

Abstract

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Single Practice Six-Year Experience Treating Food Allergy With Oral Immunotherapy

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Rationale: Interest in FOIT in the practice setting continues to increase. We report a review of 241 FOIT treated patients who reached their target dose and 53 who did not.

Methods: Retrospective record review of all patients initiating FOIT from 6/10/08 to 6/30/14, approved by the North Texas IRB. Patients received increasing FOIT doses with target doses of (mg of protein) cashew 2000, egg 4545, milk 8000, peanut 2000, pecan 2190, wheat 8000.

Results: 82% of patients reached their target dose. 66% of patients who reached the target dose and 62% of those who did not had a history of systemic reaction to the allergenic food before FOIT treatment.

Median FOIT asIgE (kU/L) dropped at least 48% immediately after FOIT completion. The median decrease in asIgE (kU/L) from before FOIT to one month after reaching the target dose was 48% whole egg, 67% egg white, 72% milk, and 51% peanut. Patients who discontinued treatment had a higher pre-FOIT asIgE than those who reached target. Patients who discontinued FOIT had more epinephrine treated reactions (ETR) during escalation (2.56 ETR/1000 doses given) than those who reached target (0.86/1000 doses given).

Conclusions: A history of anaphylaxis before starting FOIT does not help predict which patients will reach the target dose. Those with higher pre-FOIT asIgE may be less likely to reach the target dose. An increase in reactions during escalation may be a predictor of patients that are more likely to discontinue FOIT.

Introduction

The avoidance management strategy (AMS) for food allergy often fails to prevent anaphylaxis, as accidental exposures to the allergenic food can occur with disturbing frequency. (1,2). Furthermore, the fear of accidental exposure contributes to social dysfunction for both parents and children. (3,4,5). Studies have shown that food avoidance strategies cause significant psychosocial problems in food-allergic individuals (6) and are associated with bullying (7). Additionally, family and friends are negatively impacted by the necessary AMS. Decreasing the risk of reactions and developing the ability to tolerate the allergenic food is likely to lead to significant improvement in the patient's and family's quality of life(8,9). We report a more-than-six-year experience with food oral immunotherapy (OIT) in a private allergy practice setting.

Subjects

We report an IRB*-approved retrospective chart review of 298 patients who received at least one dose of food OIT. Four patients started OIT but transferred care to another allergist before reaching target. Almost all treated patients had a history of IgE-mediated sensitivity to egg, milk, peanut, cashew, pecan, or wheat or a positive food challenge. Some patients 6/298 (2%) exhibited an allergen-specific IgE that suggested that the risk of significant reaction on exposure was too high to perform a food challenge. We report the experience of patients treated between July 2008 and June 2014.

*North Texas Institutional Review Board

Methods

Patients who were treated according to a previously reported protocol (10) or adaptations of that protocol for foods other than peanut. The final twice daily doses in the escalation phase and the once daily maintenance doses are shown in Table I.

Because this is a retrospective review of clinical care, commercial laboratories were used to measure allergen specific IgE. The choice of laboratory was often dictated by insurance companies. Therefore, some allergen specific IgE values were determined by the Hycor methodology and some by the ImmunoCAP* methodology. In some instances, different methodologies were used for the same patient. Serum IgE levels were obtained one month after reaching the maintenance phase and then yearly.

Patients/parents were instructed to report all reactions attributed to OIT. We believe that epinephrine treated reactions were reliably reported but milder reactions were inconsistently reported.

Method Modifications

Based on our clinical experience and review of dose related reactions, the dosing regimens have been modified several times.

Because of the novelty of FOIT and concern about the possibility of significant reactions occurring outside of the office, very strict criteria were given for injectable epinephrine use; any angioedema, respiratory or gastrointestinal signs or symptoms. During the course of this treatment program, we observed that our criteria for epinephrine use were too stringent. Some patients experienced a single episode of vomiting without any other signs or symptoms of an allergic reaction. When this observation became apparent, we modified our epinephrine treated reaction criteria to allow for observation after a single episode of vomiting after the dose.

Target & Maintenance OIT Doses

	Target Dose ¹	Maintenance Dose ²
Egg	3 tsp egg white powder (1 egg equivalent)	3 tsp egg white powder (1 egg equivalent)
Milk	240 ml whole milk	240 ml whole or 2% milk
Peanut	12 peanuts	8 peanuts
Wheat	2 slices wheat bread	1 slice wheat bread
Cashew	12 cashews	8 cashews

1. Doses given twice a day. 2. Doses given once a day.

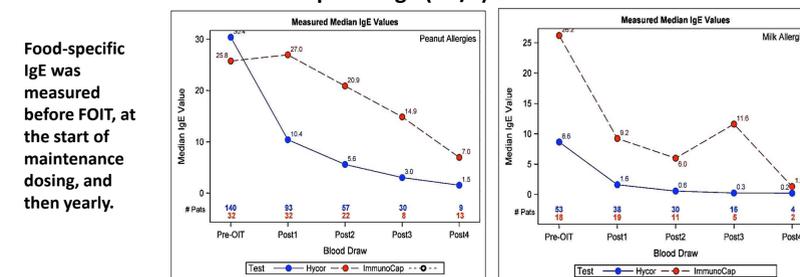
Results

Comparison of All OIT Patients vs Patients Who Reached Target

	Egg	Milk	Peanut	Wheat	Cashew
Number of patients who took the first dose	42	72	173	3	6
Patients who reached target dose (% completed)	40 (95)	57 (79)	136 (79)	3 (100)	4 (66)
Median age at start of OIT all patients (range)	6 (5-18)	7 (4-27)	7 (4-25)	11 (7-17)	8 (5-11)
Median age at start of OIT completed patients (range)	6 (5-16)	7 (4-17)	7 (4-15)	11 (7-17)	8.5 (5-11)
Gender (% male) all patients (completed patients)	57 (55)	62 (68)	60 (60)	100 (100)	50 (50)
% all patients with h/o IgE mediated multisystem reaction before OIT (% completed)	69 (70)	72 (70)	65 (64)	33 (33)	50 (50)
Pre OIT IgE range kU/L: completed patient/total (% completed patients in the IgE range)	<7: 22/22 (100) 7-50: 17/18 (94) >50: 1/2 (50)	<15: 35/41 (85) 15-50: 14/20 (70) >50: 8/11 (73)	<14: 47/52 (90) 14-50: 44/55 (80) >50: 45/66 (68)	>15: 3/3 (100)	<8: 2/3 (67) 8-50: 1/2 (50) >50: 1/1 (100)

- Patients that transferred care to another allergist were counted in the total patient data but were not counted as completed or discontinued.
- Twenty-two patients have completed OIT for more than one food.
- As of 12/2014 there were 52 patients in the escalation phase of OIT in our office.

Peanut and Milk Specific IgE (kU/L) Decline After OIT



Epinephrine Treated Reactions

	Egg Completed	Egg Discontinued	Milk Completed	Milk Discontinued	Peanut Completed	Peanut Discontinued
# of ETRs during escalation	13	1	40	8	60	26
# of patients with ETR in escalation (% patients with ETR)	13 (32)	1 (50)	19 (33)	5 (38)	38 (28)	14 (40)
# of escalation doses	14192	554	58800	4242	57378	8634
# ETRs/1000 escalation doses	0.92	1.81	0.68	1.89	1.05	3.01
# ETRs during maintenance	1	--	10	--	32	--
# of patients with ETR in maintenance (% patients with ETR)	1 (0.025)	--	6 (0.105)	--	18 (0.132)	--
# maintenance doses	42,116	--	58,800	--	122,176	--
# ETR/1000 maintenance doses	0.02	--	0.17	--	0.26	--

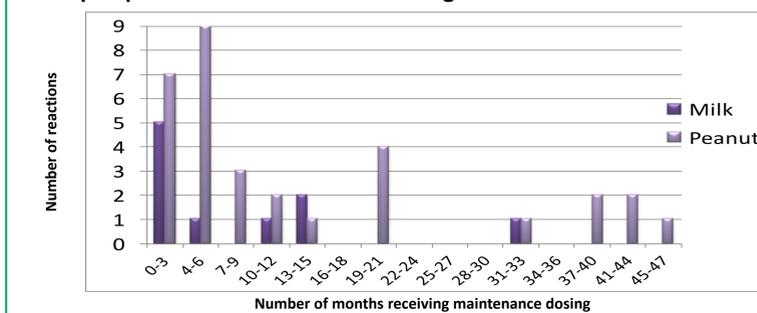
Epinephrine Treated Reactions – Original and Revised Criteria

During the first four years of FOIT, epinephrine was recommended after a single episode of vomiting without any additional signs or symptoms. The recommendations were then modified to permit observation after a single episode of vomiting in the absence of any other signs or symptoms.

Combined Escalation and Maintenance Reactions/1000 Doses

	Egg	Milk	Peanut
Original Criteria	0.25	0.87	0.90
Revised Criteria	0.24	0.35	0.37

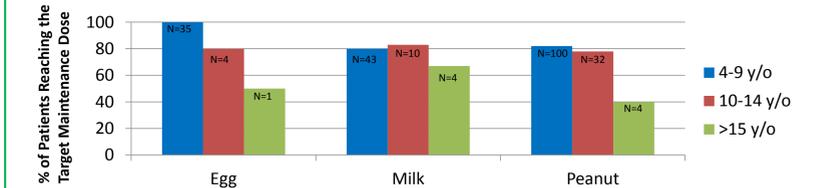
Epinephrine Treated Reactions During Maintenance Over Time



There was 1 ETR during egg maintenance dosing that occurred in the first month of maintenance dosing.

13/43 (30%) of ETRs during maintenance dosing may be explained by patient's failure to follow instructions. Triggers of these "avoidable" ETRs include prolonged time between doses, exercising within 2 hours of dose, failure to modify the dose during an illness or allergy flare.

Patient Age Predicts Success in Egg and Peanut OIT



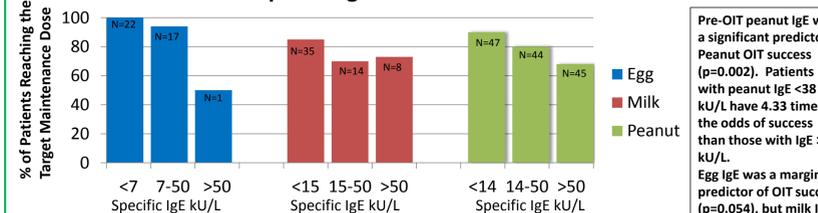
Age was a significant predictor of egg and peanut OIT success, but did not predict success in milk OIT patients.

Egg: p = 0.026 with odds ratio = 0.62 (95% CI: 0.41 – 0.94).

Milk: p = 0.261

Peanut: p=0.005 with odds ratio = 0.854; 95%CI = 0.765 - 0.953

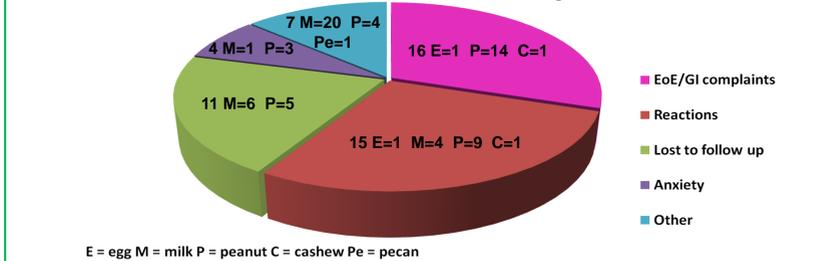
Pre-treatment Specific IgE Predicts Success in Peanut OIT



Peanut IgE as predictor: odds ratio = 0.983; 95% ci = 0.973 – 0.994; p = 0.002

Pre-OIT peanut IgE was a significant predictor of Peanut OIT success (p=0.002). Patients with peanut IgE <38 kU/L have 4.33 times the odds of success than those with IgE >38 kU/L. Egg IgE was a marginal predictor of OIT success (p=0.054), but milk IgE was not (p=0.106).

Reasons for Discontinuation of OIT During Escalation



E = egg M = milk P = peanut C = cashew Pe = pecan

Conclusions

- Most patients can be desensitized to one or more allergenic foods.
- The rate of ETRs during escalation is low and falls during maintenance.
- Pre-treatment history of an IgE mediated reaction involving two or more systems is not significantly associated with failure to reach the target maintenance dose.
- Age predicts success with egg and peanut OIT. Each year (after age 5) that OIT is deferred decreases the likelihood of success by 38% for egg and 15% for peanut.
- Pre-treatment antigen specific egg and peanut but not milk IgE is negatively associated with reaching the target maintenance dose.
- Ongoing evaluation and modification of the FOIT procedures improves outcomes and acceptability.
- FOIT can be successfully performed in an allergy office.

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