Oral health or dental health is an integral part of overall health, which is defined as being free of any illness or injury. Good oral health improves a person's ability to speak, smile, smell, taste, touch, chew, swallow, and make facial expressions to show feelings and emotions. Good oral health is essential for optimal nutrition required to promote and assure overall health and disease prevention.

Since good oral health is essential to maintaining health, poor oral health contributes to a compromise of systemic health, which is the health throughout the body or system. This connection between mouth and body must be considered when looking at the potential to improve health in mammals and particularly in humans. Furthermore, oral health must not be overlooked when considering general health.

Many systemic conditions have oral manifestations such as autoimmune and inflammatory diseases. Through understanding of the oral manifestations of such conditions in their early stages, the potential for a dental examination to lead to a diagnosis can be an important factor leading to improved outcomes. Recognition of lesions with systemic connections provides for complete and comprehensive treatment. Currently, patients see their primary health care provider for their overall health and see their dental provider for oral health. However, many persons do not seek regular preventive dental care. This can become problematic when physicians and dental providers disconnect in provision of overall preventive health services. This important opportunity for comprehensive health management may be overlooked by not recognizing the role of dental health by patients and health care providers. It is important to realize that maintaining good oral health is an important safeguard for overall health.

History

Oral disease has been documented as far back as ancient Egypt. Mummified bodies from 2,100 years ago show evidence of dental disease and potential death from resulting sinus infection. The mummy from Thebes, known as RM2718, has been widely studied and the oral conditions seen through paleopathologists interpretations provide a view of oral health in ancient times. RM2718 is reported to have died at 20 and 30 years of age and it is highly likely that his dental disease was a contributing factor to his death. The amount of dental disease indicated on both X-ray and computerized tomography (CT) scans lead researchers to believe that he succumbed to a severe sinus infection caused by tooth decay.

While oral disease can be seen as a significant influence on health in ancient times, it continues to contribute to serious and sometimes fatal consequences. As recent as 2007, Deamonte Driver, a 12-year-old boy from the state of Maryland died from an abscessed tooth. This young man developed a brain abscess resulting from untreated tooth decay, which is not uncommon. The bacteria that caused his tooth to abscess spread through his bloodstream and into his brain. After multiple operations to treat his brain abscess, Deamonte died. The death led to a heightened awareness of the importance of oral health, as well as an increased mindfulness of the serious...
consequences of untreated dental disease.

Dental care is an often overlooked, yet critical component of overall health. Comprehensive care is essential to maintaining overall health and the serious and potentially fatal outcomes from dental disease should not be underrated. The historical evidence of tooth decay and the subsequent health implications provide an important link between oral health and systemic health.

Pathophysiology
Oral manifestations of systemic disease are indicators of a person's overall health. The mouth is a window to the body's general health and can provide insight to a number of diverse and significant disease conditions. Dental plaque, the colonization of bacteria leading to dental disease, is a complex microbial biofilm that develops in the mouth and is reported to be comprising anywhere between 700 and 25,000 different strains of bacteria. While many are considered a positive feature of our healthy microflora, others are considered pathogenic. When the bacteria that comprise dental plaque are allowed to grow, uncontrolled oral disease results. Dental plaque is responsible for disease development to include dental caries (cavities) and periodontal (gum) disease. While most commonly attributed to dental disease, this microbial colonization can be associated with systemic diseases. To consider how oral health and systemic health are related, it is important to understand that oral bacteria in dental plaque can easily enter the bloodstream when considering the common condition of bleeding gums. Almost all individuals experience bleeding gums at some point in their lifetime. While this is a simple analogy of how the bacteria and their toxins contribute to systemic health, it is easily understood and impossible to prevent. Bacteria are easily disseminated through the body by the bloodstream. The circulation of blood throughout the body is the mechanism that carries the bacteria to all internal organs with potentially dangerous consequences.

Risk Factors
Oral indications of disease can be seen in a wide array of systemic conditions and astute clinicians should screen their patients accordingly. Gastrointestinal conditions such as Crohn's disease, gastroesophageal reflux, ulcerative colitis, and chronic liver disease can be indicated by conditions seen within the mouth. Orofacial symptoms can include swelling, ulcerations, bleeding, and erosion of tooth structure. Liver disease can be visible in the oral cavity through the appearance of jaundice or yellowing of the oral tissues, related to buildup of bilirubin, a waste product of the normal breakdown of red blood cells passing through the liver. Anemia is a disease of the blood, which also has oral manifestations. Glossitis or reddening of the tongue and loss of papilla can lead to a smooth appearance of the tongue, indicating iron deficiencies potentially associated with anemia. The connective tissue disorder, Sjogren syndrome, can be seen in the mouth as the reduction of saliva is a common characteristic. Xerostomia, characterized by dry mouth, can lead tissue dehydration and reddening, increased incidence of decay related to decreased salivary flow, and potential oral infection. Pulmonary conditions often manifested in oral tissues can be characterized by swelling, reddened, and glandular characteristics, typically seen on the tongue and oral mucosa. A wide multitude of oral conditions can indicate overall health and should be carefully researched when evaluating general health.

Oral health may affect or be affected by a variety of additional systemic conditions including diabetes, pregnancy and preterm birth, endocarditis, cardiovascular disease, osteoporosis, HIV/AIDS, and Alzheimer's disease. Diabetes reduces the body's ability to resist infection and contributes to early loss of teeth due to destruction of bone support necessary to maintain tooth
support. Oral infection has been linked to premature birth as well as low birth weight for women. Infection involving the inner lining of the heart, or endocarditis, can easily result from oral bacteria circulating in the bloodstream. Heart valves damaged by heart disease can develop infections leading to serious complications in individuals with compromised immune systems. The connections between oral bacteria and heart disease are to be considered in evaluation of clogged arteries and even stroke. Weak and brittle bones seen in osteoporosis can be complicated by tooth and bone loss seen in periodontal disease. Premature loss of teeth, before age 35, has been considered a risk factor for development of Alzheimer’s disease. Oral disease is an important factor for consideration in immune system disorders and eating disorders as chronic inflammation of oral tissue compromises the health of individuals.

Symptoms
The introduction of bacteria directly into the bloodstream can lead to a condition called septicemia, or infection of the blood, caused by circulating bacteria or their toxins. This is especially serious if an individual's health is compromised by other conditions and can result in septicemia resulting directly from oral bacteria. Bacterial septicemia left untreated can be a very dangerous condition and potentially fatal. A severe abscess can lead to secondary infections in a wide variety of organs. Untreated infection can progress and result in severe complications, the worst of which is death.

Diagnosis
Primary care and dental providers must be able to appropriately recognize oral manifestations of disease in order to provide accurate diagnosis and deliver comprehensive care. Recognition of various, sometimes obscure yet important signs of systemic diseases within the mouth can provide valuable insight to a person's overall health and can provide opportunities for referral of potentially overlooked conditions. The oral exam should be included in the physical exam and referral for follow-up care when indicated is a standard part of the specialty referral process. The inclusion of the oral exam and coordination of care represents an important consideration allowing for delivery of comprehensive medical care.

Treatment
Disease prevention is important, considering that dental decay is for the most part preventable. Normal brushing and flossing can aid in keeping dental plaque under control, and is essential in controlling disease processes.

Since dental health plays a critical role in management of disease conditions, health care providers realize the value of the important connection between dental health and systemic health. The World Health Organization reports that nearly 100 percent of adults experience some form of dental disease in their lifetime (US Department of Health and Human Services, 2000). While tooth decay is for the most part preventable, it is also well established as infectious, progressive, chronic, and a highly prevalent disease condition in world populations. Maintaining good oral health is important. In order to ensure prevention of dental disease and the potential for systemic complications, consideration must be given to daily oral hygiene regimens that keep the mouth healthy. The American Dental Association acknowledges that systemic diseases may first become apparent in the mouth and many of these conditions are described here. Recommendations for maintaining oral health include brushing teeth thoroughly twice daily using fluoridated toothpaste. Clean between teeth with floss or another type of interdental cleaner once a day. Consider the use of antimicrobial rinses as an adjunct to a daily oral hygiene routine. Eat a balanced diet and limit

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snacks to maintain not only oral health, but also overall health. The importance of fluoridation is not to be overlooked. Fluoridated toothpaste, rinses, and municipal water sources provide a valuable preventive opportunity when considering dental disease. Schedule regular dental checkups. Prevention and treatment of dental disease conditions are key to maintain good health. Dental disease left untreated results in pain, infection, dysfunction, learning distractions, and disruptions of normal growth and development resulting from compromised nutrition.

Oral health is a key component to maintaining good overall health. Talk to a dental provider about changes in overall health, particularly any recent illnesses or chronic conditions. Provide an updated health history regularly at dental appointments to include medication use—both prescription and over-the-counter products. Tobacco use is discouraged. Consult dental providers and public health agencies about options for quitting.

**Future**

Prevention of oral disease is an important consideration in maintaining good health. Dental disease prevention is a winnable battle and health care providers must recognize their role in the importance of education. Programs of the future will address the importance of the oral health/systemic health connections and the potential to improve health outcomes.

Medical and dental providers have joined forces in prevention of oral disease. Models such as Cavity Free at Three ([http://www.cavityfreeatthree.org](http://www.cavityfreeatthree.org)) provide tools for a cross-discipline training program applicable to all health care providers focusing on education and service delivery to families with the goal of preventing dental disease early in life. The goal of this project is to eliminate tooth decay in children at a young age ensuring that the next generation grows up with healthy mouths and bodies.

Through proper training, all health care professionals should have the skills necessary to screen for oral diseases and deliver preventive care services. The condition of the mouth can be a good indicator of a person's overall health and every opportunity to evaluate health is important.

**Conclusion**

Health care providers must pay close attention to the oral cavity and recognize the potential broad range of systemic conditions through this important window to the body. The separation of oral health care from overall health care can be a factor limiting good health. Only through the delivery of comprehensive care can humans improve and maintain good health.

See also Alzheimer's Disease; Diabetes Mellitus

**Further Reading**


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