INFLAMMATION

L29- TYPES OF INFLAMMATION

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FIBRINOUS

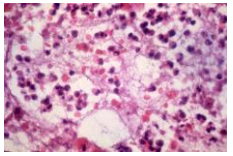
- Increased vascular permeability
- shipping fever pneumonia in **cattle**, pleuropneumonia in **sheep** and **goat**, perihepatitis and pericarditis in **poultry** in colibacillosis.
- Fibrin formation occurs in a short time and thus is an acute phenomenon
- Prevent the spread of the pathogen
- Provides the framework to lay down the fibrous tissue and ingrowth of capillaries in healing process.

Grossly,

- *Appears as pale, stringy, shaggy meshwork.*

Microscopically,

- *bright pink in the form of meshwork or sometime may appear as solid, amorphous, eosinophilic coagulum.*



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MUCOID (CATARRHAL)

- Respiratory and intestinal epithelium as an early response comprising glycosaminoglycan and glycoproteins.
- It is produced by goblet cells and mucous glands.
- The released mucous on to the surface floods the damaged cells
- Mucus exudate also contains antibodies (secreted by local plasma cells) and lysozyme (secreted by epithelial cells and leukocytes)
- Lysozyme acts on bacterial cell walls of gram positive bacteria under acidic pH.
- The gram negative bacteria are not killed owing to having lipids in their cell walls.
- Catarrhal inflammation is seen in diseases like BVD, MCF and endometeritis

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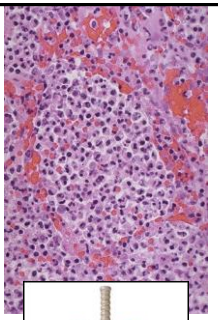
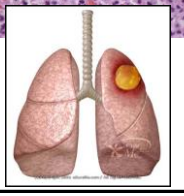
PURULENT (SUPPORATIVE)

- Composed of dead and dying neutrophils, tissues debris and variable amount of fluid (plasma) collectively known as pus.
- The process of pus formation is called as suppuration, e.g., abscess formation,
- Staphylococcal abscesses and pyometra are good examples of purulent inflammation.
- Naval abscesses are common in neonatal calves.
- Abscesses may resolve,
  - Pus is drained by rupture
  - Debris are removed by macrophages,
  - Fluid is drained mainly through lymphatics





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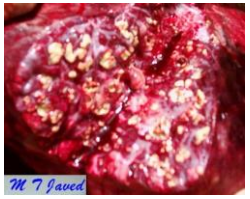
Grossly,

- Thick, opaque and cream-coloured exudate is called pus
- Type of bacteria, e.g., pseudomonas produces greenish coloured pus and Streptococcus produces yellow coloured pus.

Microscopically,

- Granular appearing mass, comprising tissue debris with predominantly neutrophils is called pus.
- With time monocytes (macrophages) accumulate
- An abscess is lined by a membrane.



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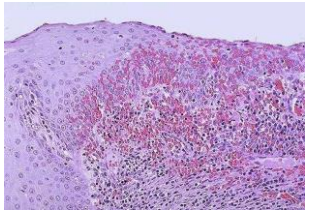
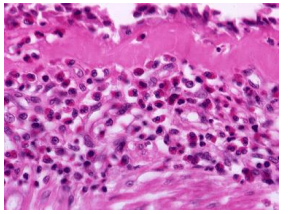
OTHER EXUDATES

- haemorrhagic inflammation as occur in dysentery (haemorrhagic enteritis) and coccidiosis (in poultry).
- eosinophilic, as occur in parasitic infestations.





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Characteristic	Exudate	Transudate
Definition	Inflammatory	Non-inflammatory
Etiology	Inflammation / infection	Non-inflammatory oedema
Specific Gravity	Above 1.025	Below 1.017
Protein contents	Above 30 g/L	Below 25 g/L
Clottable	Often	Rarely
Inflammatory Cells	Usually	Occasionally
Bacteria	Often	Rare

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LEUKOCYTE AND TISSUE INJURY

- In an inflammatory reaction host cell die, may be directly or indirectly
- There are in fact three mechanisms by which phagocytic cells can cause death of the host cells
  - Lysosomal suicide
  - Regurgitation during feeding or premature release of lysosomal enzymes
  - Frustrated phagocytosis

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LYSOSOMAL SUICIDE

- Lysosomal suicide occurs when bacteria present in the phagolysosome causes the rupture of the later resulting in release of the enzymes in the cytosol eventually digesting the cell itself.
- When the cell dies the enzymes are further released into the surrounding environment thereby also killing the tissue cells in the nearby environment.

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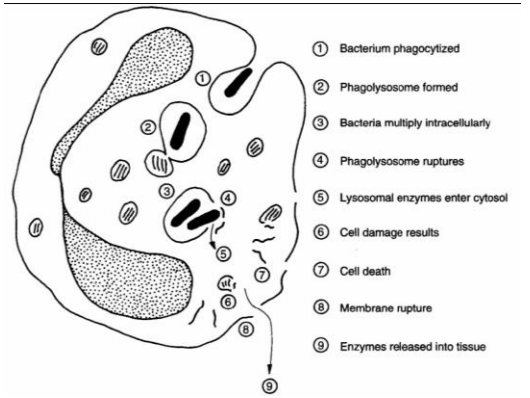

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REGURGITATION DURING FEEDING

- Phagocytes make some errors in timing
- When higher number of bacteria are present in its surrounding environment and the fusion of lysosome may occur with the developing phagosome prior to the complete internalization of the bacterium where plasma membrane has failed to completely surround the bacteria.
- In such cases the lysosomal enzymes are directly released to the extracellular environment resulting in damage to host tissue.

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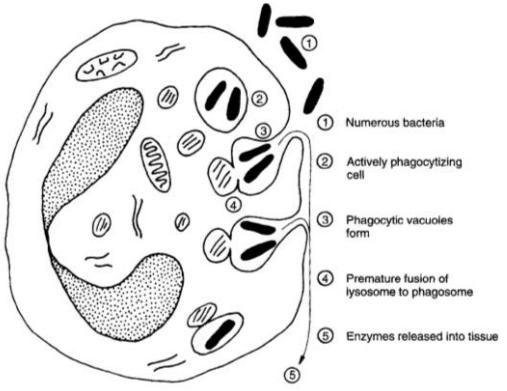

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FRUSTRATED PHAGOCYTOSIS

- Material to be internalized is too bigger and the phagosome is not formed rather the lysosome fuses with the developing phagosome which has not been developed.
- The lysosomal enzymes are released outside the cell against the membrane of the non-phagocytosable material.
- The enzymes released in the event will ultimately damage the host cells.
- Such mechanism is believed to occur in immune mediated diseases, such as glomerulonephritis, rheumatoid arthritis where the stimulus is firmly adhered with host tissue components and difficult to be internalized.

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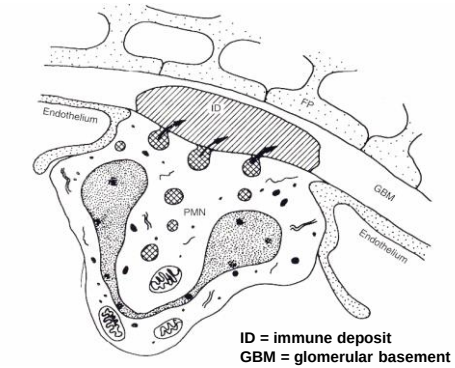

ID = immune deposit
GBM = glomerular basement membrane

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CHRONIC INFLAMMATION

- Definition: Inflammation of prolonged duration (weeks to months to years), in which active inflammation, tissue injury and healing occur at the same time.
- Characteristics

1. Mononuclear inflammatory cells
2. Tissue destruction
3. Repair
   a. Fibroblasts
   b. Endothelial cell proliferation (angiogenesis)

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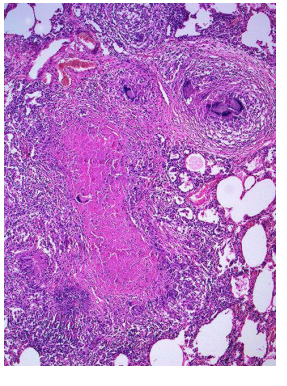
CHRONIC INFLAMMATION OCCUR:

1. Persistent infections

- Certain causative agents as, e.g., Mycobacterium, Corynebacterium and certain fungi etc.
- Granulomatous inflammation is a chronic inflammatory process as seen in tuberculosis and most other chronic inflammatory processes.



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2. Prolonged exposure to toxic agents

- Continuous exposure to non-degradable exogenous material, e.g., silica crystals or asbestos, may induce chronic inflammation.

3. Autoimmune diseases

- Development of immune response against self-antigens (against host own cells and tissues), e.g., rheumatoid arthritis.

CELLS OF CHRONIC INFLAMMATION

- macrophages, lymphocytes and plasma cells.
- Eosinophils can also be regarded as chronic inflammatory cells in cases of parasitic infestations and in cases of allergies.

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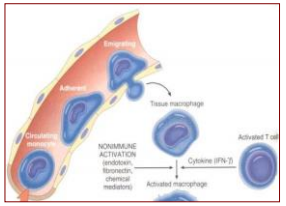
Chronic inflammation - macrophage accumulation persists

- Continued recruitment of monocytes from circulation
- Local proliferation and Immobilization of macrophages at the site
- Recruitment of other lymphocytes
- Destruction of target cells



Macrophage-lymphocytes interaction in chronic inflammation

- Lymphocytes

activate macrophages - IFN

- Lymphocytes and macropahges constantly stimulate one another unless stimulus is removed