Clinical effectiveness of polihexanide on biofilms in wounds

E. Lenselink*, A. Andriessen

# Wound and PU consultant, Medical Center Haaglanden, Den Haag, The Netherlands Andriessen consultants, Malden, The Netherlands.

*Suprasorb® X *PMBH, **Suprasorb P. are products of Lohmann & Rauscher GmbH & Co KG, Rendsburg, Germany

ID 164212

EWMAt Congress, 26 - 28 May, 2010, Geneva, Switzerland

Introduction:
Published studies on the treatment of biofilms in wounds is scarce. This paper presents the results of a literature review looking at antibacterials, specifically polihexanide (PMBH) used for infected wounds, containing a biofilm, as well as the interim results (N=25) of a real clinical practice study.

Literature review method:
A systematic literature review was carried out on diagnosis and treatment of biofilms in wounds, using the following keywords: biofilm, wound, wound management, antimicrobial, polihexanide, poloxamine. PMBH and combinations thereof. We searched published studies, which met the following criteria: Publications from January 1, 1995 to the present (May 2010) in English, German, French or Dutch; in-vitro, in-vivo and with human subjects including reviews, reports, and meta-analyses. Databases searched: Pubmed, Medscape, Medline, Embase, Cinahl and Cochrane. In addition, we searched the EWMA Journal, Dutch Journal of Wound studies and publications issued in congress proceedings.

Results of the literature review:
For the number of studies and study types see Fig. 2. Of non healing chronic and critically colonized wounds, 65-80% is associated with biofilms, leading to chronic inflammation and delayed wound healing [5-4,6,9,10]. A biofilm is an aggregate of microorganisms in which cells adhere to each other and/or to a surface [1,2,5]. These adherent cells are frequently embedded within a self-produced matrix of extracellular polymeric substance (EPS), which is generally composed of extracellular DNA, proteins, and polysaccharides. Fig. 1. Bacteria living in a biofilm usually have different properties because of free-floating bacteria of the same species, as the dense and protected environment of the film allows them to cooperate and interact in various ways [5,9]. Pseudomonas aeruginosa is not only an important opportunistic pathogen but can also be considered a model organism for the study of diverse bacterial mechanisms that contribute to bacterial persistence in relation to biofilms [6,3]. The presence of fibrin in the wound bed is associated with chronic inflammation and is an ideal breeding ground for anaerobic bacteria in particular [6,8]. Interaction between aerobic and anaerobic bacteria in a biofilm, is due to increased pathogenic effect and leads to delayed wound healing [7-9].

Cleansing is easy, but to keep the wound clean and to prevent further biofilm formation, requires a combination of frequent debridement and antibacterial agents [5,10-12,14-18]. Clinical research on the effectiveness of antibacterial agents to treat biofilms in wounds is scarce and inconclusive. In vitro, the results are often tested on a monopact [5]. PMBH in vitro and in clinical trials is effective against broad spectrum microorganisms, such as Pseudomonas aeruginosa and HIV [12,11,14,18-19-26]. 87% of biofilm was removed by PMBH in 3 weeks in vitro study [13]. In a clinical study in 710 patients the biofilm in their wounds was removed after 3 weeks treatment with PMBH [14]. HydroBalance dressing + PMBH is more effective than 10-15 minutes gauze soaked in PMBH [15]. An RCT on a HydroBalance dressing + PMBH compare with standard silver treatment showed a greater pain reduction and improved quality of life (QoL) [16]. PMBH is suitable for critically colonized and infected chronic wounds. A reduction of biofilm was shown, good tissue tolerance and no known resistance [17,18,21,22]. Wound cleansing with PMBH was faster than standard therapy [19].

Conclusion:
The treatment of biofilms in wounds is not yet fully explored. The presence of biofilms in infected wounds may further strengthen the pathogenic properties of the bacteria present. Various studies have indicated in-vitro that topical silver and povidone iodine have little effect. Clinical studies indicate that PMBH may have a positive impact on biofilms in infected wounds, however there are few large, conclusive clinical studies to date. It was shown that continuous application of PMBH using a HydroBalance® dressing was superior over using PMHB for cleansing during dressing changes. PMBH in practice is recommended for critically colonized and infected wounds.

Interim results (N=25) of a real life clinical practice study

Aim:
To evaluate clinical efficacy of a HydroBalance dressing + PMBH (X+PMBH) in the treatment of chronic wounds that contain a biofilm.

Methods:
Patients that visit the outpatient clinic, with non healing wounds of various etiologies that showed clinical signs of biofilm, were included. Clinical feature of biofilms in wounds is described as a shiny translucent slimy layer on a non-healing wound surface that mostly do not respond to treatment [7-9]. Wound cleansing is conducted with saline, if required debridement is performed. X + PMBH is covered with a *“Foam dressing. Dressing changes took place 2 to 3 times per week, depending on wound condition and exudate production. Patients were followed until healing. Reduction of the biofilm was scored on a three point scale (good/moderate/poor). Reduction in wound size was also scored on a three point scale, using planimetry and photography.

Results:
N=25 were included (12 female). For wound types see Fig. 3. 17 Patients completed the study of which n=14 had a good reduction of the biofilm, n=2 scored moderate and n=1 had no reduction. After four weeks of treatment n=4 discontinued due to copious exudate production, n=2 were lost to follow up. 12/17 Patients had a good reduction in wound area., n=2 scored moderate, n=1 scored poor and n=2 did not have their wound scores.

Conclusion:
The interim results indicate * X + PMBH to reduce biofilm in patients with chronic wounds. The dressing seems suitable for moderate to light exuding wounds, hence 4 patients were removed from the study after 4 weeks of treatment due to copious exudate production.

Bibliography: