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# Observational study of the effect of L-Mesitran® medical honey on wound healing in cats

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**ABSTRACT**

The aim of the study was to prove the healing effect of medical honey on contaminated nonsurgical wounds in cats. Ten cats with a total of fifteen contaminated nonsurgical wounds were included in the study. The wounds were treated with L-Mesitran® Soft medical honey wound gel and left to heal by second intention. All wounds smaller than 10 $cm^2$ healed in 7 to 56 days (mean 30.8 ± 16.0 days), wounds larger than 10 $cm^2$ healed in 28 to 105 days (mean 64.4 ± 31.12 days). Wounds with skin and subcutis involvement (Type 1) healed in 14 to 49 days (mean 29.17 ± 10.48 days), wounds where skin, subcutis and muscles, tendon and/or bones were involved (Type 2) healed in 7 to 105 days (mean 50.6 ± 30.74 days). The scab and necrotic tissue gradually cleared from all wounds. Odour and exudate in all wounds vanished by day 7, while pH lowered from 7.6 to 7.0 in 3 days. The mean time of the first appearance of granulation tissue in wounds Type 1 was 3.66 ± 1.63 days and for wounds Type 2 5.25 ± 2.55 days. The mean time to coverage of the bottom of the wound with granulation tissue was 3 to 18 days (mean 9.73 ± 5.11) days. Using the Mann-Whitney test, no statistically significant differences were found in healing of wounds between groups according to wound size and between groups according to the tissues involved on any of selected days ($P<0.05$). Treatment of wounds with medical honey had a positive impact on wound healing, because the function of the affected part of the body was not impaired, the wounds healed without complications and the cosmetic appearance was minimally altered due to a minimal amount of scar tissue formation, and regrowth of the hair.

**Key words:** cat; wound healing; medical honey; contaminated nonsurgical wounds; second intention healing

## Introduction

Apart from surgical wounds, the most common wounds in cats are abrasions, lacerations, contusions, shearing wounds, burns, bites, and inflammatory wounds (ANDERSON, 1996; PAVLETIC, 2010; HOSGOOD, 2012).

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The wound healing continuum is divided into 3 phases: inflammation, proliferation and maturation. Inflammation is initiated immediately after the trauma and is followed by the proliferative phase that is characterized by the formation of granulation tissue (ANDERSON, 1996; CORNELL, 2012). In the maturation phase, remodeling and restoration of the normal structure take place (ANDERSON, 1996).

In all phases of wound healing it is essential to provide conditions for optimal wound healing and to prepare the wound for possible definitive closure (ANDERSON, 2009). Healing by primary closure is undoubtedly the most satisfactory outcome of wound management, but is usually only a solution for surgical wounds. Most traumatic wounds are contaminated and cannot be closed primarily (ANDERSON, 1996; WILLIAMS, 2009). In the early stages of wound management control of infection, lavage and debridement are the most important goals. When the wound is clean, delayed primary or secondary closure should be the goal (WILLIAMS, 2009). Delayed primary closure is performed after 48-72 hours, before granulation tissue develops. Secondary closure is done after 5-7 days when granulation tissue develops (ANDERSON, 2009). The wound can also be managed as an open wound until it is fully healed (ANDERSON, 1997). The so-called second intention healing allows the wound to granulate, contract and epithelialize (ANDERSON, 1996; PAVLETIC, 2010; HOSGOOD, 2012). This is generally reserved for dirty or infected wounds or large skin defects (DEMETRIOU and STEIN, 2011). As the wound starts to granulate, the priority is to prevent damage to the wound surface, including prevention of desiccation (HOSGOOD, 2012; ANDERSON, 2009), which is achieved by appropriated bandage and dressing (ANDERSON, 1996; ANDERSON, 2009).

As a dressing on wounds, honey provides a moist healing environment, rapidly clears infection, deodorizes, and reduces inflammation, edema, and exudation. It increases the rate of healing by stimulation of angiogenesis, granulation, and epithelialization (MOLAN, 2001).

Honey is a natural product prepared by bees from nectar and contains about 180 different substances (DE ROOSTER et al., 2008). The antimicrobial properties of honey are attributed to many factors, including acidity, hydrogen peroxide content, osmolarity and phytochemical components (MOORE et al., 2001). Honey also reduces pain, as the pain in wounds results from the nerve endings being sensitized by prostaglandins produced in the process of inflammation, as well from pressure on the tissues resulting from edema (MOLAN, 2002; TONKS et al., 2001; TONKS et al., 2003).

Honey has been used for wound care in various cultures all over the world for many centuries, nevertheless it is still considered “alternative healing” by many clinicians.

In the last decade honey has been rediscovered for wound treatment in humans (FAKHRI et al., 2013) but to the authors’ knowledge mainly single clinical cases have been described in small animal practice, instead of prospective studies (DE ROOSTER et al., 2008).

While searching the literature we could not find data on how long second intention healing takes in cats (ANDERSON, 1997; PAVLETIC, 2010), some authors agree that it may be several months (HOSGOOD, 2006), but detailed information is missing. Also no data were available on how much of the wound will heal in 1, 2, 3 weeks' time, which is important data for the owner, as well as for veterinarians when discussing the progress and prognosis of wound healing.

Therefore, the aim of our study was to observe the healing effect of medical honey on different types of contaminated nonsurgical wounds in cats. Wounds were treated with L-Mesitran® Soft gel and L-Mesitran® Tulle, both containing medical honey. We assessed the time of healing, functional and cosmetic repair, and evaluated if the use of medical honey in wound treatment could be an alternative treatment to more advanced reconstructive surgery.

## Materials and methods

Ten cats, 9 domestic short-haired and one mixed long-haired cat, aged 5 months to 8 years old, of both sexes, 4 females and 6 males, weighing from 0.58 to 6.08 kg, with a total of 15 nonsurgical wounds, were included in the study. The wounds were divided into 2 groups according to the size of the wound (smaller than 10 $cm^2$ and larger than 10 $cm^2$) and into 2 groups (Type 1 and Type 2) according to the tissues involved. In Type 1wounds the skin and subcutis were involved and in Type 2 wounds the skin, subcutis and muscles, tendon and/or bones were involved (Table 1).

Table 1. Size, type and location of wounds

| Number of wound | Wound size in $cm^2$ on day 0 | Type of the wound | Location of the wound |
|---|---|---|---|
| 1* | 6.13 | dry necrosis | Right dorsal tarsus |
| 2* | 51.54 | lacerocontusion | Right leg, circumferential from the elbow to the paw |
| 3* | 7.74 | bite wound | Left caudal gluteal region |
| 4* | 4.47 | abrasion | Left lateral metatarsal region and avulsion of 3 pads |
| 5 | 2.48 | lacerocontusion | Left tibial and tarsal region |
| 6 | 50.81 | ulcerated wound | Base of the tail, perianal, perivulval region, extending to the abdomen and on the medial side of the right hind leg |
| 7 | 0.98 | dry necrosis | Right palmar region |
| 8 | 3.10 | dry necrosis | Right dorsal metatarsus and central pad |

* = wound Type 2; shaded fields represent wounds larger than 10 $cm^2$

Table 1. Size, type and location of wounds (continued)

| Number of wound | Wound size in $cm^2$ on day 0 | Type of the wound | Location of the wound |
|---|---|---|---|
| 9* | 24.44 | lacerocontusion | Metatarsus and tarsus of a right leg |
| 10* | 5.40 | dry necrosis | Left palmar region |
| 11 | 1.50 | dry necrosis | Left dorsal metatarsus and central pad |
| 12* | 6.19 | dry necrosis | Left dorsal tarsus |
| 13 | 17.19 | necrosis | Right medial, lateral and palmar antebrachial region |
| 14* | 14.73 | bite wound | Right side of the face extending from mouth to eye and pinnae |
| 15* | 3.87 | avulsion followed by amputation | $2^{nd}$ and $3^{rd}$ digit from carpal joint |

* = wound Type 2; shaded fields represent wounds larger than 10 $cm^2$

All wounds were older than 2 days, some of them had been previously treated by a referring veterinarian. Owner consent for participation in the research study was signed for each animal, where participation was entirely voluntary. Only contaminated or dirty wounds and/or wounds with skin defects of a size where closure without tension was not possible, therefore not suitable for the primary closure, were included in the study. All animals with oncological wounds or wounds where primary closure was possible, as well as immunosuppressed animals and animals on immunosuppressive drugs were excluded from the study.

The day of inclusion of the animal in the study was assigned as day 0. All wounds were assessed until they had healed. All cats received analgesics and 7 cats received antimicrobial therapy.

To investigate the effect of medical honey on wound healing, we used L-Mesitran® Soft, wound gel and L-Mesitran Tulle (Theo Manufacturing BV, Maastricht, Netherlands). L-Mesitran® Soft gel contains 40% medical grade honey, medical grade hypoallergenic lanolin (Medilan®), propylene glycol, polyethylene glycol PEG 4000, vitamins C and E.

L-Mesitran® Tulle is a non-adherent polyethylene dressing impregnated with the patented L-Mesitran® Soft.

Before starting the study, we included a control group in the protocol. Wounds in cats in the control group were treated with saline soaked sponges and bandaged, but all 3 cats deteriorated after 2 - 3 days and developed severe inflammatory response with leukocytosis and a high temperature of 40 °C, therefore we stopped that kind of treatment, which we considered unethical, so we had no control group in our study.

Wounds were treated by the following protocol:

- wound evaluation (necrosis, scab, granulation, odor, exudate, and type of affected tissues) was done on selected days, days 0, 3, 7, 14, 21 and day 28, then once a week until the wounds had healed,
- measurement of pH of the wound was performed with pH test strips (pH-Fix 0 - 14, Macherey - Nagel GmbH&Co KG, Germany) on selected days, day 0, 3, 7, 14, 21 and day 28,
- the wound was protected with a sterile swab during hair clipping on day 0,
- lavage of the wound before each bandaging with 500-1000 mL of an isotonic 0.9% sterile saline, using 50 mL syringe and 18 G needle,
- surgical debridement of the devitalized tissue when needed, followed by additional rinsing with isotonic 0.9% sterile saline,
- drying of the wound with sterile swabs,
- measuring the size of the wound with a ruler, photographing the wound on selected days, day 0, 3, 7, 14, 21 and day 28, then once a week until the wounds had healed. The area of the wound was determined using the Image J program,
- dressing of the wound (dressing 1 or dressing 2).

Dressing 1 was applied once daily from day 0 to day 6. After the wound had cleaned and the exudate diminished, from day 7 until the wounds healed we added L-Mesitran® Tulle (dressing 2) and bandaged wounds every third day.

*Dressing 1* - L-Mesitran® Soft medical honey was applied over the entire surface of the wound and covered with a low-adherent absorbent dressing, Melolin® (Smith & Nephew Medical Limited, Hull, UK). Melolin® consists of a low adherent perforated film, highly absorbent cotton/acrylic pad and hydrophobic backing layer. The plastic film is present to prevent the dressing adhering to the surface of the wound, and is perforated to allow the passage of exudate from the wound into the body of the pad. Melolin® was covered with sterile swabs, cotton rolled padding Soffban® Natural (BSN Medical, Inc., Charlotte, USA) and self-adherent elastic wrap Coban™ (3M, St. Paul, USA).

*Dressing 2* - the primary layer was L-Mesitran® Soft medical honey covered with L-Mesitran® Tulle. L-Mesitran® Tulle was covered with Melolin®, sterile swabs, cotton Soffban® Natural and Coban™.

*Statistical analysis.* In the results all data are presented as mean ± standard deviation (SD). Previous to statistical analysis all data were assessed for normality of distribution using the Shapiro-Wilk test. Since most of the data were not normally distributed and the samples were relatively small, a non-parametric test was used for statistical analysis. We used the nonparametric Mann-Whitney Test to compare healing in wounds Type 1 and

Type 2, and to compare healing in wounds smaller than 10 $cm^2$ and larger than 10 $cm^2$ on the selected days. All statistical analyses were performed using SPSS 17.0.

## Results

More than half of all the wounds (n = 8) had more than 30% of their surface covered with necrotic tissue on day 0. In one cat (Fig. 1) severe inflammation with edema developed after flushing the wound with Skinsept® mucosa. Necrosis (Fig. 2) cleared from 6 wounds in 1 week, in 3 wounds necrotic tissue persisted up to day 28.

Fig. 1. Extensive inflammation with oedema of a 3-year old cat

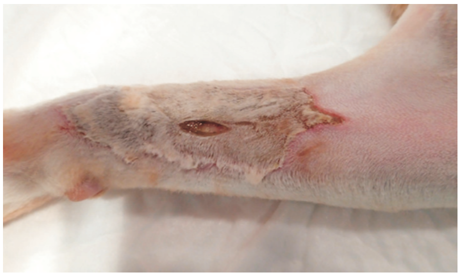

Fig. 2. Necrosis of the skin and subcutis in antebrachial region of a 3-year old cat

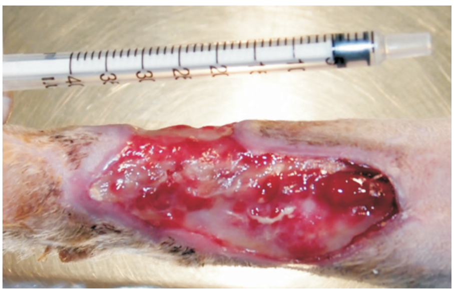

Fig. 3. Granulation tissue first appeared in small spots across the wound surfaces

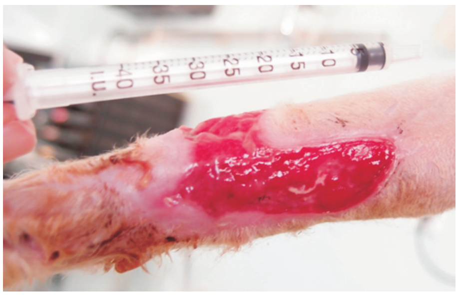

Fig. 4. Granulation tissue covered the whole wound

One wound (dry necrosis) had a scab on the surface from day 7 to day 14, and another wound had a scab (ulceration) on day 21. The other wounds had no scab form throughout the healing.

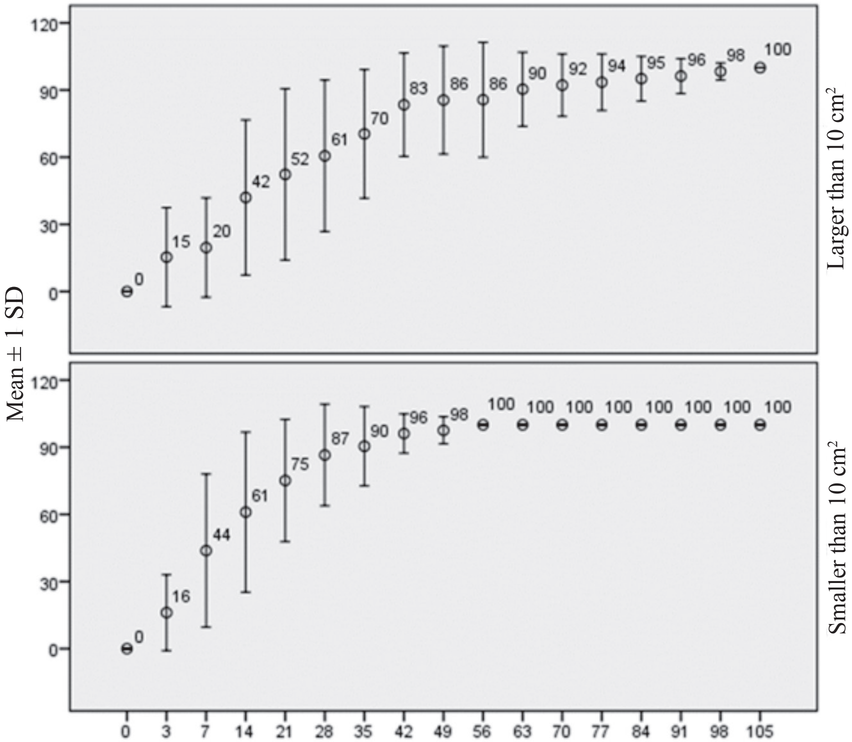


Fig. 5. Wound healing according to wound surface. Data represent mean ± SD. N = 15. There were no statistically significant differences between groups on selected days.

The first granulation tissue in Type 1 wounds appeared from day 3 to day 7 (mean 3.66 ± 1.63 days) except in one wound with extensive necrosis where it appeared on day 19 (Fig. 3). In Type 2 wounds the first granulation tissue appeared from day 3 to day 10 (mean 5.25 ± 2.55 days), except in one wound with extensive necrosis where it appeared as late as on day 12. The time to coverage of the bottom of all wounds with granulation tissue was 3 to 18 days (mean 9.73 ± 5.11 days) except one wound (Fig. 4).

An unpleasant odor was noticed in 13% of wounds on day 0 but it vanished by day 7.

Exudate was most prominent in all wounds in the first week of healing.

The mean pH of wound exudate on day 0 was 7.6 and it decreased to 7.0 on day 3.

All wounds smaller than 10 $cm^2$ healed by day 56 (mean 30.8 ± 16.0 days). The mean percentage reduction of wound surface on day 7 was 43.81% ± 34.22, on day 14 61.01% ± 35.77 and on day 21 75.15% ± 27.31 (Fig. 5).

Wounds larger than 10 $cm^2$ healed in 28 (Fig. 6a, 6b) to 105 days (Fig. 7a, 7b) (mean 64.4 ± 31.12 days). The mean percentage reduction of wound surface on day 7 was 19.60% ± 22.20, on day 14 41.99% ± 34.65, on day 21 52.31% ± 38.24 and on day 56 85.66 ± 25.69.

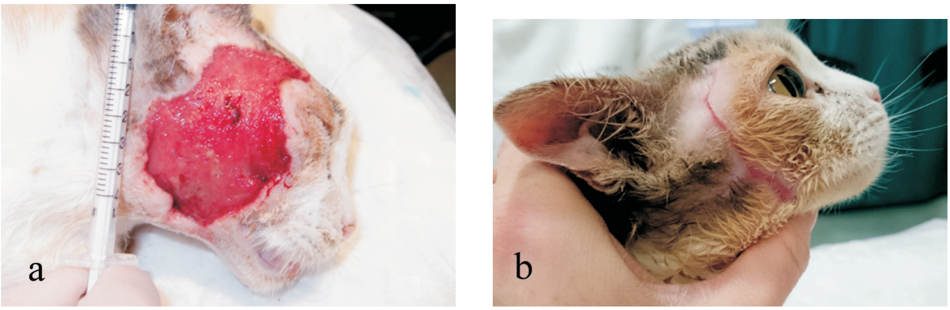


Fig. 6. A 3-year-old cat with a wound on the right side of the face extending from mouth to eye and pinna on day 0 (6a) and healed wound on day 28 (6b)

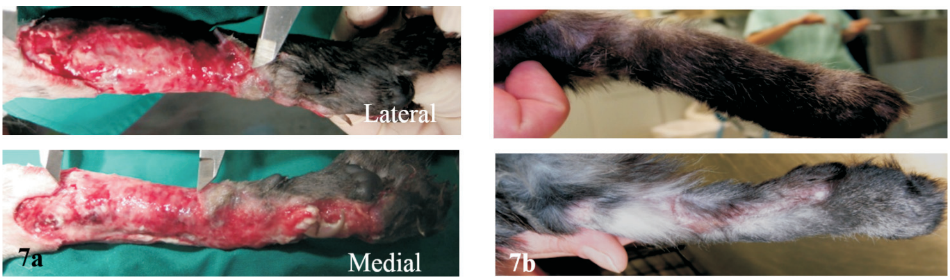


Fig. 7. Wound on the limb of a cat, in which the skin was missing on 100% circumference of the limb and extending over joints on day 0 (7a). Wound healed completely without complication and with a very good cosmetic result by second intention (7b).

Type 1 wounds healed in 14 to 49 days (mean 29.17 ± 10.48 days). The mean percentage reduction of wound surface on day 7 was 45.43% ± 29.93, on day 14 68.64% ± 35.42 and on day 21 80.59% ± 35.55 (Fig. 8).

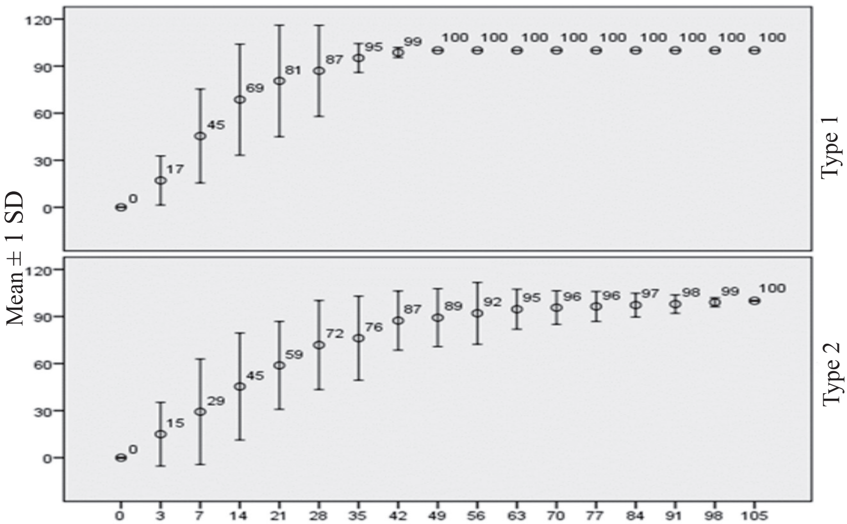


Fig. 8. Wound healing according to affected tissues. Data represent mean ± SD. N = 15. There were no statistically significant differences between groups on selected days.

Type 2 wounds healed in 7 to 105 days (mean 50.6 ± 30.74 days). The mean percentage reduction of wound surface on day 7 was 29.27%, ± 33.62, on day 14 45.36% ± 34.09 and on day 21 58.74% ± 28.02 (Fig. 8).

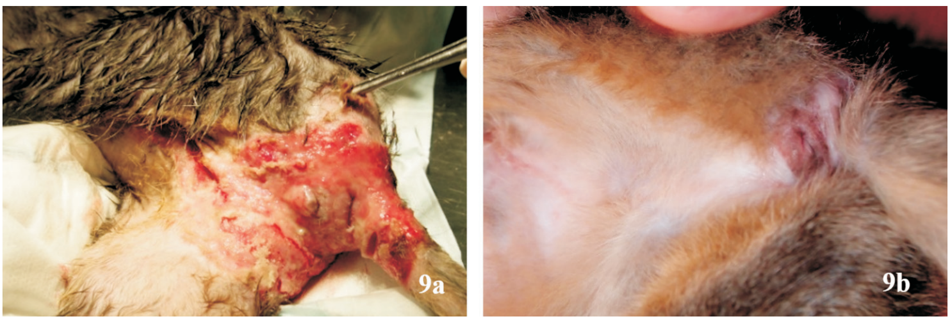


Fig. 9. Cat with extensive ulcerative skin wound and necrosis on day 0 (9a). Wound was healed on day 42 (9b).

All wounds included in our study healed completely and without complications (Fig. 9a, 9b).

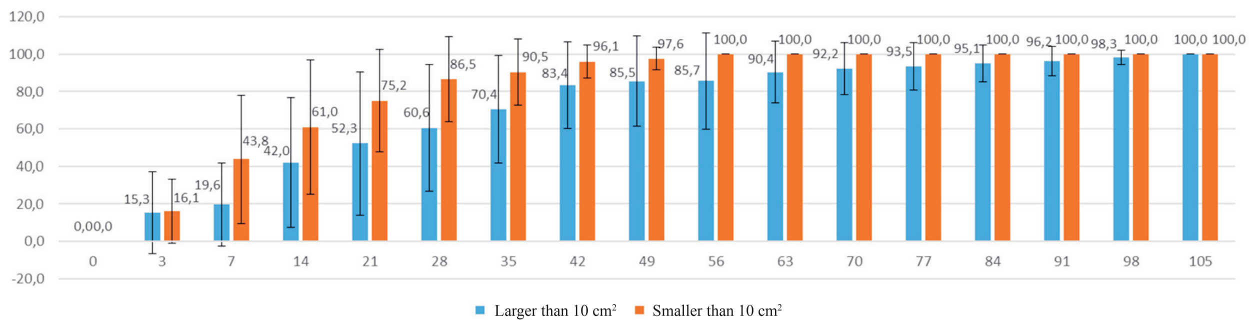


Fig. 10. Comparison of wound healing between groups according to wound surface. Data represent mean ± SD. N = 15. There were no statistically significant differences between groups on selected days.

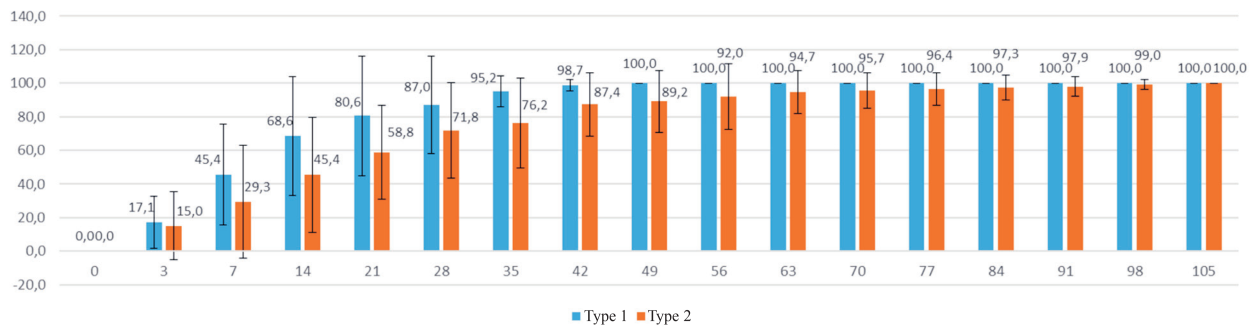


Fig. 11. Comparison of wound healing between groups according to affected tissues. Data represent mean ± SD. N = 15. There were no statistically significant differences between groups on selected days.

No statistically significant differences were found by the Mann-Whitney test in the healing of wounds between the groups according to wound size and between groups according to the tissues involved, on any of the selected days ($P>0.05$) (Figs. 10, 11).

**Discussion**

Due to contamination many traumatic wounds in animals are left for delayed primary or secondary closure, using wound debridement and cleaning techniques in the meantime (ANDERSON, 2009). The most important aspect of open wound management is wound lavage which rehydrates necrotic tissue, reduces and removes bacterial contamination, foreign material, toxins, cytokines and debris (ANDERSON 1996; ANDERSON, 1997). In our study we used 0.9% sterile saline for wound lavage and before each bandaging. There is a wide range of solutions available to clean a wound, however, antiseptics damage cells non-selectively, and have little effect on reducing bacterial load (DYCUS and WARDLAW, 2013). There is no evidence that these solutions are better than an adequate volume of isotonic fluids, in fact, they may be more harmful (DERNELL, 2006; ANDERSON, 2009; HOSGOOD, 2012). Isotonic fluids are considered the best choice, as they are non-toxic and do not cause cell rupture or electrolyte imbalance (ANDERSON, 2009; HOSGOOD, 2012).

Two cats were presented to our clinic with a povidone-iodine wound dressing and both developed extensive skin burns, with necrosis. Additionally, 1 cat was presented with a perforating wound with a dead space of 3 cm under the skin on the antebrachial region. The wound was thoroughly flushed with Skinsept® mucosa, containing 0.3% chlorhexidine, 9.9% ethanol and 0.5% hydrogen peroxide. In this case, the antiseptic solution in a concentration not suitable for wound irrigation, pooled under the skin and caused extensive inflammation with edema (Fig. 1), leading to necrosis of the skin and subcutis (Fig. 2).

The varied studies in human medicine provide evidence that in most instances, povidone-iodine and chlorhexidine do not effectively promote good wound healing; in fact, most studies showed either impaired wound healing (KRAMER, 1999; ATIYEH et al., 2009; WILKINS and UNVERDORBEN, 2013) reduced wound strength, or infection (KRAMER, 1999). There is no evidence of the toxic effect of povidone-iodine and chlorhexidine on skin in cats, but our cases clearly demonstrate that antiseptics for skin preparation should not be applied to wounds.

Odor in all wounds vanished and exudate diminished by day 7. Mean pH lowered from 7.6 to 7.0 in 3 days. The low pH of honey is inhibitory to many animal pathogens, with their optimum pH for growth normally falling between 7.2 and 7.4 (MOLAN, 1992). The scab and necrotic tissue gradually cleared from all wounds. A scab was present on 1 wound in a cat who had removed the bandage few times before coming to the clinic.

The cat with an ulcerated wound in the perianal and perivulval region had difficulties adjusting to the wound, consequently the scab formed.

Cleansing and debriding properties can be attributed to medical honey, as it is assumed that honey removes attached slough and necrotic tissue by facilitating autolytic debridement by way of the honey creating a moist wound environment through its high sugar content, causing constant osmotic withdrawal of fluid from the wound bed, which is replaced from the underlying circulation. However, the faster rate of debridement observed with honey than with hydrogels suggests that honey must have a stimulatory action on protease on the wound bed (MOLAN, 2009).

Cats are known to produce significantly less granulation tissue than dogs, and the granulation tissue first appears on the wound edges and then slowly advances across the wound surface (BOHLING et al., 2004; BOHLING et al., 2006; BOHLING and HENDERSON, 2006). In our study, the granulation tissue appeared in small spots (Fig. 3) across the wound surface and then covered the whole wound (Fig. 4). The mean time of the first appearance of granulation tissue in Type 1 wounds treated with medical honey was 3.66 days, and for Type 2 wounds it was 5.25 days, which is less than in a previous study where full-thickness skin defects were created with a scalpel blade and the first granulation tissue appeared on day 6 (BOHLING et al., 2004; BOHLING et al., 2006). Additionally, the mean time to coverage of the bottom of the wound with granulation tissue was 9.73 days, which is significantly shorter than in cats in the study of BOHLING et al., 2004 where it was 18 days. We would expect surgical wounds with straight edges created in a sterile environment to heal faster than accidental wounds, with a large burden of bacteria, foreign and necrotic material, which was the case in our study. Only in two wounds, one Type 1 and one Type 2, did granulation tissue appear as late as on days 19 and 12, respectively. Extensive necrosis in both wounds extended to the entire subcutis and persisted in the wound for one week which presumably caused a lag in healing.

In second intention healing the epithelium may be fragile and easily abraded (HOSGOOD, 2012), and scarring may result in recurrent wound break down (ANDERSON, 1997), which is disturbing from an aesthetic point of view (O'DWYER, 2007; CORR, 2009). No cat in our study developed any functional disorder or wound break down.

Healing by second intention may cause cicatrisation over joints and body openings, which may compromise function (ANDERSON, 1996; WILLIAMS, 2009). In our study 6 wounds were located over a joint (Fig. 7a), one wound was located on the right side of the face, extending from the mouth to the eye and pinnae (Fig. 6a), two wounds were located near to the anus (Fig. 9a). No compromise of function of the joint (Fig. 7b) movement or body opening was noticed after healing (Fig. 6b, 9b).

Healing by second intention may take several months for extensive wounds (HOSGOOD, 2006). In parts of the body where there is a great deal of motion, wound healing may be further slowed (VAN HENGEL et al., 2013). In our study, Type 1 wounds (affected skin and subcutis) healed on average in 1 month (29 days) and Type 2 wounds (affected skin, subcutis and muscles, tendons and/or bones) healed on average in 2 months (51 days).

It is known that in full-thickness wounds, adnexal structures do not regenerate and pigmentation of the skin is not complete (HOSGOOD, 2006). However, in the cats included in our study cicatrisation was minimal and the healed area was overgrown with hair, which is consistent with EFEM (1988) (Fig. 6b, 7b, 9b). He proposed that good regeneration of the skin may be attributed to the properties of honey, which mobilize the epithelial cells from the edges of the wound and activate the still vital epithelial cells from the hair follicles (EFEM, 1988).

Second intention healing for wounds on distal extremities may be considered for superficial wounds involving less than a 30% circumference of the limb (FOWLER, 2006). Closure of the wounds on the extremities under excessive tension can lead to edema or circulatory compromise of tissues distal to the wound (TER HAAR et al., 2013), therefore skin grafts are recommended, after establishing a bed of granulation tissue or for immediate reconstruction of clean wounds overlying healthy muscle (FOWLER, 2006). Nevertheless, we treated 7 wounds with medical honey, where the skin was missing on more than a 30% circumference of the limb. All these wounds healed with minimal scarring, and the function of the affected limbs remained unaffected. Wounds on the limbs of two cats, in which the skin was missing on 100% circumference of the limb and extending over the joints, healed completely without complications and with a very good cosmetic result by second intention (Fig. 7b). In both cases, amputation was proposed due to the expected expensive and long healing that would be further complicated in case of any failure of reconstructive surgery. The costs were not financially feasible for the owners. Both cases demonstrate that even extensive wounds on limbs in cats may be treatable with the use of medical honey without advanced reconstructive surgeries, and should be proposed to all owners with a difficult financial situation, or to owners whose animals cannot tolerate anesthesia.

According to many authors, healing by second intention can be prolonged, distressing for both clients and animals, and expensive (ANDERSON, 1996; ANDERSON, 1997; VAN HENGEL et al., 2013) in terms of dressing changes. The costs of wound management in our study were calculated and we came to the conclusion that the costs of bandages were less than reconstructive surgery. On average, a wound that healed in 60 days was bandaged with medical honey 24 times. The same protocol for bandaging would have been used until the wound was ready for reconstructive surgery and afterwards to provide support, prevent self-inflicted trauma and allow for absorption of wound fluids until suture removal. Should necrosis of the skin flap occur, necrotic skin should be removed and the resulting wound allowed to granulate for a few days, and then either closed with a new skin graft or allowed to heal by second intention (ANDERSON, 1997; TER HAAR et al., 2013). Throughout the process, the wound must be protected by a bandage. In conclusion, healing by second intention is more cost/benefit effective and should be proposed at least to all clients whose animals cannot tolerate anesthesia, for example animals with congenital heart diseases, diabetes mellitus, and pediatric patients.

Our study showed that healing of traumatic wounds in cats by second intention with the use of medical honey is more cost/benefit effective than closing wounds by advanced surgery. Wound healing with medical honey in cats resulted in a very good cosmetic appearance, so in all cases the owners were very satisfied with the healing.

## Conclusion

Honey has no reported toxic side-effects. On the basis of our results we conclude that the treatment of wounds with medical honey had a positive impact on wound healing, because the function of the affected part of the body was not impaired, the wounds healed without complications, and the cosmetic appearance was minimally altered due to a minimal amount of scar tissue and regrowth of the hair.

**Conflicts of interest**

The authors do not have any potential conflicts of interest to declare.

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**LUKANC, B., T. POTOKAR, V. ERJAVEC: Istraživanje učinka medicinskog meda L-mesitran® na cijeljenje nekirurških rana kod mačaka. Vet. arhiv 88, 59-74, 2018.**

**SAŽETAK**

Cilj istraživanja bio je dokazati ljekoviti učinak medicinskog meda na onečišćene nekirurške rane kod mačaka. U istraživanje je uključeno deset mačaka s ukupno petnaest kontaminiranih nekirurških rana. Rane su liječene medicinskim medom, L-Mesitran®, mekanim gelom koji se nanosi s ciljem sekundarnog cijeljenja. Sve rane manje od 10 $cm^2$ zacijelile su u 7 do 56 dana (prosječno 30,8 ± 16,0 dana), a rane veće od 10 $cm^2$ zacijelile su u 28 do 105 dana (prosječno 64,4 ± 31,12 dana). Rane koje su uključivale slojeve kože i potkožja (tip 1) zacijelile su u razdoblju od 14 do 49 dana (prosječno 29,17 ± 10,48 dana), a rane kod kojih su uključeni koža, potkožje te mišići, tetive i/ili kosti (tip 2) u razdoblju od 7 do 105 dana (prosječno 50,6 ± 30,74 dana). Kraste i nekrotično tkivo postupno su nestali sa svih rana. Miris i eksudat sa svih rana nestali su do 7. dana, dok je snižavanje pH od 7,6 do 7,0 nastupilo u 3 dana. Prosječno vrijeme prvoga pojavljivanja granulacijskog tkiva kod rana tipa 1 bilo je 3,66 ± 1,63 dana, dok je kod rana tipa 2 iznosilo 5,25 ± 2,55 dana. Vrijeme prekrivanja dna rane granulacijskim tkivom iznosilo je od 3 do 18 dana (prosječno 9,73 ± 5,11 dana). Mann-Whitneyevim testom, bez obzira na odabrane dane, nisu utvrđene statistički značajne razlike ($P<0,05$) u cijeljenju rana među skupinama prema veličini rane i među skupinama prema vrstama uključenih tkiva. Liječenje rana medicinskim medom pozitivno je utjecalo na njihovo cijeljenje jer funkcija tretiranog dijela tijela nije bila narušena, rane su zacjeljivale bez komplikacija, a kozmetički je izgled minimalno promijenjen zbog minimalne količine formiranog ožiljkastog tkiva i ponovnog rasta dlake.

**Ključne riječi:** mačka; cijeljenje rana; medicinski med; onečišćene nekirurške rane; sekundarno cijeljenje

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