Antipruritic Hydrogel for the Treatment of Atopic Dermatitis: An Open-Label Pilot Study

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Atopic dermatitis (AD) is the most common chronic inflammatory skin disease in industrialized nations. The efficacy and tolerability of Atrapro (RD047-26) antipruritic hydrogel was evaluated in 17 adult participants with mild to moderate AD with associated pruritus. The antipruritic hydrogel was applied 3 times daily to the affected areas of the body, and participants were evaluated on days 3, 7, and 14 (end of study). There were 3 efficacy end points: investigator global assessment (IGA), investigator pruritus assessment (IPA), and participant itch assessment (PIA). All 3 efficacy end points were met and showed a statistically significant improvement in the mean score from baseline to day 14 ($P < .001$). The mean IGA score improved 43% from a baseline score of 2.7 to a day 14 score of 1.53 ($P < .001$) on a 5-point scale (0 = clear; 4 = severe). The severity of pruritus decreased in 88% (15/17) of participants from baseline to day 14 based on the IPA and 82% (14/17) of participants based on the PIA. Most participants (82% [14/17]) experienced relief from itching by day 3, and this improvement remained consistent at each of the follow-up office visits. The only adverse event (AE) was mild postapplication skin dryness, which was reported by 59% (10/17) of participants and resolved with increased use of emollients. Based on these promising results, further research on the antipruritic hydrogel is warranted.

Antipruritic hydrogel is a novel topical treatment that was developed to address the

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challenges of AD. The formulation was designed to promote moisture retention and reduce itching, pain, and burning. It is a colorless, nonoily, pH-neutral, emollient-containing gel that is comprised of oxychlorine compounds, specifically hypochlorous acid and sodium hypochlorite. The safety and efficacy of this antipruritic hydrogel was evaluated for the treatment of mild to moderate AD in an open-label, single-center pilot study.

Methods
The study protocol was approved by an institutional review board. All participants provided informed consent. The study was conducted according to the Good Clinical Practice guidelines of the International Conference on Harmonisation, the Declaration of Helsinki, and applicable federal and local regulatory requirements.

Participants—Male and female adults (aged 18–65 years) were enrolled if they were in good general health; if they had AD as defined by the AD criteria set forth by Hanifin and Rajka, including a minimum of 3 major and 3 minor symptoms; if they had AD patches covering 5% to 25% of their body surface area (BSA); if they had mild to moderate AD based on an investigator global assessment (IGA) rating of 2 (mild) or 3 (moderate) (Table 1); and if they had AD with associated pruritus based on an investigator pruritus assessment (IPA) score of 2 (moderate) (Table 2).

Participants were required to use the same type of skin and hair products including soaps, moisturizers, lotions, creams, ointments, sunscreens, and shampoos for a minimum of 2 weeks prior to baseline, and continue to use the same products with a similar frequency throughout the study. Women of childbearing potential had to have a negative urine pregnancy test at baseline and use an effective method of birth control throughout the study.

Participants were excluded if they had a history of allergy or sensitivity to any of the components of the investigational product; had severe or uncontrolled asthma; had an anticipated need for surgery or hospitalization during the study; were pregnant, nursing, or planning a pregnancy during the study; were enrolled in a subsequent investigational drug or device study during the study; or were enrolled in an investigational drug or device study within 30 days prior to baseline.

Treatment—Treatment consisted of topical application of Atrapro antipruritic hydrogel. The first application to the affected areas of the body was done by the investigator at the baseline (day 0) office visit. At this visit the participant was trained on the application of the antipruritic hydrogel and was instructed to apply it to affected areas 3 times daily at least 3 hours apart for 2 weeks. Participants also received instructions on how to complete a daily diary.

End Points—Efficacy was measured according to 3 instruments, which were completed at each office visit (baseline and days 3, 7, and 14). The investigator visually assessed the overall severity of a participant’s AD based on the IGA (Table 1). The investigator assessed the participant’s pruritus, scratching, and discomfort a few days prior to the baseline office visit based on the IPA (Table 2). Additionally, participants self-reported the severity of itching a few days prior to the baseline office visit using the participant itch assessment (PIA). The PIA is a visual analog scale that ranges from no itch to worst.
itch imaginable. The PIA scores were normalized to a scale of 1 (no itch) to 10 (worst itch imaginable). The total BSA affected by AD and the treated BSA also were measured at each office visit based on the percentage of the head and neck, upper limbs, trunk, and lower limbs affected by AD and treated for AD, respectively.

Safety was evaluated at each office visit (baseline and days 3, 7, and 14). Adverse events (AEs) were graded based on the CTEP (cancer therapy evaluation program) CTCAE (common terminology criteria for AEs) version 4.02, if applicable, or as mild (grade 1), moderate (grade 2), severe (grade 3), or life threatening (grade 4). The relationship of AEs to the treatment was assessed by the investigator as unrelated, unlikely, possible, probable, or definite.

Statistical Analysis—All statistical programming was performed using SAS version 9.1 or higher. Statistical significance was based on 2-tailed tests at the 5% level of significance (P<.05). Analysis of the mean change (reduction) from baseline on the 3 efficacy assessment scales (IGA, IPA, and PIA) was based on a paired t test.

Results

Demographics—Of the 17 patients who were screened, enrolled, and treated, all 17 completed the study. The majority of participants were black women aged 28 to 56 years (Table 3). The mean IGA score showed significant improvement (43%) from a baseline score of 2.7 to a day 14 score of 1.53 based on a 5-point scale (P<.001). Of the 5 participants with mild AD (IGA score of 2) at baseline, 4 (80%) were rated on the IGA scale as clear or almost clear at day 14. Of the 12 participants with moderate AD (IGA score of 3) at baseline, 4 (33%) were rated as clear or almost clear at day 14.

Efficacy Assessments—The percentage of participants with a reduction based on the IGA steadily increased from baseline to day 14 (Figure 1). Of the 12 participants with moderate AD (IGA score of 3) at baseline, 4 (33%) were rated as clear or almost clear at day 14.
change (reduction) based on the PIA from baseline was statistically significant at each evaluation (P<.001) (Figure 3). When participants were categorized by race, the mean scores in the IGA, IPA, and PIA scales at baseline and day 14 were not significantly different between groups.

The proportion of participants who experienced a reduction in the percentage of BSA affected by AD had increased at each evaluation to 65% (11/17) of participants by day 14. The mean reduction from baseline to day 14 in participants’ BSA affected by AD was 37% (P<.001).

Safety Assessments—Ten participants (59%) had treatment-related AEs of postapplication skin dryness; however, all of the AEs were mild and had resolved with increased use of the emollient the participants were using at the beginning of the study and had continued to use throughout the study. Efficacy results were similar between the group of participants with postapplication dryness and those in the group with no AEs.

Comment
Atopic dermatitis encompasses a broad spectrum of symptoms and is the most common chronic inflammatory skin disease in industrialized nations. Atopic dermatitis affects individuals of all races and is more common in individuals who live in cold climates, urban settings, and developed countries. Although AD is more common in children, adult-onset AD typically presents in early adulthood and occurs more often in women. This study was carried out in the United States in a metropolitan area with a population exceeding 1.6 million individuals. The participants selected for this study were adults and mostly women. The study population represented the midrange of the AD population consisting of patients experiencing mild to moderate disease with

![Figure 1](image1.png)

**Figure 1.** Percentage of participants with a reduction from baseline on the investigator global assessment (N=17).

![Figure 2](image2.png)

**Figure 2.** Percentage of participants with a reduction from baseline on the investigator pruritus assessment (N=17).

![Figure 3](image3.png)

**Figure 3.** Mean change (reduction) in pruritus from baseline to days 3, 7, and 14 for the participant itch assessment. Asterisk indicates P<.001.
pruritus. All of the participants had a history of AD and felt that their current treatment was not sufficient in controlling their condition. The majority of the participants generally responded to treatment with the antipruritic hydrogel by day 3 and continued to respond for the duration of the 14-day study phase. Response was defined as a reduction in disease severity as well as a reduction in the severity of pruritus, with the latter end point independently evaluated by the investigator and the participant. All 3 end points were met and the mean change (reduction) from baseline was significant for the 3 end points (P < .001). In addition, a significant reduction in the percentage of affected BSA was observed at the end of the study (P < .001).

Numerous instruments exist to measure the severity and response to treatment of AD. The instruments used in this study included a global assessment of the severity of disease as assessed by the investigator, a specific assessment of pruritus as evaluated by the investigator, and an assessment of pruritus from the perspective of the participant. The results of the participant’s assessment of pruritus were consistent with the investigator’s assessment at each of the 3 follow-up office visits. Participants were seen by the investigator at days 3, 7, and 14 to evaluate the onset of response and the consistency of the response over time. In prior reports, patient adherence to AD treatment had been shown to drop following the first treatment and increase before an upcoming office visit.14,18,19 The frequency of office visits and short intervals between the first treatment and the first office visit may have improved compliance in this study. In addition to office evaluations, participants completed a daily diary that demonstrated remarkable compliance in the study. This compliance suggested that these participants with AD were highly motivated to improve their disease, which also may be the case with the general population of patients with AD and associated pruritus. In addition, the colorless, water-based qualities of the antipruritic hydrogel rendered the treatment easy for participants to apply without the concern of a greasy feeling, an oily or discolored appearance, or a detrimental effect on their clothing.

Yentzer et al14 showed a similar high level of compliance in a study of AD treatment that also included office visits on days 3, 7, and 14, in addition to electronic monitoring. In the study, approximately 55% (11/20) of participants with mild to moderate AD achieved an IGA score of clear or almost clear following corticosteroid therapy with fluocinonide cream 0.1%,14 which is similar to the results of the antipruritic hydrogel treatment used in the present study in which 47% (8/17) of participants were clear or almost clear at day 14.

The main goal of this study was to assess if the antipruritic hydrogel improved the pruritus associated with AD. The secondary goal was to determine if the antipruritic hydrogel had an effect on the overall AD present at baseline. All 3 primary end points were met and the treatment was well-tolerated. This study was limited by the small population size and by the lack of a control group. There was no washout period that allowed us to assess the effects of an additional treatment added to the participant’s standard of care as opposed to the effects of the treatment alone. The study included 3 follow-up visits over a 2-week study phase, which allowed us to assess the time course of the response.

The favorable results of this study support further research of the use of the antipruritic hydrogel as an alternative treatment of AD compared with standard topical therapies. In addition, the use of the antipruritic hydrogel may potentially eliminate or decrease the need for systemic therapy.

Conclusion

In this open-label, single-center pilot study, the antipruritic hydrogel appeared to be a well-tolerated and effective treatment of AD. A significant reduction in pruritus was observed by the investigator (P < .001) as well as approximately 90% of participants.

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REFERENCES


