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### Progress Towards Phage Stability for Possible Oral Phage Therapy

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# Progress towards phage stability for possible oral phage therapy

Erin Russo  
Dr. Ruth Plymale

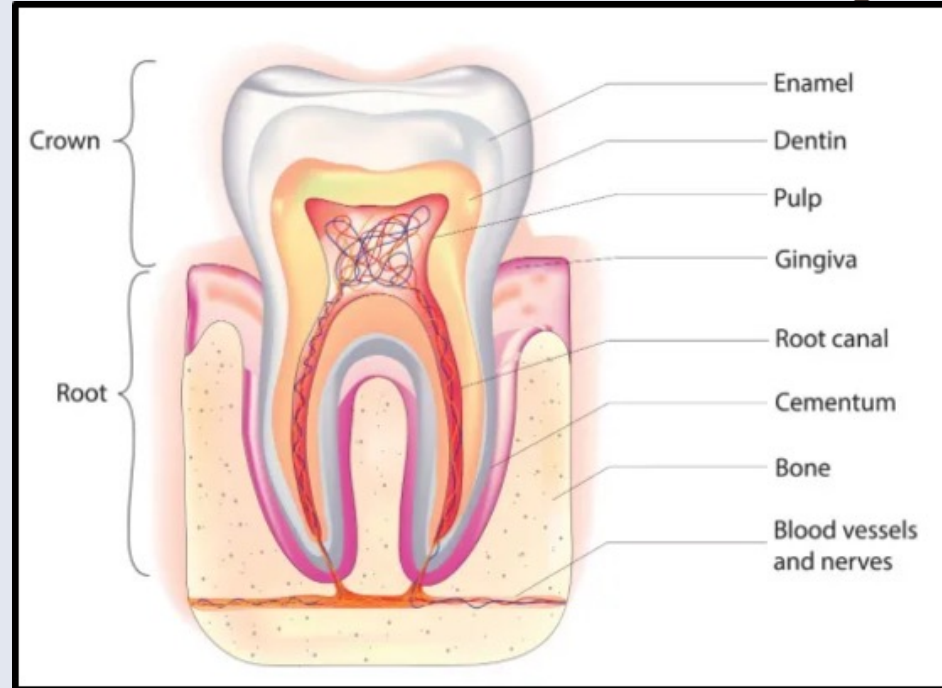


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# Background

# Cavities

- Deterioration of the tooth
- *Streptococcus Mutans*
- Treatment: filling or root canal



# Cavities



White Spot Lesion

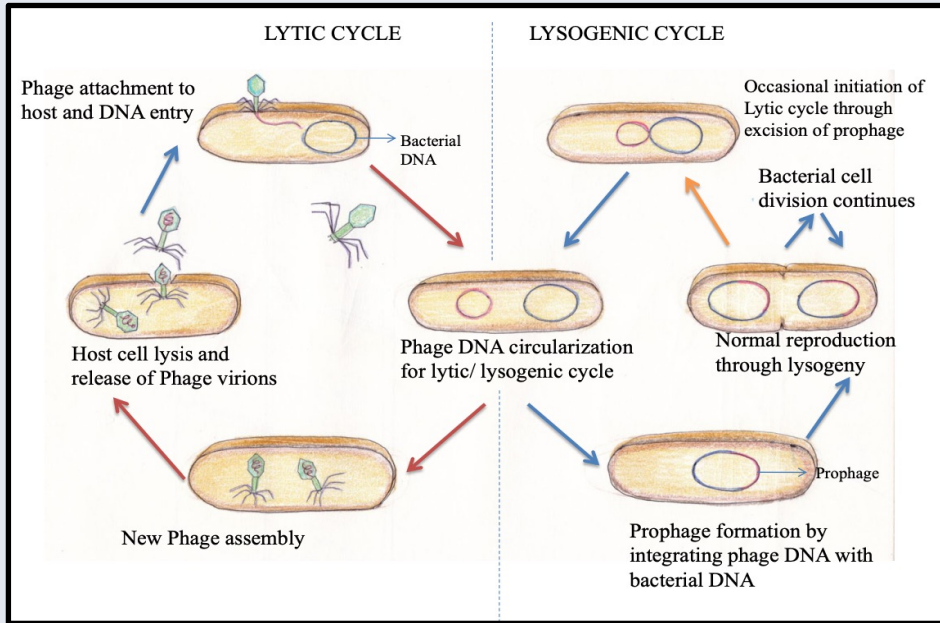


X-Ray of Cavity

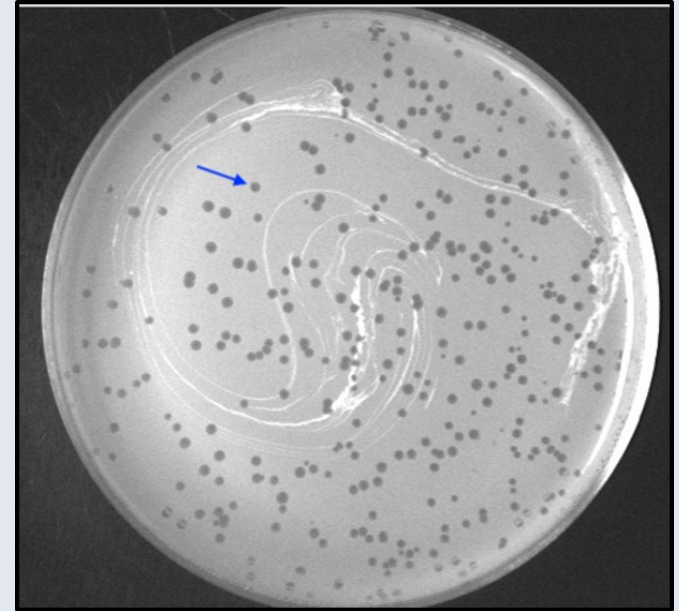
# Bacteriophages

- Viruses that attack bacteria
- Lytic life cycle
- Plaque

# Bacteriophages



Phage Life Cycles



Plaque

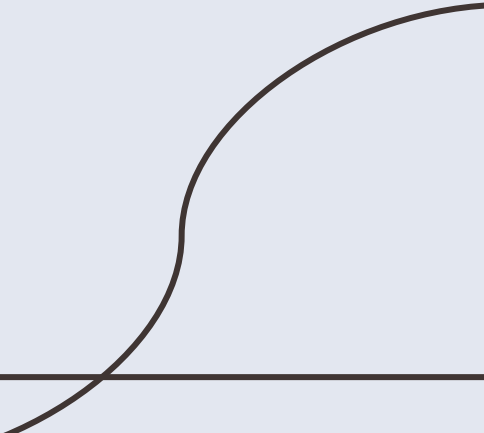


# Bacteriophages as Cavity Treatment



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# Materials & Methods

- Phages: Phrick and Stonehill
  - Bacteria: *Gordonia terrae* CAG3
  - Unwaxed Floss: POH brand
  - Stability Solutions:
    - Sucrose (Suc)
    - Glucose (Glu)
    - Brain-heart Infusion (BHI)
    - Phage Buffer (PB)
  - Experiments:
    - Storage temperature
    - Treatment solution concentration
    - Exposure time
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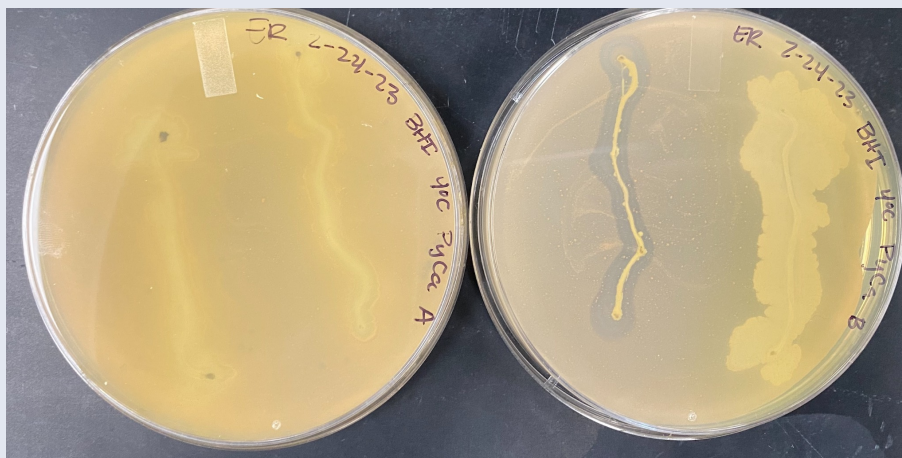
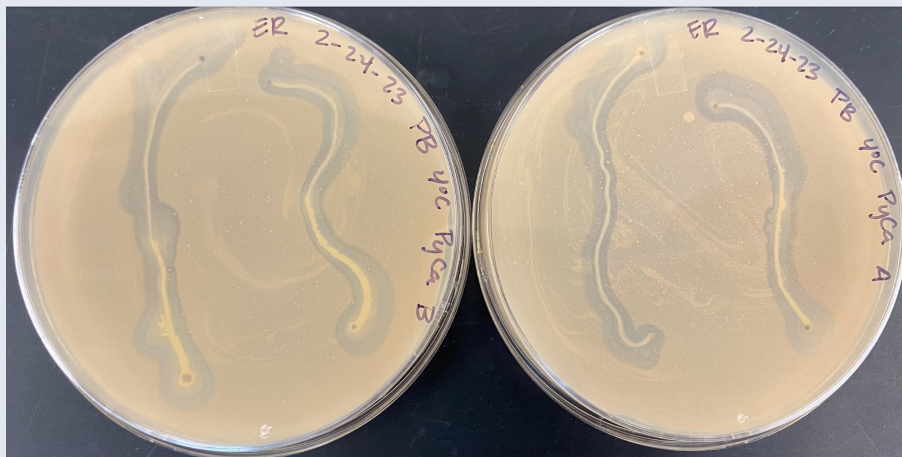
# Testing Different Storage Temperatures for Phage Stability

- Freezer (-20°C)
- Fridge (4°C)
- Lab bench (25°C)

With 2M concentration treatment solutions (Glu, Suc, BHI, PB)

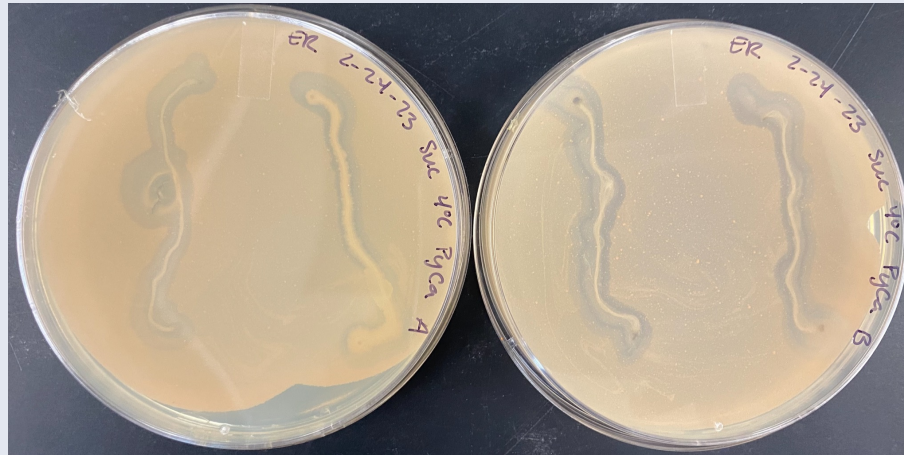
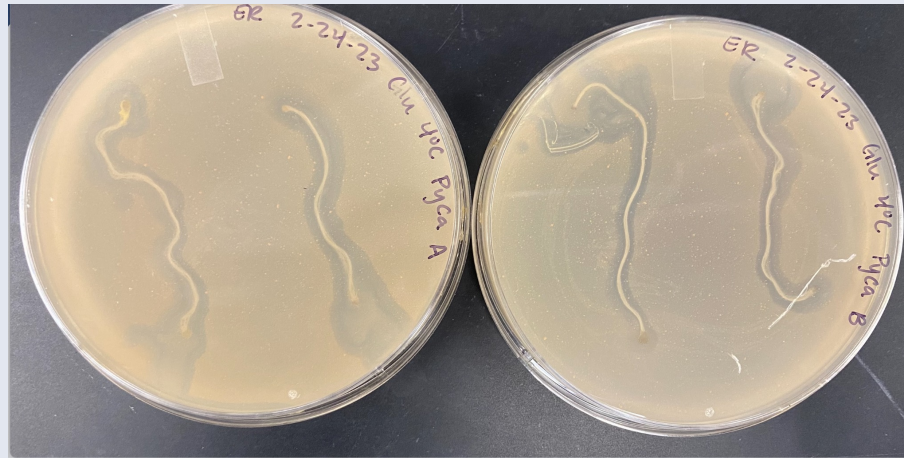
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4 °C PB



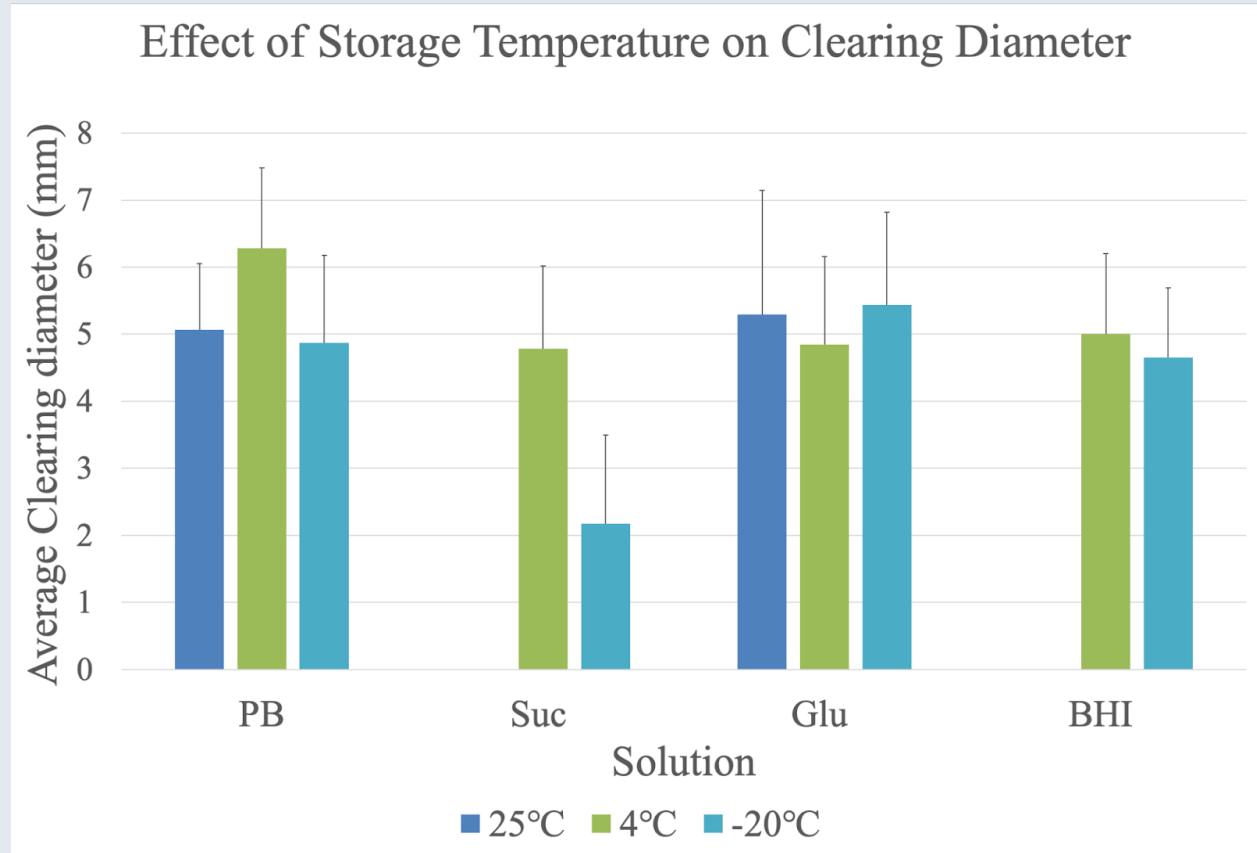
4 °C BHI

4 °C Glu



4 °C Suc

# Results



# ANOVA Test

Comparison	F-value	P-value
Temperatures	2.15	0.1346
Solutions	3.938	<b>0.0179</b>
Temperature + solution	1.739	0.1684

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# Testing Different Molar Concentrations of Treatment Solutions for Phage Stability

- 2.0M
- 1.0M
- 0.8M
- 0.5M
- 0.3M

With treatment solutions (Glu, Suc, BHI, PB) stored at 4 °C

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PB



0.8M BHI



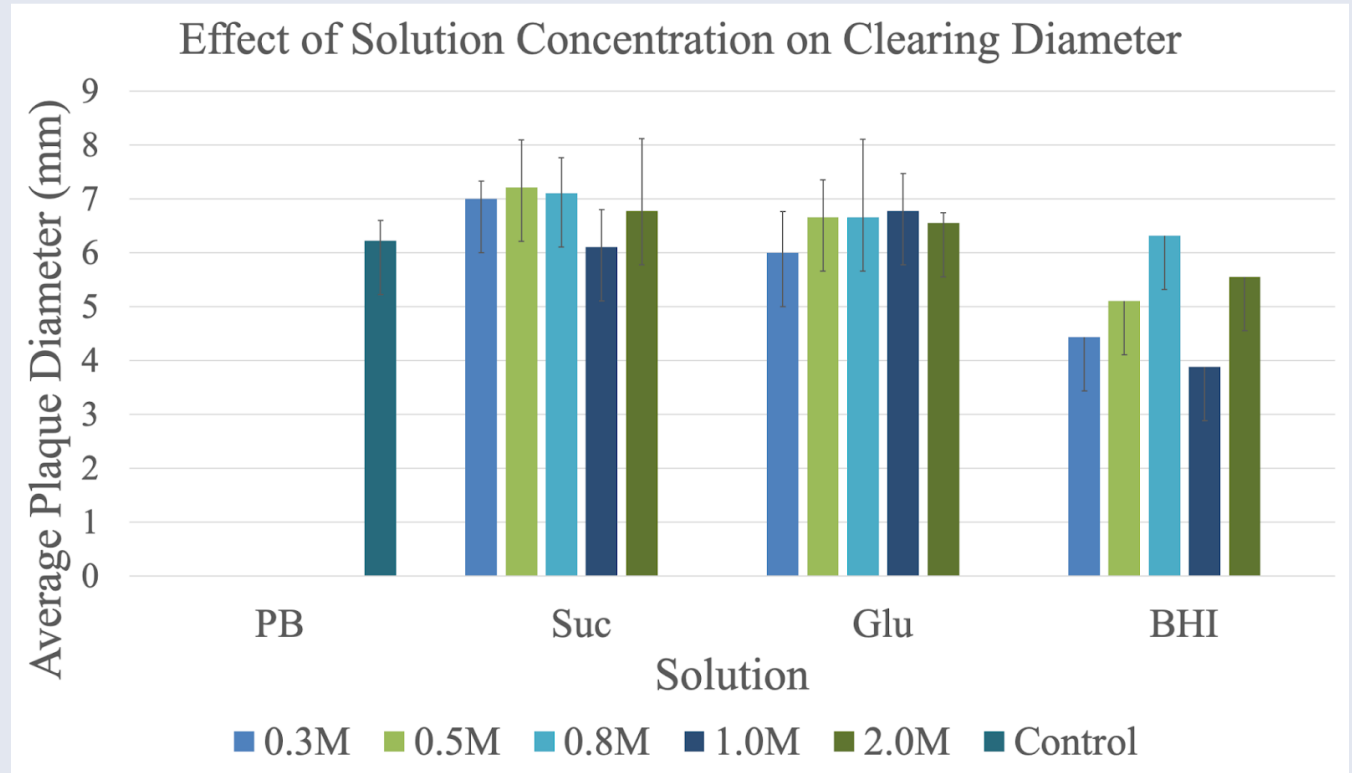
0.5M Suc



1.0M Glu



# Results



# ANOVA Test

Comparison	F-value	P-value
Concentrations	2.341	0.0776
Solutions	18.085	<b>7.03E-6</b>
Concentration + solution	1.207	0.3283

# Testing Different Exposure Times of Phage to *G. terrae* CAG3

- 30 minutes
- 15 minutes
- 10 minutes
- 5 minutes

With treatment solutions  
(stored at 4 °C):

- PB
- 0.8M BHI
- 1.0M Glu
- 0.5M Suc



PB



0.8M BHI

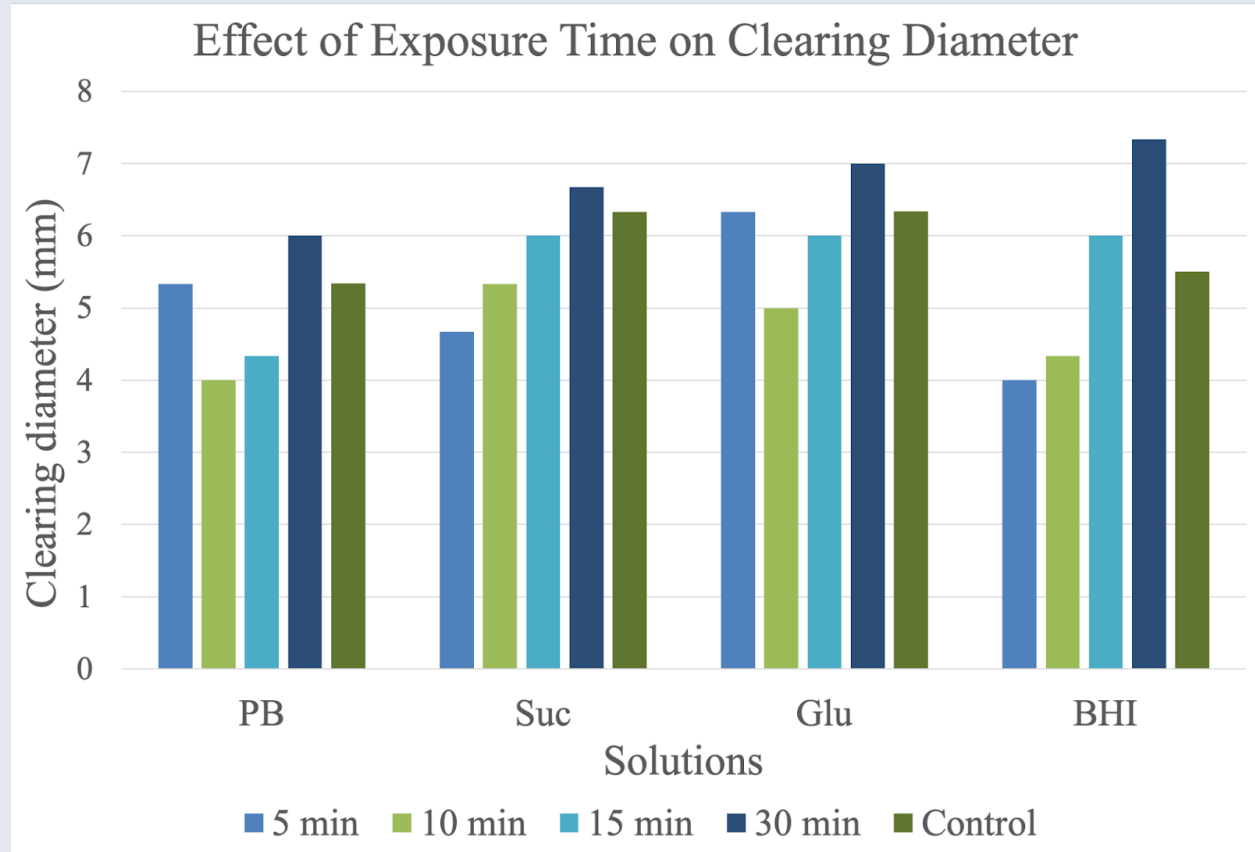


0.5M Suc



1.0M Glu

# Results



# ANOVA Test

Comparison	F-value	P-value
Exposure times	4.972	<b>0.0387</b>
Exposure times + solutions	1.304	0.307

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# Conclusions

- Bacteriophages can be integrated onto floss
  - Storage temperature: 4 °C
  - Treatment solution: 0.5M Suc
  - Exposure time: 30 minutes
-

**Questions?**