Bacteria may establish social networking and structurally organize in aggregates known as biofilms.

In the United States, 6.5 million patients are affected by chronic wounds. Of all the chronic wounds, about 60% are associated with biofilm infection.

In the biofilm form, bacteria are ensconced within an extracellular polymeric substance (EPS) and become recalcitrant to antimicrobials and host defenses, rendering them extremely challenging and costly to treat.

A number of research efforts have been concentrated on the problem of planktonic bacteria. Planktonic bacteria were shown to be increased through the application of weak electric fields – Wellman et al coined the term BIOELECTRIC FIELD.

Bioelectric dressing – Procellera™ - improves wound healing

Ag/Zn BED has potent bacteriostatic activity

Ag/Zn BED is more potent than silver alone

Ag/Zn BED effectively kills bacteria in an in-vitro biofilm model demonstrated by SEM

Eps 3D rendering

Live/Dead staining

Potential difference = 0.2V to 1V

Peak electric field = 2.7V/cm to 13.5V/cm

Bacterial biofilms and the bioelectric effect


Real-time PCR was used to measure the expression of QS genes in the biofilm normalized with nadB.

Ag/Zn BED down-regulates anti-biotic resistance genes

<table>
<thead>
<tr>
<th>Gene</th>
<th>placebo</th>
<th>Ag only</th>
<th>Ag/Zn BED</th>
<th>p-value</th>
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<tbody>
<tr>
<td>toxA</td>
<td>120</td>
<td>80</td>
<td>40</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>coxA</td>
<td>160</td>
<td>120</td>
<td>80</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>coIII</td>
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<td>40</td>
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<td>mexB</td>
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<tr>
<td>coIII*</td>
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<tr>
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<td>GPDH</td>
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<td>80</td>
<td>&lt;0.005</td>
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</tbody>
</table>

Ag/Zn BED shows that it can significantly down-regulate anti-biotic resistance genes.

Ag/Zn BED achieves this by targeting Quorum Sensing and antibiotic resistance.

Endotoxin and bacterial viability in the biofilm were measured using BacLight kit to observe biofilm viewed under 60x magnification.

Real-time PCR was used to measure the expression of QS genes in the biofilm.

The Ohio State University

SILVER-ZINC COUPLED BIOELECTRIC DRESSING DISRUPTS BACTERIAL BIOFILM BY TARGETING QUORUM SENSING AND ANTIBIOTIC RESISTANCE

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