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## Successful treatment of silver-polyurethane foam dressing ContreetÖ – a case report

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**Aim:** The aim of these two cases was to test silver-polyurethane foam dressing ContreetÖ in treatment of burns and the donor site. The clinical tests were planned together with Coloplast.

**Case 1:** A 24 years old male swayed against the hot stove and his arm and body was burnt. As the first aid he was cooling in the lake about 15 minutes. The man had 4 % deep dermal burns in left upper arm and 18 % first degree burns in thigh and body. After 5 days dermatoplasty and revision was made. The following day the left thigh was infected and the area was rinsed with physiological saline and covered with ContreetÖ. Two weeks after the operation the patient was discharged. The patient stayed one week at home and came back to hospital. At home he had applied some oil and basic cream on his donor site. Little by little greenish exudate from the donor site of the left thigh increased so much that bedclothes, curtains, carpet and floor got dirty. The other wounds were healing normally. First at hospital the treatment of the wounds was to rinse with physiological saline and apply silver sulphadiazine. Four days later the treatment was changed to ContreetÖ. The wound got better during one week so that epithelisation was 80 % and granulation was 20 %. Wound exudate diminished and there was no odour.

**Case 2:** A 19 years old female burnt her left leg in a candle flame. As the first aid she rinsed the burn with cold tap water. She had 10 % deep dermal burns and 5 % superficial burns in the lower extremity. After 2 days dermatoplasty was made. The recovery was in slow due to panic disorder. Only on the 11th postoperative day she sat down in the wheel chair. The dermatoplasty area was infected after 2 weeks from the operation. The size of the wound was 4 × 4 cm, it was full of yellow sloughy, wound exudate and odour was moderate. Two weeks later the wound had got better and ContreetÖ was discontinued.

**Conclusions:** ContreetÖ was easy to change and its absorption ability was good. Silver of the dressing did not cause any problem to the periwound. ContreetÖ was found to be in these cases an effective dressing in the management of exudative, sloughy and infected wounds.

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## Germ colonization in the second contamination of experimental surgical wounds

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**Aim:** Quantify the germ colonization in the second contamination of experimental surgical wounds.

**Introduction:** The first germ infections are originated in the skin which seems previously normal. The second cutaneous infections can emerge on surgical wounds.

**Methods:** Experimental study of the germ colonization in the second contamination of surgical wounds which were performed at the back of the adult white rat (Sprague Dawley). Doses of cutaneous specimens with hisopo and sowing and germ cultivation of each wound were made until the suture was removed, in order to know the amount and type of the germ colonizations which have been developed.

**Results:** The germ colonization oscillated between 0 and 780.000 germs with a middle of 35.235 germs. The staphylococcus coagulasa – was finally the germ wich appeared more often in the germ specimens. However it's necessary to take into account not only the big amount of the scarce presence of certain germs such as *staphylococcus aureus* and *pseudomonas aeruginosa*.

**Discussion:** The germ colonization of the second contamination of surgical wounds is one of the problems that affects in their evolution. The usual germs of the cutaneous flora are substituted with others that are more aggressive in terms of the number of colonials and its power to infect as well.

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## Extractive methodology of hair versus germ type in surgical wounds in the animal used to do the experiment

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**Aim:** To relate the preoperative preparation of the skin with the type of germ colonization in experimental surgical wounds. To check the aggressiveness or goodness of certain extractive

methods of hair.

**Introduction:** Traditionally it has been said that extractive methods of hair are more aggressive to the skin than the ones with chemical characteristics.

**Methods:** Experimental study of the effect that the extractive methodology of hair has at the back of the animal used as an experiment (white rat, Sprague Dawley) in order to find out what types of germs are developed in the skin. The animals were subdivided into three groups. Each one was treated with a different technique of extraction of the hair: manual razor, electric razor and shaving cream. Doses of cutaneous specimens with hisopo and post-sowing and germ cultivation of each group of animals were taken in order to find at the type of colonies that had been developed, depending on the methodology that was used in each group.

**Results:** The extraction of the hair through electric razor was colonized by *Aerococcus* (maximum: 200 germs). The manual razor was colonized by *Staphylococcus coagulans* (maximum: 102.000 germs) and the shaving cream method by *Corynebacterium* sp. (maximum: 780.000 germs).

**Discussion:** The extractive method of hair affects to the type of germ colonization and to the grade of aggressiveness as well.

## P 204

### ***New test method for measuring absorption in foams***

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**Introduction:** Excellent exudate management is crucial for the performance of foam dressings. This includes rapid absorption and a high retention of exudate in the foam. Foam dressings are most commonly used under compression therapy when applied to venous leg ulcers. However, today it is common laboratory testing practice to neglect effects of pressure from the compression therapy when the exudate management of foams is evaluated and compared (e.g. the widely used EN13726-1:2002 method, part 2: Paddington Cups). Therefore, in vitro data might not give the complete picture with regards to interpreting the performance of foams used on exuding wounds. Acknowledging the need for reliable measurements, a test method for determination of absorption and retention of liquid in foams under pressure has been developed.

**Aim:** The method is used to compare the performance of a range of foam dressings used on moderate to high exuding wounds.

**Methods:** In the proposed test method, the samples are subjected to 40 mmHg pressure (corresponding to the pressure most often used with compression therapy) and the test liquid is added ensuring absorption is possible from one side of the sample only. After 24h the absorption under compression of the samples is measured.

**Results:** The following data have been determined after 24h:

Table 1: P 204

Product	Absorption under compression g/cm <sup>2</sup>
A	0.87 (0.05)
B	0.86 (0.03)
C	0.39 (0.01)
D	0.59 (0.01)
E	0.49 (0.04)
F	0.44 (0.02)

**1 A: Biatain Soft-Hold (Coloplast A/S), B: Biatain Non-Adhesive (Coloplast A/S), C: Allevyn? Non-Adhesive (Smith + Nephew), D: Allevyn? Compression (Smith + Nephew), E: Mepilex® (Mölnlycke HealthCare AB), F: Tielle? Plus Borderless (Johnson & Johnson).**

**Note:** The results represent the mean of 5 measurements and the figures in brackets denote standard deviations<sup>1</sup>.

**Conclusions:** The ability of foam dressings to absorb liquid is affected by pressure. Therefore, it is recommended to evaluate the performance of foam dressings based on properties determined using a test method simulating actual conditions for use. Among the tested foam dressings, Biatain Soft-Hold and Biatain Non-Adhesive show high absorption capacity under compression indicating that these dressings will have excellent exudate management when used under compression therapy, compared to the other tested foam dressings.

## P 205

### ***The role of ACTICOAT™ in complicated post-surgical wounds***

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**Aim:** To demonstrate that ACTICOAT with Nanocrystalline Silver† has an excellent performance in controlling infection on complicated post-surgical wounds.

**Introduction:** We present a case study of a patient with a post-surgical wound localised to the fronto-parietal region with exposure of a plastic plate and encephalic mass, secondary to deep tissue infection after a meningioma resection. Wound cultures were found to be positive for *Klebsiella pneumoniae* and *Enterococcus* sp. Larger volumes of exudate made management of the wound difficult and the wound required treatment three times per day. Closure of the wound by third intention was impossible at this point. The patient was suffering from septic shock secondary to neurological infection.

**Material and methods:** The protocol consisted of cleansing the wound with sterile water, then dressing it with ACTICOAT with Nanocrystalline silver†, covering all of the wound. ALGISI-TE™M was applied as a secondary dressing to assist with exudate control. ACTICOAT dressings were changed every three days. The wound was cleansed with sterile water.

**Results:** After three dressing changes with ACTICOAT (ten days), the wound culture was negative and exudate considerably reduced. Wound closure by neurosurgeons was possible after 15 days.

**Discussion:** Post-surgical infection is a complication that can compromise the life of the patient. After being managed by conventional methods, (cleansing with antiseptics and gauze dressing) the wound showed clearly signs of failure in infection management and exudate reduction was becoming a mandatory issue interns of saving the life of the patient. The use of ACTICOAT combined with ALGISITE M in this case appeared to be the solution to manage the infection: after six days with this protocol, improvement was observed, control of the infection was corroborated with a negative swab after 10 days and the reduction in exudate made closure of the wound possible.

<sup>™</sup> Trade Mark of Smith & Nephew <sup>†</sup>Nanocrystalline silver is a patented technology of NUCRYST Pharmaceuticals Corp., under license. <sup>‡</sup>All trade marks acknowledged

## P 206

### ***Nanocrystalline silver<sup>†</sup> of ACTICOAT<sup>™</sup> as an excellent option for deep secondary burns management in children***

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**Aim:** To demonstrate the use of ACTICOAT in the management of infected wounds and the promotion of fast epithelialisation in infected second degree burns of children.

**Introduction:** Silver based products have been the local treatment option on infected burn wounds. Sulfadiazine has been widely used even though it has some contra-indications. We present three cases of children where ACTICOAT with Nanocrystalline silver has been used in the management of infected second degree burns of less than 10% total body surface area.

**Material and methods:** We include three second degree burns, two of them were localised on the leg and one on the arm. The first two burns were caused by hot water scalds, and the third one by electricity. After assessing the three patients and evaluating the presence of infection, we proceeded to the wound treatment which consisted of cleansing with sterile water, debridement of dead tissue (if required), and application of ACTICOAT to the burn, leaving it in place for 5 days with adequate irrigation. When removed, we reassessed the wound and reapplied the dressing if necessary.

**Results:** In all patients, three dressing changes were necessary, removal of all dead tissue was possible and all signs of infection were controlled after the first application. We decided to continue using the silver dressing for 10 more days. After removal of the third dressing we found adequate epithelialisation of the burn area in the first two cases (15 days approximately). On the third case, re-epithelialisation was achieved after one month. After the first silver dressing cycle, both exudate and pain were successfully controlled without using analgesics.

**Conclusions:** ACTICOAT was an excellent additional option for the management of infected burns. After one month of ACTICOAT application, epithelialisation was achieved in the largest of the wounds. It is important to note that a skin graft was not necessary in any case.

<sup>†</sup>Nanocrystalline silver is a patented technology of NUCRYST Pharmaceuticals Corp., under license. <sup>™</sup>Trade Mark of Smith & Nephew. <sup>‡</sup>All trade marks acknowledged

## P 207

### ***The role of nanocrystalline silver<sup>†</sup> in complicated wounds in the orthopaedic ward***

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**Introduction:** The management of complicated wounds in an orthopedic setting has generally been carried out in an empirical manner and has often involved morbidity and multiple surgical procedures.

**Aim:** The aim of this study was to compare the efficacy of a nanocrystalline silver antimicrobial barrier dressing (ACTICOAT<sup>\*</sup>) to current dressing management protocols, for complicated wounds in the orthopaedic ward.

**Material and methods:** This was an open, prospective, comparative, randomised study. Patients were randomised to one of two treatments (ACTICOAT dressing or control) using the Shuffle1 program. The control treatment consisted of: surgical debridement, saline-soaked gauze and antibiotics as appropriate, and on occasion hydrocolloid, alginate dressing or VACTM. Patients randomised to the ACTICOAT group used ACTICOAT as an adjunct to the control treatment. A total of 60 patients were randomised into the study from the department of orthopaedics at Kuala Lumpur hospital; treatment groups were well matched for the demographic data. Duration of the study was maximum 4 weeks. Dressing change assessments were carried out every 3 days in each group.

**Results:** Patients in the ACTICOAT group had significantly more percentage improvement in granulation ( $p = 0.0112$ ), slough ( $p = 0.0019$ ) and necrotic tissue ( $p = 0.0112$ ) at the end of the trial compared to patients in the control group. The median percentage reduction in wound area, from baseline, for the ACTICOAT group was 40.0 %, while for the control group it was -7.1 % (i. e. an increase of 7.1 %). This result was significantly better ( $p < 0.0001$ ) for patients in the ACTICOAT group. The change in the exudate and odour levels at the end of the trial was significantly better ( $p < 0.0001$ ) in the ACTICOAT group compared to the control group. Following enrolment in the trial, no patients in the ACTICOAT group required further surgical debridement – compared to 67 % in the control group who required at least one further surgical debridement procedure.

*Conclusions:* In this study, it would appear that the use of ACTICOAT as an adjunct to the control treatment, is a superior treatment regime for complicated orthopaedic wounds, when compared to the control group.

<sup>1</sup>Pallier C. Shuffle: a program to randomize lists with optional sequential constraints.

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<sup>†</sup> Nanocrystalline silver is a patented technology of NUCRYST Pharmaceuticals Corp., under licence.

<sup>™</sup> All trade marks acknowledged

*Conclusions:* During and after the stay in hospital the patient's physical condition was very poor. The patient had a low life expectancy on discharge from hospital with the diagnosis giving little hope of wound healing. Through the consistent implementation of an optimal dressing protocol, a clear reduction in the wound surface area was achieved. The wound continues to reduce in size – the aim being to achieve complete healing. The patient is now able to drive and can participate in social activities. Everyone involved in the case has been surprised by the progress in wound healing.

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## P 208

### **Wound management of a patient with abdomen aperture using ACTICOAT<sup>™</sup> absorbent**

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*Aim:* To assess the use of ACTICOAT Absorbent in the management of an abdominal aperture

*Introduction:* A 47-year-old patient with dehiscence after a laparotomy (abdomen aperture) presented with a very large wound (over 150cm<sup>2</sup>, depth of 4 cm and circumference of 89.8 cm) from the sternum down to navel and opening laterally across to both hip joints. The patient's general condition was significantly serious and the life expectancy was low. He was admitted to hospital and stayed there for 2 months and was then released into the care of the general practitioner. A moderate infection Methicillin-Resistant Staphylococcus aureus (MRSA) was noticed.

*Methods:* During the patient's admission, V.A.C.<sup>™</sup> and local antibiotic therapy were commenced after necrotic tissue had been debrided. The subsequent microscopic examination revealed the presence of MRSA and the assessment of the wound demonstrated a significant extension and an increase of exudate. The patient was discharged to outpatient care where the wound was dressed with INTRASITE<sup>™</sup> Gel, ALGISITE<sup>™</sup> M, ALLEVYN<sup>™</sup> Non-adhesive and OPSITE<sup>™</sup> Flexifix, with daily dressing changes. One month later, heavy exudate and odour proved to be problematic. Swabs were taken, which confirmed another MRSA infection. The new protocol consisted of cleansing the wound with PRONTOSAN<sup>™</sup>, applying INTRASITE Gel and ACTICOAT Absorbent and covering with ALLEVYN Adhesive and reinforcing with OPSITE Flexifix.

*Results:* Following the introduction of ACTICOAT Absorbent there was:

- a clear reduction in the amount of exudate and odour,
- a reduction in frequency of dressing changes to every two days,
- a reduction in the wound surface area from 183.37 cm<sup>2</sup> to 30.8 cm<sup>2</sup> (in two months).

From this time onward, dressing changes were performed every three days.

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### **The use of ACTICOAT<sup>™</sup> absorbent in neonatal limb ischaemia**

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*Aim:* To assess the use of ACTICOAT Absorbent in neonatal limb ischaemia.

*Introduction:* Neonatal limb ischaemia of unknown cause is a rare phenomenon which is difficult to treat. Short term management involves therapies to preserve as much viable tissue and limb function as possible. This case report outlines the use of Acticoat Absorbent in a neonate born with extensive upper limb necrosis.

*Methods:* A 37 week gestation female born with extensive ischaemia to the dorsum of her right hand and forearm of unknown cause. ACTICOAT Absorbent was applied to the necrotic eschars as they matured in order to help prevent infection and decrease bacterial loads in preparation for grafting the defects with cultured epithelial autograft.

*Results:* There were no clinical signs of infection in the wounds during treatment. At day 29 post-partum, the cultured epithelial autografts were grafted onto healthy, granulating wound beds. By 43 days post-partum, all wounds had healed well, with function returning in the thumb and wrist.

*Conclusions:* ACTICOAT Absorbent may be used as an adjunctive treatment to help prevent infection in neonatal limb ischaemia.

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### **Management of partial thickness burns in children using moist wound healing and an antimicrobial dressing – a successful combination**

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*Aim:* The aim of this paper was to assess, in a series of case studies, the efficacy of ACTICOAT<sup>®</sup> in combination with products that maintain a moist wound environment in the treatment of mid to deep second-degree burns.

*Introduction:* Treatment of second-degree and deep second-degree burns in young children is often complex. Early inter-

vention and an appropriate dressing regime are important in order to avoid infection and delayed healing.

*Material and methods:* The treatment regime was as follows: Mechanical debridement was performed and followed by the application of ACTICOAT and INTRASITE<sup>®</sup> Gel. ALLEVYN<sup>®</sup> was then applied as a secondary dressing. Dressing changes were carried out once every 3–4 days. Patients were hospitalised for pain management or if nursing assistance was required. Once their condition improved, treatment continued on an Outpatient basis. As the wound improved ACTICOAT, under a secondary dressing of ALLEVYN<sup>®</sup> Lite, was used until healing.

*Results:* N = 5, the average age of the patients was 4 years and 3 months. The cause of the burns was 4/5 scalds and 1/5 fire. The average TBSA was 8 %, the average healing time was 14.2 days.

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Table 1: V 210

Name	Age	Cause	TBSA	Healing	Location
Patient 1	3.5 years	Scald	5 %	11 days	chest / abdome
Patient 2	14 month	Scald	10 %	17 days	leg and foot
Patient 3	18 month	Scald	15 %	20 days	chest and arm
Patient 4	14 years	Fire	4 %	11 days	leg
Patient 5	18 month	Scald	6 %	12 days	chest

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### **Mepilex<sup>®</sup> Lite as a safe, useful and comfortable wound dressing in the management of diabetic foot ulcers**

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*Introduction:* Wound dressings, especially when used together with different off-loading devices, should protect ulcers from friction and shearing as well as providing an optimal healing environment. This study was designed to evaluate a soft silicon dressing, Mepilex<sup>®</sup> Lite, in the treatment of patients with diabetic foot ulcers. The study was designed as an open non-randomised two-centre study. The primary objective was to evaluate conformity and comfort. Secondary objectives included safety, tolerance and influence on healing.

*Methods:* 20 adult diabetic patients in a diabetes centre in Germany and an orthopaedic department in Sweden were included in the study. Mean age 62,6 years, mean diabetes duration 18,2 years and with non-infected diabetic foot ulcers according

to stage Wagner 1 or 2. Patients were to be followed for a maximum of six weeks or until healing. High secreting wounds, patients with hypersensitivity to dressing components or signs of clinical infection were excluded. Dressing changes were performed according to usual hospital routines. Ulcers were documented photographically and evaluated once a week. At final visit patients and involved staff completed questionnaires regarding their experience with the dressing.

*Results:* 13 of the 20 included patients fulfilled the protocol. 6 other patients became protocol violators due to non-compliance or misunderstandings in the inclusion/exclusion criteria. 1 patient dropped out because of a serious adverse event. This was caused by patient incompliance, failing to change dressing after having a sauna bath this patient developed an osteomyelitis. However, 19 out of the 20 patients showed good progress in wound healing. Most frequent positive observations from the patients' point of view were that they experienced little or no pain during the dressing changes, that the dressing was easy to use and only needed a little space in the shoe. Other objective findings were the good fluid management of low secreting wounds, the apparent protection of the surrounding skin and the minimum of space required under different off-loading devices like the total contact cast (TCC).

*Conclusions:* Mepilex<sup>®</sup> Lite is comfortable and safe to use, conforms well to most areas of the foot (toe) and has no negative effect on wound healing.

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## **ACTICOAT™ absorbent used after an amputation**

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**Aim:** To describe the use of ACTICOAT Absorbent in the management of an amputation wound.

**Introduction:** The patient is a 57-year-old woman who was hospitalised while she had two toes amputated on her right foot as a result of Diabetes mellitus. After the amputation, she was initially treated in hospital with V.A.C.™ therapy and then sent home, where the therapy was continued. After the V.A.C.™ therapy ended, a foam dressing was applied. After two days, the wound was very moist, 50 % yellow and 50 % red. The edges of the wound were macerated and irritated.

**Methods and results:** The wound was dressed with ACTICOAT Absorbent and ALIONE™ Foam was applied as a secondary dressing. Treatment commenced on 23/08/04. After three days, the patient returned to the hospital. On removing the ACTICOAT Absorbent, a piece of green plaque was loosened. Underneath that, the wound was visually more healthy and had a yellow plaque over only 10 % of the surface. Due to the considerable amount of exudate in the wound, the top bandage was changed daily. The ACTICOAT Absorbent was changed twice a week. Later, by 02/09/04, the wound was, once again, appeared more healthy and smaller. There was no longer any yellow plaque in the wound. All that remained was a slightly yellow coloured, micro-thin membrane, which came away easily. The edges of the wound appeared healthy. It was decided to continue ACTICOAT Absorbent application for another week. Two weeks later, the foot had healed further. The patient was instructed to put more weight on the foot and this didn't cause any adverse reaction. The wound appeared completely red and it had an optimally moist wound environment. The only dressing applied to the wound, from this point, was a foam dressing.

**Conclusions:** Just over two months after the treatment began, the wound had healed. All that remains is a minor scar.

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## **The use of S.I.S. extracellular matrix in hard to heal ulcers of mixed aethiology**

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The aim of this study was to document the efficacy of a wound matrix in the treatment of hard to heal ulcers of mixed aethiology. A total of 54 patients with mixed A/V chronic ulcers were randomized into the study to receive: a) porcine small intestine sub-

mucosa (SIS) extracellular matrix, or b) hyaluronic acid wound dressing. Outcomes evaluated included time to complete wound closure, proportions of patients achieving wound closure in 16 weeks, mean dressing change, patient comfort and pain assessment. In total, 82,6 % of wounds in group a) healed in the 16 weeks evaluation period compared to 46,2 % of group b). Mean dressing change was significantly reduced in group a) (6.4 days) compared to group b) (2.4 days) and this result lead to a better patient comfort and pain control. The use of wound matrix was found to be superior in this study compared to hyaluronic wound dressing in patients where standard treatment is moist wound healing without the possibility to safely apply compression treatment.

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## **A national pain audit in patients using ActiFormCool?**

**S. Hampton, A. Kerr**

TVCS, Eastbourne, United Kingdom

This study was a national audit of pain in leg ulcers. It had been noted that painful wounds are less painful when ActiFormCool™ is applied (Hampton, 2003). However, pain is complex with multiple causes and no one dressing could possibly reduce pain in all painful wounds. Therefore, the objectives of this audit was to establish the effectiveness of ActiFormCool™ hydrogel sheet dressing in reducing pain in painful leg ulcers and to establish what types of pain could be reduced. The results will be used as a basis for designing a pain tool for leg ulcers. Each patient was already being provided with ActiFormCool™ as part of their care, prior to the audit and, therefore, no changes to care were made. The parameters measured were pain levels during wear time, ease of application and removal, and the effect of the dressing regime on the patients' quality of life. The hypothesis is as follows: the treatment group using the ActiFormCool™ hydrogel dressing as a primary dressing will experience less pain during wear time, improved healing and quality of life. The study hypothesis was measured by the Verbal Descriptor Pain Scale –5, the subjects' self-report and by the reported experience of using the dressing during the study. The study question reviewed whether the patient experiences more or less pain than with previous treatments during wear time, and/or on application and removal, as measured by the 1–5 Verbal Descriptor Pain Scale (Nagata et al 1996). The audit results demonstrated a reduction in pain in most types of pain with the largest reduction in those wounds where pain could be identified as actually in the wound bed. Those patients with pain separate to the wound, such as arterial pain, were provided with some temporary relief when the dressing was applied, but pain returned once the cooling effect of the dressing had dissipated. The outcome of this audit has provided details of pain types related to leg ulcers, and has provided a firm basis of information for the pain tool to be produced. It also demonstrated the usefulness of ActiFormCool™ in painful leg ulcers.

## References

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## P 215

### ***Evaluation of Cadesorb (a protease modulating dressing) in the management of 'real life' wounds***

**S. Hampton, A. Kerr, L. King**

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In chronic wounds, the orderly sequence of events seen in acute wounds becomes disrupted or "stuck" at one or more of the different stages of wound healing. For the normal repair process to resume, the barrier to healing must be identified and removed through application of the correct techniques<sup>1</sup>. This is known as wound bed preparation and is a vital skill that should be adopted by all those in wound management. Proteases play an important role in regulating the balance between tissue synthesis and degradation. However, in chronic wounds, this regulation may be defective and healing problems will result<sup>2</sup> and, if their activity becomes uncontrolled, proteases can mediate devastating tissue damage and consequently they have been implicated in chronic wound pathophysiology<sup>3</sup>. Collagen can inactivate potentially harmful factors such as proteases, oxygen free radicals and excess metal ions present in chronic wound fluid<sup>4</sup>. Cadesorb is an ointment containing an absorbent starch based polymer, polythene glycol and poloxamer. This study reviewed the potential for healing in 'real world' wounds when a protease modulating dressing (Cadesorb) was used. 'Real world' describes the wounds commonly found by community nurses. In many trials, the wound types are strictly controlled in order to reduce variables found in all patients. This study aimed to demonstrate the potential for healing in chronic, recalcitrant wounds. This was a prospective, descriptive, evaluative, non-blinded clinical audit using a sample size of 20 patients, with different types of wounds, who were receiving active treatment with Cadesorb. The study duration was 3-weeks for each patient. Cadesorb was left in situ for up to three days with a bland secondary dressing (dressing pad) over the cadesorb in order to avoid variabilities caused by other active dressings when used as secondary dressings. Assessment of the wound was based on the wound healing continuum and TIME assessment framework. The outcome of the study was that 18 of the wounds reduced in size with the 2 that did not reduce, being an arterial leg ulcer, (healing was delayed due to the status of blood flow, which actually decreased during the study) and one leg ulcer that had changes suggestive of malignancy. The latter wound is being biopsied as a result of the assessment made during the study. All wounds had changes that reduced the position of each wound on the healing continuum. The conclusion was that Cadesorb provides an optimum wound healing environment in normally recalcitrant wounds.

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### ***Reviewing use of a new sacral dressing (Allevyn plus); will thicker foam increase the potential for healing in recalcitrant sacral pressure ulcers?***

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This was a descriptive, evaluative study based on case studies of four patients with sacral pressure ulcers. The aim of the study was to investigate the potential and appropriateness of Allevyn Plus in sacral pressure ulcers. The measurements were both qualitative and quantitative with assessments based on TIME framework and the continuum of wound healing. The quantitative planimetry measurements were taken and Vistrak (A portable digital device that provides accurate, reproducible data for tracking wound progress) provided the wound surface measurements and photographs confirm the changes in colour and size of the wound. Qualitative measurements investigated comfort, absorbency, adhesion, ease of removal and durability. The study reviewed four patients (all gave full informed consent) with pressure ulcers with each patient being visited weekly over a 4-week period. The Allevyn Plus was left in situ until strike through was apparent and was changed by the patient's primary nurse. The weekly assessments were carried out by the researcher and the dressing was photographed prior to removal and the new dressing photographed on application. The nurses were asked to comment on ease of application, wear-time, absorbency and ease of removal of trial dressing. The outcome was surprising, as each of these wounds improved according to the TIME framework and each wound moved through the wound healing continuum toward granulation with one wound healing during the evaluation. No actual conclusion can be made of this as it was a simple evaluation of four patients. Nevertheless, it leads the author to question whether the thicker dressing might offer some pressure reduction over the sacral area and recommends that pressure should be investigated in a future study.

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### ***Evaluation of tegaderm absorbent clear acrylic dressing evaluation***

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This was a prospective, descriptive, evaluative, non-blinded clinical trial with sample size of 8 patients with partial or full-thickness dermal wounds that would normally require treatment with a hydrocolloid (low to medium exudate) or adhesive foam dressing (medium exudate). The aim was to evaluate the performance of 3M Tegaderm Absorbent Clear Acrylic dressing and to review the receptivity and appropriateness of this dressing in target

wounds. The secondary aim was to evaluate clinician acceptance of this clear, absorbent, acrylic dressing as an improved alternative to hydrocolloid dressings in terms of wear time, absorption and ability to visualize the wound. The absorbent film dressing, in contact with the wound surface, is perforated to allow uptake of the wound fluid by the absorbent acrylic pad. The film backing is not perforated and the non-perforated film backing is moisture vapour permeable, but impermeable to liquids, bacteria, and viruses. Planimetry measurement was used to assess the healing in the wounds but photographic evidence was considered the most powerful method of reviewing the dressing potential both before wear time and after 2 days wear. The patients ages ranged from 79 to 91 with a mean of 82.7 years and all the patients resided in nursing homes. Those with pressure ulcers or diabetic foot wounds were considered suitable for inclusion in the study. The evaluation was conducted over a 20-day period and photographs were taken of the wound every two days, whether the dressing was removed or left in place. Photographs were also taken before removal of the dressing where possible to assess the containment of the wound fluid. The results demonstrated the dressings potential to hold wound fluid in the central core in 100 % of the subjects. The wound was visible through the dressing until the core became filled with fluid. The patients found the dressing comfortable and the nurses found it easy to apply. The wound photographs were the main assessment tool in this study and they demonstrate the changes in the wounds. The amount of absorption capacity was based on subjective data from the nurses' opinions. The capacity of absorption was considered higher than hydrocolloids although this is based on subjective data from the nurses' opinion. This absorbent dressing is ideal for smaller wounds such as leg ulcers, skin tears and surgical wounds. It provides the opportunity to observe the wound without removing the dressing and offers an ideal wound healing environment.

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### ***TIME and wound assessment: non invasive evaluation of maceration***

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**Introduction:** Skin integrity is essential in heavily exuding wounds to prevent complications and increased workload from caregivers. Surrounding skin assessment to venous leg ulcers plays a key role in wound bed preparation. Aim of this study was to apply non invasive measurement techniques to validate the new TIME table on wound assessment.

**Methods:** 38 patients with venous leg ulcers and uncontrolled edema were enrolled in this study. Treatment assigned was four layers bandaging and moist wound healing. Surrounding skin assessment was performed weekly by means of trans epidermal water loss (TEWL), cutaneous temperature and skin hydration measurement for a total of 8 weeks treatment period.

**Results:** A reduction of TEWL was observed in 79 % of the subjects assessed, together with a significant increase of skin hydration in 65 % of patients compared to baseline measure-

ments.

**Conclusions:** Non invasive surrounding skin assessment can play a significant role in wound bed preparation of highly exuding venous ulcers.

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### ***The use of honey in slow to heal wounds***

***V. Robson***

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Non-healing wounds have a major impact on patients and health-care practitioners. The reasons why wounds fail to heal are complex and diverse. Many properties have been attributed to honey that aid in the management of wounds. Honey provides a moist environment to promote healing and it acts as a viscous barrier to minimise microbial invasion and fluid loss that limits cross-infection. Antimicrobial components contribute to the rapid clearance of infection, the reduction of bacterial burden and the elimination of malodour. Honey is also reported to have a debriding effect, to be anti-inflammatory and to hasten wound healing through the stimulation of tissue regeneration.<sup>1</sup> Honey has a long history of use as an antibacterial wound dressing, and evidence continues to grow for its effectiveness in care of chronic wounds where traditional wound care products have failed.<sup>1,2,3</sup> This paper examines the clinical use of Medihoney™ a proprietary antibacterial honey from Australian and New Zealand *Lepidospermum* sp. This mix of honey has been shown to have uniquely high levels of antibacterial component. The paper will illustrate a number of case studies in which the honey was used on recalcitrant wounds and complex post operative wounds. This honey product proved effective in these cases, there were no reported side effects and patients readily accepted the use of a 'natural' product. It is easy to use, and in uncomplicated wounds patients are able to manage their own dressings. The success of honey in wound management indicates that this age-old treatment that has been relegated into the archives of wound management, but which is now being revived and re-examined, deserves consideration alongside its modern day counterparts.

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**The cochrane wounds group****S. E. M. Bell-Syer, N.A. Cullum****Cochrane Wounds Group, University of York, York, United Kingdom**

*Aim:* To present an overview of the work of the Cochrane Wounds Group, its completed systematic reviews and the trials within its Specialised Trials Register.

*Methods:* The Cochrane Wounds Group was established in 1995 with the aim of using evidence from randomised controlled trials to summarise the effectiveness of interventions for the prevention and treatment of wounds and wound complications. Members of the Group search for controlled trials of wound care interventions, undertake and maintain systematic reviews.

*Results:* The Cochrane Wounds Group has 200 registered authors from 16 countries. There are 35 completed reviews (in 8 topic areas) and 26 protocols (reviews in progress) published in Issue 2, 2005 of the Cochrane Library with a further 34 reviews being started. The Wounds Group Specialised Trials Register lists 5000 citations to trials and is regularly updated through searching databases and handsearching journals and conference proceedings. Several reviews regularly appear in the top 50 most accessed reviews on Wiley Interscience the publisher of The Cochrane Library. The Wounds Group has been involved in updating national guidelines on pressure ulcer prevention and treatment, leg ulcers and perioperative fasting.

*Discussion:* Systematic reviews produced by the Cochrane Wounds Group contribute to clinical decision making, priority setting for research programmes and to clinical practice guidelines. They are widely disseminated through The Cochrane Library and print journals such as the BMJ and Evidence based Nursing.

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**The management of severe infection in oncological wounds in paediatrics – two case studies****T. Del Carlo, G. Casazza****Oncoematologia Pediatrica con Trapianto di Midollo Osseo – Azienda Ospedaliera Universitaria Pisana, Pisa, Italy**

*Aim:* This paper describes the successful management of two severely infected oncological wounds using advanced dressings such as ACTICOAT™, ALLEVYN™ and INTRASITE™ Gel.

*Methods and results:* *Case 1:* A thirteen-year-old boy affected by parameningeal Rhabdomyosarcoma embrionale, was admitted to hospital with a recurrent regional pathology ("right mastoid with extension to the petrous pyramid"). Radical surgery was performed. Two weeks later, an area of leakage of substance (2 × 2 × 2 cm) with abundant malodorous secretion from the ear cavity and from the external part in the right retro-auricular area was noticed. This lesion was secondary to the surgical wound and to the effect of radio-induced tissue necrosis; the wound had

been further complicated by a super infection. Exudate cultures were repeatedly positive for *Enterococcus faecalis*. The scheduled chemotherapy was discontinued. ACTICOAT was applied to the wound. In 17 days, infection had subsided and chemotherapy was recommenced. The wound regime now consisted of ALLEVYN Thin application. When the wound size was further reduced, plastic surgery was performed.

*Case 2:* A seven-year-old boy was admitted to the hospital with a diagnosis of acute leucosis. In the chin and lower lip region, he had an extended inflamed area (6 × 5 cm) infiltrated with eschar, which extended and entered and affected the lower gum fornix. Blood tests showed hyperleucosis with severe neutropenia and anaemia. A medullar sample revealed acute biphenotypical leukaemia (hybrid). Broad-spectrum antibiotics and polychemotherapy was commenced. Over the course of the following few days, a severe medullar aplasia developed and a skin swab was found to be positive for *Pseudomonas aeruginosa*. INTRASITE Gel was applied for 1 week which allowed rapid debridement. ACTICOAT was then applied and covered with ALLEVYN. Within 14 days, cultures were negative and the wound care regime was changed to CUTICERIN™ and ALLEVYN Thin. The wound healed in one month.

*Conclusions:* In these case studies, ACTICOAT was effective in the management of infected wounds and contributed to good wound bed preparation. Progress of the wound in Case 1 was such that chemotherapy was quickly recommenced and reconstructive surgery also to be performed.

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**Diabetic foot infection: A world of problems****J.C.F. Gouveia****Primary Care Centre, Pampilhosa da Serra, Portugal**

*Aim:* This case report study reports on the use of ACTICOAT™ Absorbent as an antimicrobial dressing to prevent infection. The objectives of this case study were the following:

- evaluate the efficiency of the protocol, of an critically colonised diabetic foot ulcer with ACTICOAT Absorbent
- cost-effectiveness evaluation.

- evaluate the evolution of healing, utilising ACTICOAT Absorbent, in terms of odour control, frequency of changes of dressings, absorption capacity of the dressing as well as pain control.

*Materials and methods:* ACTICOAT Absorbent was changed every two days depending on the patient tolerance. The degree of pain was evaluated as a 7 by a pain scale (0–10) by the patient. Exudate collection and semi-quantitative swabs were undertaken and the wound measurement was also evaluated. A reduction of the frequency of dressing changes occurred, since the patient could not support the taxi transportation costs incurred.

*Results:* It was verified that: ACTICOAT Absorbent presents a very effective alternative to the current protocol in critically colonised diabetic foot ulcers, as demonstrated by the semi-quantitative

tive swab analysis. The aim was completely achieved: eradication of infection. From a cost-effectiveness point of view, in this case, a saving of 45,12 % was verified at the end of the treatment regime. Although the unitary costs of the antibiotic was found to be lower, the increase in number of dressing changes resulted in an increase in travelling costs. The wound bed was covered with granulation tissue and a sinus of 2 cm deep, was closed. Furthermore, the odour was eliminated and the exudate was controlled. This permitted to the patient to proceed with his normal daily activities. The number of dressing changes reduced as the protocol progressed, demonstrating a good absorption capacity. Pain reduction was observed after the second dressing change to 0.

**Conclusions:** Due to the increasing number of infected, diabetic foot ulcers as well the increasing resistance to antibiotics, it is necessary to act in accordance to establish norms and protocols in order to maximise the human resources and the elimination of the pain component. Based on these findings, it should be expected that in practice, healthcare professionals should implement protocols that are effective and practical bearing in mind the well being of the patient as the core of the treatment.

™Trade Mark of Smith & Nephew †Nanocrystalline silver is a patented technology of NUCRYST Pharmaceuticals Corp., under license

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## Treatment of diabetic foot ulcers with protease inhibitors (Promogran®)

### Behandlung von diabetischen Fußwunden mit Proteasehemmer (Promogran®)

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**Introduction:** Recent research has shown that the pathophysiology and healing pattern of a chronic ulcer differs from that of acute wounds. An important feature of chronic ulcers is a more severe inflammation phase than in acute wounds. The fluid from a chronic ulcer contains 10–100 times more protein-splitting enzymes, the so-called proteases (metalloproteases, elastase etc.) which suggests a far higher breakdown of the components of the wound healing process, including growth factors. Promogran® is the first commercially available enzyme inhibitor able to bind proteases in tissue and render them inactive. As a result extensive breakdown is normalised. The use of enzyme inhibitors is a new method for improving the healing potential of an ulcer.

**Material and method:** The effect of Promogran® was assessed on 10 patients with diabetic foot ulcers classifiable as Wagner grade 1–3. The patients were followed for 12 weeks or until healing was complete. Frequency of change of dressings was 2–3 times a week. The product was cut to the size of the ulcer and positioned within the ulcer's edges. On interaction with the ulcer exudate, the material changes into a gel-like substance, which is completely absorbed by the ulcer in the course of 1–3

days. Depending on the degree of exudation, Tielle Borderless or Tielle Plus Borderless was used as a secondary dressing. Patients' dressings were changed by the project nurse 2–3 times a week and evaluation was performed at weekly intervals. On inclusion in the study and then every other week, the ulcer was photographed and the area of ulceration measured. The effect was assessed according to four parameters:

- Completely healed ulcers.
- Ulcers with ulcerated area reduced by 49-1 %.
- Ulcers with ulcerated area reduced by 99-50 %.
- Ulcers where the area had increased.

**Results:** Two patients left the trial when conditions of severe ischaemia made surgical intervention necessary. Of the 8 patients under evaluation, 4 healed completely. 3 patients had an ulcerated area reduced by 99–50 %. 1 patient had the ulcerated area reduced by 49–1 %. No side effects were observed during the study period.

**Conclusions:** In this study, Promogran® together with Tielle Plus/Tielle seems to be effective in treating diabetic foot ulcers classifiable as Wagner grade 1–3. Patients did not express any discomfort or difficulty in connection with the treatment. In particular, there were no problems with the ulcers' environment which could be ascribed to the product.

**Einleitung:** Die Forschung in den letzten Jahren hat ergeben, dass sich die Pathophysiologie und das Heilungsmuster einer chronischen Wunde in vielerlei Hinsicht von denen einer akuten Wunde unterscheiden. Ein wesentliches Merkmal der chronischen Wunde ist, dass sie sich in einer heftigeren Entzündungsphase befindet als die akute Wunde. In der Wundflüssigkeit aus der chronischen Wunde sind zehnt- bis hundertmal mehr proteolytische Enzyme, die sogenannten Proteasen (Metalloproteasen, Elastase u. a.), enthalten, was darauf hinweist, dass ein weitaus größerer Abbau der Bestandteile des Wundheilungsprozesses stattfindet, zu denen auch die Wachstumsfaktoren gehören. Promogran® ist der erste kommerziell zugängliche Enzymhemmer, der die Proteasen im Gewebe binden und inaktivieren kann. Dadurch wird der extensive Abbau normalisiert. Der Einsatz von Enzymhemmern ist ein ganz neues Verfahren zur Verbesserung des Heilungspotentials einer Wunde.

**Material und Methode:** Die Wirkung von Promogran® wurde an zehn Patienten mit diabetischen Fußwunden beurteilt, die als Wagner Grad 1–3 eingestuft werden konnten. Die Patienten wurden über zwölf Wochen oder bis zur vollständigen Heilung begleitet. Die Verbände wurden zwei- bis dreimal wöchentlich gewechselt. Das Produkt wurde auf die Größe der Wunde zugeschnitten und innerhalb der Wundränder auf die Wunde aufgebracht. Durch die Einwirkung des Wundexudats wird das Material in eine gelartige Substanz umgewandelt, die nach ein bis drei Tagen ganz von der Wunde absorbiert wird. Je nach Exudationsgrad wurde als Sekundärverband Tielle Borderless oder Tielle Plus Borderless verwendet. Der Verbandwechsel bei den Patienten erfolgte zwei- bis dreimal wöchentlich durch die Projektkrankenschwester, die Beurteilung fand in wöchentlichen Abständen statt. Bei der Inklusion sowie jede zweite Woche wurde die Wunde fotografiert und die Wundfläche aufgezeichnet. Die Wirkung wurde nach vier Parametern beurteilt:

- Vollständig verheilte Wunde
- Wunde mit um 49 – 1 % reduzierter Wundfläche
- Wunde mit um 99 – 50 % reduzierter Wundfläche
- Wunde mit vergrößerter Fläche

**Ergebnisse:** Zwei Patienten schieden aus der Studie aus, da ihr Zustand wegen schwerer Ischämie chirurgische Eingriffe erforderte. Von den acht beurteilbaren Patienten fand bei vier Patienten eine vollständige Heilung statt. Bei drei Patienten wurde die Wundfläche um 99–50% reduziert. Bei einem Patienten verkleinerte sich die Wundfläche um 49–1%. Während der Dauer der Studie wurden keine Nebenwirkungen beobachtet.

**Konklusion:** Promogran® scheint in dieser Untersuchung zusammen mit Tielle Plus/Tielle wirksam in der Behandlung von diabetischen Fußwunden zu sein, die als Wagner Grad 1–3 klassifiziert werden konnten. Die Patienten haben in Verbindung mit der Behandlung weder über Beschwerde

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### **Case studies with a novel hydrogel dressing in the treatment of chronic venous leg ulcers**

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W. Simmonds<sup>2</sup>, P. Davis<sup>3</sup>, J. Wilkins<sup>3</sup>**

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These case studies illustrate the effectiveness and carer and patient acceptability of a novel 2-layer antimicrobial hydrogel dressing\*. The dressing actively transports oxygen to the wound environment and also generates low levels of iodine which may help to control bacteria. The hydrogel aids autolytic debridement, where necessary, and maintains moisture balance to encourage healing. Four case studies (participants of a larger study) will be described. All patients suffering with recurrent venous leg ulcers were followed over a period of 42 days or until the ulcer healed. Ulcer size, condition of wound surface, wound malodour, condition of surrounding skin, rate of healing and patient comfort and acceptability were assessed at weekly intervals during treatment. The frequency and severity of pain experienced by the patients was also recorded. All four ulcers healed during the course of treatment. The wounds of three of the patients that had had slough became clean and healthy during the evaluation period. All four patients found the dressing comfortable under compression therapy and non-traumatic upon removal.

\* OxyzymeT is produced by Insense Ltd, Bedford, UK.

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### **Honey in wound care, evaluation of 110 fully documented case reports**

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**Introduction:** some 4 years ago honey became a hot topic in wound care. Suddenly respected researcher wrote articles about honey and its use in wound care. At least 4 commercial products were brought to the market\*.

**Methods:** Multicenter case reports of acute and chronic wounds were brought together. The healing time and overall comments by users and patients were evaluated. Total patients involved 110.

The studies were executed in different facilities, general hospitals (24), nursing homes (25) and home care facilities (61). The evaluated wounds were: acute wounds (bruises and burns) and chronic wounds (diabetic, venous insufficiencies, arterial diseases and pressure ulcers).

**Results:** The most striking effect of the ointment is the quick debridement seen in necrotic and sloughy wounds, then the faster healing rate in burns and venous ulcers. Another observation was that the honey ointment could be used in small and large, deep and superficial wounds and that no infections or allergic reactions were seen during the treatment. The best results were seen in small 2nd degree burns and venous ulcers. The ointment was able to heal skin tears quicker than any other product. Less difference was seen in the healing of pressure sores. All wounds were photographed and clearly dated and accompanied by important data about the patients pathology and medical background.

**Discussion:** Honey based ointment has shown in vivo and in vitro to kill most common wound pathogens and also yeast and fungi. The quick debridement leads to less inflammation and a faster healing. The fat in the ointment is a known scavenger for free oxygen radicals. It also protects the surrounding skin. In the presentation examples of this features will be shown.

**Conclusion:** Honey based ointments seems to have great advantages. More clinical trials must be done to confirm these optimistic results. It is also advisable to look for a scientific explanation.