

# Effect of skin preparation pad on transepidermal water loss and absorption of methyl aminolevulinate in *ex vivo* human skin

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## INTRODUCTION

Transepidermal water loss (TEWL) is a well-established method for the determination of skin integrity. In addition, the fraction of *stratum corneum* (SC) removed is related to an increase in TEWL. Derma-sanding using skin preparation pad (SP) is an emerging procedure used to enhance the penetration of photosensitizer in skin before photodynamic therapy. Conventional photodynamic therapy (PDT) and more recently daylight PDT with Metvix<sup>®</sup> has proven its efficacy in the treatment of actinic keratosis. With PDT, pretreatment of skin is considered essential to enhance the photosensitizing agent absorption and light penetration. The objective of this work was to compare the effect of two different skin preparation pads and tape stripping on TEWL and on dermal absorption of [<sup>14</sup>C]-methyl aminolevulinate (MAL) contained in Metvix<sup>®</sup> cream in *ex vivo* human skin.

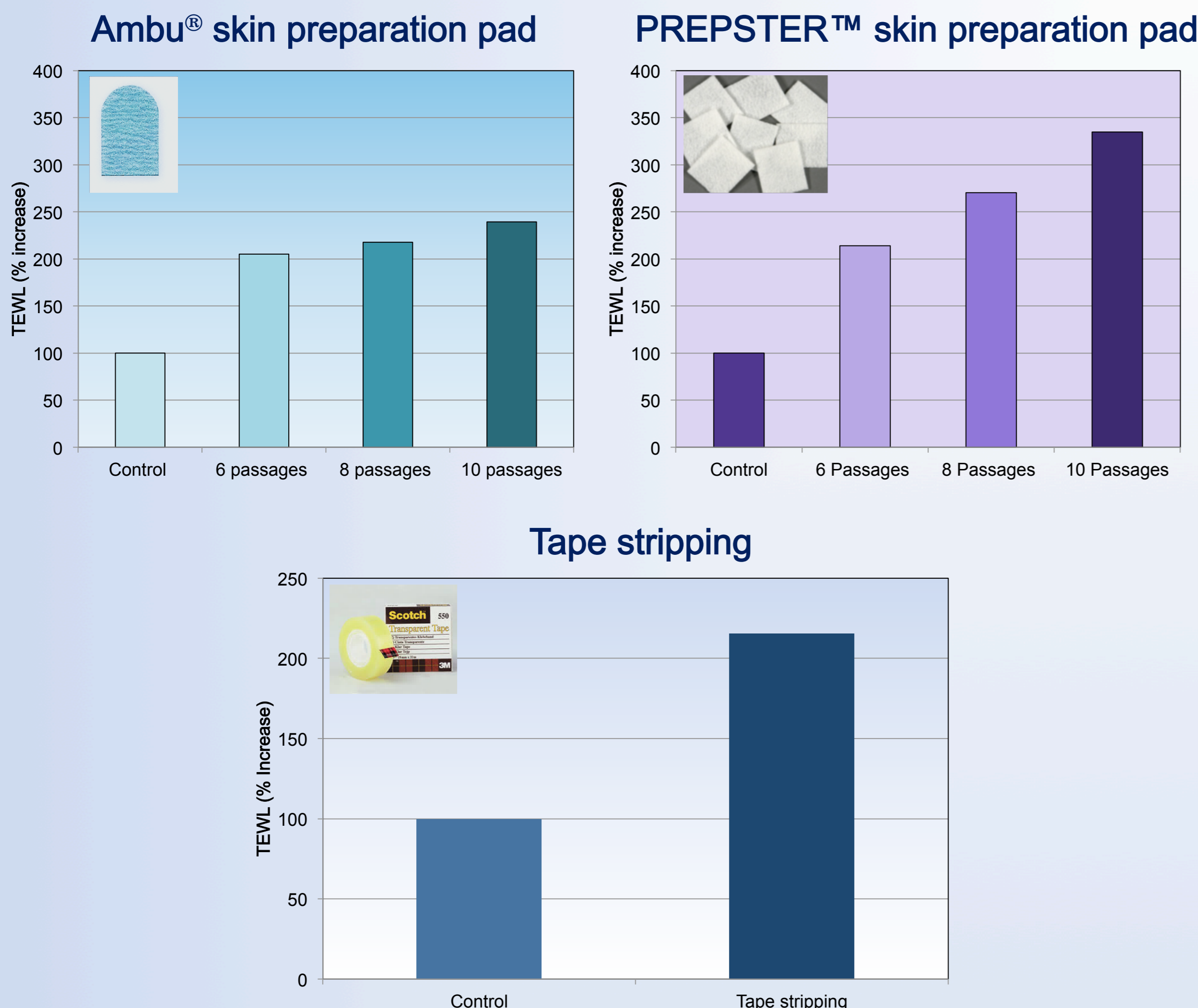
## METHODS

- *Ex vivo* human skin samples from 3 different donors were pretreated in triplicates as follows:
  - Ambu<sup>®</sup> skin preparation pad: 10, 8 and 6 passages
  - PREPSTER<sup>™</sup> skin preparation pad: 10, 8 and 6 passages
  - Tape stripping: 10 tape strips to remove SC using 10 adhesive tapes
- TEWL was measured on intact skin and after skin barrier impairment using skin preparation pad and tape stripping procedure.
- Impairment of SC barrier function was checked by histological analysis.
- Dermal absorption of [<sup>14</sup>C]-MAL was measured in intact skin (control) and after 10 passages of Ambu<sup>®</sup> SP. Skin samples were treated with 100 mg/cm<sup>2</sup> of Metvix<sup>®</sup> 168 mg/g cream containing [<sup>14</sup>C]-MAL for 2.5 hours.

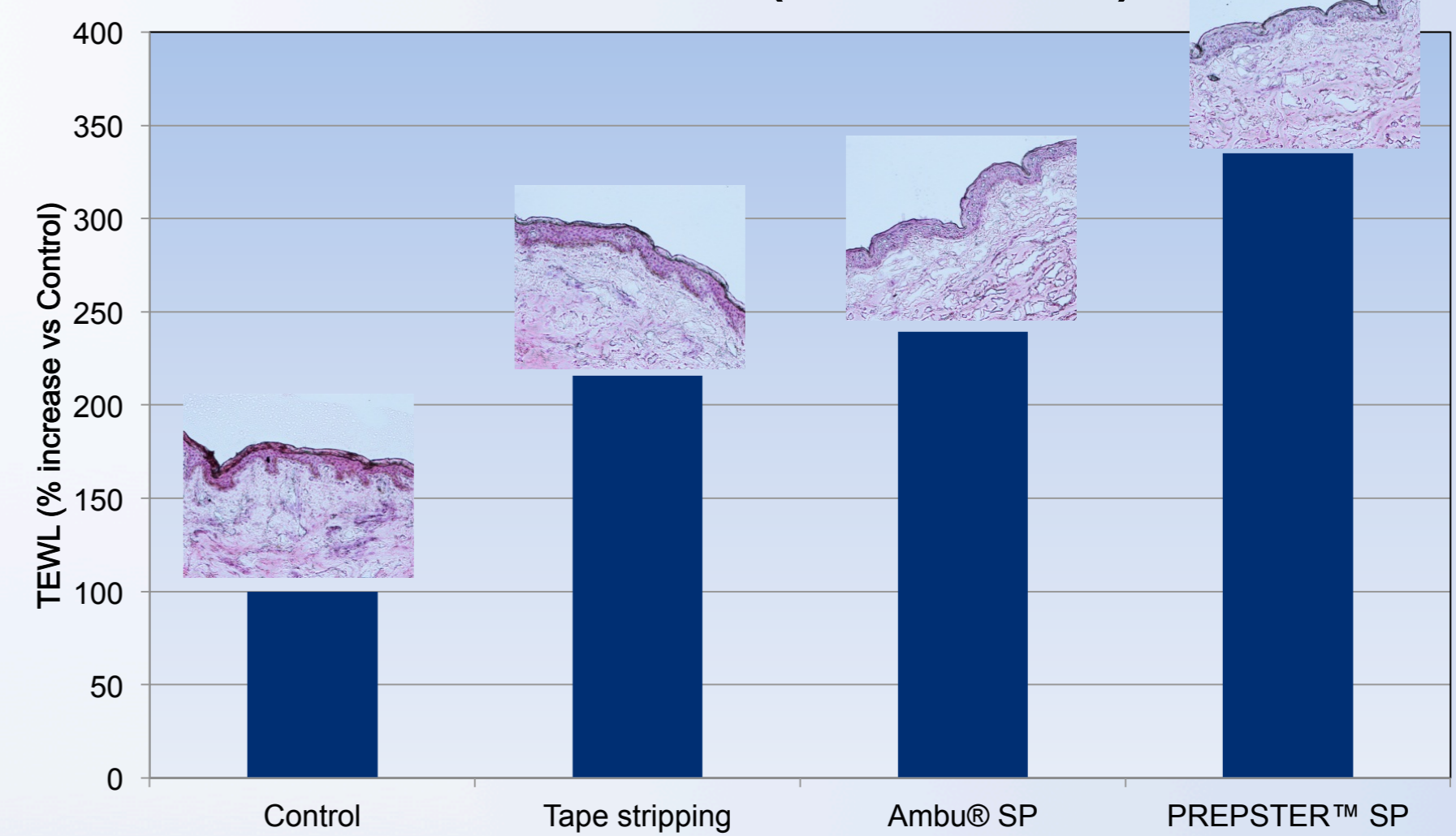


## RESULTS

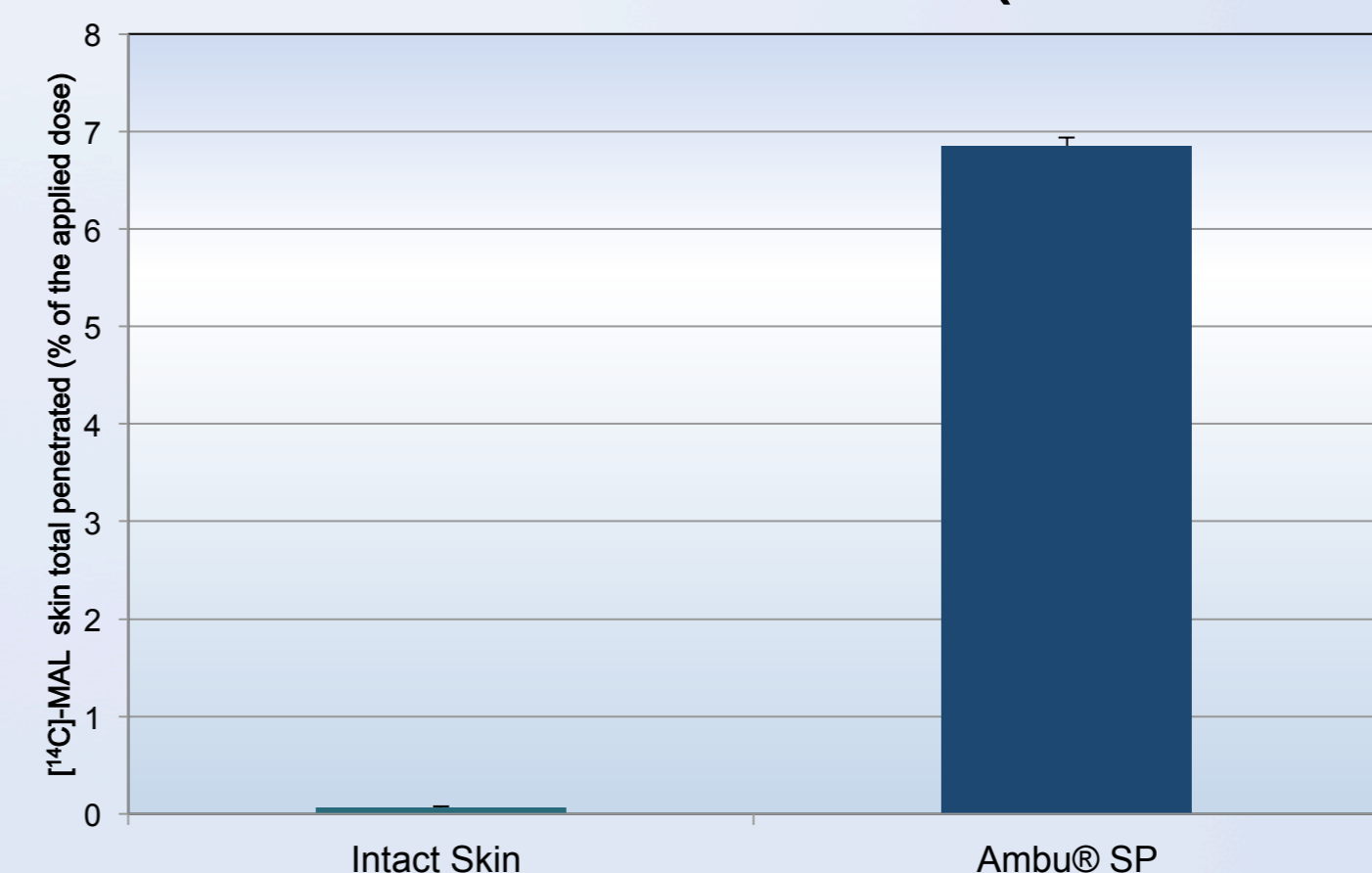
Effect of skin preparation pad and tape stripping on TEWL in *ex vivo* human skin (Mean, N = 9)



Effect of skin preparation procedure on *stratum corneum* on *ex vivo* human skin (Mean, N = 9)



Effect of Ambu<sup>®</sup> skin preparation pad (10 passages) on dermal absorption of MAL in *ex vivo* human skin (Mean & SEM, N = 12)



- Removal of the *stratum corneum* using 10 tape strips increased TEWL by 2.2-fold, indicating an impaired *stratum corneum* barrier function
- TEWL increased with increasing the number of passages of skin preparation pad
- TEWL increased by 2.4- and 3.3-fold following ten passages of Ambu<sup>®</sup> or PREPSTER<sup>™</sup> SP, respectively
- Histological analysis showed only partial removal of the SC, with no damage observed on the epidermis, whatever the procedure used
- 10 passages of Ambu<sup>®</sup> skin prep pad on *ex vivo* human skin may result in a [<sup>14</sup>C]-MAL penetration of 6.8% of the applied dose

## CONCLUSION

Preparation of the skin using tape stripping, Ambu<sup>®</sup> or PREPSTER<sup>™</sup> skin preparation pad increases TEWL value, indicating slight impairment of *stratum corneum* barrier function, with PREPSTER<sup>™</sup> SP being the more efficient procedure. Increase of TEWL correlates well with the increase of dermal absorption of [<sup>14</sup>C]-MAL on *ex vivo* human skin.