Lecture 1
Body's Response to Disease
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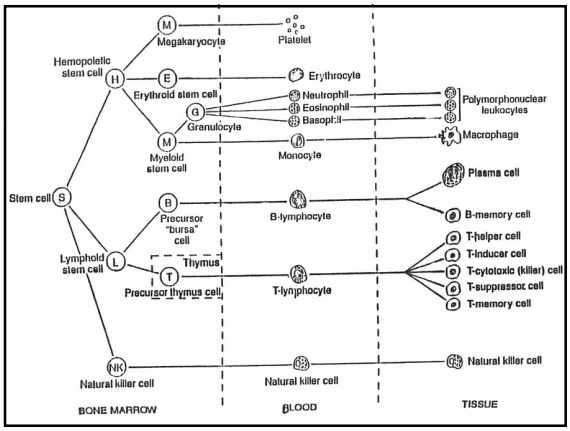
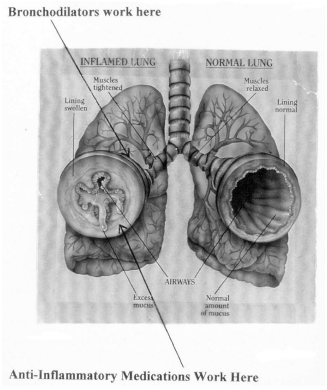
Part 5 Inflammatory Response

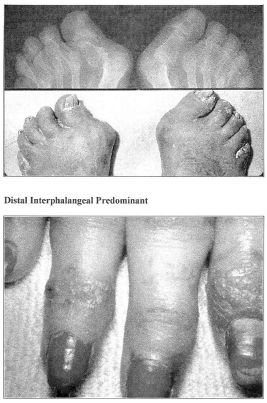


Inflammatory Response

- Definition
  - Cellular and vascular responses to ***subletha***l cell injury
  - Homeostatic
  - Purpose-to limit injury and remove necrotic debris
  - Problem-often goes awry resulting in further damage and disability
  - Examples-?



Broncho-constriction in Asthma



Rheumatoid Arthritis

Inflammatory Response

- Stereotypical Response-degree and duration vary with cause and length of injury
- *Vascular response*-Inc. blood flow and vascular permeability leads to loss of water, electrolytes, proteins to tissues
- *Cellular response*-Movement of leukocytes especially neutrophils and monocytes to injury site

Blood Flow and Cellular Activity in Acute Inflammation

- **Normally, cellular components of blood are carried in the blood's mainstream.**

2. As blood flow to the area of injury increases and slows, leukocytes begin to marginate or align along vessel walls.

Acute Inflammation cont'd

3. After Leukocytes begin to align along vessel walls, they *pavement* the walls.

4. Next, they force a *pseudopod* through the now permeable vessel membrane.

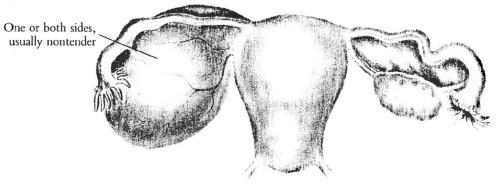
5. The leukocytes emigrate between the endothelial cells into the interstitial tissues.

6. These cellular migration processes are signaled, progressing in response to tissue damage and other chemotactic substances released by leukocytes.

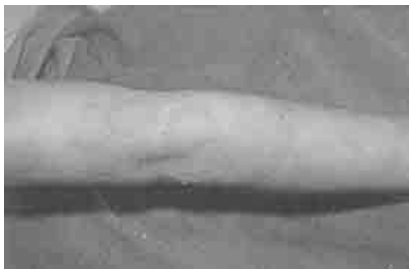
Clinical Manifestations of Inflammation

- Rubor-red
- Color-heat
- Dolor-pain
- Tumor-swelling
- Functio laesa-altered function

Ovarian Cyst

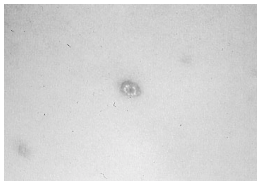


Urticaria



Candida

Molloscum Contagiosum



Inflammatory Response

- Need to get quick delivery of cellular components to injury site
  - Increased blood delivery and stasis (***red, warm)***
  - Exudation (***swelling, loss of function, pain***)
  - Leukocyte arrival
    - Margination
    - Pavementing
    - Pseudopod to allow emigration to tissues

Fluid Mechanics in Inflammation Leading to Edema

- Increased blood flow causes increased hydrostatic pressure
- Increased vascular permeability due to endothelial cell shifting
- Increased compensatory lymphatic drainage

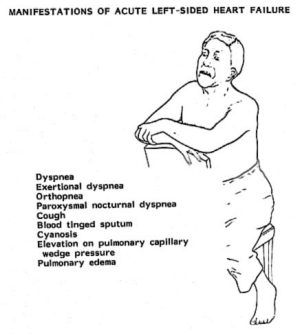
How Does the Inflammatory Process Start?

- Altered innate resistance or damage to first line of defense due to foreign protein-chemotaxis of WBCs
- Neutrophils first cells to arrive in acute inflammation lasting 6-12 hours

Exudates Indicative of Localized Inflammation

- Serous-examples?
- Fibrinous-examples?
- Mucinous-examples?
- Neutrophilic-examples?
- Mixed-examples?

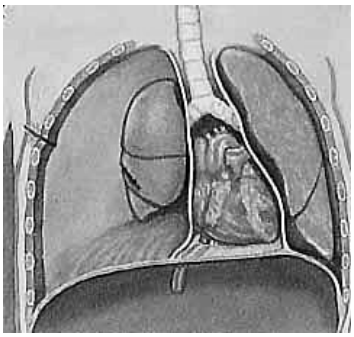
CHF Leading to Pulmonary Edema



Ascites in Liver Failure

Pitting
Edema

Pleural Effusion



Caseating Necrosis

Resolution of Inflammation

- Factors influencing outcome
- Granulomatous inflammation
- Wound healing
  - Regeneration-needs healthy cells surrounding
  - Fibrous connective tissue-structural integrity, not functional
- Complications
- Systemic manifestations of inflammation

Acute Inflammation Unresolved

- If neutrophils are unable to remove the antigen
- Macrophages arrive to continue a chronic inflammatory response
  - On biopsy, presence of macrophages is hallmark of chronic unresolved inflammation
  - Often, chronic inflammation is a step in cell changes leading to cancer

Factors Affecting Outcome of Inflammation-Acute vs. Chronic

- Removal of causative agent or foreign body-type, duration, magnitude, cell viability
- Persistence of low-grade injury w/o acute phase
- Host health-stress, nutrition, sleep, age, DM, anti-inflammatory meds.
- Necrotic tissue-inc. susceptibility to pyogenic bacteria

Acute vs. Chronic Inflammation

- ***Acute***
- Causes
  - Acute injury, antigens, infections
- Lesions
  - Red, exudate w/ neutros. And macrophages
- Manifestations-Local and systemic

- ***Chronic***
- Causes
  - Same, more prolonged or extensive
- Lesions
  - Less exudate, filled w/plasma cells and lymphocytes
- Manifestations-same, less severe, variable

Granulomatous Inflammation

- Chronic inflammation characterized by focal collection of closely packed, plump macrophages
- Response to indigestible foreign material, e.g. asbestos, wood, talc

Granulomatous Inflammation (cont'd)

- T lymphocytes become sensitized and bring large macrophages to site which group and form giant cells
- Produce pale, yellow, nodules and may have caseous necrosis (What disease has this characteristic?)