Putative Etiologic Factors for Severe ECC

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Executive Vice President & Chief Scientific Officer, C3 Jian Inc
It all starts with “Miller Time”
W.D. Miller and his "chemico-parasitic" theory
What is clear!

- Host & Teeth
- Microflora
- Diet & Time

No Caries

CARIES
What is clear!

Cariogenic bacteria → Carbohydrates (sucrose) → Glucans/Levans → Plaque formation

← Acids → Demineralization
What is clear!

100,000,000,000,000 bacteria/per mouth
Over 700 species have been identified
What are not clear

- About caries
  - Are all factors equally important?
  - Is there a dominant cariogenic bacterium?
  - How to treat caries as an ecology based disease?

- About severe ECC
  - The same etiologic factors at higher degree?
  - New etiologic factors?
Struggle in the dark w/o knowing the answers

Cariogenic Bacteria

Antimicrobials

Sugars

Xylitol etc

Tooth Decay

Fluoride
What is getting clear

Host & Teeth

Diet & Time

Cariogenic bacteria

Caries
What is getting clear

- Simple mechanical removal can not control oral microbial infections
- Board spectrum antimicrobials can not effectively control oral microbial infections
- Dental plaques are very resistant to antimicrobial treatments
Reforming dental plaque after extensive treatments
What is getting clear

*S. mutans* is the major cariogenic bacterium!

- Well-established data by other groups
  - The presence of *S. mutans* is correlated with disease
  - The absence of *S. mutans* is correlated with health

- New findings by us
  - In collaboration with JCVI and PNNL, we developed a novel confocal-NMR microscope, which led to the discovery that *S. mutans* contributes 60-80% acids within dental plaques
  - In collaboration with Colgate, we discovered that the targeted elimination of *S. mutans* will greatly reduce other cariogenic bacteria within dental plaque
**S. mutans**-specific monoclonal antibodies

<table>
<thead>
<tr>
<th>Species</th>
<th>Strain name</th>
<th>Cross-reactivity</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>SWLA1</td>
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<tr>
<td><em>Streptococcus mutans</em></td>
<td>ATCC25175</td>
<td>+</td>
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<tr>
<td></td>
<td>LM7</td>
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<td>OMZ175</td>
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<td><em>Streptococcus rattus</em></td>
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<td><em>Streptococcus gordonii</em></td>
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<td><em>Streptococcus mitis</em></td>
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<td><em>Streptococcus sobrinus</em></td>
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<td><em>Lactobacillus acidophilus</em></td>
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<td><em>Lactobacillus casei</em></td>
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<td><em>A. actinomyctemcomitans</em></td>
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<td><em>Porphyromonas gingivalis</em></td>
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<td><em>Prevotella intermedia</em></td>
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<td><em>Bacteroides forsythus</em></td>
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<td><em>Eikenella corrodens</em></td>
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<td><em>Fusobacterium nucleatum</em></td>
<td>ATCC25586</td>
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</tr>
</tbody>
</table>
Detecting *S. mutans* in dental plaque
MAb-based chairside test for *S. mutans*
MAb-based chairside test for *S. mutans*
Saliva diagnosis

Saliva with high S. mutans content

Saliva with low S. mutans content
Summary of salivary counts of *S. mutans* among children under dental insurance
Summary of percentage of *S. mutans* of total flora among children under dental insurance

![Graph showing the percentage of S. mutans of total flora](image-url)
DISTRIBUTION OF RESTORATIVE SERVICES

10% OF THE POPULATION RECEIVE 65% OF RESTORATIONS
See Dee’s report on the application of the technology