

QUICK FACTS

Biofilm

A Major Cause of Delayed Wound Healing



What Is Biofilm?

Biofilm is an aggregate of bacteria that is encased in extracellular polymeric substance, or EPS. Biofilm is tolerant to attack by most immune cells and antibiotics.¹

How Does it Form?

Bacteria communicate through electrochemical signaling called quorum sensing. When messaging between bacteria grows strong enough, they begin to behave as a coordinated aggregate. They signal each other to secrete EPS, which creates a biofilm shield around the bacteria.¹

Biofilm Disrupts Normal Wound Healing

- › Resists attack by immune system and antimicrobial agents, including silver¹⁻⁷
- › Confers antibiotic resistance¹⁻⁷
- › Locks the wound bed in a chronic inflammatory state^{1,5}
- › Cannot be visually detected, making debridement difficult¹
- › Even after aggressive debridement, biofilm can reform in as little as 24 hours⁵

~78%

of wounds are infected with bacterial biofilm²

1.7 million

US hospital-acquired infections per year involve biofilm, contributing to **>500,000** deaths per year³

\$94 billion per year

estimated cost in US for biofilm infections³

Bacteria in biofilms can become up to

1000 times more resistant to antibiotics

than their planktonic counterparts⁴



Electricity Works Against Biofilm

- › JumpStart® dressings are proven to kill biofilm both in vitro⁶ and in vivo⁷
- › Disrupts quorum sensing
- › Prevents biofilm formation
- › Disrupts existing biofilm infection
- › Restores functional wound closure

References

1. Bjarnsholt T, Eberlein T, Malone M, Schultz G. Management of wound biofilm made easy. *Wounds Int.* 2017; 8(2); 1-26. 2. Malone M, Bjarnsholt T, McBain AJ, et al. The prevalence of biofilms in chronic wounds: a systematic review and meta-analysis of published data. *J Wound Care.* 2017;26(1):20-25. 3. Römmling U, Kjelleberg S, Normark S, Nyman L, Uhlin BE, Åkerlund B. Microbial biofilm formation: a need to act. *J Intern Med.* 2014;276(2):98-110. 4. Hall CW, Mah TF. Molecular mechanisms of biofilm-based antibiotic resistance and tolerance in pathogenic bacteria. *FEMS Microbiol Rev.* 2017;41(3):276-301. 5. Cole W. Treating biofilm and bioburden. *Podiatry Management.* 2019:112-118. 6. Banerjee J, Das Ghatak P, Roy S, et al. Silver-zinc redox-coupled electroceutical wound dressing disrupts bacterial biofilm. *PLoS One.* 2015;10(3):e0119531. 7. Barki KG, Das A, Dixith S, et al. Electric Field Based Dressing Disrupts Mixed-Species Bacterial Biofilm Infection and Restores Functional Wound Healing. *Ann Surg.* 2019;269(4):756-766.