

Comparison of the physical properties of 8 different skin protectant (barrier) creams

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Introduction

- Exposure to moisture for extended periods can damage skin. Because of its higher coefficient of friction (CoF), macerated skin may be more prone to shear and friction injury.¹
- In this physical properties assessment, barrier cream A with unique polymer technology when compared with 7 commercially available barrier creams was found to have breathable, low dermatitis potential, non-irritating, long-lasting moisture barrier protection that is gentle to the skin.

Purpose

- The present study was undertaken to assess properties of 7 different skin protectant (barrier) creams versus the unique polymeric product (product A).
- Skin protectant (barrier) creams were evaluated based on wash off resistance, friction associated with use, and their effect on adhesive adhesion along with breathability.

Methods

Wash off resistance

- The potential for product wash off was tested via 2 methods. For the first method, 0.4 g of each product was smoothed onto porcine skin and then submerged in water. After 24 h, the supernatant optical density (OD) was measured at 425 nm.
- A second method placed 0.2 g of product onto a 2 in² water-resistant board. Wipers with a 1% dye solution were placed on top of the product for 5 min and the area of board where dye penetrated was calculated.

Coefficient of Friction (CoF)

- Barrier cream products were applied to a polyurethane film attached to a flexible gel pad (simulating the skin) and samples were mounted in the test equipment and slid against a piece of 100% cotton sheet to measure the CoF (simulating bedding and clothing).

Methods (Cont'd)

Removability of adhesive over barrier cream (Adhesion to Steel)

- Adhesion was measured by applying product to a steel panel and allowed to dry prior to fixing a surgical tape. The surgical tape was removed using a load frame testing system (Zwick Z2.5/TN1S, ZwickRoell, Germany). The force required to remove the surgical tape from a steel panel was then measured.

Products Tested

- A= Polymeric durable barrier cream
- B= Zinc oxide cream
- C= Skin protectant with dimethicone and seed oils
- D= Transparent skin ointment
- E= Skin nourishing protection cream
- F= Barrier cream with antibacterial honey
- G= Barrier cream with dimethicone, glycerin, and vitamin E
- H= Moisturizing barrier cream
- I= Control

Results

Wash off resistance (porcine skin method)

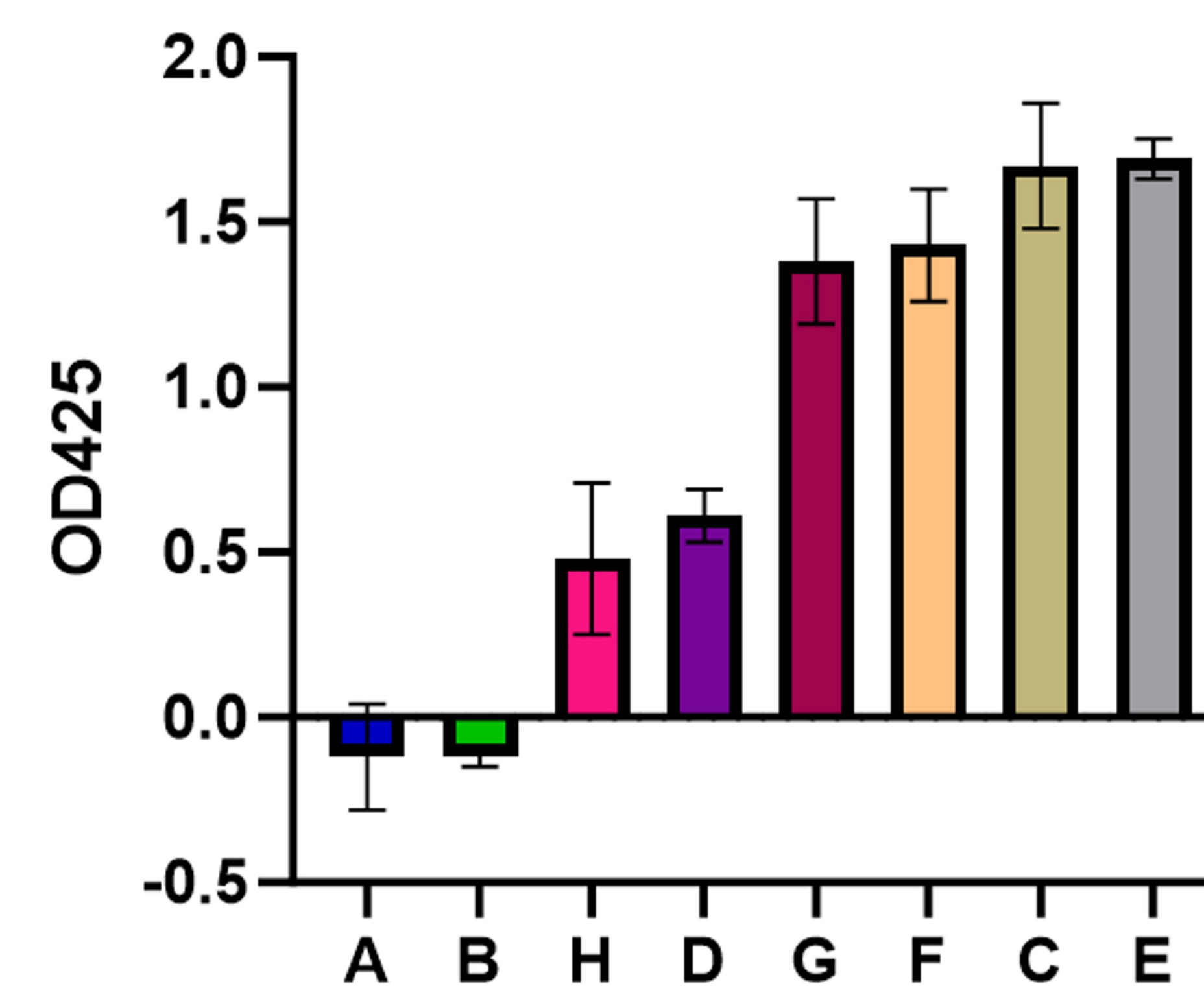


Figure 1. Supernatant OD at 425nm after submerging barrier cream coated porcine in water for 24 hours. Higher ODs indicate less protective effect. Statistical analysis showed that barrier cream A has similar barrier properties as cream B, but provides significantly better barrier properties compared to six other skin barrier creams while.

Results (Cont'd)

Wash off resistance (dye penetration method)

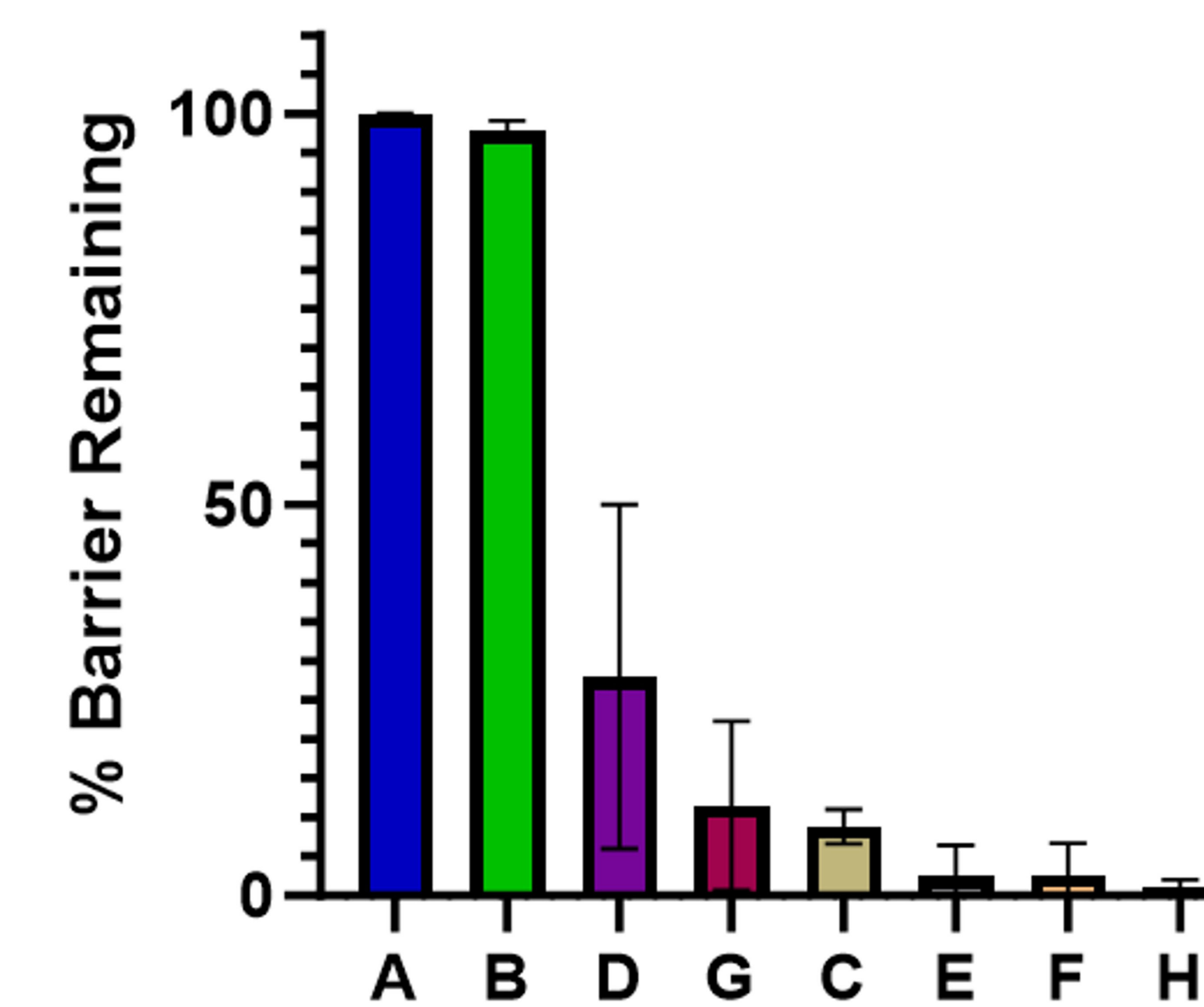


Figure 2. Graphical representation of % barrier remaining after water wash off. Statistical analysis showed that product A provides significantly better barrier properties compared to six other skin barrier creams while similar to product B.

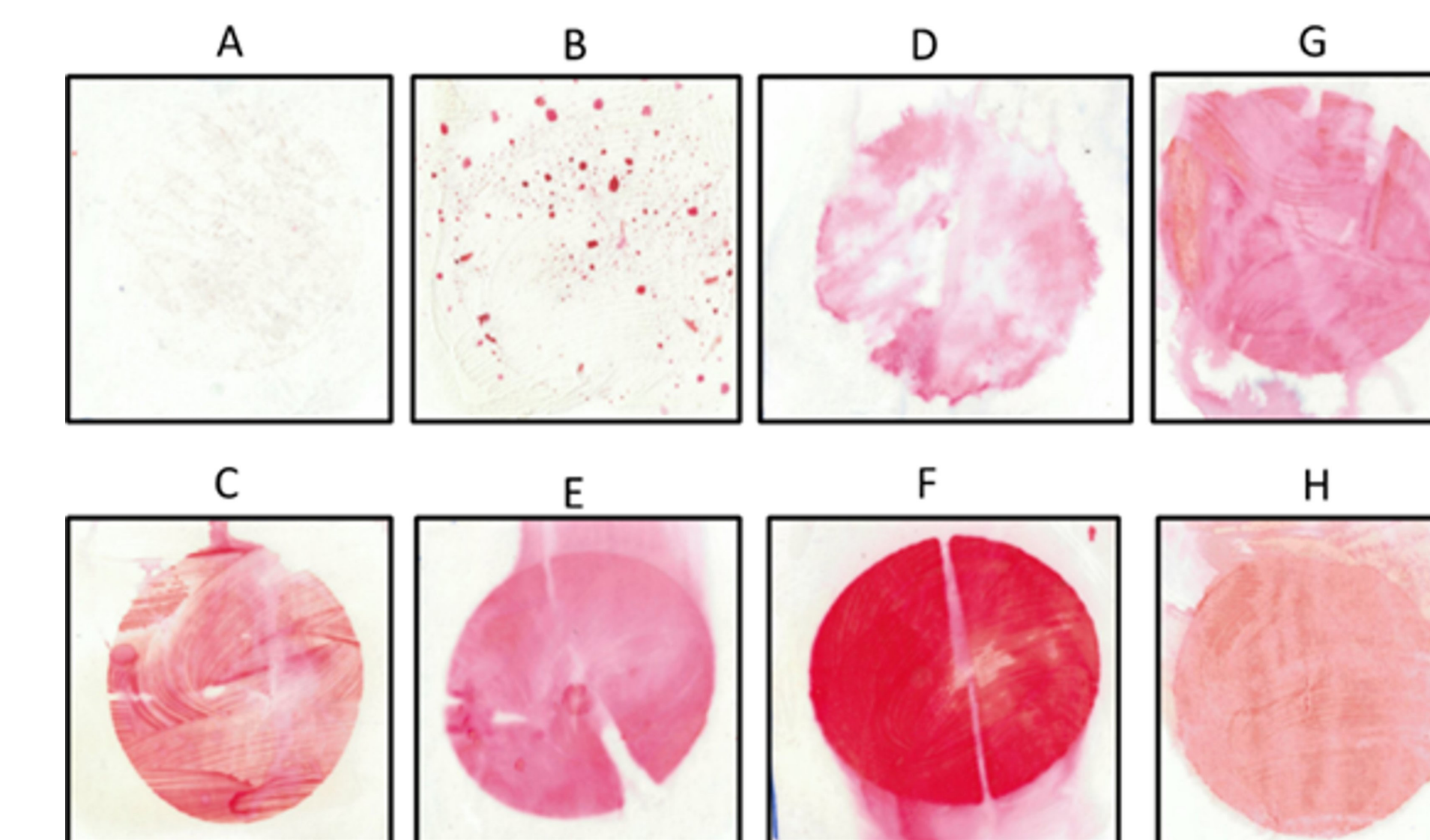


Figure 3. Representative images of each product after water wash are shown above. Darker color indicates less barrier property as the dye has penetrated through the barrier product to the water-resistant board.

Coefficient of Friction (CoF)

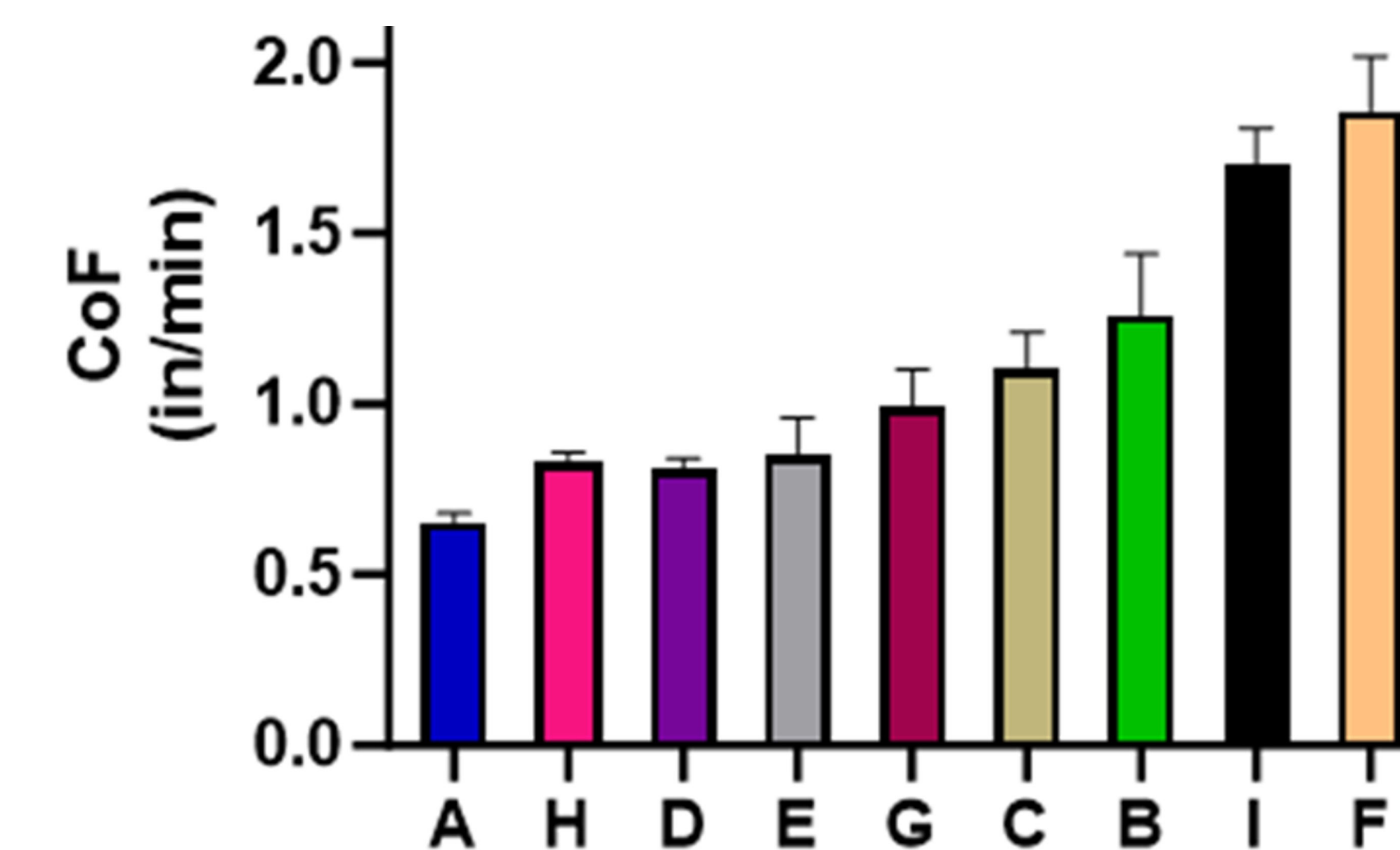


Figure 4. Kinetic CoF for all 8 barrier products. Product A was significantly lower than all other products as well as the control (without any barrier product) (p<0.05).

Results (Cont'd)

Removability of adhesive over barrier cream (Adhesion to Steel)

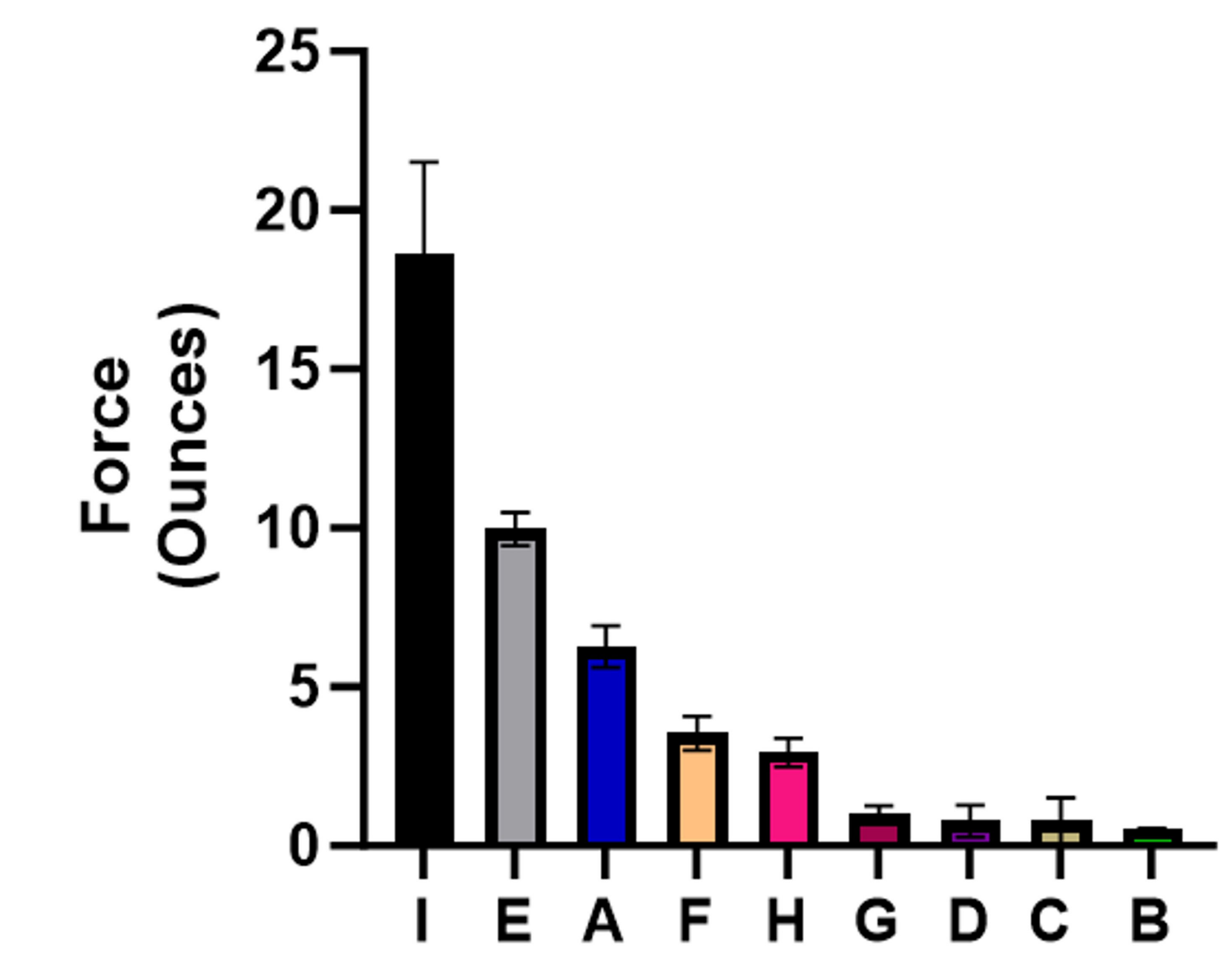


Figure 5. Force required to remove surgical tape from a steel plate with barrier cream. Products B, C, D, and G showed no adhesion after 24 hours dwell time, were the worst in the series and can compromise dressing/tape adhesion. All adhesion product averages were significantly lower than the control average (p<0.05). Product A adhesion was statistically significantly higher than all other product averages except product E (p<0.05).

Conclusions

- Kinetic CoF was significantly lower for product A, the double barrier cream with unique polymer formulation.
- Product A resulted in the least dye penetration, 99.9% of the board remained undyed under the product.
- Wash off from skin was significantly less (p<0.05) for product A compared to 6 of the creams, and equivalent to product B.
- Product B underperformed in CoF and adhesion.
- Adhesion was less impacted by product E. The product A formulation was second best.
- Product A performed best in terms of dye penetration and kinetic CoF. It was better than 6 of 7 products tested for wash off and adhesion.
- The polymeric formulation tested herein is resistant to wash off and penetration and doesn't increase CoF. It may be a good option for protecting skin from moisture associated skin damage.

References

- Gerhardt LC, Strässle V, Lenz A, Spencer ND, Derler S. Influence of epidermal hydration on the friction of human skin against textiles. *J R Soc Interface*. 2008 Nov 6;5(28):1317-28.

Products Tested

- A= 3M™ Cavilon™ Durable Barrier Cream (terpolymeric barrier cream)
- B= Coloplast Conveen® Critic Barrier (zinc oxide cream)
- C= Medline Remedy® Olivamine® Dimethicone Skin Protectant Moisture Barrier
- D= Smith and Nephew Proshield Plus Skin Protectant
- E= Hartmann Molicare® Skin Nutriskin Protection Complex

- F= Integra Medihoney® Barrier Cream
- G= Essity HMS North America Inc TENA® ProSkin™ Barrier Cream
- H= Coloplast Brava® Barrier Cream
- I= Control