

# Effect of Neu-Thera® surgical glove formulation on the antimicrobial efficacy of surgical scrub products

## Glove Products

### Background

The problem of dry, irritated skin among healthcare workers (HCWs) is important not only because of its magnitude, but also because it increases the risk of pathogen transmission to patients and healthcare personnel. Cracks and fissures associated with irritant dermatitis increase occupational exposure of HCWs to bloodborne pathogens such as hepatitis B, hepatitis C and HIV, since broken skin provides a more direct route for an organism to enter the bloodstream.<sup>1</sup> Additionally, once the integrity of the skin is disrupted, hands can become colonized with nonresident microorganisms.<sup>2,3,4</sup>

The Centers for Disease Control and Prevention (CDC) document "Guideline for Hand Hygiene in the Healthcare Setting,"<sup>5</sup> published in 2002, addresses issues that can result in higher incidence of nosocomial infections among patients, and specifically recommends that HCWs select products that contain emollients in order to reduce the potential for contact irritant dermatitis. Two of those recommendations are designed to improve the hand hygiene practices of HCWs and to reduce transmission of pathogenic microorganisms to patients and personnel in healthcare settings:

1. Provide HCWs with hand lotions or creams to minimize the occurrence of irritant contact dermatitis associated with hand antisepsis or hand washing.
2. Solicit information from manufacturers regarding any effects that hand lotions, creams or alcohol-based hand antiseptics may have on the persistent effects of antimicrobial soaps being used in the institution.

Products and practices that make it easy for HCWs to comply with recommendations regarding the use of

moisturizers have the potential to make a significant contribution to better hand hygiene.<sup>6</sup> Two new types of surgical gloves, Esteem® polyisoprene surgical gloves with Neu-Thera® formulation and Protegrity® latex surgical gloves with Neu-Thera® formulation, can reduce the problem of dry, irritated skin among HCWs. Both gloves are treated with ingredients known to moisturize, soothe and protect the skin (Table 1). The CDC guidelines also recommend that HCWs obtain manufacturer's information concerning any effects these products may have on the persistent effects of antimicrobial soaps used in healthcare settings.<sup>7</sup> This study evaluates the impact that surgical gloves treated with Neu-Thera® formulation have on the antimicrobial efficacy of surgical scrub products.

Benefit to Skin	Ingredient			
	Provitamin B	Glycerin	Gluconolactone	Chitosan
Protect	√			√
Restore	√	√	√	
Moisturize	√	√		√
Soothe	√		√	√

**Table 1.** Above are the skin benefits of and the ingredients used in the Neu-Thera® glove formulation.

### Study design/methods

In this study, Esteem® polyisoprene surgical gloves with Neu-Thera® formulation and Protegrity® latex surgical gloves with Neu-Thera® formulation were compared to equivalent surgical gloves without the Neu-Thera® formulation to assess their effect on the antimicrobial efficacy of eight surgical scrub products (Table 2). All gloves used in the study were sterile and powder-free. Standardized cultures of *Staphylococcus aureus* ATCC 6538, a gram-positive organism, and *Escherichia coli* ATCC 11229, a gram-negative organism, were used to assess the antimicrobial efficacy of the surgical scrub products.<sup>8</sup> To assess the antimicrobial efficacy of surgical scrub products after exposure to gloves with and without Neu-Thera® formulation, 50 µL aliquots of each surgical scrub product were placed on sterile microscopic slides, spread evenly to create an area of approximately 1" square and allowed to dry for one hour. Ten µL of each microorganism culture were placed on the inside surface of 1" square samples that had been aseptically cut from the palm area

of the gloves to be tested. The inoculated glove samples were placed in contact with the area of the microscope slide that contained the surgical scrub product. A weight of 70g was put on top of each glove sample. The slides were incubated at 39° C for a total of 60 minutes. A control was prepared for each scrub product. For each control, 10 µL of microorganism culture was inoculated onto a sterile cover slip and then placed in contact with the slides coated with the scrub products. The control slides were incubated without pressure at 37° C for 60 minutes. At the end of incubation, the slides with the glove samples or cover slips were dropped into 10mL of letheen broth that neutralized the antimicrobial activity of the scrub products without interfering with the viability of the microorganisms.<sup>9</sup> After mixing, surviving microorganisms on each sample were enumerated using standard culture methods.<sup>10</sup> The number of microorganisms in the original inoculum was titrated using the same neutralizing solution. The log reduction per inoculum was calculated for each surgical scrub product for the Esteem<sup>®</sup> polyisoprene surgical gloves with and without Neu-Thera<sup>®</sup> formulation, Protegrity<sup>®</sup> latex surgical gloves with and without Neu-Thera<sup>®</sup> formulation and for the control for each incubation time. The p values were calculated to determine if there were statistically significant differences between the coated and uncoated gloves.

Product Name	Manufacturer
EZ Scrub 205 PVP-I	Becton Dickinson
EZ Scrub 408 with PCMX-Ultradex	Becton Dickinson
EZ Scrub 107, 4% CHG	Becton Dickinson
3M™ Avagard™ surgical and health-care personnel hand antiseptic	3M
Triseptin <sup>®</sup> brush-free surgical scrub	Healthpoint
Scrub Care <sup>®</sup> surgical scrub brush – sponge/nail cleaner with PCMX emollient cleansing solution	Cardinal Health
Exidine <sup>®</sup> Chlorhexidine Gluconate (CHG) 4%	Cardinal Health
PVP-I scrub, povidone-iodine cleansing solution, scrub	Cardinal Health

**Table 2.** These surgical scrub products were used to compare the ability of surgical gloves with and without Neu-Thera<sup>®</sup> formulation to impact antimicrobial efficacy.

## Results

There was no statistically significant difference in the log reduction/inoculum of gram-positive or gram-negative bacteria (as indicated by p values) for either the Esteem<sup>®</sup> polyisoprene surgical gloves with and without Neu-Thera<sup>®</sup> formulation or the Protegrity<sup>®</sup> latex surgical gloves with and without Neu-Thera<sup>®</sup> formulation (Table 3).

Glove type	Difference in log reduction/inoculum of <i>S. aureus</i> ATCC 6538 (gram-positive) between gloves with and without Neu-Thera <sup>®</sup> formulation	Difference in log reduction/inoculum of <i>E. coli</i> ATCC 11229 (gram-negative) between gloves with and without Neu-Thera <sup>®</sup> formulation
Protegrity <sup>®</sup> latex surgical gloves	Not significant (p = 0.2009)	Not significant (p = 0.4411)
Esteem <sup>®</sup> polyisoprene surgical gloves	Not significant (p = 0.1943)	Not significant (p = 0.9611)

**Table 3.** This chart shows the statistical significance of differences in the log reduction/inoculum of surgical scrubs exposed to surgical gloves with and without Neu-Thera<sup>®</sup> formulation.<sup>11</sup>

## Conclusions

In a study to assess the effect of surgical gloves with Neu-Thera<sup>®</sup> formulation on the efficacy of antimicrobial surgical scrub products, no difference was found between Protegrity<sup>®</sup> latex surgical gloves with and without the Neu-Thera<sup>®</sup> formulation nor between Esteem<sup>®</sup> polyisoprene surgical gloves with and without Neu-Thera<sup>®</sup> formulation. These results indicate that HCWs choosing to use Protegrity<sup>®</sup> or Esteem<sup>®</sup> surgical gloves with Neu-Thera<sup>®</sup> formulation to improve the condition of their hands can do so without affecting the antimicrobial persistence of surgical scrub solutions.

<sup>1</sup>Ojarjarvi J, Makela P, Rantsal I. (1977). Failure of hand disinfection with frequent hand washing: a need for prolonged field studies. *J Hyg (Lond)*. (79), 107-19.

<sup>2</sup>Larson, E., et al. (1998). Changes in bacterial flora associated with skin damage on hands of healthcare personnel. *Am J Infection Control*. (Vol. 26), 513-521.

<sup>3</sup>Casewell M, Phillips I. (1977). Hands as a route of transmission of Klebsiella species. *Br Med J*. (2), 1315-17.

<sup>4</sup>Falk, P.S. (1999). Infection control and the employee health service. In: C.G. Mayhall (Ed.), *Hospital epidemiology and infection control* (2<sup>nd</sup> ed.). (pp 1381-876). Philadelphia: Lippincott, Williams & Wilkins.

<sup>5</sup>Boyce, J. M., Pittet, D., (2002). Guideline for Hand Hygiene in healthcare Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force, *Infection Control and Hospital Epidemiology*, 23 (12).

<sup>6</sup>Ibid.

<sup>7</sup>Ibid.

<sup>8</sup>IPR 04-07O. (issued 03/13/02). Time-Kill Test.

<sup>9</sup>Cardinal Health (internal data).

<sup>10</sup>IPR 04-07O. (issued 03/13/02). Time-Kill Test.

<sup>11</sup>IPR 04-07O. (issued 03/13/02). Time-Kill Test.

Esteem, Exidine, Neu-Thera, Protegrity and Scrub Care are registered trademarks of Cardinal Health, Inc. or one of its subsidiaries. 3M and Avagard are trademarks of 3M Company. Triseptin is a registered trademark of Healthpoint.

© Copyright 2006. Cardinal Health, Inc. or one of its subsidiaries. All rights reserved. Lit. No. 2GLV0370 (0807/5M/MC2957)

 Paper contains a minimum of 10% post-consumer fiber.

Cardinal Health  
Glove Products  
1500 Waukegan Road  
McGaw Park, IL 60085

[www.cardinalhealth.com/gloves](http://www.cardinalhealth.com/gloves)

