EPIPEN INSERVICE
Emergency Administration of Epinephrine for the Basic EMT

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Case #1

- NR is an 8 yo male c/o hot mouth and stomach ache after eating jelly beans, lemonade, and potato chips at a school party.
- No rash or visible symptoms were noted

30 Minutes later

- Abdominal pain worsened, a fuzzy feeling in his throat developed and he had chest pain.
- He was sent to the nurse's office where no medications were administered while his mother was contacted.
- Mother drove patient to his pediatricians office

60 minutes later

- NR complaining of tightness in his throat and chest, severe abdominal pain.

- Epinephrine, benadryl, albuteral NMT, and O2 administered.
- 911 contacted

Outcome

- Pt responded briefly, but enroute became hypotensive, and cyanotic.
- Asystole developed and was pronounced dead 2 hours after eating suspect foods.

Past Medical History

- Food allergy: NR was allergic to eggs and peanuts since early childhood.
- Previous reactions were hives, vomiting, and itching to oral area.
- Moderate asthma – diagnosed at age 2.
- Seasonal and allergic rhinitis at age 3.
- Atopic Dermatitis
- No known allergies to meds or bee stings
- Meds: Flovent MDI, Epipen Jr.

Discussion

- Fatal anaphylaxis:
  - Food allergy most common cause anaphylaxis
  - 5-7% of children
  - Death occurs about 150/yr.
  - 3 major causes of death
    - Peanut and tree nut oil
    - Hx of asthma
    - Delay of epinephrine administration*****
- Jellybeans NR ate contained peanut flour.

Case #2

- AS, 11 yo female with h/o asthma and tree nut allergy.
- BD Party at friend's home
- Developed itching in her mouth after eating a hotdog, potato chips, and fruit salad.
- Skipped the BD cake, and other snacks because nut oil risk.
- She called her mother to discuss symptoms
- She did not have her Epipen Jr. with her

10 minutes later

- Mom arrives with Epipen Jr.
- AS now had marked swelling to lips, face, and diffuse hives. Her throat felt tight and she was coughing constantly.
- Epipen Jr. was administered as well as 2 puffs MDI
- 911 was contacted as AS improved, 10min response time and 25 min transport.
- AS had hives and mild swelling on EMS arrival.

Enroute

- Cough, tightness in chest and throat, and wheezing reoccur.
- No epi available to EMS crew.
- O2, Albuterol MDI 4 puffs administered with no relief.

EC Arrival

- Epinephrine, benadryl, and prednisone given.
- Pt improved immediately.
- AS sent home after 4 hour observation.

Past medical history

- Food allergy: AS had first reaction age 2, on cereal with almonds. Age 5 on cookies with traces of walnuts. Hives and angioedema.
- Mild to moderate asthma since age 1yo.
- Allergy to amoxicillin.
- Medications: Pulmicort MDI, Albuterol MDI, Epipen Jr. PRN

Discuss

- Anaphylactic reaction while eating “safe foods”
- AS reaction due to walnuts in fruit salad.
- Age 11 at 88#, Epipen Jr. under dosed but may of saved her life.
- A second dose may be required, need observation.
- Peanuts and tree oils most common cause of food related mortality.

Anaphylaxis

Screen, educate, and protect

+

Immediate treatment

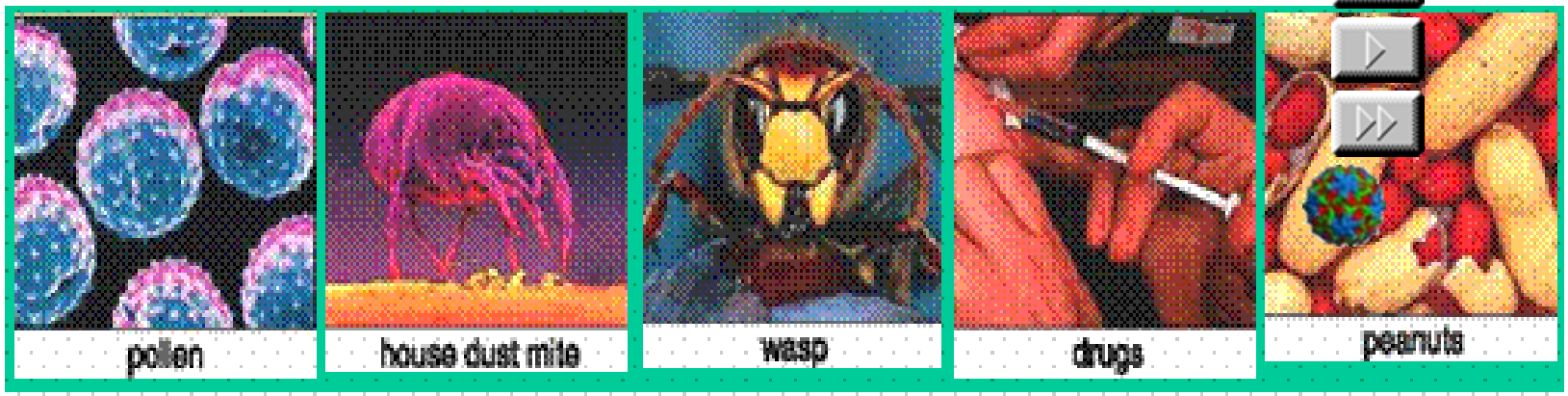
=

Saved lives

Type I Hypersensitivity

Allergy (atopy)

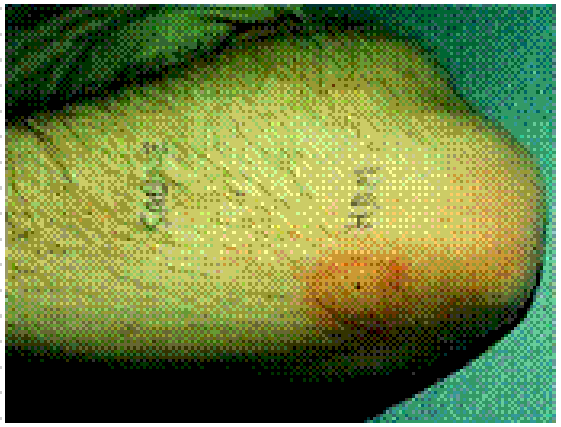
- Individual becomes "sensitized" to an allergen
  - Usually harmless environmental protein antigens
- IgE response is required for type I hypersensitivity
- Rapid response of smooth muscle and vascular tissue followed by inflammation



Type I Hypersensitivity

Inflammation:

- **Mast cell produces inflammatory mediators:**
  - IL-4
  - TNF-α
  - Leukotrienes (100x more potent than histamine)
  - Prostaglandins
- **Stimulates inflammation**
- **Attracts eosinophils, basophils, neutrophils, T_H2; inflammation escalates and can damage tissues**



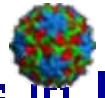
Immediate

Late-phase

Type I Hypersensitivity

Allergic reactions:

- **Inhalation most common route of entry**
  - "Hay fever" (rhinitis) or allergic asthma (lower resp. system)
- **Hives may result from activation of skin mast cells**
  - Bites, plant allergens, cosmetics, etc.
  - Chronic reaction: atopic dermatitis (eczema)
- **Ingestion of allergens can activate gut mast cells**
  - Proteins in foods, esp. nuts, fruits, grains, legumes, shellfish, eggs and milk
  - Reaction can become systemic
- **Systemic anaphylaxis can result from allergens in blood**
  - Widespread activation of mast cells drops blood pressure, constricts airways: anaphylactic shock



Type I Hypersensitivity

Therapy:

- **Symptomatic**
  - Antihistamines
  - Epinephrine
  - Anti-inflammatory steroids
- **Desensitization ("allergy shots")**
  - Injection of specific allergens to stimulate producti of neutralizing IgG/IgA
- **Anti-IgE may block binding to mast cells**

Anaphylaxis:

Screen, Educate, and Protect to Improve Patient Outcomes

Definition of Anaphylaxis

- Systemic allergic reaction
  - Affects body as a whole
  - Multiple organ systems may be involved
- Onset generally acute
- Manifestations vary from mild to fatal

Myth: Anaphylaxis Is Rare

REALITY:

- Anaphylaxis is underreported
- Incidence seems to be increasing
- Up to 41 million Americans at risk (Neugut AI et al, 2001)
- 63,000 new cases per year (Yocum MW et al, 1999)
- 5% of adults may have a history of anaphylaxis (various surveys)

Pathogenesis of Anaphylaxis

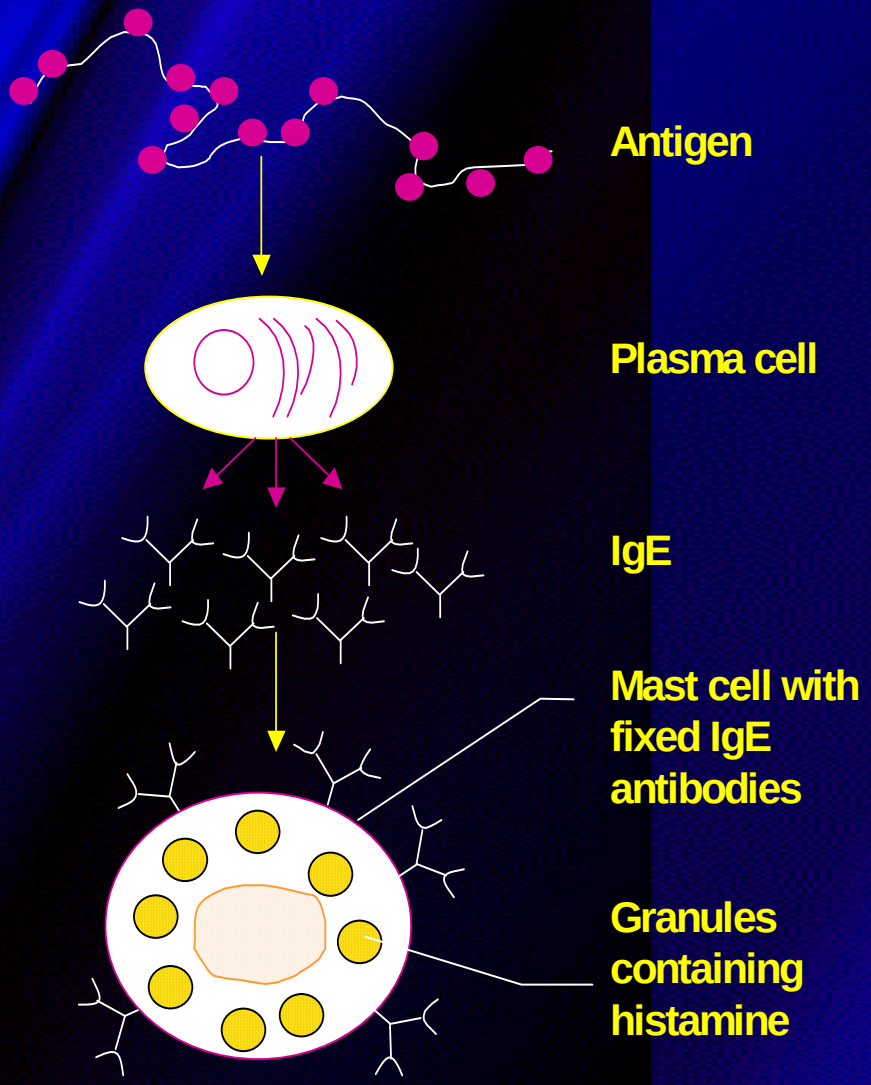
- IgE-mediated (Type I hypersensitivity)
- Sensitization stage
- Subsequent anaphylactic response

Sensitization Stage

① Antigen (allergen) exposure

② Plasma cells produce IgE antibodies against the allergen

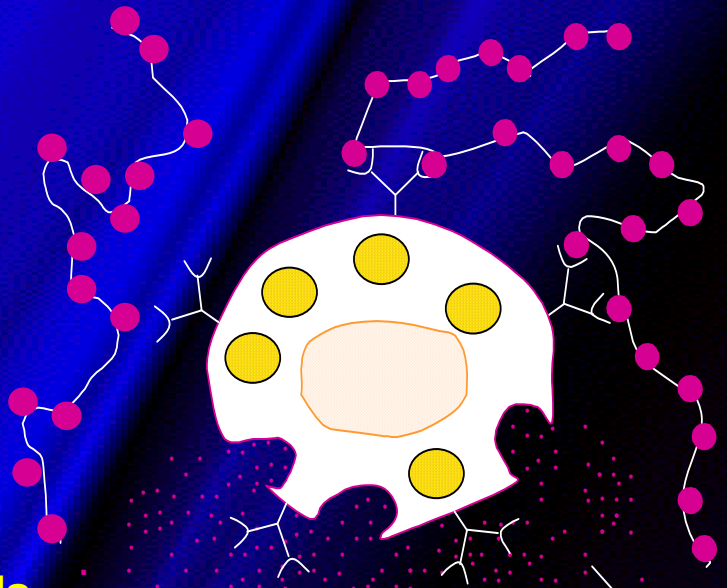
③ IgE antibodies attach to mast cells and basophils



Anaphylactic Reaction

④ More of same allergen invades body

⑤ Allergen combines with IgE attached to mast cells and basophils, which triggers degranulation and release of histamine and other chemical mediators



Antigen

Mast cell granules release contents after antigen binds with IgE antibodies

Histamine and other mediators

Common Causes of IgE-mediated Anaphylaxis

- Foods
- Insect venoms
- Latex
- Medications
- Immunotherapy
  - Insect venom
  - Inhalant allergens

Anaphylactoid Reactions

- Non–IgE-mediated
  - Complement-mediated
    - Anaphylatoxins, eg, blood products
  - Direct stimulation
    - eg, radiocontrast media
  - Mechanism unknown
    - Exercise
    - NSAIDs

Myth: The Cause of Anaphylaxis is Always Obvious

REALITY:

- Idiopathic anaphylaxis is common
- Triggers may be hidden
  - Foods
  - Latex
- Patient may not recall details of exposure, clinical course

Clinical Manifestations of Anaphylaxis

- **Skin:** Flushing, pruritus, urticaria, angioedema
- **Upper respiratory:** Congestion, rhinorrhea
- **Lower respiratory:** Bronchospasm, throat or chest tightness, hoarseness, wheezing, shortness of breath, cough

Clinical Manifestations of Anaphylaxis

- **Gastrointestinal tract:**
  - Oral pruritus
  - Cramps, nausea, vomiting, diarrhea
- **Cardiovascular system:**
  - Tachycardia, bradycardia, hypotension/shock, arrhythmias, ischemia, chest pain

Myth: Anaphylaxis Always Presents with Cutaneous Manifestations

REALITY:

- Approximately 10%-20% of anaphylaxis cases will not present with hives or other cutaneous manifestations

- 80% of food-induced, fatal anaphylaxis cases were not associated with cutaneous signs or symptoms

Clinical Manifestations of Anaphylaxis

Signs/symptoms	Incidence (%)
Urticaria and angioedema	88
Upper airway edema*	56
Dyspnea and wheezing	47
Flush*	46
Dizziness, syncope, and hypotension	33
Gastrointestinal symptoms	30
Rhinitis*	16
Headache*	15
Substernal pain*	6
Itch without rash*	4.5
Seizure*	1.5

*Symptom or sign not reported in all four series

Clinical Course of Anaphylaxis

- Uniphasic
- Biphasic
  - Recurrence up to 8 hours later
- Protracted
  - Hours to days