

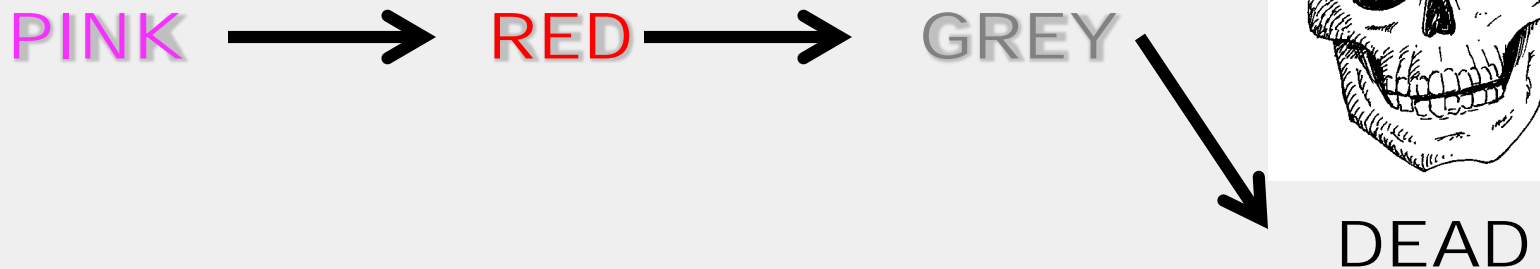
Allergic Reactions and Anaphylaxis

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Allergy to Anaphylaxis

- Defined as a *histamine-mediated* spectrum of physiologic events that include:

- Smooth muscle constriction
- Vasodilatation
- Edema



“...it is critical to remember that even apparently mild acute allergic reactions may progress to...severe systemic response, anaphylaxis and death.”

-- Tintinalli JE. 2004. Emergency Medicine. McGraw Hill. 247

EMS Case Study

You are called to the home of a 68 yo female who just started “a urine pill” for an apparent bladder infection.

She tells you she believes she may be allergic to the medicine.

“I itch like a sunuvabitch”

EMS Case Study

Assessment

HPI: as above

ALL: PCN

MEDS: Bactrim, lisinopril, metoprolol, ASA

PMH: HTN, CAD, OA

FH: CAD

SH: smoker, lives alone

EMS Case Study

Exam

GEN: 68yo female, NAD, standing on lawn

VS: 37.6, 99, 132/78, 24, 97% RA

HEENT: NAD, MMM

PULM: CTAB

CV: Tachy, no M/R/G

DERM: irregular, diffuse rash that blanches

EMS Case Study

- The patient tells you she has taken some Benadryl
- She feels embarrassed, now, that she called
- She states she is sure that she will be OK and does not want transport to the hospital
- “I’m going to sit down right here and wait for you to get the form– I’m feeling a little dizzy”



EMS Case Study

- **Thoughts?**
- **Re-exam:**
 - GEN:** 68yo female, ill-appearing
 - VS:** 130, 101/60, 28, 97% RA
 - CV:** Tachycardia
 - PULM:** Good air entry. Diffuse wheeze
 - DERM:** Rash more pronounced.

Case Study No. 1

- “I don’t feel so well”
- Patient vomits on lawn.
- You notice a change in facial appearance almost before your eyes...

- **THOUGHTS?**



EMS Case Study

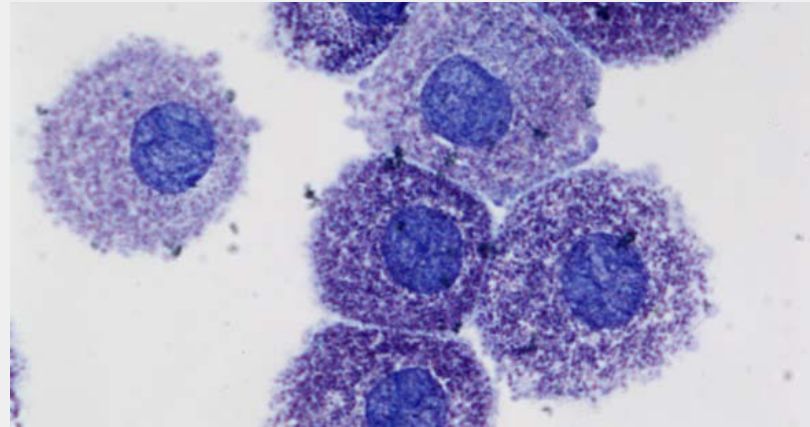
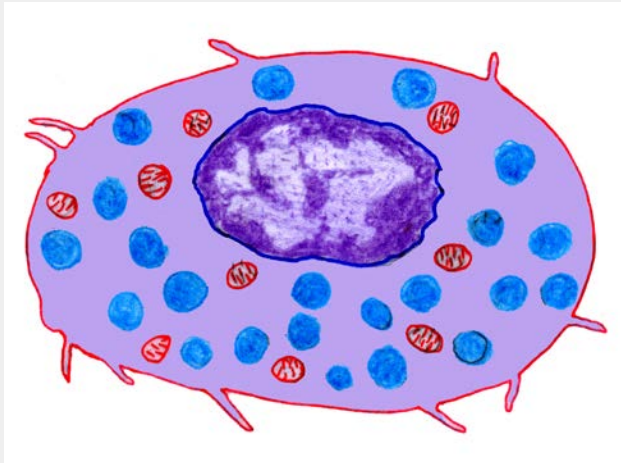
- Interventions?
- Epinephrine 1:1000
 - Oxygen
 - IV
 - Monitor
 - Meds (if available)
 - IV Benadryl
 - Albuterol Neb
 - IVF
 - Solu Medrol

Allergy and Anaphylaxis: Incidence

- In USA - 400 to 800 deaths/year
- Parenterally administered antibiotics account for 100 to 500 deaths per year
 - But still only occurs 1:10,000 exposures (!)
- Hymenoptera stings account for 40 to 100 deaths per year
 - Sawflies, wasps, bees and ants.



Thanks to: The Mast Cell



Coated with IgE (Immunoglobulin E) receptors
Loaded with histamine and other cytokines

“Like little, ticking time bombs...”

HISTAMINE

- Smooth muscle constriction

BRONCHOSPASM

- Capillary bed dilatation

HYPOTENSION

- Increases vascular permeability

- Promotes inflammation

EDEMA

Anaphylaxis: Causes of Deaths

- **Respiratory Failure (>70%)**
 - Laryngospasm and edema
 - Acute (refractory) bronchospasm
- **Circulatory collapse (25%)**
- **Other <5%**
 - ICH
 - DIC
 - AMI



Anaphylaxis

- Antigenen enter body by:
 - Injection
 - Ingestion
 - Inhalation
 - Absorption



Allergic Reaction

- **Antigen/ activating complex**
 - **Drugs (antibiotics)**
 - **Foods (nuts, shellfish)**
 - **Insect venoms**
 - **Animal serum**
 - **Latex**
 - **Radiographic contrast material/ dye**
 - **Incompatible blood types**

Insect Sting Hypersensitivity

- **Hymenoptera (yellow jackets, honeybees, hornets, wasps, bumble bees)**
 - **90%: Local hives, pruritus**
 - **+/- 10%: Massive local reaction, including swelling beyond two joints of extremity**
 - **1%: Systemic reaction**
 - **10%: have worse reaction on second sting**
 - **28%: have recurrent systemic reaction**

Vasodilation

- **Decreased peripheral vascular resistance**
- **Hypotension**
- **Tachycardia**
- **Peripheral hypoperfusion**

Increased Capillary Permeability

- Tissue edema, urticaria (hives), itching
- Laryngeal edema
 - Airway obstruction
 - Respiratory distress
 - Stridor
- Fluid leakage from vascular space
 - Hypovolemic shock

Smooth Muscle Spasm

- **Laryngospasm**
- **Bronchospasm**
 - Respiratory distress
 - “Tight Chest”
 - Wheezing
- **GI Tract Spasm**
 - Nausea, vomiting
 - Cramping, diarrhea
- **Bladder Spasm**
 - Urinary urgency
 - Urinary incontinence

Allergic Reactions

- Generally classified into 3 groups:
 - Mild allergic reaction PINK
 - Moderate allergic reaction RED
 - Severe allergic reaction GREY
 - Anaphylaxis/ shock DEAD

Mild Allergic Reaction

- **Characteristics**
 - Urticaria (hives), itchy
 - Erythema (redness)
 - Rhinitis
 - Conjunctivitis
 - Mild bronchoconstriction (faint wheeze)
- **No SOB or hypotension/hypoperfusion**
- **Often self-treated at home**



Urticaria (Hives)

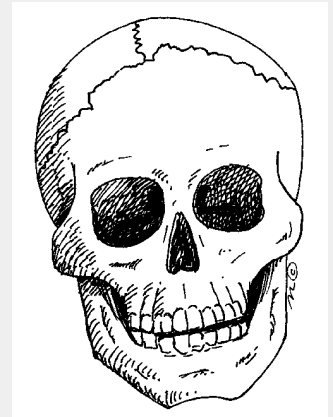


Moderate Allergic Reaction

- **Characteristics**
 - Mild signs/symptoms with any of following:
 - Dyspnea, possibly with wheezes
 - Angioneurotic edema (facial, tongue swelling)
- **No hypotension/hypoperfusion**

Severe Allergic Reaction (Anaphylaxis)

- **Characteristics**
 - Mild and/or moderate signs/symptoms plus
 - Shock / hypoperfusion



Clinical Manifestation

- **Dependent on:**
 - Degree of hypersensitivity
 - Quantity, route, rate of antigen exposure
 - Pattern of mediator release
 - Target organ sensitivity and responsiveness

Typically impossible to definitively determine prehospital

Clinical Manifestation

- Severity varies from mild to fatal
- Most reactions are respiratory, dermatologic
- Less severe early findings may progress to life-threatening **over a short time**
- Initial signs/symptoms do NOT necessarily correlate with severity, progression, duration of response
- Generally, quicker symptoms = more severe reactions

Clinical Manifestation

- First manifestations involve **skin**
 - Warmth and tingling of the face, mouth, upper chest, palms and/or soles, or site of exposure
 - Erythema
 - Pruritus (itching) is universal feature
 - May be accompanied by generalized flushing, urticaria, nonpruritic angioedema

Clinical Manifestation

- **May progress to involvement of respiratory system**
 - cough
 - chest tightness
 - dyspnea
 - wheezing
 - throat tightness
 - dysphagia
 - hoarseness



Clinical Manifestation

- **Other Signs and Symptoms**
 - lightheadedness or syncope caused by hypotension or dysrhythmia
 - nasal congestion and sneezing
 - ocular itching and tearing
 - cramping abdominal pain with nausea, vomiting, or diarrhea
 - bowel or bladder incontinence
 - decreased level of consciousness

Assessment

- **Physical Exam findings may include**
 - urticaria, angioedema, rhinitis, conjunctivitis
 - tachypnea, tachycardia, hypotension
 - laryngeal stridor, hypersalivation, hoarseness, angioedema

Management

- Treatment depends upon severity of reaction and signs/symptoms of its presentation

Management

- **Optimal management requires**
 - **Early diagnosis**
 - **AGGRESSIVE Pharmaceutical intervention**
 - **Epinephrine early...and maybe repeat**
 - **Antihistamines do not treat anaphylaxis and have no life-saving capacity – if an anaphylactic reaction is occurring, give epinephrine immediately**
 - **Observation**
 - **Appropriate disposition**

Management

1. Prepare for the worst: “O-M-I”
 - Oxygen
 - Monitor
 - IV
2. Meds immediately at hand
3. Airway plan and equipment at hand
4. Early notification of Med Ctrl.

Mild Allergic Reaction

- Epinephrine 1:1000
- Diphenhydramine 25 - 50mg PO/IM/IV
 - IV is preferred
- If stinger present, flick it away with credit card or fingernail
- May consider (if available and indicated):
 - inhaled beta-agonists
 - corticosteroids
 - cimetidine or ranitidine (H2 blocker)

Moderate Allergic Reaction

- Epinephrine 1:1,000
- High flow oxygen
- IV NS
 - Titrated to systolic BP 90 mm Hg
- ECG monitor
- Beta agonists
 - Nebulized albuterol
- Diphenhydramine 25-50 mg IM or IV
- Methylprednisolone 125 mg IV
- Transport

Anaphylaxis

- **Airway and Breathing**
 - High concentration oxygen
 - Ventilations, ETT ←
 - Consider inhaled beta agonists
- **Circulation**
 - Large bore IV NS X 2
 - Quickly titrate fluids to perfusion with bolus therapy
 - ECG monitor
- **Treat as pre-arrest patient**

Intubate
EARLY or
prepare to get
comfortable
with Quick-
Trach™

Medications

- **Epinephrine 0.5 - 1.0 mg 1:10,000 IV**
 - Hypotension unresponsive to fluids and epinephrine → consider dopamine ~10 mcg/kg/min
- **Diphenhydramine 50 mg IV**
- **Methylprednisolone 125 mg IV**
- **Rapid transport**

EMS Case Study

- Repeat exam demonstrates SBP of 82.
- You administer...Epinephrine
- ...and drive like the wind...
- 10min after Epi, patient reports she can breathe better, you notice lessening of rash

EMS Case Study

- **Repeat VS show BP 108/78**
- **Patient continues to improve**
- **Evaluated in ED, admitted to ICU for observation**
- **Complete recovery.**

Patient is sick



YOU DO THE THING



Patient is healthy