

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

**Jan Vandeputte, RN, MA, Infection
control manager A.Z. St. Jozef Oostende,
Belgium, Europe**



Background

- 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 histological 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



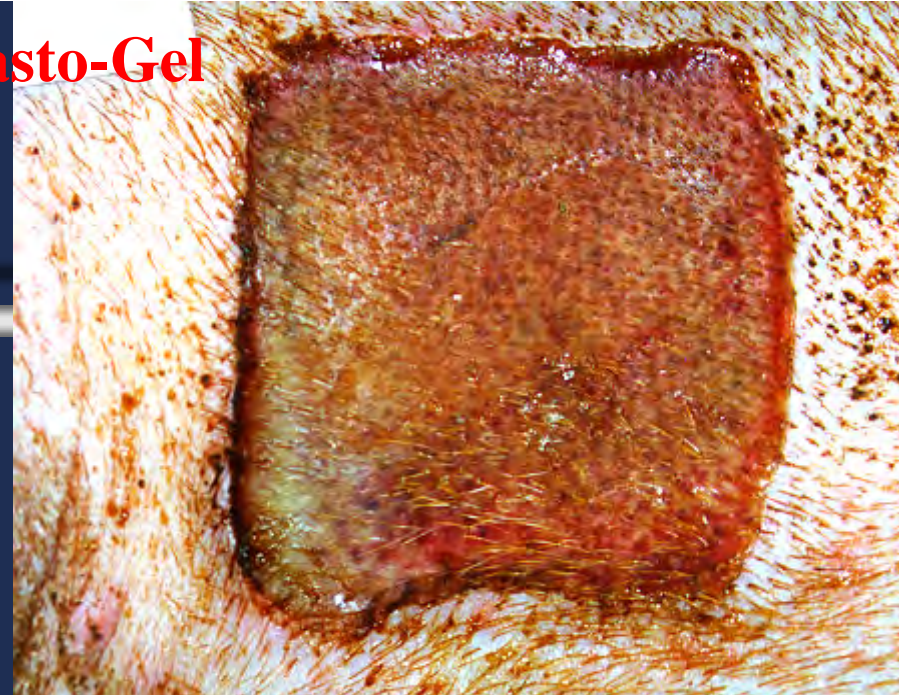
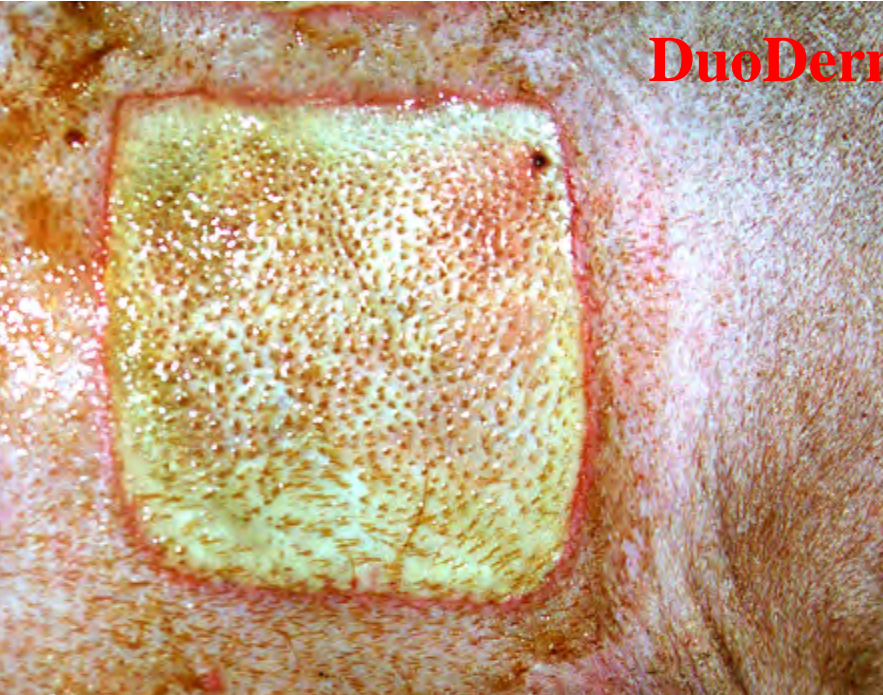
Results : Macroscopically

- 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.

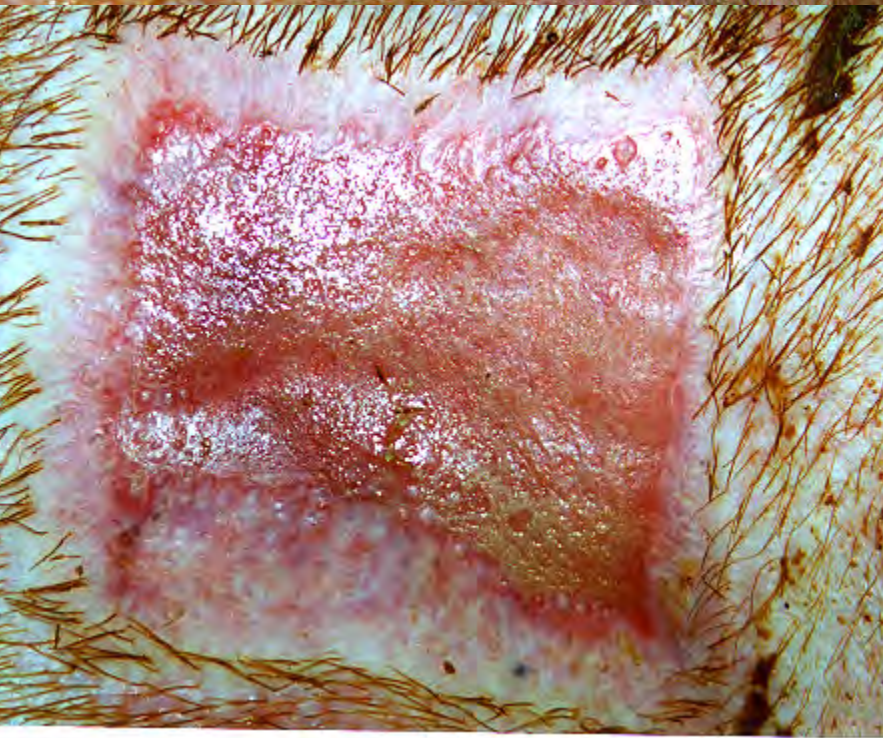


DuoDerm E Vs Elasto-Gel

Pbd 7



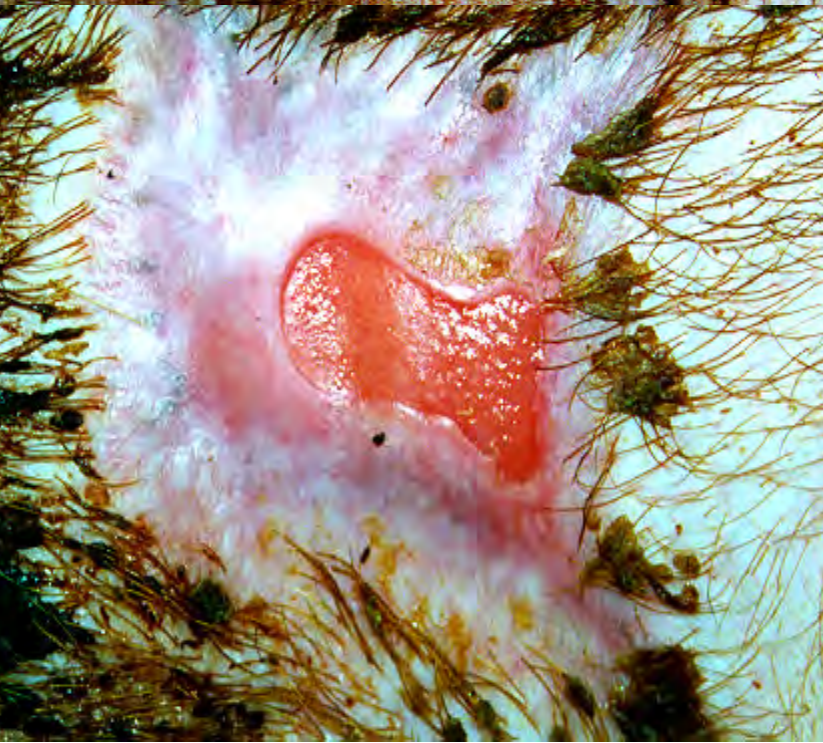
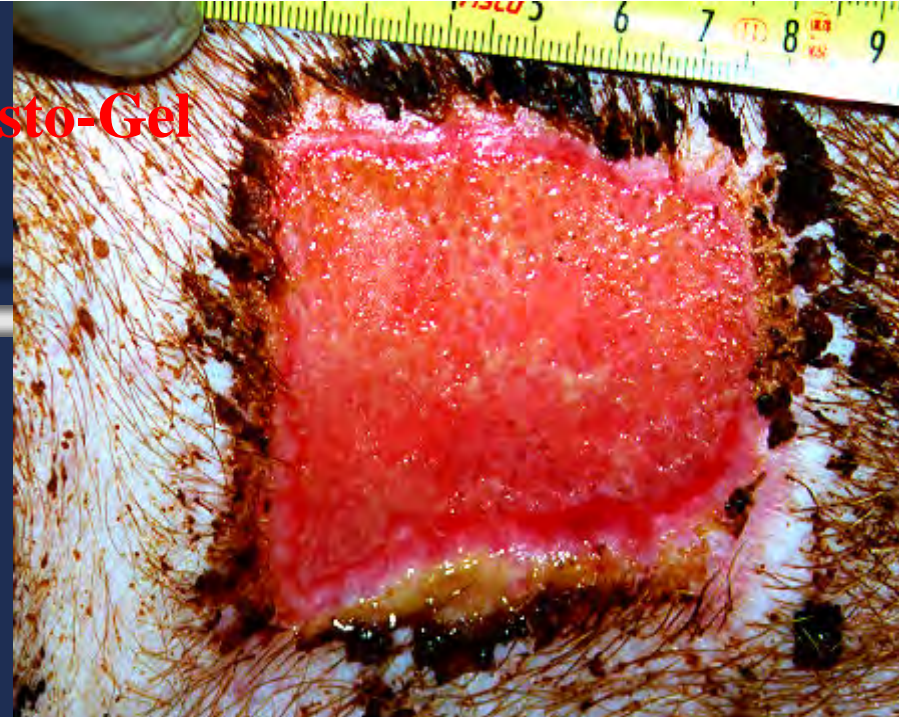
Pbd 14



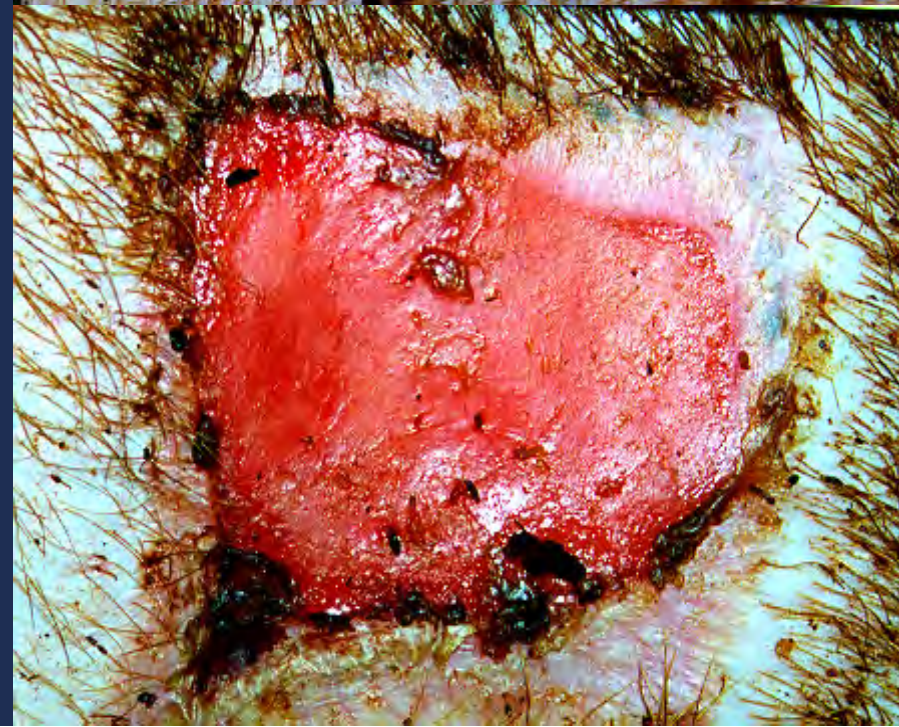


DuoDerm E Vs Elasto-Gel

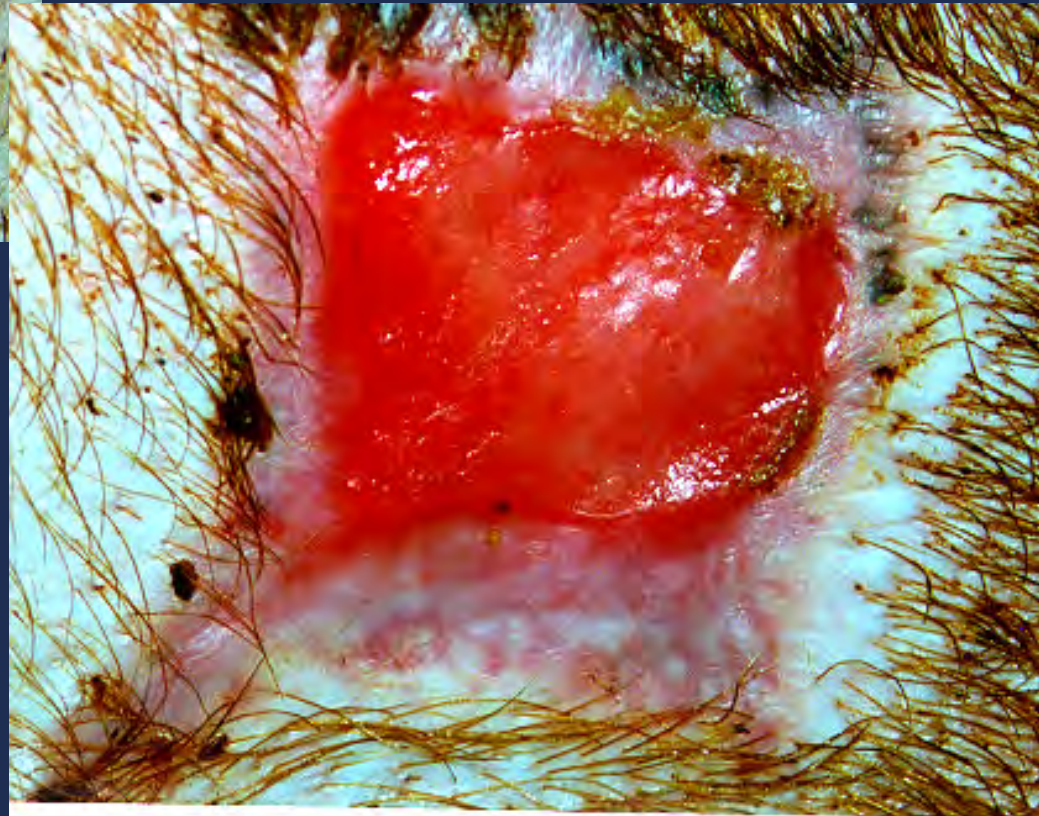
Pbd 21



Pbd 29



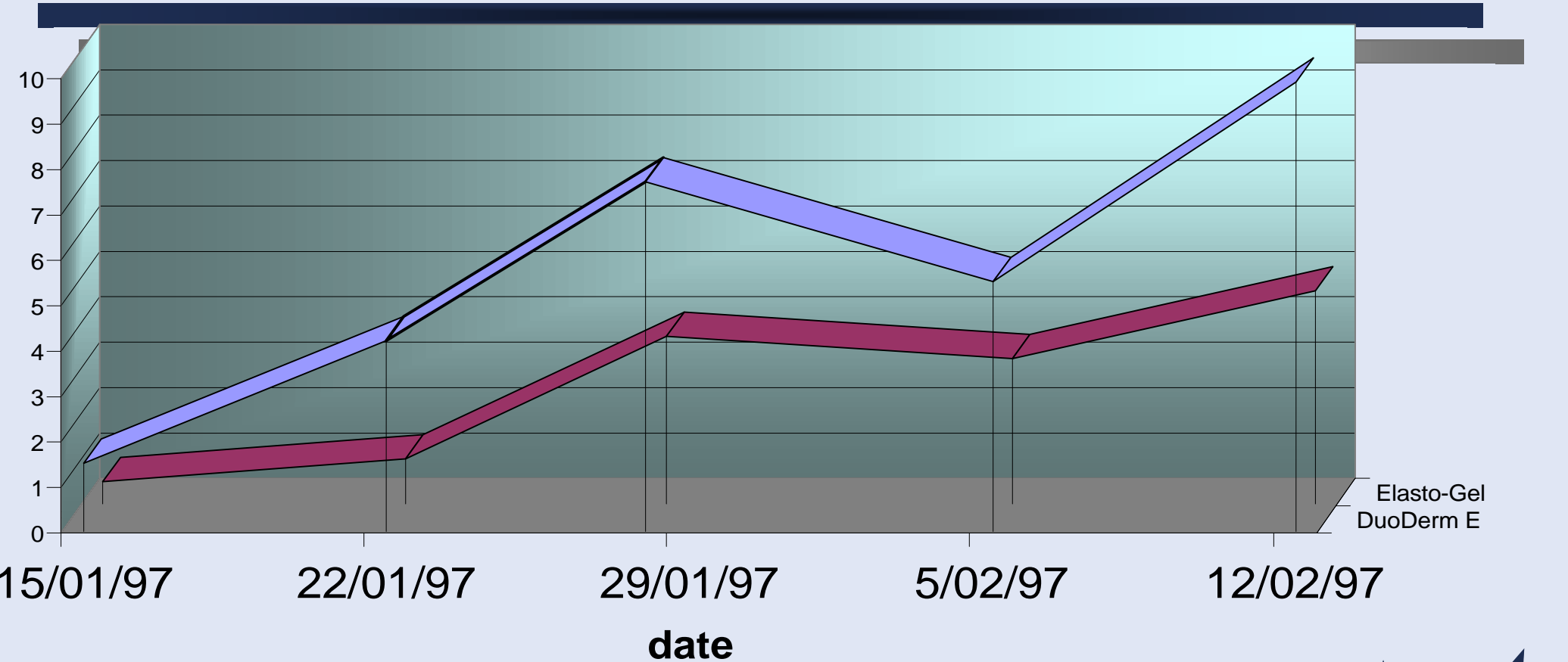
<= DuoDerm E ,pbd 36



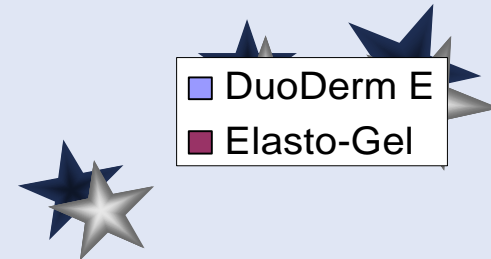
Elasto-Gel, Pbd 36 =>



Central ulcer scar thickness in mm



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.



Microscopically (2)

- 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.



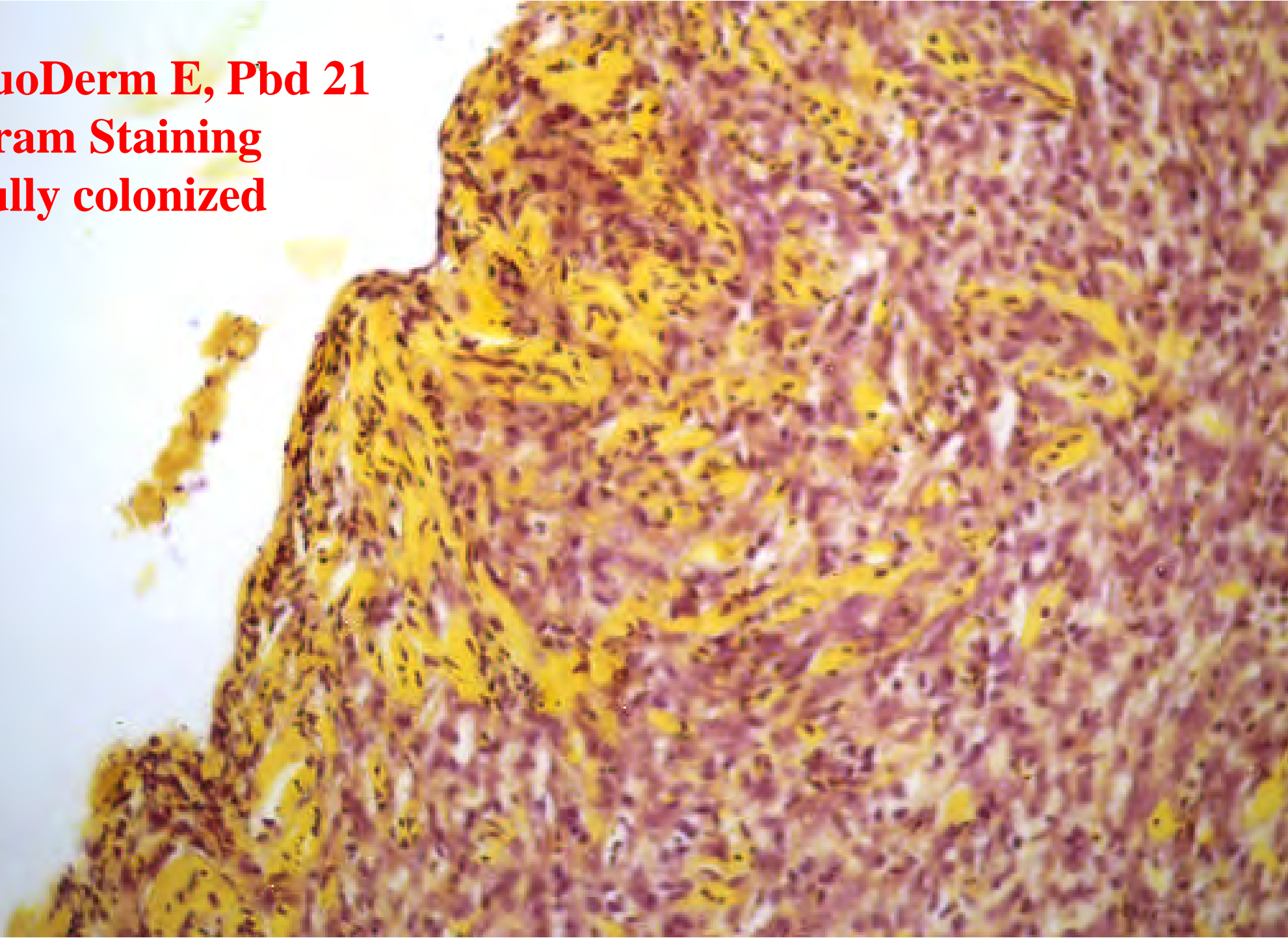


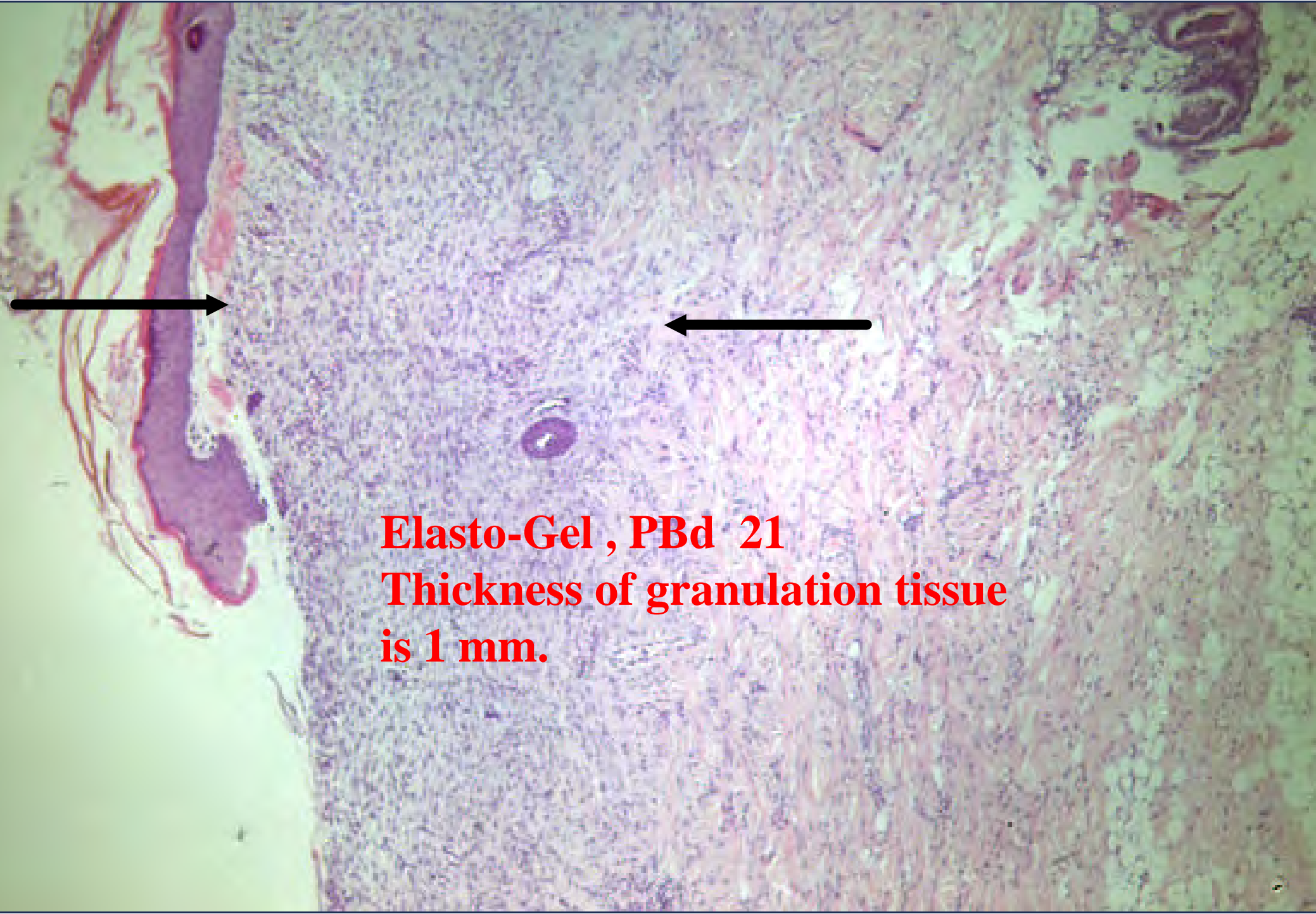
A histological section of granulation tissue, stained with hematoxylin and eosin (H&E). The tissue shows a dense population of cells, including fibroblasts and inflammatory cells, with numerous small blood vessels. The overall appearance is pinkish-purple. Two black arrows are present: one on the left pointing right towards the tissue, and one on the right pointing left towards the tissue.

DuoDerm E , Pbd 21

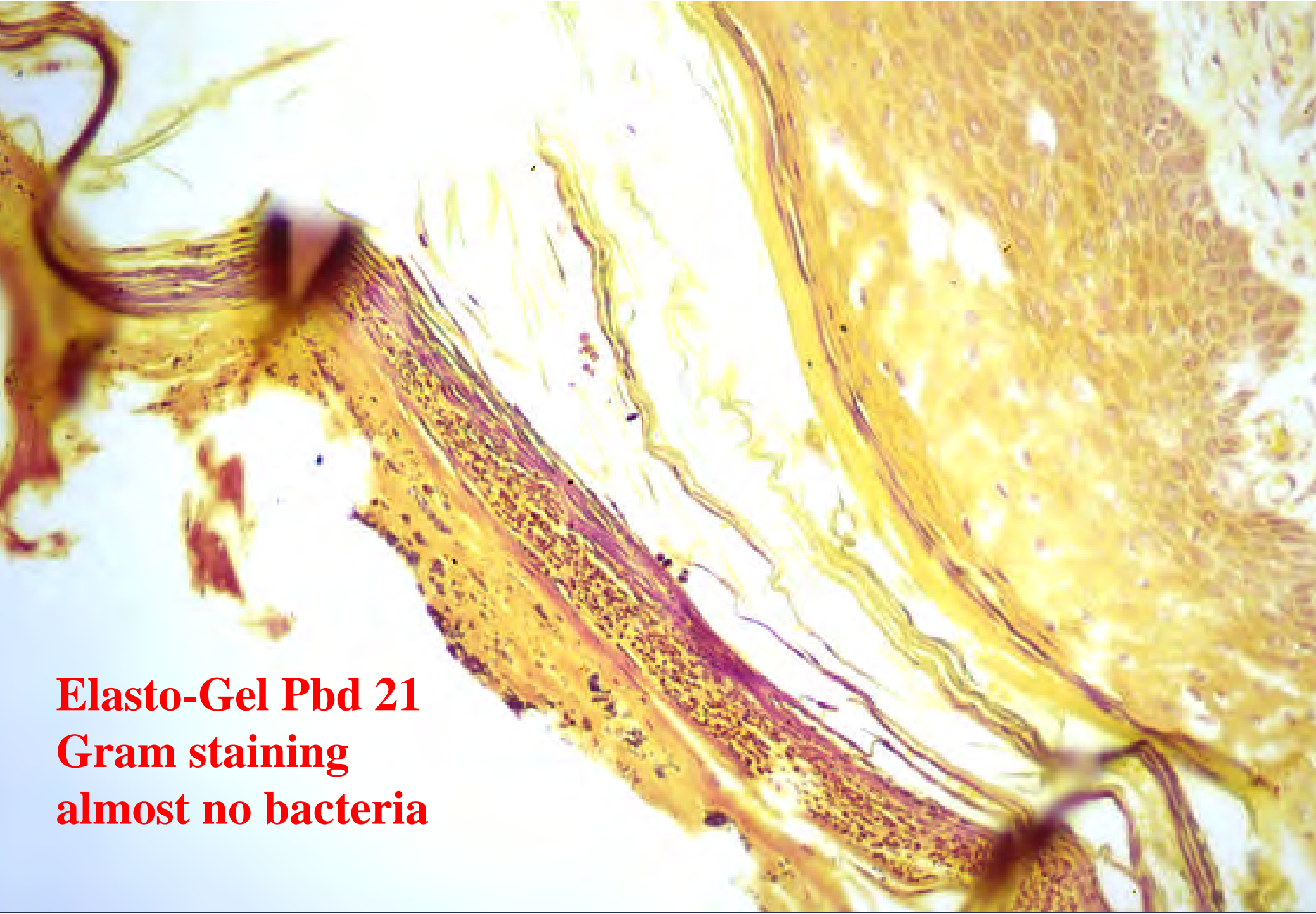
Thickness of granulation tissue is 4.2 mm

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

Discussion (1)

- 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 (hypertrophic 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 !!!

