

Real-life infant peanut allergy testing in the post-NIAID peanut guideline world

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Clinical Implications

- Infants with mild to moderate eczema often get screened for peanut allergy before ingestion. Most infants presenting with a history of a reaction to peanut do not meet National Institute of Allergy and Infectious Diseases screening criteria, and most do not have severe reactions to peanut.

TO THE EDITOR:

Following the Learning Early About Peanut (LEAP) allergy study,¹ which indicated that early introduction of peanut to high-risk infants (those with egg allergy and/or severe eczema) decreased the risk of peanut allergy (PA), the National Institute of Allergy and Infectious Diseases (NIAID) published the “addendum guidelines for the prevention of peanut allergy in the United States.”² These guidelines² stratify patients into high (severe eczema and/or egg allergy), moderate (mild to moderate eczema), or low (no eczema or food allergy [FA]) risk categories for PA. For high-risk infants, screening with peanut specific IgE (p-sIgE) or peanut skin prick test (p-SPT) is strongly recommended before introduction. Studies have reviewed the complexities³ and application of the guidelines, specifically to the high-risk category,^{4,5} but none have reviewed the outcomes of the other categories. In addition, the group of infants that presents with a reaction upon home introduction (without prior screening) has not been assessed. To answer these questions, we performed a retrospective chart review of infants (younger than 12 months) who were tested for PA by 7 allergy providers at an academic medical center between January 2017 and January 2018. We categorized eczema as “severe” when documented as such by the allergist or by the need for daily topical steroids. All other patients with eczema were categorized as having “mild to moderate” eczema.

Within the study period, 112 infants were tested for peanut sensitization (84 screened and 28 for concern of a peanut reaction) (Table I). Of 84 patients screened, 40 (48%) met NIAID screening criteria (26 with egg allergy and 15 with severe eczema), 37 screened had mild to moderate eczema (44%), and 6 were screened because of a family history of FA.

The results and outcome of testing stratified by NIAID guidelines are detailed in Figure 1 and Table E1 in this article’s Online Repository at www.jaci-inpractice.org.

Of all patients screened (84), 52 had p-SPT wheal diameter of 0 to 2 mm and 2 patients who were evaluated only by p-sIgE had levels less than 0.35 kU/L. All 54 patients were advised introduction of peanuts, which was overall successful. However, 4 of these patients returned with reactions following lack of

introduction or inconsistent ingestion. The NIAID guideline 1 recommends consistent peanut ingestion for the high-risk group to prevent development of sensitization. In our study, this was noted to be important in infants with any severity of eczema. All 9 patients with p-SPT wheal diameter of greater than 7 mm were recommended avoidance.

The NIAID addendum recommends performing oral food challenges (OFCs) in patients (without peanut reaction history) with p-SPT wheal diameter of 3 to 7 mm. In our group of patients screened, 16 had p-SPT wheal diameter of 3 to 7 mm and 8 (50%) were offered OFCs. The remaining were recommended avoidance on the basis of physician discretion. Reaction rate in this group among those with known outcomes was 43% (3 of 7), which is consistent with the previously reported reaction rate.^{4,5} It is reassuring that less than 50% of those challenged had reactions and none had a severe reaction. Details of reactions are presented in Table E2 in this article’s Online Repository at www.jaci-inpractice.org.

Because the LEAP study¹ excluded patients with p-SPT wheal diameter of greater than or equal to 5 mm and the NIAID guidelines² recommend OFC up to p-SPT wheal diameter of 7 mm, we specifically addressed the outcome of this group. Of those screened (84), 12 had p-SPT wheal diameter of 5 to 7 mm. Of these, 5 (42%) were recommended OFCs (3 passed, 1 failed, and 1 pending). Lower rate of challenges offered may be due to the reported higher (80%) risk of reactions in the group with SPT wheal diameter of greater than 4 mm.⁶

During the study period, 28 patients were tested because of a concern of a clinical reaction with peanut. Of these (Table E3 in this article’s Online Repository at www.jaci-inpractice.org), 6 would have met NIAID screening criteria before introduction (none had a severe reaction) but most (22) would not have.

TABLE I. Characteristics of infants tested for peanut sensitization

Characteristic	Value
Total	112
Sex	
Male	64 (57%)
Female	48 (43%)
Age at initial evaluation (mo)	
Median (range)	7 (4-12)
Atopic history	
History of eczema	92 (82%)
Mild to moderate eczema	73 (65%)
Severe eczema	19 (17%)
History of egg allergy	30 (27%)
Personal history of inhalant allergy	0
Personal history of asthma	0
Family history of FA	40 (36%)
Patients screened for PA (no prior ingestion of peanut)	84
Patients tested because of clinical reaction concern	28
Peanut specific testing	
p-SPT done	104 (93%)
p-sIgE done	50 (45%)
Peanut component serum IgE done	19 (17%)

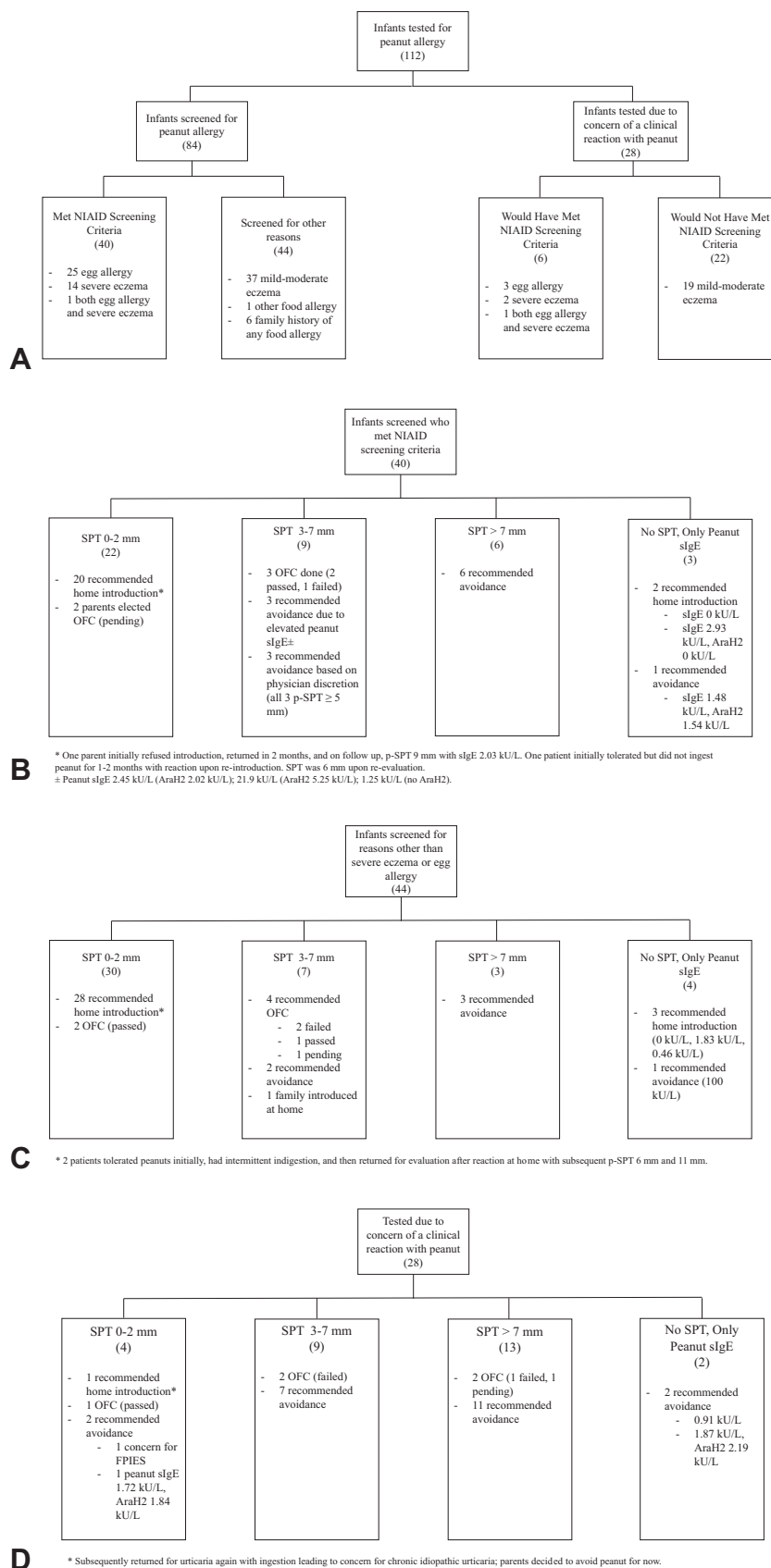


FIGURE 1. Outcomes of PA testing in infants (age <12 months). **(A)** Overview of all 112 infants tested for peanut. **(B)** Infants screened who met NIAID screening criteria. **(C)** Infants screened for reasons other than severe eczema or egg allergy. **(D)** Infants tested because of concern of a clinical reaction with peanut. *FPIES*, Food protein–induced enterocolitis syndrome.

Nineteen of the 22 patients had mild eczema and the remaining 3 had no identifiable risk factors. On review of their reaction histories (Table E4 in this article's Online Repository at www.jaci-inpractice.org), it was found that 43% (12 of 28) had isolated cutaneous symptoms, and a few (14%; 4 of 28) required epinephrine administration. The 4 patients requiring epinephrine did not meet NIAID screening criteria. All but 3 patients who presented for reaction to peanuts had eczema. These 3 patients had no identifiable risk factors, including no family history of FA. This is consistent with the finding of the HealthNuts study,⁶ in which a small number of infants (14%) demonstrated PA in the absence of any risk factors.

We did not always have documented family history of FA, so we were unable to assess whether family history was predictive of PA in at-risk infants. However, all our 6 patients who were screened for PA only because of a family history of FA (no personal history of eczema or FA) screened negative. In addition, of all patients who presented for a reaction history with peanut all but 3 had eczema. Those 3 patients did not have a family history of FA. This suggests that family history of FA in isolation (with no personal history of eczema) was not predictive of PA.

In conclusion, among patients screened for PA, half met NIAID screening criteria of severe eczema and/or egg allergy, whereas others were screened for mild to moderate eczema, family history of FA, or history of another FA. No reactions upon initial peanut introduction were noted in those who showed no sensitization to peanut. However, inconsistent ingestion/lack of introduction was noted to induce sensitization in infants with eczema, irrespective of severity of eczema. Most patients presenting after a reaction to peanut at home did not meet NIAID screening criteria. Finally, in our study, family history of FA in isolation without personal history of atopy was not noted to be a risk factor for PA.

A limitation to our study is that not all patients with p-SPT wheal diameter of 3 to 7 mm underwent OFCs to be revelatory of outcomes. This however represents "real-life" trends where most physicians rely on component testing before offering OFCs, a topic not addressed by the NIAID addendum. Furthermore, our data are reflective of a tertiary care center's practices with ability to perform infant challenges⁷ and may not be reflective of practices in smaller centers. Our data analyze a time period occurring relatively soon after the

publication of the addendum. It is possible trends are changing now and a follow-up study comparing these with future trends may be useful.

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ONLINE REPOSITORY

TABLE E1. Outcomes of infants screened for peanut sensitization presented as NIAID risk-stratification categories

Outcomes of patients screened for PA (n = 84)	0-2 mm (n)	3-7 mm (n)	>7 mm (n)	Peanut sIgE (no SPT) <0.35 kU/L (n)	Peanut sIgE (no SPT) > 0.35 kU/L (n)
With egg allergy (26) and/or severe eczema (16): Total 40	22	9	6	1	2
At-home introduction	20*	0	0	1	1
In-office challenge	2 (P)	3	0		0
Reactions	—	1	—		
Passed	—	2	—		
Avoidance recommended	0	6	6		1
Final disposition: Avoidance	0	7 (78%)†	6 (100%)		1
Final disposition: Tolerance	20 (100%)‡	2 (22%)‡	0	1	1
With mild to moderate eczema (no egg allergy) (n = 37)	24	7	3	1	2
At-home introduction	23‡	1	0	1	1
In-office challenge	1	3 (+1 P)	0		0
Reactions	0	2	—		—
Passed	1	1	—		—
Avoidance recommended	0	2	3		1
Final disposition: Avoidance	0	4 (67%)‡	3 (100%)		1
Final disposition: Tolerance	24 (100%)	2 (33%)‡	0	1	
Without eczema or any FA (screened because of family history of FA) (n = 6)	6	0	0	0	0
At-home introduction	5	—	—		
In-office challenge	1	—	—		
Reactions	0	—	—		
Passed	1	—	—		
Avoidance recommended	0				
Final disposition: Avoidance	0				
Final disposition: Tolerance	6 (100%)				
All patients screened for peanut sensitization	52 (67%)	16 (21%)	9 (12%)	2	4
At-home introduction	48§	1	0	2	2
In-office challenge	2 (+2 P)	6 (+1 P)	0	0	0
Reactions	0	3 (43%)	—	—	—
Passed	2	3 (67%)	—	—	—
Avoidance recommended	0	8	9	0	2
Final disposition: Avoidance	0	11 (73%)‡	9 (100%)‡	0	2
Final disposition: Tolerance	50 (100%)‡	4 (27%)‡	0	2	2

P, Pending OFCs.

*One tolerated peanut, no ingestion for 1 to 2 mo, and subsequent reaction with p-SPT wheal diameter of 6 mm. One parent initially refused introduction and returned in 2 mo and on follow-up p-SPT wheal diameter was 9 mm.

†Percentages are calculated on the basis of challenges with known outcome.

‡Two tolerated introduction, had intermittent ingestion, and returned for reactions with follow-up p-SPT wheal diameter of 6 and 11 mm.

§Parents refused introduction. Two-month follow-up p-SPT wheal diameter of 9 mm.

TABLE E2. Characteristics of infants who developed reactions to peanut during physician-supervised OFCs (N = 6)

Age of initial evaluation (mo)	Age at OFC (mo)	Concern for previous reaction	Peanut SPT (mm)	Peanut sIgE	Egg reaction (Y/N)	Degree of atopic dermatitis	Family history of FA (Y/N)	Reaction dose (g)	Reaction symptoms	Reaction treatment
11	16	Y	12	<0.35	N	Mild	Y	0.125	Hives	Antihistamine
6	22	Y	5		N	Mild to moderate	N	0.6	Hives, upper respiratory tract reaction	Antihistamine
10	11	Y	5	<.035	N	Mild	N	2.2	Hives	Antihistamine
7	7	N	3		N	Moderate	N	2	Hives	Antihistamine
7	8	N	4	2.24*	N	Severe	Y	0.15	Hives	Antihistamine
6	9	N	5		N	Mild to moderate	N	0.44	Behavioral change	Antihistamine

N, No; Y, yes.

*Obtained after failed OFC.

TABLE E3. Outcomes of infants tested for PA due to concern of a clinical reaction to peanut

Outcomes	0-2 mm (n)	3-7 mm (n)	>7 mm (n)	Peanut sIgE (no SPT) <0.35 kU/L (n)	Peanut sIgE (no SPT) > 0.35 kU/L (n)
Outcomes of patients tested because of clinical reaction concern (n = 28)	4	9	13	0	2
Severe eczema and/or egg allergy (n = 6)					
At-home introduction	1	0	0	—	0
In-office challenge	1	2	2	—	0
Reactions	0	2	1	—	—
Passed	1	0	0	—	—
Avoidance recommended	2*	7	11	—	2

*One patient with peanut Ara h2 of 1.84 kU/L. One patient diagnosed with peanut-related food protein–induced enterocolitis syndrome.

TABLE E4. At-home reaction symptoms of infants who presented because of concern of a clinical reaction with peanut (N = 28)

Reaction characteristic	n (%)
Urticaria, rash	25 (89)
Angioedema	4 (14)
Cutaneous only	12 (43)
Upper respiratory	3 (11)
Lower respiratory	6 (21)
Gastrointestinal	7 (25)
Behavior	2 (7)
Evaluated by a physician	11 (39)
Treated with epinephrine	4 (14)