PROFICIÊNCIA EM LEITURA EM LÍNGUA INGLESA

Adapted from Medical Sciences. *http://www.jnsci.org/files/html/2016/e241.htm*. **Dental Caries: A Current Understanding and Implications**. Ryan L. Quock. Department of Restorative Dentistry & Prosthodontics, University of Texas School of Dentistry at Houston, Houston, TX 77054, USA. *Nature and Science, 1(1):e27, 2015.* Acceded in 09/10/2018 18:11

[1] Introduction. Dental caries, or "tooth decay" as it is more colloquially known, is a microbiologic disease that has implications both local to the oral cavity and in extreme cases, systemically. While other conditions, such as cancer, diabetes, and cardiovascular disease garner much attention in the scientific community and public, dental caries continues to quietly manifest with alarming prevalence. Indeed, dental caries has been identified as the most common chronic childhood disease in the United States, more common than asthma and hay fever. Globally, 60-90% of children and nearly 100% of adults have teeth affected by dental caries.

[2] Beside the implications for personal and public health, dental caries has a strong economic impact. Oral diseases are the fourth most expensive to treat in the industrialized world. An estimated 5-10% of public health expenditures in these countries are for oral health. It should be noted that not all patients who would benefit from dental treatment in industrialized countries seek it, likely influenced by economics as well.

[3] Pathobiology of dental caries. Dental caries is a microbiologic disease that results in the dissolution of the mineral structure of teeth. Although there are other factors involved, it is generally accepted that three basic components must be simultaneously present over a period of time for caries to clinically manifest: a tooth substrate, acidogenic bacteria, and fermentable carbohydrates for the bacteria to metabolize.

[4] Human teeth are anchored in the alveolar bone by a ligamental sheath (the periodontal ligament) and are composed of three histologically distinct layers. The innermost layer, the pulp, consists of vascular and nerve connections to systemic counterparts – these give teeth "vitality". The pulp is encased protectively by dentin, which has a mineral content of about 75%; blastic cells for dentin (odontoblasts) can be found at the pulp-dentin interface. Dentin of the crown (portion of tooth clinically visible in oral cavity) is covered by enamel, which is even more highly mineralized than dentin at over 95% – it is the hardest substance in the human body. Cementum covers the root dentin and by contrast is only about 50% mineralized.

[5] At least two things are of note regarding the relationship between tooth histology and dental caries. First, more highly mineralized layers of teeth are more resistant to acidic dissolution, which occurs in dental caries – thus enamel at one end of the spectrum plays an important protective role, but cementum on the other end is more susceptible to mineral loss. Secondly, the presence of live odontoblasts in the pulp provides potential for repair to acid-damaged dentin. Enamel does not have this same ability for self-repair, although the literature strongly points to other means to non-invasively repair its mineral structure, which will be discussed later.

[6] Aciduric, acidogenic bacteria are thought to be the primary agents responsible for lowering pH in the oral environment, which in turn results in the dissolution or demineralization of teeth. Although

the oral ecosystem is complex and there likely a potentiating and additive effect of a variety of bacterial species in dental caries, the chief initiator of caries on tooth enamel is *Streptococcus mutans*. Other species, such as *Lactobacilli,* have been associated with advancing dental caries lesions, as well as *Actinomyces* on root cementum. These various species reside in biofilm on tooth surfaces – dental plaque; left undisturbed and after metabolism of fermentable dietary carbohydrates like sucrose, acidic bacterial by-products lower oral pH. During extended periods of lowered pH (approximately 5.5 for enamel, 6.5 for dentin), minerals such as phosphate and hydroxyl ions leech out of the tooth into the oral environment.

[7] The first clinical sign of this demineralization is a slight color change in the enamel surface - the initial caries lesion; if oral pH is restored to a more neutral level by the removal of bacterial plaque and/or carbohydrates, then available calcium, phosphate, and hydroxyl ions in the saliva and plaque participate in re-uptake into the enamel crystalline structure.

[8] To review, acidogenic bacteria like *Streptococcus mutans* create acid by-products, which in turn demineralize tooth structure. These acidogenic bacteria primarily metabolize dietary fermentable carbohydrates, like sucrose, to produce the acidic by-products – this makes patient diet and oral hygiene an important *controllable* aspect of the disease process. Indeed, data suggests that when sugar intake is limited to more than 10% energy, caries experience is reduced.

[9] Furthermore, time plays an important role – the longer the teeth and bacteria are exposed to carbohydrates, the more time the bacteria have to create acidic by-products and thus demineralize the teeth. By extension, if a limit is placed on how much time the carbohydrates spend in the oral environment, then the acid challenge is reduced. For this reason, snacking and/or sipping on foods and beverages is discouraged.

[10] So in one sense, from a dental perspective it matters not how much carbohydrates are ingested, but how much time is spent doing so. Regardless, because patient diet relates strongly to daily decisions and actions, a current understanding of dental caries categorizes it as a "behavioral disease with a bacterial component". This nuanced, but significant, shift in perspective on dental caries has resulted in a paradigm change with regard to its management.

[11] From a medical perspective, localized progression of dental caries can have serious implications. As noted earlier, prolonged periods of bacteria-induced, low pH in the oral environment encourages an unchecked constant demineralization of tooth enamel. If enough mineral content is lost, the enamel apatite matrix substructure collapses into a cavitation, or "hole", and is unremineralizable. Furthermore, this cavity is a niche (often uncleanable) for cariogenic bacteria.

RESPONDA DE ACORDO COM O TEXTO. AS RESPOSTAS DEVEM SER EM <u>PORTUGUÊS</u>

1) **Considere os Parágrafos [1], [2] e [3].** Assinale com um [x] apenas a sentença incorreta.

   (1,0 ponto)

a) Nos Estados Unidos, as cáries dentarias são consideradas doenças microbiológicas e por esse motivo recebem, dos órgãos competentes, tanta atenção quanto o câncer, a diabetes e as doenças cardiovasculares.	(x)
b) Em países industrializados, a estimativa de gastos é de 5 – 10% com a saúde bucal (oral), porém indivíduos que podem se beneficiar de tal tratamento não o fazem, também por motivos econômicos.	( )

c) A cárie é uma doença microbiológica que consiste na dissolução dos minerais que compõe a estrutura dos dentes.	( )

2) **Considere o parágrafo [4].** O dente humano é composto por três camadas histologicamente distintas. Quais são essas camadas e quais suas características? (2,0 pontos)

Resposta esperada:

As três camadas histologicamente distintas são: a camada mais interna do dente, que é chamada de polpa, a qual consiste em conexões vasculares e nervosas e são as contrapartes sistêmicas que dão validade aos dentes; a dentina da coroa, a qual consiste na porção visível da cavidade bucal, que é coberta por esmalte, altamente mineralizada, e é a parte mais dura do corpo humano e por fim o cemento que é a substância a qual cobre a dentina radicular e em contraste à mesma é apenas 50% mineralizado.

3) **Considere o Parágrafo [5].** Quais fatores importantes a serem considerados acerca da relação entre histologia dos dentes e as cáries dentárias? (1,0 ponto)

Resposta esperada:

São dois fatores a serem considerados acerca da relação entre histologia dos dentes e as cáries dentárias. O primeiro fator diz respeito às camadas mais altamente mineralizadas dos dentes pois são mais resistentes à dissolução ácida. E o segundo fator refere-se a presença de odontoblastos vivos na polpa que fornecem potencial para o reparo de dentina danificada por ácido.

4) **Considere o Parágrafo [6].** Durante períodos prolongados de pH reduzido minerais, como fosfato e íons de hidroxila, são liberados dos dentes para o ambiente oral. Qual ou quais fator (es) podem ser indicados como responsáveis pela redução do pH? (1,0 ponto)

Resposta esperada:

Acredita-se que as bactérias acidogênicas sejam os principais agentes responsáveis pela redução do pH no ambiente bucal, o que, por sua vez, resulta na dissolução ou desmineralização dos dentes.

5) **Considere os Parágrafos [7], [8], [9], [10] e [11].** Escreva ao lado de cada sentença as palavras VERDADEIRA ou FALSA, apropriadamente. (1,0 ponto cada/5,0 total)

a) O primeiro sinal clínico da desmineralização é a mudança imperceptível na coloração da superfície esmaltada do dente.	*VERDADEIRA*
b) A redução da ingestão de açúcar a apenas 10% diminui a incidência de cáries.	*FALSA*
c) Quanto maior for o tempo de exposição dos dentes e das	*VERDADEIRA*

bactérias aos carboidratos, mais tempo as bactérias terão para criar subprodutos ácidos causando, dessa forma, a desmineralização dos dentes.	
d) A mudança de comportamento dos indivíduos quanto à dieta é significativa, o que resultou em mudança de paradigma com relação à gestão do tratamento das cáries.	*FALSA*
e) A partir do momento que um conteúdo mineral for perdido, a subestrutura da matriz do esmalte entra em colapso, causando a cavidade, assim sendo, o dente não é mais suscetível à remineralização.	*VERDADEIRA*