Comparison of conventional and acetone precipitated dog allergen extracts in identification of dog allergy by skin prick test

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Introduction

Can f 1 was characterized as the major dog (Canis familiaris) allergen in 1990 and was subsequently identified as a product of salivary glands[1]. Up to 1/3 of dog allergic subjects may be sensitized to Can f 2, a minor dog allergen, which is also a salivary protein, whereas the clinical relevance of Can f 3, dog serum albumin is questionable. Since the majority of dog allergic individuals are sensitized to Can f 1, it can be regarded as an indicator of dog allergy [1].

Traditional allergen extracts of epithelium form dogs of mixed breads have been commercially available for many years. A novel acetone precipitated (AP) dog hair and dander extract was recently made commercially available by Hollister-Stier. AP has been reported to perform better than traditional mixed bread (TMB) extracts in identifying dog allergic patients by skin testing [2,3].

These extracts differ significantly in their major allergen content. In previous reports Can f1 concentration in TMB 1:20 w/v extract was approximately 5 µg/mL as compared to 128-204 µg/mL in AP 1:100 w/v extract [2,3,4].

A review of the literature identified two reports that compared TMB and AP extracts by skin prick testing [2,3]. In one study 123 sequential skin test subjects were evaluated and 48% had a positive reaction to at least one extract. Of those all subjects reacted to AP and 59% to both extracts, but none reacted only to TMB [3]. In another report, of 73 patients skin tested by both extracts 15% reacted positive to one or both extracts. Of those testing positive, 27% reacted to both and 73% only to AP extract.

Recently, another major dog allergen has been identified and characterized as prostatic kallikrein with IgE reactivity in 70% of the subjects [5].

Specific Aim

Our goal was to compare the ability of TMB and AP extracts in identification of allergic sensitization to dog by skin prick test (SPT) in our clinic.

Methods

We reviewed SPT results of consecutive patients who were referred to our practice with respiratory symptoms suggestive of allergic sensitization between August 2007 and January 2008. The study was approved by IRB.

All patients were tested with AccuSet (ALK-Abello) to a common panel of aeroallergens, including AP and TMB. Can f1 concentration in TMB 1:20 w/v extract (Greer Laboratories) was 1.0 µg/mL and dog albumin 632-799 µg/mL. The AP 1:100 w/v extract (Hollister-Stier) contains 87 mcg/mL of Can f1.

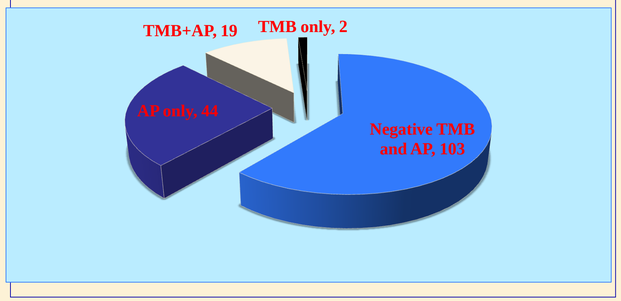
A wheal of at least 3 mm larger than the negative control was considered a positive reaction. The results were expressed in mm as mean wheal diameter (MWD) and median and compared using statistical analysis (two tailed paired t-test)

Results

In the 6-month period 168 patients (57 male; age range 3-75 years) underwent SPT.

A positive reaction to one or both dog extracts was present in 65 patients (39%). Of those 63 (97%) tested positive to AP (MWD 5.9 +/- 2.65 mm) and 18 (32%) to TMB (MWD 4.5 +/- 1.67 mm). This difference is statistically different (p=0.0129).

AP identified 44 dog allergic patients (68%) that were missed by the TMB, whereas only and 2 patients (3%) had positive reaction to TMB and not AP.



	Histamine (n=168)	Diluent (n=168)	TMB (n=22)	AP (n=63)
Wheal (mean, mm)	5.88	0.6	4.57	5.92
SD	2.7	1.2	1.67	2.65
Median	6	0	4	5
Flair (mean, mm)	16.97	0.26	12.38	16.22
SD	11	1	8.08	9.6
Median	15	0	10	15

Discussion

The accuracy of skin test in diagnosis of allergic sensitization and the efficacy allergen immunotherapy (AIT) are dependent on the quality of allergen extract.

Unfortunately, many relevant allergens are not yet standardized, thus quality varies significantly between commercially available extracts [6]. In the absence of established standards, the concentration of major allergen can be used as a surrogate for extract quality.

AP contains a substantially higher concentration of Can f1 than any other commercially available dog allergen extract. Previous studies have demonstrates a superior diagnostic value of AP in patients with clinically relevant allergy to dog [2,3].

A study of dog AIT established the maintenance dose to produce optimal response at 15 µg of Can f1, however 3 µg produced a significant, but suboptimal effect [7]. Current AIT practice parameter also endorse this dose. [4]. To deliver Can f1 in this dose range, 0.6-3 mL of undiluted TMB (5 µg/mL) will be necessary that would not be practicable. This dose; however can be easily achieved with AP and will also allow room for other extracts to be mixed in one vial to treat other relevant allergies.

Since prostatic kallikrein has been identified as a new dog major allergen, it would be important to determine its content in dog allergen extracts.

Economic factors also play an important role in the selection of allergen extracts by allergists for skin testing and AIT. The approximate cost of AP and TMB 5 mL skin test extract are $47.00 and $22.35, respectively. We also compared the cost of extract to deliver dog AIT. A 50 mL vial of AP is priced at $369 vs TMB at $112. Based on the Can f 1 concentration ranges reported, a single maintenance dose of 0.1 mL AP 1:100 would deliver about 15 µg at cost of $0.74 vs. 0.6 mL of TMB that yields 3 µg at $1.35. Even though the per volume cost of AP is higher than TMB, because a significantly smaller volume of AP is necessary, AIT with AP is not only more cost effective but also more efficacious since it delivers a much higher Can f 1 dose.

Conclusions

AP is superior to TMB in identifying allergic sensitization to dog. Given the higher sensitivity of SPT with AP, it should replace TMB to maximize the diagnostic value of SPT in patients with a history suggestive of allergy to dog.

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