Assignment

• Write a two page essay describing the differences between specific and non-specific immunity
The Immune System
I. Immunity

• A. defense against invading parasites and abnormal cells

• B. Types:
  – 1. nonspecific
  – 2. specific

• C. Lymphatic System
  – 1. vessels, lymph nodes, thymus, tonsils, appendix, spleen, bone marrow
  – 2. liquid = lymph
I. Immunity

• 3. fluid and WBC’s leak from capillaries, taken up by lymphatic system
• 4. lymph carries microbes
• 5. vessels run through lymph nodes
  – contain lymphocytes and macrophages
    • immune cells, destroy invaders
    • cell numbers increase with an infection
      – “swollen glands”
• 6. lymph then drains to vessels that open into blood-carrying veins in chest
Lymphatic System

*fluid moves by skeletal muscle pressure

Fig. 24.3
II. Nonspecific Responses

• A. Barriers
  – 1. intact skin
    • primary defense against parasitic invaders
  – 2. ciliated tracts sweep out bacteria
    • lungs
  – 3. enzyme-containing secretions
    • tears contain lysozyme, an antibacterial enzyme
  – 4. gastric fluid - pH = 1.0
  – 5. normal healthy flora in gut and on skin
    • out-compete pathogens
II. Nonspecific Responses

• B. Antimicrobial Proteins
  – complement proteins
    • complements other factors
  – interferons
    • general antiviral proteins

• C. Inflammatory Response
  – 1. Damaged skin and blood cells release histamines
  – 2. histamines cause:
    • a) vasodilation
    • b) capillary permeability
    • c) fluid flow from capillaries
II. Nonspecific Responses

– 3. **phagocytes** - 3 types of white blood cell
  • a) eating cells
  • b) scattered in body
  • c) battle invading bacteria
Inflammatory Response

1. Tissue injury; release of chemical signals such as histamine
2. Dilation and increased leakiness of local blood vessels; migration of phagocytes to the area
3. Phagocytes (macrophages and neutrophils) consume bacteria and cell debris; tissue heals

Fig. 24.2
III. Specific Responses

• = Immune System

• A. Cells involved = lymphocytes - wbc’s
  – 1. about 1 trillion in body
  – 2. cell surface receptors recognize foreign proteins (antigens)
    • a) receptors specific to particular antigen
  – 3. formed in bone marrow
  – 4. maturation ➔ specificity
  – 5. recognize self from nonself
III. Specific Responses

III. Specific Responses

Fig. 43.8

Fig 24.5

III. Specific Responses

III. Specific Responses

Fig. 43.8

Fig 24.5

III. Specific Responses

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III. Specific Responses
III. Specific Responses

–6. types
  • a) B-cells - do not pass through thymus
    – humoral or antibody-mediated immunity
  • b) T-cells - pass through thymus to mature
    – cell-mediated immunity
III. Specific Responses

• B-Cells are selected by antigens and secrete specific antibodies
III. Specific Responses

- T-Cells kill by punching holes in nonself cell
III. Specific Responses

• B. Antibodies
  – 1. structure
    • a) proteins that combine with a specific antigen*
    • b) Y-shaped, with specific sticky points at tips of “Y”; can “hook” 2 antigens

*antigen - a specific substance that invokes an immune response, usually a...
III. Specific Responses

- 2. function
  - a) flag foreign invader
  - b) neutralize toxins
  - c) clumping of invader
  - d) dissolve some infective agents

- 3. formation and action
  - a) T- and B-cell antibodies
  - b) B-cell antibodies released to circulate; T-cells retain antibodies on their surface
  - c) B cells produce antibodies only if antigen present and if helper T-cells stimulate them

Fig. 24.6
III. Specific Responses
III. Specific Responses
III. Specific Responses

• D. Primary Immune Response
  – 1. first exposure to antigen
  – 2. involves both humoral and cell-mediated immunity
  – 3. primary response slow
  – 4. disease symptoms from invader result
  – 5. chemical “calls to arms”
    • interferon-viral attack
III. Specific Responses

D. Secondary Immune Response
   1. Subsequent exposure to antigen
   2. both humoral and cell-mediated response involved
   3. much faster response against antigen
   4. no disease symptoms
III. Specific Responses

• E. Immunization
  – 1. Active immunity
    • a) vaccine = antigen
      – (1) inactive virus
      – (2) other antigen
    • b) induces primary response
    • c) primed for secondary response
  – 2. passive
    • a) antibodies from another source collected and used
      – (1) snakebite
        » horses given venom; antibodies derived from blood
IV. AIDS

A. Acquired Immunodeficiency Syndrome

B. HIV, Human Immunodeficiency Virus
   - 1. causes AIDS
   - 2. effects
      - a) virus attacks helper T-cells
      - b) immune system compromised
      - c) opportunistic infections then able to attack
         - (1) Kaposki’s sarcoma
         - (2) Pneumocystis pneumonia
         - (3) tuberculosis
IV. AIDS

– 3. retrovirus
  • a) contains RNA
  • b) coated virus-covered by host cell membrane with embedded viral proteins
  • c) enzyme reverse transcriptase
    – (1) in virus
    – (2) reverse transcribes RNA to DNA
IV. AIDS

• 4. treatments
  – a) treatment - NOT CURES
  – b) drug combinations
  – c) AZT - against reverse transcriptase
  – d) protease inhibitors
    • (1) very promising
    • (2) works against viral enzyme
    • (3) has reduced levels of HIV in infected individuals to nondetectable levels
    • (4) requires strict regimen
IV. AIDS

• 5. transmission
  – a) virus in semen, vaginal secretions, blood, and breast milk
  – b) sexual contact - high risk behaviors
    • (1) anal intercourse
    • (2) vaginal intercourse
    • (3) oral sex
    • (4) other acts that share body fluids
  – c) sharing needles/drug works
  – d) across placenta from infected mother
IV. AIDS

– e) blood transfusion

• However--
• very rare today in U.S.
• screening
  – blood tested for antibodies to HIV (and other pathogens)
  – screening of donors
• heat treatment
  – destroys virus
Allergies

**SENSITIZATION:**
Initial exposure to allergen

**LATER EXPOSURE TO SAME ALLERGEN**

- Allergen (pollen grain)
- B cells make antibodies
- Antibodies attach to mast cell
- Histamine is released, causing allergy symptoms

- Allergen binds to antibodies on mast cell
- Histamine is released, causing allergy symptoms
V. Allergies

• A. part of immune system against parasites
  – immunoglobulin E (igE)
• B. irrational attack against normally harmless antigen
  – 1. pollen
  – 2. dust mite feces
  – 3. pet fur
  – 4. many, many others
V. Allergies

- C. release of histamine
  - 1. watery eyes
  - 2. sneezing
  - 3. swelling of tissues

- D. can lead to shock
  - 1. serious condition - possibly fatal

- E. allergy shots
  - 1. small amount of antigen
  - 2. lessening of symptoms
  - 3. exact mechanism unknown