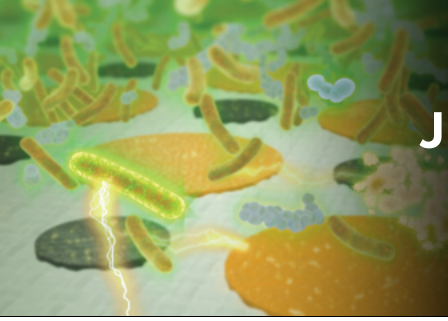

JumpStart® Antimicrobial Wound Dressing Scientific Update

JumpStart antimicrobial wound dressing is an advanced microcurrent-generating dressing used for the management of wounds and surgical incision sites. Microcell batteries made of elemental silver and zinc generate an electrical current when activated by a conductive fluid, such as saline, hydrogel, or wound exudate. These microcell batteries create microcurrents to support the body's natural electrical healing process and provide antimicrobial protection to assist with wound healing. JumpStart antimicrobial wound dressing has demonstrated broad spectrum bactericidal activity against antibiotic-resistant strains of wound isolates within 24 hours.[1]

Antibacterial Properties

Kim H, Park S, Housler G, Marcel V, Cross S, Izadjoo M

An overview of the efficacy of a next generation electroceutical wound care device. *Mil Med.* 2016;181(5 Suppl):184-190. doi:10.7205/MILMED-D-15-00157

- Previous literature has shown that wound healing is "enhanced in the presence of an external electrical field."
- JumpStart dressing is capable of generating a direct current voltage from 0.5 V - 0.9 V.
- JumpStart dressing demonstrated antibacterial efficacy against 28 various antibiotic-sensitive, Gram-positive, and Gram-negative bacteria, including Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, and Staphylococcus aureus.
- Significant reduction in mono- and polymicrobial biofilm species.

Takeaway

The unique technology of JumpStart dressing facilitates antibacterial efficacy and biofilm disruption to enhance wound healing capabilities.

Kim H, Makin I, Skiba J, Ho A, Housler G, Stojadinovic A, Izadjoo M

Antibacterial efficacy testing of a bioelectric wound dressing against clinical wound pathogens. *Open Microbiol J.* 2014;8:15-21. doi:10.2174/1874285801408010015

- Examined in vitro antibacterial efficacy of bioelectric dressing against 13 wound pathogens.
- The bioelectric dressing demonstrated bactericidal activity against antibiotic-sensitive, multidrug-resistant strains and multiple–antibiotic-resistant strains of wound pathogens, and bacteriostatic activity against Enterococcus species.
- The large-scale use of silver dressings has been "associated with an antimicrobial resistance to silver."

Takeaway

In vitro, the advanced microbattery technology of JumpStart dressing provides protection against a broad spectrum of bacteria.

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Anti-biofilm Properties

Kim H,
Izadjoo MJ

Antibiofilm efficacy evaluation of a bioelectric dressing in mono- and multi-species biofilms. *PLoS One.* 2015;24(Suppl 2):S10-14. doi:10.12968/jowc.2015.24.Sup2.S10.

- Evaluated antibiofilm properties of JumpStart® antimicrobial wound dressing against 10 clinical wound pathogens in monospecies (biofilm formed from a single bacterial strain) and multispecies (biofilm formed of more than one bacterial strain) settings.
- The bioelectric dressing was effective against mono- and multispecies biofilm-forming bacteria, demonstrating 100- to 1000-fold reductions in bacterial numbers compared to 3 different controls.

Takeaway

JumpStart dressing demonstrates significant disruption of mono- and multispecies biofilms.

Barki KG,
Das A,
Dixith S,
Ghatak PD,
Mathew-Steiner S,
Schwab E,
Khanna S,
Wozniak DJ,
Roy S,
Sen CK

Electric field based dressing disrupts mixed-species bacterial biofilm infection and restores functional wound healing. *Ann Surg.* 2019;269(4):756-766. doi:10.1097/SLA.0000000000002504

- Tested ability of wireless electroceutical devices (WED) to manage bacterial biofilm infection in vivo in a porcine chronic wound biofilm infection model inoculated with Pseudomonas aeruginosa and Acinetobacter baumannii.
- WED disrupted existing biofilm infection and prevented biofilm from forming.
- WED repressed genes responsible for quorum sensing, disrupting bacteria's ability to communicate and form biofilm.

Takeaway

Bioelectric dressings are an effective method for disrupting and preventing biofilm formation.

Banerjee J,
Das Ghatak P,
Roy S,
Khanna S,
Hemann C,
Deng B,
Das A,
Zweier JL,
Wozniak D,
Sen CK

Silver-zinc redox-coupled electroceutical wound dressing disrupts bacterial biofilm. *J Wound Care.* 2015;10(3):e0119531. doi:10.1371/journal.pone.0119531

- A bacterial biofilm model was used to test a bioelectric wound dressing's ability to inhibit Pseudomonas aeruginosa biofilm over a 24- hour period.
- The bioelectric wound dressing impaired biofilm structural integrity, markedly disrupting bacterial biofilm structures and causing significant cell death in comparison to controls.
- Silver alone was unable to disrupt the biofilm.

Takeaway

The use of bioelectric dressing can be advantageous for wound closure, improving re-epithelization and disrupting biofilm formation.

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Re-epithelialization

Banerjee J, Das Ghatak P, Roy S, Khanna S, Sequin EK, Bellman K, Dickinson BC, Suri P, Subramaniam VV, Chang CJ, Sen CK

Improvement of human keratinocyte migration by a redox active bioelectric dressing. *PLoS One.* 2014;9(3):e89239. doi:10.1371/journal.pone.0089239

- JumpStart® wound dressing significantly accelerated keratinocyte cell migration. This effect was not observed with placebo, silver alone, or zinc alone.
- JumpStart wound dressing increased signaling and production of H_2O_2, triggering cell signaling pathways to influence intracellular activity and accelerate cell migration.
- JumpStart wound dressing energized mitochondria in keratinocytes with a greater than twofold enhancement of basal glucose uptake after treatment compared to placebo.

Takeaway

The technology of JumpStart dressing proved effective in increasing keratinocyte migration to promote re-epithelialization.

Blount AL, Foster S, Rapp DA, Wilcox R

The use of bioelectric dressings in skin graft harvest sites: a prospective case series. *J Burn Care Res.* 2012;33(3):354-357. doi:10.1097/BCR.0b013e31823356e4

- "At week 1 postprocedure, average epithelialization of 71.8% was noted on the bioelectric dressing-treated side, compared with 46.9% on the SOD side, representing an average 34.62% faster wound healing (P=.015)."
- Patients rated bioelectric dressing superior in terms of scar color, stiffness, thickness, and overall quality.

Takeaway

Patients treated with the bioelectric dressing healed faster and had improved appearance, in addition to reporting subjective satisfaction.

Acute and Chronic Wounds

Whitcomb E, Monroe N, Hope-Higman J, Campbell P

Demonstration of a microcurrent-generating wound care device for wound healing within a rehabilitation center patient population. *J Am Coll Clin Wound Spec*. 2013;4(2):32-39. doi:10.1016/j.jccw.2013.07.001

- Retrospective, dual-center review of wound healing outcomes found that microcurrent-generating dressing reduced healing times for postoperative wounds by 34% and open wounds by 45%.
- The average time from initial measurement to wound closure for microcurrent-generating dressing patients was 19.78 days (SD=14.45), compared to 36.25 days (SD=28.89) for the standard of care patients.
- The mean percent wound volume per day for the microcurrent-generating dressing patients was -9.82% versus -3.83 for standard of care patients.

Takeaway

JumpStart dressing can help promote decreased postoperative wound-healing time.

Arthrex®

Ofstead CL, Buro BL, Hopkins KM, Eiland JE

The impact of continuous electrical microcurrent on acute and hard-to-heal wounds: a systematic review. *J Wound Care*. 2020;29(Sup7):S6-S15. doi:10.12968/jowc.2020.29.Sup7.S6

- Systematic review of 13 studies published between 2009 and 2019 where wounds were treated with an electroceutical device (ECD). Nine studies included dressings embedded with zinc and silver particles to generate electricity.
- In vitro laboratory studies found that the "electrical current of ECDs can kill bacteria, disrupt biofilm, and encourage re-epithelialization and healing."
- ECDs demonstrated exceptional results to standard of care wound therapies for hard-to-heal wounds and patients who had unsuccessful treatments showed remarkable improvements.
- Studies evaluating acute wounds noted that ECDs demonstrated a reduction in treatment cost and resource use, which is largely a result of the associated increased healing rate, shorter length of stay, lower number of dressing changes, and reduced staff required to manage wound care.

Takeaway

JumpStart® dressing is a cost-effective product that disrupts biofilm, kills bacteria, and encourages healing.

Cost-Effectiveness

Chow J

Wireless microcurrent-generating antimicrobial wound dressing in primary total knee arthroplasty: a single-center experience. *Orthop Rev (Pavia)*. 2016;8(2):6296. doi:10.4081/or.2016.6296

- Single-institution chart review of 92 patients who underwent total knee arthroplasty, from the same surgeon, and were treated with a microcurrent-generating antimicrobial dressing.
- Found no major complications, prosthetic joint infections (PJI), or major infectious complications.
- Microcurrent dressing use led to a reduced need for dressing changes and nursing time, lightening the burden on clinical personnel.
- Postoperative treatment with microcurrent dressing is approximately $50, which is significantly less than the cost to treat one PJI that may be between $50,000 and $100,000.

Takeaway

JumpStart antibacterial dressing is a low-cost investment in infection prevention that may decrease length of pateint stay and treatment burden on facility personnel.

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Ghatak PD, Schlanger R, Ganesh K, Lambert L, Gordillo GM, Martinsek P, Roy S

A wireless electroceutical dressing lowers cost of negative pressure wound therapy. *Adv Wound Care (New Rochelle)*. 2015;4(5):302-311. doi:10.1089/wound.2014.0615

- Thirty chronic wound patients undergoing negative-pressure wound therapy (NPWT) were randomized into two arms (control = NPWT standard of care with thrice-weekly dressing changes; test = wireless electrical device [WED] + NPWT with twice-weekly dressing changes)
- WED + NPWT effectively decreased required dressing change frequency from thrice to twice weekly without any negative impacts on wound healing
- Cost of care with WED + NPWT was significantly lower than NPWT alone ($P < .05$)

Takeaway

Using JumpStart® dressing in conjunction with a NPWT device, has demonstrated fewer dressing changes and decreased cost of care for wound care patients.

Preoperative Use of JumpStart Dressing

Miller BS, Olszewski AM, Bedi A

A microcurrent dressing reduces *Cutibacterium Acnes* colonization in patients undergoing shoulder arthroplasty or arthroscopy: a prospective case series. *HSS J*. 2023;19(1):92-96. doi:10.1177/15563316221100989

- Study included 20 patients scheduled to undergo elective shoulder arthroplasty or arthroscopic shoulder surgery. JumpStart® dressing was placed over the area of the planned surgical incision. Cultures and biopsies were obtained at time of surgery.
- Culture results showed significantly reduced C. acnes skin burden at the time of surgery compared to baseline measurements (p=0.004).
- JumpStart dressing is a safe and simple preoperative intervention that may aid in reducing perioperative infections.

Takeaway

JumpStart dressing demonstrated efficacy in reducing the *C. acnes* burden preoperatively.

Cooke CL, Greene RS, van Eck CF, Uquilas C, Limpisvasti O

Bioelectric silver-zinc dressing equally effective to chlorhexidine in reducing skin bacterial load in healthy volunteers. *Arthroscopy*. 2018;34(10):2886-2891. doi:10.1016/j.arthro.2018.05.046

- Three groups of 48 patients were treated with either 2% chlorhexidine, 4% chlorhexidine, or JumpStart dressing prior to knee surgery.
- Skin cultures taken 24 hours after application that all three were effective in decreasing epidermal bacterial load compared to the control contralateral limb.

Takeaway

The use of JumpStart dressing after knee surgery can match the standard of care preparation methods, and could be advantageous in special clinical scenarios such as postoperative bleeding that causes a dilution of a chemical antiseptic.

Reference

1. Cooke CL, Greene RS, van Eck CF, Uquilas C, Limpisvasti O. Bioelectric silver-zinc dressing equally effective to chlorhexidine in reducing skin bacterial load in healthy volunteers. *Arthroscopy*. 2018;34(10):2886-2891. doi:10.1016/j.arthro.2018.05.046

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