Cutimed® HydroControl made easy

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Introduction

Promoting healing in dry/low-exuding and sloughy wounds, which may be failing to progress as expected, can be challenging. This Made Easy will focus on how to manage these challenges, how dressing technologies can help to help to promote healing and introduce Cutimed® HydroControl dressings (BSN medical), which are designed to promote healing in such wounds. The dressing's technology provides and maintains an optimum moisture balance, supports removal of devitalised tissue via autolytic debridement and potentially stimulates the wound healing processes.

Authors: Tickle J, von Hallern, B . Full author details can be found on page 5.

Managing dry, sloughy and stagnant wounds

With evidence-based care, it is realistic to expect that wounds will heal within a reasonable timeframe. A wound that does not decrease in size by 30% in three weeks or by 50% in four to five weeks is considered chronic[1]. Some wounds may become stagnant or stalled in the granulation stage, with semi-epithelialised tissue and failure to close. There are many reasons why healing may have stalled, including the wound bed being too dry or containing slough. As such, attention has turned in recent years to factors influencing wound healing and preparation of the wound bed[2].

Wound bed preparation is 'the management of a wound in order to accelerate endogenous healing or to facilitate the effectiveness of other therapeutic measures'[3,4]. The TIME system[5] (Table 1), developed in 2002 to assist with implementation of wound bed preparation, is a useful theoretical framework that allows identification of and action to remove barriers to wound healing. The framework comprises the following four elements[4]:

- **Tissue management**
- **Control of infection and inflammation**
- **Moisture balance**
- **Advancement of the epithelial edge of the wound.**

Non-viable tissue

Where tissue is non-viable or deficient, wound healing is delayed[6]. Therefore, debridement of non-viable tissue is an integral part of wound management[7]. Chronic wounds often contain necrotic or sloughy tissue, which can harbour bacteria and act as a barrier to healing[7]. The presence of non-viable tissue may also affect the moisture balance of the wound, as it forms a physical barrier to epidermal cell migration, leading to reduced hydration at the wound interface and causing a vicious circle that impedes the healing processes[5]. To remove non-viable tissue, a range of debridement techniques are in use in clinical practice[7]:

- **Autolytic**
- **Biosurgical**
- **Hydrosurgical**
- **Mechanical**
- **Sharp**
- **Surgical**
- **Ultrasonic**

Autolytic debridement is generally stimulated by applying dressings that donate moisture to the wound bed, either in an amorphous or gel sheet form. More recent dressing technologies include those which stimulate autolytic debridement by exerting an osmotic effect.

Table 1. Wound bed preparation: TIME in practice (adapted from Dowsett, 2005[5])

	Proposed pathophysiology	Action	Effect of action and clinical outcome
Tissue (non-viable or deficient)	Defective matrix and cell debris	Debridement, either autolytic or via biological agents	Restored, viable wound base Functional extracellular proteins
Infection/ inflammation	High bacterial counts or prolonged infection	Remove infected foci	Bacterial balance/ reduced inflammation (lowered inflammatory cytokines and protease activity, higher growth factor activity)
Moisture	Desiccation slowing epithelial cell migration; Excessive fluid causing maceration	Apply moisture-balancing dressings; Use compression therapy, negative pressure wound therapy or other methods to remove fluid	Restored epithelial cell migration Desiccation avoided Oedema / excessive fluid controlled Maceration avoided
Edge (non-advancing or undermining)	Non-migrating keratinocytes; Non-responsive wound cells and abnormalities in extra-cellular matrix or abnormal protease activity	Re-assess/ consider corrective therapies: • Debridement • Skin grafts • Biological agents • Adjunctive therapies	Advancing edge of wound Migrating keratinocytes Responsive wound cells Restoration of appropriate protease profile

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Moisture balance

A wound that progresses normally will produce enough moisture to promote cell proliferation and support the removal of devitalised tissue through autolysis. However, an incorrect moisture balance can cause problems with the wound healing process[5].

Box 1: Autolytic debridement

Autolytic debridement is the process by which the body attempts to shed devitalised tissue by the use of moisture. Where tissue can be kept moist, it will naturally degrade and de-slough from the underlying healthy structures. This process is helped by the presence of enzymes called matrix metalloproteinases (MMPs), which are produced by damaged tissue and which disrupt the proteins that bind the dead tissue to the body.

This process can be enhanced by using dressings that have an osmotic effect, thereby promoting a moist environment by donating moisture to the devitalised tissue.

A moist wound environment is required for optimal healing[8], therefore a dry wound bed or under-production of exudate can adversely affect the healing process.

In wounds that are not healing as expected, an incorrect moisture balance appears to impede healing and wound contraction by:

- **Slowing down or preventing cell proliferation**
- **Interfering with growth factor availability**
- **Desiccation of the underlying collagen matrix and surrounding tissue[6]**

Conversely, if an optimal moisture balance is achieved, this can reduce time to healing, dressing change frequency, and related problems such as peri-wound skin damage, thus improving overall healthcare efficiency[9].

Managing wounds that are failing to progress

Wound bed preparation (as per the TIME framework) and removing barriers to healing help the natural healing processes in wounds where healing may have stalled[5]. In such wounds, dressings can be used that will prepare the wound bed and thus stimulate the healing processes.

Selecting dressings for managing dry and sloughy wounds

If a wound is dry and/or sloughy, it is important to consider dressing choices that will provide the correct moisture balance; dressings that stimulate both autolytic debridement and wound healing should also be considered where required. It is important to consider the benefits and limitations of traditional dressing options when deciding on a treatment plan for such wounds[10]. More recently, new specialty dressings have become available, which combine attributes to promote optimal wound healing conditions[10].

- **Hydrocolloid dressings: self-adherent dressings which, when in contact with exudate, interact to form a gel at the wound interface, creating a moist environment; however, the adhesive matrix may disintegrate when in contact with fluid. Hydrocolloid dressings may adhere to the wound bed or be difficult to remove and may damage fragile skin on removal.**
- **Hydrogels: composed of polymers that can be formulated as either amorphous or sheet applications. They have a high moisture content so can hydrate a dry wound rapidly and may also contain glycerine to inhibit moisture evaporation. Gel sheets must be cut to the exact size of the wound to prevent maceration of surrounding tissue. In most cases, hydrogel dressings will require an additional cover dressing as they are often difficult to secure and prevent from drying out.**
- **Foams: usually made from polyurethane with a film outer layer to prevent strikethrough. There are many different types of foam dressing which vary in thickness and their ability to absorb moisture. Traditional foam dressings do not de-slough devitalised tissue, and in dry wounds, using foam dressings may cause the wound bed to become desiccated.**

What is Cutimed HydroControl?

Cutimed HydroControl is a sterile, self-adhesive dressing combining a hydropolymer gel matrix with a semi-permeable polyurethane backing film (Figure 1). It promotes healing by creating the optimum moisture balance in dry to moderately exuding wounds – moisture is donated to the wound bed, while any exudate is vertically absorbed to protect the surrounding skin.

In sloughy wounds, Cutimed HydroControl helps to stimulate autolytic debridement by donating moisture to the wound bed. Such stimulation of wound healing is supported by the principle of osmosis (Figure 2)[11]. As autolytic debridement prepares the wound bed for healing, the improved supply of nutrients, enzymes and growth factors coming into the wound as fresh fluid arrives at the wound bed, allows for the optimal support of new tissue formation[11].

Table 2 provides detailed information as to the clinical benefits of Cutimed HydroControl.

Using Cutimed HydroControl in practice

Cutimed HydroControl is specifically designed for dry to moderately exuding, chronic and secondary healing wounds, such as:

- **Venous leg ulcers**
- **Arterial leg ulcers**
- **Diabetic foot ulcers**
- **Pressure ulcers**

Table 2. Advantages of Cutimed HydroControl[11]	
Advantage	**How?**
Creates a moisture balance to support moist wound healing	The hydropolymer gel matrix donates moisture to drier wounds due to its water content, while also providing exudate management. The polyurethane (PU) top film and flexi pores provide a high MVTR and thereby support optimal fluid handling.
Protection against maceration	The high MVTR helps to manage fluid levels, whilst the ability of the hydropolymer gel matrix to absorb vertically, keeps exudate away from wound margins and prevent leakage onto the peri-wound area.
Prepares the wound bed and removes barriers to healing	The hydropolymer gel matrix supports autolytic debridement by donating fluid and exerting an osmotic effect on the wound bed.
Patient comfort	The dressings are highly flexible and conforming, the natural tack of the hydropolymer gel matrix provides reliable adhesion even to contoured body parts and joints without the need for secondary fixation. The dressings have a low risk of allergies, leave little residue on the skin and are gentle to remove. The low friction surface of the PU film also protects patients' skin as they are moved.
Convenient	The dressings can be cut to size if required to assist application to awkward body areas. They can also remain in place for up to seven days resulting in potentially fewer dressing changes leaving the wound bed undisturbed for longer and so minimising associated trauma. Unlike hydrocolloids, the dressing does not break down within the wound bed when saturated.

Figure 1 | Composition and function of Cutimed HydroControl

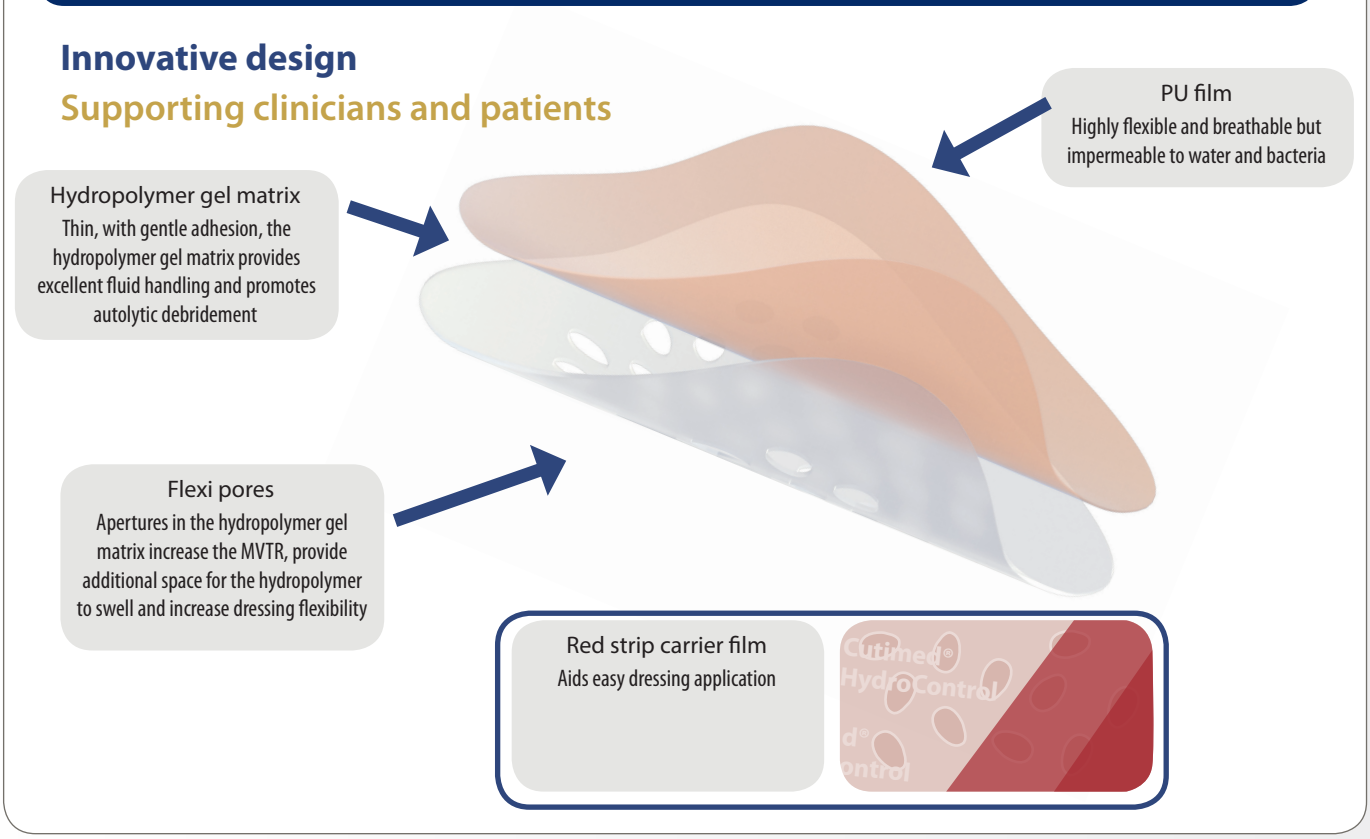
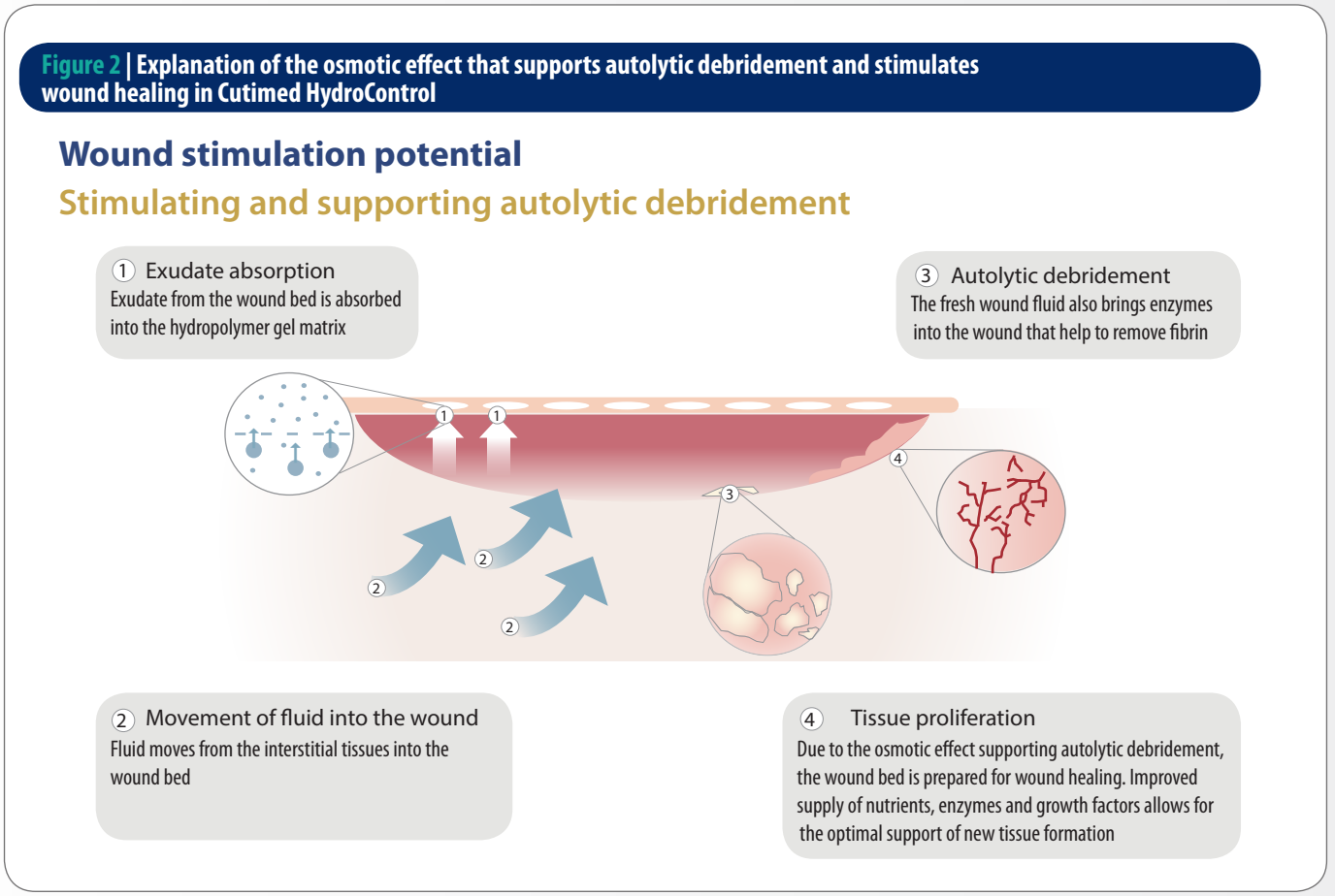


Figure 2 | Explanation of the osmotic effect that supports autolytic debridement and stimulates wound healing in Cutimed HydroControl



Prior to applying Cutimed HydroControl, the wound should be prepared as per local management guidelines. A dressing should be chosen that overlaps the wound edge by at least 2cm (Figure 3, Box 2 and Box 3).

The wound should be inspected frequently and dressings changed according to the wound condition, but they can be left in place for up to seven days. Cutimed HydroControl should be stored at room temperature; refrigeration or exposure to high humidity should be avoided.

Case study 1: Using Cutimed HydroControl on a dehisced wound

A 30 year-old male presented with a six-week-old wound to the palm of the left hand measuring 3cm x 1.5cm (Figure 4) as a result of a blast trauma. The patient underwent plastic surgery with tissue transfer at the carpus region, but the wound dehisced. At presentation, the wound bed was covered in a mix of granulation tissue, epithelial tissue and slough. Treatment objectives were to stimulate the formation of epithelial tissue. A dressing was required that could conform well to the contours of the hand and stay reliably in place, allowing the patient to continue with physiotherapy.

Cutimed HydroControl (10 x 10cm) was applied, with the first dressing change taking place three days later. Increased granulation tissue was noted on the wound bed and the clinician reported good absorption of exudate (Figure 5). The patient reported no pain associated with the dressing change.

The second dressing remained in situ for four days and during this period the width of the wound decreased to 0.8cm. At dressing change good exudate management was noted, with fluid absorbed vertically into the dressing (Figure 6) and removal of slough (necrotic connective tissue) from the wound bed.

After 10 days of treatment there was a further decrease in size and the wound bed was fully granulated with some areas of epithelial tissue (Figure 7). Both the patient and the clinician were satisfied with the dressing performance, with the clinician finding the application to be 'easy'. The dressing was rated overall as 'very good', and better than the previous wound care regime due to the dressing's size and flexibility.

Box 2: Applying Cutimed HydroControl

When applying Cutimed HydroControl in practice, follow these steps:

1. Peel away the lower, transparent carrier to expose the adhesive surface (Figure 3a)
2. Hold the dressing by the white applicator tab and apply with the adhesive surface towards the wound (Figure 3b)
3. Peel away the white tab and gently smooth the dressing (Figure 3c)
4. Remove the top carrier film with the red strips (Figure 3d)

Secondary fixation can be used if necessary, such as a bandage or picture frame with transparent film dressings or fixation strips. Do not overlap dressings.

NB. If the dressing comes into contact with moisture, the dressing may swell and de-tack at the edges. A waterproof frame fixation should be used if required.

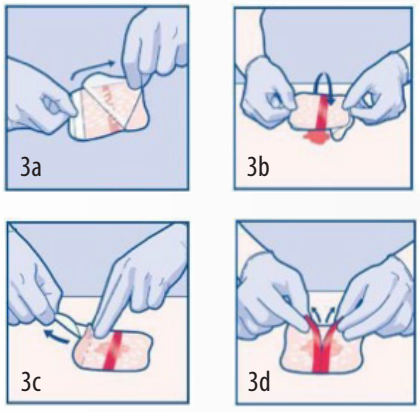


Figure 3a to 3d. Applying Cutimed HydroControl.

Case Study 2: Using Cutimed HydroControl with compression therapy

This case concerns a 92-year-old female with bilateral venous leg ulcers. The patient also had osteoporosis and chronic venous insufficiency and wore compression hosiery for treatment of the latter.

Left leg

The ulcer was located on the outer aspect of the lower leg just above the ankle, measured 15cm x 1.3cm (Figure 8) and had been present for 19 months. There were low levels of exudate and the wound bed was covered in a mixture of slough, granulation and epithelial tissue with intact wound margins and peri-wound skin. Cutimed HydroControl was applied to the wound with the aim of stimulating wound progression.

The dressing on the left leg was changed after two days as it had become saturated, with some small areas of maceration to the surrounding skin. The dressing was re-applied and left in place for a further two days. This time, the dressing reliably managed the exudate. The wound had also decreased in size, with a mix of granulation and epithelial tissue on the wound bed; the maceration had also resolved.

After four days it was noted by the clinician that there was unexpected, overall improvement in the wound and by day 13, a large amount of epithelial tissue was present. At this stage the dressing was rated as 'very good' in its ability to maintain a moist wound environment and promote the formation of granulation tissue. As such, after the closing of the study, the wound was further treated with Cutimed Hydrocontrol for an additional 3.5 months. During this time the wound almost healed completely (Figure 9).

Box 3: Tips for dressing change and removal

- The dressing may be moistened with sterile saline solution for easier removal
- Should gel fragments remain in the wound bed after removing the dressing, these can be removed by irrigation with sterile saline solution or water
- During the body's normal healing process, autolytic debridement (i.e. removal of non-viable tissue from the wound) could initially make the wound appear larger. If the wound continues to grow larger after the first few dressing changes, seek further medical advice
- As Cutimed HydroControl creates an environment that favours angiogenesis, the delicate newly formed blood vessels may occasionally produce blood-stained wound fluid. If excessive bleeding occurs, the dressing may be used together with an alginate wound dressing.

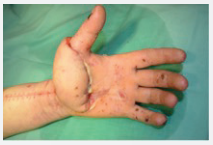


Figure 4. Wound at start of treatment with Cutimed HydroControl

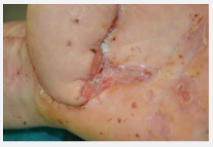


Figure 5. Day 3: First dressing change with increasing granulation tissue

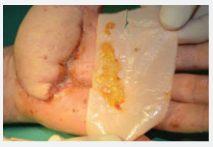


Figure 6. Day 7: Second dressing change (note vertical absorption)

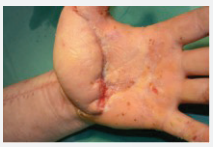


Figure 7. Day 10: Final examination with fully granulated wound bed

Right leg

The ulcer was located on the inner aspect above the ankle, measured 3.5cm x 5cm and was 10 months old (Figure 10). Exudate levels were low and the wound was partially granulated but without any epithelial tissue. Wound margins and surrounding skin were intact.

The dressing was changed after two days (Figure 11). Absorption was good, with exudate absorbed vertically into the dressing. Healing progression was seen with the wound moving towards complete

Author details

Tickle J[1], von Hallern, B[2]

1. Shropshire Community Health NHS Trust, UK
2. Elbe Klinikum Stade, Germany

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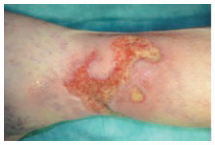

Figure 8. Left leg: prior to application of Cutimed HydroControl

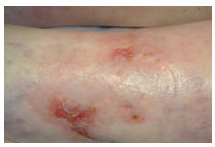

Figure 9. After 4 months: Final examination. The wound was almost completely epithelialised

granulation with areas of epithelialisation. Handling and initial performance of the dressing were rated as 'very good'.

After a further two days the dressing was changed (Figure 12). Absorption was again rated as good with the wound fully granulated and showing partial epithelialisation.

At final examination the patient was 'very satisfied' with the treatment. The overall assessment was 'very good' and better than previous regimen, with fast granulation and maintenance of a moist wound environment. Overall, the status of the wound had improved.

For both wounds, additional fixation was not required and with no damage to the surrounding skin, which was expected in this patient as most other self-adhesive dressings resulted in trauma. The patient reported that the dressings were comfortable under her compression hosiery.

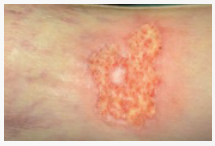

Figure 10. Right leg: Prior to application of Cutimed HydroControl

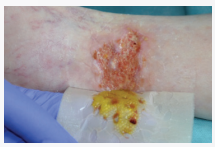

Figure 11. Day 2: First dressing change

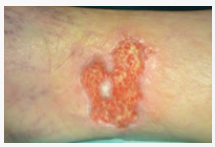

Figure 12. Day 4: Final examination

Case Study 3: Using Cutimed HydroControl on very dry skin

This case involved a 72-year-old female with rheumatism who had been treated with hydrocortisone for five years, resulting in dry, fragile skin. She had a dehisced wound 3cm in diameter to the right leg, which had been present for six weeks (Figure 13). The wound was very dry, with necrosis present and no granulation or epithelial tissue.

After the initial two weeks of treatment, the patient was treated for another 10 weeks; after the total treatment of 12 weeks, the wound size was remarkably reduced and wound was already partly epithelialised (Figure 14).

The clinician rated the application as 'very good', noting good adaption to the body and good adhesion. The patient

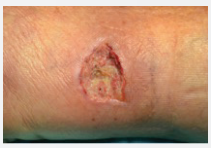

Figure 13. Wound prior to application of Cutimed HydroControl

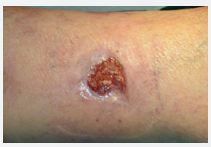

Figure 14. Week 12: Final examination

was 'very satisfied'; overall, the dressing was rated 'very good' and better than the previous dressing regimen.

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Summary

In managing dry/low exuding and sloughy wounds, which may be failing to progress as expected, wound bed preparation and removing devitalised tissue, plus creating and then maintaining an optimum moisture balance, are key[5]. Selecting a dressing that can facilitate autolytic debridement and potentially stimulate the wound healing processes may help to address the challenges of managing such wounds[10]. The case studies demonstrate the benefits of Cutimed HydroControl dressings in managing dry, sloughy and stagnant wounds – by creating and controlling moist wound conditions, facilitating autolytic debridement through an osmotic effect, and supporting the formation of granulation tissue[11].