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# Bactericidal activity of a new 'skin friendly' combined handwash and leave-on skin conditioner

J. Gallagher, P. Rosher, K. Rees – Dermal Laboratories Ltd, Hitchin, UK

## Hygienic handwash

WHO define hygienic handwash as the treatment of hands with an antiseptic handwash to reduce the transient flora without necessarily affecting the resident skin flora[1]. Transient microorganisms are often acquired by healthcare professionals during direct contact with patients and are most frequently associated with healthcare-associated infections.

## Objectives

The aim of this study was to determine the bactericidal activity of a novel 'skin friendly' combined hygienic handwash and leave-on skin conditioner, Dermol Wash.

## Methods

**Standard EN 1499; chemical disinfectants and antiseptics - test for the evaluation of bactericidal activity of skin disinfectants was employed in this study. This test simulates practical conditions for establishing whether a product is suitable for hygienic handwash where disinfection is medically indicated, or in food, industrial, domestic and institutional areas.**

The test comprises of an assessment of the number of test organisms *(E. coli)* released from the fingertips of artificially contaminated hands of volunteers, before and after hygienic handwash with test and reference products. The ratio of the two resulting values is called the reduction factor (RF). It represents a measure of the antimicrobial efficacy of the handwash product tested. To pass the test, the RF of the test product must be significantly superior to that of the standard reference product.

In order to simulate the recommended use of the test product, the EN 1499 test method followed in this study was modified so that the product was used both to wash the hands with and then re-applied as a leave-on conditioner, and this was compared with the reference standard soap.

### Artificial contamination of the hands

Prior to contamination, the hands were washed for one minute using European standard soft soap. After thoroughly drying, the fingers were then contaminated by immersion of the hands up to the mid metacarpals into a bowl containing 2 litres of contamination fluid, *i.e.* an overnight culture of *E. coli K12 NCTC 10538* in Tryptone Soya Broth (TSB). After 5s, the hands were withdrawn from the contamination fluid, excess fluid was allowed to drip from the fingers, and then the hands were held horizontally with the fingers spread apart and allowed to dry for 3min. The fingertips were then sampled to obtain 'Pre-values' of surviving test organisms before applying the 'Test' or 'Reference' procedure. Sampling involved rubbing the fingertips and thumb for one minute on the base of a Petri dish containing 10ml of TSB.

### Reference (European standard soft soap) handwash procedure

5ml of product was poured into pre-wetted cupped hands, and rubbed vigorously into the skin for 60s up to the wrists to ensure total coverage of the hands. This was followed by a 15s water rinse of the fingers from distal to proximal with fingertips upright, under running tap water. The hands were held with the fingers pointing upwards until excess water was dried off by the experimenter, using two dry paper towels to dab any excess water from the base of the hands and the wrists. The hands were then sampled immediately by rubbing the fingertips and thumb for one minute on the base of a Petri dish containing 10ml of neutraliser broth.

### Test product (Dermol Wash) handwash procedure

The test product, 4ml, was applied to pre-wetted cupped hands over 60s. This was followed by a 15s rinse under running tap water. The hands were held with the fingers pointing upwards until excess water was dried off by the experimenter, using two dry paper towels to dab any excess water from the base of the hands and the wrists. A further 2ml of the product was then applied to dry cupped hands over 60s. The test procedure is completed with a 5s rinse under running tap water. The hands were then sampled immediately by rubbing the fingertips and thumb for one minute on the base of a Petri dish containing 10ml of neutraliser broth.

The effectiveness of the products was established by determining the number of colony forming units of the test bacteria released from the fingertips of the left and right hands of 15 volunteers before and after using the reference and test products.

## Results

The computed $\log_{10}$ values (mean of left and right hand) and $\log_{10}$ reduction factors are tabulated below.

| | Reference product | | | Test product | | |
|---|---|---|---|---|---|---|
| | $\log_{10}$ pre values | $\log_{10}$ post values | $\log_{10}$ reduction | $\log_{10}$ pre values | $\log_{10}$ post values | $\log_{10}$ reduction |
| 1 | 6.44 | 3.15 | 3.29 | 7.20 | 2.99 | 4.21 |
| 2 | 7.47 | 3.54 | 3.93 | 7.06 | 3.56 | 3.50 |
| 3 | 7.29 | 4.28 | 3.01 | 7.36 | 3.18 | 4.18 |
| 4 | 7.05 | 3.67 | 3.38 | 6.64 | 3.05 | 3.59 |
| 5 | 7.15 | 4.07 | 3.08 | 7.17 | 3.72 | 3.45 |
| 6 | 7.07 | 4.11 | 2.96 | 7.35 | 3.59 | 3.76 |
| 7 | 7.10 | 3.76 | 3.34 | 7.20 | 2.76 | 4.44 |
| 8 | 7.17 | 3.98 | 3.19 | 7.28 | 3.16 | 4.12 |
| 9 | 7.41 | 3.89 | 3.52 | 7.24 | 3.63 | 3.61 |
| 10 | 7.40 | 3.16 | 4.24 | 7.36 | 2.78 | 4.58 |
| 11 | 7.44 | 3.69 | 3.75 | 7.34 | 2.57 | 4.77 |
| 12 | 7.31 | 3.88 | 3.43 | 7.07 | 3.14 | 3.93 |
| 13 | 7.34 | 3.95 | 3.39 | 7.24 | 3.06 | 4.18 |
| 14 | 6.99 | 4.22 | 2.77 | 7.08 | 3.10 | 3.98 |
| 15 | 7.38 | 3.32 | 4.06 | 7.52 | 2.89 | 4.63 |
| **Mean** | **7.20** | **3.78** | **3.42** | **7.21** | **3.15** | **4.06** |
| Standard deviation | 0.262 | 0.358 | 0.419 | 0.202 | 0.344 | 0.424 |

All neutraliser and test validation criteria specified in EN 1499 were satisfied. Use of the test product was significantly more effective than the reference soap, with a mean RF of 4.06 compared to 3.42 (Wilcoxon matched pairs signed ranks test, $p$=0.01).

## Discussion and Conclusion

Hygienic handwashes containing detergents/soap and antimicrobial ingredients can be notoriously irritant when employed for routine hand disinfection by healthcare professionals. Dermol Wash is a new antimicrobial soap substitute and skin conditioner. The particular combination of antibacterial agents used, a mixture of benzalkonium chloride and chlorhexidine dihydrochloride, acts synergistically, and therefore each agent is present at the low concentration of 0.1%. Cleansing action is achieved using a non-ionic surface-active agent, cetomacrogol 1000, which is an effective soap substitute. The product also contains two emollient ingredients, liquid paraffin and isopropyl myristate, to form a physical barrier within the stratum corneum, thereby helping to maintain the skin's normal barrier function. In this study we have demonstrated that Dermol Wash satisfies the requirements of EN 1499 (modified). This confirms its suitability for use where disinfection is medically indicated. The product's skin friendliness/skin protectant properties are reported elsewhere.

**Reference:** 1. WHO Guidelines on Hand Hygiene in Health Care 2009.

Please turn over for poster summary

# Bactericidal activity of Dermol Wash, a 'skin friendly'combined handwash and leave-on skin conditioner

WHO define hygienic handwash as the treatment of hands with an antiseptic handwash to reduce the transient flora without necessarily affecting the resident flora.[1] Transient microorganisms are often acquired by healthcare professionals during direct contact with patients and are most frequently associated with healthcare-associated infections.

Dermol Wash is an antimicrobial emollient wash, which can be used as a 'skin friendly' combined hygienic handwash and leave-on skin conditioner. Two antiseptics, benzalkonium chloride and chlorhexidine dihydrochloride, act synergistically, providing effective bactericidal activity with each at the low concentration of 0.1%. A cleansing action is achieved using a non-ionic surface-active agent, cetomacrogol 1000, which is an effective soap substitute. Two emollients, liquid paraffin and isopropyl myristate, form a physical barrier within the stratum corneum, helping maintain the skin's normal barrier function.

The trial summarised overleaf shows that Dermol Wash used as a combined handwash and leave-on skin conditioner, complies with Standard EN 1499 (modified), the evaluation test for suitability of a hygienic handwash where disinfection is medically needed.

## Summary of poster overleaf:

- This Standard EN 1499 test comprises an assessment of the number of test organisms *(E. coli)* released from the fingertips of artificially contaminated hands before and after hygienic handwash. The ratio of the two resulting values is the reduction factor (RF) measured in $\log_{10}$ reduction values.
- The reduction factor (RF) of the test product must be significantly superior to the standard reference product (European standard soft soap).
- Dermol Wash used as a hygienic handwash and leave-on skin conditioner, was significantly more effective than the reference soap with a mean RF of 4.06 compared to 3.42 ($p$=0.01).
  NB. $\log_{10}$ reduction of 4 equates to ≥99.99% reduction in microbial counts.

## Conclusion

*"Hygienic handwashes containing detergents/soap and antimicrobial ingredients can be notoriously irritant when employed for routine disinfection by healthcare professionals. Dermol Wash is a new antimicrobial soap substitute and skin conditioner. The particular combination of antibacterial agents used, a mixture of benzalkonium chloride and chlorhexidine dihydrochloride, acts synergistically, and therefore each agent is present at the low concentration of 0.1%. Cleansing action is achieved using a non-ionic surface-active agent, cetomacrogol 1000, which is an effective soap substitute. The product also contains two emollient ingredients, liquid paraffin and isopropyl myristate, to form a physical barrier within the stratum corneum, thereby helping to maintain the skin's normal barrier function. In this study we have demonstrated that Dermol Wash satisfies the requirements of EN 1499 (modified). This confirms its suitability for use where disinfection is medically indicated."*

# Dermol® Wash

**Benzalkonium chloride 0.1% w/w, chlorhexidine dihydrochloride 0.1% w/w, liquid paraffin 2.5% w/w, isopropyl myristate 2.5% w/w.**

**Adverse events should be reported. Reporting forms and information can be found at yellowcard.mhra.gov.uk. Adverse events should also be reported to Dermal.**

'Dermol' is a registered trademark

DERMAL
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Further information is available from:
Dermal Laboratories Limited, Tatmore Place, Gosmore, Hitchin, Herts SG4 7QR

Click **here** for the Dermol Range Prescribing Information or scan the QR code below

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