Compositions for Prevention/prophylactic Treatment of Poison Ivy Dermatitis
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Abstract
Poison ivy (Toxicodendron radicans), poison oak (T. diversilobum), and poison sumac (T. vernix) are the primary causes of contact dermatitis in the United States, affecting 10-50 million Americans every year. Other genera of the plant family Anacardiaceae with dermatogenic constituents include Anacardium (cashew nuts), Semirartus (India ink tree), Metopism (poison wood), and Mangifera (mango). The prevalence of sensitivity to poison ivy and poison oak in the general adult population ranges from 50% to 70% with peak frequency for sensitization occurring between the ages of 8 and 14. Outdoor activities as well as outdoor occupations which relate to firefighting, forestry and agriculture are at high risk, costing significant medical expenses and worker’s disability. Each fire season, approximately one third of forestry workers in California, Oregon and Washington are disabled by poison oak dermatitis with treatment costs in California alone representing 1% of the annual worker’s compensation budget. During ongoing studies aimed at the discovery of an effective prophylactic treatment for Toxicodendron dermatitis, we have developed a series of novel agents and tested the efficacy of these agents in an in vivo animal model.

Methods and Project Design
The novel agents were synthesized, purified, and characterized by spectral analysis techniques [1]. A guinea pig contact dermatitis model was used for in vivo efficacy studies.

![Diagram](image)

Figure 1: Sites on the abdominal surface of skin for application of urushiol challenge doses dissolve in 15µl acetone vehicle.

Introduction
Poison ivy is a weed found in just about every state of mainland USA. The leaves of poison plants release only minimal urushiol which is a strong allergen. When urushiol contacts skin it causes dermatitis. Hence the name “Contact Dermatitis”. Inside poison ivy, other plants that contain similar allergens include poison oak, and poison sumac. Only 1 mg (billionth of a gram) needed to cause rash while average is 100 mg for most people. Five hundred people could itch from the amount covering the head of a pin. One to 5 years is normal for urushiol oil to stay active on any surface including dead plants.

Twenty-five million to 40 million Americans require medical attention after being exposed to one of these plants. The symptoms of poison ivy dermatitis usually appear within one to two days of contact with the plant oils. They begin with intense itching and a rash that progresses to swelling and blistering. The inflammation is confined to the area that had contact with the plant, often the hands or face, and can occur on any part of the body.

Methods

Scoring skin reactions
The severity of erythema and edema were observed and scored according to Draize scoring system.

Results
Score of erythema and edema of each animal in a group was added to give a sum total score at 24, 48 and 72 hours. Figure 2A shows the sum of scores of skin reactions observed at 24 h post urushiol challenge in all groups. ELLI-21-83, ELLI-21-78-1 and ELLI-21-57-3 treated animals showed no skin reaction compared to buffer or vehicle treated groups (figure 2A). At 48 h after challenge, the skin reaction in group IV was very mild (below the lowest score). No erythema or edema was observed in group III at either of the 3 challenge doses (figure 2B). At 72 hours post urushiol challenge, the sum total score of groups III, IV and V remain under the lowest score in the Draize scoring scale compared to buffer or vehicle treated guinea pigs (figure 2C).

Stability
ELLI-21-57-3 is stable as freeze dried material for 3 years. It is also stable in five aqueous formulations for 18 months at room temperature. Studies will be carried out for 24 months.

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Reference

Conclusion
- The novel agents were shown to be effective in vivo in a guinea pig contact dermatitis model at preventing sensitization, when administered pre-exposure to poison ivy (tolerance).
- Skin reaction to urushiol challenge was dose dependent.
- Pretreatment with ELLI-21-83, ELLI-21-78-1 or ELLI-21-57-3 showed a protective effect against dermatitis caused by urushiol.