Anatomy of the biliary tract

- Biliary secretions contribute up to 40% of bile volume
- Regulated by secretin

Figure removed due to copyright reasons.
Exocrine Pancreas - Anatomy

- **Acini**
  - secretion of zymogens
  - regulated by CCK

- **Ductal system**
  - secretion of HCO$_3$ rich fluid
  - regulated by secretin
Pathology of the exocrine pancreas

- Cystic fibrosis
- Acute pancreatitis
- Cysts and pseudocysts
- Neoplasms
  - Exocrine
  - Endocrine
Acute pancreatitis

- Severe condition characterized by acute necrosis of pancreatic parenchyma
- Adults, M>F
- Etiology
  - alcohol
  - gallstones
  - trauma
  - ischemic damage
- Pathogenesis: autodigestion; ?mechanisms of activation
Acute pancreatitis- pathogenesis

Figure removed due to copyright reasons.
Acute pancreatitis- pathology

• **Early**
  – Congestion, edema
  – Vascular thrombi, parenchymal necrosis
  – Acute inflammation, fat necrosis

• **Late**: Scarring, chronic pancreatitis

• **Complications**
  – peritonitis
  – hypocalcemia
  – disseminated fat necrosis
Acute pancreatitis

Figure removed due to copyright reasons.
Chronic pancreatitis

• Secondary to recurrent pancreatitis
• Pathogenesis
  – recurring acute pancreatitis (alcoholism, biliary tract disease, cystic fibrosis)
  – familial
  – autoimmune
• Complications
  – exocrine pancreatic insufficiency
  – diabetes mellitus
Chronic pancreatitis - pathology

- Pancreatic parenchymal atrophy, fibrosis
- Focal acute pancreatitis, fat necrosis
- Duct ectasia
- Calcifications
- Pseudocysts
Cystic fibrosis

- CF: 1/3000 live births, Caucasians
- Gene defect: CFTR transmembrane cAMP-activated Cl\(^-\) channel; common mutations result in impaired trafficking of protein and loss of surface expression
- Expressed in many epithelia (airway, pancreas, sweat glands)
- Results in inability to reabsorb Cl, and increase in viscosity of secretions
Cystic fibrosis- pancreatic and GI pathology

- Dilated ducts filled with inspissated secretions
- Exocrine pancreatic atrophy with fibrosis (i.e. chronic pancreatitis)
- Exocrine pancreatic insufficiency
- Diabetes relatively late
- GI tract: meconium ileus in infants
Pancreatic cysts and pseudocysts

- Most cystic lesions are pseudocysts associated with acute or chronic pancreatitis
- Congenital (associated with polycystic kidney disease, von Hippel Lindau syndrome)
- Neoplastic
  - cysts lined by serous (pancreatic duct-like) or mucinous epithelium
  - benign or malignant
Pancreatic pseudocyst

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Pancreatic neoplasms

- Vast majority are epithelial in origin
- Exocrine
  - ductal-type adenocarcinoma
  - acinar cell carcinoma (unusual)
  - Serous cystic tumors
  - mucinous neoplasms (unusual)
- Endocrine
  - functional
  - non-functional
Pancreatic carcinoma

- Majority arise from ductal epithelium
- Peak age >50 years, slight M>F
- Symptoms: weight loss, painless jaundice; may be asymptomatic until relatively advanced
- Pathology: tubular adenocarcinoma showing a range of differentiation
- Aggressive neoplasm with poor prognosis
Pancreatic endocrine tumors

- Arise from islet cells
- May be functional or non-functional
- Gastrinomas (from delta cells) associated with Zollinger-Ellison syndrome
- Insulinomas: associated with hypoglycemia
- Pathology similar to GI carcinoids
- Liver metastasis common
Gallbladder

- **Anatomy**
  - Mucosa
  - Submucosa
  - Muscularis
  - Serosa
- **Functions**
  - Storage and concentration of bile
  - Regulated by CCK, secretin
Gallstones

- Extremely common in U.S.
- Risk factors: female gender, obesity, parity
- Etiology likely multifactorial
- Classification
  - Cholesterol
  - Bilirubinate
  - Mixed
- Effects: 80% asymptomatic; acute cholecystitis, gallstone ileus, ?gallbladder CA
Acute Cholecystitis

- **Clinical:** 90% a/w gallstones
  - acalculous
  - HIV-associated
- **Gross:** distended, hemorrhagic, exudate
- **Microscopic:** AI, necrosis
- **Variants:**
  - vasculitis
  - emphysematous
  - gangrenous
Chronic cholecystitis

- Usually due to repetitive acute cholecystitis
- Most associated with gallstones, may also be associated with bacterial infection in biliary tract
- Gross appearance: Fibrotic gallbladder with wall thickening contraction
- Microscopic: Fibrosis, chronic inflammation, mucosal hyperplasia with Rokitansky-Aschoff sinuses
Gallbladder carcinoma

Clinical

- Most common GB malignancy, incidence 1/100K
- F:M 2:1, peak in 8th decade
- Risk factors: ethnicity, gallstones, abnormal CDP junction, UC, porcelain GB, chemicals
- Symptoms: pain, jaundice, weight loss

Gross

- Mostly fundus; nodular, polypoid or infiltrative
Gallbladder carcinoma- pathology

- 75-90% adenocarcinoma NOS
- Well differentiated (50%) >95% glands
- Moderately differentiated glands 50-94%
- Poorly differentiated 5-49% glands
- Undifferentiated <5% glands

- Adenocarcinoma variants- papillary, mucinous, adenosquamous, signet ring cell
- Other: pleomorphic/giant cell, small cell, squamous cell
- Special studies: mucin+; CK7+CK20+/-; CEA+
- 30-40% focally positive for NE markers
Cholangitis

- Primary sclerosing cholangitis
- Secondary cholangitis (more common)
  - choledocholithiasis
  - prior procedure, surgery
  - infection
  - pancreatitis
  - toxic injury
- Two types usually difficult to distinguish histologically
Primary Sclerosing Cholangitis

- **Clinical:** middle aged adults, M>F
  - 70-90% of pts have IBD (usually UC)
  - other associated conditions

- **Radiology:** Stricture ("beading") of BDs

- **Indications for biopsy:**
  - BD biopsy: exclude malignancy
  - liver biopsy: confirm diagnosis or r/o others; evaluate progression of liver disease
Primary Sclerosing Cholangitis - Pathology

- Periductal and periglandular lymphocytic inflammation
- Mild ductular distortion, concentric fibrosis
- Progression: obliteration of lumen
- Ddx:
  - invasive carcinoma
  - secondary cholangitis