

ORAL BACTERIA AND ESOPHAGEAL CANCER

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INTRODUCTION

BACTERIA IN THE MOUTH:

WHAT ARE ORAL BACTERIA AND HOW DOES IT RELATE TO ESOPHAGEAL CANCER?

Oral bacteria are pathogenic bacteria that can cause decay, gingival inflammation and periodontitis that can lead to tooth loss. It accumulates on the pellicle in the form of biofilm, when it is not properly removed using a toothbrush, interdental aids, and regular visits to your hygienist. Studies have shown that bacteria which is found in the mouth affects our oral mucosa and is a contributor to esophageal cancer. When we eat we swallow food as well as oral bacteria. This results in exposure of our digestive system, specifically our esophagus, to pathogenic oral bacteria.

ESOPHAGEAL CANCER

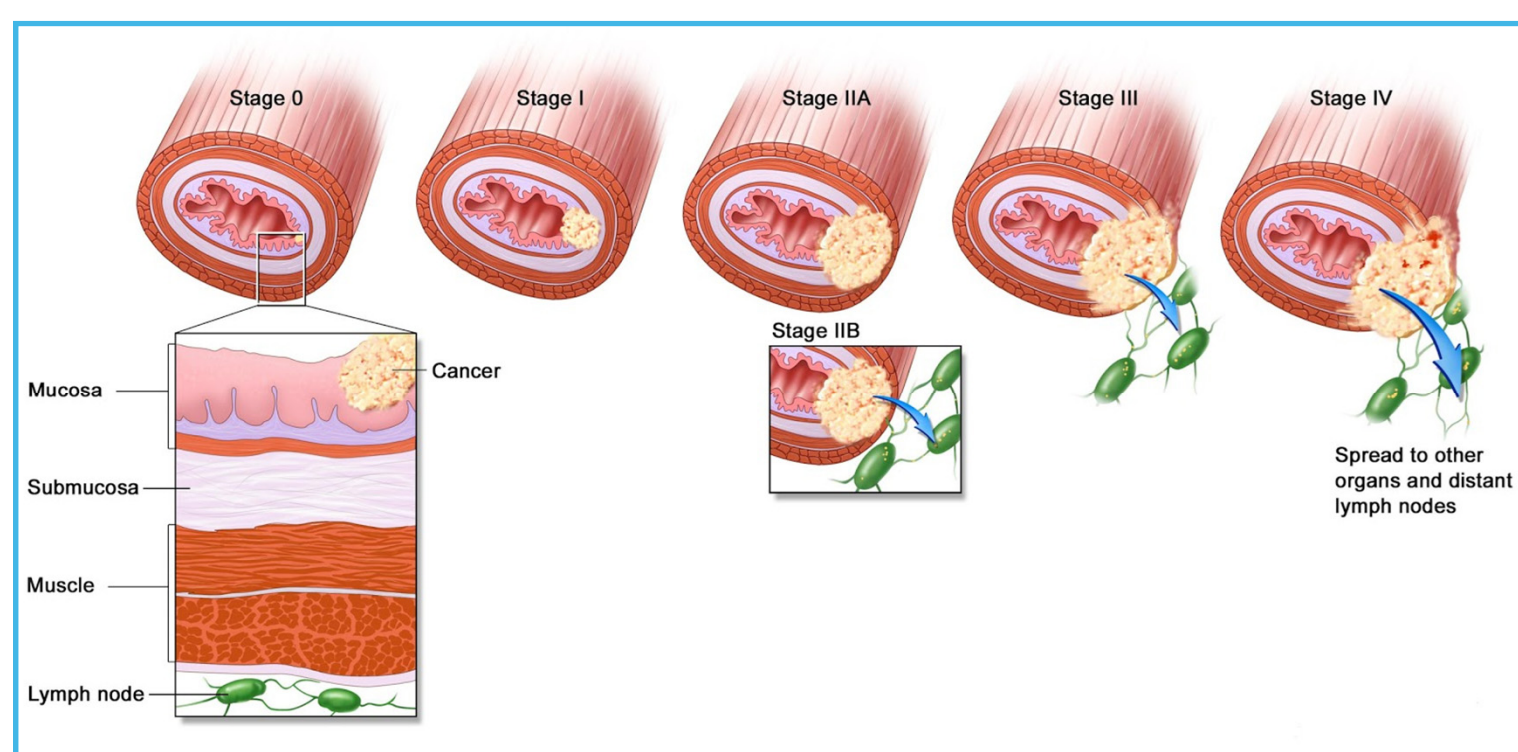
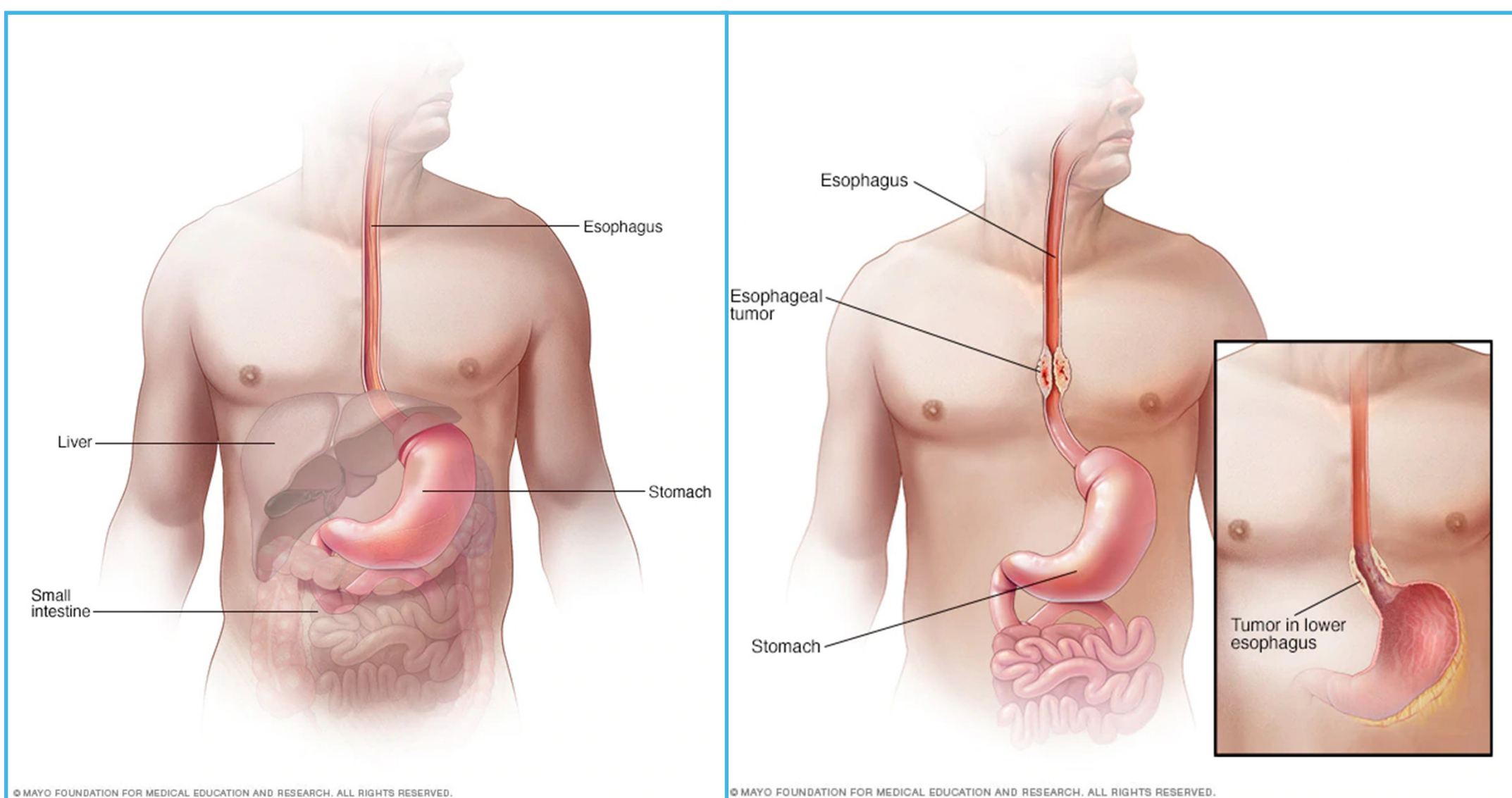
Mayo Clinic states that esophageal cancer “usually begins in the cells that line the inside of the esophagus. Esophageal cancer can occur anywhere along the esophagus. More men than women get esophageal cancer.” Several studies done about the relationship between esophageal cancer and oral bacteria state that bacteria present in the esophagus near the cancer site was also found in the oral cavity. In one study, the participants had two different types of esophageal cancer, EAC and ESCC, they presented with different bacterial species in their mouth.

There are 2 main types of esophageal cancer:

- **EAC (Adenocarcinoma):** “Adenocarcinoma begins in the cells of mucus-secreting glands in the esophagus. Adenocarcinoma occurs most often in the lower portion of the esophagus. Adenocarcinoma is the most common form of esophageal cancer in the United States, and it affects primarily white men.”
- **ESCC (Squamous cell carcinoma):** “The squamous cells are flat, thin cells that line the surface of the esophagus. Squamous cell carcinoma occurs most often in the upper and middle portions of the esophagus. Squamous cell carcinoma is the most prevalent esophageal cancer worldwide.”

EAC or esophageal adenocarcinoma is prominent in developed countries, and ESCC or esophageal squamous cell carcinoma is more common worldwide and is increasing.

Adenocarcinoma is the most common type of cancer of the esophagus among **whites**, while **squamous cell carcinoma** is more common in **African Americans**.



HOW DO I KNOW IF I'M AT RISK?

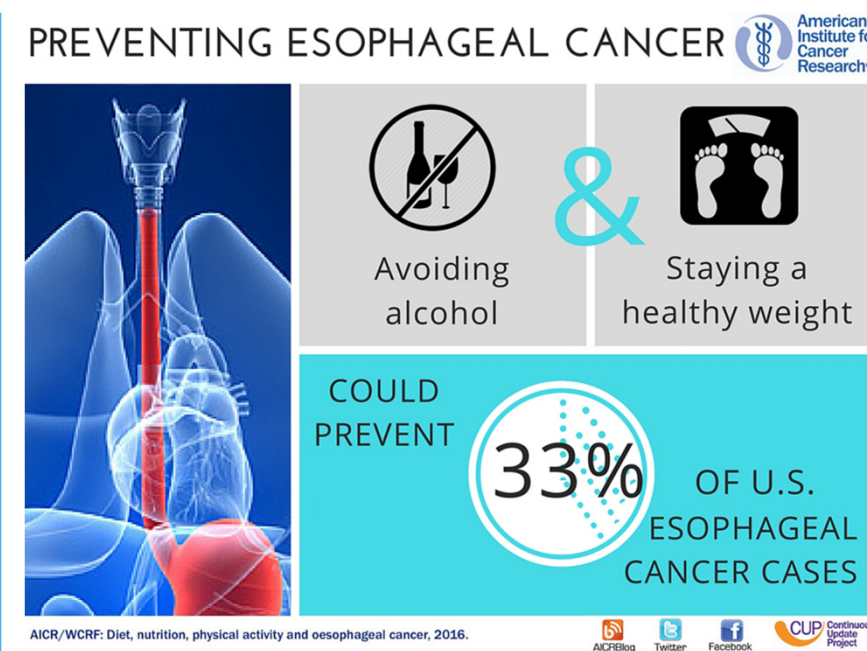
Known risk factors for EAC:

- GERD
- Obesity
- Low fruit/vegetable intake
- Smoking

Known risk factors for ESCC:

- Alcohol
- Low fruit/vegetable intake
- Smoking

The etiology of these EAC and ESCC cannot be fully explained, therefore studies were conducted that show only drinking is associated with ESCC. An abundance of certain bacteria prove higher risks for esophageal cancer. *T. forsythia* showed higher chances of EAC and *P. gingivalis* was marginally associated with ESCC.



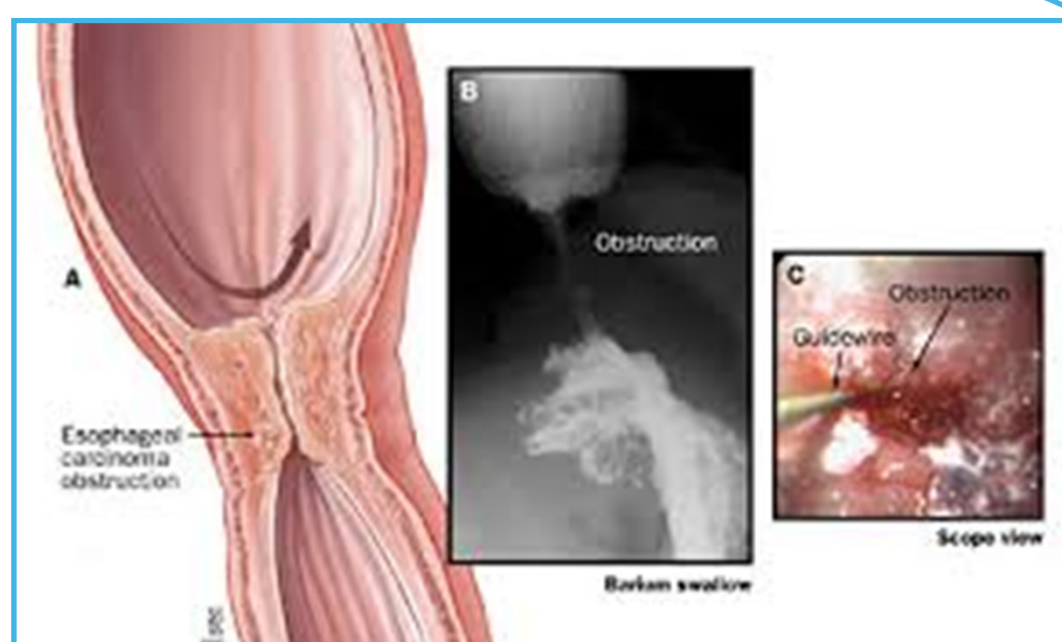
SIGNS AND SYMPTOMS

Signs and symptoms of esophageal cancer are:

- Dysphagia
- Weight loss without trying
- Chest pain, pressure, or burning
- Indigestion or heartburn that becomes worse
- Coughing or hoarseness

Barrett's esophagus, a precancerous condition increases your risk of esophageal cancer due to chronic acid reflux. Ask your doctor what conditions, and signs to look out for that may indicate your condition is worsening.

Early esophageal cancer typically doesn't present with signs and symptoms.



INFLUENCE OF ORAL BACTERIA ON ESOPHAGEAL CANCER

Several studies done about the relationship between esophageal cancer (EC) and oral bacteria state that bacteria present in the esophagus near the cancer was also found in the oral cavity. In one study, the participants had two different types of esophageal cancer, EAC and ESCC, they presented with different bacterial species in their mouth. The etiology of EC cannot be fully explained, therefore studies were done which showed that only drinking was associated with ESCC. The periodontal pathogen *Porphyromonas gingivalis* was marginally associated with higher risk of ESCC. On the other hand, Specifically, an abundance of *T. forsythia* showed higher chances of EAC.

Another article source provides and explains scientific evidence that suggests a relationship between *Porphyromonas gingivalis*, or *P. gingivalis*, and esophageal cancer. *P. gingivalis* is an oral pathogen that invades and disrupts a host immune response. After conducting the study, results showed that *P. gingivalis* was present in most patients with esophageal cancer but not in healthy individuals.

Furthermore, it was suggested that this bacterium is a prognostic indicator and etiologic agent of esophageal cancer. The article concludes that evidence has proven a positive correlation between a *Porphyromonas gingivalis* infection and the severity and prognosis of esophageal cancer in an individual.

To further these results, a study was done on how oral bacteria affects post-operative patients of esophageal cancer. This study showed that a decrease in the number of oral bacteria also decreased the number of post-op complications associated with esophageal cancer. A group of the test subjects was provided intensive, professional mechanical oral cleanings using benzethonium chloride, interdental brushes, and hydrogen peroxide. All participants were provided a complete oral hygiene service before surgery and only a portion of them was provided the intensive cleaning with benzethonium chloride. There was a decrease in fever, pneumonia, and the number of oral bacteria in the mouth and the incision site.

In conclusion, evidence proves a positive correlation between *Porphyromonas gingivalis* and esophageal cancer in an individual.

DISEASE MANAGEMENT RELATED TO DENTAL HYGIENE

Cancer treatment usually leads to oral side effects such as dry mouth, sores, difficult/painful eating and swallowing, and nausea. Dietary adjustments can be made by a nutritionist, and recommendations can be made by your hygienist for pain management related to your oral health.

Your hygienist will recommend:

- A puréed or soft mechanical diet.
- Soft, moist foods
- NO steaming hot foods/drinks
- NO acidic foods, or vinegar
- NO spicy foods



A nutritionist, will provide specific foods to manage overall health to make sure a healthy weight and nutritional intake is obtained. Usually a high-calorie, high-protein diet is created and personalized per patient needs.

ROLE OF THE HYGIENIST

The dental hygienist can play a role in the prevention and maintenance of oral bacteria in patients who are susceptible to esophageal cancer or have had a history of esophageal cancer. Hygienists play a role in educating and maintaining the patient's oral health. Comprehensive assessment and treatments such as scaling and teaching home care are provided too.

In the case of patients that are at risk of having esophageal cancer or are recovering post-op, the role of the dental hygienist includes:

- Assess the status of the patient's oral health.
- Determine proper treatment to restore unhealthy aspects.
- Recommend dietary and nutritional changes.
- Create a treatment plan to restore to optimal oral health.
- Follow the treatment plan which includes:
 1. Regular scaling and root planing
 2. Removal of biofilm
 3. Teaching patient home/self-care to maintain oral health.
 4. Recommend a shorter timeline for re-care maintenance.
 5. Continuously monitor oral status at re-care visits.
 6. Recommend proper dentifrices and rinses to provide comfort from symptoms and keep bacteria in oral cavity at a minimum.



REFERENCES

1. How Much Bacteria is in My Mouth? (n.d.). Retrieved from <http://www.dentalplans.com/dental-information/dental-concerns/bacteria-in-your-mouth>. Pathogenic. (n.d.). Retrieved from <http://www.merriam-webster.com/dictionary/pathogenic>.
2. Esophageal cancer. (2018, March 06). Retrieved April 2, 2019, from <https://www.mayoclinic.org/diseases-conditions/esophageal-cancer/symptoms-causes/syc-20356084>
3. Peters, B. A., Wu, J., Pei, Z., et. al. (2017, December 01). Oral Microbiome Composition Reflects Prospective Risk for Esophageal Cancers. Retrieved from <http://cancerres.aacrjournals.org/content/77/23/6777.long>
4. Shegan, G., Shuoguo, L., Zhikun, M., et.al. (2016, January 19). Presence of *Porphyromonas gingivalis* in esophagus and its association with the clinicopathological characteristics and survival in patients with esophageal cancer. Retrieved from <https://infectag.entscancer.biomedcentral.com/articles/10.1186/s13027-016-0049-x>
5. Mizuno, H., Mizutani, S., Ekuni, D., et.al. (2018, December 27). New oral hygiene care regimen reduces postoperative oral bacteria count and number of days with elevated fever in ICU patients with esophageal cancer. Retrieved from https://www.jstage.jst.go.jp/article/e/josnusd/60/4/60_17-0381/_article
6. Diet and Nutrition During Treatment for Esophageal Cancer. Retrieved from <https://www.mskcc.org/cancer-care/patient-education/nutrition-during-treatment-esophageal-cancer>
7. New Report Links Obesity, Alcohol to Esophageal Cancers. Retrieved from https://www.aicr.org/cancer-research-update/2016/07_28/cru_new-scientific-report-links-obesity-alcohol-to-esophageal-cancers.html
8. High Calorie Protein Shake. Retrieved from <https://www.arknutrition.co.uk/pages/high-calorie-protein-shake>