Caries Management Course
Module: Caries 2020

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Module Objectives

• Review Current Understanding of Caries

• Relevance to Caries Management Principals

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Relevance

Childhood Caries
Multifactorial Disease
Low income minorities highly affected
52% among 6-8 year-olds
28% among 3-5 year-olds
Childhood Obesity
Nutrition Risk Factors
U.S. Population
15.3% among 6-11 year-olds
10.4% among 3-5 year-olds
Surgical Model of Treating Decay has high recurrence
Weight Reduction is difficult and has high relapse
Early Prevention Needed
Public Message of Tooth Decay

Bacteria + Sugar

Decay

SEM colored image by Yuping Li

Public Message of Tooth Decay

Bacteria + Acid

Decay

SEM colored image by Yuping Li

Public Message of Tooth Decay

Bacteria

Which?

SEM colored image by Yuping Li

Public Message of Tooth Decay

Bacteria

What?

SEM colored image by Yuping Li
Early Studies

Which?

Bacteria

Sugar Water Rinse Experiment
Stephan (1944)

pH Curve

Time

Recent Studies in Children’s Plaque

More Subtle Relationship between pH Drop and Caries Status

Caries Free

Caries Activity (slight)

Time

pH Curve

Sucre Rinses

Caries Free

Caries Activity (slight)

pH Curve

Time

Example based on Stephan (1944)

Take Home

- Clinical Implications:
  - Not a specific pathogen causing acid
  - Acid From:
    - Streptococcus Mutans
    - Streptococcus Oralis, mitis and S. Salivarius
    - Streptococcus Species
    - Actinomyces Species
    - Other species

• Reference 1
• Reference 2
• Reference 3
**Take Home**

- Clinical Implications:
  - Not a specific pathogen causing caries
    - ...But over half of the bacteria have not been individually isolated.
  - Hundreds of bacteria with thousands/millions of strains variations
  - We lack some comprehensive understanding of all acid generating bacteria

**Take Home**

- Clinical Implications:
  - Not a specific pathogen causing caries
  - Sucrose (Fermentable Carbohydrates) makes dental plaque in any individual cause pH drops
  - Frequency of exposure to sucrose is important

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**Not Just Frequency**

- Clinical Implications:
  - Diets with sugar exposures with other foods high in protein and lipids may counteract this pH decrease
  - Water (Drinking) and Food Clearance of Sucrose is not Addressed

**Complex Disease**

- Complex ‘Polymicrobial’ Disease
  - Healthy Patients have Acid Producing Bacteria
  - In some cases, there is a clear increase in the proportion of Acid Producing and Tolerating Bacteria but that is not always the case.
  - Ecology Shift Hypothesis (Key Reading!!!)
Complex Disease

- Complex ‘Polymicrobial’ Disease
- **Risk Factors**
  - Decrease pH and longer time of lower pH exposure
- **Protective Factors**
  - Keeping pH higher, shorter time of ‘low (bad)’ pH time, and increasing enamel resistance to acid

Thickness and Coverage

Interproximal Plaque pH was less severe after flossing*

*Firestone and Muhlemann, 1985 Clin Prev Dentistry
### Review

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<th>Ecological Plaque Shifts</th>
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### Vertical Transmission

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### Early Childhood Caries

**For Infants:**
- High Frequency Feeding
- Reduced Fluoride Exposure
- Immature Biofilms

*Early acquisition of Streptococcus mutans and sobrinus is a major risk factor for early childhood caries and future caries experience.*

**Vertical Transmission**

- Caretaker with Active Caries
- It is similar to the Ecological Plaque Hypothesis but instead of a shift the child ‘acquires’
- Can happen at pre-dentate stage
- ‘Window of infectivity’ (Under 3 years old)
Sharing Utensils

Vertical Transmission Prevention
Reduce Caretaker Cleaning Pacifier with Own Mouth or Sharing Utensils

Allergy Development
Sharing may reduce allergy and asthma

Conclusion

Non-Specific Plaque Causes Caries
A lot of Bacteria Cause Acid and Initial Caries
Generalized Model For Caries Initiation

Ecological Plaque Shifts
Over Time Specific Bacteria may become more dominate
Chronic Caries May not always occur
Specific Bacteria
Vertical Transmission Streptococcus mutans
Early Childhood Caries Risk Factor
But not the only Risk

Clinical Implications

Non-Specific Plaque Causes Caries
Caries can happen quickly since it is not necessary to have a specific bacteria.

Ecological Plaque Shifts
Environment plays a pivotal role
A History of Caries, a child is at risk of LOSING Bacteria diversity
Acid Tolerating/Generating Bacteria
Clinical Implications

Specific Bacteria

Vertical Transmission is a risk factor for Early Childhood Caries
Horizontal Transmission is less of a risk factor