

A New Antimicrobial Dressing for Infected and Critically Colonised Chronic Wounds



Deborah Addison, Tracy Rennison, Sally Norris
J&J Wound Management, Gargrave, U.K.



SILVERCEL*

- Absorbent Antimicrobial Dressing Comprising
 - High G (guluronic acid) calcium alginate
 - Carboxymethylcellulose
 - Silver coated fibres **X-static**
- Unique dressing composition
 - Manages exudates in infected & critically colonised wounds
 - Silver combats wound microorganisms
 - Moist wound healing
 - Intact removal (high wet tensile strength)
 - Non-staining
 - Cuttable
- First therapeutic step in the management of all moderate to heavily exuding deep chronic wounds

Alginate

- Alginate is a hydrophilic high molecular weight polymeric acid that is derived from seaweed and is readily formed into fibres
- Alginate is composed of two monomer units, beta-D-mannuronic acid (M type) and alpha-L-guluronic acid (G type); alginates comprise a mixture of both types of units
- The polymer is associated with sodium or calcium ions, where the sodium alginate is soluble in water and the calcium insoluble due to the cross linked polymer chains
- Alginate fibres have unique properties that make them ideal for exudate management and moist wound healing

Combination of High G Alginate & CMC

- High G calcium alginate fibres, calcium-binding ability of the fibre is strong and the ion exchange between the fibre and wound exudates is slow
- High M calcium alginate fibres more absorbent as calcium-binding is lower – dispersible in fluid
- High G calcium alginate has lower absorbency but high wet tensile strength
- Carboxymethylcellulose (CMC) has been incorporated in to SILVERCEL* *Hydro-Alginate* giving the dressing higher absorbency similar to a high M alginate products but with the superior wet tensile strength associated with high G products

Absorbency

- Calcium alginate fibres exchange calcium ions with sodium ions from the wound exudates to create a calcium/sodium alginate fibre
- The sodium alginate fibre absorbs large quantities of water forming a firm gel in contact with the wound surface
- Removal can be facilitated by an excess of sodium ions, which can be provided from irrigating with sterile sodium chloride solution.

Absorbency Profile

- Figure 1 shows dressing absorbency per 100cm²
- Figure 2 shows absorbency per dressing as sold
- SILVERCEL* 11 x 11 cm (calcium alginate, cmc & silver coated fibres)
- Kaltostat 7.5 x 12 cm (calcium alginate)
- Aquacel 10 x 10 cm (cmc)
- Aquacel Ag 10 x 10 cm (cmc & silver compound)

Silver

- Acceptability
 - Proven broad spectrum antimicrobial for controlling bacteria, fungus (mould & yeast), algae, and viruses
 - Low toxicity profile
 - Low potential for resistance number of modes of action
- Low solubility of elemental silver
 - Silver ions, Ag⁺, are the active species
 - Allows for sustained and controlled release of the silver ion, Ag⁺, from reservoir of elemental silver – prolonged activity
 - Releases silver ions at bactericidal levels
 - No bolus dosing of silver
 - Significantly lowers risk of tissue sensitivity or systemic toxicity
 - Non-staining of tissue

Silver Release In Simulated Wound Fluid

- Samples placed in fresh wound fluid on each day
- Silver release determined by Atomic Absorption

Potent Antimicrobial

- Demonstrates rapid *in-vitro* antimicrobial efficacy
- Non-staining
- Broad spectrum - effective against wide range of microorganisms (>150 human clinical isolates tested) including:
 - Pseudomonas aeruginosa*
 - Escherichia coli*
 - Streptococcus pyogenes*
 - Staphylococcus aureus*
 - Staphylococcus epidermidis*
 - Klebsiella pneumoniae*
 - Candida albicans*
- Effective against resistant strains
- Efficacious when dry (no pre-wetting required)
- Efficacious when pre-wet with 0.9% saline

Human Clinical Isolates Tested

- SILVERCEL* shown to be effective against the following isolates
- Isolates in red denote those not included in Acticoat literature

Bacterial Aerobes			
Gram +ve Rods	Gram -ve Rods	Gram -ve Cocci	Gram +ve Cocci
<i>Bacillus</i> sp. (4)	<i>Acinetobacter</i> sp. (5)	<i>Propionibacterium</i> sp. (10)	<i>Methicillin</i> sp. (2)
<i>Corynebacterium</i> sp. (5)	<i>Aeromonas</i> sp. (3)	<i>Sarasinella</i> sp. (6)	<i>Staphylococcus</i> sp. (22)
<i>Propionibacterium</i> sp. (2)	<i>Burkholderia</i> sp. (5)	<i>Serratia</i> sp. (3)	(10 MRSA)
	<i>Citrobacter</i> sp. (5)	<i>Stenotrophomonas</i> sp. (2)	<i>Stenotrophomonas</i> sp. (16)
	<i>Comamonas</i> sp. (1)	<i>Morganella</i> sp. (1)	<i>Enterococcus</i> sp. (15)
	<i>Enterobacter</i> sp. (7)	<i>Proteus</i> sp. (4)	<i>Enterococcus</i> all VRE
	<i>Escherichia</i> sp. (6)	<i>Providencia</i> sp. (5)	
	<i>Klebsiella</i> sp. (2)		
Bacterial Anaerobes			
Gram +ve Rods	Gram -ve Rods	Gram -ve Cocci	Gram +ve Cocci
<i>Clostridium</i> sp. (2)	<i>Bacteroides</i> sp. (2)	<i>Veillonella</i> sp. (2)	<i>Peptostreptococcus</i> sp. (2)
<i>Eubacterium</i> sp. (1)	<i>Fusobacterium</i> sp. (1)		
	<i>Porphyromonas</i> sp. (1)		
	<i>Prevotella</i> sp. (2)		
Fungi			
Moulds		Yeasts	
<i>Aspergillus</i> sp. (2)		<i>Candida</i> sp. (3)	

Antibiotic Resistant Clinical Isolates

- Repeat Challenge Each Day - Average Zone of Inhibition

Log₁₀ Reduction

- Extended Log₁₀ Reduction Test
 - Tested at extreme: small piece of dressing challenged to > 10,000,000 microorganisms at time points up to 3 hours
 - Essentially no viable bacteria remain 5 log reduction
 - SILVERCEL achieves > 5 log reduction in this test for a number other microorganisms including *Candida albicans*

Wet Tensile Strength

- High Wet tensile strength
 - No value obtained (under condition of test) for Aquacel Ag as product disintegrated in wetting solution

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