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### Diagnosis of Peanut Allergy Using Continuous Likelihood Ratios

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## Research Abstract Title

Diagnosis of Peanut Allergy Using Continuous Likelihood Ratios

**Submitting/Presenting Author (must be a trainee):** Nalin U.G.

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Resident/Psychology Intern ( $\leq 1$  month of dedicated research time)

Resident/Ph.D/post graduate ( $> 1$  month of dedicated research time)

X Fellow

**Primary Mentor (one name only):** Dr. Jay Portnoy

**Other authors/contributors involved in project:** Jodi Shroba APRN, CPNP, Aarti Pandya, MD

**IRB Number:** Except as used unidentified patients

**Describe role of Submitting/Presenting Trainee in this project (limit 150 words):**

Analyzing given data and interpreting data with Dr. Portnoy. Helped write discussion, methods and results.

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

### **Background:**

Peanut allergy is common and is associated with a substantial burden on patients. Diagnosis usually includes tests for peanut-specific IgE (sIgE). A low sIgE in a patient who is peanut allergic is called a false negative (FN) and a high sIgE in a peanut tolerant patient is called a false positive (FP). This occurs because interpretation of sIgE often does not account for the pretest probability of peanut allergy.

### **Objectives/Goal:**

Using Bayesian statistics, we developed a method for interpreting peanut-sIgE that accounts for the pretest probability of peanut allergy.

### **Methods/Design:**

We obtained information from 117 children who underwent a peanut oral food challenge (OFC) between January 2017 to November 2019. Peanut-sIgE was measured using ImmunoCAP. A ROC curve was constructed, and polynomial regression used to fit the data. Its first derivative was used to determine likelihood ratio (LR) for each value of 1-Specificity. These were converted to sIgE and linear regression was used to estimate LR for each of value of peanut-sIgE.

### **Results:**

The regression had an  $R^2$  of 0.9878. Its first derivative had an  $R^2$  of 0.9758. The cutoff for  $LR = 1$  was 0.22 which is comparable to cutoffs from prior studies.

**Conclusions:**

By using Bayes' theorem and a ROC curve, we could estimate LRs for each value of peanut sIgE. When combined with estimates of pretest probability, this method eliminates the concept of FP and FN and should permit computerized decision-making algorithms to better estimate the probability that a patient has a peanut allergy.