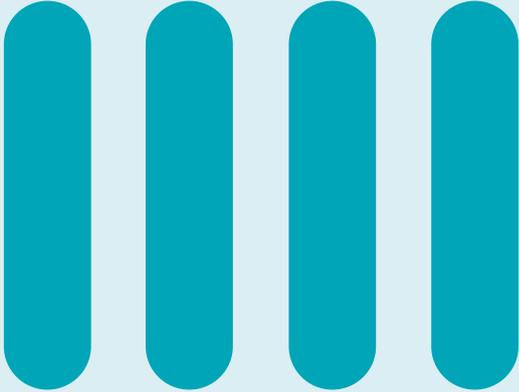


THE ROLE OF DIET IN ORAL HEALTH



Diet and oral health have a synergistic relationship.

Diet impacts the integrity of teeth, oral tissues, bone and other supporting structures, while oral health influences how food is consumed. Oral pain, missing teeth, and other oral health issues may influence the types of food an individual can consume. Candy alone is not the only food responsible for poor oral health. In fact, a variety of dietary factors impact oral health along with the behaviors associated with their consumption.



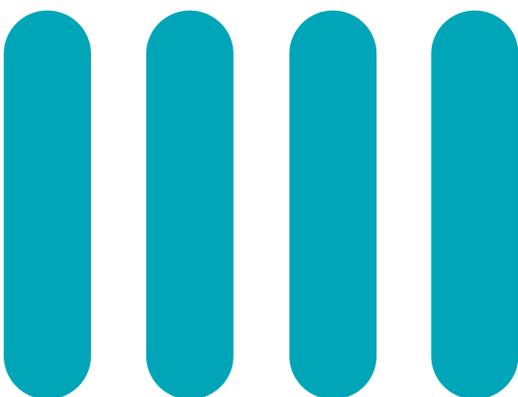


NUTRITION AND LINKS TO BROADER HEALTH

Diet can influence the initial development, growth, and maintenance of the oral cavity and the impact of diet on the mouth can be very different depending on when a nutritional imbalance occurs.¹ In fact, early nutritional disturbances throughout periods of active growth, influence malformations the most.¹ An insufficient supply of vitamins and minerals pre-conception, can negatively impact the growth of the maxilla and skull, while inadequate intake of the macronutrients affects the development of the dental hard tissues, occlusion and connective tissue.² Macronutrients are classified as substances needed in larger amounts. The three macronutrients required by humans are carbohydrates (sugar), lipids (fats), and proteins.

Dietary protein is the building block for bone and the periodontium and support tissue repair.³ Ward and colleagues discussed the association of clinical attachment loss with low dietary protein intake and suggested that higher intake of protein may improve musculoskeletal and periodontal health, although further research is needed.³

Some of the most influential nutrients during growth and development of teeth are Vitamins A, C, D calcium, phosphorous, protein and fluoride. Vitamin A is essential to maintain the integrity of epithelial tissues and for the growth and maintenance of salivary glands.² Vitamin A deficiency has also been associated with an increased risk of oral and pharyngeal cancers.⁴ Vitamin C is necessary for production of fibroblasts (collagen forming cells), osteoblasts, and odontoblasts, and needed for optimal activity of white blood cells.^{2,5} Vitamin C deficiencies could result in gingivitis, secondary gingival infections and weakened tooth enamel.^{2,5}



Eating a well-balanced diet low in sugar may help keep your oral microbiome healthy.

Vitamin D helps to maintain a healthy periodontium and sufficient levels have been associated with less inflammation, while insufficient levels have been linked to a higher prevalence of periodontitis.⁶ A vitamin D deficiency can result in: enamel hypoplasia, increasing the risk of the development of dental caries and impact wound healing, which can have negative treatment outcomes for periodontal surgery.⁶ Studies have also linked Vitamin D with certain oral cancers and osteonecrosis of the jaw.⁶

The outer enamel layer of teeth is made up of roughly 96% calcium and phosphate ions that form strong hydroxyapatite crystals, making enamel one of the strongest substances in the human body.⁷ Teeth need a constant source of calcium and phosphorus from the saliva to maintain the integrity of the outer enamel surface.⁸ Fluoride, which is a naturally occurring element, is essential for enamel strength, growth, and maintenance of teeth because fluoride acts as a catalyst in the remineralization of enamel with phosphate ions dissolved in saliva.^{8,9}

THE LINKS BETWEEN DIET AND THE ORAL MICROBIOME

The oral microbiome is heavily influenced by diet. The oral microbiome refers to the symbiotic community of healthy and pathogenic microorganisms in the oral cavity, and next to the gut, is the second largest human microbial community in the human body.¹⁰ The microorganisms in the oral cavity colonize on hard and soft tissues. The natural pH of the mouth helps to keep the community of microbes in balance. Diets that are high in refined carbohydrates can cause an oral imbalance.^{11,12}



THE IMPACTS OF DIETARY CHOICES ON ORAL HEALTH

Nutritional deficiencies can produce oral health conditions and diseases including bleeding gums, xerostomia, dental caries, and various inflammatory pathologies. Deficiencies in iron, folate, and vitamin B12 can lead to swelling of the tongue, papillary atrophy, and surface ulcerations.¹ In addition, insufficient supply of vitamin B12 can produce glossitis, angular cheilitis, recurrent oral ulcers, oral candidiasis, and diffuse erythematous mucositis.^{1,2}

Another common dental condition linked to diet is acid erosion. Dental erosion is the loss of minerals and progressive wearing away of the enamel resulting from recurrent exposure to a low pH in the mouth due to intrinsic factors (i.e. acid reflux) or extrinsic factors (i.e. excessive consumption of acidic foods and drinks).¹³ Foods and drinks considered high in acid include some fruit and fruit juices, sodas, fruit teas, and wine.¹⁴⁻¹⁶ Avoiding these items would help to decrease repeated exposures to low pH in the mouth and limit contact with acid foods;¹⁶ however, doing so may be difficult for some individuals.

The use of a specialist toothpaste can help protect the teeth from dental erosion associated with dietary acids and help to manage any symptoms associated with dentin hypersensitivity. GSK has developed a toothpaste, Pronamel, which is designed to strengthen and protect tooth enamel against dietary acids.^{17,18} Pronamel is designed to maximize fluoride delivery to the tooth surface while enhancing remineralization and decreasing demineralization.¹⁷ Pronamel also works to lock in more minerals already present in the tooth surface, all of which helps to protect the enamel from the constant assault of dietary acids.¹⁷⁻²⁰

Eating a healthy diet is beneficial for dental health. A diet that is beneficial for your dental health includes: varied vegetables and fruits, limited fat intake and fiber.^{21,22} A mouth-friendly diet should also have sufficient amounts of vitamin A, D, E, and vitamin K2 and minerals such as calcium, and phosphorus.²¹⁻²² Eating foods that are good for oral health are also good for general health.^{21,22}



*based on an *in vitro* study in which fluoride uptake was measure at 10µm depth. Sourced and tested in 2014.

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