

# EVALUATION OF THE USE OF A POINT OF CARE TEST FOR PROTEASES TO IDENTIFY PATIENTS WITH INCREASED RISK OF SKIN GRAFT FAILURE

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## BACKGROUND

In chronic wounds, proteolytic environment persists, degrading proteins of the extracellular matrix. A new point of care diagnostic test for elevated protease activity (EPA)\* is now available. According to a recently published study, EPA is associated with a 90% probability of non-healing<sup>1</sup>. This study was designed to evaluate the value of this test to identify chronic wounds with an increased risk of graft failure.

## METHODS

30 chronic wounds were recruited, of which the quality of the bed of the wound is considered by one senior surgeon of the team good enough to perform a skin graft. All the wounds are assessed using the new protease test in the operating room before the graft procedure is performed. All receive a meshed dermo-epidermal thin graft with standard follow up treatment. Of the wounds, the ones with EPA are assigned to group 1 and the ones with low protease activity to group 2. The percentage graft 'take rate' is recorded at Day 3 or 4 using standard criteria.

## RESULTS & CONCLUSIONS

Out of the 30 wounds, 13% had EPA and were assigned to group 1. The graft success rate for group 1 was only 25% (1/4), demonstrating that EPA is highly predictive of graft failure. The success rate for group 2 (low protease activity) was 85% (22/26), which is significantly higher than the overall success rate of 77% (23/30). Graft failure was associated with EPA in 43% (3/7) of cases. We can conclude that the protease test evaluated is a very interesting predictive and objective test to help the surgeon in his decision whether or not to carry out a graft procedure, which is very interesting from both a clinical and economical point of view.

\*WOUNDCHEK™ Protease Status

1. Serena T. et al. Protease activity levels associated with healing status of chronic wounds. Poster, Wounds UK 2011

## Methods: Study Design

**30 chronic wounds**  
with wound bed quality suitable for meshed dermo-epidermal thin graft (per assessment by senior surgeon)

- Inclusion criteria:
  - Wound duration >6 weeks
  - Require a graft
- Exclusion criteria:
  - Children
  - Immuno-suppression

Test for EPA in OR pre-surgery

**EPA**  
(elevated protease activity)



**Group 1**

**LOW protease activity**



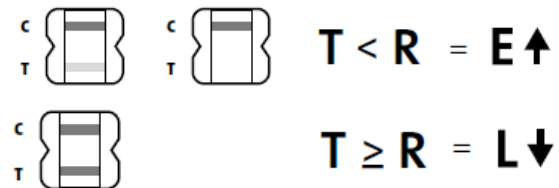
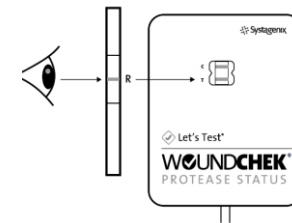
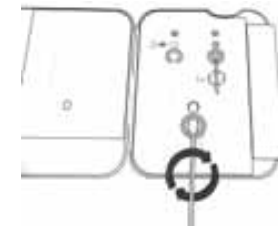
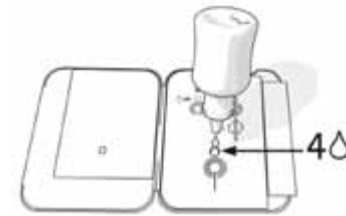
**Group 2**

All receive a meshed dermo-epidermal thin graft  
(by 6 different surgeons, consistent methods)  
with standard follow up treatment.

**'take rate' recorded at Day 3 or 4 (not by surgeon)**  
**Failure = <80% take**                      **Success = ≥80% take**

## Methods: Test Procedure

1. **Cleanse the wound with sterile saline**
2. Lay test card flat on the work surface and slowly add 4 drops of Reagent to the top hole.
3. **Apply additional saline to the wound area to be swabbed, such that the area is visibly moist.**
4. **Press the head of the swab flat against the base of the wound and gently roll it back and forth several times while applying pressure until fully coated and discoloured (tan/yellow) by wound fluid.**
5. Insert sample swab into the bottom hole of the test card and firmly push upwards so the swab tip is fully visible in the top hole and Rotate swab shaft 5 times, then wait 10 minutes.
6. Peel off adhesive liner from the right edge of the test card. Close and securely seal the card, then wait 5 minutes.
7. Read test result in window 5 minutes after closing the test card. If the Control Line (C) does not appear the test is **invalid**. For all valid tests, interpret the results by comparing the color intensity of the Test Line (T) to the color intensity of the Result Interpretation Reference Line (R), which is located on Result Interpretation Reference Strips provided in the kit.
  - If the color intensity of the Test Line (T) is lighter than the color intensity of the Reference Line (R), or the Test Line (T) is not visible at all, then the sample contains **elevated levels of inflammatory protease activity (E↑)**.
  - If the color intensity of the Test Line (T) is darker than or equal to the color of the Reference Line (R), then the sample contains **low levels of inflammatory protease activity (L↓)**.



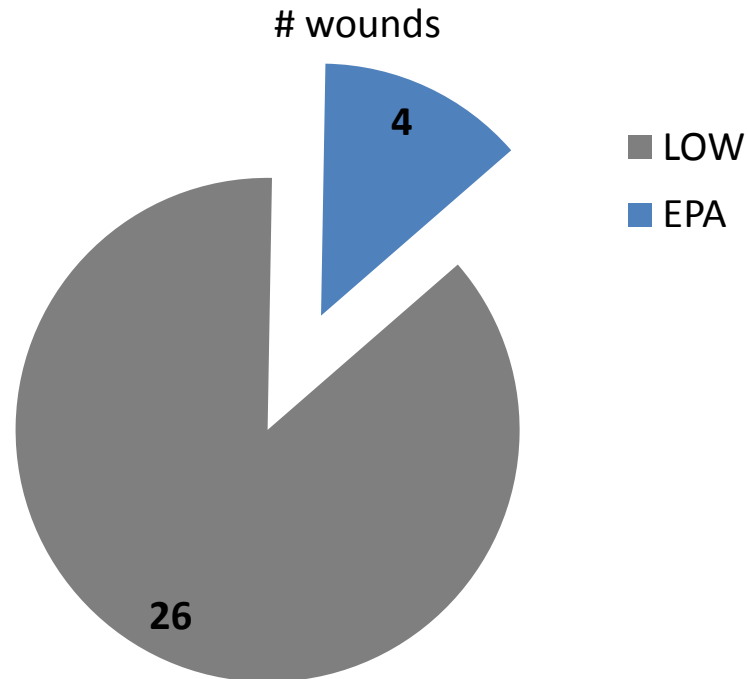
## Results: Patients included in the study

- 30 patients / 30 wounds
- 18 females / 12 males
- Mean age:  
57 years old (32-78)
- Mean wound duration:  
22.4 weeks (6-100)
- Mean wound area:  
67.7cm<sup>2</sup> (8-250cm<sup>2</sup>)
- Wound location:
  - 26 cases lower limb
  - 1 abdomen
  - 1 thorax
  - 2 upper limb

Aetiology	Number of patients
Burns	7
Surgical dehiscence	6
Post infectious	3
Ulcer (venous)	5
Purpura fulminans	1
Traumatic	6
Pressure sore	2

## Results: Prevalence of EPA among skin graft 'candidates'

**13% of all chronic wounds scheduled for skin graft had EPA**

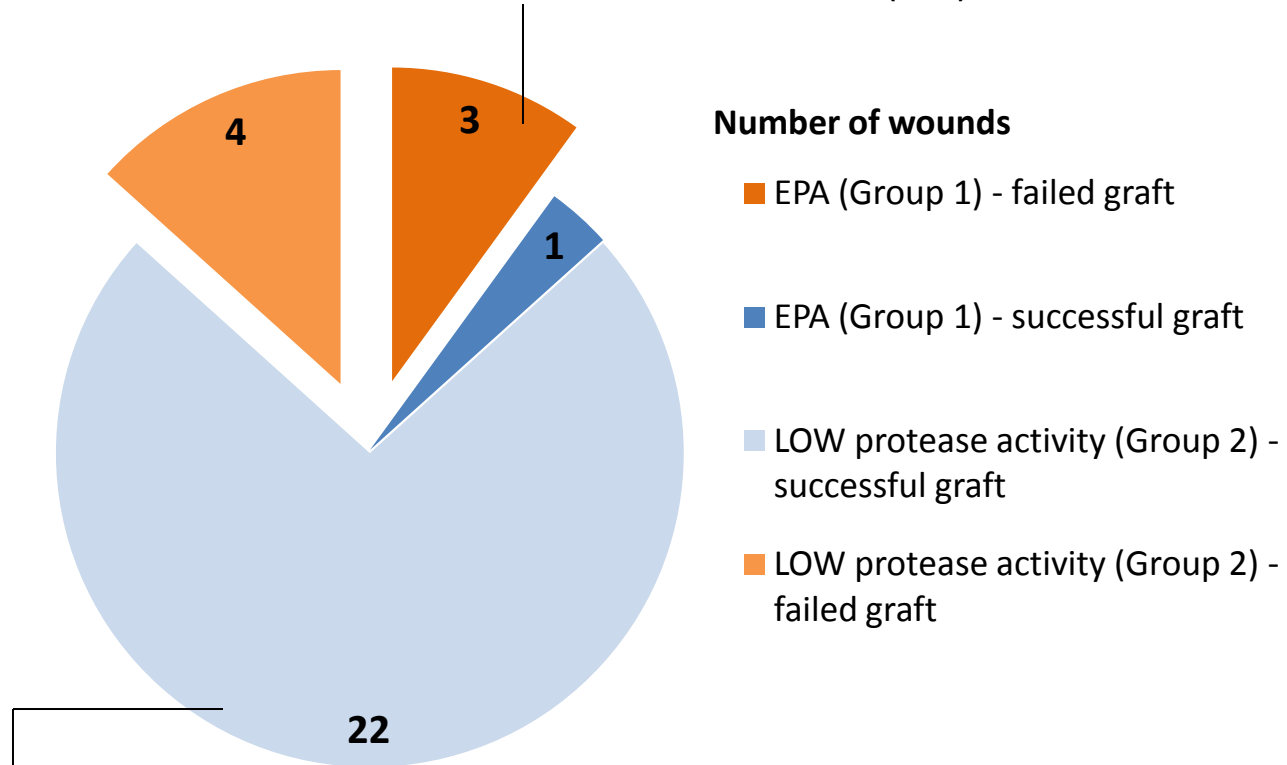


n.b. previous studies have shown that 28% of all non-healing chronic wounds have EPA<sup>1</sup>. This will have included wounds not suitable for grafting.

1. Serena T. et al. Protease activity levels associated with healing status of chronic wounds. Poster, Wounds UK 2011.

## Results: Graft success / failure rates by protease status

Graft failure was associated with EPA in 43% (3/7) of cases.



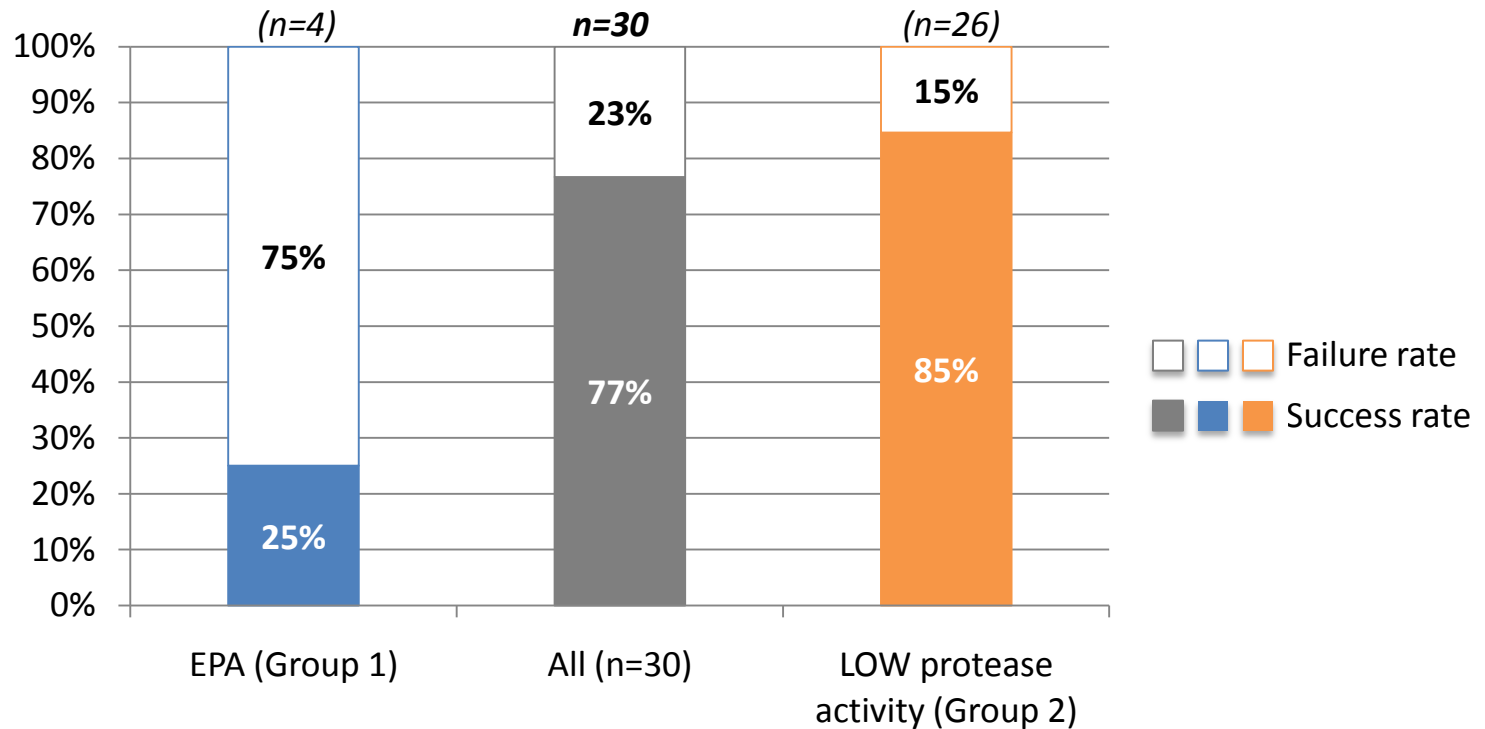
96% (22/23) all graft successes had low protease activity.

By eliminating the wounds with EPA, the number of graft failures could be reduced.

## Results: Graft success / failure rates by protease status

**For 3/4 wounds with EPA skin grafts failed.**

The presence of EPA was 75% (3/4) predictive of graft failure.



**A 'low' test result was highly predictive of graft success (85%, 22/26).**

## Summary of Results

- ❖ 13% of all chronic wounds scheduled for skin graft had EPA
- ❖ Graft failure was associated with EPA in 43% (3/7) of cases.
- ❖ 96% (22/23) all graft successes had low protease activity.
- ❖ For 3/4 wounds with EPA skin grafts failed.
- ❖ A 'low' test result was highly predictive of graft success.



## Conclusions

- ❖ Protease status is not the only factor in graft failure, however EPA is associated with a major risk of graft failure.
- ❖ By assessing protease status and eliminating EPA, the number of graft failures could, however, be reduced.
- ❖ The point of care protease test\* used in this study is objective and could help both...
  - ... confirm the surgical indication for skin grafts (LOW test result), and
  - reduce the risk of failure.
- ❖ The point of care protease test is interesting in dermo epidermal thin graft indication from an economic point of view and should play a role in wound management.
- ❖ The results are compelling, but need to be confirmed in further research / studies.