

No You Can't Keep It



I'm Allergic

Anaphylaxis

(and allergy stuff too)

My Background

- ❁ Fairfax County Fire and Rescue
- ❁ Richmond Ambulance Authority
- ❁ Goochland County Fire and Rescue
- ❁ MedSTAR Transport
- ❁ Louisa County Emergency Services
- ❁ Lexington Lifesaving and First Aid Crew
- ❁ Hanover Fire and EMS

Purpose and Background

Who has been on a life-threatening emergency call?

Of those calls, did you provide the definitive life saving intervention?

Pick three medications from your protocols, you only get to keep three.

Objectives

- ⊗ Review Terminology
- ⊗ Discuss allergy stats
- ⊗ Discuss immunity
- ⊗ Review signs/symptoms
- ⊗ Discuss Pre-Hospital Treatment
- ⊗ Understand what is happening when the patients look like this



Basic Terminology

⊗ Allergen

⊗ Antibody

⊗ Allergy

⊗ Anaphylactic Shock

⊗ Antigen

⊗ Histamine

⊗ Immune System

⊗ Leukotriene

⊗ Mast Cell

How prevalent are
allergies

Allergy Facts

1 out of 5 Americans suffer from all types of allergies

Allergy is 5th leading chronic disease in the US among all ages (3rd most common when under 18)

The most common pet allergy...

Cat Dander – 10 million people

Most common indoor allergy triggers: tree, grass, & weed pollen, mold spores, dust mite and cockroach allergen, cat, dog, and rodent dander

Allergy Facts

6% of allergy sufferers have food and drug allergies as their primary

Penicillin is the most common drug allergy

90% of all food allergies are caused by 8 foods:

Milk, soy, eggs, peanuts, tree nuts, fish, and shellfish

4% of allergy sufferers have latex as the primary allergy

Est. 10% of healthcare workers

Allergy Facts

Food allergies account for more than 30,000 ED visits/year

200 cases of anaphylactic shock are caused each year by latex allergen

200 deaths a year due to food allergies, 400 from penicillin, 100 from insects, 10 from latex

All of this costs \$14.5 Billion per year

Asthma and Allergy Foundation of America.

<http://www.aafa.org/display.cfm?id=9&sub=30>

The Immune System

Immune System

- ⊗ Internal response to foreign substance
- ⊗ 2 types of immunity
 - ⊗ Innate (General)
 - ⊗ Specific (Acquired)

Immune System

- ⊗ Innate (General)

- ⊗ Uses collectins

- ⊗ Makes use of phagocytes and natural killer cells in the inflammatory response to microorganisms

Immune System

- ❁ Specific (Acquired)
 - ❁ The immune system develops antibodies in response to exposure to an antigen
 - ❁ Another source can supply these antibodies

Antigens

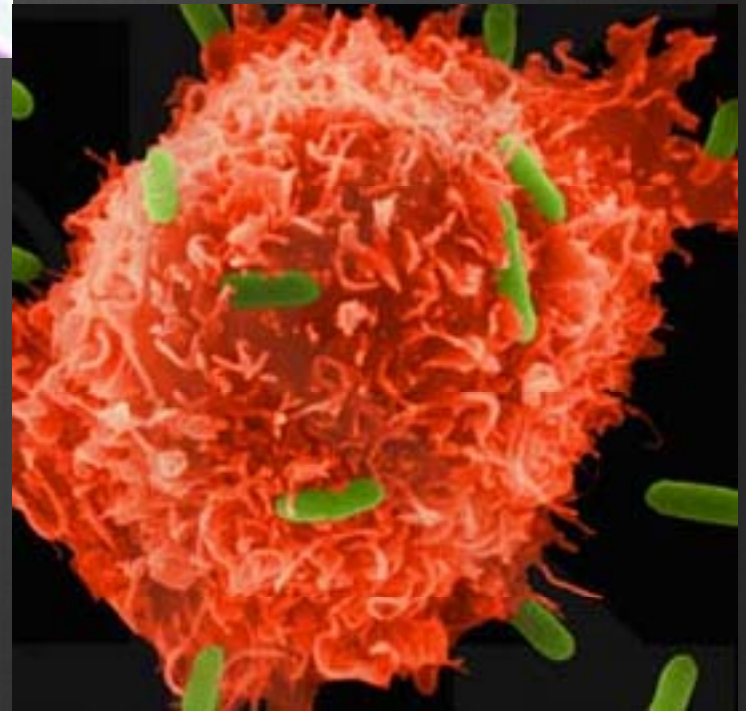
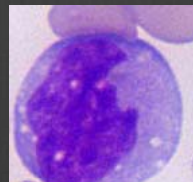
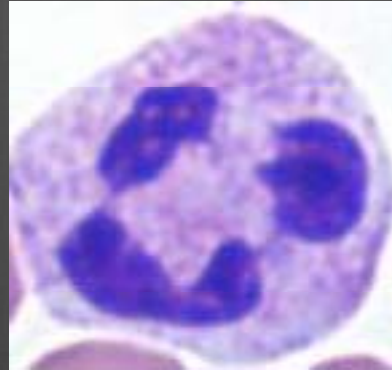
- ⊗ Most are proteins
 - ⊗ But other types include:
 - ⊗ Polysaccharides
 - ⊗ Complex lipids
 - ⊗ Nucleic acids
 - ⊗ Bacteria
 - ⊗ Fungi
 - ⊗ Viruses
 - ⊗ Parasites
 - ⊗ Foreign tissue

General Immunity

- ⊗ First line of defense
 - ⊗ Doesn't need previous exposure
 - ⊗ Doesn't distinguish
 - ⊗ Doesn't change the intensity of its response

General Immunity

- ⊛ Includes
 - ⊛ Barriers
 - ⊛ Physical
 - ⊛ Chemical
 - ⊛ Mechanical
 - ⊛ Biological Defenses
 - ⊛ Phagocytosis
 - ⊛ Inflammatory Response
 - ⊛ Cytokines



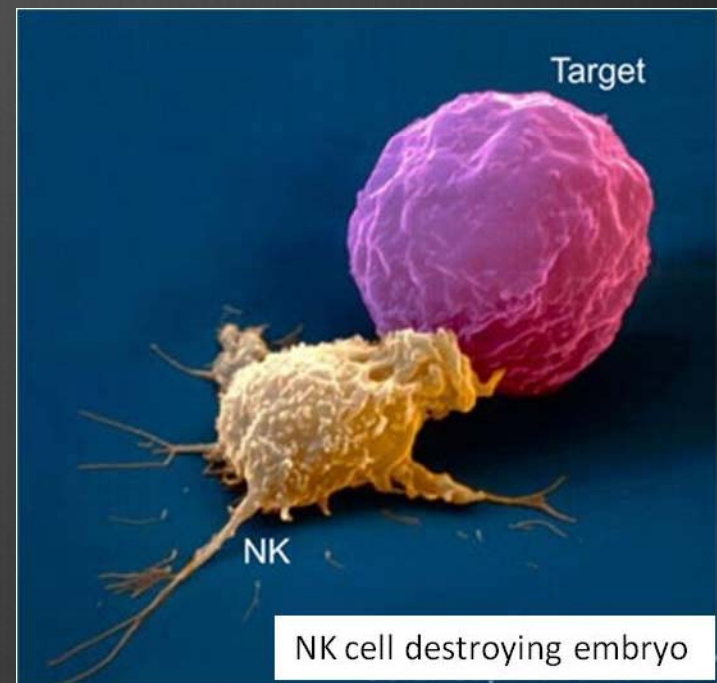
Inflammatory Response

- ⊗ The acute physiological, non-specific response of the body to tissue injury
 - ⊗ Repair of tissue damage and infection defense
 - ⊗ Initially localized, but can become systemic – fever, malaise
- ⊗ 3 stages
 - ⊗ Vascular Stage
 - ⊗ Cellular Exudate Stage
 - ⊗ Tissue Repair and Replacement stage

Cytokines

- ❁ Chemical messengers that mediate inflammatory response
 - ❁ AKA interleukins

- ❁ Activation of NK cells



Specific Immunity

- ⊗ Persistent invaders cause activation
 - ⊗ These require sensitization to be most effective
- ⊗ 2 types of specific immune responses
 - ⊗ Cell-mediated
 - ⊗ Humoral
 - ⊗ Most foreign substances activate both

Lymphocytes

- ⊗ B and T lymphocytes
 - ⊗ originate from stem cells and
 - ⊗ differentiate and mature in the primary lymphoid organs
- ⊗ During development they acquire receptors for specific antigens
 - ⊗ Committed to this specificity for life
 - ⊗ Each make clones

Lymphocytes

- ⊗ After preprocess in primary lymphoid organs migration to secondary lymph tissue— site of interaction with antigens
 - ⊗ Secondary lymphatic tissue – lymph nodes
 - ⊗ Special lymphoid tissue – spleen, tonsils, adenoids, appendix, marrow, GI tract

Cell Mediated Immune Response

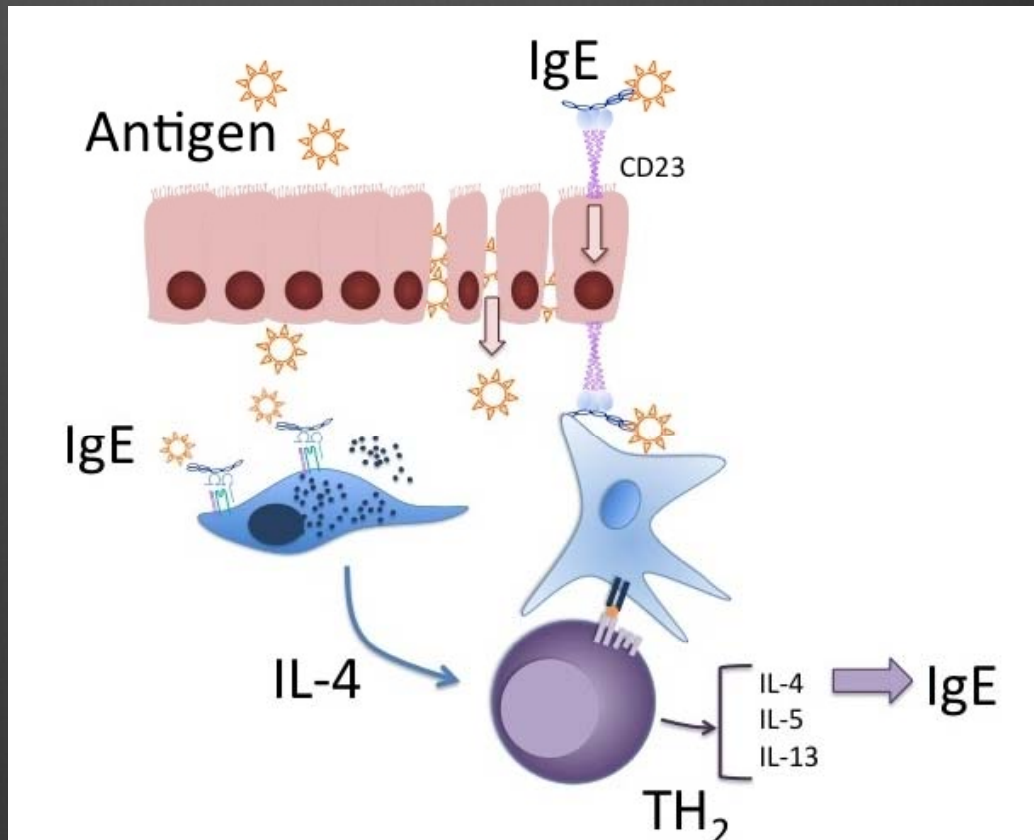
- ⊗ Response to fungi, parasites, intracellular bacteria
- ⊗ Stimulation and resoultion of antibody production
- ⊗ T lymphocytes have an antigen receptor
 - ⊗ when activated, they clone and move to lymphoid tissue
 - ⊗ Act as effector cells and regulators of both cellular and humoral immune response
 - ⊗ Antigen stimulation initiates cell mediated response, may be mediated by macrophages that bind to antigen and aid in recognition

Humoral Immune Response

- ⊗ Extracellular
 - ⊗ Humoral immunity involves 2 types of serum proteins
 - ⊗ Immunoglobulins
 - ⊗ Complement
 - ⊗ Immunoglobulins – antibody molecules that differentiate to plasma cells and memory cells
 - ⊗ Plasma cells secrete antibodies that bind to antigens – complexes ingested by phagocytes
 - ⊗ After elimination, memory cells remain in circulation to mature into plasma cells if antigen seen again

Immunoglobulins

- ⊗ IgA
- ⊗ IgM
- ⊗ IgG
- ⊗ IgD
- ⊗ IgE



Complement

- ⊗ 15 proteins that circulate in active form
- ⊗ Activate each other in cascade when first encounters antigen-antibody complex
 - ⊗ End product – cylinder that lyses cell membrane of target and kills it
- ⊗ Activated in 3 ways
 - ⊗ Classic activation
 - ⊗ Alternate pathway and lectin pathways not initiated by antibodies, start in resp to polysaccharides found on surface of some bacteria
- ⊗ Facilitates interaction of antibodies and enhances all actions of inflammatory process

Anaphylaxis

- ⊕ IgE or non-IgE mediated

- ⊕ Non

- ⊕ Anaphylactoid reactions

- ⊕ IgE mediated

- ⊕ Immune system response to a specific antigen it has been sensitized to

- ⊕ Antigen binds with IgE, triggering mast cells and basophils

- ⊕ Release of histamine, prostaglandins, leukotrienes, eosinophil chemotactic substance, heparin, neutrophil chemotactic substance, and platelet-activating factor -2



Anaphylaxis

- ⊗ Substances – especially histamine, prostaglandins, leukotrienes cause
 - ⊗ Systemic vasodilation
 - ⊗ Increased capillary permeability
 - ⊗ Bronchoconstriction
 - ⊗ Coronary vasoconstriction
 - ⊗ Urticaria
 - ⊗ Myocardial depression
 - ⊗ Excessive mucous
 - ⊗ Peripheral vasodilation

Anaphylaxis

- ⊗ Diffuse arterial vasodilation creates a mal-distribution of blood to tissue
- ⊗ Venous dilation decreases preload, decreasing CO
- ⊗ Capillary permeability depletes vascular volume, further decrease to CO and perfusion

Mild to Moderate



- ⊗ Clearly symptomatic
- ⊗ Respiratory involvement not present/ mild
- ⊗ Oxygen
- ⊗ Antihistamine
- ⊗ Beta Agonist prn

Severe

- ❁ Respiratory involvement to the point of compromise or the anticipated clinical course
- ❁ Epi
- ❁ Antihistamine
- ❁ Bronchodilators
- ❁ corticosteroids



Shock

- ⊗ Epi
- ⊗ Antihistamine
- ⊗ Bronchodilators
- ⊗ Corticosteroids
- ⊗ Volume
- ⊗ Vasopressors
- ⊗ Consider airway control



Questions?