Wonderful world of bugs and spit: The oral microbiome's role in health and disease

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Talk Outline

- What is the microbiome
- Oral microbiome and impacts on health
- Saliva microbiome – methods and concepts
What is the human microbiome?

"The microbes that live in and on us"
Oral microbiome in health and disease

Oral microbiome influence on health

- Oral health:
  - Healthy tooth
  - Tooth decay (Caries)
  - Cavity (Deep caries)

- Colonizing other sites (lung and gut)

- Systemic health effects
Oral microbiome influence on health

oral microbiome

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systemic health effects
Oral microbiome colonizing other sites

- Upper Throat
- Mouth
- Larynx
- Lung
- Stomach
- Bowel
Oral microbiome influence on health

oral microbiome

oral health
- Healthy tooth
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- Cavity (Deep caries)

colonizing other sites (lung and gut)

systemic health effects
Our bodies are connected by the immune system
Oral microbiome influences systemic health through inflammation

Modified from: Kumar. J Physio. 595(2). 465-476. 2017
Example of oral microbiome influence on lung infection

V Sampson et al. Brit Dent J 2020; 228:971-975
Oral microbiome in health and disease

Host

Interaction

Oral microbiome

Virome

Mycobiome

Bacteriome

Protozoome

Archaeome

Healthy Oralome (Eubiosis)

Unbalanced Oralome (Dysbiosis)

Current and Novel Techniques to Modulate Dysbiotic Oralome

Oral hygiene

Antimicrobial peptides

Prebiotics

Probiotics

Nanoparticles

Drug Delivery Systems

Extracellular Matrix Disruption

Host Response Modulators

Periodontitis/Caries & Sequelae
Endocarditis
Atherosclerosis
Alzheimer's Disease
Diabetes
Head and Neck Cancer

• What is the microbiome
• Oral microbiome and impacts on health
• Saliva microbiome – methods and concepts
How do we measure the microbiome?

Who's there?
Saliva microbiome – how collection method impacts microbiome measurement

n = 22

Saliva collection:
- With Preservative
- No Preservative

16S rRNA gene sequencing

Modified from: Armstrong et al. npj Biofilms and Microbiomes. 7, 2021
Number of "species equivalents" in the saliva microbiome

** p < 0.01
*** p < 0.001

Modified from: Armstrong et al. npj Biofilms and Microbiomes. 7. 2021
Comparing whole microbial communities

A

B

C
Comparing whole microbial communities

Modified from: Armstrong et al. npj Biofilms and Microbiomes. 7. 2021
Concluding thoughts

• The microbiome consists of more than just bacteria and exists where our bodies have "outside" exposure

• The oral microbiome impacts health beyond the mouth – colonizing other body sites, making products, and trigger the immune system

• The microbiome is studied through sequencing – "16S" sequencing targets a "fingerprint" gene to tell us who is there

• How we collect and view body sites can change how we view the microbiome there

• Bioinformatics is at the core of how we understand this work.
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