A Comparative burn wound model in a Duroc pig for the histopathological evaluation of local therapeutic regimes: DuoDerm E and Elasto-Gel

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So many dressings, and they all claim to be better than ....

How can we obtain objective information which will tell us what the dressing does exactly on the wound.

We believe that the macroscopic evaluation should be accompanied by a histological evaluation.
The pig model

- Pig skin is histologically close to the human skin
- Make identical burn wounds
- The pig is his own control
- When difference in parameter is more than 30% then statistically one pig is enough.
- This experiment is not possible in humans
6 equal wounds on each flank
Research questions

- Which dressings shows the fastest epithelialization?
- How long can the dressing stay on the wound?
- How fast is granulation tissue growing in the wound?
- What is the scar outcome during and after the treatment?
- What is the bacterial load in the wound during the treatment?
Materials and methods

- One Duroc pig (red hared)
- Twelve areas 7 by 7 cm (6 on each flank)
- Deep dermal burns were inflicted by applying a brass block of 6.7 x 6.7 cm, weighing 450 grams.
- The block was heated up to 170°C and was applied during 20 seconds without additional pressure.
Jean-Luc the Duroc pig
Results: Macroscopically

- After 7 days we see that the crust is becoming plastisized under Elasto-gel.
- The dead tissue under DuoDerm E dissolves and no real crust is visible.
- Epithelialization is faster under DuoDerm but at pbd 21 the epithelium is becoming open again.
- The DuoDerm E treated wounds have a typical odor.
- At the end (pbd 43) there is no difference.
Central ulcer scar thickness in mm

Date:
- 15/01/97
- 22/01/97
- 29/01/97
- 5/02/97
- 12/02/97

Materials:
- DuoDerm E
- Elasto-Gel
Microscopically (1)

- The thickness of the granulation tissue during the healing under the two dressings is significantly different.
- The build up of granulation tissue shows the same pattern under the two dressings.
- The granulation build up is 50% to 60% higher in DuoDerm E in comparison to Elasto-Gel.
Under Elasto-Gel there are almost no bacteria present during the whole treatment.

Under DuoDerm E we find a fully colonized wound during the first 3 weeks and then the amount of bacteria drops fast.

There is an abundance of fibroblasts in the DuoDerm E treated wounds and a higher inflammation reaction.

This is the opposite in the Elasto-Gel treated wounds.
DuoDerm E, Pbd 21
Thickness of granulation tissue is 4.2 mm
DuoDerm E, Pbd 21
Gram Staining
Fully colonized
Elasto-Gel, PBd 21
Thickness of granulation tissue is 1 mm.
Elasto-Gel Pbd 21
Gram staining
almost no bacteria
The use of an animal model gives us more information. The high amount of bacteria under the DuoDerm E treated wounds could explain the odor and the higher inflammation with as result the higher granulation tissue build up.
Discussion (2)

- The almost absence of bacteria under the Elasto-Gel treated wounds could explain the lower inflammation and the absence of odor and consequently the slower build up of granulation tissue.

- The higher reaction of the macrophages could be due to the glycerine (Elasto-Gel consist of 65% glycerine) but why is not answered yet.
Future

- The pig is still alive and we will wait another 3 months and see if there is a difference in scar outcome between the two dressing regimes.
- Additional pig studies are needed
- Additional test on the cellular level are needed to clarify the role of glycerine.
Conclusion (1)

- In burn wounds we do not want the wound to scar to much (hypertropic scar and keloids).
- We now that the formation of granulation tissue is an unwanted phenomenon in healing burns.
- So we have shown that the formation of granulation tissue under Elasto-Gel is 60% lower than under DuoDerm E in deep 2nd degree burns in a Duroc pig model.
- This might lower the possibility of an hypertrophic scarring !!!
Conclusion (2)

- So we have shown that the formation of granulation tissue under Elasto-Gel is 60% lower than under DuoDerm E in deep 2nd degree burns in a Duroc pig model.
- Elasto-Gel might lower the possibility of hypertrophic scarring in burns !!!