

## What is Mouth Cancer?

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### **Understanding mouth cancer, causes, symptoms, stages, diagnosis and treatment**

Mouth cancer is the most common form of head and neck cancer. Mouth cancer refers to the cancer that develops in any of the parts that make up the mouth (oral cavity) such as the tongue, lips, gums, inner lining of the cheeks, roof of the mouth, floor of the mouth, area behind the wisdom teeth. Therefore, it is also called oral cancer.

The most common known cause of cancer in the mouth is tobacco use. But there are other lesser known causes of mouth cancer such as poor diet, prolonged sun exposure, drinking alcohol and chewing betel nut.

Mouth cancer looks like a common problem with lips or mouth, like pain in the mouth that doesn't go away, voice changes, trouble in chewing, swallowing, moving the jaw or the tongue, etc. Also, issues completely unrelated to the mouth like weight loss or pain in the ear, could also signify mouth cancer. In the case of mouth cancer, these common problems don't heal. And when left untreated, they can spread to affect other organs.

Mouth cancer can be life-threatening if not detected early. Since, the symptoms of mouth cancer are similar to common problems of the mouth, it is crucial to understand these symptoms. As early detection can greatly increase the possibility of curing the cancer.

About 11 people in 100,000 develop mouth cancer during their lifetime. Mouth cancer is commonly found in people over the age of 50. Also, men are more likely to develop mouth cancer than women.[10] With increasing cases worldwide, it is crucial to understand it. This guide aims to provide an easy-to-understand explanation of mouth cancer.

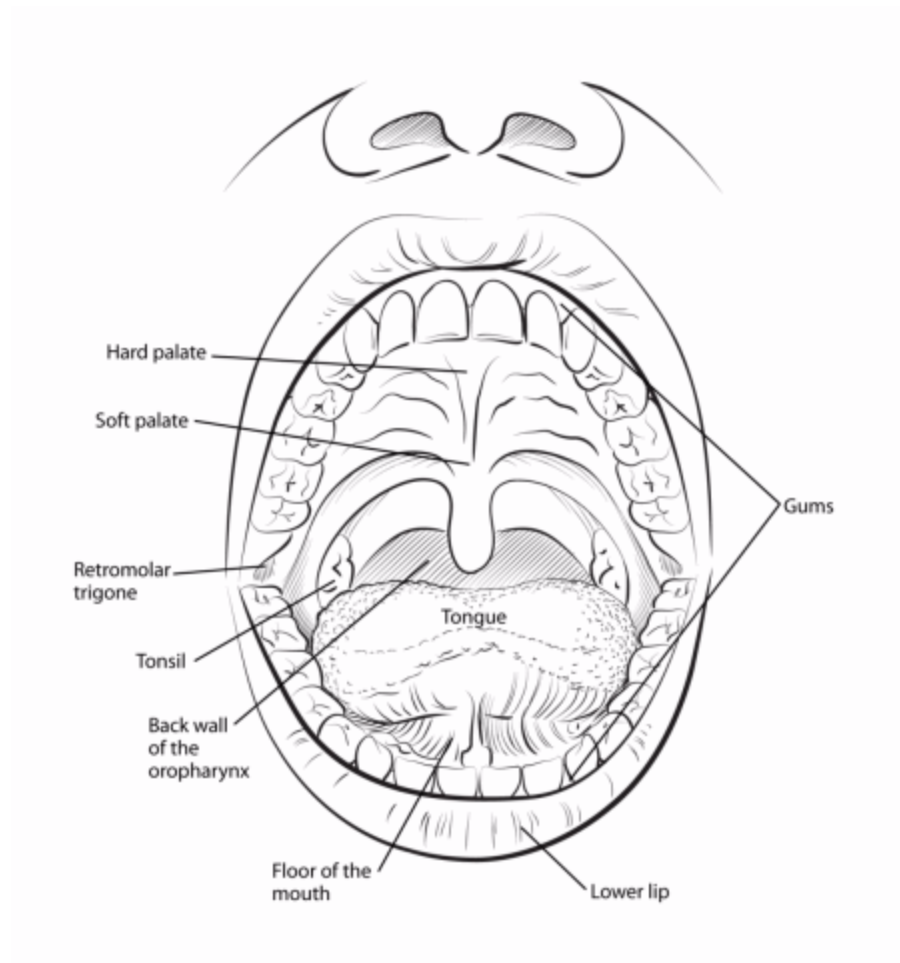


Fig 1. A diagram illustrating the parts of the mouth where mouth cancer occurs.

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Above information is used for main page of mouth cancer

## Where does Mouth Cancer affect?

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

Mouth cancer occurs in the oral cavity which includes:[2][3][8]

- Lips: Lip cancer appears as persistent sores, cracks, or growths.

- Gums: Gum cancer may cause swollen or bleeding areas resembling gum disease.
- Tongue: Tongue cancer looks like red or white patches or ulcers on the surface.
- Inner lining of the cheeks: Buccal mucosa cancer presents as thick patches or sores that don't heal.
- Roof of the mouth: Palate cancer appears as white patches or painful sores.
- Floor of the mouth (under the tongue): Floor cancer often shows as red patches or swelling under the tongue.
- The area behind your wisdom teeth: Cancer here affects the retromolar trigone and may cause ulcers or swelling.

The oral cavity and oropharynx are made up of different types of cells. The DNA of the cell has the instructions that tell the cell what to do. Cells on the lips or in the mouth go through changes (mutations). These mutations cause the cells to continue growing and dividing when healthy cells would naturally die. These abnormal cells can form a tumour. Left untreated, they may spread inside the mouth and to the head and neck or other parts of the body. This is called mouth cancer. The cause of the mutations in the cells that lead to mouth cancer is still undiscovered and under research.[3]

## Types of Mouth Cancer

- **Squamous cell carcinomas:** 90% of all mouth cancers found are squamous cell carcinomas. Squamous cells are thin and flat cells that are found in the tissue that makes the lining of the mouth.[1][8][11]
- **Verrucous Carcinoma:** It is a type of squamous cell carcinoma that is found in the gums and the cheeks. It is a rare type of cancer that rarely spreads to the other parts.[1][11]
- **Oral Melanoma:** This too is a rare type of cancer found in melanocytes, the cells that produce pigments that give the skin its color. It can occur anywhere inside the mouth.[1][11]
- **Minor Salivary gland cancers:** These cancers occur in the glands of the mouth. There are many types of Minor Salivary gland cancers depending upon the type of cells. Some of these are adenoid cystic carcinoma, mucoepidermoid carcinoma, and polymorphous low-grade adenocarcinoma to name a few. [1][11]
- **Mucoepidermoid Carcinoma:** It is the most common type of minor salivary gland cancer. It occurs in the mucus-producing cells.[11]

## What causes Mouth Cancer?

1. **Tobacco:** Eight out of ten people with mouth cancer smoke cigarettes, cigars, pipes, chew tobacco. Moreover, an IARC study found that one in three cases of mouth cancer globally are due to smokeless tobacco.[11] Tobacco contains carcinogens, such as nitrosamines and polycyclic aromatic hydrocarbons, they damage the DNA in cells of the oral cavity, leading to mutations and cancer.[1][8][9]
2. **Alcohol:** Excessive alcohol consumption especially along with tobacco use increases the risk of mouth cancer. Excessive alcohol intake damages tissues in the mouth and throat, increasing the likelihood of abnormal cell growth.[1][8][9]
3. **Chewing Betel Nut and Areca Nut:** Common in some Asian cultures, one in three cases of mouth cancer globally are due to areca nut consumption. They contain carcinogenic substances which cause chronic irritation to the oral mucosa (membrane lining the inside of the mouth).[1][8][9]
4. **Immunosuppression:** Long term use of immunosuppressive medications, such as azathioprine and cyclosporine, which are used to suppress the immune system, can increase the risk of certain cancers, including lip and tongue cancers. These risks occur because immunosuppressive drugs weaken the immune system, making it harder for the body to fight off cancer-causing changes in cells.[8]
5. **HPV:** Most of the time, the immune system wipes out HPV before it causes symptoms. But sometimes it develops symptomatic oral HPV. Oral HPV isn't cancer. But studies have found that HPV-16 can turn into mouth cancer.[1][8][9]
6. **Poor oral hygiene:** Poorly fitted dentures, chronic oral infections and untreated dental problems are co-factors in high-risk individuals. These may facilitate exposure to carcinogens.[8][9]
7. **Diet:** Vitamins A, C, and E in fruits and vegetables reduce the risk of cancer. Thus, low intake of fresh vegetables and fruits leads to insufficient antioxidants. These antioxidants protect against cellular damage which increases the risk of mouth cancer.[1][8]
8. **Prolonged Sun exposure:** Excessive exposure to ultraviolet (UV) rays, increases the risk of lip cancer.[8][9]

## What are the symptoms of Mouth Cancer?

Mouth cancer can cause different symptoms and these symptoms vary widely. These symptoms may be mistaken for common problems but may be precancerous conditions. Common symptoms of mouth cancer include:[3][8]

- Sores on the lip or inside the mouth that don't heal.

- Rough spots or crusty areas on the lips, gums or inside of the mouth.
- Areas in the mouth that bleed for no obvious reason.
- Difficulty chewing or swallowing, speaking or
- Difficulty in moving the jaw or tongue.
- Earache.
- Chronic bad breath.
- A white or reddish patch on the inside of your mouth.
- Loose teeth.
- A growth or lump inside the mouth.
- Persistent sore throat, hoarseness or loss of voice.
- Swelling of the jaw that causes dentures to fit poorly.
- Numbness in your tongue or other areas of your mouth.

## What are the stages of Mouth Cancer?

A stage describes the cancer's location, whether the cancer has grown, or penetrated the surface of the area where it was found. The tests also check if the cancer has moved to other areas of the body. Mouth cancers are staged using the TNM system.

### The stages for oral cavity cancer are:

- **T1:** The tumour in the mouth measures 2 centimetres or less.
- **T2:** The tumour is 2 centimetres or smaller but isn't larger than 4 centimetres.
- **T3:** The tumour is larger than 4 centimetres.

## How is mouth cancer diagnosed?

- **Physical exam.** The doctor or dentist will examine the lips and mouth to look for abnormalities.
- **Biopsy:** The doctor or dentist removes a sample of cells for the laboratory. The cells are analysed for cancer or precancerous changes that indicate a risk of future cancer. A biopsy is the only way to know for sure that mouth cancer is present.
- **Endoscopy:** The doctor passes a small, flexible camera equipped with a light down the throat to look for signs that cancer has spread beyond the mouth.
- **Special Dye:** The doctor may use a dye called toluidine blue. If the dye is spread over an abnormal area, it will turn a darker blue than the areas around it.

- **Light:** When fluorescent light is reflected off abnormal tissue, it looks different from the light reflected off normal tissue.
- **Barium swallow:** In this test, the patient drinks a liquid called barium, this coats the walls of the throat and esophagus, then a series of x-rays are taken. This test is done because people with mouth cancers are also at a risk for cancer of the esophagus.
- **Imaging tests:** Imaging tests may include X-ray, CT, MRI and PET scans, among others. Not everyone needs each test. The doctor will determine which tests are appropriate based on the condition.[1]

If the patient is diagnosed with mouth cancer, some other tests are done to see if the patient is healthy enough for treatments like surgery, radiation therapy, or chemotherapy.[1]

- **Blood tests:** Such tests can help diagnose poor nutrition and low blood cell counts. It can show if you are anemic it can also help to determine how well the liver or kidneys are working.
- **Function tests before surgery:** If a surgery is part of the treatment, pulmonary (lung) function tests and an electrocardiogram (EKG) is done to make sure the heart and lungs are working well.
- **Dental exam:** If radiation therapy will be part of the treatment, a dentist will help with routine dental care. The dentist may remove any bad teeth, if needed, before radiation treatment is started.
- **Hearing tests:** Cisplatin, the main chemotherapy drug used in treating mouth cancer can cause hearing loss. Therefore, before starting treatment hearing tests are done.

## How is mouth cancer treated?

One or more than one of the following treatment methods are used together to treat the cancer:[4][9]

- **Surgery:** The tumor and nearby areas are removed through surgery to prevent the cancer from spreading. Reconstructive surgery is performed to reform the oral cavity,
- **Radiation therapy:** In radiation therapy strong beams of energy kill cancer cells or stop them from growing. This treatment method is used with other methods.
- **Targeted therapy:** This cancer treatment uses substances to precisely identify and attack the cancer cells without harming the healthy cells.

- **Chemotherapy:** Anti-cancer drugs that kill cancer cells are used. It reduces the size of the tumor and decreases its spread. This is often paired with other treatment methods.
- **Immunotherapy:** Immunotherapy is a cancer treatment that boosts the immune system to fight the cancer cells. This helps to slow down or stop the cancer from spreading.
- **Rehabilitation:** Post-treatment, includes therapy for improving speech and swallowing. This helps the patients to rebuild and regain their previous oral condition.

### What are the side effects of the treatment?

- Surgery affects the speech, swallowing and chewing temporarily or permanently.
- Radiation therapy damages the salivary glands and causes dry mouth. This causes tooth decay and gum disease, dehydration, malnutrition.
- Chemotherapy causes nausea and vomiting which is common due to the drug's effect on the digestive system. It also leads to hair loss and reduced number of white blood cells.
- Chemotherapy and radiation therapy slow or stop the growth of new cells. They slow down the ability of the tissue in the mouth to repair itself.[5]

### Recurrent Cancer and Second Cancer

For many patients, the treatment will successfully remove or destroy the mouth cancer. But they still face the risk of recurrent cancers. Recurrent cancer is the cancer that comes back after treatment. This happens because a small number of cancer cells survive the treatment. Over time, these cells grew into tumors or cancer[6]

But some cancer survivors develop a completely unrelated cancer later. This is called second cancer. Mouth cancer survivors can get any second cancer, but they have an increased risk of:[1]

- Lung cancer
- Esophagus cancer
- Cancers of the larynx and hypopharynx
- Another mouth cancer
- Oropharynx cancer
- Stomach cancer

- Liver cancer
- Colon cancer
- Rectal cancer
- Cervical cancer

## **Conclusion:**

Mouth cancer is increasing in patients under the age of 45. Although mouth cancer is highly found in men than in women, this gap is narrowing over time. When the cancer is still in stage I i.e., less than 2 cm, nearly 90% of people survive for at least two years.[7] Thus, mouth cancer is a preventable and treatable condition if detected early.

## **Further reading:**

For further reading, consider exploring **how to prevent mouth cancers**, an essential topic in understanding mouth cancer.

## **References:**

- [1]<https://www.cancer.org/cancer/types/oral-cavity-and-oropharyngeal-cancer.html>
- [2]<https://my.clevelandclinic.org/health/diseases/11184-oral-cancer#symptoms-and-causes>
- [3]<https://www.mayoclinic.org/diseases-conditions/mouth-cancer/symptoms-causes/syc-20350997>
- [4]<https://www.mdanderson.org/cancer-types/oral-cancer/oral-cancer-treatment.html>
- [5]<https://www.cancer.gov/about-cancer/treatment/side-effects/mouth-throat/oral-complications-pdq#>
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[11]<https://www.cancerresearchuk.org/about-cancer/mouth-cancer/stages-types-grades/types-grades>

[12][https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(24\)00458-3/abstract](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(24)00458-3/abstract)

### **Images Section:**

Fig 1. American Cancer Society-

<https://www.cancer.org/cancer/types/oral-cavity-and-oropharyngeal-cancer.html>