

Penile Barrier Integrity and a Mechanistic search for the effectiveness of Medical Male Circumcision in preventing HIV acquisition.

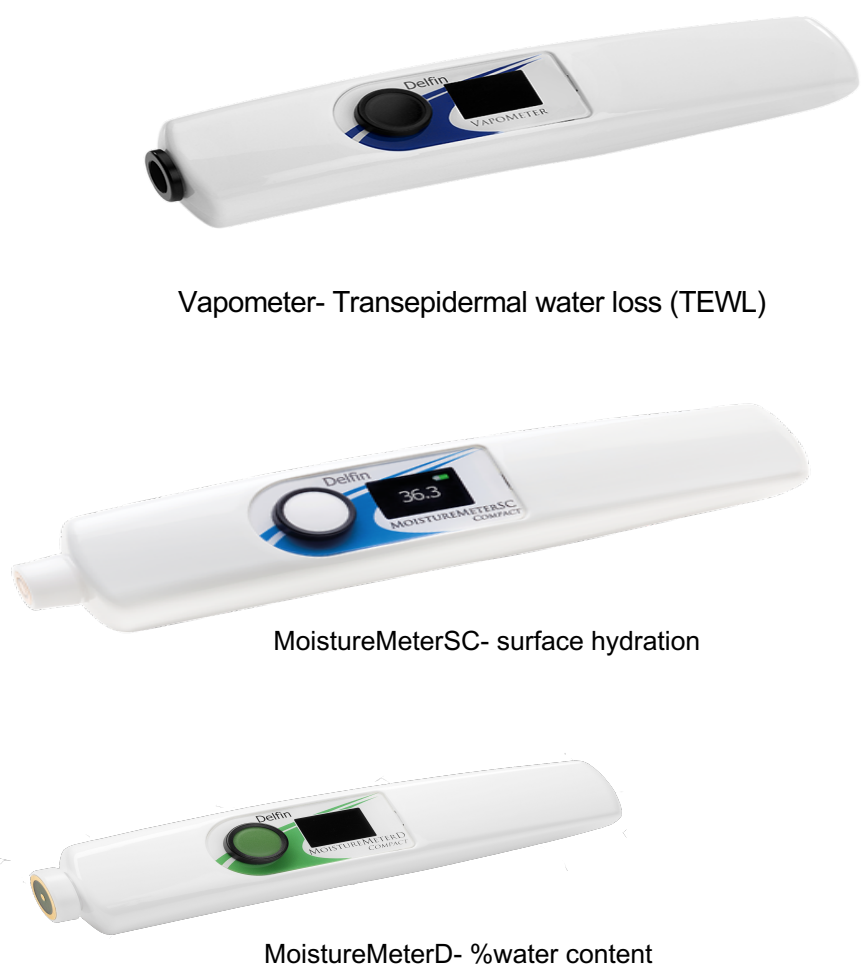
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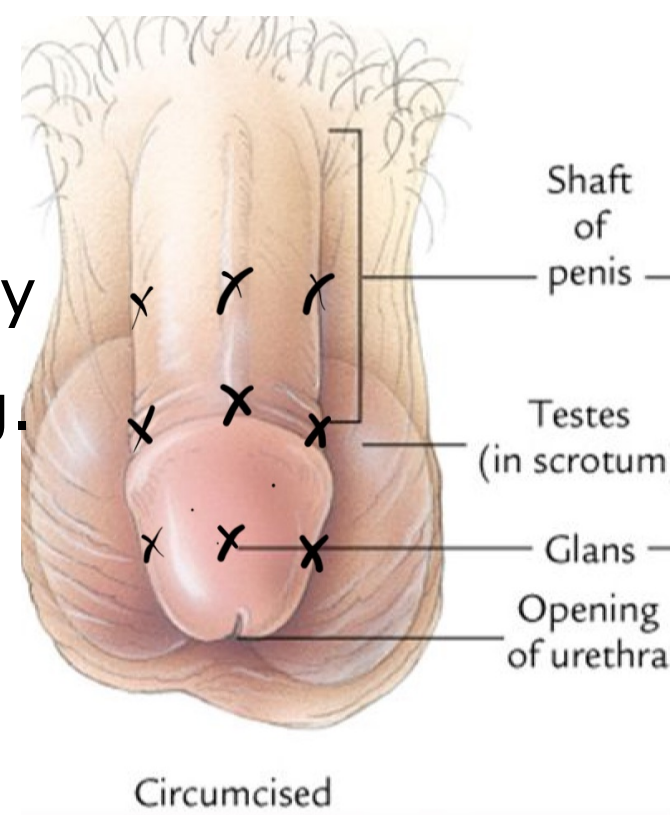
BACKGROUND

- Voluntary medical male circumcision (VMMC) has demonstrated a 60% reduction in HIV acquisition. However, the biological mechanisms by which circumcision confers this protection remain poorly understood.
 - We have used hand-held devices that measure water content and trans-epithelial water loss in penile skin prior to MMC
 - Aims: a) to measure changes in penile skin integrity before & after VMMC and b) to measure how asymptomatic sexually transmitted infections (aSTIs) alter skin barrier function.
- Hypotheses: 1) Skin barrier integrity of the penile glans improves after VMMC; 2) that the presence of an aSTI results in lower in vivo penile skin barrier integrity before and after VMMC.

METHODS



- Skin barrier integrity was assessed by measuring transepithelial water loss (TEWL) using a Vapometer (n=181) in adult males; 18-35 yrs) and surface hydration values using a Moisture SC meter (n=203 adult males) & dermal water content using MoistureD & EpiD (n=176 adult males) at three main penile sites: glans, inner foreskin and shaft as annotated as proxy measures. The hip was measured as a control site and Relative humidity (RH) & Room temp were measured at each reading.
- Follow-up measurements were taken at 2(Visit1), 12(n=28) and 24(weeks(n=16) after circumcision in the glans and shaft
- First-pass urine (5ml) were collected & tested for four aSTIs: Chlamydia trachomatis, Neisseria gonorrhea, Trichomonas vaginalis & Mycoplasma genitalium.



RESULTS

Figure 1. Different anatomical sites show different barrier integrity
Prior to circumcision, the inner foreskin (Medians 27.6 g/hr/m²) and glans (Medians 22.3 g/hr/m²) measured higher (p<0,0001) TEWL and hydration than the shaft(16 g/hr/m²), with the inner foreskin having the highest amongst the three. (normalized with hip readings and RH & temp were adjusted for)

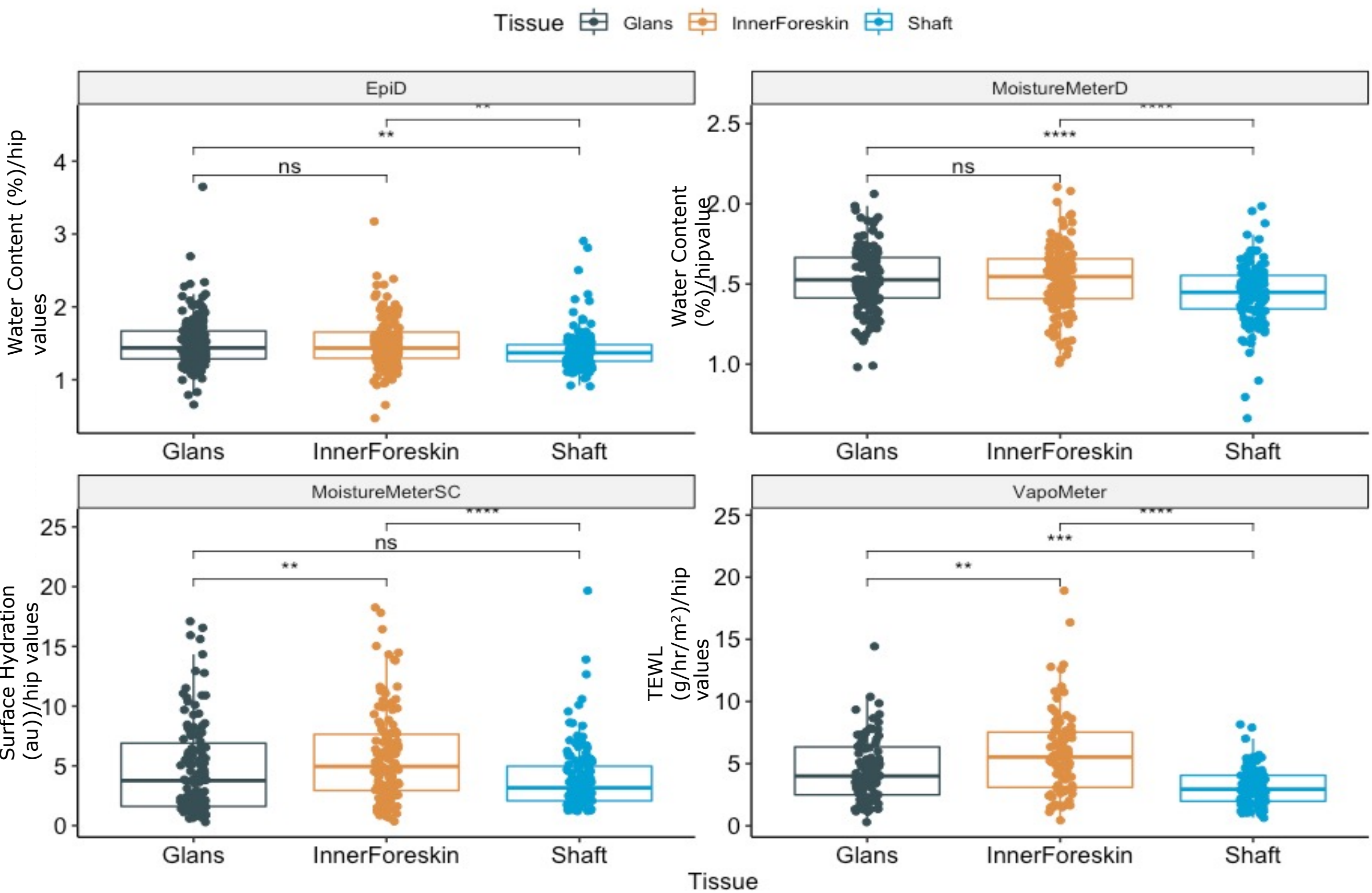


Figure 2. The presence of aSTIs increases surface hydration in the stratum corneum

Surface hydration within the stratum corneum in the glans of STI pos (n=36) vs STI neg (n=142) males before circumcision were significantly higher in the glans(97.4 vs 52.3 au; p= 0.0380)

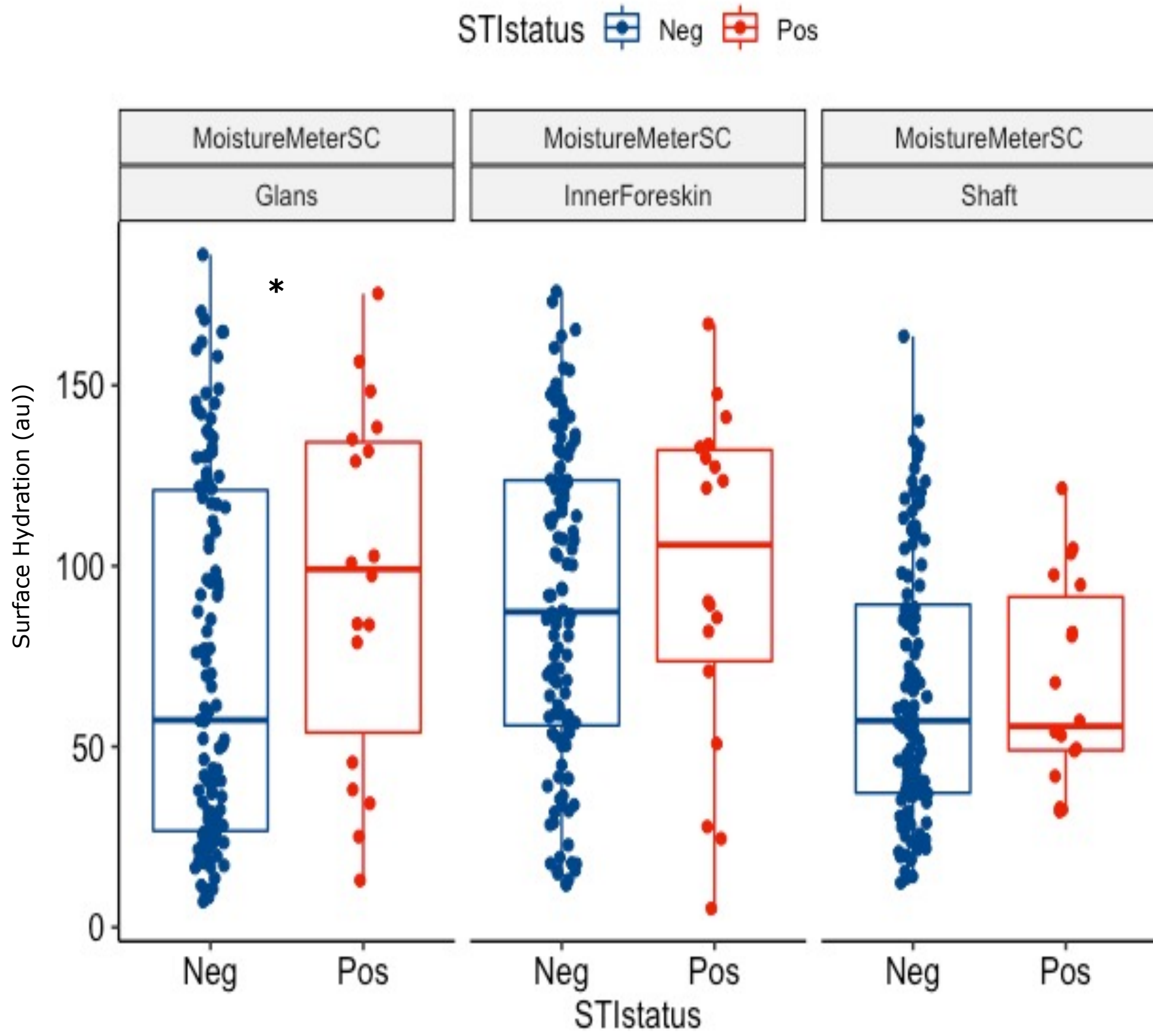
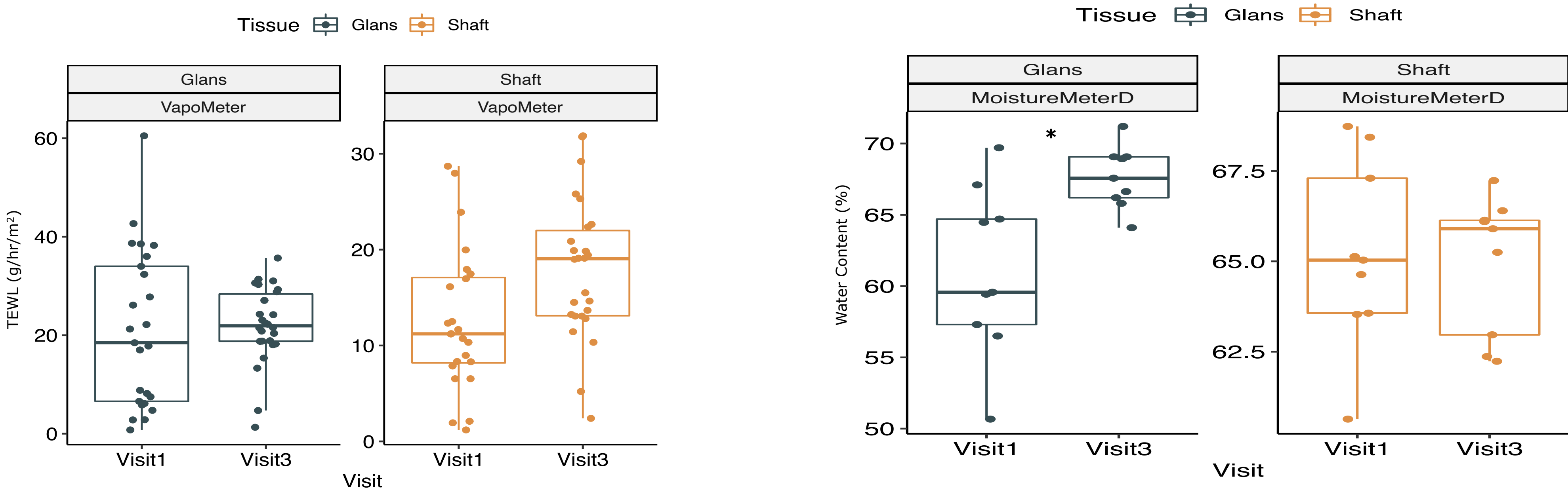


Fig 3. Durable changes in penile barrier integrity months post circumcision

After 12 weeks (n=28) post-VMMC, % water content in the glans increased significantly 59,2 vs 67,6% (p=0,0205). This was associated with an increase in TEWL in both the glans and shaft although not significant.



DISCUSSION & CONCLUSION

Prior to MMC, the glans and inner foreskin have lower skin barrier integrity, and this may be linked with HIV susceptibility in uncircumcised males.

MMC increases water content in the glans with an associated increase in TEWL (as measured by TEWL AND % water content)

In the presence of a detectable aSTI, water content significantly increases in the Stratum Corneum of both the glans and inner foreskin

Changes in barrier measures could be one potential mechanism underlying the efficacy of medical male circumcision.