PUBLIC HEALTH ROUNDS CASE

1B-5, 9/23/2019

ROUNDS TEAM

- **Group Leader: Dr. Smithy**

- **Specialty Leader: Dr. Bhagavatula**

- **Project Team Leader: Nisha Soni**

- **Project Team Participants:**

- **D1: Matthew Johnson**

- **D2: Christian May**

- **D3: Macy Lentz**

PATIENT:

- 38 y.o.
- Female
- Caucasian
- CC: "I have been having throbbing pain in my upper right."
- Clinic A

MEDICAL HISTORY

- Latex allergy

- History of cold sore flare-ups

- Medications: Depo-provera (birth control)

- Current smoker

DENTAL HISTORY

- Regular prophies, restorative fillings, root canal therapy
- Sensitivity to hot and cold
- Oral hygiene:
  - Brushes 2x/day
  - Floss 1x/week
  - Experiences bleeding
- Unhappy with
  - Chip on #12
  - Length difference between #8 and #9
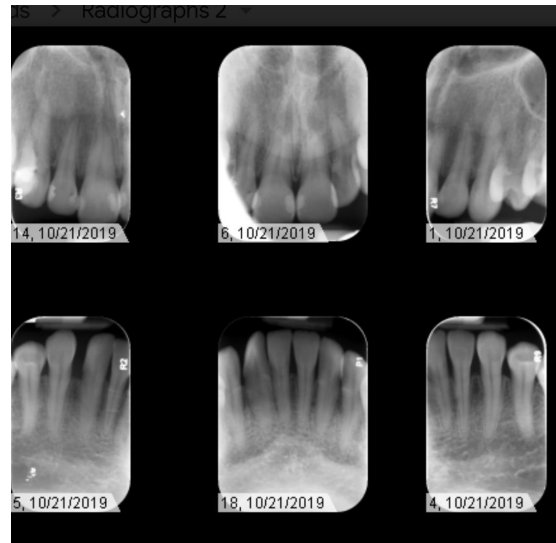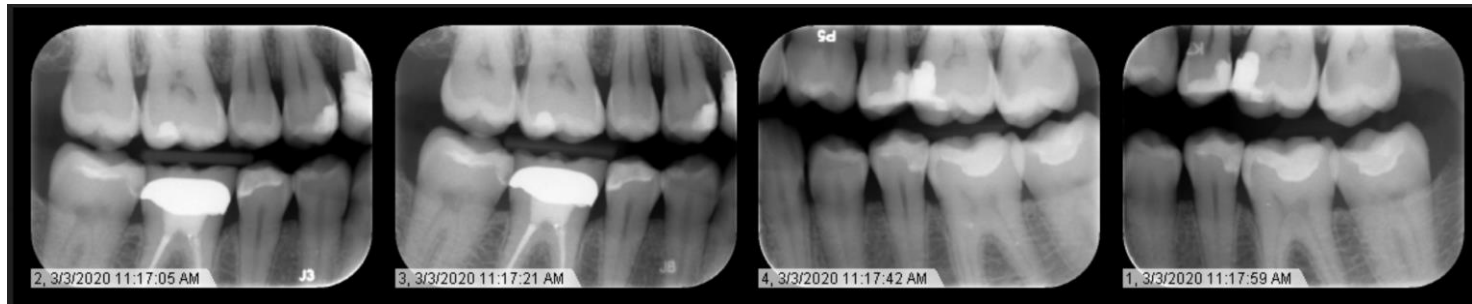 - Gap between #26 and #27

CLINICAL PHOTOS
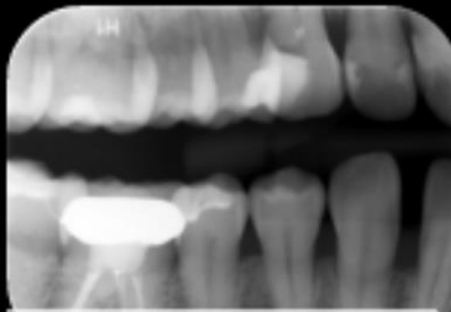
CLINICAL PHOTOS

RADIOGRAPHS

BITEWINGS
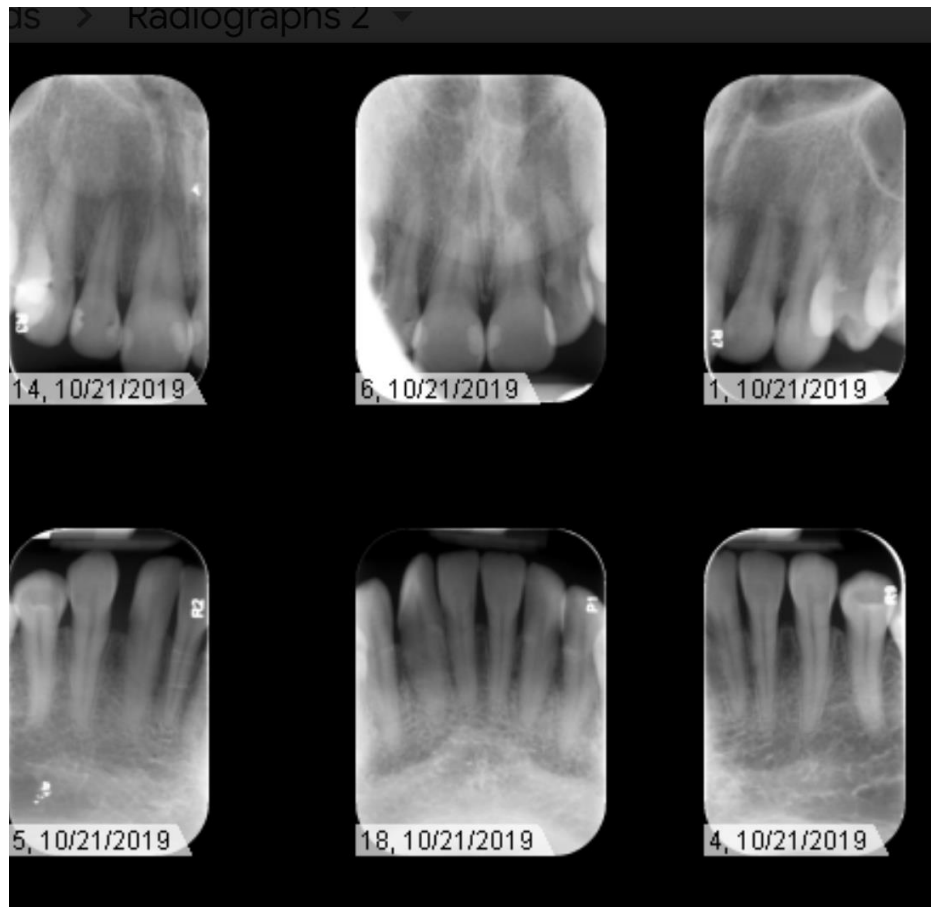
RIGHT SIDE

LEFT SIDE

15, 10/21/2019 2:49:44 PM
7, 10/21/2019 2:49:07 P
17, 10/21/2019 2:59:50 PM
9, 10/21/2019 2:59:22 P
2, 10/21/2019 2:50:55 PM
3, 10/21/2019 2:52:02 P

CLINICAL FINDINGS

SPECIFIC FINDINGS

- #2 O watch
- #3 O
- #5 MO
- # 6 pulpal necrosis -> RCT
- #7 DF, MFL, M and D watch
- #8 MF
- #9 MF, caries on DF
- #13 DO
- #14 MO
- #15 MO, caries on L

- #19 MO, caries on MB
- #20 O
- #21 DO, GF watch
- #29 DO
- #30 RCT, PFM
- #31 DO

PERIODONTAL CHARTING: MAXILLA

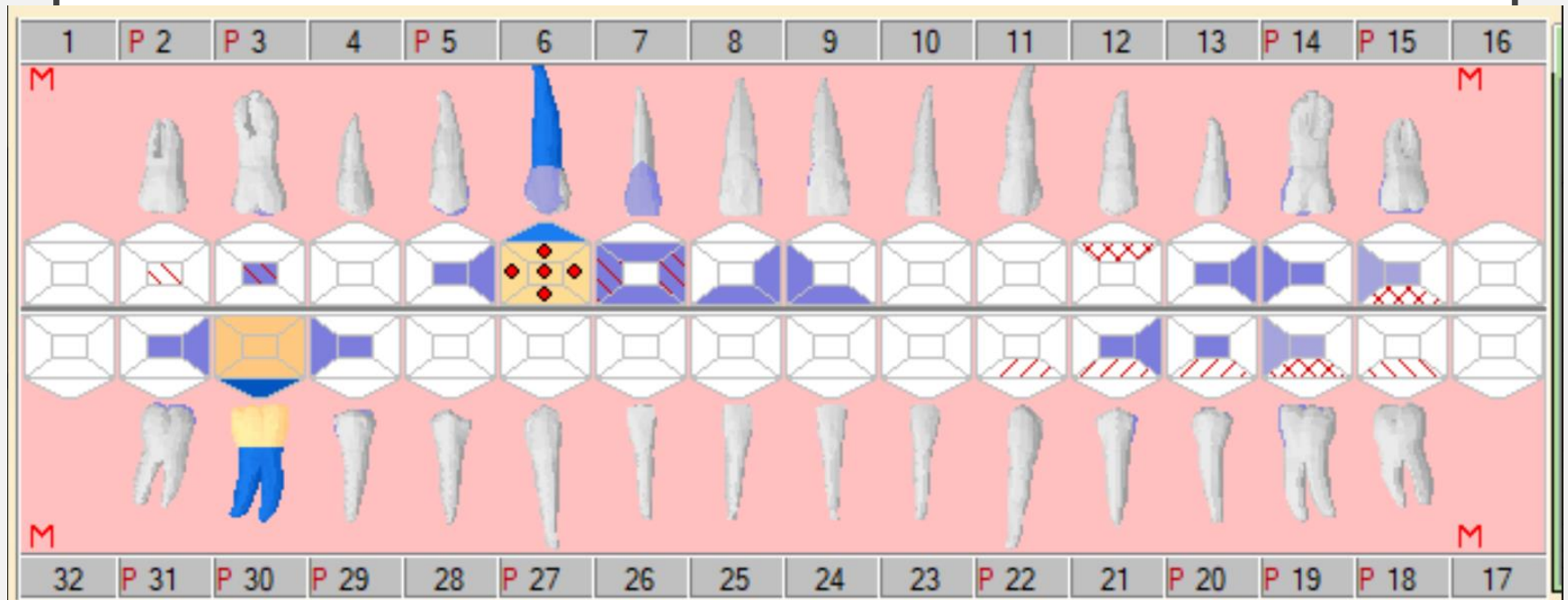|	Maxillary		1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16
FURCA																																																	
PLAQUE																																																	
BOP																																																	
MGJ																																																	
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P.D.			3 3 3		3 3 3		3 2 3		3 2 3		3 2 2		2 3 3		2 2 2		2 2 2		3 3 3		3 3 3		3 2 3		3 2 2		4 3 3		3 2 3	
FGM																																																	

Facial

Lingual

FGM																																																	
P.D.			6 2 4		4 2 3		2 2 3		4 2 2		3 2 2		3 2 2		2 2 2		3 2 3		3 2 3		3 2 2		3 3 3		3 2 3		3 3 3		3 3 4	
CAL			6 2 4		4 2 3		2 2 3		4 2 2		3 2 2		3 2 2		2 2 2		3 2 3		3 2 3		3 2 2		3 3 3		3 2 3		3 3 3		3 3 4	
MGJ																																																	
BOP																																																	
PLAQUE																																																	
FURCA																																																	

PERIODONTAL CHARTING: MANDIBLE

Mandibular		32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
FURCA																	
PLAQUE																	
BOP																	
MGJ																	
CAL		3 3 3	5 3 3	5 2 3	3 2 2	5 2 2	3 2 3	3 2 3	3 2 3	3 2 3	4 2 2	2 2 3	3 2 3	4 2 3	4 4 5		
P.D.		3 3 3	5 3 3	5 2 3	3 2 2	5 2 2	3 2 3	3 2 3	3 2 3	3 2 3	4 2 2	2 2 3	3 2 3	4 2 3	4 4 5		
FGM																	

Lingual

Facial

		32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
FGM																	
P.D.		4 2 3	3 2 2	2 2 3	2 2 3	2 2 3	2 2 2	2 1 3	2 2 2	3 2 1	2 1 3	2 2 3	3 2 4	4 3 4	3 3 3		
CAL		4 2 3	3 2 2	2 2 3	2 2 3	2 2 3	2 2 2	2 1 3	2 2 2	3 2 1	2 1 3	2 2 3	3 2 4	4 3 4	3 3 3		
MGJ																	
BOP																	
PLAQUE																	
FURCA																	

Template revision 09/01/2019

SMOKING HABITS

- Current cigarette smoker

- 5/day

- 20 years

- Recreational Marijuana use

- Contemplating quitting but not taking concrete steps as of now

15. Do you use or have you used tobacco (smoking, snuff, chew, bidis)? (Specify):	Y
Currently	Y
Did you (Student) provide educational material to patient related to smoking?	Y
Please specify type:	cigarettes
Please specify amount per day:	5
For how many years:	20

PROBLEM LIST

- Sensitivity and pain

- Caries

- Bleeding

- Aesthetics

HEALTHY HUMAN ORAL BACTERIA

- Many different groups and species present (Viridans streptococci, Fusobacterium, Neisseria)

- Important part of digestive health for humans

- Can affect the gut microbiome

(Bacterial Flora of the Human Oral Cavity, and the Upper and Lower Esophagus...: MARQCATplus Discovery Search, n.d.)

DECREASE IN DIVERSITY

- Smokers exhibited greater initial diversity but that decreased over time

- Niche saturation level was lower

- Non-smokers exhibited high levels of key genera of bacteria (*Streptococcus, Neisseria, and Veillonella*)

(Kumar et al., 2011)

PATHOGENIC BACTERIA

- Smokers' biofilms contained pathogenic bacteria within 24 hours

- *Haemophilus* and *Pseudomnas* persisted during observation period

- These bacteria could spread systemically

(Kumar et al., 2011)

VAPING EFFECTS

- Oral microbiomes compared between control and two test groups

- Compared levels of four organisms found in oral microbiome

- Findings show no statistical difference between non-smokers and E-cig users

- E-cigarette use may be less harmful to the oral microbiome than tobacco smoking

(Alzoubi et al., 2020)

LITERATURE CITED

- Alzoubi, H., Abu-Lubad, M., Al-Mnayyis, A., Satari, A., Alzobi, M., Al Ramadneh, M., & Jarajreh, D. (2020). Effect of Electronic Cigarettes on the Carriage of Selected Organisms in the Nasal and Oral Cavity in Comparison to Tobacco Smokers and Non-smokers. *Journal of Clinical & Diagnostic Research*, *14*(7), 11–15. https://doi.org/10.7860/JCDR/2020/45034.13852

- *Bacterial flora of the human oral cavity, and the upper and lower esophagus...: MARQCATplus Discovery Search*. (n.d.). Retrieved September 16, 2020, from https://0-eds-b-ebscohost-com.libus.csd.mu.edu/eds/pdfviewer/pdfviewer?vid=3&sid=25a36f46-a58d-423f-a658-40f7666968cc%40sdc-v-sessmgr02

- Kumar, P. S., Matthews, C. R., Joshi, V., Jager, M. de, & Aspiras, M. (2011). Tobacco Smoking Affects Bacterial Acquisition and Colonization in Oral Biofilms. *Infection and Immunity*, *79*(11), 4730. https://doi.org/10.1128/IAI.05371-11

- Saleh, G. M., Najim, S. S., & Hindal, A. S. (2016). *Comparative study of oral bacterial composition and neutrophil count between smokers and non-smokers*. *4*(1), 6.

D2 PATHOLOGY: SMOKING'S EFFECT ON THE PERIODONTIUM

COMPONENTS

Electronic Cigarettes	Traditional Cigarettes
Nicotine	Nicotine
Propylene Glycol	Tobacco Leaves
Glycerin/Glycerol	Hydrogen cyanide
Cancer Causing Chemicals	Formaldehyde
Aldehydes & Carbonyls	Arsenic
Heavy Metals	Etc
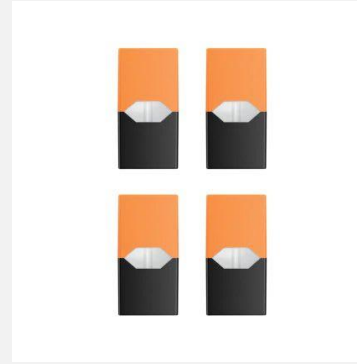
EFFECTS OF VAPING

- Oxidative Carbonyl Stress
  - Inflammation and DNA damage
  - Increase Stress and inflammatory cytokines in PDL
- Premature Senescence State in Gingival Epithelium
  - Arrested Cells
- Compromised Repair
  - Protein Carbonylation-Autoantibody production
- Greater response in flavored vapes
  - Increased Oxidants/ROS Reactivy

Sundar, I. K., Javed, F., Romanos, G. E., & Rahman, I. (2016). E-cigarettes and flavorings induce inflammatory and pro-senescence responses in oral epithelial cells and periodontal fibroblasts. *Oncotarget*, *7*(47), 77196.

CLINICAL

- Overall limited clinical evidence

- Relatively New

EFFECTS OF SMOKING TOBACCO

- Smoking-induced chronic hypoxia

- Response of microcirculation to plaque accumulation

- Fewer PMNs

- Cigarette Smoke: Significantly alters Cell Viability, Cell migration, Myofibroblastic differentiation in Gingival Mesenchymal Cells

- Nicotine: affects cells ability adhere to tooth structure

Chahal, G. S., Chhina, K., Chhabra, V., & Chahal, A. (2017). Smoking and its effect on periodontium–Revisited. *Indian Journal of Dental Sciences, 9*(1), 44.

EFFECTS OF SMOKING CONTINUED

- Higher Implant Failure
  - 0-17% compared to 2-7%
- Lower Clinical Attachment gain in Guide Tissue Regeneration Therapy
  - (5.2mm) compared to (2.1mm)
- Worse Scaling and Root planing outcomes
  - Higher percentages of residual pockets

- Sources: Chahal, G. S., Chhina, K., Chhabra, V., & Chahal, A. (2017). Smoking and its effect on periodontium–Revisited. *Indian Journal of Dental Sciences*, *9*(1), 44.

D3 PICO

- **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 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

SEARCH BACKGROUND

- **Date(s) of Search: 9/20/2020**

- **Database(s) Used: PubMed**

- **Search Strategy/Keywords: smoking, healthy, periodontal disease, bacteria**

SEARCH BACKGROUND

- **MESH terms used:**
    - **Cigarette smoking**
    - **Chronic periodontitis**
    - **Microbiology**
    - **Healthy**

ARTICLE 1 CITATION, INTRODUCTION

- 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

- Study Design: Individual Cohort Study

- Study Need / Purpose: Investigate the oral microbiome in smoking & nonsmoking patients with periodontal disease and periodontal health

ARTICLE 1 SYNOPSIS

- **Method**

  - Collected saliva of 451 people from 20-89 years old

  - 41 selected for study: 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

  - **Periodontally healthy smokers** = higher quantities of cystatins, CGRP yellow complex (*S. mutans and S. salivarius*)

  - Periodontitis smokers = S100 proteins (potentially from lysing neutrophils)

  - Average degree: periodontally healthy nonsmoker 1.2, periodontally healthy smoker 2.3, periodontitis nonsmoker 3.4, periodontitis smoker 7.4

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 1 SYNOPSIS

- **Conclusions**

  - RNase 7 is 19x's more abundant in periodontal health vs periodontal 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

- **Limitations**

  - Unwanted periodontal variations included (i.e. gingivitis)

  - Small subject size

  - Vague criteria regarding smoking (i.e. packs per day, number of years)

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 1 SELECTION

- **Reason for selection**
  - Applies to the PICO question

- **Applicability to your patient**

- **Implications**

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 CITATION, INTRODUCTION

- 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: Individual Cohort Study

- Study Need / Purpose: Assessment/comparison of oral bacteria in patients with and without oral cancer

ARTICLE 2 SYNOPSIS

- **Methods**

  - 121 oral cancer cases

  - Matched with 242 controls

  - Evaluated alcohol & tobacco use, periodontal disease/health, case-control status, and composition of oral microbiome

  - DNA extracted

  - 16S rRNA gene sequencing, OTU

- **Results**

  - Stronger shifts in microbiome in relation to tooth loss than other factors mentioned

  - 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

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

ARTICLE 2 SYNOPSIS

- **Conclusions**
  - 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 was a major risk factor for oral cancer
  - Past smoking habits did not significantly effect the oral microbiome
  - Spected

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

ARTICLE 2 SELECTION

- **Reason for selection**
  - Relates to PICO questions

- **Applicability to your patient**

- **Implications**
  - Radical treatment including resection is indicated for this patient especially considering the primary lesion has already recurred. Post-operative follow-up is important.

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

LEVELS OF EVIDENCE

☐ **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)

☐	**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

CONCLUSIONS

- D3: Inform the patient of the negative impact smoking cigarettes and e-cigs has on the oral cavity, including the increased risk of developing oral cancer.

- D4: Encourage patients that smoke to form a plan to quit smoking. Track their progress and screen for oral cancer regularly.

DISCUSSION QUESTIONS