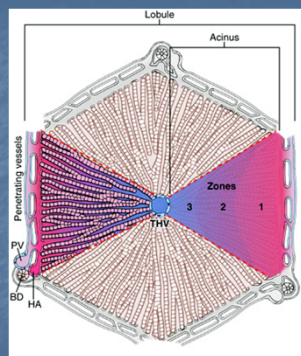




Disorders of the Liver and Pancreas

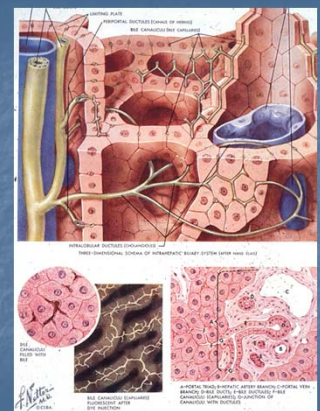
Liver Lobule

- Hexagonal plates
 - Sinusoids
 - Triads
 - Bile duct branch
 - Arteriole
 - Venuole
- Blood flows from periphery to
- Central vein
- Space of Dissé



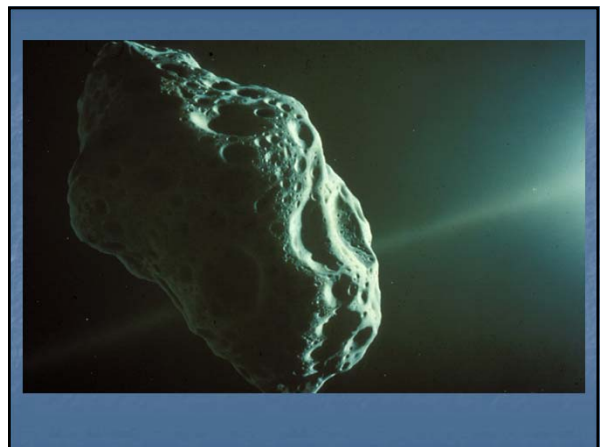
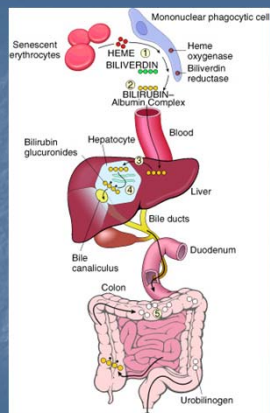
Lobular Microanatomy

- Hepatocytes
- Canaliculi
- Triad
 - Arteriole
 - Venuole
 - Bile Duct Branch



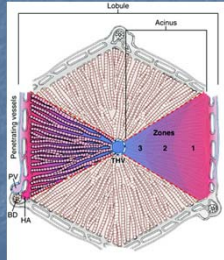
Bile Formation

- Hemoglobin breakdown
- Conversion in liver to water soluble form
 - Bilirubin
 - Serum levels help diagnose liver disease
- Excretion in bile
- Some is reabsorbed



Zonal Pattern of Injury

- Peripheral
- Middle
- Central
- Triadal
 - Limiting plate
- Piecemeal necrosis

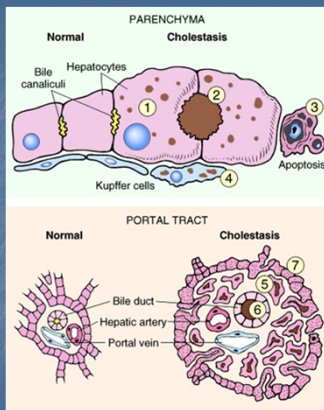


Liver Injury, The Basics

- Lots of stuff injures the liver.
- It's the great detoxifier
- Chronic injury
 - Fibrosis
 - Regeneration
 - Providing the underlying framework remains

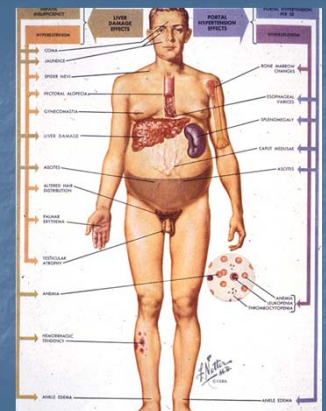
Cholestasis

- Slowed bile excretion
- Intracellular
 - Drugs
 - Viral infection
- By means of ducts
 - Drugs
 - Obstruction



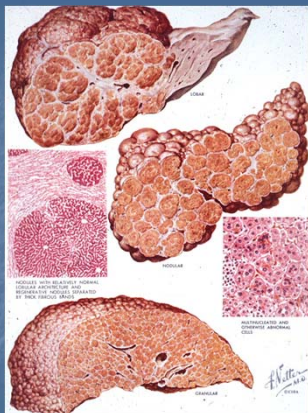
Cirrhosis

- Many things may lead to cirrhosis
- Common features
 - Irreversible
 - Chronic inflammation
 - Scarring (fibrosis)
 - Parenchymal loss
 - Regenerative nodules
 - Altered vascularity
- Symptoms
 - Ascites
 - Gynecomastia
 - Esophageal varices
 - Splenomegaly
 - Caput medusae



Cirrhosis

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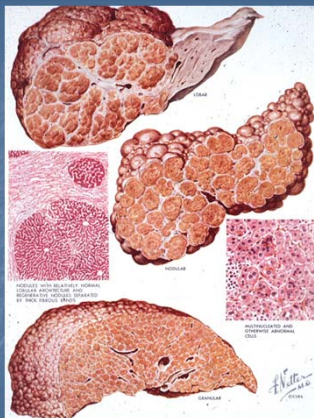
Cirrhosis

- Irreversible
- Scarring
- Botched regeneration
- Vascular rearrangements
 - Caput medusae ->
- Ascites ->
- Low albumin
- Venous portal hypertension



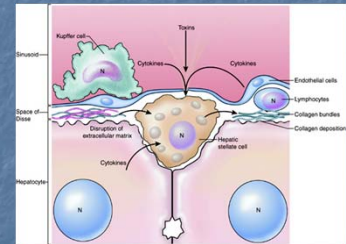
Common Etiologies

- Inherited
- Pigmentary
- Post necrotic
- Chronic viral
- Nutritional



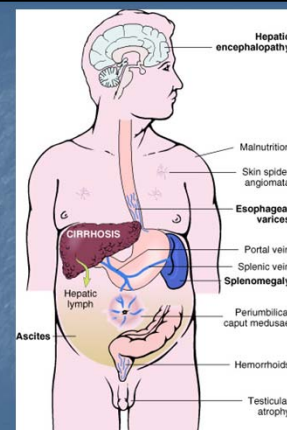
Cirrhosis

- Stellate cell becomes real important
- Normally stores vitamin A
- Lymphocytes turn him into a collagen making machine



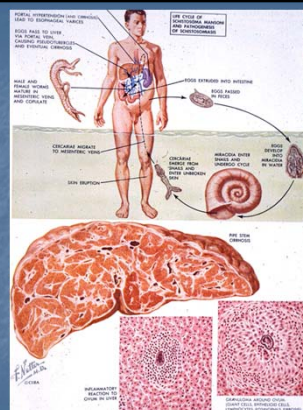
Sequence of Events

- Liver cell injury
- Cycle of chronic inflammation
 - Destruction of underlying architecture
 - Fibrosis
 - Attempts to regenerate
 - Vascular reorganization leading to shunting
 - Repeat cycle
- Progressive
- Irreversible



Parasitic

- There are several
- Schistosomiasis
- Clonorchis sinensis

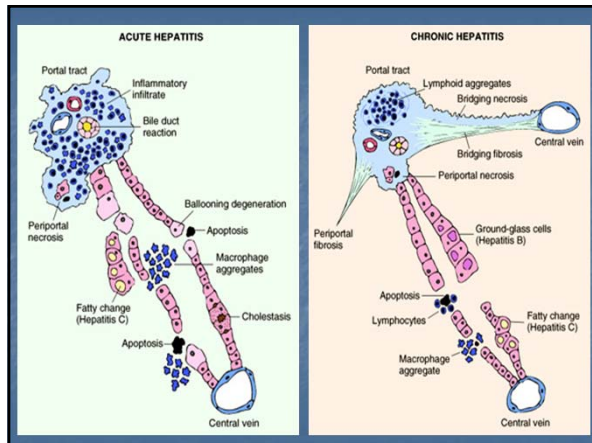


Inflammation of Liver

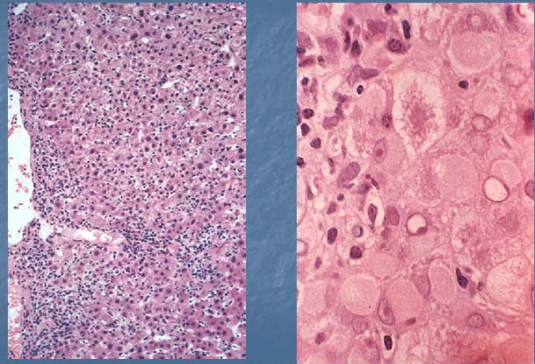
- Very common, lots of things do it.
- Toxins and drugs
- Bacteria
 - Cholangitis
 - Abscesses
- Viruses
 - EBV
 - CMV
 - Hepatic specific
- Parasites
- Autoimmune

Viral Hepatitis

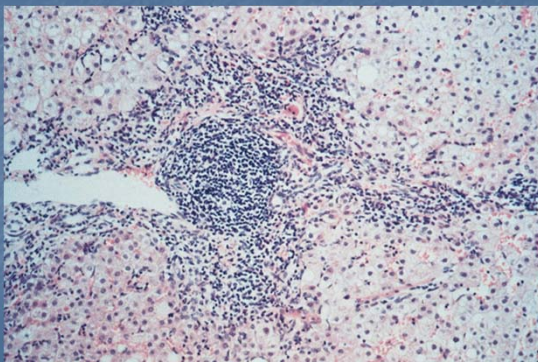
- Generally taken to mean hepatic specific viruses.
- Histologic features common to most
- Acute
 - Necrosis of random liver cells
 - Councilman bodies = bright pink dead cells
 - Diffuse liver cell swelling
 - Bile stasis
 - Portal (triadal) inflammation
- Chronic pattern = persistence or relapse for 6 months
 - Chronic and acute inflammation
 - Piecemeal necrosis
 - Bridging necrosis
 - cirrhosis



Acute Viral Hepatitis

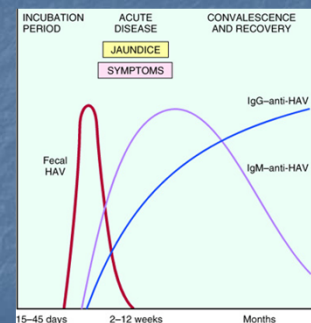


Chronic or Persistent Hepatitis



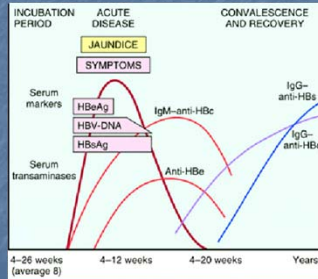
Hepatitis A

- 'Infectious hepatitis'
- Food handlers
- Virus in stool
- Seafood
- Self limiting
 - No chronic state
 - No cirrhosis
- No carrier state
- History and serology
 - IgM
 - IgG
 - Maybe virus



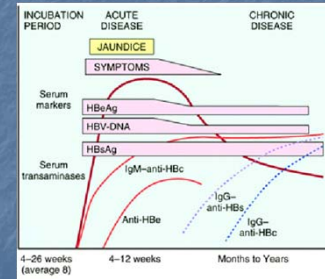
Hepatitis B

- 'Serum hepatitis'
- Sexually transmitted
- Blood borne
- Longer incubation
- Common in Asia
- Most get over it fine
- Immunologic damage
- Less common
 - Chronic progressive
 - Fulminant failure and death
 - Cirrhosis
 - Chronic carrier state

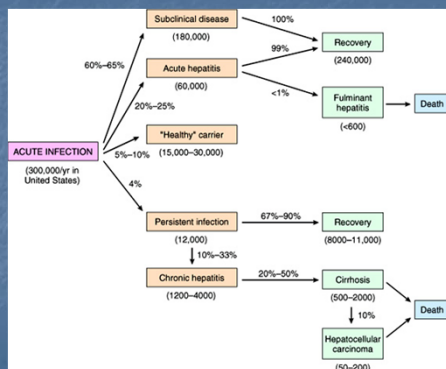


Chronic Hepatitis B

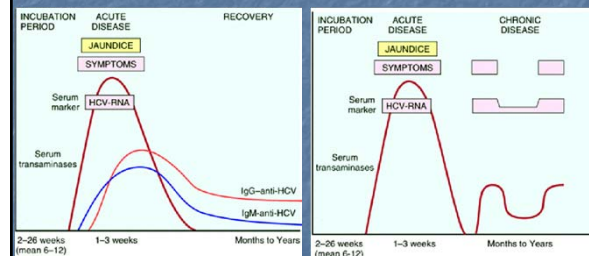
- Infrequently a person develops chronic infection with B.
- Leads to cirrhosis



Hepatitis B Outcomes



Hepatitis C

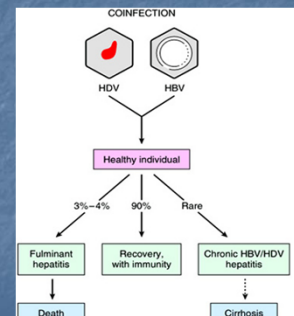


Hepatitis C

- Very high rate of persistence
- Long incubation period
- Cirrhosis

Delta Agent

- Incomplete virus
- Needs hepatitis B to replicate
- The two together cause terrible disease.
- Fulminant loss of liver
- Can become infected later if you are a carrier of hepatitis B



Hepatitis Outcomes

- Asymptomatic infection
- Acute hepatitis like a bad case of the flu
- Overt Jaundice
- Carrier state
- Fulminant liver death
- Chronicity, +/- cirrhosis

- # Hepatitis Outcomes
- Asymptomatic infection
 - Acute hepatitis like a bad case of the flu
 - Overt Jaundice
 - Carrier state
 - Fulminant liver death
 - Chronicity, +/- cirrhosis

Autoimmune Hepatitis

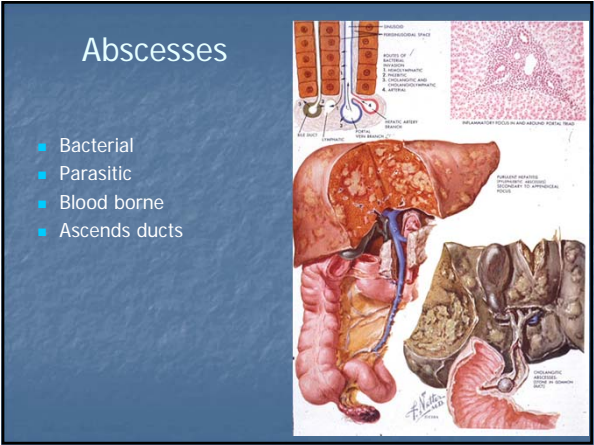
- Women
- Chronic hepatitis
- No viral markers
- May lead to cirrhosis

- # Autoimmune Hepatitis
- Women
 - Chronic hepatitis
 - No viral markers
 - May lead to cirrhosis

Abscesses

- Bacterial
- Parasitic
- Blood borne
- Ascends ducts

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- Bacterial
 - Parasitic
 - Blood borne
 - Ascends ducts



Drug and Toxin

- Too many to list
- Direct hepatocyte toxicity
- Biliary paralysis
- Conversion to a truly toxic agent

- # Drug and Toxin
- Too many to list
 - Direct hepatocyte toxicity
 - Biliary paralysis
 - Conversion to a truly toxic agent

Reye's Syndrome

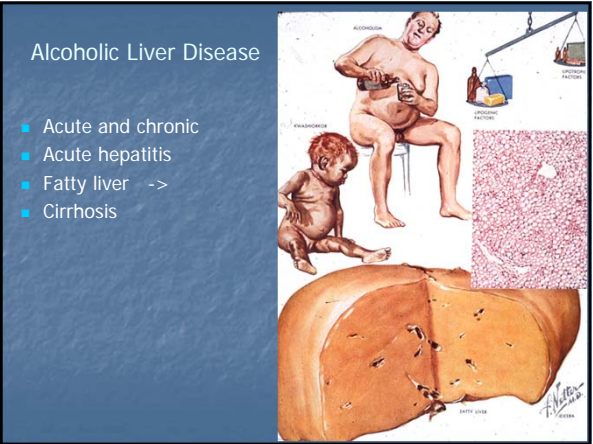
- Young kids
- Follows flu
- Got aspirin
- Liver and brain
- Fulminant liver failure

- # Reye's Syndrome
- Young kids
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Alcoholic Liver Disease

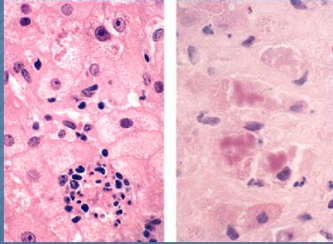
- Acute and chronic
- Acute hepatitis
- Fatty liver ->
- Cirrhosis

- # Alcoholic Liver Disease
- Acute and chronic
 - Acute hepatitis
 - Fatty liver ->
 - Cirrhosis
-



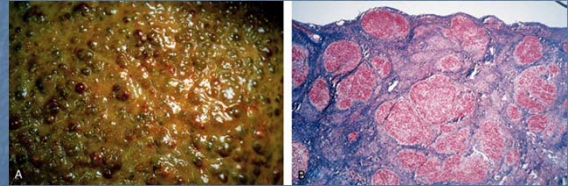
Acute Alcoholic Hepatitis

- Liver cell necrosis
- Balloon degeneration
- Neutrophils
- Mallory bodies



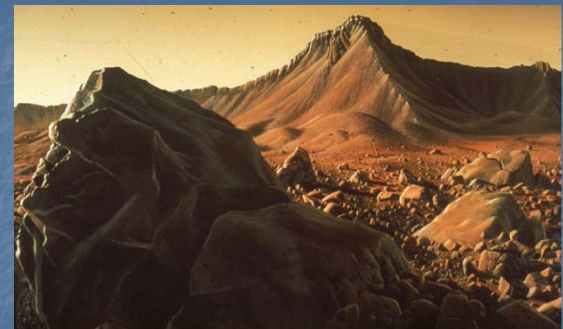
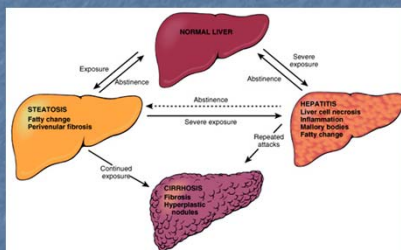
Alcoholic Cirrhosis

- About 15-20% of alcoholics
- Micronodular pattern, so called 'hobnails'
- Increased portal pressures



Alcoholic and Non-Alcoholic Fatty Liver Disease

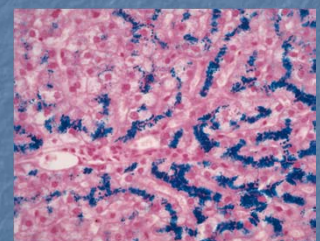
- Non Alcoholic
- DM
 - Obesity
 - Metabolic syndrome
 - Even kids



Other Types of Cirrhosis

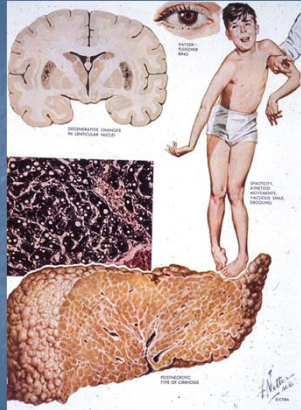
Pigmentary

- Iron
- Oxidative injury
- Scarring
- Congenital problem with excessive absorption



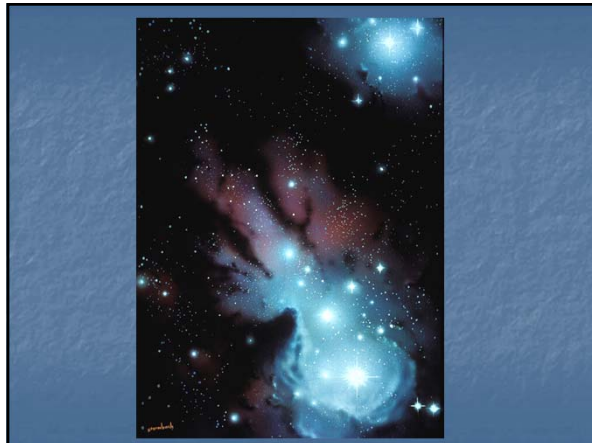
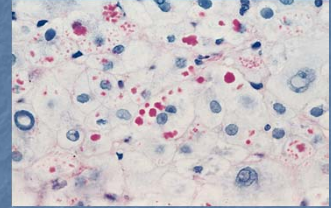
Wilson's Disease

- Copper metabolism
- Absence of transport protein
- Builds up in various organs
- Cirrhosis
- Brain degeneration
- Corneal ring



Alpha-1 Anti-trypsin Deficiency

- Neutralizes proteases and elastases
- Made in the liver
- Can't finish the process
- Constipated cells fill up with partially completed anti-trypsin
- Causes cell death and scarring
- Emphysema



Intrahepatic Biliary Disease

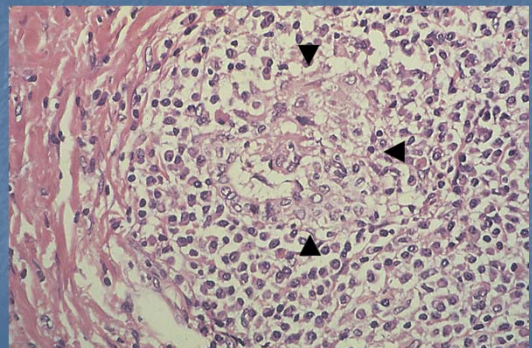
- Drug related
 - Bile stasis
 - Inflammation
 - Scarring
- Primary conditions of the biliary tree
 - Autoimmune, often leading to cirrhosis
 - Sometimes associated with other conditions

Primary Biliary Cirrhosis

- Women
- Granulomatous destruction of medium sized bile ducts
 - High serum cholesterol
 - Xanthomas
- Cirrhosis
- Antimitochondrial antibodies
- Sicca syndrome
 - Dry eyes & mouth
 - Scleroderma
 - Rheumatoid arthritis
 - All autoimmune in nature

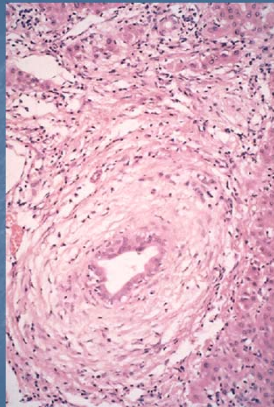


Primary Biliary Cirrhosis



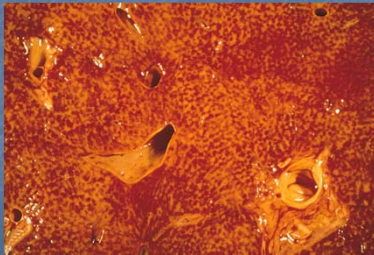
Primary Sclerosing Cholangitis

- Concentric fibrosis of smaller bile ducts
 - Onionskin
- Seen with ulcerative colitis
- No antibodies
- No other problems, like Sicca syndrome

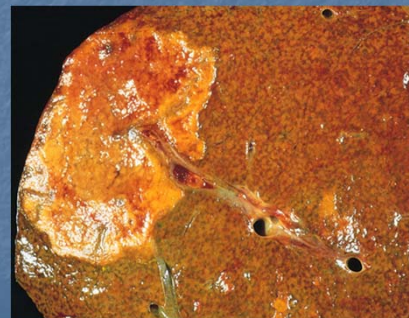


Vascular Related

- Congestion
- Infarcts
- Cirrhosis altered vascularity of liver

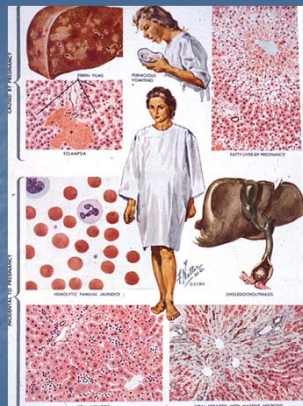


Hepatic Infarct



Pregnancy Related

- HELLP syndrome
 - Hepatic enzymes
 - Low platelets
- Eclampsia
 - High blood pressure
 - Fatty liver
 - May be life threatening



Eclampsia





Tumors of the Liver

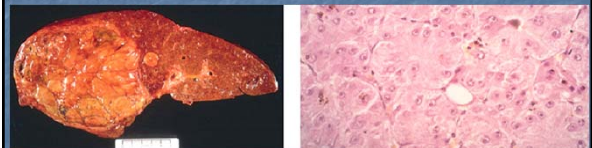
- Hyperplasia vs. true tumor
 - Estrogens
- Benign vs. malignant
- Primary vs. metastatic
 - Bowel
 - Lung
 - Kidney
 - Breast

Metastatic Cancer



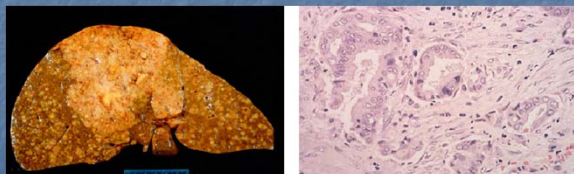
Hepatocellular Carcinoma

- Malignant hepatocytes
- Associated with
 - Hepatitis B
 - Cirrhosis
- May be multiple foci



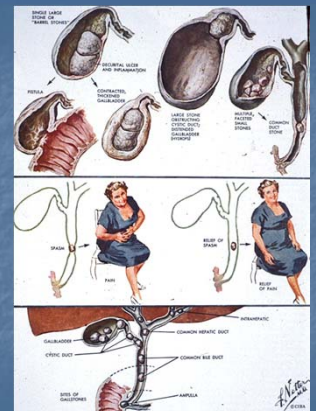
Cholangiocarcinoma

- Comes from bile duct epithelium
- Adenocarcinoma
- Much desmoplasia
- Not associated with the stuff seen in hepatocellular cancer

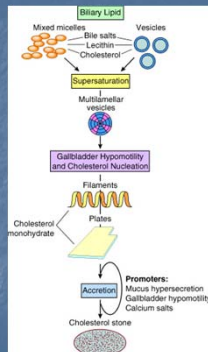


Gallstones

- Ethnicity
- Age
- Sex
- Fatty foods
- Cholesterol and mixed stones
- Pigmentary stones
- Obstruction
 - Painful
 - Infection

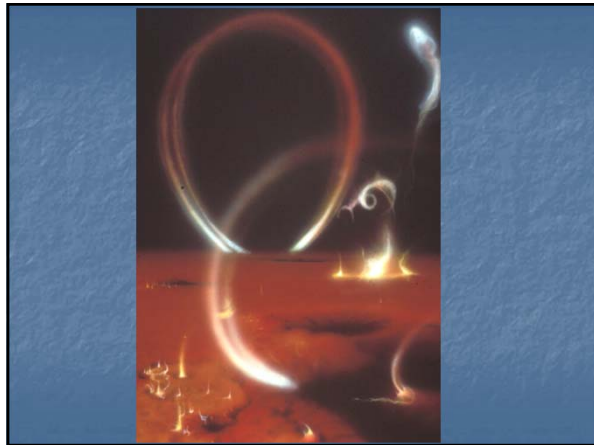
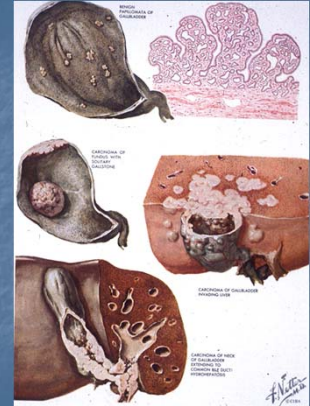


Gallstones

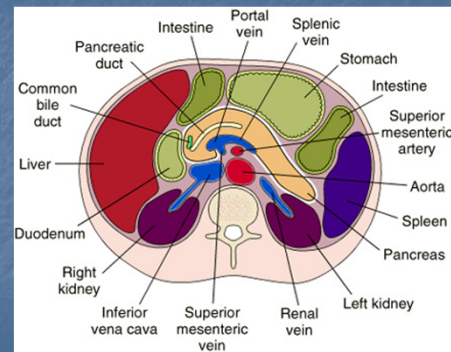


Cancer of Gallbladder

- Chronic irritation of gallstone
- Chronic cholecystitis
- Presumed oxidative damage
- Cancer

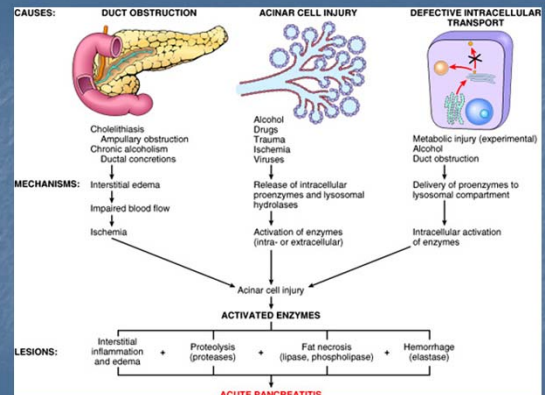


Pancreas



Acute Pancreatitis

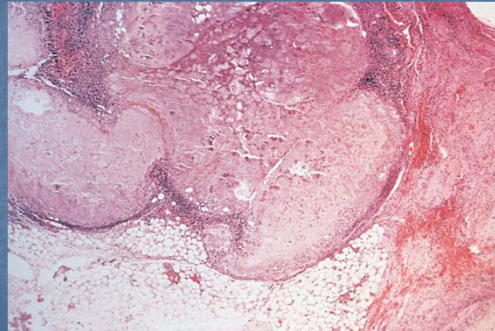
- Autodigestion
 - Acute inflammation
 - Enzyme activation
 - Fat necrosis with soapification
 - Hemorrhage
- Causes
 - Obstruction
 - Stone
 - Tumor
 - Alcohol
- Complications
 - Pseudocyst
 - Shock



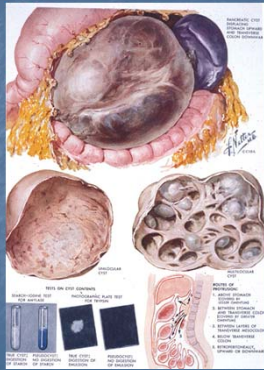
Acute Pancreatitis



Soaponification

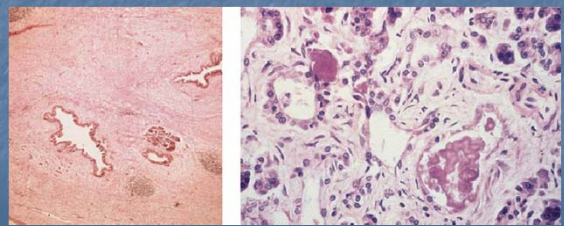


Pancreatic Pseudocyst



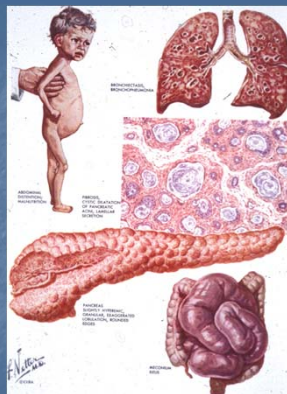
Chronic Pancreatitis

- Extensive fibrosis
- Calcifications
- Cystic fibrosis



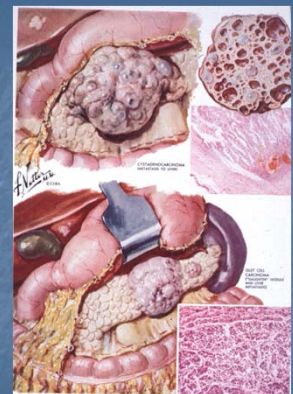
Cystic Fibrosis

- Inherited problem of chloride pump
- Thick mucus
- Clogs
 - Bowel
 - Pancreas
 - Fibrosis
 - Malabsorption
 - Bronchi



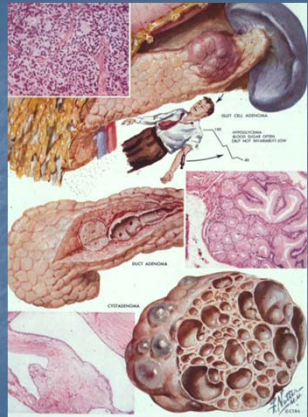
Pancreatic Cancer

- Often advanced at the time of discovery.
- Adenocarcinoma
- From ductal epithelium
- Spreads to liver
- Not hormonally active
- Painless jaundice

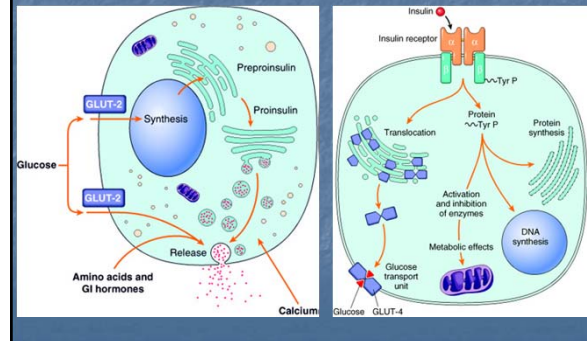


Islet Cell Tumors

- Insulin secreting
 - Hypoglycemic episodes
- Gastrinoma
 - Zollinger-Ellison
- Glucagonomas
- VIPomas

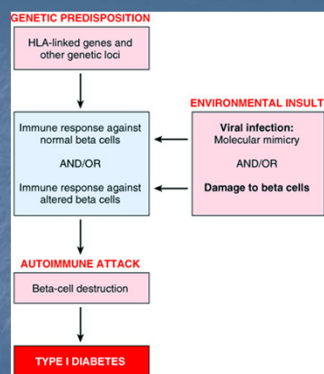


Insulin Secretion and Peripheral Utilization



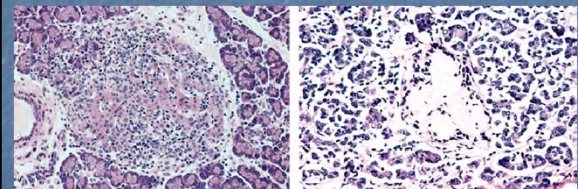
Type I Diabetes

- Lack of insulin
- Trigger causes autoimmune destruction of beta cells.
- Ketosis prone



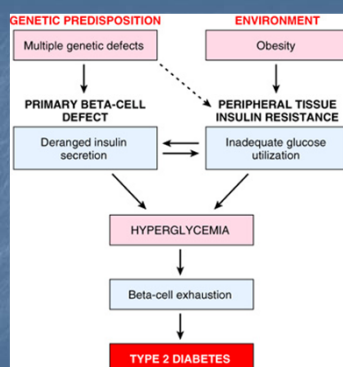
Type I Diabetes

- Trigger leads to autoimmune destruction of islets



Type II Diabetes

- Insulin release problem
- Peripheral resistance
- Non-ketosis prone



Glycosylated Proteins

- Small vessel vascular disease
- This is what diabetes becomes

