

***In vivo* friction properties of human skin**

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Abstract

In vivo frictional properties of human skin and five materials, namely aluminium, nylon, silicone, cotton sock, Pelite, were investigated. Normal and untreated skin over six anatomic regions of ten normal subjects were measured under a controlled environment. The average coefficient of friction for all measurements is 0.46 ± 0.15 ($p < 0.05$). Among all measured sites, the palm of the hand has the highest coefficient of friction (0.62 ± 0.22). For all the materials tested, silicone has the highest coefficient of friction (0.61 ± 0.21), while nylon has the lowest friction (0.37 ± 0.09).

Conclusion

Frictional forces can be generated via two actions, one from the "ploughing" action, and the other one from the force required to overcome adhesion between the two surfaces. The former produces friction forces due to the mechanical interlocking of surface roughness elements. The latter generates friction forces due to dissipation when the atoms of one material are plucked out of the attractive range of their counter-parts on the material surface. The relative contribution from these two mechanisms depends on the physical and chemical properties of the contact surfaces. Generally speaking pairs of materials with compatible properties will have a larger friction if the second part is the major contributor. This may be the reason why silicone has the highest friction among the test materials. The high coefficient of friction found in the palm of the hand may also be related to the fact that this is very rarely sweat free (Comaish *et al.*, 1971). Thus the physiological state of the skin at any one time must have a profound effect. Other geometric features such as the epidermal ridges may play an important part.

PMID: 10493141 [PubMed - indexed for MEDLINE]