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Cellular Injury and Death I - Lecture

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1:00 PM

- **Genetic Storage Disease: Gaucher Cells**
  - **Gaucher cells –** macrophages accumulating too much shit
    - Look like crumpled tissue paper, lack a fast enough metabolism, occur where macrophages are:
    - Lymph nodes, liver, spleen, bone marrow
  - **Bone marrow** – holes in bone marrow from Gaucher cells cause rarefaction of bone marrow:
    - **Hematopoesis** slowed, (small dark cells = hematopoetic cells, lacking)
    - **Bone density** decreases, and thus greater likelihood of fracture
  - **Spleen** – Gaucher cells can create a **HUGE spleen**, causing trapped blood, petechiae/ecchymosis
    - Gaucher cells are eating up platelets, create a huge enlargement necessitating splenectomy
- **Genetic Storage Disease: Fabry Disease**
  - **Fabry Disease** – lysosomal storage disease
  - **Fabry Disease** affects **kidneys & myocardium** – appear evacuated here
  - **Myocardium** – myofibrils pushed aside, Fabry's accumulates --> "jelly rolls" form in myocardium
- **Genetic Storage Disease: Glycogen Storage Disease**
  - **Myocardium – myocytes** greatly expanded due to high [glycogen]
- **Hydropic/Vacuolar Change**
  - Kidney tubules & glomeruli can accumulate water = **hydropic change**
  - Vacuoles accumulate in epithelial cells = **vacuolar change** (same thing?)
- **Steatosis**
  - **Steatosis** is in your **liver**, caused by **alcohol, steroids, trauma**… looks like fatty blobs of various sizes
    - **Storage disease** of **lipids** in liver
  - **Steatohepatitis –** steatosis **accompanied by fibrosis** (excess *connective tissue* forming = scar tissue)
  - **NAFLD/NASH** – Non-alcoholic steatohepatitis – another kind on the rise, risks include obesity, diabetes, HTN
- **Cholesterolosis**
  - Occurs in **gall bladder**, core filled with **foamy-looking substance** in plicae = **cholesterol**
  - **"Strawberry gall bladder"** – has many yellow dots everywhere = cholesterol
  - Benign
- **Hyaline Droplets**
  - **Red, glassy droplets** in kidney = hyaline droplets, coming from **glomeruli leaking filtrate;** no actual damage b/c protein should be reabsorbed in tubules
  - Kidney takes up leaky filtrate, exhibits **proteinurea**
  - **Mallory hyaline** – can accumulate in liver, hepatocytes seriously injured
- **Constipated Plasma Cells**
  - **Russell Bodies** – constipated **plasma cells**, have way too much protein to handle, swell up w/ hyaline
- **Intracellular Pigments**
  - Blood breakdown – **erythrophagocytosis** --> iron storage overload = **hemosiderin**, RBCs broken down by macrophages, leave clusters of brown crap around.
  - Wear and Tear – **lipofuscin** formed; generally in tissues with slow/no cell turnover – **liver, neuron, muscle**
    - Accumulates during **starvation & atrophy** – hepatocytes will break down & accumulate
  - Melanin – **melanoma-->** pigmented cells in cancerous tumor, notice cancer cells have **funky nuclei** (pleiomorphic, mitotic bodies --> malignancy)
  - Bile – **cholestasis -->** bile buildup in canaliculi, Kuppfer cells, etc., **brown pigment** everywhere
  - Exogenous – **anthracotic pigment** of lung (smoking/miner) --> carbon buildup, very **black**
  - **Formalin precipitate** – reacts with blood, appears as **artifact** – brown gunk
- **Nuclei Necrosis**
  - **Pyknosis –** nuclei lose water, become **dark & shriveled**
  - **Karyolysis –** nuclei dissolve, become barely visible even with hematoxylin stain
  - **Karyorrhexis –** nuclei fragment
  - *True necrosis* during life, and not just post-mortem would be **accompanied by inflammation!**
- **Necrosis vs. Apoptosis**
  - **Apoptosis** – controlled cell death; see as "haloed" cells; **isolated cells**, no overt inflammation
  - **Necrosis** – no order to death, passive process, heavy **inflammation**
  - Note that these **aren't mutually exclusive** – necrosis can often trigger apoptosis, for example
- **Myocardial Infarct**

- An area of necrotic tissue in heart muscle will leave **myocardial infarct** if ischemic for too long
- **Nitro blue tetrazolium –** black stain for **lactic dehydrogenase (LDH)** – normal in healthy tissue
    - Stains tissue black if LDH present; **absent in infarct**
- **Creatinine Kinase**– look for in muscle necrosis
- **Amino Transferase** – look for in liver necrosis
- **Lipase** - pancreas
- Fate of necrotic tissue:
    - Demolition & Repair – leukocytes break down dead tissue to allow for rep
    - Separation – necrotic tissue might just slough off from live tissue (ulcers, toes)
    - Perisistence/Calcification – remains in body and calcifies
        - **Dystrophic calcification** – ensues when dead tissues aren't rid of
            - Atherosclerosis, lymph node & heart valve hardening
        - **Metastatic calcification –** previously normal tissue becomes calcified due to metabolic abnormalities (from necrosis?)
        - **Calculi –** "stones" precipitating in organs from weird chemical reactions, such as gallstones, kidney stones, kidney "stag-horns"