Pancreatitis
Pathophysiology

ACUTE PANCREATITIS

• **BILIARY OBSTRUCTION**

  • Duct obstruction in the bile duct, pancreatic duct, or both.

  • Increasing pressure

  • Unregulated activation of digestive enzymes.

• **Inflammation**
  - TNF
  - IL-1

• **Edema**
  - Increased vascular permeability due to inflammation
Unregulated activation of digestive enzymes
Insult
(supramaximal secretagogue stimulation, bile duct obstruction, etc.)

→ Block in secretion

→ Co-localization of zymogens and lysosomes

→ Activation of trypsinogen by cathepsin B

→ Activation of other zymogens

→ Acinar cell injury

→ Release of chemokines and cytokines

→ Infiltration by leukocytes

→ Increased cytokine release

→ Multiorgan dysfunction

→ Death

→ Recovery
Pathophysiology
ACUTE PANCREATITIS

• **ALCOHOL**

• Most common etiology of chronic pancreatitis and most acute pancreatitis patients have underlying chronic disease.
What is considered one serving of alcohol?

- One drink contains about 14g pure alcohol.
Mini Alcohol Lesson

- **ADH**: Alcohol dehydrogenase
- Can only function until a certain limit.
- **MOES**: microsomal ethanol oxidizing system
Pathophysiology
ACUTE PANCREATITIS

- ALCOHOL
- Sensitizes cells to CCK stimulation
- Zymogen activation
Pathophysiology
CHRONIC PANCREATITIS

- Permanent and irreversible damage to the pancreas
- Chronic inflammation and fibrosis
- Destruction of exocrine and endocrine tissue.
Pathophysiology
CHRONIC PANCREATITIS

- BILIARY OBSTRUCTION
  - Stricture of the main pancreatic duct as a consequence of long term obstruction.
  - Benign strictures can develop after severe acute pancreatitis attacks.
  - Trauma to the pancreas lead to strictures.
  - Recurrent acute pancreatitis
  - Leads to necrosis and pseudocysts
  - Leads to exocrine and endocrine insufficiency
Pathophysiology
CHRONIC PANCREATITIS

• **ALCOHOL**
  • Sensitizes cells to CCK stimulation
  • Zymogen activation
  • Alcohol metabolites stimulate pancreatic stellate cells.
  • Stellate cells - fibrosis
Diagnosis

• Digestive enzymes
  • Amylase
  • Lipase
• Ultrasounds
• CT scan
• ERCP
Amylase

- Pancreas accounts for 40-45% of serum amylase.
- Rises within 6 to 12 hours
- Cleared quickly from the blood
- Not 100% sensitive or specific
- Normal range: 25-125 U/L
- Use with lipase to diagnose pancreatitis
Lipase

- Greater specificity for pancreatitis
- Rises within 4-8 hours
- Remains elevated for longer period of time
- Normal range: 0-110 U/L
Ultrasound

- Search for gallstones, dilation of the bile duct, and ascites.
Computed Tomography

- Most important imagine test for diagnosis of pancreatitis.
- Diffuse or segmental enlargement of pancreas
- Fluid collection
- Pancreatic inflammation
- Pancreatic necrosis
- Help diagnose disease severity
Pancreatic CT

Fig. 1 Computed tomography demonstrating infected pancreatic necrosis, with abscess and gas bubbles (arrow).
ERCP

• Endoscopic retrograde cholangiopancreatography

• Scope placed down the throat and into the small intestine where the pancreas and bile duct can be visualized.

• Used when it is suspected a person’s bile or pancreatic duct may be narrowed or blocked due to:
  • Tumors, gallstones, inflammation, infections, scarring, pseudocysts.
Prognosis

• Prognosis can be determined by using a clinical scoring system.
Ranson’s Score

- **Ranson Criteria**
  - 11 signs of prognostic significance during the first 48 hours.
  - Scores <2 mortality = 2.5%
  - Scores >3 mortality = 62%
  - The higher the Ranson’s score the higher the incidence of complications, necrosis, and infection.
## Ranson’s Criteria for Severity

<table>
<thead>
<tr>
<th>At Admission</th>
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<tbody>
<tr>
<td>Age &gt;55 yr</td>
</tr>
<tr>
<td>WBC &gt;16,000/mL</td>
</tr>
<tr>
<td>LDH &gt;350 IU/L</td>
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<tr>
<td>AST &gt;250 IU/L</td>
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<tr>
<td>Glucose &gt;200 mg/dL</td>
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<table>
<thead>
<tr>
<th>At 48 Hours</th>
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<tbody>
<tr>
<td>Hematocrit decrease &gt;10%</td>
</tr>
<tr>
<td>BUN increase &gt;5 mg/dL</td>
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<tr>
<td>Calcium &lt;8 mg/dL</td>
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<tr>
<td>Pao₂ &lt;60 mm Hg</td>
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<tr>
<td>Base deficit &gt;4 mg/dL</td>
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<tr>
<td>Fluid sequestration &gt;6 L</td>
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</table>
APACHE-II Score

• Predicts severity.

• Assigns points for 12 physiologic variables, age, and chronic health.

• 12 variables: temperature, heart rate, respiratory rate, mean arterial blood pressure, oxygenation, arterial pH, serum potassium, sodium, and creatinine, hematocrit, WBC, and glasgow coma scale.

• <9 = higher survival rate

• >13 = high likelihood of dying
Case Study
NUTRITION ASSESSMENT

**Anthropometric**
- Male, 29
- 5’11”, 245 lbs
- BMI 34.2
- IBW 172, 142%
- NPO

**Biochemical**
- BUN 30 (8-18)
- Creatinine serum 1.6 (.6-1.2)
- Osmolality 303 (285-295)
- Bilirubin total 1.9 (<1.5)
- Bilirubin direct .9 (<.3)
- Alkaline phosphatase 256 (30-120)
- ALT 38 (4-36)
- AST 56 (0-35)
- CPK 219 (55-170)
- Lactate dehydrogenase 402 (208-378)
- Lipase 980 (0-110)
- Amylase 543 (25-125)
- CRP 18 (<1)
- Cholesterol 210 (120-199)
- Triglycerides 285 (40-160)
- WBC 19.8 (4.8-11.8)
- Neutrophil % 90 (50-70)
# Case Study

## NUTRITION ASSESSMENT

### Clinical
- Abdominal pain
- N/V
- Depression
- Dry skin
- Abdomen tender, guarding, rebound
- Medications:
  - Imipenen
  - Pepcid
  - Meperidine
  - Ondansetron
  - Colace
  - Milk of Magnesia
  - Ativan

### Dietary
- Six pack of beer, 4-5 shots of bourbon daily; mixed drinks and wine on weekends
- Typical Intake
  - Breakfast: coffee and toast
  - Lunch: Sub sandwich or pizz
  - Dinner: Eats out
  - Hasn’t eaten much over past three days because of pain, N/V
  - Current diet order NPO with post pyloric feeding tube

### Genetics
- Mom with breast cancer
- Dad with HTN
Case Study
NUTRITION DIAGNOSIS

PES Statement

Inadequate oral intake related to nausea and vomiting as evidenced by patient statement of poor appetite due to abdominal pain.
Case Study

PLAN

- NCM (25-35 kcal/kg/day)
  - 2159-3022 REE

- NCM Protein 1.2-1.5 g/kg/day
  - 133-167 g/day PRO

- 1900-2400 mL

- Mild-moderate: NPO

- Severe: Enteral feeding

- Recommend patient limit alcohol consumption to prevent future attacks
Sample Diet

**Breakfast:**
Honey Nut Cheerios  
Skim lactose-free milk  
Small banana

**AM Snack:**
Greek yogurt with granola

**Lunch:**
Ham sandwich with lettuce, tomato, 2 tsp light mayo  
Apple  
Baby carrots

**PM Snack:**
Low fat cheese and crackers

**Dinner:**
Grilled chicken  
White Rice  
Steamed Broccoli

**HS Snack (or dessert):**
Nonfat frozen yogurt  
Sliced strawberries

2200 Kcals  
15% of Calories from fat  
138 g Protein