

Anaphylaxis

Clinical Background

Anaphylaxis is an acute, potentially fatal allergic reaction involving multiple organ systems.

Epidemiology

- Incidence
 - 75/100,000 lifetime incidence
 - 30/100,000 adults
 - 1/200 children
- Age – all ages
- Sex – M:F, equal
- Most deaths from anaphylaxis occur in children <10 years

Risk Factors

- Previous history of anaphylaxis; hives or urticaria following allergen exposure
- One or more comorbidities
 - Asthma, atopic eczema and/or allergic rhinitis

Pathophysiology

- Involves activated mast cell release of multiple substances – cytokines, histamine, tryptase, prostaglandins
- Type 1 or immediate hypersensitivity mediated by IgE
 - IgE mediated
 - Medications
 - Foods
 - Insect venoms
 - IgE independent
 - Cold, heat
 - Drugs – opioids, muscle relaxants, NSAIDs, ACE inhibitors
 - Exercise
 - Radiocontrast media
- Interval to anaphylaxis depends on allergen
 - Food – 25-30 minutes after ingestion
 - Drugs – 10-20 minutes after administration
 - Insect stings – 10-15 minutes after sting
 - Blood or blood products in IgA deficient patients (no detectable level)

Clinical Presentation

- Respiratory – dyspnea, tachypnea, bronchospasm, laryngeal or tongue edema
- Cardiovascular – tachycardia, hypotension, cardiac arrhythmias, angina, cardiac arrest
- Gastrointestinal – nausea, abdominal cramps, emesis, diarrhea
- Cutaneous – erythema, generalized pruritus, urticaria, angioedema
- Other – rhinitis, cramps, dizziness, syncope

Treatment

- Immediate
 - Epinephrine

- Antihistamines
- Corticosteroids
- Observation after initial treatment, fluid administration

Prevention

- Avoidance of known allergens
- Use of epinephrine pens when exposed to known allergen; epinephrine should be available at all times for possible repeat exposures
- Desensitization for insect stings

Diagnosis

- Clinical history and examination consistent with anaphylaxis
- Laboratory testing
 - Serum tryptase
 - Levels peak 1 hour after onset of anaphylaxis; should be obtained within 3 hours of onset of symptoms
 - Elevation persists for 4-6 hours
 - Normal levels cannot be used to refute diagnosis of anaphylaxis
 - More common in food allergy anaphylaxis
 - May be used postmortem (femoral vein sampling) to confirm anaphylaxis as cause of death
 - Serum or plasma histamine
 - Levels peak 5 minutes after onset of anaphylaxis
 - Return to baseline levels within 30-60 minutes
 - May be impractical since levels must be obtained at onset of episode
 - May be elevated in serum due to artifactual basophil activation during clotting
 - Urine histamine
 - Levels of a histamine metabolite, N-methylhistamine, remain elevated in the urine for many hours after anaphylaxis
 - Reflects overall levels of released histamine
 - Appropriate IgE testing
 - Single IgE level may be helpful
 - Multiple allergen IgE testing based on suspicion of allergen
 - No recommendations for routine determination of serum IgE level
 - *In vitro* IgE detection may not correlate with anaphylactic reaction
 - IgE levels do not correlate with antigen-specific IgE determinations

Differential Diagnosis

- Vasovagal reaction
- Asthma
- Panic attack
- Flush syndrome
- Hereditary or acquired angioedema
- Other forms of shock
- Systemic mastocytosis
- Pulmonary embolism
- Hypoglycemia
- Seizure disorder

- Acute poisoning

Lab Tests

Indications for Laboratory Testing

Tests generally appear in the order most useful for common clinical situations. For test-specific information, refer to the test number in the ARUP Laboratory Test Directory on the ARUP Web site at www.aruplab.com.

Test Name and Number	Recommended Use	Limitations	Follow Up
Tryptase 0099173 Method: Fluorescence Immunoassay	May be useful in confirming anaphylaxis	This assay measures total tryptase; it does not distinguish between alpha and beta protein types	
Immunoglobulin E 0050345 Method: Electrochemiluminescent Immunoassay	May be useful in evaluation of allergic disease including therapies for asthma	May be elevated in AML, MDS, mastocytosis, hypereosinophilic syndrome	
Histamine, Whole Blood 0070037 Method: Enzyme Immunoassay	May be useful in confirming anaphylaxis	Needs to be drawn near time of event	
Histamine, Plasma 0070036 Method: Enzyme Immunoassay	May be useful in confirming anaphylaxis	Needs to be drawn near time of event	
Histamine, Urine 0070038 Method: Enzyme Immunoassay	May be useful in confirming anaphylaxis May be more useful than serum measures, but negative test does not rule out anaphylaxis	Needs to be drawn near time of event	

Guidelines

Sampson HA, Munoz-Furlong A, Campbell RL, Adkinson NF Jr, Bock SA, Branum A, Brown SG, Camargo CA Jr, Cydulka R, Galli SJ, Gidudu J, Gruchalla RS, Harlor AD Jr, Hepner DL, Lewis LM, Lieberman PL, Metcalfe DD, O'Connor R, Muraro A, Rudman A, Schmitt C, Scherrer D, Simons FE, Thomas S, Wood JP, Decker WW. Second symposium on the definition and management of anaphylaxis: summary report--second National Institute of Allergy and Infectious Disease/Food Allergy and Anaphylaxis Network symposium. *Ann Emerg Med*. 2006; 47 (4) 373-380.

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General References

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