

Study Title: **Evaluation of the efficacy and tolerability of a solution containing Undecylenamidopropyl-Betaine and Polihexanide (Prontosan®) in controlling the bacterial burden of chronic wounds during Wound Bed Preparation**

Study Type: Mono-centric, prospective, controlled, explorative comparison trial

Principal Investigator: **Prof. Marco Romanelli**  
Wound Healing Research Unit, Dept. of Dermatology  
University of Pisa, Via Roma, 67, 56126 Pisa, Italy

Clinical research team: Valentina Dini, MD  
Sabrina Barbanera, MD  
Maria Stefania Bertone, NT  
Cinzia Brilli, RN

## **Executive Summary**

### Introduction:

Chronic wounds or non-healing ulcers such as venous leg ulcers, pressure ulcers and diabetic foot ulcers fail to heal in a timely and orderly manner. These wounds are characterized by defective remodelling of the extracellular matrix, a failure to re-epithelialize, and an extended inflammation. Most clinicians are concerned about infection in the course of the prolonged treatment. Micro-organisms are present in all chronic wounds, although number, virulence, species and mixture can vary.

Bacteria can exist in four different categories which are defined as contamination (presence of non-replicating micro-organisms), colonization (presence of replicating micro-organisms without host reaction), critical colonization (increased number of replicating micro-organisms associated with a delay in wound healing but without overt host reaction) and infection (presence of replicating micro-organisms leading to an overt host reaction which results in inhibition of the wound healing process).

When bacteria proliferate in wounds, they may form micro-colonies, which firmly attach to the wound surface and are enclosed in a three-dimensional matrix of primarily polysaccharide material. These microbial communities, called "biofilms", protect the micro-organisms against antibiotics, antiseptics and host immune defences.

Recently, the concept of wound bed preparation along with the TIME principles has been introduced and classified according to the clinical parameters of chronic wounds:

<b>T</b> issue	non-viable or deficient tissue (removal of sloughy and necrotic tissue)
<b>I</b> nfection or <b>I</b> nflammation	Reduction of bacterial load and removal of biofilm
<b>M</b> oisture	Moisture balance (exudate control)
<b>E</b> pithelial margin	non-advancing or undermined wound edges

One of the basic principles of proper wound bed preparation is certainly appropriate wound cleansing to create a wound environment optimal for healing.

Therefore, thorough wound cleansing with an advanced wound irrigation solution should be the aim of every clinician as a prerequisite for normal wound healing and as an efficient contribution to wound bed preparation by removal of biofilm, slough and necrotic tissue.

The innovative wound cleanser containing undecylenamidopropyl-betaine and polihexanide (Prontosan®, B. Braun) is a ready to use solution for cleansing and moistening of acute and chronic wounds. Polihexanide is a preservative that prevents bacterial growth and is proven to be non toxic with no skin irritation. Betaine is a surface active solution that penetrates difficult coatings and removes debris, bacteria and biofilms.

#### Study objectives:

In this study, 40 patients were included with colonized, critically colonized and infected venous leg ulcers. 20 patients have been treated with Prontosan Wound Irrigation Solution in association with standard wound care (compression and antimicrobial dressing). The second group of 20 patients (control group) were treated with saline solution at every dressing change in association with standard wound care (compression and antimicrobial dressing).

Wound planimetry and pH-measurement of the wound were performed as an objective evaluation. Additionally a biopsy has been taken for a quantitative and qualitative evaluation of bacterial burden at the baseline and final visit on each wound.

#### Study Results:

Patients treated with Prontosan showed a significant better control of bacterial burden both clinically and by means of instrumental evaluation compared to the control group. PH value of the wound was significantly lower ( $p < 0,05$ ) in the group treated with Prontosan which is indirectly related to the control of bacterial burden.

Wound size was not statistically different in both groups due to the short period of observation time. However, better pain control was achieved with the application of Prontosan ( $p < 0.05$ ). The use of Prontosan wound irrigation was generally well tolerated by the patients. The wound biopsy did not show any differences between the two groups regarding the microbiological quantification in the deeper portion of the wound

#### Conclusion:

The role of bacterial burden is a critical issue in wound management. Assessment and management of bacterial burden at dressing changes must be considered as a fundamental step in wound care. Therefore it is vital that practitioners should be able to assess and manage bacterial burden by using the principles of best practice today available from various consensus documents. Optimal local wound care will influence wound healing and the selection of an ideal wound cleanser such as Prontosan Wound Irrigation Solution will contribute to reach positive outcomes and to produce a faster healing response.

The results of this study clearly reflect the superior cleansing activity of Prontosan Wound Irrigation Solution with the ability to significantly reduce the bacterial burden in venous leg ulcers with different levels of microbial involvement. Because Prontosan is extremely effective on the wound surface, efficient biofilm control in chronic wounds can be speculated since biofilm affects the surface of the wound.

Furthermore, the study confirms that Prontosan also increases patients comfort by alleviating pain and reducing wound odour.

Prontosan Wound Irrigation Solution can be regarded as a highly efficient wound cleanser successfully contributing to a proper wound bed preparation.

## Evaluation of the efficacy and tolerability of a solution containing Propyl-betaine and Polyhexanide for wound irrigation.

M.Romanelli, V.Dini, MS.Bertone, S.Barbanera, C. Brilli.

Wound Healing Research Unit, Dept. of Dermatology – University of Pisa - Italy

m.romanelli@med.unipi.it



### Introduction

Chronic venous ulcers are an important cause of disability in the elderly population. A correct diagnosis and an appropriate treatment are the mandatory requirements for a successful healing. It is generally accepted that, among the various factors hindering the healing process of chronic wounds, the bacteria colonising the wound represent a negative element for its recovery. In front of infected or colonized wounds a proper cleansing procedure is required as a part of the full treatment (Fig 1, 2 and 3). An innovative, ready to use cleansing solution containing Propyl-betaine and Polyhexanide (Prontosan®, B.Braun) has recently become available.

### Aim of the Study

The aim of our study was to evaluate the efficacy and tolerability of a solution containing Propyl-betaine and Polyhexanide (Prontosan®, B.Braun) in order to control the bacterial burden of chronic wounds.

### Materials and Methods

40 patients (25 F - 15 M, mean age 62±7) affected by chronic venous leg ulcers with clinical signs of critical colonization, were enrolled into the protocol and randomized to two treatment groups.

**Group A:** treated with Prontosan® on alternate days on the wounded area during dressing change and before the standard therapy.

**Group B:** treated with standard therapy on alternate days on the wounded areas.

The study period was 4 weeks and wounds were evaluated by means of clinical and objective parameters:

Wound planimetry, microbiological quantification of the wound bacterial load, pH measurement (Skin pH meter HI99181 HANNA Instruments)(Fig. 1) of the wound's surface, pain evaluation (VAS score).

### Results

38 patients concluded the study. 2 patients were lost during treatment because of change of residency, they were both from group B.

Group A showed a significant better control of bacterial burden both clinically (Fig. 1-2) and by means of instrumental evaluation compared to Group B at the end of the study. pH measurement was significantly lower ( $p < 0,05$ ) in Group A compared to Group B at the end of the study (Table 1). Baseline pH on the wound surface (median range) was initially 8.9 and after 4 weeks of cleansing treatment and moist wound dressing was reduced and stable at 7.0 in Group A. Clinical scoring was significantly correlating with different levels of pH in both groups at baseline (Table 2). Pain control was achieved during treatment in group A better than in group B ( $p < 0.05$ ) (Tab. 3). No differences were observed about microbiological quantification between the two groups. During treatment, patients were not affected by serious and/or unexpected adverse reactions with a significant improvement of the wound bed preparation. Wound size was not statistically different in both groups from baseline to the end of the study. We think that this was mainly due to the short period of observation time. The treatment with the solution containing Polyhexanide and Betaine was well tolerated by the patients and was found useful in the absorption of wound odors. We did not see any significant difference in bacterial qualitative and quantitative evaluation at the end of the study between the two groups.



Fig. 1: Skin surface pH measurement



Fig. 1a Before Tx



Fig.1b After Tx



Fig. 2a Before Tx



Fig 2b After Tx

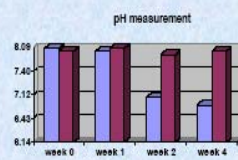


Table 1

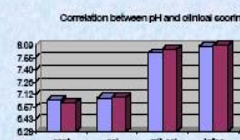


Table 2

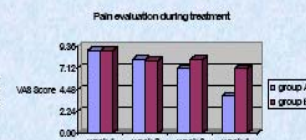


Table 3

### Conclusions

The cleansing solution Prontosan® used in this study has shown efficacy, safety and tolerability in patients with critically colonized venous leg ulcers and can be considered a valid method to control and reduce bacterial burden in chronic wounds.

### Reference

Tsukada et al.: The pH changes of Pressure ulcers related to the healing process of wounds. WOUNDS 1992; 4 (1) 16-20.