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Medi Quest BRS Hospital

A monthly News letter from BRS Hospital

Food Allergy: Clinical features, differentiation from food intolerance and diagnostic testing - *PART 1*

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Clinical features of food allergy

Food allergy is an immune-mediated reactiontypically IgE-drivenoccurring after ingestion of specific foods. Symptoms generally begin within minutes to 2 hours; rarely, they may be delayed for several hours.

- **Skin:** Hives, itching, eczema, red rashes
- **Edema:** Angioedema of lips, face, tongue, throat
- **Oropharyngeal:** Tingling or itching in the mouth, hoarseness, difficulty swallowing
- **Respiratory:** Wheezing, coughing, nasal congestion, shortness of breath
- **Gastrointestinal:** Abdominal pain, nausea, vomiting, diarrhea
- **Circulatory/neurologic:** Dizziness, light-headedness, fainting

Severe systemic reaction: Anaphylaxis

- **Airway:** Constriction and tightening, throat swelling, sensation of a lump
- **Cardiovascular:** Severe hypotension (shock), rapid pulse
- **Neurologic:** Dizziness, syncope, loss of consciousness
- **Action:** Immediate emergency care is required

Differentiating food allergy from food intolerance

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Feature	Food allergy	Food intolerance
System involved	Immune (IgE mediated)	Digestive (enzyme deficiency, chemical sensitivity)
Severity	Can be life threatening (anaphylaxis)	Usually not life threatening
Onset	Rapid (minutes–2 hours)	Delayed (hours)
Amount needed	Tiny amounts trigger	Small amounts often tolerated
Examples	Milk, egg, peanut, tree nuts	Lactose intolerance, sulfite sensitivity, celiac disease

- **Examples in pediatrics:**
  - o **Lactose intolerance:** Lack of lactase → gas, diarrhea after milk
  - o **Additive sensitivity:** Sulfites in dried fruit
- **Management:** Limiting/avoiding the food, enzyme supplements (e.g., lactase), and dietary adjustments

Diagnostic approach and testing

Clinical workflow

1. **History and symptom diary:** Detailed exposureresponse patterns often clarify diagnosis in most cases.
2. **Skin prick test (SPT):** First-line, reliable method in suspected food allergy.
3. **Serum sIgE testing:** Specific IgE antibodies to allergen is the most used (misused)test by non allergists
4. **Advanced diagnostics:** Component resolved diagnostics

Skin prick test (SPT)

- **Principle:** Detects immediate hypersensitivity by introducing allergen extracts into the skin.
- **Procedure:**
  - o **Placement:** Drops of allergen (e.g., milk, egg, peanut, wheat, soy, shellfish) on forearm or back
  - o **Prick:** Sterile lancet through each drop to the superficial skin
  - o **Read:** 15-20 minutes for wheal/flare
- **Interpretation:** Wheal ≥3 mm above the negative control is typically considered positive.
- **Provider:** Performed by allergists; standardized technique improves reliability.

Serum specific IgE (sIgE) assays

- **Role:** Quantifies allergen-specific IgE in serum/plasma; complements SPT, especially when SPT is contraindicated or equivocal.
- **Caution with "allergy panels":**
  - o **IgG/IgM panels:** Misleading for food allergy; elevated IgG/IgM reflects exposure/tolerance, not pathogenic allergy.

Detection of Specific IgE antibodies to the allergens (s-IgE assays)

Why FEIA (Fluorescent Enzyme Immuno Assay)is preferred over ELISA in allergy diagnostics in detecting specific IgE

- **Sensitivity and detection limit:**
  - o **FEIA:** Fluorescent signals detect very low IgE levelscrucial for clinical accuracy.
  - o **ELISA:** Colorimetric signals are less sensitive; low-level IgE may be missed.

- **Quantitative accuracy:**
  - o **FEIA:** Precise, reproducible quantitation in kU/L supports risk assessment and monitoring.
  - o **ELISA:** Often semi-quantitative with greater inter-assay variability.

- **Automation and workflow:**
  - o **FEIA:** Fully automated platforms reduce human error and improve reproducibility.
  - o **ELISA:** Manual pipetting/washing increases variability.

- **Standardization across labs:**
  - o **FEIA:** Strict calibration and quality control yield globally comparable results.
  - o **ELISA:** Kit-to-kit differences in allergen preparation reduce comparability.

- **Allergen binding capacity:**
  - o **FEIA :** Covalent binding to a sponge-like polymer CAP preserves allergen structure and density.
  - o **ELISA:** Adsorption to plastic wells may denature allergens, increasing noise and reducing reliability.

- **Clinical validation:**
  - o **FEIA :** Extensively validated; considered the gold standard in vitro method for allergen-specific IgE.
  - o **ELISA:** General-purpose immunoassay not optimized for allergen-specific IgE.

Side-by-side comparison

Feature	ELISA	FEIA
Signal	Colorimetric	Fluorescent
Sensitivity	Moderate	High (detects very low IgE)
Quantification	Semi quantitative	Quantitative (kU/L), reproducible
Standardization	Variable across kits	Globally standardized
Allergen binding	Adsorbed on plastic	Covalently bound to CAP polymer
Clinical role	General immunoassay	Gold standard for sIgE diagnostics

Phadiatop , Fx5 and ImmunoCAP

Thermofisher an American based company which uses FEIA platform in offering Phadiatop Fx5 and Immunocap,commercial assays for detecting specific IgE antibodies

Phadiatop

- **Purpose:** Screening for inhalant allergen sensitization (pollens, dust mites, animal dander, molds).
- **Method:** Mixed inhalant allergen panel bound to solid phase; detects presence of IgE to common aeroallergens.
- **Result type:** Qualitative/semiquantitative (positive/negative, sometimes graded).
- **Clinical role:** First-line respiratory allergy screen; guides need for specific sIgE testing and reduces unnecessary individual tests.

Fx5 panel

- Fx5 → a food mix test that screens for IgE antibodies against six common pediatric food allergens (milk, egg, soy, wheat, fish, peanut)
- When used together, clinicians sometimes refer to the "Phadiatop + Fx5 panel"

ImmunoCAP

- **Purpose:** Quantitative measurement of sIgE to individual allergens (food, inhalant, venom, etc.).
- **Method:** FEIA technology with covalent binding of specific allergens to CAP polymer.
- **Output:** Precise IgE concentration (0100 kU/L).
- **Clinical role:** Gold standard diagnostic; identifies the specific allergen and degree of sensitization; enables monitoring over time.

Side-by-side comparison

Side-by-side comparison table of Phadiatop, Fx5, and ImmunoCAP

- **Comparison Table**

Feature	Phadiatop	Fx5 Panel	ImmunoCAP
Test type	Screening for inhalant allergens	Screening for food allergens	Diagnostic, quantitative test for individual allergens
Purpose	Detects sensitization to common aeroallergens (pollens, dust mites, dander, molds)	Detects sensitization to 6 frequent pediatric food allergens (milk, egg, soy, wheat, fish, peanut)	Measures specific IgE to individual allergens (food, inhalant, venom, etc.)
Method	Mixed inhalant allergen panel bound to solid phase	Mixed food allergen panel bound to solid phase	Fluorescent enzyme immunoassay (FEIA) with allergens covalently bound to CAP polymer
Result type	Qualitative / semiquantitative (positive/negative, sometimes graded)	Qualitative / semiquantitative (positive/negative)	Quantitative (precise IgE concentration, 0–100 kU/L)
Clinical role	First-line respiratory allergy screen; guides need for specific sIgE testing	First-line pediatric food allergy screen; reduces unnecessary individual tests	Gold standard diagnostic; identifies specific allergen and degree of sensitization; enables monitoring over time
Workflow role	Initial step in aeroallergen workup	Initial step in pediatric food allergy workup	Second step for targeted analysis, confirmation, and longitudinal monitoring

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Key Takeaway

- **Phadiatop → broad inhalant allergy screen.**
- **Fx5 → broad food allergy screen (especially pediatric).**
- **ImmunoCAP → precise, quantitative diagnostic test for specific allergens.**

Together, Phadiatop + Fx5 serve as first-line screening tools, while ImmunoCAP provides the gold standard diagnostic detail for clinical decision-making.

Practical takeaways

- **Food allergy:** Immune-mediated, rapid onset, can be severe (anaphylaxis).
- **Food intolerance:** Non-immune, delayed onset, uncomfortable but not life-threatening.
- **Testing foundation:**
  - **SPT** as first-line, standardized method.
  - **sIgE assays -** prefer **FEIA platform as opposed to ELISA** for sensitivity, specificity, and standardization .
  - Avoid relying on **IgG/IgM "allergy panels"**

Part 2 will cover component-resolved diagnostics (CRD) and the oral food challengethe definitive tools for complex cases and confirmation.

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