any cancer has come back (recurrence) is important. Carcinoma in situ that keeps coming back after resection may require radiation therapy.

Nearly all patients at this stage survive a long time without the need for more intensive treatment. But it is important to note that continuing to smoke increases the risk that a new cancer will develop.

## **Stages I and II**

Most patients with stage I or II oral cavity and oropharyngeal cancer can be successfully treated with either surgery or radiation therapy. Both approaches work equally well in treating these cancers. The choice of treatment is influenced by the expected side effects.

**Lip:** Lip cancer is generally treated with surgery, including Mohs surgery. Radiation therapy or more extensive surgery may be used if the tumor turns out to be larger than expected. If needed, special reconstructive surgery can help correct the defect in the lip.

Radiation alone may also be used as the first treatment. This is usually external beam radiation, sometimes along with brachytherapy. Surgery may be used if radiation doesn't completely get rid of the tumor.

If the tumor is thick, the surgeon may remove and examine lymph nodes in the neck.

**Floor of the mouth:** Surgery is preferred if it can be done because radiation may cause bone damage. If the cancer does not appear to have been completely removed by surgery, radiation may be added. This cancer readily spreads to neck lymph nodes. Surgery (neck dissection) may be recommended to remove these. Usually, the surgeon will remove lymph nodes from the side of the neck nearest the tumor. But if the tumor is in the middle, then lymph nodes on both sides of the neck will need to be removed.

**Front of the tongue:** Surgery is preferred for small tumors and radiation for larger ones, especially if cutting the tumor out would impair speech or swallowing. If surgery could not remove all the cancer, radiation may be added. For larger tumors, removal of neck lymph nodes will likely be recommended.

**Buccal mucosa (cheek):** These cancers are usually treated with surgery. Radiation may be another option. If surgery is used, radiation may be added. If the tumor is large, the neck lymph nodes will be removed as well.

**Lower gums:** Cancer in the lower gums is usually treated with surgery, which may include removing part of the mandible (jaw bone). Radiation may be added if all of the cancer could not be removed. Radiation may be used as the main treatment, but it carries a risk of damage to the jaw bone. Surgery to remove the neck nodes is often recommended.

**Upper gums and hard palate:** Cancers in the upper gum or hard palate (the front of the roof of the mouth) are also usually managed with surgery. Radiation may be added as well if needed. Lymph nodes in the neck may be removed.

**Back of the tongue:** Radiation is generally preferred because surgery would cause more problems with speech and swallowing, although surgery is used in some cases. The lymph nodes in the neck generally need to be treated as well.

**Soft palate (back of the roof of the mouth):** Because surgery would probably interfere with speech and swallowing, radiation is often the preferred treatment. Radiation may also be given to the neck. If surgery is used as the first treatment, then the neck nodes also might be removed.

**Tonsils:** Surgery and radiation (perhaps combined with chemotherapy) work about equally well in treating cancer of the tonsils. If the cancer will need to be treated with radiation after surgery, many doctors prefer giving the radiation treatments first. Then, surgery is still an option if radiation doesn't get rid of all the cancer. The neck lymph nodes can be treated the same way — surgery or radiation.

## **Stages III and IV**

More advanced oral cavity and oropharyngeal cancers generally require a combination of either surgery and radiation, radiation and chemotherapy (or cetuximab), or a combination of all three. The effect of combining radiation with both chemotherapy and cetuximab is also being studied. The choice of treatment is influenced by where the cancer is, how much it has spread, the expected side effects, and the patient's current health status.

Surgery usually includes a neck dissection because of the high risk of cancer spread to the lymph nodes. Radiation therapy often is required after surgery, particularly if the tumor has spread to the lymph nodes. Sometimes chemotherapy is given as well, especially if the cancer has worrisome features. The amount of tissue removed during surgery depends on the extent of cancer, and the method of reconstruction depends on the surgical defect created.

Primary tumors that are too large to be completely removed by surgery are often treated with radiation, either alone or with chemotherapy (or cetuximab). Doctors are also studying giving chemo as the first treatment, although not all doctors agree with this approach. Sometimes, these treatments may shrink the tumor enough so that surgery can be done.

Cancers that have already spread to other parts of the body are usually treated with chemotherapy, often along with cetuximab. Other treatments such as radiation may also

be used to help relieve symptoms from the cancer or to help prevent problems from occurring.

Clinical trials are looking at different ways of combining radiation and chemotherapy with or without cetuximab or other new agents to improve survival and quality of life, and reduce the need for radical resection of advanced oral cavity and oropharyngeal cancers.

## **Recurrent oral cavity or oropharyngeal cancer**

When cancer come backs after treatment, it is called *recurrent cancer*. Recurrence can be local (in or near the same place it started) or distant (spread to bone or organs such as the lungs). Treatment options for recurrent cancers depend on the location and size of the cancer, what treatments have already been used, and on the person's general health.

If the cancer comes back in the same area and radiation therapy was used as the first treatment, surgery is often the next treatment if possible. Usually, external beam radiation therapy cannot be repeated in the same site except in selected cases. However, brachytherapy can often be used to control the cancer if it has come back in the place it started. If surgery was used first, more surgery, radiation therapy, chemotherapy, or a combination of these may be considered.

If the cancer comes back in a distant area, chemotherapy (and/or cetuximab) is the preferred form of treatment. This may shrink or slow the growth of some cancers for a while and help relieve symptoms, but these cancers are very difficult to cure. If further treatment is recommended, it's important to talk to your doctor so that you understand what the goal of treatment is — whether it is to try to cure the cancer or to keep it under control for as long as possible and relieve symptoms. This can help you weigh the pros and cons of each treatment. Because these cancers are hard to treat, clinical trials of newer treatments may be a good option for some people.

## **More treatment information for oral cavity and oropharyngeal cancer**

For more details on treatment options — including some that may not be addressed in this document — the National Comprehensive Cancer Network ([www.nccn.org](http://www.nccn.org)) and the National Cancer Institute (NCI) are good sources of information.

The NCI provides treatment guidelines via its telephone information center (1-800-4-CANCER) and its Web site ([www.cancer.gov](http://www.cancer.gov)). Detailed guidelines intended for use by cancer care professionals are also available on this Web site.

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 Web site ([www.nccn.org](http://www.nccn.org)). (Information on oral cavity and oropharyngeal cancers is found in the NCCN Head and Neck Cancers guideline.)

# What should you ask your doctor about oral cavity and oropharyngeal cancers?

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

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

In addition to these sample questions, be sure to write down some of your own. For instance, you might want more information about recovery times so you can plan your work or activity schedule. Or you may want to ask about second opinions or about clinical trials for which you may qualify.

# What happens after treatment for oral cavity and oropharyngeal cancers?

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

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

For other people, the cancer may never go away completely. These people may get regular treatments with chemotherapy, radiation therapy, or other therapies to help keep the cancer in check for as long as possible. Learning to live with cancer as a more of a chronic disease can be difficult and very stressful. It has its own type of uncertainty.

## Follow-up care

If you have completed treatment, your doctors will still want to watch you closely. It is very important to go to all of your follow-up appointments. During these visits, your doctors will ask questions about any problems you may have and may do exams and lab tests or imaging tests (such as MRI or CT scans) to look for signs of cancer or treatment side effects. Your health care team will discuss which tests should be done and how often based on the type and initial stage of your cancer, the type of treatment you received, and the response to that treatment.

Patients with cancer of the oral cavity or oropharynx may develop recurrences or new cancers in the head and neck area or lungs. Therefore, they must be followed closely after treatment. Recurrences happen most often in the first 2 years after treatment, so patients are usually examined about every few months during the first 2 years and then less often after that. For someone who was treated with radiation to the neck, blood tests to look at thyroid function may be needed as well.

With improvements in surgery and radiation therapy, the ability to control a patient's main cancer mass has greatly improved. However, development of second cancers in the head and neck remains an important risk.

Many studies have found that the patient's quality of life tends to get worse in the first few months after treatment. After that, however, if the patient has given up smoking and drinking alcohol, things tend to get better. Within a year, many patients are feeling reasonably well and happy.

Almost any cancer treatment can have side effects. Some may last for a few weeks to several months, but others can last the rest of your life. Don't hesitate to tell your cancer

care team about any symptoms or side effects that bother you so they can help you manage them.

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

If cancer does recur, treatment will depend on the location of the cancer and what treatments you've had before. For more information on how recurrent cancer is treated, see the section, "Treatment options by stage." For more general information on dealing with a recurrence, you may also want to see the document, *When Cancer Comes Back: Cancer Recurrence*. You can get this document by calling 1-800-227-2345.

## Speech and swallowing therapy

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

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

Oral cavity or oropharyngeal cancers and their treatments may also affect a person's speech. A speech therapist may help if you have problems speaking or swallowing. These experts are knowledgeable about speech and swallowing problems.

## 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 is important that you be able to give your new doctor the details of your diagnosis and treatment. Make sure you have this information handy:

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

- If you had chemotherapy (or targeted therapy), a list of the drugs, drug doses, and when you took them

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

## Lifestyle changes after having oral cavity and oropharyngeal 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.

### **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 the 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 oral cavity or oropharyngeal cancer. The cancer or its treatment may affect how you swallow or cause dry mouth, changes in taste, 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 caused weight changes or eating or taste 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 manage these treatment side effects.

One of the best things you can do after cancer treatment is put healthy eating habits into place. You may be surprised at the long-term benefits of some simple changes, like increasing the variety of healthy foods you eat. Getting to and staying at a healthy weight,

eating a healthy diet, and limiting your alcohol intake may lower your risk for a number of types of cancer, as well as having many other health benefits.

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

## **Rest, fatigue, and exercise**

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

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

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

If you are very tired, you will need to balance activity with rest. It is 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, please see *Fatigue in People With Cancer* and *Anemia in People With Cancer*.)

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

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

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

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

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

Tobacco and alcohol use have clearly been linked to oral cavity and oropharyngeal cancers, so not smoking or drinking may help reduce your risk of the cancer returning. In fact, some studies have shown that people with head and neck cancers who continue to smoke during treatment don't do as well as those who quit before treatment starts. If you smoke, it is very important to quit. Quitting may also reduce your chance of developing other new cancers (especially other head and neck or lung cancers), which is a serious problem among oral cavity and oropharyngeal cancer survivors. Quitting can also help improve your appetite and your overall health. If you want to quit smoking and need help, call the American Cancer Society at 1-800-227-2345.

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

## **How does having oral cavity or oropharyngeal cancer affect your emotional health?**

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

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

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

counselor. Whatever your source of strength or comfort, make sure you have a place to go with your concerns.

The cancer journey can feel very lonely. It is not necessary or good for you to try to deal with everything on your own. And your friends and family may feel shut out if you do not include them. Let them in, and let in anyone else who you feel may help. If you aren't sure who can help, call your American Cancer Society at 1-800-227-2345 and we can put you in touch with a group or resource that may work for you.

## **If treatment for oral cavity and oropharyngeal cancers stops working**

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

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

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

No matter what you decide to do, you need 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 purpose of palliative care is to improve the quality of your life, or help you feel as good as you can for as long as you can. Sometimes this means using drugs to help with symptoms like pain or nausea. Sometimes, though, the treatments used to control your symptoms are the same as those used to treat cancer. For instance, radiation might be used to help relieve bone pain caused by cancer that has spread to the bones. Or chemo might be used to help shrink a tumor and keep it from blocking the bowels. But this is not the same as treatment to try to cure the cancer.

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

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

## **What's new in oral cavity and oropharyngeal cancer research and treatment?**

Important research into oral and oropharyngeal cancers is taking place in many university hospitals, medical centers, and other institutions around the country. Each year, scientists find out more about what causes the disease, how to prevent it, and how to improve treatment.

### **DNA changes**

A great deal of research is being done to learn what DNA changes cause the cells of the oral cavity and oropharynx to become cancerous.

One of the changes often found in DNA of oral cancer cells is a mutation of the *p53* gene. The protein produced by this gene normally works to prevent cells from growing too much and helps to destroy cells with too much damage for the cells to repair. Changes in the *p53* gene can lead to increased growth of abnormal cells and formation of cancers. Some studies suggest that tests to detect these *p53* gene changes may allow oral and oropharyngeal tumors to be found early. These tests may also be used to better define surgical margins (area of normal cells after the tumor is removed) and to determine which tumors are most likely to respond to surgery or radiation therapy.

Another DNA change found in some oropharyngeal cancer cells (and less often in oral cancer cells) is the presence of DNA from a human papilloma virus (HPV). Some parts of the HPV DNA instruct the cells to make proteins that inactivate the *p53* protein, which may allow the cancer cells to grow and divide. Studies are looking at whether tests to detect HPV DNA may help in diagnosing these cancers.

In addition, most studies suggest that oropharyngeal cancers that are linked with HPV tend to have a better outcome than those without HPV. Studies are being done to see if HPV-linked cancers can be treated less aggressively without reducing survival.

## Prevention

### **Human papilloma virus (HPV) infection**

In recent years, it has become clear that HPV infection is now a major factor in the development of many oropharyngeal cancers (as well as some oral cavity cancers).

Vaccines that reduce the risk of infection with certain types of HPV are now available. These vaccines were developed to lower the risk of cervical cancer, but they may reduce the risk of other cancers linked to HPV as well. This may include some mouth and throat cancers, although this has not been studied directly.

These vaccines are only effective if given before someone is infected with HPV, which is why they are generally recommended before a person becomes sexually active. As more young people get the vaccines, researchers will watch them to see if rates of mouth and throat cancers go down as these people age.

### **Chemoprevention**

As mentioned in the section, "Can oral cavity and oropharyngeal cancers be prevented?" doctors are looking for medicines to help prevent these cancers, particularly in people at increased risk, such as those with leukoplakia or erythroplakia.

So far, studies using isotretinoin (13-cis-retinoic acid) and other drugs related to vitamin A (retinoids) have not found any long-term benefit in helping patients avoid cancer or live longer.

Several other types of drugs are now being tested to help prevent these cancers. Non-steroidal anti-inflammatory drugs (NSAIDs), such as sulindac and celecoxib are being tested as chemopreventive drugs. Some early research has found that certain extracts of black raspberries may help prevent these cancers. Another compound showing some promise is known as Bowman-Birk inhibitor (BBI), a protein derived from soybeans.

All of these drugs and compounds would need further study before they could be recommended.

## Treatment

### **Surgery**

Doctors continue to refine surgery techniques to try to limit the amount of normal tissue that is removed along with the tumor. This may help limit the side effects after treatment.

**Transoral robotic surgery:** For this surgery, the surgeon operates from a control panel that allows him or her to precisely move robotic arms. The arms hold long surgical tools that are passed down the throat. This technique requires smaller incisions, so if it proves successful it might lessen the side effects from surgery. This approach is most commonly being used to treat tumors in the throat.

**Sentinel lymph node mapping and biopsy:** In many oral cancers, the nearby lymph nodes are routinely removed during surgery (known as a *lymph node dissection*). A sentinel lymph node biopsy can help the doctor determine whether the cancer has spread to these nodes beforehand, which may allow the patient to avoid this surgery if the cancer has not spread. Sentinel node mapping and biopsy helps the doctor identify and examine the sentinel node(s) — the one(s) that the cancer would have spread to first before it went to other nodes. If this node doesn't contain cancer, it's very unlikely that any other nodes would contain cancer either.

In this procedure, the surgeon injects a radioactive material around the tumor, usually the day before surgery. The material will travel the same route that any cancer cells would likely have taken if they went to the lymph nodes. On the day of surgery a blue dye is injected into the tumor site, which will also travel to the nearby lymph nodes.

During surgery, the surgeon can use a radiation detector to find the lymph node region that the radioactivity (and presumably the cancer) may have spread to. The surgeon then cuts into the area to look for radioactive or blue stained lymph nodes. These are removed and examined by a pathologist. If there is no cancer, then no further surgery is needed. If there is cancer, then all the lymph nodes in the area will be removed.

Most doctors still consider this procedure to be experimental for cancers of the mouth and throat, and more work is needed to tell if this can replace routine lymph node removals.

## **New chemotherapy approaches**

A great deal of research is focusing on improving results from chemotherapy in people with these cancers. This includes finding the best time to give these drugs, figuring out which combinations of drugs work best, and determining how best to use these drugs with other forms of treatment.

Researchers also continue to develop new chemotherapy drugs that might be more effective against advanced oral and oropharyngeal cancers. The combination of docetaxel, cisplatin, and 5-fluorouracil (TPF) given before radiotherapy seems to work better than cisplatin and 5-fluorouracil alone. Its role in combination with radiation and other chemotherapeutic agents is now being tested in larger studies.

In one newer approach to treating head and neck cancers, the doctor injects the drug directly into the tumor (intralesional chemotherapy). Success with this approach has been limited in the past because the drug tended to spread out of the tumors and to nearby tissues and the rest of the body quite quickly. Recent advances in preparing the drug solution so that it remains in the tumor (such as suspending it in a gel) have renewed interest in this treatment.

## **New radiotherapy methods**

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

**Stereotactic radiosurgery/stereotactic radiotherapy:** This type of treatment delivers a large, precise radiation dose to the tumor area in a single session (radiosurgery) or in a few sessions (radiotherapy). (There is no actual surgery involved in this treatment.)

In one technique, radiation beams from a machine are focused at the tumor from hundreds of different angles for a short period of time. Another approach uses a movable linear accelerator (a machine that creates radiation) that is controlled by a computer. Instead of delivering many beams at once, this machine moves around to deliver radiation to the tumor from different angles.

This treatment is used mostly for some brain and spinal cord tumors, but some doctors are now using it to treat recurrent oropharyngeal cancer.

**Proton beam therapy:** This approach uses a beam of protons rather than x-rays to kill cancer cells. Unlike x-rays, which release energy both before and after they hit their target, protons cause little damage to tissues they pass through and then release their energy after traveling a certain distance. Doctors can use this property to deliver more radiation to the tumor with less damage to nearby normal tissues. Proton beam therapy requires highly specialized equipment and is not widely available — there are only a handful of proton beam centers in the United States at this time. Most doctors still consider its use experimental for oral cavity and oropharyngeal cancers.

## **Targeted therapy**

Clinical trials are studying several targeted therapies that block the action of substances (such as growth factors and growth factor receptors) that cause head and neck cancers to grow and spread.

Several drugs that target the epidermal growth factor receptor (EGFR) may help treat oral and oropharyngeal cancers. Cetuximab (Erbix) is already approved for use against these cancers. Other drugs now being studied include erlotinib (Tarceva<sup>®</sup>), panitumumab (Vectibix<sup>®</sup>), and lapatinib (Tykerb<sup>®</sup>).

Drugs that block the growth of blood vessels tumors need to survive, such as bevacizumab (Avastin<sup>®</sup>) and sunitinib (Sutent<sup>®</sup>), are now being studied for use against these cancers as well.

Doctors are also studying several other types of targeted drugs.

## **Vaccines**

Most people think of vaccines as a way to prevent infectious diseases such as polio or measles. As mentioned above, vaccines against human papilloma virus (HPV) infection are already being used to help prevent cervical cancer. They may have the added benefit of preventing some oral cancers as well, although they won't help treat the disease.

However, some vaccines are being studied as a way to treat people with cancer by helping their immune system recognize and attack the cancer cells. Many of these vaccines involve dendritic cells (cells of the immune system), which are removed from the patient's blood and exposed in the lab to something that causes them to attack tumor cells. The dendritic cells are then injected back into the body, where they should induce other immune system cells to attack the patient's cancer.

## **Gene therapy**

New discoveries about how changes in the DNA of cells in the mouth and throat cause these cells to become cancerous are being applied to experimental treatments intended to reverse these changes. Gene therapies that interfere with the growth-stimulating effect of certain HPVs are also being developed. Another type of gene therapy adds new genes to the cancer cells to make them more susceptible to being killed by certain drugs. These forms of treatment are still in the earliest stages of study, so it will probably be several years before we know if any of them are effective.

# **Additional resources for oral cavity and oropharyngeal cancers**

## **More information from your American Cancer Society**

The following related information may also be helpful to you. These materials may be ordered from our toll-free number, 1-800-227-2345.

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

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

Clinical Trials: What You Need to Know

Guide to Quitting Smoking (also available in Spanish)

Living With Uncertainty: The Fear of Cancer Recurrence

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

Pain Control: A Guide for Those With Cancer and Their Loved Ones (also available in Spanish)

Questions About Smoking, Tobacco, and Health (also available in Spanish)

Surgery (also available in Spanish)

Targeted Therapy

Understanding Chemotherapy (also available in Spanish)

Understanding Radiation Therapy (also available in Spanish)

When Your Cancer Comes Back: Cancer Recurrence

The following books are available from the American Cancer Society. Call us at 1-800-227-2345 to ask about cost or to place your order.

*American Cancer Society Complete Guide to Complementary & Alternative Cancer Therapies*

*American Cancer Society Complete Guide to Family Caregiving, Second Edition*

*American Cancer Society Complete Guide to Nutrition for Cancer Survivors*

*American Cancer Society's Guide to Pain Control, Second Edition*

*Cancer in the Family: Helping Children Cope with a Parent's Illness*

*Kicking Butts*

*What Helped Me Get Through: Cancer Patients Share Wisdom and Hope*

*What to Eat During Cancer Treatment*

*When the Focus Is on Care: Palliative Care and Cancer*

## National organizations and Web sites\*

In addition to the American Cancer Society, other sources of patient information and support include:

### **Let's Face It**

Web site: <http://desica.dent.umich.edu/faceit/>

### **National Cancer Institute**

Toll-free number: 1-800-422-6237 (1-800-4-CANCER)

Web site: [www.cancer.gov](http://www.cancer.gov)

### **National Coalition for Cancer Survivorship**

Toll-free number: 1-888-650-9127

Web site: [www.canceradvocacy.org](http://www.canceradvocacy.org)

## **Oral Cancer Foundation**

Phone number: 1-949-646-8000  
Web site: [www.oralcancerfoundation.org](http://www.oralcancerfoundation.org)

**SPOHNC (Support for People with Oral, Head, and Neck Cancer)**

Toll-free number: 1-800-377-0928  
Web site: [www.spohnc.org](http://www.spohnc.org)

*\*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](http://www.cancer.org).

## References: Oral cavity and oropharyngeal cancers detailed guide

American Cancer Society. *Cancer Facts & Figures 2012*. Atlanta, Ga: American Cancer Society; 2012.

American Joint Committee on Cancer. Lip and Oral Cavity. In: *AJCC Cancer Staging Manual*, 7th ed. New York, Springer: 2010; 29–35.

American Joint Committee on Cancer. Pharynx. In: *AJCC Cancer Staging Manual*, 7th ed. New York, Springer: 2010; 41–49.

Ang KK, Harris J, Wheeler R, et al. Human papillomavirus and survival of patients with oropharyngeal cancer. *N Engl J Med*. 2010;363:24–35.

Atkinson JC, Harvey KE, Domingo DL, et al. Oral and dental phenotype of dyskeratosis congenita. *Oral Dis*. 2008;14:419–427.

Bsoui SA, Huber MA, Terezhalmay GT. Squamous cell carcinoma of the oral tissues: A comprehensive review for oral healthcare providers. *J Contemp Dent Pract*. 2005;4:1–16.

Chaturvedi AK, Engels EA, Pfeiffer RM, et al. Human papillomavirus and rising oropharyngeal cancer incidence in the United States. *J Clin Oncol*. 2011. Epub ahead of print October 3, 2011.

Cogliano V, Straif K, Baan R, Grosse Y, Secretan B, El Ghissassi F. Smokeless tobacco and tobacco-related nitrosamines. *Lancet Oncol*. 2004;5:708.

D'Souza G, Kreimer AR, Viscidi R, et al. Case-control study of human papillomavirus and oropharyngeal cancer. *N Engl J Med*. 2007;356:1944–1956.

Henley SJ, Thun MJ, Connell C, Calle EE. Two large prospective studies of mortality among men who use snuff or chewing tobacco (United States). *Cancer Causes Control*. 2005;16:347–358.

Howlader N, Noone AM, Krapcho M, et al (eds). SEER Cancer Statistics Review, 1975-2008, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2008/](http://seer.cancer.gov/csr/1975_2008/), based on November 2010 SEER data submission, posted to the SEER web site, 2011.

Koch WM, Stafford E, Bajaj G. Cancer of the Oral Cavity. Part A: General Principles and Management. In: Harrison LB, Sessions RB, Hong WK, eds. *Head and Neck Cancer: A Multidisciplinary Approach*. Philadelphia, Pa: Lippincott Williams and Wilkins; 2009: 250–265.

Kutler DI, Auerbach AD, Satagopan J, et al. High incidence of head and neck squamous cell carcinoma in patients with Fanconi anemia. *Arch Otolaryngol Head Neck Surg*. 2003;129:106–112.

Menedenhall WM, Werning JW, Pfister DG. Treatment of head and neck cancers. In: DeVita VT, Hellman S, Rosenberg SA, eds. *Cancer: Principles and Practice of Oncology*. 8th ed. Philadelphia, Pa: Lippincott Williams & Wilkins; 2008:809–877.

National Cancer Institute. Physician Data Query (PDQ). Oropharyngeal Cancer Treatment. 2011. Accessed at [www.cancer.gov/cancertopics/pdq/treatment/oropharyngeal/HealthProfessional](http://www.cancer.gov/cancertopics/pdq/treatment/oropharyngeal/HealthProfessional) on October 12, 2011.

National Comprehensive Cancer Network (NCCN). NCCN Clinical Practice Guidelines in Oncology: Head and Neck Cancers. V.2.2011. Accessed at [www.nccn.org/professionals/physician\\_gls/pdf/head-and-neck.pdf](http://www.nccn.org/professionals/physician_gls/pdf/head-and-neck.pdf) on October 11, 2011.

Paleri V, Rees G, Arullendran P, et al. Sentinel node biopsy in squamous cell cancer of the oral cavity and oral pharynx: A diagnostic meta-analysis. *Head Neck*. 2005;27:739–747.

Piccirillo JF, Costas I, Riechmann ME. Cancers of the Head and Neck. In: Ries LAG, Young JL, Keel GE, Eisner MP, Lin YD, Horner M-J (editors). *SEER Survival Monograph: Cancer Survival Among Adults: U.S. SEER Program, 1988–2001, Patient and Tumor Characteristics*. National Cancer Institute, SEER Program, NIH Pub. No. 07-6215, Bethesda, MD, 2007.

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

Vartanian JG, Magrin J, Kowalski LP. Total glossectomy in the organ preservation era. *Curr Opin Otolaryngol Head Neck Surg*. 2010;18:95–100.

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

Wrangle JM, Khuri FR. Chemoprevention of squamous cell carcinoma of the head and neck. *Current Opinion in Oncology*. 2007;19:180–187.

Last Medical Review: 11/9/2011

Last Revised: 1/27/2012

2011 Copyright American Cancer Society

For additional assistance please contact your American Cancer Society  
1 - 800 - ACS-2345 or [www.cancer.org](http://www.cancer.org)