

Correspondence

Cost of testing and treating with Hymenoptera venom extracts

To the Editor:

The considerable expense involved in testing and treating Hymenoptera-sensitive individuals is of interest and concern to physicians, patients, and third-party payment carriers. Costs, as summarized in Tables I to IV, do not include the initial history and physical examination; the costs of overhead such as mortgage or rent, electricity, telephone, and typing; physician's time to supervise the tests or administer the extracts; office personnel's time to learn new techniques, order extracts, and schedule patients; and patient's conference with physician following tests.

The high cost of venom extracts is due to many factors. These include (1) the difficulty of obtaining venoms; (2) the problems involved in production and standardization of

freeze-dried extracts; (3) the requirements of meeting the many standards established by governmental regulating agencies; and (4) the lack of pharmaceutical competition (although other firms have now entered the market, costs will remain high).

The cost per patient depends upon (1) the number of patients tested or treated on the same day with the same extract(s), and (2) the amount of space available to the physician for each patient over an extended period. The cost to the physician to diagnose and treat Hymenoptera-sensitive individuals using Pharmacia venom extracts, is as follows: \$67.53 to test only one individual with one diagnostic kit; \$16.07 per patient to test six individuals within 24 hr with one diagnostic kit; \$137.94 to treat honeybee-sensitive individual for the first year; and \$607.88 to treat a wasp-, Vespid-, and honeybee-sensitive individual for the first year. Assuming there are 900,000 to 1,800,000 persons in the United States who are Hymenoptera sensitive (based on 0.4% to 0.8% of total population), and that 400,000 to 800,000 of these are treated, the direct costs to the physicians who treat these individuals (as of October, 1979) for the first year would range from \$55,176,000 to \$110,352,000 for treatment with honeybee extract alone and from \$243,152,000 to \$486,304,000 for treatment with the extracts of all five Hymenoptera venoms. The estimated number of hypersensitive individuals is probably unrealistically high, since many individuals with insect hypersensitivity never seek care. Also, some patients who are candidates for immunotherapy will refuse treatment.

Adding the physician's cost for testing would increase costs by \$6,428,000 to \$12,846,000 (testing six individuals at the same time) to \$27,012,000 to \$54,024,000 (testing one individual at one time).

Costs can be decreased by (1) testing and treating the maximum number of patients on the same day; (2) requesting the pharmaceutical firms to dispense vials containing less than 100 µg of venom extract (this would be cost effective in medical facilities with few patients); (3) prolonging the shelf life of reconstituted freeze-dried extracts, especially of the weaker dilutions (more data is needed); (4)

TABLE I. Cost to test one individual alone*

	Cost	
A. Mailing extract	\$ 1.50	
B. Diagnostic kit†	\$37.00	
C. Materials to make dilutions		
7 dilutions (each venom × 5 venoms = 35 +		
1 vial for control purposes = 36		
36 × \$.45 (cost of each HSA diluent)		
(assumes testing done initially with 0.0001		
µg/ml)	\$16.20	
Syringes, 25 for venoms, 1 for control, 1 for		
histamine control = 27 × \$.10	\$ 2.70	
D. Technologist's time to mix venom extracts and		
place in syringes (estimated to be 1 hr),		
\$6.75/hr	\$ 6.75	
Subtotal No. 1	\$64.15	
E. Actual testing	Patient's time (min)	Technologist's time (min)
Prick test, 0.01	20	5
ID, 0.0001 µg/ml	40	5
ID, 0.001 µg/ml	60	5
ID, 0.01 µg/ml	80	5
ID, 0.1 µg/ml	100	5
ID, 1.0 µg/ml	120	5
Total time	2 hr	30
Technologist's time, \$6.75/hr	Subtotal No. 2	\$ 3.38
	Total	\$67.53

HSA = human serum albumin; ID = intradermal.

Data assume all tests are needed and the patient is positive at the last dilution.

*Cost estimate based on personal experience in Tampa, Fla.

†Cost for kit is same if assembled by physician.

TABLE II. Approximate cost per patient to test six individuals simultaneously on the same day*

Subtotal No. 1 (cost in Table I divided by 6)	\$10.69
Subtotal No. 2	\$3.38
Additional needles and technologist's time (per patient)†	\$2.00
Total cost per individual	\$16.07
Total cost for six individuals	\$96.42

*Cost estimate based on personal experience in Tampa, Fla.

†Assumes technologist is busy and efficient.

TABLE III. Cost of honeybee immunotherapy for first year

Shipment (first-year supply cost is variable)				\$ 4.35
First year of venom				\$108.00*
Administering extract†				
<i>Materials</i>	<i>Total cost for materials</i>	<i>Patient's time (hr) (includes 0.5 hr for routine office delay)</i>	<i>Technologist's time (min) to prepare and administer extract‡</i>	
Week 1 \$\$.45 × 3 = \$1.35		2	15	
Syringes \$.10 × 3 = \$.30	\$1.65			
Week 2 \$\$.45 × 3 = \$1.35		2	15	
Syringes \$.10 × 3 = \$.30	\$1.65			
Week 3 \$\$.45 × 3 = \$1.35		2	15	
Syringes \$.10 × 3 = \$.30	\$1.65			
Week 4 \$\$.45 × 2 = \$.90		1.5	10	
Syringes \$.10 × 2 = \$.20	\$1.10			
Week 5 \$\$.45 × 2 = \$.90		1.5	10	
Syringes \$.10 × 2 = \$.20	\$1.10			
Week 6 \$\$.45 × 2 = \$.20		1.5	10	
Syringes \$.10 × 2 = \$.20	\$1.10			
Week 7 \$\$.45 × 2 = \$.90		1.5	10	
Syringes \$.10 × 2 = \$.20	\$1.10			
Week 8 \$\$.45 × 2 = \$.90		1.5	10	
Syringes \$.10 × 2 = \$.20	\$1.10			
Week 9 \$.45 + .10	.55	1	5	
Week 10 \$.45 + .10	.55	1	5	
Week 12 \$.45 + .10	.55	1	5	
Week 15 \$.45 + .10	.55	1	5	
			1.92 hr	
			(= \$6.75 hr	
Subtotal	\$12.65	plus	\$12.94 =	\$25.59
Total cost of administering extract				\$137.94

*Cost would be less if more than one individual could receive extract in concentrations of less than 100 µg from the same vial.

†Assumes there are no repeat injections necessary or systemic reactions.

‡Assumes technologist is busy and efficient.

suggesting that physicians in the same institution or building share testing and treating extracts; (5) ascertaining, through additional research, which patients are at greatest risk and therefore candidates for immunotherapy; (6) performing additional research to establish optimal duration of treatment as well as the longest interval between injections necessary to maintain the immune status; (7) promoting additional research to develop an in vitro test (a better radioallergen sorbent test?) which is equal to or more effective than the skin test, and less expensive; and (8) increasing pharmaceutical competition (other firms have entered the market).

How will third-party health insurers pay for venom skin testing and immunotherapy? A large third-party health insurer is recommending that the diagnostic testing procedures be based on a global fee concept which will include the professional services, the necessary extracts, and supplies. Since the coding structures currently in use are antiquated, they are not presently useful. The same insurer is recommending that reimbursement for the venoms necessary for immunotherapy be made on a cost basis. The ad-

TABLE IV. Cost of therapy with wasp, mixed vespids, and honeybee venoms for first year*

Shipment (Honeybee × 3, cost is variable)	\$ 13.05
First year of venom	531.00*
Administering extracts†	
Materials (Honeybee × 3)	37.95
Nurse's time, \$6.75/hr (Honeybee × 2)‡	25.88
Total	\$607.88

*Cost would be less if more than one individual could receive extract in concentrations of less than 100 µg from the same vial.

†Assumes there are no repeat injections necessary or systemic reactions.

‡Honeybee × 2, rather than 3, since less time involved than three times that needed to prepare and administer one extract.

ministration of the venom would be paid for on a fee-for-service basis. Unique codes would be required for the global fee, for the diagnostic testing procedure, for each specific venom, for each mixed venom, and for immunotherapy utilizing the venom.

The costs as outlined here are conservative, based on complete adherence to the package insert, and assume that optimal conditions and personnel are available. The costs for the venom extracts will decrease to some extent with additional pharmaceutical competition; however, even with this decrease, the cost of venom immunotherapy will remain extremely high. All those involved in the diagnosis and treatment of Hymenoptera hypersensitivity (pharmaceutical firms and medical providers) should make every effort to decrease these expenses and keep them as low as possible.

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Anaphylactic reactions in skin test-negative patients

To the Editor:

In response to Dr. Yunginger's editorial on Hymenoptera sensitivity, we report on three patients who were skin test-negative but developed anaphylactic reactions following an insect sting. All patients were skin tested to all five venoms according to Pharmacia's recommendations. No intervening stings occurred between the skin testing and the sting and all patients had a positive histamine control. The venom we used to skin test these patients gave positive results in other sensitive patients that same day.

Case A, W. A., is a 10-yr-old boy who was initially stung in October of 1978 and immediately developed hives. The insect was unknown at this time. He was skin tested on June 16, 1979, according to Pharmacia's recommendations and was skin test negative up to the 1.0- μ g/ml level (See Table I). On July 20, 1979, he was stung by an insect and immediately developed hives and angioedema. He gave himself antihistamines and adrenaline and went to the hospi-

tal where he was admitted for observation. He was retested on August 11, 1979 (Table I).

Case B, S. B., is a 14-yr-old boy who was stung by a wasp in July of 1973 on the abdomen and within 15 min developed facial itching, and swelling around the mouth and eyes. He also developed angioedema of the tongue. He was stung by a honeybee approximately 1 yr later with no reaction. He was treated at this time (approximately 1974) by whole body extract and remained on this until the fall of 1978. He was skin tested in May of 1979 to all five venoms with negative results (Table I). On June 24, 1979, he was stung by an insect and developed generalized urticaria. He immediately took antihistamines and administered adrenaline to himself. No further reaction occurred. He was retested on August 7, 1979 (Table I).

Case C, A. R., is an 8-yr-old boy who was stung on the knee in September of 1978 and developed generalized urticaria and pruritus. He was skin tested to all five venoms on May 4, 1979, and all the skin tests were negative (Table I). On July 8, 1979, he was again stung and developed generalized urticaria with difficulty breathing. He was retested on August 4, 1979 (Table I).

The above patients were from a group of 313 Hymenoptera-sensitive patients, 30% of whom were over 15 yr old. All of the 313 patients had generalized allergic reactions following a sting. There were 223 skin test-positive patients, 78 skin test-negative patients, and 12 were equivocal.

We report these cases in order to plea to the allergist and all those involved in this problem not to make dogmatic statements of "not sensitive to stinging insects" based solely on the data from skin testing. We feel from our experience that regardless of the skin test result, a patient with an anaphylactic history to an insect sting would be wise to carry adrenaline.

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TABLE I. Results of skin tests

	Case A (S. B.)		Case B (W. A.)		Case C (A. R.)	
	5/12/79*	8/7/79	6/16/79	8/11/79	5/4/79	8/4/79
Honeybee	6/0†	0	0	0	0	5/0
Yellow hornet	5/0	0	0	8/25	0	5/0
Yellow jacket	5/0	10/15	0	8/20	0	10/12
White-faced hornet	0	10/22	0	12/30	0	10/20
Wasp	0	0	0	8/30	0	0
Rast test	None		None		Honeybee	+
					Yellow jacket	0
					Yellow hornet	0
					White-faced hornet	+
					Wasp	0

* Date tested.

† Expressed as millimeters of wheal/flare.