

# Comparison of Anaphylaxis Criteria with Outpatient Oral Food Challenge Outcomes

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**Bruce J. Lanser, MD**

Assistant Professor of Pediatrics

Director, National Jewish Health Pediatric Food Allergy Center

Associate Director, Pediatric Allergy Fellowship Training Program



# BACKGROUND

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# Existing Criteria

## NIAID/FAAN Criteria

Anaphylaxis is highly likely when any 1 of the following 3 criteria are fulfilled:

1. Acute onset of an illness (minutes to several hours) with involvement of the skin and/or mucosal tissues (eg, generalized hives, pruritus or flushing; swollen lips, tongue or uvula) and  $\geq 1$  of the following:
  - a. Respiratory compromise (eg, dyspnea, wheeze or bronchospasm, stridor, decreased PEF, hypoxemia)
  - b. Decreased BP and associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence)
2.  $\geq 2$  of the following that occur rapidly after exposure to a likely allergen for that patient:
  - a. Involvement of the skin and/or mucosal tissues
  - b. Respiratory compromise
  - c. Decreased BP with associated symptoms
  - d. Persistent gastrointestinal symptoms (eg, crampy abdominal pain, vomiting)
3. Decreased BP after exposure to known allergen for that patient:
  - a. Infants and children: low systolic BP (age specific) or  $>30\%$  decrease in systolic BP
  - b. Adults: systolic BP  $<90$  mm Hg or  $>30\%$  decrease from that person's baseline

## Niggemann & Beyer Criteria

Grade I	Grade II		Grade III		
Local reaction	Mild to moderate systemic reaction (without cardiovascular and/or respiratory involvement)		Severe systemic reaction = anaphylaxis (with cardiovascular and/or respiratory involvement)		
Grade I	Grade II A	Grade II B	Grade III A	Grade III B	Grade III C
Local reactions: <input type="checkbox"/> Redness <input type="checkbox"/> Swelling <input type="checkbox"/> Pruritis	Skin: <input type="checkbox"/> Urticaria <input type="checkbox"/> Angioedema <input type="checkbox"/> Flush  <i>or</i> GI-tract: <input type="checkbox"/> Abdominal pain <input type="checkbox"/> Vomiting <input type="checkbox"/> Diarrhea	Skin plus GI-tract: <input type="checkbox"/> Urticaria <input type="checkbox"/> Angioedema <input type="checkbox"/> Flush  <i>plus</i> <input type="checkbox"/> Abdominal pain <input type="checkbox"/> Vomiting <input type="checkbox"/> Diarrhea	Respiratory: <input type="checkbox"/> Cough <input type="checkbox"/> Wheezing <input type="checkbox"/> Stridor  <i>or</i> Cardiovascular: <input type="checkbox"/> Tachycardia <input type="checkbox"/> Lowered BP	Severe respiratory: <input type="checkbox"/> Objective dyspnea <input type="checkbox"/> Accessory muscle use  <i>and/or</i> Severe cardiovascular: <input type="checkbox"/> Shock	Reanimation: <input type="checkbox"/> Respiratory arrest <i>and/or</i> <input type="checkbox"/> Cardiovascular arrest

## Brown Criteria

Grade	Defined by
1 – Mild (skin and subcutaneous tissues only)	Generalized erythema, urticaria, periorbital edema, or angioedema
2 – Moderate (features suggesting respiratory, cardiovascular or gastrointestinal involvement)*	Dyspnea, stridor, wheeze, nausea, vomiting, dizziness (presyncope), diaphoresis, chest or throat tightness, or abdominal pain
3 – Severe (hypoxia, hypotension, or neurologic compromise)*	Cyanosis or SpO <sub>2</sub> $<92\%$ at any stage, hypotension (SBP $<90$ mm Hg in adults), confusion, collapse, loss of consciousness or incontinence

Brown SGA. JACI 2004; 114:371-76.

Niggemann B & Beyer K. Allergy 2016; 71:135-6.

Sampson HA, et al. JACI 2006; 117:391-7.

## Small percentage of anaphylactic reactions treated with epinephrine during food challenges in Dutch children

Johanna P.M. van der Valk, MD<sup>\*</sup>; Irene Berends, BSc<sup>\*</sup>; Roy Gerth van Wijk, MD, PhD<sup>\*</sup>; Nicolette J.T. Arends, MD, PhD<sup>†</sup>; Maurits S. van Maaren, MD<sup>\*</sup>; Hans de Groot, MD, PhD<sup>‡</sup>; Harry J. Wichers, PhD<sup>§</sup>; Joyce A.M. Emons, MD, PhD<sup>†</sup>; Anthony E.J. Dubois, MD, PhD<sup>||</sup>; Nicolette W. de Jong, PhD<sup>\*</sup>

Number of Patients Treated With Epinephrine With and Without Anaphylaxis in the Clinical and Research Groups

	Positive challenge reactions 312	Anaphylaxis 83 (27%)		No anaphylaxis 229 (73%)	
		Epinephrine	No epinephrine	Epinephrine	No epinephrine
Clinical group	175	24	10	6	135
Peanut	74	11 (15%)	4 (5%)	3 (4%)	56 (76%)
Hazelnut	26	3 (12%)	1 (4%)	1 (4%)	21 (81%)
Milk	30	4 (13%)	2 (7%)	1 (3%)	23 (77%)
Egg	45	6 (13%)	3 (7%)	1 (2%)	35 (78%)
Research group	137	8	41	2	86
Cashew	137	8 (6%)	41 (30%)	2 (1%)	86 (63%)
Total epinephrine		32 (39%)		8 (3%)	

- Anaphylaxis defined by the EAACI criteria

# Objectives

- To understand differences among anaphylaxis grading systems, and potential implications for future research
- To analyze our use of epinephrine during failed, clinical OFCs

*Allergists' use of epinephrine for food-induced anaphylaxis*  
*Time to practice what we preach*

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DATA

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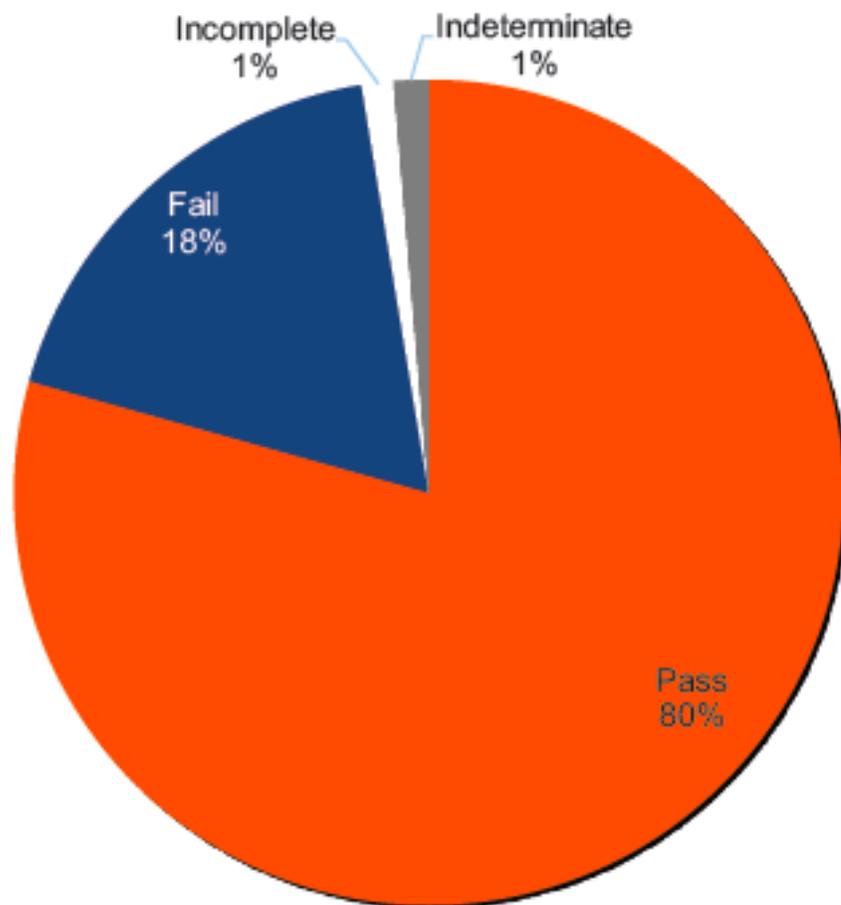


# Demographics

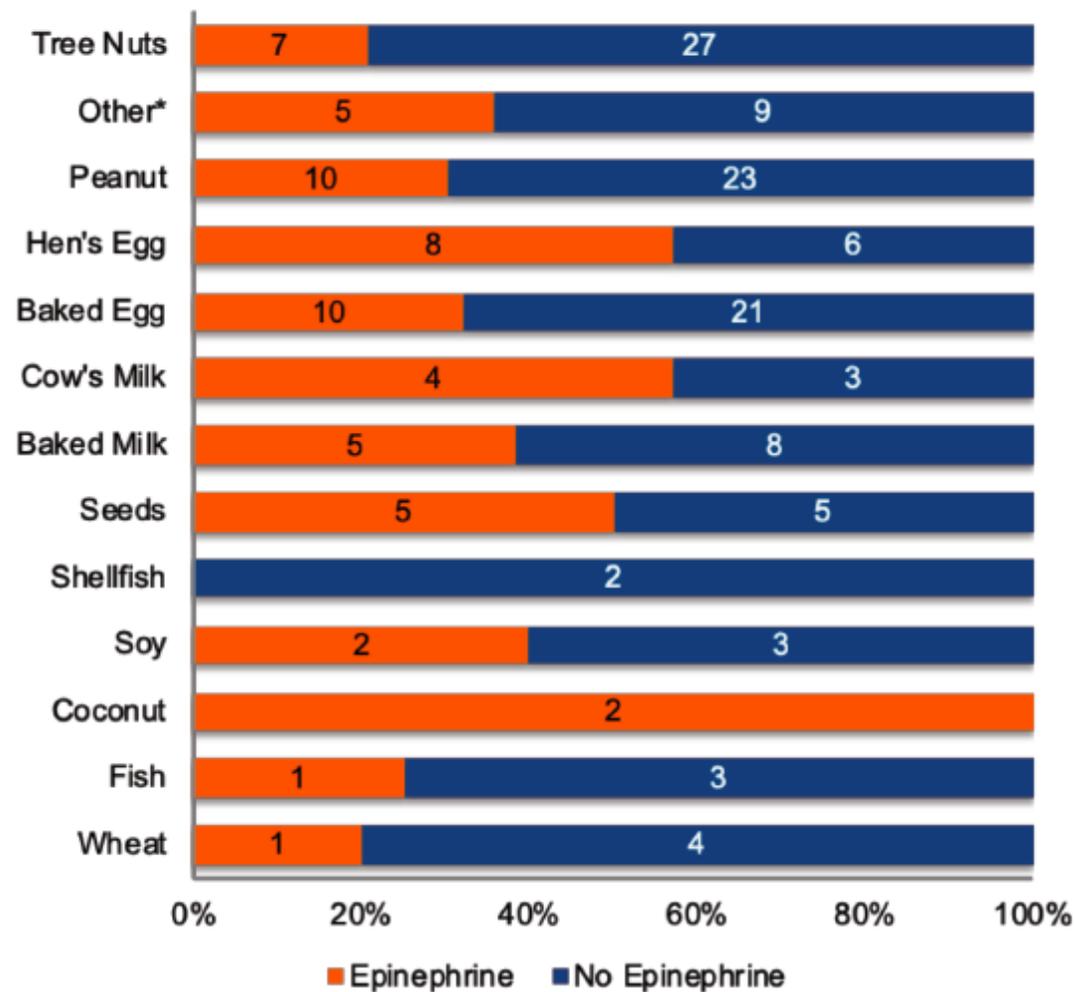
Failed OFC	All Subjects (n=163)	Anaphylaxis per NJH Provider (n=59)	Fail Without Anaphylaxis (n=104)	p-value
Age (years); range [mean;SD]	0.4 – 22.3 [6.5;4.9]	0.8 – 20.2 [6.7;4.8]	0.4 – 22.3 [6.3;5]	0.416
Male Gender	97 (59.5%)	37 (62.7%)	60 (57.7%)	0.53
White Race	108 (66.3%)	36 (61%)	72 (69.2%)	0.692
Black Race	14 (8.6%)	7 (11.9%)	7 (6.7%)	
Other Race	21 (12.9%)	8 (13.6%)	13 (12.5%)	
Non-Hispanic Ethnicity	123 (75%)	47 (79.7%)	76 (73.1)	0.183
<b>Comorbidities</b>				
AD	120 (73.6%)	44 (74.6%)	76 (73.1%)	0.835
Asthma	75 (46%)	30 (50.8%)	45 (43.3%)	0.351
Allergic Rhinitis	78 (47.9%)	32 (54.2%)	46 (44.2%)	0.219
Multiple Food Allergies	43 (26.4%)	14 (23.7%)	29 (26.9%)	0.563

# Outpatient OFCs at NJH

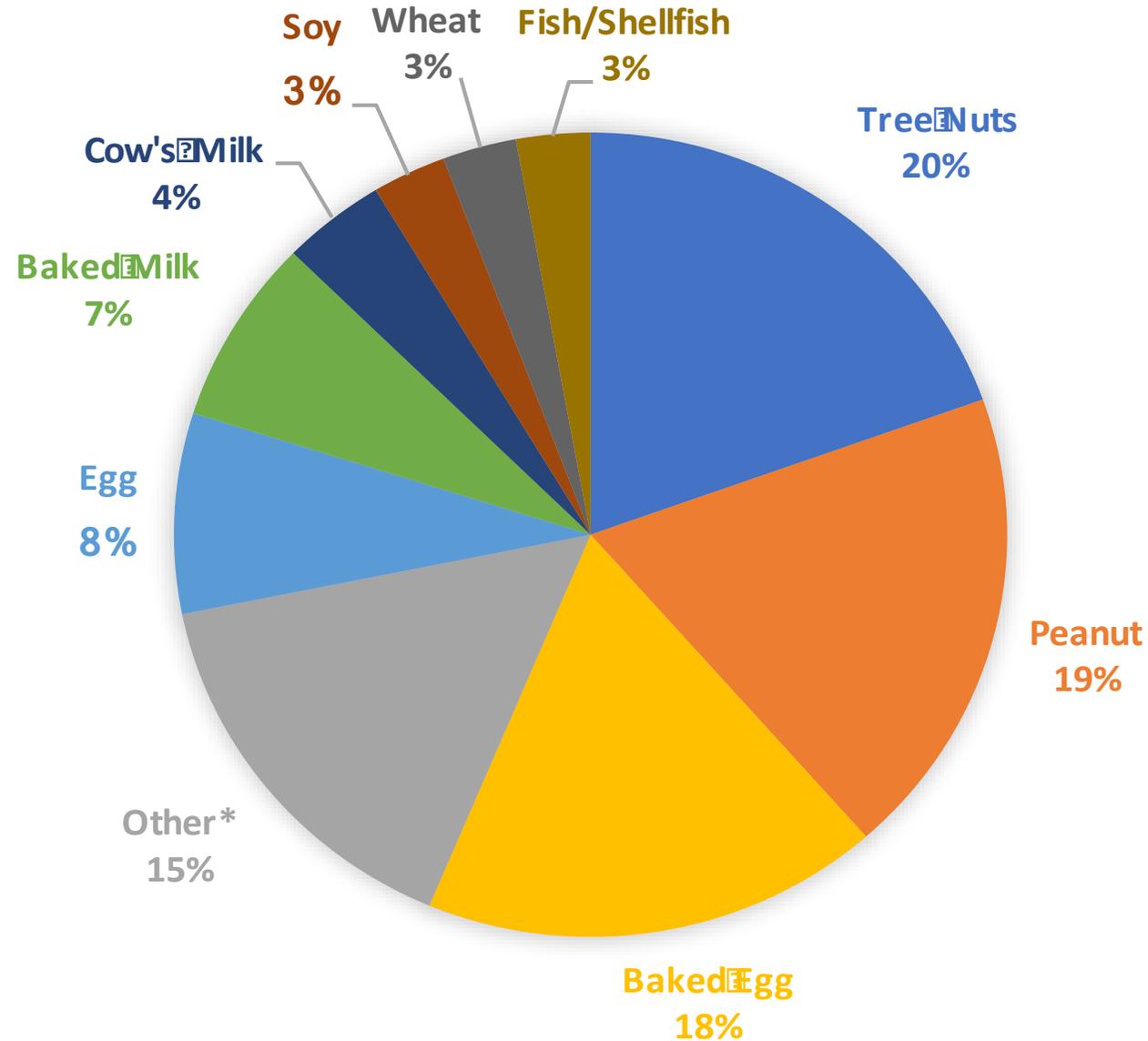
OFC Outcomes (n=964)



Percent of Failures Receiving Epinephrine by Food

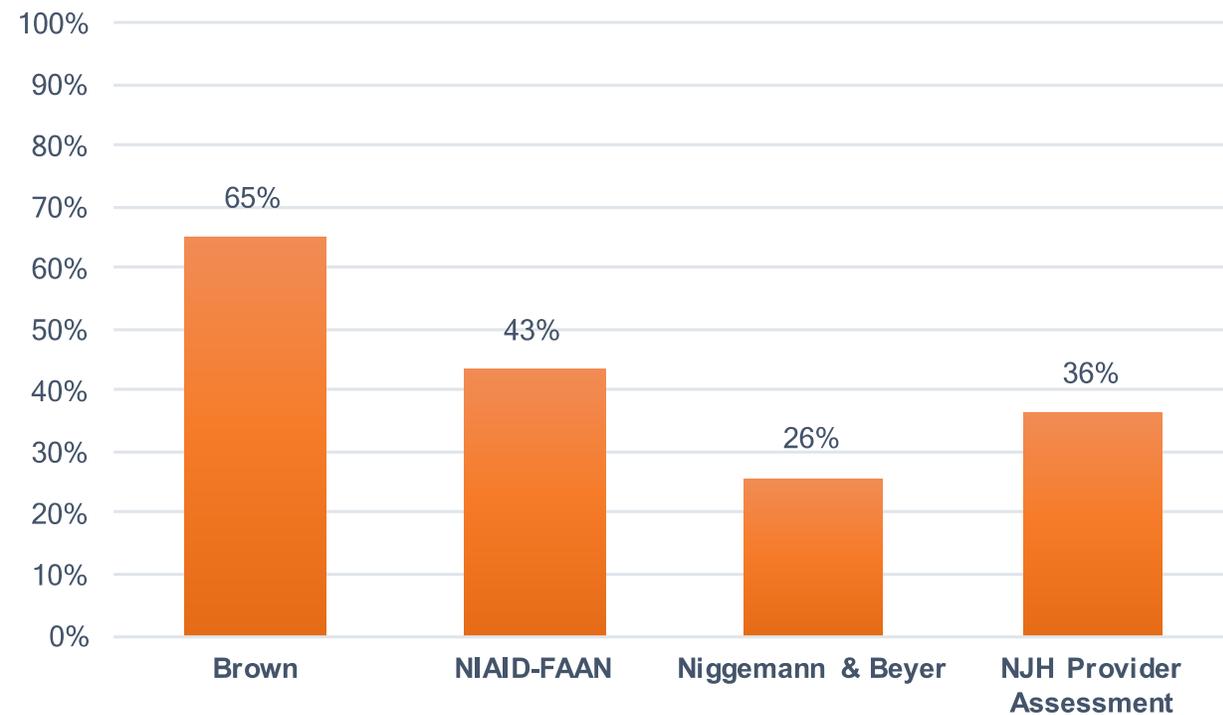


# Foods Challenged During Failed OFCs

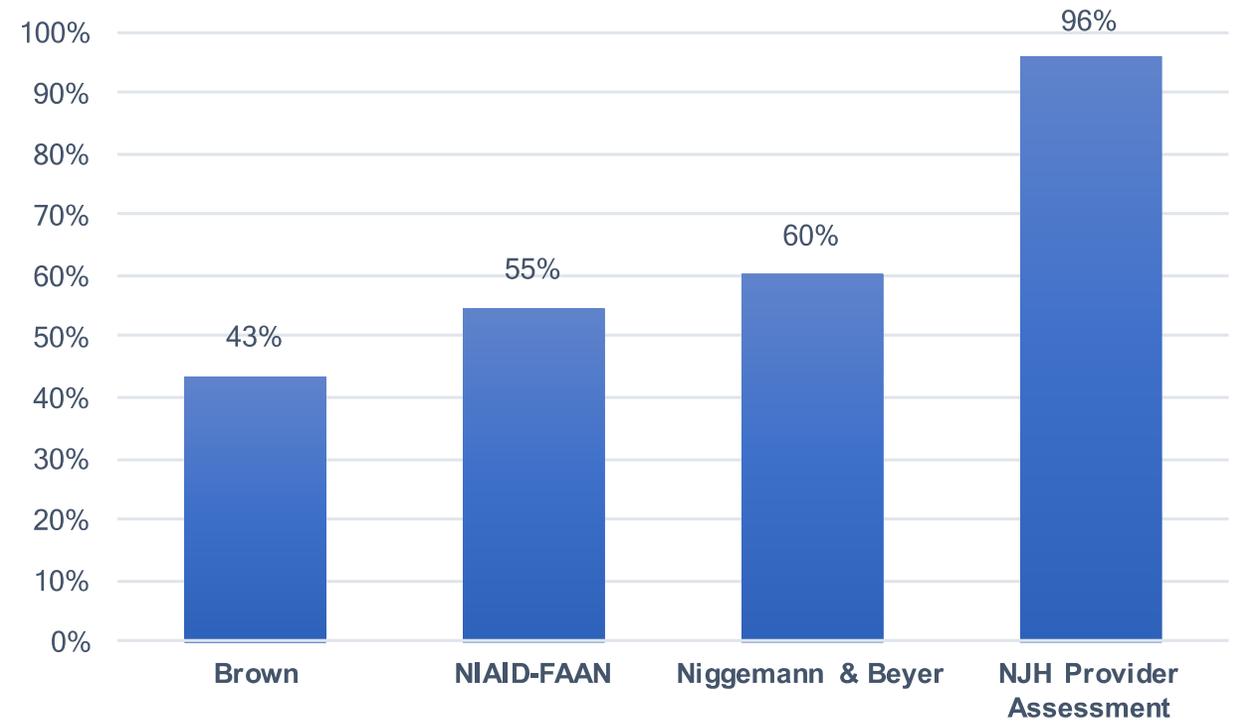


# Applying the Anaphylaxis Criteria

## Diagnosis of Anaphylaxis by Each Criteria



## Epi Use in OFCs Diagnosed as Anaphylaxis



# Correlations

		Brown Criteria	NIAID-FAAN Criteria	Niggemann & Beyer Criteria	Epi Admin	NJH Provider Assessment
<b>Brown Criteria</b>	Correlation Coefficient	1.000	.617**	.433**	.315**	.300**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
<b>NIAID-FAAN Criteria</b>	Correlation Coefficient	.617**	1.000	.323**	.422**	.446**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
<b>Niggemann &amp; Beyer Criteria</b>	Correlation Coefficient	.433**	.323**	1.000	.320**	.307**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000
<b>Epi Admin</b>	Correlation Coefficient	.315**	.422**	.320**	1.000	.848**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
<b>NJH Provider Assessment</b>	Correlation Coefficient	.300**	.446**	.307**	.848**	1.000
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	

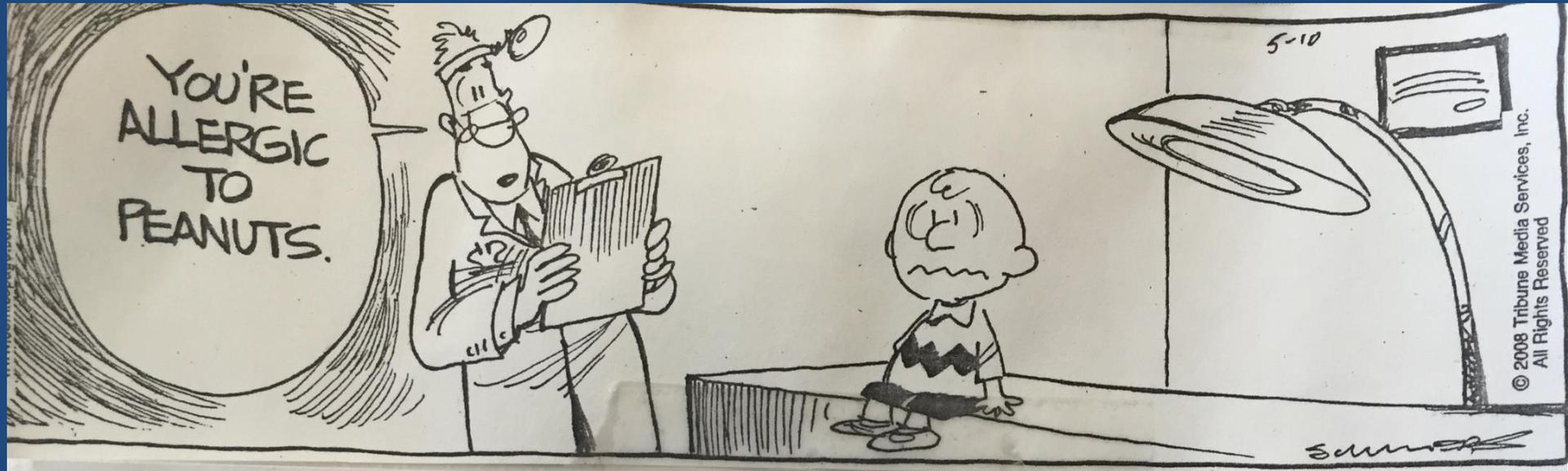
SO WHAT?

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# Next Steps

- Analyze symptom data in relation to epi administration
- Attempt to utilize the PRACTALL scoring system to guide treatment with epinephrine
- Collaborate with ER providers to develop a scoring system to guide appropriate treatment
  - Apply to OFC data
- Analyze anaphylaxis data from schools in the State of Colorado since 2015
  - MPH capstone project
- Analyze skin barrier dysfunction in anaphylaxis



# THANK YOU!

Trainees- Hannah Giclas, Melissa Robinson

Mentors- Corinne Keet, Drew Bird, Allan Bock, and Donald Leung

# Questions & Discussion



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