

# The Effect of Antibacterial Soap With 1.5% Triclocarban on *Staphylococcus aureus* in Patients With Atopic Dermatitis

Debra L. Breneman, MD, Cincinnati, Ohio

Jon M. Hanifin, MD, Portland, Oregon

Cynthia A. Berge, BS, Cincinnati, Ohio

Bruce H. Keswick, PhD, Cincinnati, Ohio

Paula B. Neumann, PhD, Cincinnati, Ohio

*This double-blind study determined whether daily bathing with an antibacterial soap would reduce the number of Staphylococcus aureus on the skin and result in clinical improvement of atopic dermatitis. For 9 weeks, 50 patients with moderately severe atopic dermatitis bathed daily with either an antimicrobial soap containing 1.5% triclocarban or the placebo soap. They also used a nonmedicated moisturizer and 0.025% triamcinolone acetone cream as needed, but the availability of the corticosteroid cream was discontinued after 6 weeks. The antimicrobial soap regimen caused significantly greater improvement in the severity and extent of skin lesions than the placebo soap regimen, which correlated with reductions both in S aureus in patients with positive cultures at baseline and in total aerobic organisms. Outcome measures included reductions in S aureus, total aerobic organisms, and dermatologic assessments. Overall, daily bathing with an antibacterial soap was well tolerated, provided clinical improvement, and reduced levels of skin microorganisms.*

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Dr. Breneman is from the Department of Dermatology, University of Cincinnati, Ohio. Dr. Hanifin is from the Department of Dermatology, Oregon Health and Sciences University, Portland. Ms. Berge and Drs. Keswick and Neumann are from The Procter & Gamble Company, Cincinnati, Ohio.

REPRINT REQUESTS to University Dermatology Consultants, Inc., University of Cincinnati, 234 Goodman Street, Pavilion A-3, Cincinnati, OH 45267 (Dr. Breneman).

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Approximately 10% to 15% of the population is affected with atopic dermatitis,<sup>1</sup> which causes patients to have high frequencies of skin colonization with *S aureus* and increased numbers of skin flora, acute lesions, and chronic plaques. Clinical studies have shown that the affected skin of 80% to 95% of atopic patients (versus about 5% of controls) is colonized with *S aureus*,<sup>2,4</sup> which is especially dense in the lesions and plaques.<sup>2-6</sup> The levels of *S aureus* colonization have been directly related to the extent and severity of atopic dermatitis.<sup>7-9</sup> *S aureus* is of clinical importance in atopic dermatitis because it can cause secondary skin infections and contribute to the dermatitis.<sup>8</sup> Although the exact mechanism is not known, *S aureus* appears to increase inflammation by the direct action of the bacteria, their metabolic end products on the skin, or an immunologic reaction to the bacterial antigens and superantigens.<sup>10,11</sup>

Clinical studies have shown that treatment with topical antibiotics and antiseptics that reduce the levels of *S aureus* results in improvement in the clinical severity of atopic dermatitis.<sup>3,15-17</sup> However, prolonged use of topical antibiotics can be complicated by the development of bacterial resistance.<sup>3,18,19</sup> Recent reports suggest that topical products containing antimicrobial ingredients may provide similar benefits without this complication.<sup>15,16</sup> One such ingredient, triclocarban (the active ingredient in the antibacterial soap used in this study), is effective against the *Staphylococcus* species that colonizes the skin.<sup>12-14</sup> Washing with an antibacterial soap removes bacteria and deposits the antimicrobial ingredient on the skin,

which can control the number of surviving organisms and help prevent the colonization of pathogens such as *S aureus*.

The purpose of this study was to determine if bathing at least once daily with an antibacterial soap with 1.5% triclocarban would reduce the number of microorganisms, particularly *S aureus*, on the skin and result in clinical improvement in atopic dermatitis. We also investigated whether the use of topical corticosteroids in addition to the antibacterial soap was beneficial.

## Methods

*Summary of study design*—This double-blind, randomized clinical study consisted of a 14-day standardization period to ensure that subjects were using the same products, a 42-day treatment period, and a 21-day regression period. Fifty patients with dermatitis of moderate severity, who had Fitzpatrick skin types I to IV,<sup>20</sup> and who met criteria for the diagnosis of atopic dermatitis specified by Hanifin and Rajka<sup>21</sup> were enrolled and gave informed consent. These patients had active dermatitic lesions manifested by combinations of erythema, scales, lichenification, crusting, and excoriation. The study was reviewed and approved by the Institutional Review Board of the University of Cincinnati prior to its conduct.

During the standardization period, patients were given a nonmedicated cleansing bar and a nonmedicated moisturizing cream to use in place of their regular cleansing and moisturizing products, and they were instructed to refrain from using systemic or topical antibiotics and antibacterial/antimicrobial soap, lotion, cream, and shampoo until after the study was completed. In addition, patients were given a topical corticosteroid cream containing 0.025% triamcinolone acetonide to use in place of other topical corticosteroid medications.

During the treatment period, patients were given either a bar soap (Safeguard®) containing 1.5% triclocarban as the active antimicrobial ingredient or a placebo bar soap identical to the antibacterial bar but without triclocarban. To ensure adequate exposure to the test products, patients were required to thoroughly wash their entire bodies with the assigned product at least once daily. All patients continued on the nonmedicated moisturizer and topical corticosteroid treatment regimen established during the standardization period. This allowed for a comparison of the amount of topical corticosteroid used between the 2 groups to determine if patients using the antibacterial soap required less. The extent of the atopic dermatitis on each patient was assessed, and microbial specimens were taken on days 0 (before beginning the treatment period), 14, 28, and 42.

Patients stopped using all topical corticosteroids during the regression period to determine the rate at which clinical symptoms returned. However, they were allowed to use the moisturizing cream and continued to use their assigned test product daily. Dermatologic evaluations were done on a weekly basis to ensure that the patients' conditions did not become extensively worse. Microbial specimens were taken at the end of this period.

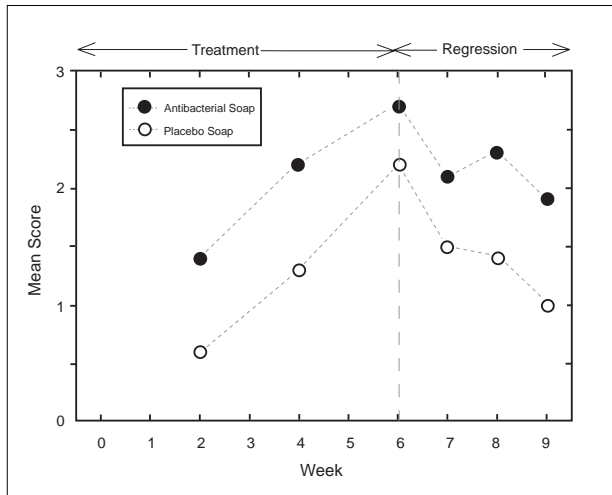
*Baseline grading for disease severity*—The baseline grading system reported by Rajka and Langeland<sup>22</sup> was used to determine the severity of the patients' atopic dermatitis. Only patients who had atopic dermatitis of moderate severity were enrolled.

*Rating the extent and severity of dermatitis*—A rating scale was also used to determine the amount of itching experienced by the patient.<sup>23,24</sup> On day 0, only patients with a minimum total evaluation score of 4.0 for the 3 primary attributes in at least one area of the body were allowed to continue into the treatment period. The percentage of the body surface area affected was scored on a scale of 0 to 6 (0=0% affected, 6=90% to 100% affected).<sup>25</sup>

*Investigator's global evaluation*—To provide an additional perspective into the worsening or improvement of a patient's dermatitis, the investigator scored the change in global atopic dermatitis from day 0 (baseline) to days 14, 28, and 42 after product use and at the weekly visits during the regression period. A scale of -5 to 5 (-5=severe worsening, 0=no change, 5=total clearing) was used to evaluate the extent and severity of dermatitis and skin symptomology.

*Use of topical corticosteroids*—During the standardization and treatment periods, patients who needed a topical corticosteroid cream were provided with a low-potency cream containing 0.025% triamcinolone acetonide. This cream was selected because reports claim that it did not cause significant quantitative or qualitative changes in the microbial flora of the skin.<sup>26</sup> One 60 g tube was provided to patients at the study enrollment and as needed at their visits to the clinical site. They were instructed to sparingly apply the cream to the affected areas of the skin and limit the applications to only when necessary. Their unused, partially used, or empty tubes were weighed to monitor the amounts of applied cream. Patients were not permitted to use any systemic or topical corticosteroids during the regression period.

*Microbiologic sampling*—Microbiologic specimens were taken from 4 or 5 skin sites using a swab-wash method.<sup>27</sup> An open circular area of 5.0 cm<sup>2</sup>, delineated by a Teflon® template, was wiped with a cotton-tipped swab moistened in 2.0 mL of Lethen broth (Difco® 0681-01-5) for 60 seconds. A total of



**FIGURE 1.** Mean global improvement scores throughout the 6-week treatment period and the subsequent regression period when the use of corticosteroid cream was restricted. An assessment of the overall improvement in atopic dermatitis for the antibacterial soap group (●) and the placebo soap group (○) was compared to the baseline assessment on a scale of -5 to 5 (-5=severe worsening, 0=no change, 5=total clearing).

4 specimens were taken from the elbow- and knee-crease areas. If a patient did not have any dermatitic lesions in either of these areas at the visit on day 0, a fifth specimen was taken from a lesional site in another area, not including the back, scalp, or hands. When it was necessary to take a fifth specimen, a sampling of this site was continued throughout the study.

The specimens were plated on trypticase soy agar with 5% sheep blood and on mannitol salt agar for the enumeration of total aerobic organisms and *S aureus*, respectively. Differential counting of the *S aureus* was based on differences in colonial morphology (ie, size, color, general appearance). Identification of *S aureus* was confirmed with a BBL® Staphyloslide® test.

### Statistical Analysis

Statistical comparisons were made using repeated measures analysis of variance or covariance over time. For primary and secondary dermatologic attributes, including total aerobic microorganisms, *S aureus*, and itch, changes from baseline were analyzed using baseline response as a covariant and body part as a factor when multiple samples were collected from different areas of the body. Microbiologic data were log transformed prior to analysis. For dermatologist-assessed global change in atopic dermatitis, repeated measures analysis of variance over time was used to make statistical comparisons.

Homogeneity at baseline was verified for all endpoints with analysis of variance, and  $P$  values  $\leq .05$  were considered statistically significant.

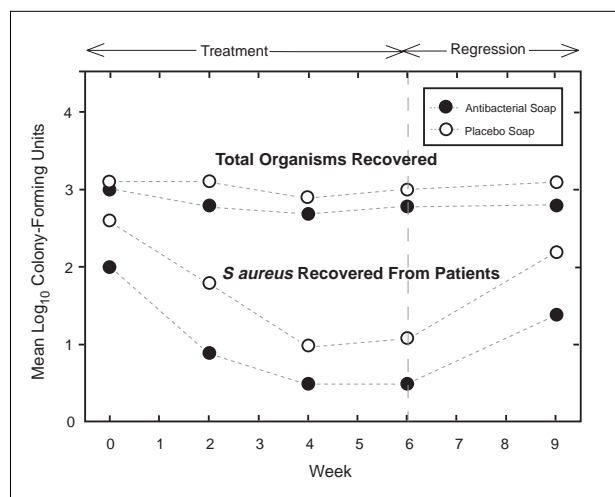
### Results

This study showed that an antibacterial soap was more beneficial than a placebo soap when used in a daily bathing and treatment regimen for atopic dermatitis. These results were consistent with the dermatologic and microbiologic assessments.

**Dermatologic Endpoints**—Global improvement in atopic dermatitis was significantly greater in the group that used the antibacterial soap than in the group that used the placebo soap. The scores for both groups tended to improve throughout the entire 6-week treatment period and worsen slightly during the subsequent regression period when use of corticosteroid was restricted; however, the tendency toward worsening was less pronounced in the antibacterial soap group (Figure 1).

In general, the antibacterial soap group showed greater and more rapid improvement with respect to disease extent and severity than did the placebo soap group; they experienced less itching and held this improvement better during the 3-week regression period. Results from analyses of the total of the 3 primary attributes, the total of the 3 secondary attributes, and the total of all 6 dermatologic attributes indicated that the change from baseline scores was significantly greater in the antibacterial regimen compared with the placebo regimen. The results from the analyses of the individual components of the primary and secondary attributes, except for oozing/weeping/crusting, also indicated that the efficacy was significantly higher in the regimen using antibacterial soap than in the one using placebo soap. The prevalence of oozing/weeping/crusting was too low to demonstrate a significant change. The greatest improvement was shown for excoriation. All scores followed the same trends of decreasing during the 6-week treatment period and gradually increasing during the regression period. As with global improvement, the antibacterial group regressed more slowly than the placebo group after discontinuing corticosteroid use. The secondary attributes followed a similar score pattern: there was a significant reduction in the percentage of body surface area affected by atopic dermatitis in the antibacterial group, while the percentage of body surface area affected in the placebo group remained unchanged. No significant differences between the 2 treatment groups were detected at baseline for any of the measured parameters ( $P > .05$ ).

There was no significant difference in the amount of topical corticosteroid used by either treatment group ( $P = .86$ ). During the standardization and treat-



**FIGURE 2.** Mean log<sub>10</sub> colony-forming units (CFUs) recovered from the antibacterial soap group (●) and the placebo soap group (○) during the treatment and regression periods when the use of corticosteroid cream was restricted. (A) Upper graph: CFUs of total organisms recovered from both lesional and nonlesional areas. (B) Lower graph: CFUs of *S aureus* recovered from both lesional and nonlesional areas for the 50% of patients who began the study with a detection of *S aureus*.

ment periods, the average amount of corticosteroid used by the antibacterial and placebo groups was 79.9 and 83.6 mg, respectively. There was only one study-related adverse event: a patient from the antibacterial soap group withdrew at day 28 because of worsening of dermatitis.

**Microbiologic endpoints**—For the 50% of the patients who began the study with a detection of *S aureus* (22% antibacterial, 28% placebo), the antibacterial soap regimen reduced *S aureus* counts significantly more than the placebo soap regimen. When patients without *S aureus* at the beginning of the study were included in the analysis, there was no significant difference in the reduction of the numbers of *S aureus* between the 2 treatment regimens. The reduction in the total numbers of aerobic organisms was greater in the antibacterial soap group than in the placebo group (Figure 2). The ratio of *S aureus* to total organism counts was significantly lower for patients using the antibacterial soap, and high concentrations of total organisms and *S aureus* tended to be associated with lesional, rather than nonlesional, areas.

**Demographics**—Thirty-five females and 15 males, aged 12 to 74 years, were included in the study. The mean and median ages were 34.6 and 35 years, respectively. Age distributions ( $P=.65$ ) and gender distributions ( $P=.76$ ) were not significantly different between the 2 treatment groups. Fitzpatrick skin types II, III, and IV were represented by 20, 5, and 25 patients, respec-

tively, and all Fitzpatrick skin types were similarly represented in the 2 treatment groups ( $P=.34$ ).

## Discussion

In this study, using an antibacterial soap for daily bathing had advantages over using a nonantibacterial placebo soap in a regimen to treat atopic dermatitis. The clinical improvements, including reductions in the extent and severity of atopic dermatitis, itching, and levels of microorganisms like *S aureus*, were consistently greater in the antibacterial soap regimen than in the placebo soap regimen. In addition, dermatitis in the antibacterial soap group remained less severe than in the placebo soap group during the regression period when corticosteroid use was prohibited. These differences in product efficacy were not impacted by the amount of topical corticosteroids used because the total amounts used by both groups were similar.

The results of this study suggest a correlation between an improvement in atopic dermatitis and a decrease in the number of *S aureus* on the skin. The carriage rate of *S aureus* was lower than the 79% to 95% previously reported for atopic dermatitis (50% at day 0).<sup>2,5</sup> This lower prevalence was likely due to the limited number of skin sites sampled for microorganisms relative to the entire affected body surface area that was assessed during the dermatologic evaluations. However, the results from the dermatologic evaluations strongly suggest that an improvement in atopic dermatitis can occur with even a small decrease in the numbers of *S aureus*.

Patients with atopic dermatitis are frequently instructed to avoid the use of antibacterial soap; however, no significant incident of irritation or irritant contact dermatitis was reported in either group. The results of this study show that regular use of an antibacterial soap containing 1.5% triclocarban may lead to a significant improvement in atopic dermatitis without increasing the incidence of irritation. This type of antibacterial soap may be a useful, well-tolerated, and inexpensive addition to the clinical management of atopic dermatitis.

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