INTRODUCTION

The skin provides a physical barrier to absorption of externally applied drugs and xenobiotics. If the barrier is damaged or compromised, transfer of molecules across the skin can be enhanced leading to greater systemic exposure and possibly to altered pharmacological and toxicological effects. There is growing interest in models of damaged or compromised skin in vivo in minipigs. For such models, methods must be defined for damage or compromise of the skin used for measuring the degree of damage caused. Tape stripping offers a convenient method for inducing reproducible epidermal damage while transepidermal water loss (TEWL) offers a measure of damage based on the degree of compromise of the epidermal barrier.

In the present study we evaluated TEWL on normal skin at 4 different locations on 2 minipigs; thereafter one of the sites on each animal was tape stripped. In this poster, the results presented are of TEWL measured using an open chamber TEWL meter.

METHODS

Two Götttingen minipigs (one male and one female), 4 to 5 months old were used. The animals were anaesthetised during the procedures to ensure that the tape-stripping and measurements could be performed under similar conditions each time. TEWL measurements were made on two occasions, one week apart, at 4 skin sites on both animals. The skin sites that were used, dorsum just behind the ears, left flank, abdomen and inside of right thigh, were chosen to represent different types and thickness of skin. The stripped area was chosen to be the site on the dorsum.

Measurements of TEWL were made using an open chamber TEWL meter (Cortex Technology) which operates on a vapour gradient principle, measuring evaporation from the skin surface; and a conductance meter (Skicen-200EX) which provides a measure of the hydration of the skin by measurement of the conductance which is increased when the stratum corneum is well hydrated.

Tape stripping was achieved by use of Scotch 3M Tape at 20 strips per occasion.

RESULTS

During the test period handling and use of both the conductance meter and the open chamber TEWL meter was found to be easy and straightforward. Both meters were found suitable for measuring water loss from the skin of minipigs in a laboratory set-up. The results of the TEWL measurements for both meters showed the expected result which was an increase following tape stripping. There was less variability of the results obtained from use of the TEWL meter, and therefore we have chosen to report only the results from this method in this poster.

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Table 1: Mean TEWL (g/m²/h) in different areas of untreated minipig skin

<table>
<thead>
<tr>
<th>Area</th>
<th>Day 1</th>
<th>Day 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td>10.7</td>
<td>12.2</td>
</tr>
<tr>
<td>Flank</td>
<td>8.0</td>
<td>9.4</td>
</tr>
<tr>
<td>Abdomen</td>
<td>7.8</td>
<td>9.7</td>
</tr>
<tr>
<td>Inner thigh</td>
<td>6.3</td>
<td>5.2</td>
</tr>
</tbody>
</table>

The results of the TEWL measurement (Table 1) indicate that there are small differences from the different areas of normal skin with the highest being from the area below the neck, slightly lower values from the flank and abdomen (but virtually the same values for these two areas) and the lowest rate of loss from the inner thigh. The flanks are typically used for dosing in dermal studies because they offer the greatest area of uniform skin, and it is interesting to note that the abdominal skin is similar in its normal barrier properties, meaning that the dosing field in a minipig can be extended to this area.

CONCLUSION

We conclude that tape stripping, a method that is commonly used for removal of part or all of the epidermis, can be used both reliably and accurately in minipigs to model compromised or damaged skin and that TEWL offers a convenient method for quantifying the extent of epidermal barrier damage.