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An Oral Antigen Preparation in the Prevention of Poison Ivy Dermatitis  
--Results in 455 cases of ivy sensitivity--  
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Poison ivy dermatitis commonly thought of as one of the vacation and holiday dermatoses, may also be regarded as an occupational disease affecting outdoor workers. The poison ivy plant and its allies are major occupational hazards to tree service workers, telephone and electric power linesmen, pipeline layers, woodsmen, farmers, and large number of men in the armed services. In some occupations, ivy poisoning is one of the chief causes of lost man-hours.

Tree service workers, because of their frequent contact with poison ivy year after year, make excellent subjects for studies of desensitization methods. Employees of a tree service company,<sup>1</sup> as well as private patients, were subjects of the studies presented in this paper. The purpose of these studies was to investigate the effectiveness and safety of an oral antigen preparation,\* in the prophylaxis of poison ivy dermatitis.

### **Selection of Prophylactic Agent**

Attempts to prevent ivy dermatitis by ingesting parts of the poison ivy plant or its oleoresins are as old as the American Indian practice of chewing poison ivy leaves.

It is difficult, from a survey of the literature, to evaluate the practicality of desensitization preparations and procedures. There are too many variables as to the *source of the antigen* (fresh ivy leaves and stems, dried ivy leaves,<sup>2</sup> ground ivy seeds,<sup>3</sup> synthetic pentadecylcatechol plus hydrocortisone,<sup>4</sup>), the *vehicle* (alcohol,<sup>5</sup> corn oil,<sup>6</sup> almond oil,<sup>7</sup> peanut oil,<sup>8</sup> aqueous solutions<sup>9</sup>), the method of *administration* (oral<sup>3,5,6,10</sup> parenteral<sup>4,7,8,9,11</sup>) and factors controlling the amount and rate of antigen received (initial *concentration* of the antigen, *stability* of the preparation, single and total *dosage*, and graduation of dosage). Selection of the desensitization method for the present studies was based on the following analysis of the variables:

Success or failure of desensitization methods depends to a considerable extent on the dosage and conditions affecting dosage. If the total amount of antigen in all the doses is too small, the patient is not desensitized. Presumably there is an insufficient build-up of antibodies. On the other hand, if the dose at any one time is too large, the patient may experience undesirable side effects such as pruritis and gastrointestinal disturbances. One of the important advantages of oral administration is that small doses can be taken daily over an extended period of time so that the total amount of desensitizing agent has an accumulative effect sufficient for safe prophylaxis.

Parenteral administration of poison ivy antigen is objectionable for several reasons: (1) the method is not suitable for frequent administration of small doses, (2) inflammatory reactions at the site of injection are common, and (3) incipient poison ivy dermatitis may flare up as a severe dermatitis as a result of contact between skin and antigen preparation.

In oral administration, the nature of the vehicle is important because it governs the rate of absorption of the antigen and the site of absorption. Pruritus ani is a frequent

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\* Oral Ivy, Milderm Research Laboratories, 1011 Arch Street, Philadelphia

complication when oil is the vehicle.<sup>6</sup> Oil is absorbed slowly; some of the unabsorbed oil may reach the perineal area and cause severe itching.

Alcohol was used as the vehicle of a poison ivy extract by Schamber.<sup>5, 12</sup> Although this preparation was not stable and the dosage was not standardized, oral therapy with an alcoholic extract was regarded as satisfactory.

Poison ivy preparations, whether in alcoholic or oily vehicle or in dry form, are unstable because of the tendency of ivy oleoresins to oxidize. It is difficult to regulate the dosage in a preparation whose antigen content is variable. The unreliability of such preparations may explain some of the contradictory results reported in the literature.

From the above considerations, it would appear that the desirable characteristics of a poison ivy extract include (a) suitability for oral administration, (b) solution in a nonoily vehicle and (c) stability.

These conditions are met by the antigen preparation used in the present series of studies. This preparation is a stabilized extract of fresh poison ivy leaves and stems in 70% alcohol. The uniform potency of the extract makes it possible to prescribe a standardized dosage.

## **Methods and Results**

The studies were made during the years 1953 to 1957 on various groups, as follows:

In 1953-1955, a preliminary study<sup>13</sup> was conducted in Philadelphia. The subjects were 161 private patients, children and adults, from all walks of life.

In 1955, with the cooperation of the Asplundh Tree Service Company, 100 tree service workers were studied.

In 1956, a similar study was made of 77 tree service workers.

In 1956-1957, a study was made of 100 private patients in Wilmington, Delaware. The composition of this group is shown in Table 1.

Dr. Charles R. Rein made available his records on 17 private patients who were taking the oral antigen preparation in 1954. His results are included in this report.

Only patients with known susceptibility to poison ivy dermatitis were used as subjects.

To get the pertinent histories of tree service workers, who were geographically scattered, it was necessary to use a questionnaire. The definitions printed on the questionnaire form define the terms "severe," "moderate," and "mild" as used throughout these studies.

All subjects were supplied with the oral antigen. Adults were instructed to take five drops in one-quarter glass of water, milk or fruit juice just before breakfast for at least six weeks beginning about the first week in March and then three times weekly until the end of the poison ivy season. The dose for children under six years was three drops.

The results of the prophylactic treatment are shown in Tables I, II, and III.

In the preliminary study<sup>13</sup> on 161 private patients in my Philadelphia office, prophylaxis was effective for 120 (74.5%), as indicated by reduced severity and frequency of attacks. Of those patients not benefited, it was observed that most had been exposed to poison ivy within two weeks after beginning prophylactic treatment. No pruritus, gastrointestinal disturbances, or other untoward effects were reported.

Similarly, 75% of the 100 patients in the Wilmington study (Table I) were afforded protection. Undesirable side effects were experienced by only one patient, who complained of nausea and gastrointestinal discomfort.

Combined results of the two studies on employees of the Asplundh Tree Service Company (Table II) show that half the men (50.8%) had no attacks at all during the season following prophylaxis, and that 80.8% were improved (no attacks or milder attacks than usual). No untoward side effects were reported.

Rein<sup>14</sup> reported on his cases: "...12 of the 17 individuals believed the oral antigen was effective in reducing the severity and frequency of the recurrent episodes while on the prophylactic regime. In those individuals who developed severe episodes of dermatitis venenata, it was noted that they were exposed to the poison ivy plant within two weeks after starting oral prophylaxis...There was no evidence of intolerance or gastrointestinal side effects except in one patient who was known to be extremely sensitive to poison ivy."

TABLE I.  
ONE HUNDRED PATIENTS WITH RECURRENT ATTACKS OF MODERATE OR SEVERE POISON IVY DERMATITIS  
(1956-1957 STUDY)

Composition of the group	No. of Patients
Sex	
Male.....	60
Female.....	40
Age range (4-62)	
10-21.....	35
22-42.....	55
other ages.....	10
Occupations and activities (opportunities for contact with ivy)	
campers.....	32
sportmen (golfers, fisherman, hunters).....	19
housewives and others (possible contact through gardening or indirect contact though dogs).....	44
miscellaneous.....	5
Results of prophylaxis	
Clinical protection, even though patients had contact with ivy and continued with their hobbies.....	75
Mild to moderate recurrence.....	20
No appreciable desensitization.....	5

TABLE II  
INCIDENCE OF POISON IVY DERMATITIS IN A GROUP OF IVY-SENSITIVE  
TREE SERVICE WORKERS BEFORE AND AFTER PROPHYLAXIS\*

Before Prophylaxis (number of subjects)	After Prophylaxis (number contracting ivy dermatitis during season following prophylaxis)				
	Severe	Moderate	Mild	None	Improvement†
Severe 60	3	12	21	24	45
Moderate 79	1	8	32	38	70
Mild <u>38</u>	<u>1</u>	<u>1</u>	<u>8</u>	<u>28</u>	<u>28</u>
Total: 177	5	21	61	90	143
Percent	2.8	11.9	34.5	50.8	80.8

\*Summary of two studies made during 1955 and 1956 on prophylaxis of poison ivy dermatitis in employees of the Asplundh Tree Service Company.

†Number of cases in which men subject to severe or moderate attacks before prophylaxis had no attacks or only mild attacks during the season following prophylactic treatment, and cases in which men subject to mild attacks had no attacks during that season.

TABLE III  
SUMMARY OF STUDIES ON PROPHYLAXIS WITH ORAL ANTIGEN

Study	Number of subjects in study	Improvement*	
		Number	%
Tree service workers (1955)	100	84	84.0
Tree service workers (1956)	77	59	76.6
Private patients (Philadelphia, 1953-1955)	161	120	74.5
Private patients (Wilmington, 1956-1957)	100	75	75.0
Dr. Charles R. Rein's patients (1954)	<u>17</u>	<u>12</u>	<u>70.6</u>
Total	455	350	76.9

\*Attacks of poison ivy dermatitis milder or absent during season following prophylaxis.

All the studies are summarized in Table III. A total 455 subjects received oral prophylaxis. Of these, 350, or 76.9%, were benefited.

Two case histories are reported:

CASE 1: A. S. had severe attacks of poison ivy dermatitis every summer without exception from age three (in 1938) to age 16. In 1948 he received 10 weekly injections

of a poison ivy extract without success. Three injections given in 1950 and one in 1952 were also failures. The 1950 series of injections caused an inflammatory reaction. In March, 1953, prior to prophylactic treatment with the oral antigen preparation, his reaction to rhus antigen as shown by patch test was 4 plus. One month of oral antigen treatment (five drops in one-quarter glass of water before breakfast) brought the rhus antigen reaction down to 1 plus. The treatment was continued for another two weeks, at the end of which time a patch test indicated a negative reaction. That summer, for the first time in 13 years, he suffered no attacks of poison ivy dermatitis, although he went to camp and carried on his usual activities.

CASE 2: D.S., our technician, has had severe attacks of poison ivy dermatitis for as long as she can remember. In March, 1953, a patch test indicated 4 plus reaction to thus antigen. After six weeks of prophylaxis, her reaction became negative. That summer she was free from poison ivy dermatitis although she did considerable hunting and fishing. The following year, also, her reaction was 4 plus before prophylaxis, negative after six weeks treatment. During the summer she had direct contact with poison ivy (she can recognize the plant) but did not develop ivy dermatitis.

### **Summary and Conclusions**

A stable alcoholic extract of fresh poison ivy leaves and stems was tested as an oral prophylactic agent against poison ivy dermatitis. Four hundred and fifty-five subjects, including private patients and the employees of a tree service company, were given the extract orally in small daily doses for six weeks prior to the poison ivy season and less frequent maintenance doses during the season. All subjects had a previous history of sensitivity to poison ivy. During the season following prophylaxis, 76.9% of the subjects were either free of ivy dermatitis or experienced milder attacks. Two of the patients complained of nausea and gastrointestinal disturbances. There were no other reports of untoward side effects.

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<sup>1</sup> Safety Director, Asplundh Tree Expert Company (H. W. Masters).

<sup>2</sup> SPAIN, W. C. and COOKE, R. A.: Studies in Hypersensitiveness XXVII: Dermatitis Venenata: Observation Upon the Use of a Modified Extract for Toxicodendron Radicans. *J. Immunol.*, 13:93, 1927.

<sup>3</sup> BESSER, J. P., and URBACH, J.: Peroral Prophylaxis of Poison Ivy Dermatitis, *Ann. Allergy*, 10:169, 1952

<sup>4</sup> KLIGMAN, A.M. and EPSTEIN, W. L.: Suppression of Local Allergic Reactions with Hydrocortisone. *J. Allergy*, 27:395, 1956.

<sup>5</sup> SCHAMBERG, J. F.: Desensitization of Persons Against Poison Ivy. *J.A.M.A.*, 73:1213, 1919.

<sup>6</sup> HELMIRE, B.: The Poison Ivy Plant and Its Oleoresin. *J. Invest. Dermat.*, 4:337, 1941.

<sup>7</sup> CLOCK, R. O.: Rhus Dermatitis: Its Treatment with Poison Ivy Extract. *M.J. & Record*, 122:93, 1925.

<sup>8</sup> KEENEY, E. L., *et al*: Poison Ivy Dermatitis: the Diagnostic Value of the Patch Test Made with an Ether Extract from Fresh Leaves and Stems of Poison Ivy Plant. *Bull. Johns Hopkins Hosp.*, 69:482, 1941.

<sup>9</sup> STRAUSS, M. B., and SPAIN, W. C.: Studies on Poison Ivy and Other Dermatitis Producing Plants Wherein Active, Resinous Principles are Suspended in Aqueous Solution. *J. Allergy*, 17:1, 1946.

<sup>10</sup> GOLD, H., and MASUCCI, P.: Prophylactic Oral Therapy Against Poison Ivy. *J. Allergy*, 13:157, 1941-1942.

<sup>11</sup> STRICKLER, A.: Treatment of Dermatitis Venenata. *J. Cutan. Dis.*, 36:327, 1918.

<sup>12</sup> SCHAMBER, J. F.: Poison Ivy Treatment. *Arch. Dermat. & Syph.*, 11:266, 1925.

<sup>13</sup> GROSS, E. R.: Desensitization to Poison Ivy. *Medical Times*, 84:921, 1956.

<sup>14</sup> REIN, C. R.: Private communication.