Critically Appraised Topic (CAT)

Project Team:	
1B-5	
Project Team Participants:	
D4: Nisha Soni, D3: Macy Lentz, D2: Christian May, D1: Matthew Johnson	
Clinical Question:	
How does smoking affect the overall oral health of a patient?	
PICO Format:	
P:	
Patient that smokes	
I:	
Periodontal disease	
C:	
Periodontal health	
O:	
Higher chance of developing oral cancer	
PICO Formatted Question:	
For a smoking patient, does having periodontal disease compared to periodontal health, increase the chance of developing oral cancer?	
Clinical Bottom Line:	
When smokers have periodontal disease, they are more likely to develop oral cancer when compared to smokers with periodontal health	
Date(s) of Search:	
9/20/2020	
Database(s) Used:	
PubMed	
Search Strategy/Keywords:	
Smoking, healthy, periodontal disease, bacteria	
MESH terms used:	
Cigarette smoking, chronic periodontitis, microbiology, healthy	
Article(s) Cited:	
Article 1: Grant, M., Kilsgård, O., Åkerman, S., Klinge, B., Demmer, R. T., Malmström, J., & Jönsson, D. (2019). The Human Salivary Antimicrobial Peptide Profile according to the Oral Microbiota in Health, Periodontitis and Smoking. *Journal of innate immunity*, *11*(5), 432–444. https://doi.org/10.1159/000494146	

Article 2:
Börnigen, D., Ren, B., Pickard, R., Li, J., Ozer, E., Hartmann, E. M., Xiao, W., Tickle, T., Rider, J., Gevers, D., Franzosa, E. A., Davey, M. E., Gillison, M. L., & Huttenhower, C. (2017). Alterations in oral bacterial communities are associated with risk factors for oral and oropharyngeal cancer. *Scientific reports*, *7*(1), 17686. https://doi.org/10.1038/s41598-017-17795-z
Study Design(s):
Article 1: Individual Cohort Study
Article 2: Individual Cohort Study
Reason for Article Selection:
Article 1: Applies to PICO question
Article 2: Relates to PICO question
Article(s) Synopsis:

Article 1:

Method:

- **Collected saliva of 451 people from ages 20-89 years old**
- **41 selected: 10 nonsmokers with periodontitis, 9 smokers with periodontitis, 11 nonsmokers with periodontal health, 11 smokers with periodontal health**
- **Salivary supernatant for peptides and pellet for bacteria**
- **Saliva was sampled and analyzed by checkerboard DNA-DNA hybridization**
- **Correlations were graphed and analyzed**

Results:

- **AMPs remained significant in nonsmokers after an age-adjusted ANCOVA**
- **No difference in abundance of specific AMPs in periodontally healthy smokers compared to nonsmokers**
- **Healthy smokers = higher quantities of cystatins, CGRP yellow complex (S. mutans and S. salivarius)**
- **Periodontitis smokers = S100 proteins (potentially from lysing neutrophils)**
- **Average degree: healthy nonsmoker 1.2, healthy smoker 2.3, periodontitis nonsmoker 3.4, periodontitis smoker 7.4)**

Limitations:

- **Small subject size (too expensive to test all 451 subjects)**
- **Gingivitis included since periodontal health was determined by pocket depth and bone loss**
- **Some criteria may have been too vague (i.e. how many packs did/does each person smoke and for how many years etc.)**

Article 2:

Method:

- **121 oral cancer cases matched with 242 controls**
- **Evaluated alcohol & tobacco use, periodontal disease/health, case-control status, and composition of oral microbiome**
- **DNA extraction**
- **16S rRNA gene sequencing, OTU**

Results:

- **Stronger shifts in microbiome in relation to tooth loss than other factors**
- **Structure and function of the oral microbiome changes in association with status of oral cancer**
- **Shift towards anaerobic microbes in oral cancer patients**
- **Patients with no remaining natural teeth have a large shift in oral microbiome**

Levels of Evidence: (For Therapy/Prevention, Etiology/Harm)

See http://www.cebm.net/index.aspx?o=1025

☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)

☐ **1b** – Individual RCT

☐ **2a** – Systematic Review of Cohort Studies

☒ **2b** – Individual Cohort Study

☐ **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research

☐ **4a** – Systematic Review of Case Control Studies

☐ **4b** – Individual Case Control Study

☐ **5** – Case Series, Case Reports

☐ **6** – Expert Opinion without explicit critical appraisal, Narrative Review

☐ **7** – Animal Research

☐ **8** – In Vitro Research

Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews

See article **J Evid Base Dent Pract 2007;147-150**

☒ **A** – Consistent, good quality patient oriented evidence

☐ **B** – Inconsistent or limited quality patient oriented evidence

☐ **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

Conclusion(s):

Article 1:

- RNase 7 is 19x's more abundant in periodontal health vs disease in nonsmokers
- RNase is inversely correlated with bacteria, but has not been studied with periodontal disease before

- Periodontitis smoker samples had the most connections
- Smoking impacts pathogenesis of periodontitis largely
- The microbes in the oral cavity are impacted by both periodontal and smoking status

Article 2:

- Some alterations in microbiome with oral cancer patients, tobacco smokers, and periodontitis patients
- Significant changes in the shift of the microbiome after complete tooth loss
- Tooth loss alone is a major risk factor for oral cancer
- Past smoking habits did not significantly effect the oral microbiome