

Wound Infection and Biofilm: A Hurdle for Healing

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Wound Infection

More than 6.5 million people are suffering from non- or slow-healing wounds, 90% of which will develop biofilm. All open wounds are contaminated with micro-organisms, which activate the host immune response. Wound infection occurs when micro-organisms move deeper into the wound tissue and proliferate, leading to a local or systemic immune response. The host's immune system and the species of micro-organisms (quantity and virulence) will influence the development of wound infection.¹

Signs of infection are also signs of biofilm. As biofilms are not visible to the naked eye, signs of infection such as delayed wound healing, increased exudate and slough, increased inflammatory response, erythema, malodour and high bacterial load should be closely monitored.

Silver in Wound Care

Silver has been used as an antimicrobial for many years. It has a broad antimicrobial efficacy and is widely used in antimicrobial wound dressings. Furthermore, silver has efficacy against biofilms (shown *in vitro*),³ and there is abundant clinical evidence supporting the use of silver in wound care.³⁻⁵

Silver works by targeting multiple sites in bacteria. Silver ions bind to the bacterial cell wall, blocking transport of substances in and out of the cell. They are also transported into the bacterial cell, where they block the respiratory system to destroy energy

production. Finally, silver ions interact with DNA and inhibit bacterial cell division, stopping replication. Through these mechanisms, the cell membrane bursts, and the bacterium is destroyed.⁶ Due to the multiple targets, antimicrobial resistance to silver is rare.

In Vitro and Clinical Evidence for Biatain® Silicone Ag and Biatain® Ag

Not all silver dressings are the same; they vary in dressing material, silver release profile, absorption capacity and conformability to the wound bed. *In vitro* studies have shown that Biatain® Silicone Ag and Biatain® Ag kill mature biofilms (*S. aureus* and *P. aeruginosa*) *in vitro* and are effective against a broad spectrum of bacteria and fungi for up to seven days.⁷

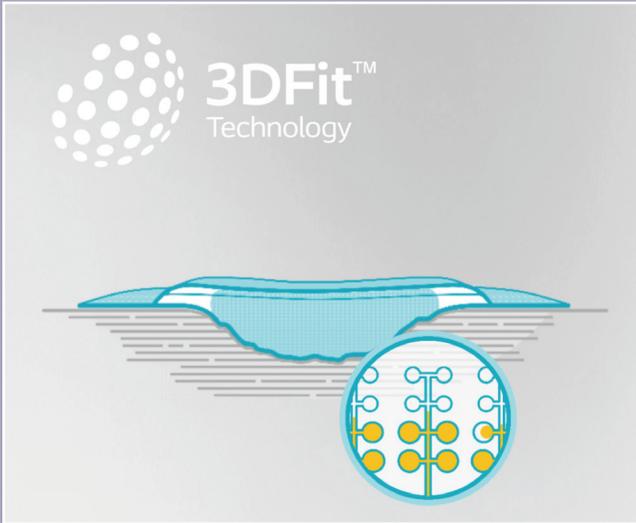
Biatain® Silicone Ag and Biatain® Ag have been shown to promote healing of non-healing, infected wounds in a number of clinical studies.⁸⁻¹⁰ Biatain®

About Biofilms

Biofilms are microscopic structures not visible to the eye. Non-healing wounds are an ideal environment for biofilms. Biofilms can grow on the wound surface as well as in deep tissue and are difficult to kill. Recent studies indicate that 60–100% of non-healing wounds contain biofilms.² Biofilms keep the wound in an inflammatory state, which prevents wound healing.

3DFit™ Technology

3DFit™ Technology, used in Biatain® Ag dressings, has a microcapillary structure that allows vertical exudate absorption and conforms to the wound bed (up to a depth of 2 cm) to promote optimal healing conditions.



Silicone Ag and Biatain® Ag with 3DFit™ Technology (see box) show positive clinical results in infected, non-healing wounds.⁸⁻¹⁰ These dressings have been shown to kill 99.99% of mature biofilms (formed in 24 hours) and to prevent biofilm formation (shown *in vitro*).¹¹

Conclusions

It can be assumed that all infected wounds contain biofilms. Signs of infection are also the signs of biofilms, which are impossible to see with the naked eye. Biatain® Ag has been shown to promote healing of infected, non-healing wounds in a number of clinical studies. Clinical studies have demonstrated that Biatain® Silicone Ag and Biatain® Ag reduce mature biofilms and prevent biofilm formation *in vitro*.

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