A PERSPECTIVE. . .

The role of the oral cavity in human health and illness.

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Introduction: **The digestive tract is a hollow tube that runs from the tip of the tongue to the anal opening. The tube is lined by a single layer of cells coated with mucus collectively known as the *mucosa*.**

Function: **The headwaters or gateway to the digestive tract is the oral cavity. From the first day of life, lining cells of the oral cavity are exposed to every substance taken into the mouth whether it is a nutrient, a microbe, or a toxin —the good, the bad, and the ugly.**

The journey: **Digestion begins in the mouth, albeit relatively minor amounts of digestion take place here, compared to the rest of the digestive tract. Sugars are modified and, in the adult, small amount of fats are metabolized—more so in the infant. Proteins, however, are minimally digested.**

Microbes migrating through the oral cavity as individual units of life have less chance of survival compared to those banding together in a communal living arrangement. These communities of microbes are known as biofilms.

In the oral cavity, microbes form biofilms on the surface of the teeth, the nooks and crannies in the mouth such as the

pockets between the gum and teeth (gingival sulcus), pits on the surface of the tongue, and craters in the tonsils.

How microbes survive: As a survival technique, microbes secrete a protein laden gummy substance known as plaque. They use this protective coating (biofilm) to hide, to survive, to thrive, to replicate and to avoid the destructive, abrasive forces of tooth brushing, and flossing, and require removal by scrapings done with sharp tools and power washings done by the dental hygienist.

The dangers of dental plaque formation: Plaque in the mouth can be most easily visualized between the tooth surface and gums at the gum line. If plaque is left untreated, it will eventually turn into a calcified material called tartar.

Plaque and tartar are capable of not only destroying dental enamel leading to dental decay but cause gum diseases, gingivitis and periodontitis. According to the U.S. Centers of Disease Control and Prevention, nearly half of Americans over the age of 30 have one or both of these oral cavity diseases. The advanced form of periodontitis causes the gums to pull away from the teeth, bone can diminish, and teeth may loosen or fall out.

Penetration and migration of oral microbes: Perhaps more troubling is the fact that microorganisms accumulating on gum surfaces can penetrate and spread through the blood stream or lymphatics to distant sites within the body.

Distant spread of these microbes has been *associated with* diseases like arthritis, dementia, Parkinson's disease, cancer, cardiovascular disease, pneumonia, bronchitis, and more[1]. Associations, of course, do not prove causation, but a large

body of evidence has accumulated suggesting strong correlations.

The sloughing of oral cavity microbes from plaque and biofilms results in the human host swallowing enormous numbers of microorganisms. The esophagus, therefore, is inundated by a virtual tsunami of bacteria, viruses, fungi and protozoa.

The constant bathing of the esophagus by microbes may be influential in causing esophageal symptoms of indigestion and pain. Esophageal illnesses (perhaps even esophageal cancer) may be due as much, or maybe more, to the antegrade flow of microbes arriving from the oral cavity as caused by the traditional explanation of the retrograde flow of gastric acid coming up from the stomach.

After leaving the esophagus, excess microorganisms reaching the stomach, in those with mouth pathology, can potentially overwhelm the protection provided by stomach acid that ordinarily keeps live microorganisms from migrating further into the digestive tract. Those microbes that survive the acidic stomach environment are free then to enter the small intestine causing a condition known as small intestinal bacterial overgrowth—SIBO, which, itself, can cause numerous gastrointestinal symptoms.

Conclusion: Unlike Vegas, what happens in the mouth does not stay in the mouth and many human diseases may have their origins in the populations of microbes proliferating in the oral cavity.

Those who treat digestive illnesses must take into consideration the oral cavity as a source of human illness, and

individuals trying to recover or avoid digestive illnesses must recognize the need for regular, meticulous, oral home care measures and regular visits to their dentist and dental hygienist to stay well.

Brushings and flossings are more than just a way to avoid having bad breath, they may prevent chronic and, in some cases, potentially lethal diseases.[2]

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[1]Sudhaka, P, Oral dysbiotic communities and the implications in systemic diseases. Dent J (Basel) 2018 Apr 16, doi: 10.3390/dj 6020010.

[2]Al-Bayaty FH, Impact of dental plaque control on the survival of ventilated patients severely affected by COVID-19 infection: An overview. Dent Med Probl 2021 Jul-Sep;58(3):385-395. doi: 10.17219/dmp/132979. PMID: 34597881.

Ten dentist approved measures for oral home health care

1. **Brush long enough: The American Dental Association recommends brushing a minimum of two minutes each time to remove dental plaque. For those who have devices in their mouth, like braces, a bridge, or implants, add extra time to clean around areas where food may get trapped on the device.**
2. **Brush often enough: Ideally, teeth should be brushed after each meal and before bedtime to remove bacteria and plaque. At a minimum they should be brushed twice daily.**
3. **Brush the right way: After placing the toothbrush in the mouth, tilt the toothbrush up so that it's at a 45° angle to the gums. Move the brush head from tooth to tooth using a small**

circular motion. This goes for the outer surfaces of teeth, the inner surfaces of teeth, and the tops or chewing surfaces of teeth.

4. **Use the right kind of toothbrush:** **Most dental professionals will agree that a rotating, oscillating, electronic toothbrush or sonic driven toothbrush is better at removing plaque from the teeth than a manual bristle toothbrush. Oscillating toothbrushes may rotate at up to 8800 strokes per minute. Sonic toothbrushes may vibrate at up to 40,000 strokes per minute. A popular brand name oscillating toothbrush is marketed under the brand name of Oral-B®. A popular sonic toothbrush is marketed under the name of Sonicare.®**
5. **Floss after meals and at bedtime:** **Flossing is important. Failure to floss results in missing half the surfaces of the teeth where plaque can form causing cavities and gum disease.**
6. **Brush the tongue:** **The tongue forms the floor of the mouth. It is critical for speech and swallowing. It can, however, act as a trap for bacteria causing bad breath, dental decay, and gum disease. Use the toothbrush to gently brush back and forth several times with each brushing. Special tongue brushes may be purchased on the Internet that cost only a few dollars**
7. **Don't brush too hard:** **Whether using a manual or a powered toothbrush, the most effective way to clean the teeth is by repetition, not force. Exert the same amount of pressure as the amount one might use to ring a doorbell. Too much pressure may wear down the enamel surface and cause the gums to shrink and recede from the teeth forming pockets at the base of the teeth in which microbes can hide.**
8. **Don't use too much toothpaste:** **Adults need only to express a pea-sized amount of toothpaste on the brush, or one half the length of the standard toothbrush.**

9. **Store the toothbrush properly**: **Keep the toothbrush as clean as possible. Rinse thoroughly after using it to make sure toothpaste and any debris is removed from the bristles. Store the brush in the upright position where it can air dry. If stored with other toothbrushes, make sure they do not come in contact with each other. Don't store the toothbrush in a closed container since microorganisms that grow best in warm, dark, and moist environments may proliferate on the brush.**
10. **Change the toothbrush or the toothbrush tip on an electronic powered toothbrush frequently. The lifespan of a manual bristle toothbrush is about 3 to 4 months. After that, the bristles become frayed and do not clean the teeth well. Replace the brush. For powered toothbrushes change the toothbrush tip every 90 days.**