Research Days

May 5th, 11:30 AM - 1:30 PM

Likelihood Ratios for Reactions to Egg based on Specific IgE and Oral Challenges

Melissa Anderson

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Submitting/Presenting Author (must be a trainee): Melissa Anderson, MD
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☐ Medical Student
☐ Resident/Psychology Intern (≤ 1 month of dedicated research time)
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X Fellow

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Other authors/contributors involved in project: Aarti Pandya, MD; Jodi Shroba, NP

IRB Number: none

Describe role of Submitting/Presenting Trainee in this project (limit 150 words):
As this data had already been collected prior to the beginning of my fellowship, my role consisted of contributing to the writing of the abstract and submission to the American Academy of Allergy, Asthma and Immunology Annual Meeting, where I will be presenting it as a poster in February 2022.

Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words

Background:
Specific IgE (sIgE) to foods has been used to predict the risk of a systemic reaction (SR) when the food is ingested. An arbitrary cutoff of 0.35 is often used to separate a positive likelihood ratio (LR+) from a negative one (LR-), yet there is little evidence supporting the use of this value.

Objectives/Goal:
The objective of this project was to establish a more accurate method for estimating the probability of food allergy to egg.

Methods/Design:
Egg-sIgEs were measured and open oral egg challenges were performed on 155 children with a clinical history of egg allergy. Logistic regression (LR) was performed with sIgE as the dependent variable and the result of the egg challenge as the independent variable. A random forest (RF) analysis was also performed on these same data. Receiver operating characteristics (ROC) curves were generated for both LR and RF analyses.

Results:
The area under the curve (AUC) for LR was 0.87 and for the RF was 0.77 indicating that LR gave a better model for predicting egg reactions. LRs were determined for each value of sIgE represented

on the LR ROC curve. The regression equation for this was LR=0.9641ln(sIgE)+1.4542 with an R-squared of 0.93. Setting LR to 1 and solving for sIgE gave a cutoff of 0.62kU/L. The usual cutoff of 0.35kU/L gave a LR of 0.44 indicating a decreased likelihood of egg allergy in such patients.

Conclusions:

Use of LRs generated from ROC curves provides a method for calculating cutoffs for sIgE tests and for determining LRs for each value of sIgE. When combined with Bayesian analysis, this may lead to a more accurate estimate for the probability of food allergy.