Intracellular Accumulation

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Intracellular Accumulation

- One of the manifestation of metabolic derangements
  - Normal cellular components
    - H₂O, lipids, proteins, carbohydrates etc
  - Abnormal substance
    - Exogenous
      - Mineral, product of infectious agent
    - Endogenous
      - Abnormal synthesis or metabolism
- May be located in
  - Cytoplasm (phagolysosome)
  - Nucleus
• Normal endogenous substance is produced at a normal or increased rate, but the rate of metabolism is inadequate to remove it
  • Fatty change in the liver, reabsorption protein droplets in renal tubules
• Abnormal endogenous substance due to defective metabolism
  • Accumulation of mutated α-1 antitrypsin
• Normal endogenous substance deposited due to defect in metabolism
  • Glycogen storage diseases
• Abnormal exogenous substance due to lack of enzyme for its metabolism
  • Carbon, silica etc

Causes of abnormal accumulation
Abnormal metabolism

Alterations in protein folding and transport

Deficiency of critical enzyme

Inability to degrade phagocytized particle
Fatty Change (Steatosis)

- Abnormal accumulation of triglycerides
- Liver is the commonest organ, followed by heart, muscle, kidney, etc
- Causes of steatosis include:
  - Toxins
  - Protein malnutrition
  - Diabetes mellitus
  - Obesity
  - Hypoxia
Excess accumulation of triglycerides results either from:

- Excessive entry
  - Hyperlipidemia, alcohol abuse, Diabetes mellitus, obesity,
- Defective metabolism
  - Alcohol abuse, CCl₄ poisoning, hypoxia
- Defective export of lipids
  - PCM, starvation, nephrotic syndrome,
Morphology of Fatty Change

- Most often seen in liver and heart
  - Hepatomegaly
  - Bright yellow, soft, greasy organ
  - Clear vacuoles within parenchymal cells
    - Microvesicular steatosis
    - Macrovesicular steatosis
• Atherosclerosis
• Xanthomas
• Cholesterolosis
• Niemann-Pick Disease Type C
  • Lysosomal storage disease
  • Cholesterol accumulation in multiple organs

Cholesterol & Cholesterol Esters Accumulation
• Diverse causes
  • Reabsorption droplets in PCT
  • Proteins normally synthesized and stored
    • Russell Bodies (plasma cells with excessive Immunoglobulin accumulations)
  • Accumulation of cytoskeletal protein
  • Aggregation of abnormal proteins
    • Amyloidosis etc
Any Question??