VIRTUAL LUNCH MEETING

DISCOVER THE POWER OF SILVER DRESSINGS WITH **AG OXY Salts** — THE EVOLUTION IN MANAGING INFECTED WOUNDS

1 JULY 2021  HELEN THOMASON  LUNCHTIME
13:00 - 13:45
Discover the power of silver dressings with Ag Oxysalts™ Technology

Dr Helen Thomason will present:

• Why biofilms are difficult to treat

• The differences in silver technology

• How Ag Oxysalts™ Technology can create a favourable wound environment for healing.
Disclaimer

• Prior to the use of any 3M Therapy System, it is important for the provider to consult treating physician and read and understand all instructions for use, including safety information, dressing application instructions, and therapy device instructions.

• Specific indications, contraindications, warnings, precautions, and safety information exist for these products and therapies. Please consult a clinician and product instructions for use prior to application.

• This information is intended for healthcare professionals only. 3M recommends that clinicians participate in device in-service and training prior to use.

• Scientific research was conducted by 3M employees and consultants.

• Follow local institutional protocols for infection control and waste disposal procedures. Local protocols should be based on the applicable federal, state and/or local government environmental regulations.
Factors that impact healing

• Planktonic microorganisms: free-floating single cells

• A biofilm is a **community of microorganisms, irreversibly attached** to a surface and enclosed within an **extracellular matrix** composed of extracellular polymeric substances

• Bacteria within a biofilm are **sessile** and exhibit **increased tolerance** to host immune response and antimicrobial agents.
Complications associated with biofilms

1. Bacteria adhere to a surface
2. Secrete an extracellular polymeric substance (EPS)
3. Bacteria within a mature biofilm exhibit slow growth
4. Biofilm can quickly reform

Potent antimicrobials are required for effective anti-biofilm treatment.
For silver to gain antimicrobial efficacy it must lose electrons to become ionic silver.

Metallic silver (Ag\textsuperscript{0})  
Ionic silver: Ag\textsuperscript{1+}
Ionic silver ($\text{Ag}^{1+}$) kills bacteria by scavenging electrons from bacterial cells:

- Disrupts the cell wall
- Interferes with DNA replication
- Disrupts enzymes and proteins essential for survival.
• Proprietary silver technology: silver oxynitrate or Ag$_7$NO$_{11}$

• Ag Oxysalts™ Technology breakdown to produce Ag$^{1+}$, Ag$^{2+}$, Ag$^{3+}$. 

Ionic Silver: Ag$^{3+}$
• The higher valent states of silver have greater reduction potentials ($V$) and oxidising power.

\[
\begin{align*}
\text{Ag}^1+ & \quad \text{Ag}^2+ & \quad \text{Ag}^3+ \\
E^o &= 0.80 & E^o &= 1.98 & E^o &= 1.80
\end{align*}
\]
Ag Oxysalts™ Technology kills bacteria within a biofilm


All silver stock solutions were prepared at equal molar concentrations of Ag molecules

<table>
<thead>
<tr>
<th>Metal compound</th>
<th>E. coli</th>
<th>P. aeruginosa</th>
<th>S. aureus</th>
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<tbody>
<tr>
<td>AgO</td>
<td><img src="E.coli_AgO.png" alt="Graph" /></td>
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• Advanced silver wound contact layer composed of three layers:
  o Two non-adherent polyethylene mesh wound contact layers
  o One polyester core

• All three layers coated with Ag Oxysalts™ Technology

• Silver content = 40mg/100cm².
Mature *in vitro* biofilms treated for 4 hrs with wound dressings

**P. aeruginosa**

**S. aureus**

Effectiveness against multi-drug resistant biofilm

Mature multi-drug resistant biofilms treated with wound dressings for 24 hrs

K. pneumoniae (bla\textsubscript{NDM-1})

P. aeruginosa (bla\textsubscript{VIM-2})

Healing independent of infection

Fibroblasts

Control

Ag Oxysalts™ Technology

Keratinocytes

Control

Ag Oxysalts™ Technology

Healing independent of infection

Murine incisional wounds treated for 3 days with wound dressings

Control dressing

Kerracontact™ Ag dressing

Ag Oxysalts™ Technology produces oxygen

• All aspects of wound repair require adequate oxygen

• Systemic and topical oxygen therapies promote healing
  • Increase angiogenesis
  • Enhance inflammatory cell activity
  • Down-regulates pro-inflammatory cytokines
  • Up-regulates growth factors
  • Potentiates effects of antibiotics.

The role of hydrogen peroxide (H$_2$O$_2$) in wound healing

• Silver catalyses hydrogen peroxide breakdown to oxygen and water.

\[
2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2
\]

• Low concentrations promote healing but high concentrations inhibit healing.

• In chronic wounds excess levels create a hostile wound environment and cause tissue damage.

• Silver catalyses hydrogen peroxide breakdown to oxygen and water.

Rebalance the wound environment

Infected chronic wound

Ag Oxysalt™ Technology

Biofilm
Keratinocyte
Neutrophil
Macrophage
Fibroblast

Ag Oxysalt™ dressing

Bioburden
Neutrophils
Macrophage
Hydrogen Peroxide
Oxygen
Re-epithelialisation

H₂O₂
O₂
H₂O₂
H₂O₂
H₂O₂
H₂O₂
H₂O₂
H₂O₂
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