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| **Name:** |
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| **Group:** |
| 5B-2 |
| **Basic Science Question:** |
| What is the difference in microbial population between non-carious teeth and carious teeth? |
| **Report:** |
| The ecological shift of the plaque biofilm in response to oral environmental changes is responsible for the progression from non-carious to carious teeth. Dental caries is an infectious microbial disease that results in localized destruction of calcified tooth structure. (Philip, 2018) In the resident microbial flora of non-carious patients, the relationship between bacterial species and the host can be classified as symbiotic, with the teeth undergoing demineralization and remineralization at a consistent rate. While attempts have been made to sequence the oral microbiome and determine the genetic makeup in health by identifying identical bacterial sequences from unrelated healthy individuals, this varies greatly from person to person and requires further research. (Zaura, 2009)  Changes to the environment of the oral cavity which promote caries development can be caused by a variety of etiologic factors, including diets high in carbohydrates and sugars, salivary dysfunction, lack of fluoride or sufficient oral hygiene, and social and demographic factors. (Fejerskov, 1997) Caries are induced by endogenous bacteria which are normally a part of this resident microbiome, but have disrupted the homeostatic balance between the mineralized tooth and the plaque fluid which is surrounding the tooth surface. (Philip, 2018) The bacteria primarily associated with caries initiation is streptococcus mutans, which is highly aciduric and acts as an adherent to initiate the resulting carious lesions. The acidogenic characteristic of bacteria such as lactobacilli is also important in causing the ecological shift which leads to the progression of dental caries and subsequent host immune response. (Fejerskov, 1997) The highly acidic environment created by an increased number of bacteria can reduce the overall bacterial diversity within the microbiome. It is important to note that a variety of bacteria can promote acidification and lead to caries within a particular patient, and that an array of bacterial compositions can then be seen in each individual carious lesion. (Mira, 2017) However, the overall mechanism involving the creation of a dysbiotic state and the interruption of normal resident microbiota remains the same. |
| **References:** |
| Fejerskov, O. (1997), Concepts of dental caries and their consequences for understanding the disease. Community Dentistry and Oral Epidemiology, 25: 5-12. doi:[10.1111/j.1600-0528.1997.tb00894.x](https://0-doi-org.libus.csd.mu.edu/10.1111/j.1600-0528.1997.tb00894.x)  Mira, A,  Simon‐Soro, A,  Curtis, MA.  Role of microbial communities in the pathogenesis of periodontal diseases and caries. *J Clin Periodontol*  2017;  44 (Suppl. 18):  S23– S38. doi:[10.1111/jcpe.12671](https://0-doi-org.libus.csd.mu.edu/10.1111/jcpe.12671).  Philip, N., Suneja, B., & Walsh, L. (2018). Beyond Streptococcus mutans: clinical implications of the evolving dental caries aetiological paradigms and its associated microbiome.*British Dental Journal, 224*(4), 219-225. <http://dx.doi.org/10.1038/sj.bdj.2018.81>  Zaura E, Keijser BJ, Huse SM, Crielaard W. Defining the healthy "core microbiome" of oral microbial communities. BMC Microbiol. 2009 Dec 15;9:259. doi: 10.1186/1471-2180-9-259. PMID: 20003481; PMCID: PMC2805672. |