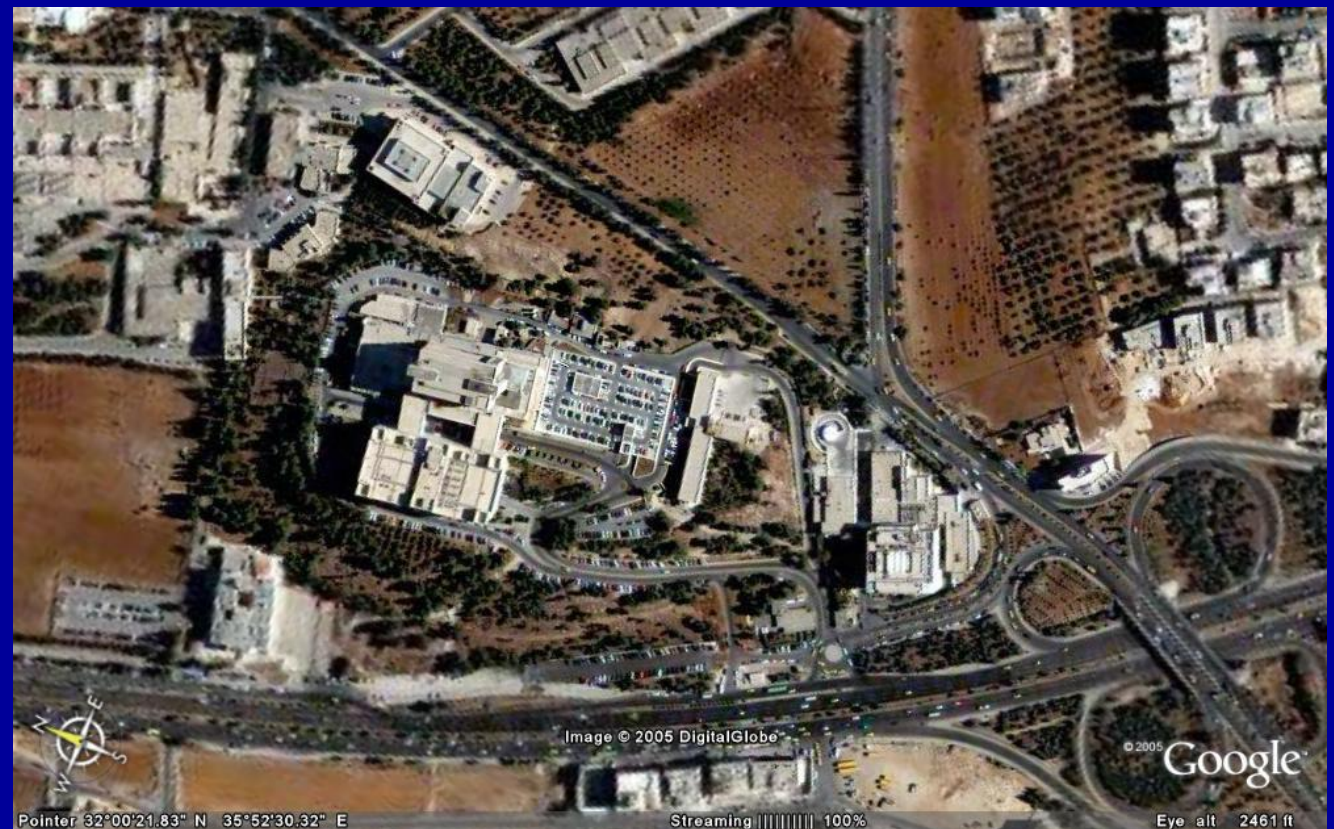


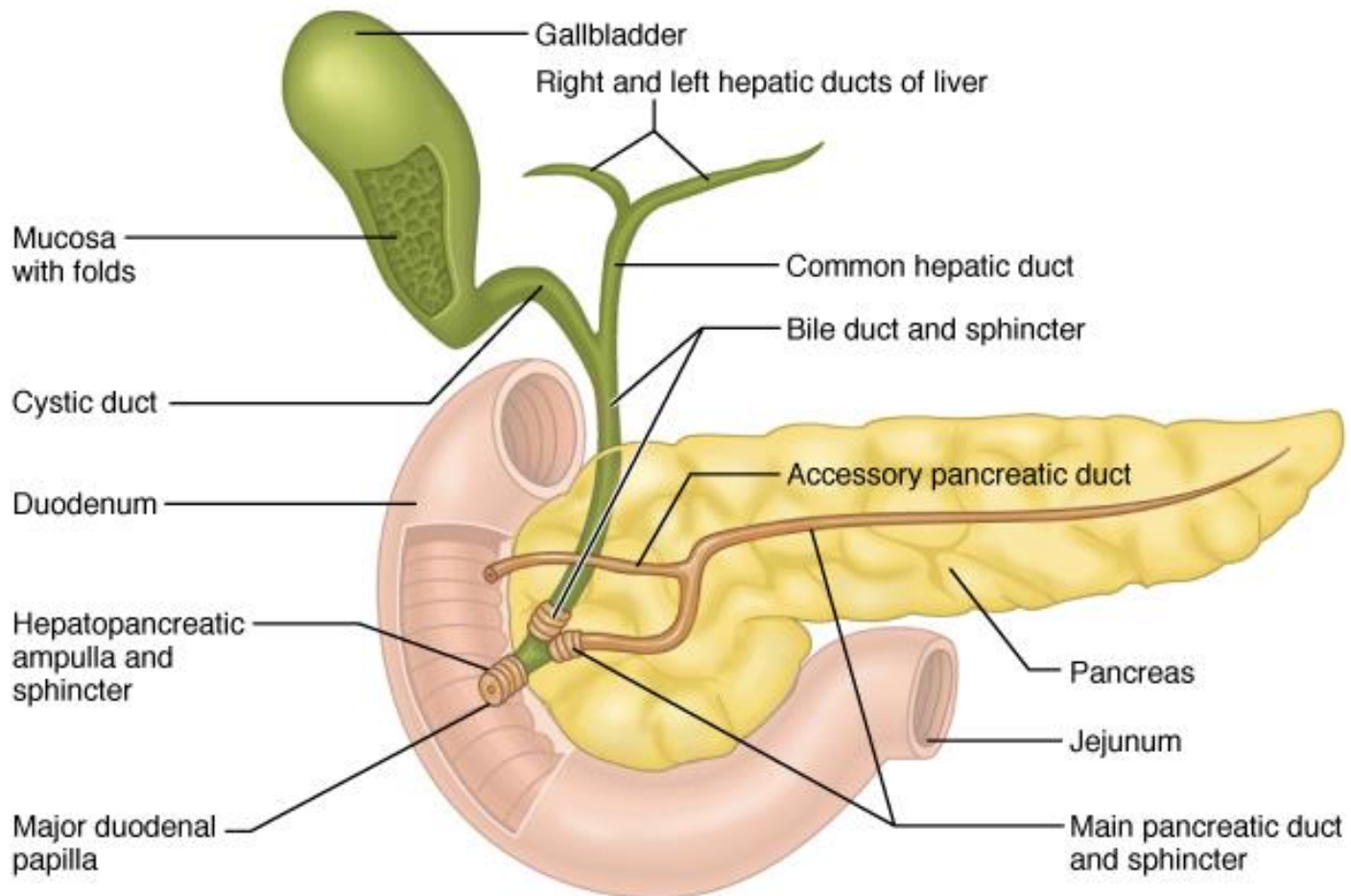
# Pancreatitis

University of Jordan





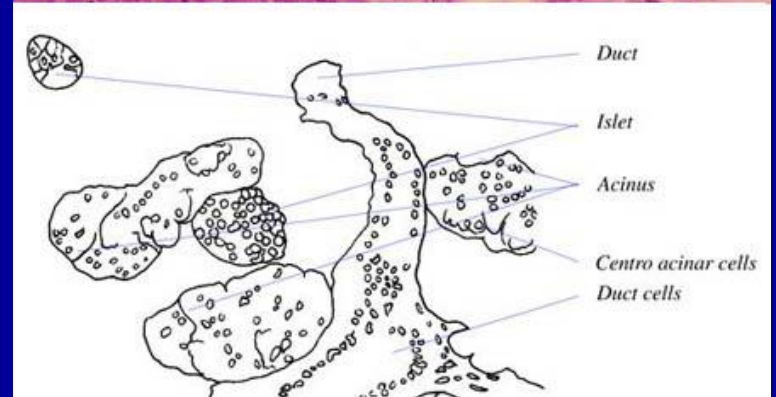
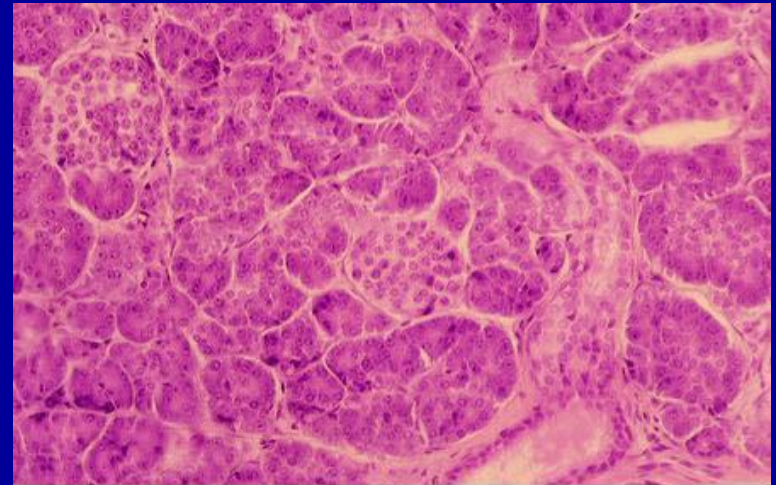
# Pancreatitis



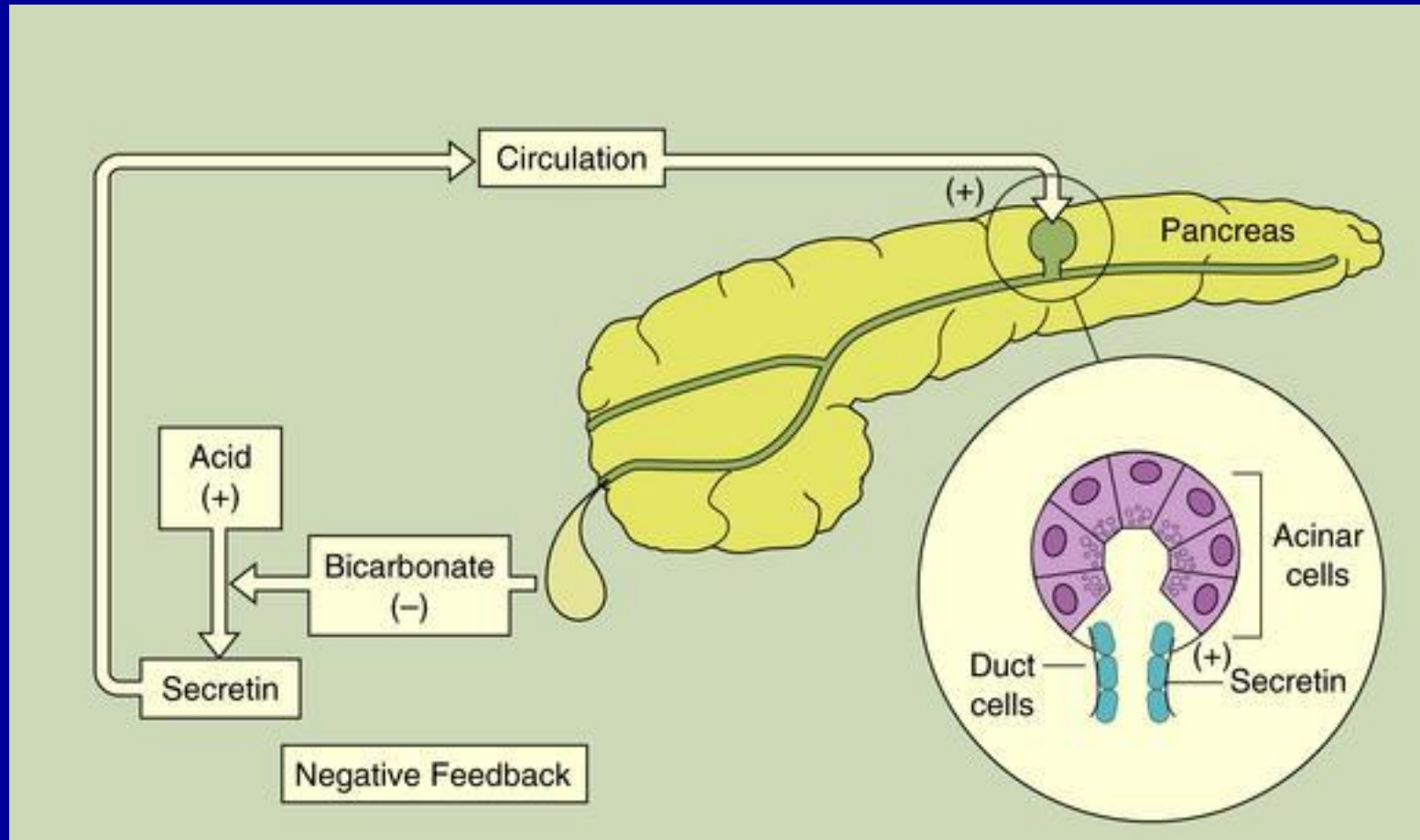
# Pancreas

## Overview

- Three major types of cells
  - Ductal 10%
  - Acinar 80%
  - Islet 10%
- Four major types of Islet cells
  - Insulin
  - Glucagon
  - Somatostatin
  - Pancreatic polypeptides



# Pancreas Overview

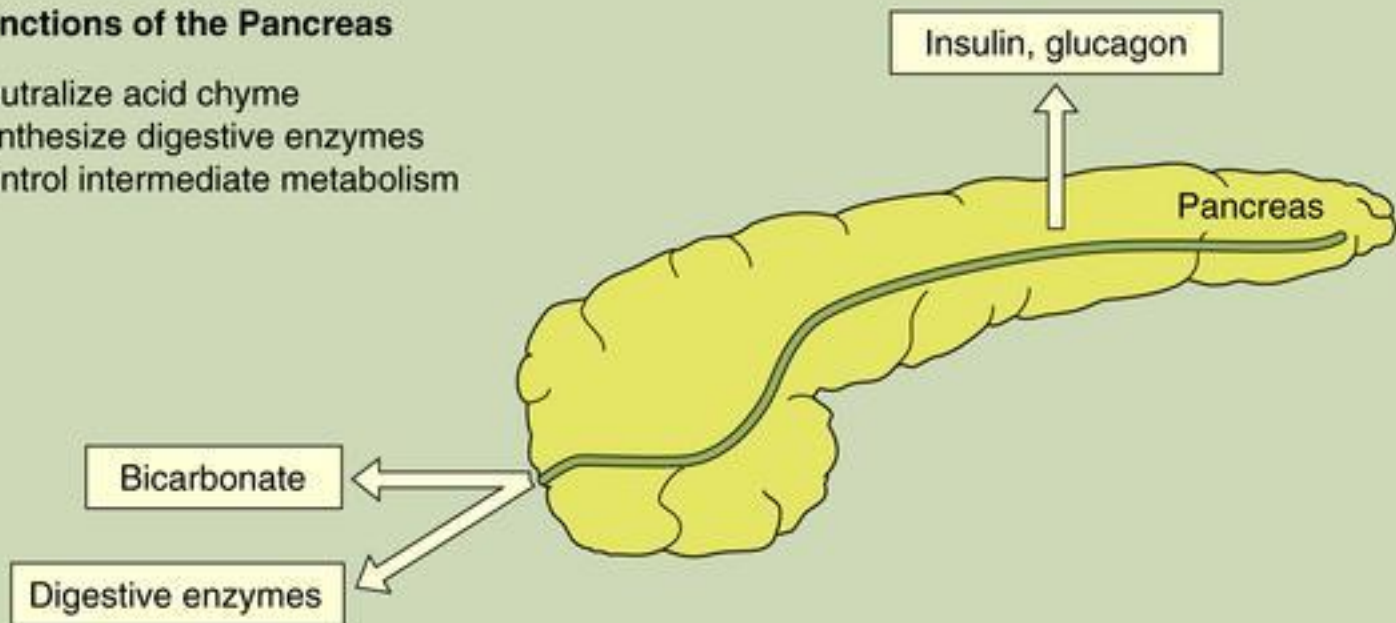


# Pancreas

## Overview

### Functions of the Pancreas

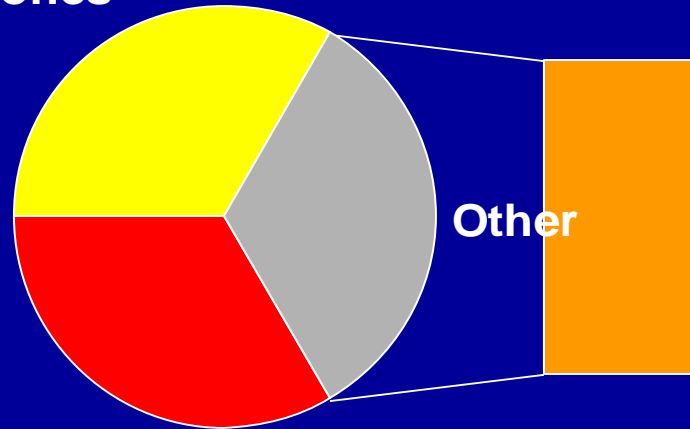
Neutralize acid chyme  
Synthesize digestive enzymes  
Control intermediate metabolism



# Acute Pancreatitis Causes

Gallstones

Alcohol



Other

Others

Idiopathic  
Drugs  
Hyperlipidemia  
Infectious agents  
Hypercalcemia  
Ductal obstruction  
Trauma  
Hypotension  
Post op

# Acute Pancreatitis

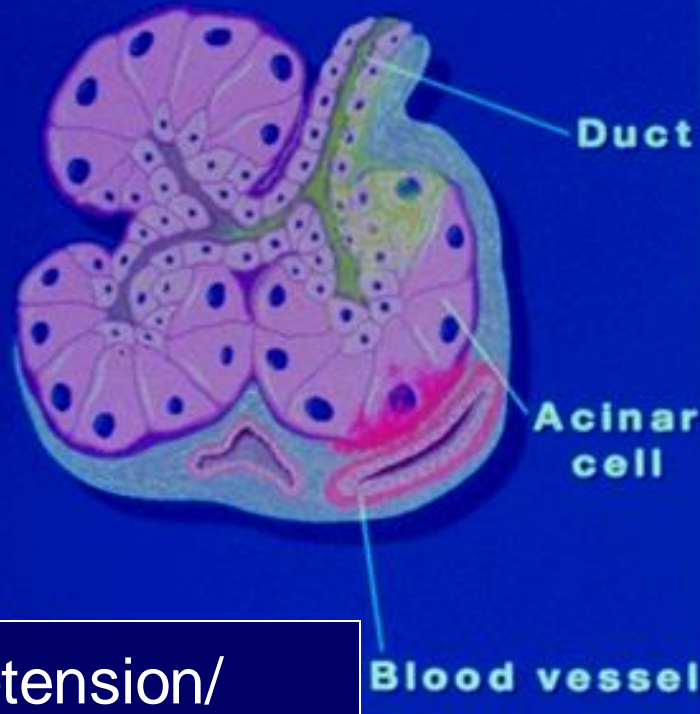
## Drug-induced

Azathioprine/ 6-MP	Idiosyncratic
Sulfonamide	Idiosyncratic
Pentamidine	Idiosyncratic
Valproic acid	Idiosyncratic
Thiazide	High dose
Estrogens	Associated with high TG
Cimitidine	Idiosyncratic



# Acute Pancreatitis

## Pathogenesis



Ductal obstruction, reflux,  
Increase permeability of  
The ducts

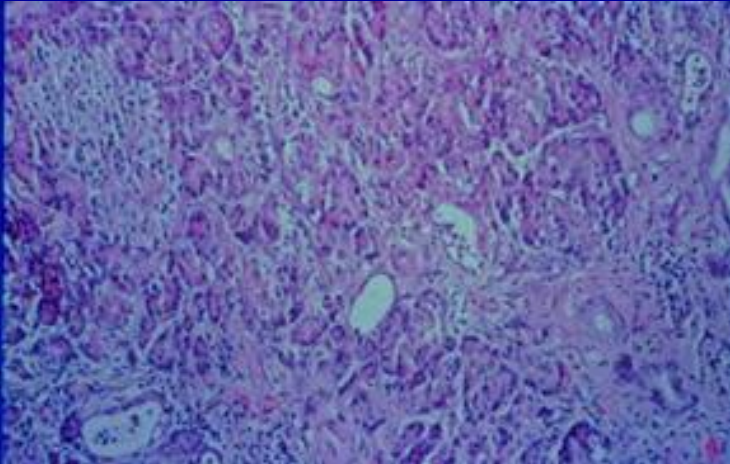
Alcohol, drugs, infections  
Causing disruption of cell  
membranes

Hypotension/  
ischemia

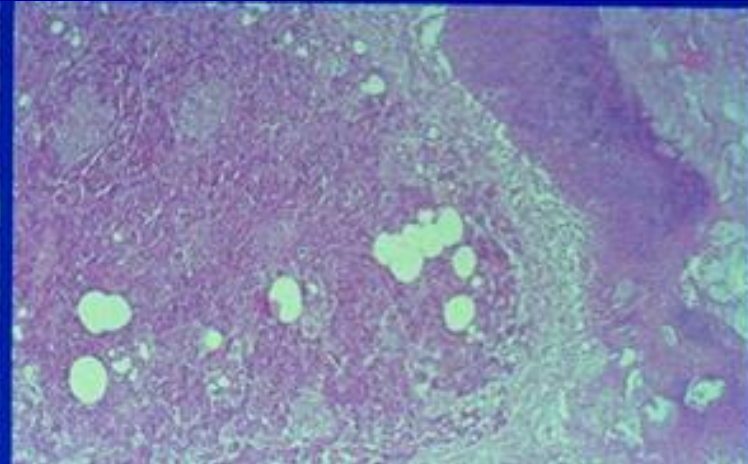
# Acute Pancreatitis

## Pathology

Interstitial



Necrotizing



# Acute Pancreatitis

## Clinical features

### Symptoms & Signs

Abdominal pain  
Nausea/ Vomiting  
Fever  
Tachycardia  
Grey- Turner sign  
Cullen

### Labs

Leukocytosis  
High Amylase  
High Lipase

### Differential Diagnosis

Choledocholithiasis  
Perforated Ulcer  
Mesenteric Ischemia  
Salpingitis  
Ectopic pregnancy  
Intestinal obstruction

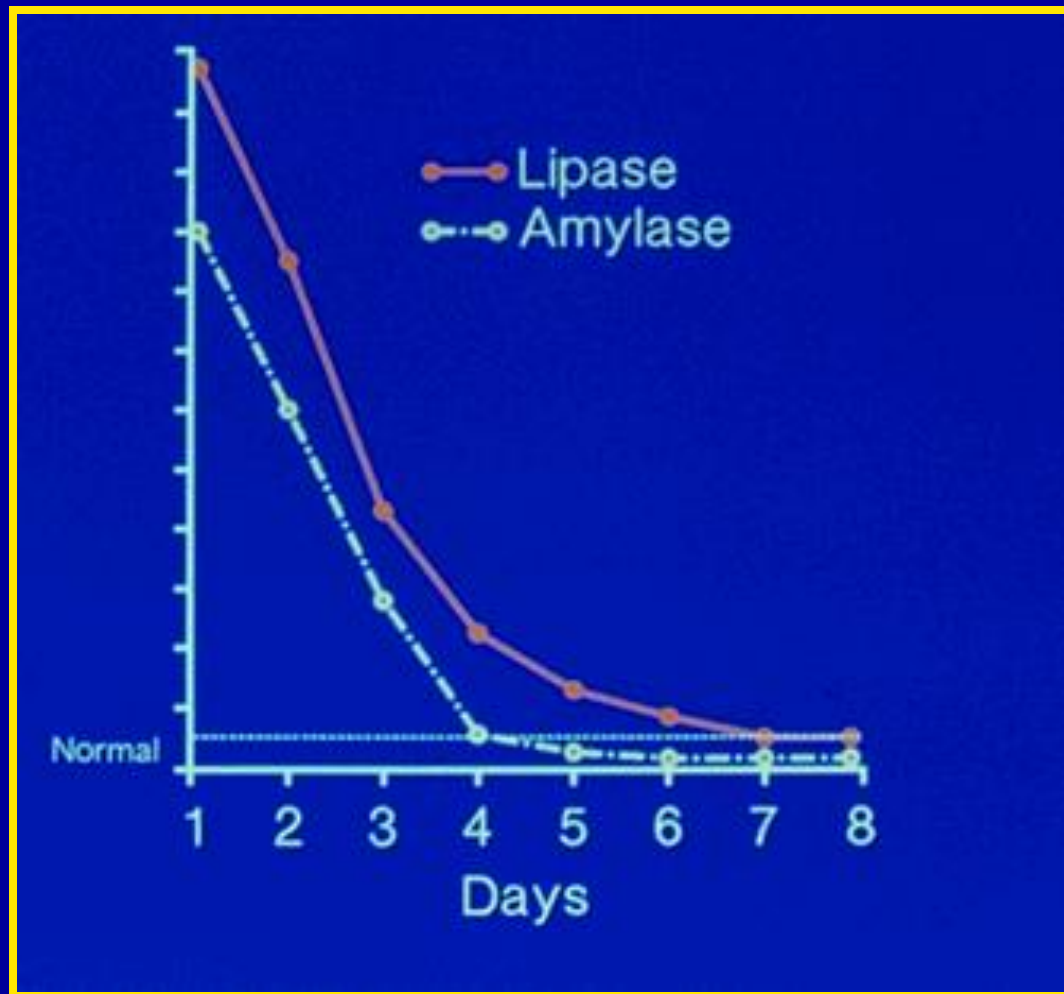
# Acute Pancreatitis

## Causes of Hyperamylasemia

	Amylase	Lipase
Pancreatitis	Increase	Increase
Parotitis	Increase	Normal
Biliary stones	Increase	Increase
Intestinal injury	Increase	Increase
Tubo-ovarian	Increase	Normal
Renal failure	Increase	Increase
Macroamylasemia	Increase	Normal

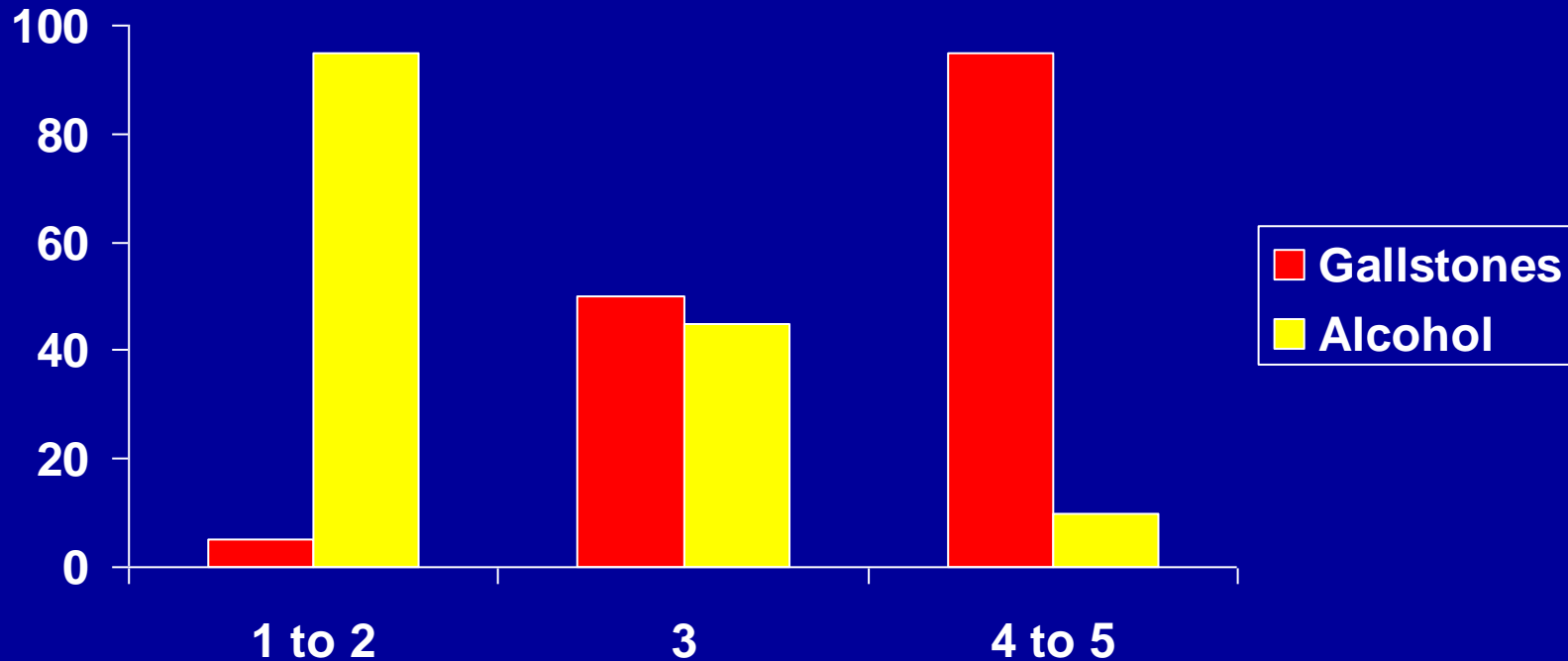
# Acute Pancreatitis

## The course of enzymes



# Acute Pancreatitis

## Factors predictive of Gallstone pancreatitis



- Age > 50
- Female
- Amylase > 4000 IU/L
- AST > 100 U/L
- Alkaline phosphatase > 300 IU/L

# Acute Pancreatitis

Diagnosis: Ultrasound

Normal



Pancreatitis



# Acute Pancreatitis

## Ranson's criteria of severity

### At admission

Age	55
WBC	16 K
Glucose	200 mg/dl
LDH	>350 IU/L
AST	> 250 U/L

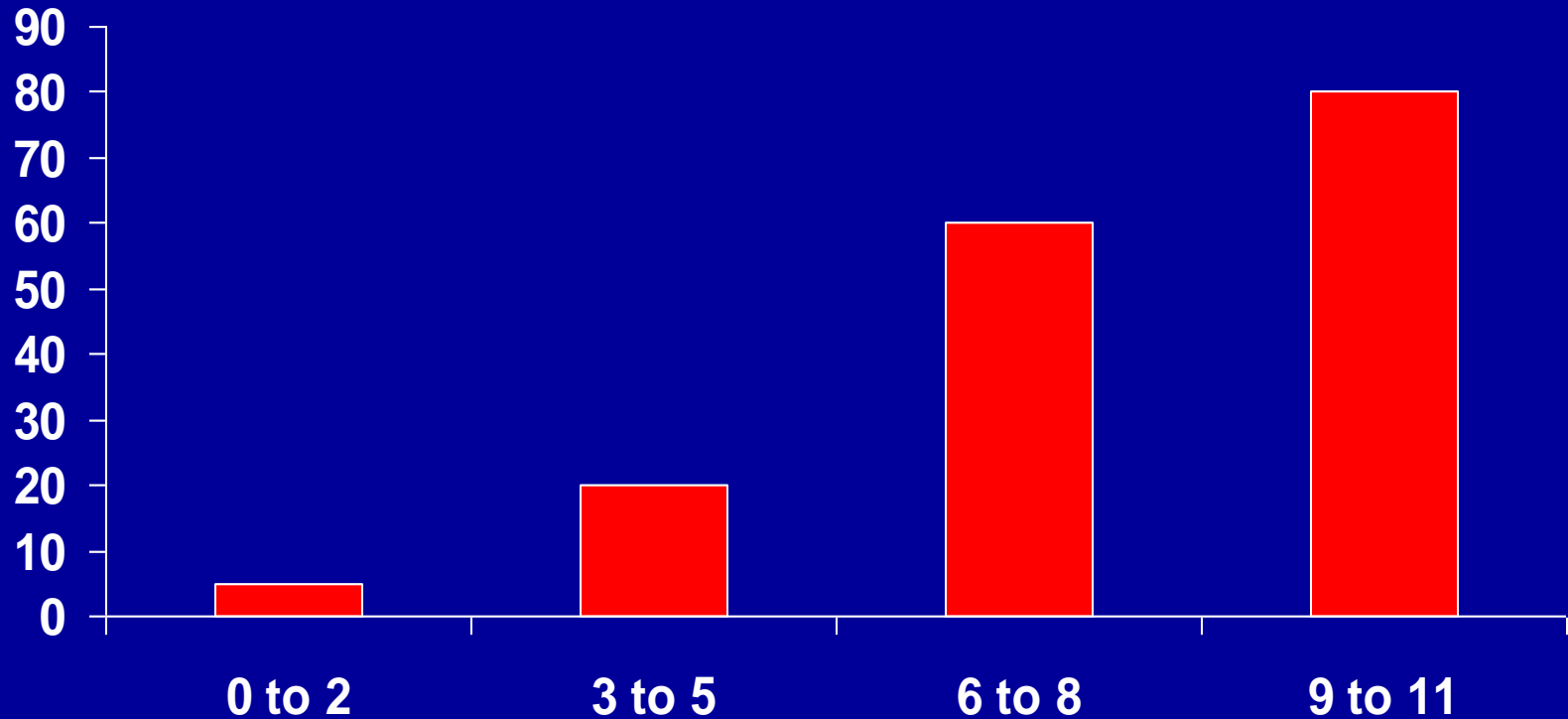
### During the first 48 hours

Hct	decrease of 10
BUN	increase of >5 mg/dl
Ca	<8 mg/dl
PaO <sub>2</sub>	< 60 mm Hg
Base deficit	>4 mEq/L
Fluid sequestration	> 6L



# Acute Pancreatitis

## Mortality related to Ranson's



# CAT Scan



# Acute Pancreatitis

## CT Criteria of severity

- A** Normal
- B** Enlargement
- C** Peri-pancreatic Inflammation
- D** Single fluid collection
- E** Multiple fluid collection

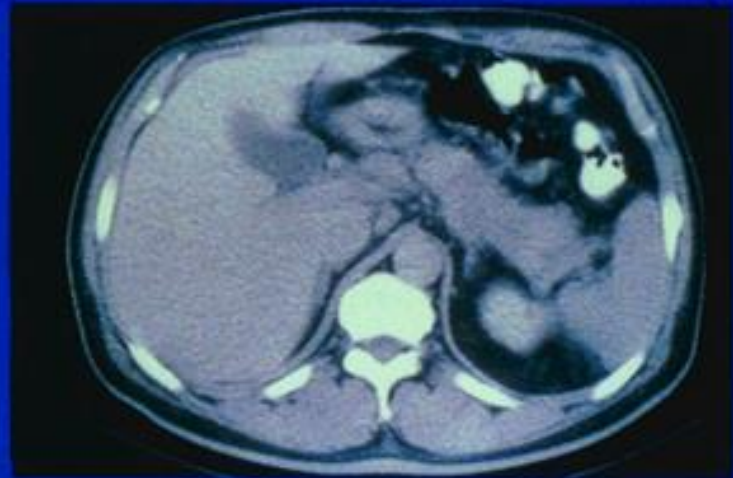
# Acute Pancreatitis

## CT Criteria of severity

Grade C

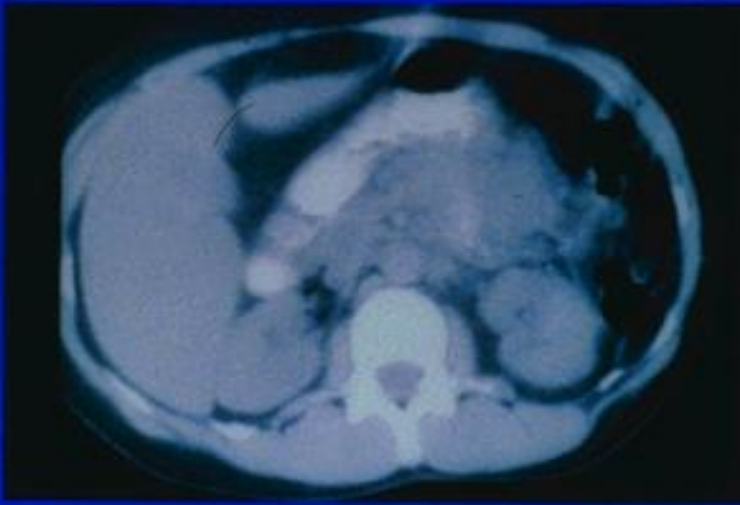


Grade D



# Acute Pancreatitis

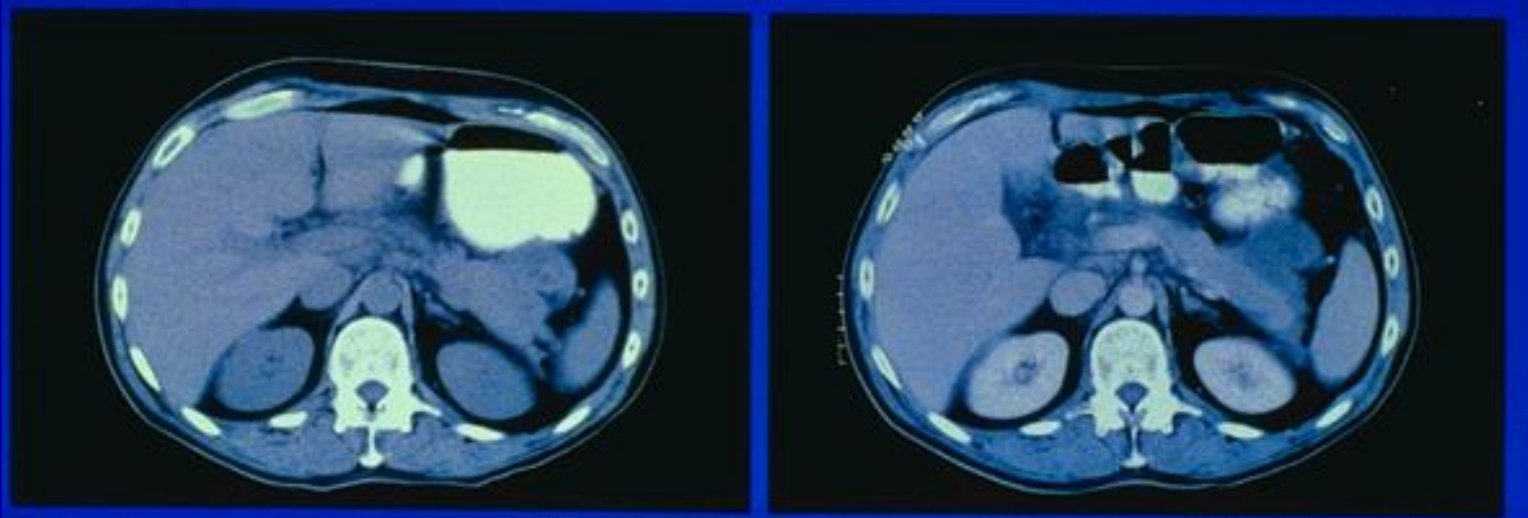
## CT Criteria of severity



Phlegmon  
III defined mass  
Sterile or infected  
Stage E

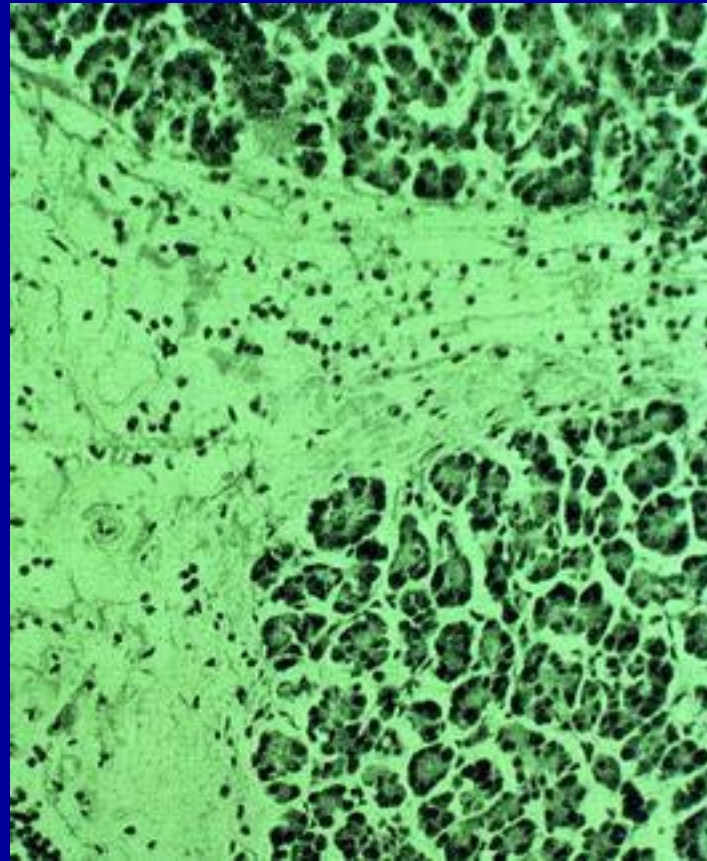
# Acute Pancreatitis

## Interstitial



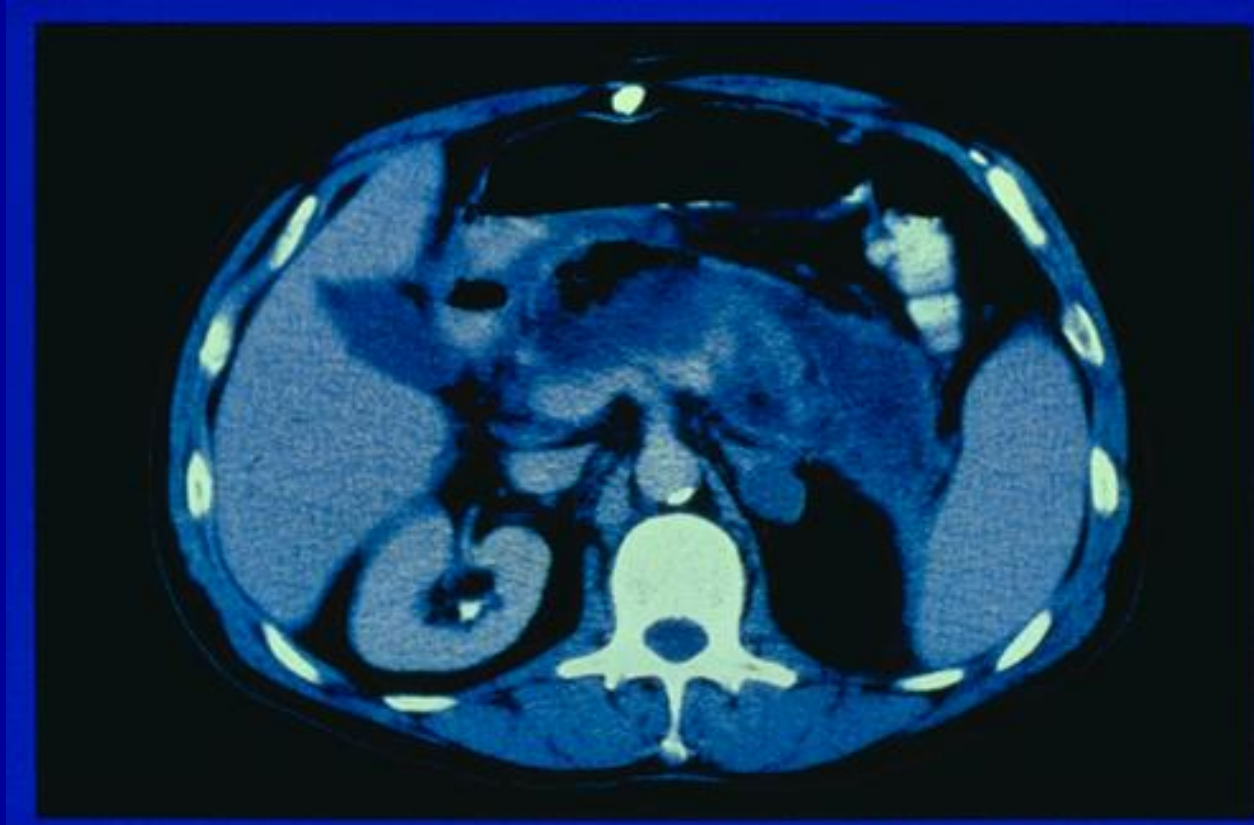
# Acute Pancreatitis

## Interstitial



# Acute Pancreatitis

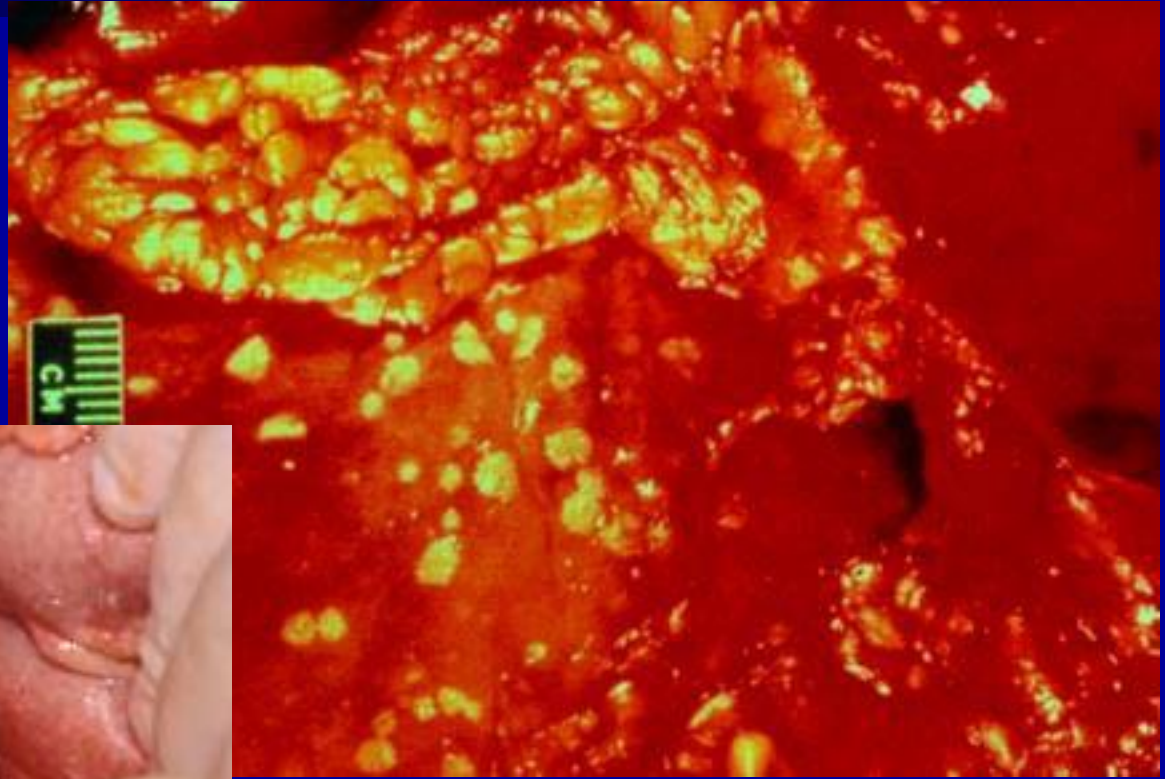
## Necrotizing





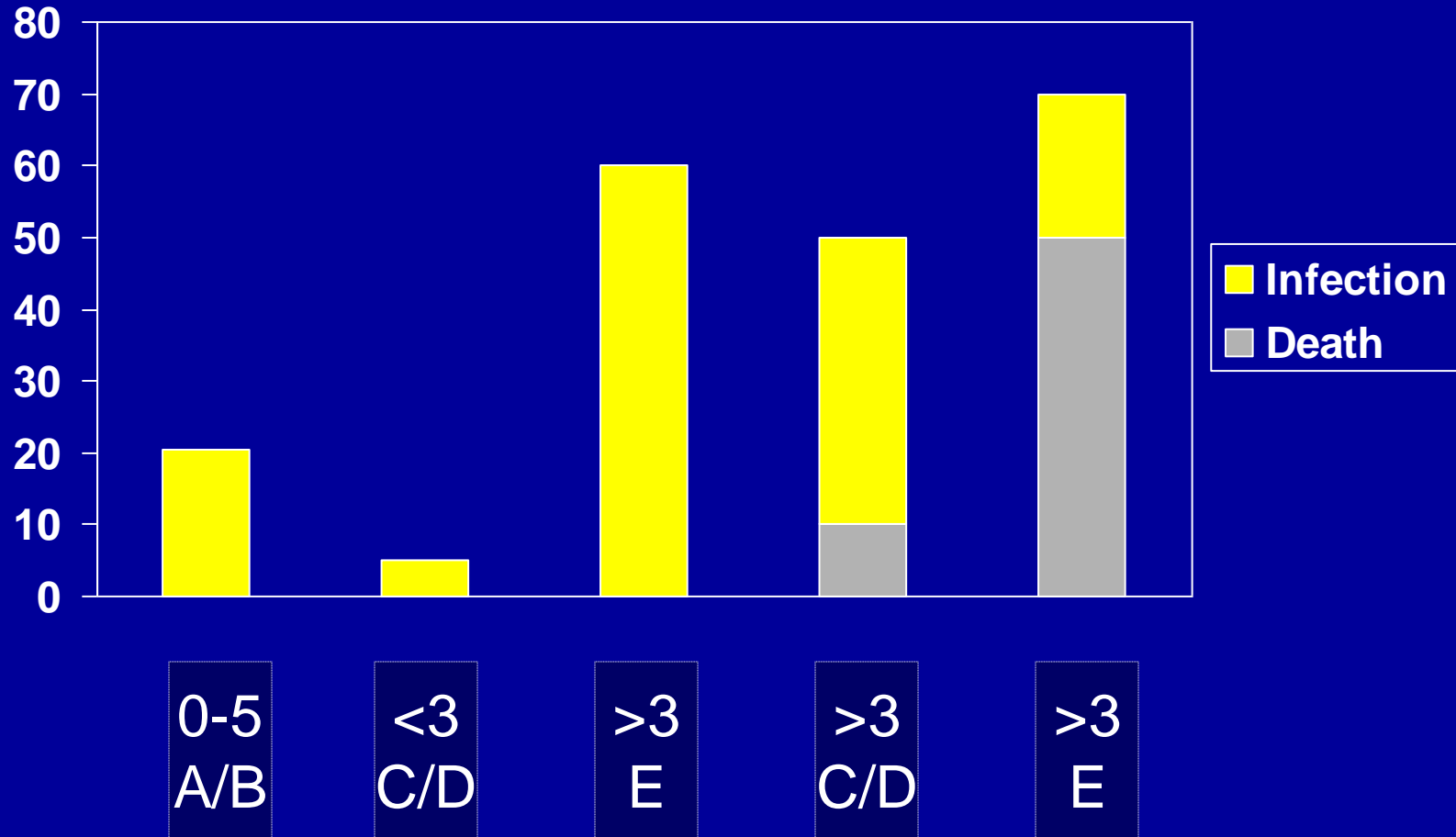
# Acute Pancreatitis

## Necrotizing



# Acute Pancreatitis

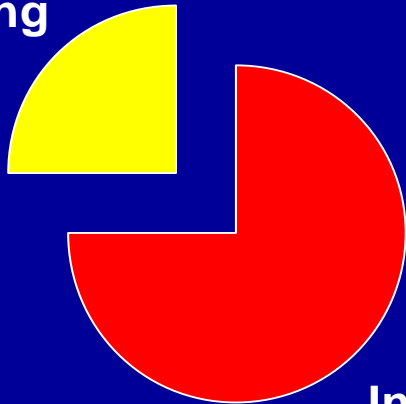
## Risk of infection and death



# Acute Pancreatitis

Prognosis based on CT findings

Necrotizing



Interstitial

Infection <1%  
Mortality <1%

Infection 30-50%

Mortality

Sterile 10%

Infected 30%

# Acute Pancreatitis

## Indications for CT scan

- Ranson's score  $>3$
- Refractory Hypoxemia
- Refractory Hypotension
- Persistent leukocytosis or fever
- Tender abdominal mass
- Hemodynamic deterioration
- Cullen or Grey-Turner signs

# Acute Pancreatitis

Grey - Turner sign



# Acute Pancreatitis

Cullens sign



# Acute Pancreatitis

## Treatment Goals

- Supportive care
- Reduce inflammation
- Assess and treat complications

# Acute Pancreatitis

## Supportive care

### Essential

Close clinical surveillance

NPO

IV fluid replacement

Nutritional support

Pain control

### Not proven

Antibiotics

Reduction of pancreatic secretions:

(H2 Blockers, NG suction, glucagon, somatostatin)



# Acute Pancreatitis

## Decrease Inflammation

- Remove impacted stones
  - ERCP and Papillotomy
  
- Remove Ascites
  - Peritoneal lavage

# Acute Pancreatitis

## Assess and treat complications

- Hypocalcemia
- ARDS
- Infection
- Pseudocyst

# Acute Pancreatitis

## Antibiotics Therapy

- Antibiotics with effective penetration
  - Ciprofloxacin
  - Ofloxacin
  - Imipenem
  - Metronidazole
- Antibiotics with poorer penetration
  - Aminoglycosides
  - Broad spectrum penicillins
  - Third generation cephalosporins

# Acute Pancreatitis

## Complications: Hypocalcemia

### Loss of non-ionized Calcium

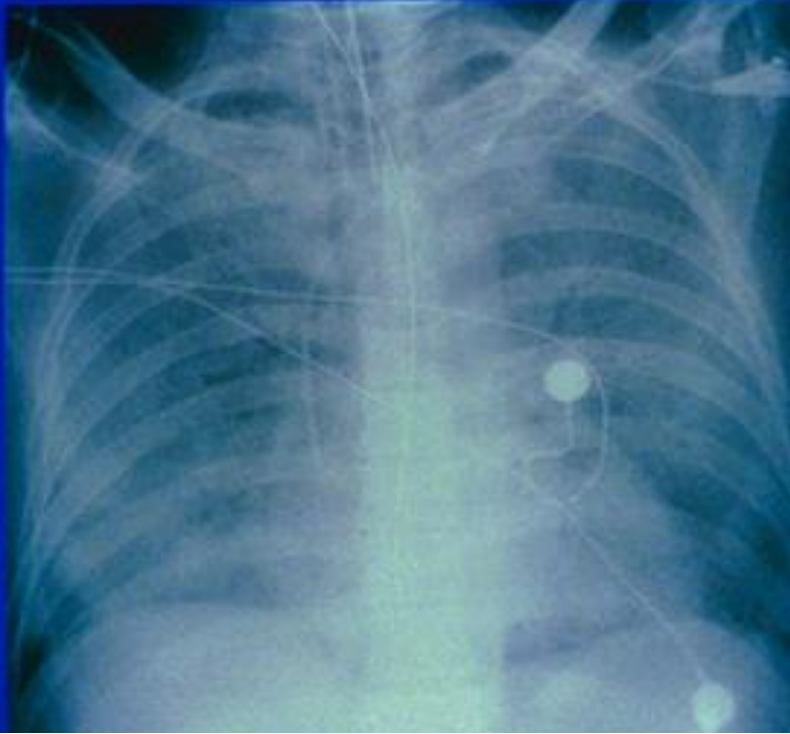
Common  
Asymptomatic  
No treatment needed

### Loss of ionized calcium

Rare  
Neuromuscular irritability  
Treatment needed

# Acute Pancreatitis

## Complications: ARDS



Delay onset  
More associated with hyper-  
Lipidemia  
Potentially reversible

1. Acute, severe, progressive respiratory distress
2. Hypoxemia not responding to oxygen
3. Increase stiffness of the Lungs
4. Diffuse radiological opacity

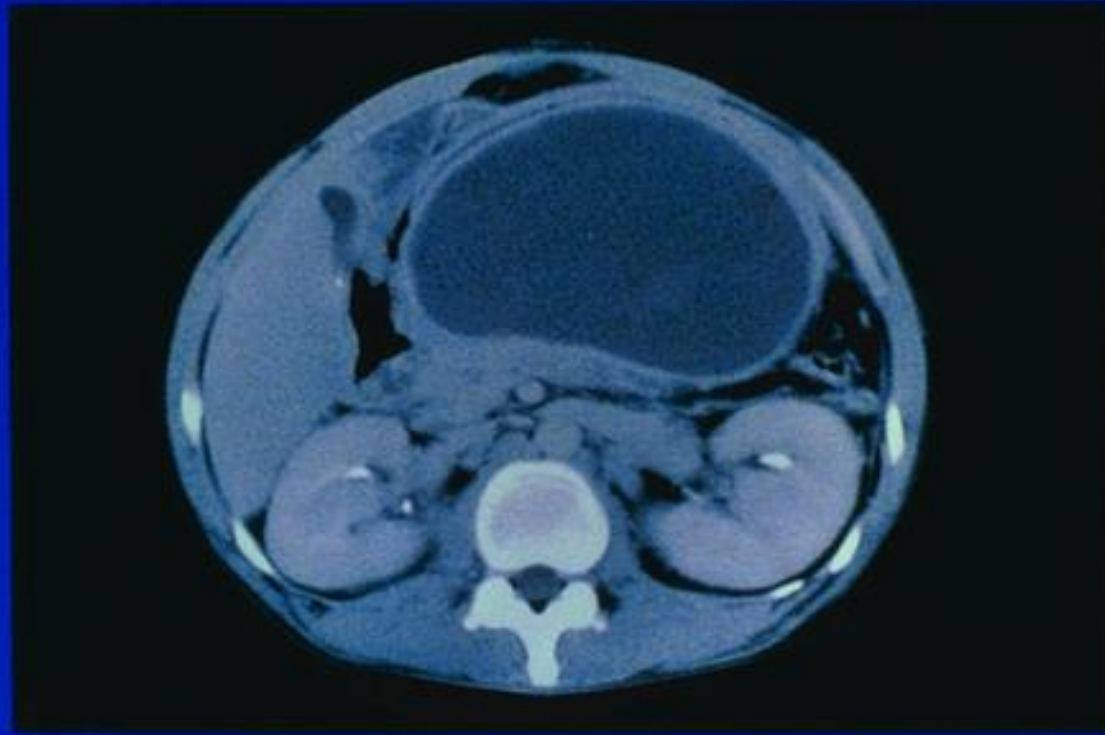
# Acute Pancreatitis

## Complications: Pseudocyst

- Severe pain
- Obstruction(CBD, Duodenum)
- Dissection
- Bleeding
- Infection
- Leakage
- Rupture

# Acute Pancreatitis

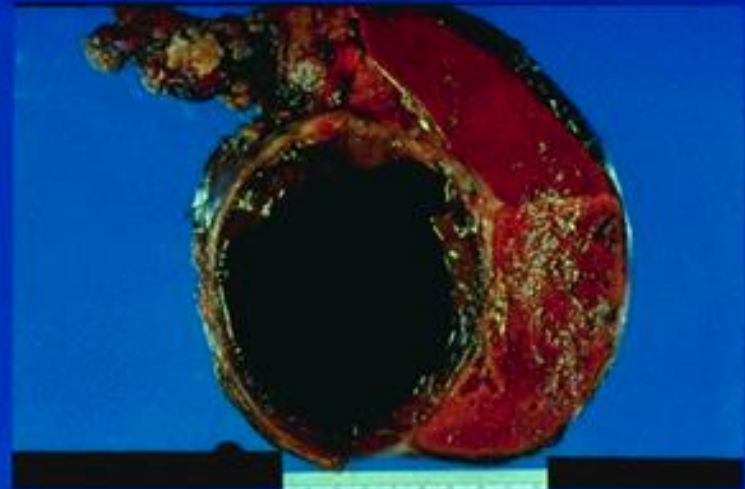
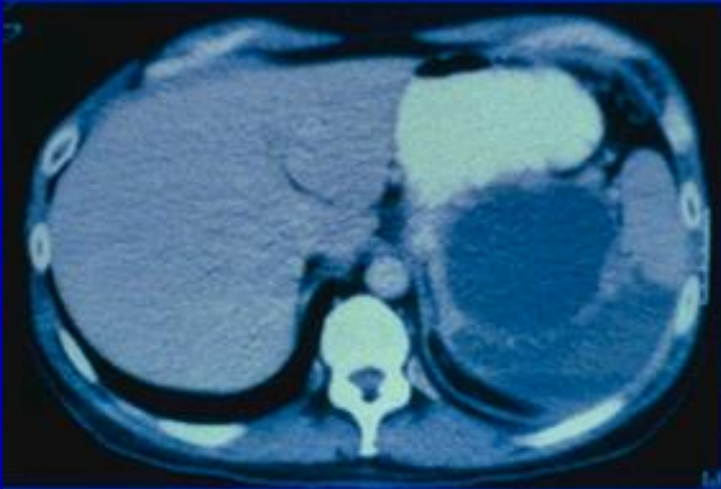
Complications: Pseudocyst



# Acute Pancreatitis

## Complications: Pseudocyst

Rupture





# Acute Pancreatitis

## Complications: Pseudocyst

### Indications:

Size > 5 cm

Duration >4-6 weeks

Severe pain

Rapid expansion  
complications

### Techniques:

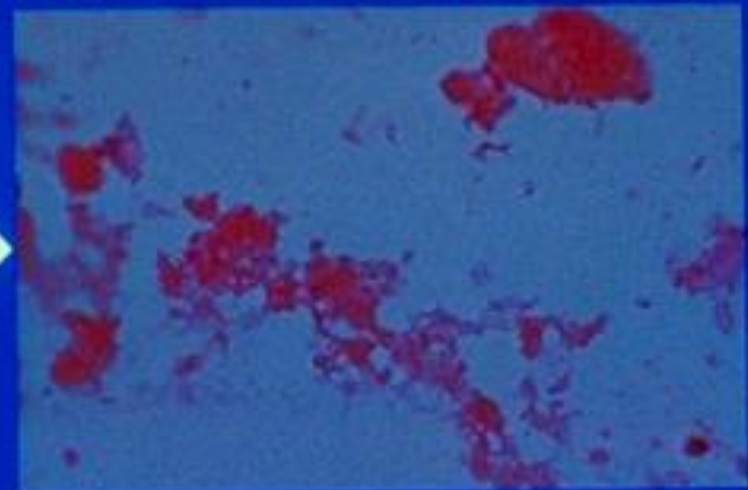
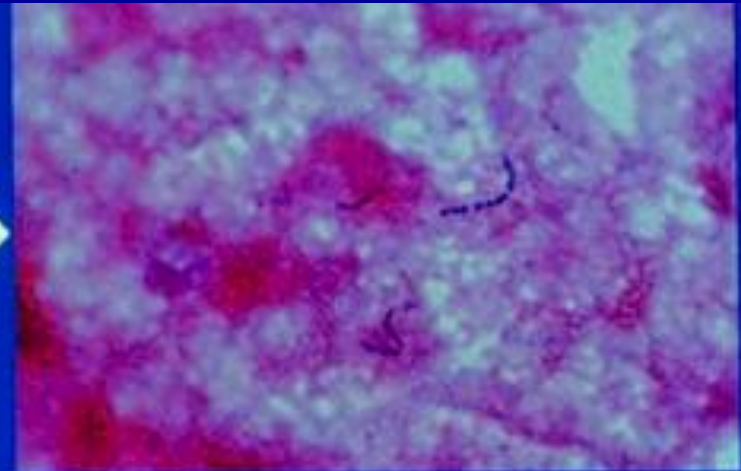
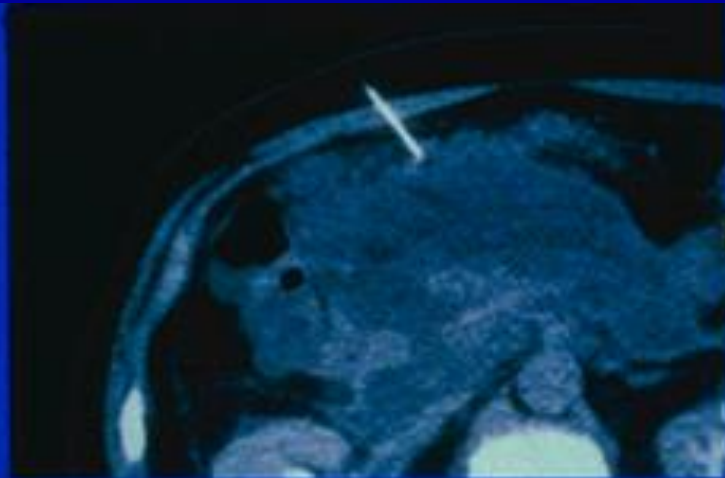
Surgical

Percutaneous

Endoscopic

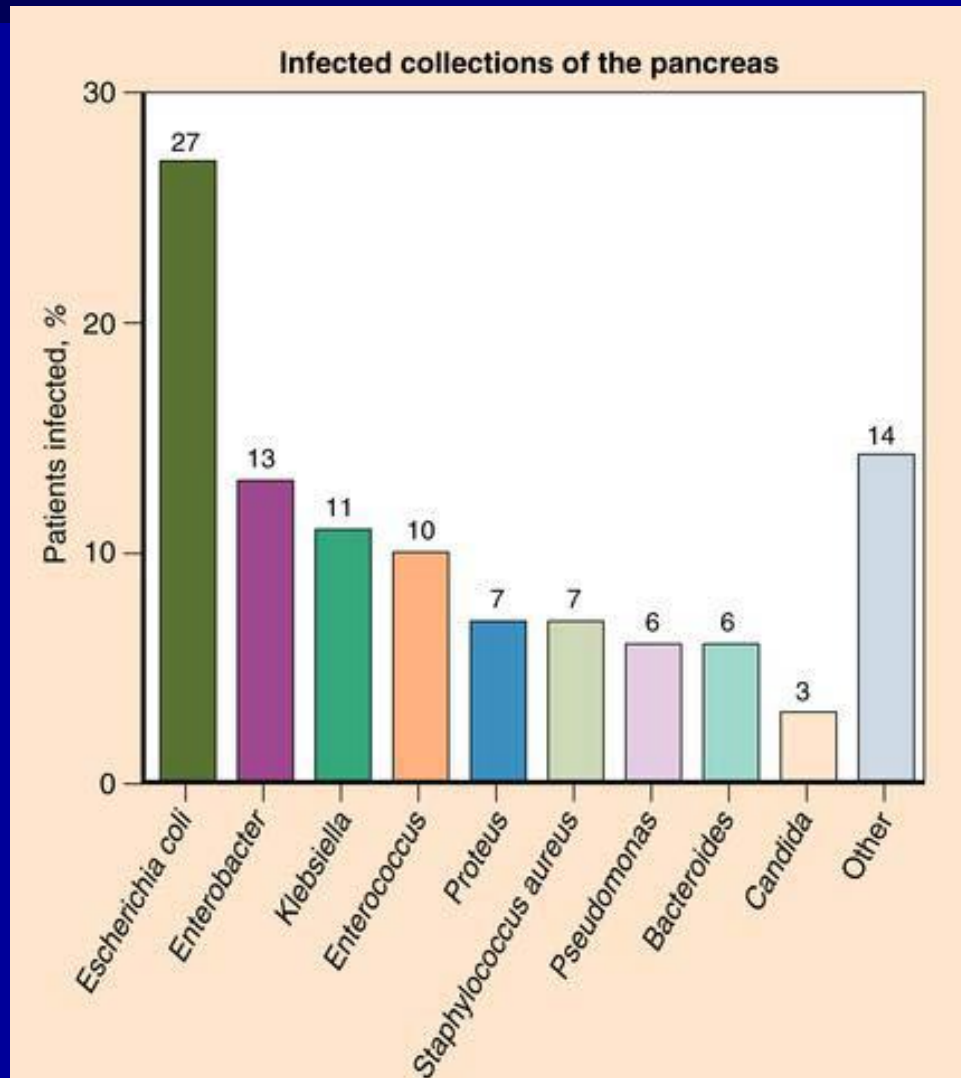
# Acute Pancreatitis

## Complications: Infection



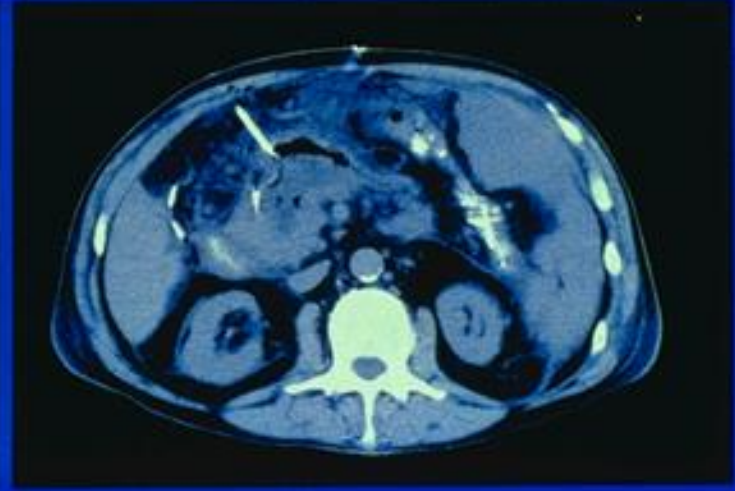
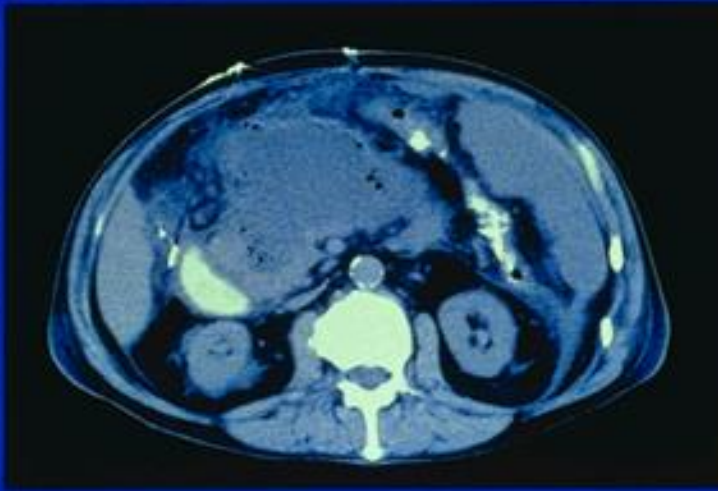
# Acute Pancreatitis

## Complications: Infection



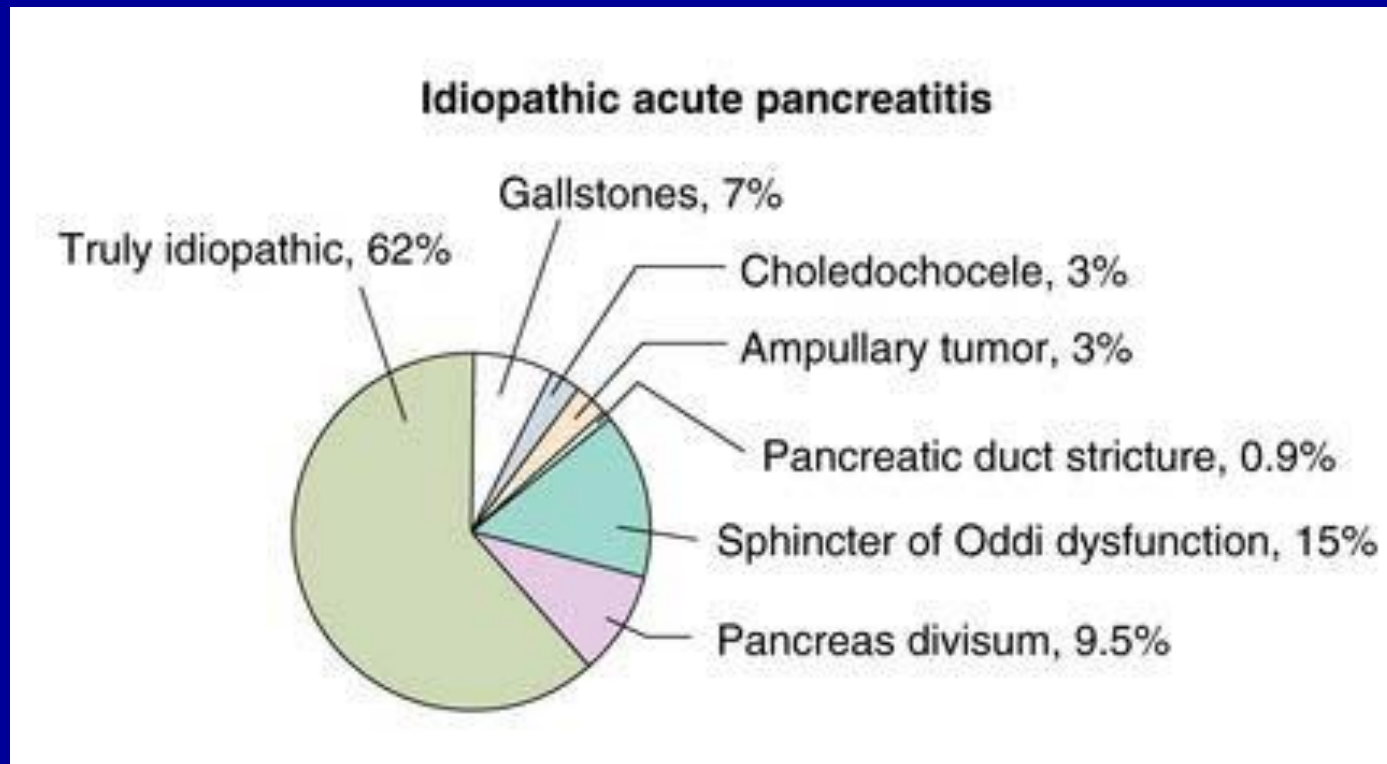
# Acute Pancreatitis

## Complications: Infection



# Acute Pancreatitis

## Idiopathic



# Recurrent Pancreatitis

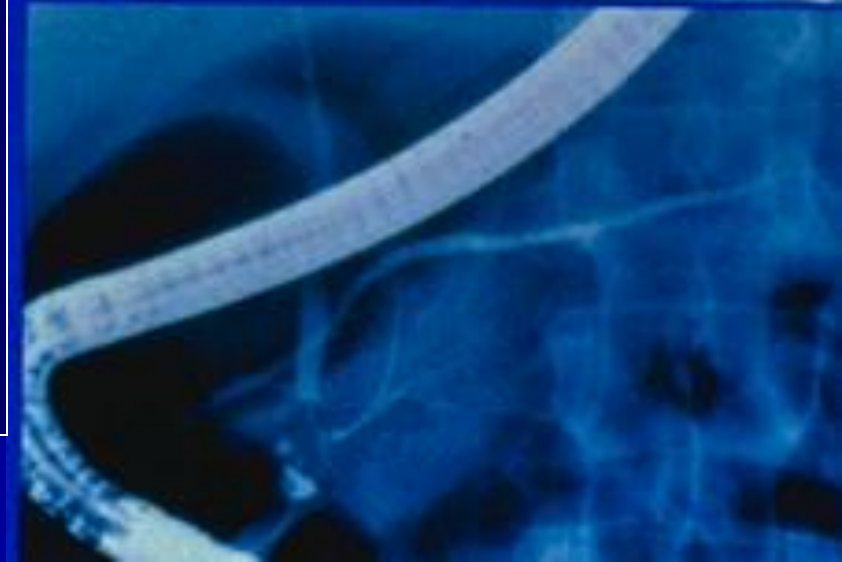
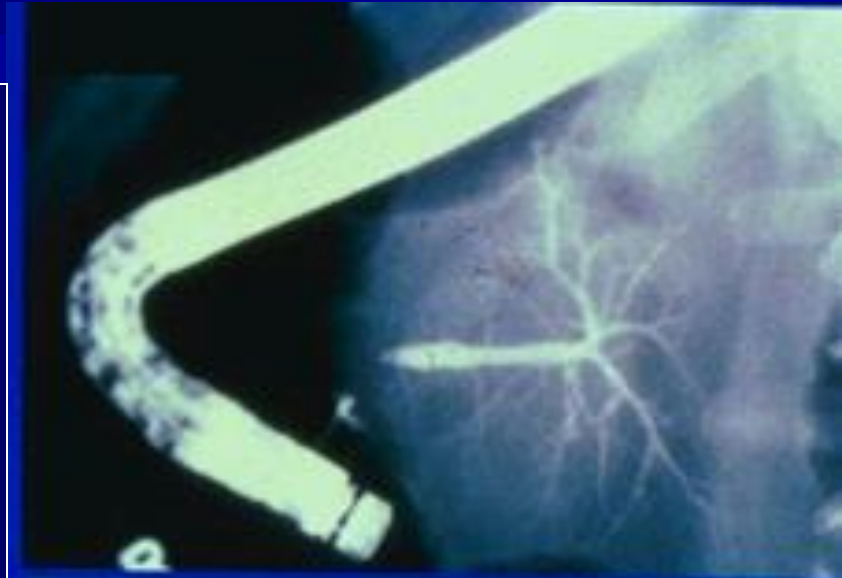
## Pancreatic Divisum

5 - 10% Population

Most common congenital abnormality of the pancreas

Failure of fusion of major and minor pancreatic ducts during embryonic life

Treatment by minor duct sphincterotomy



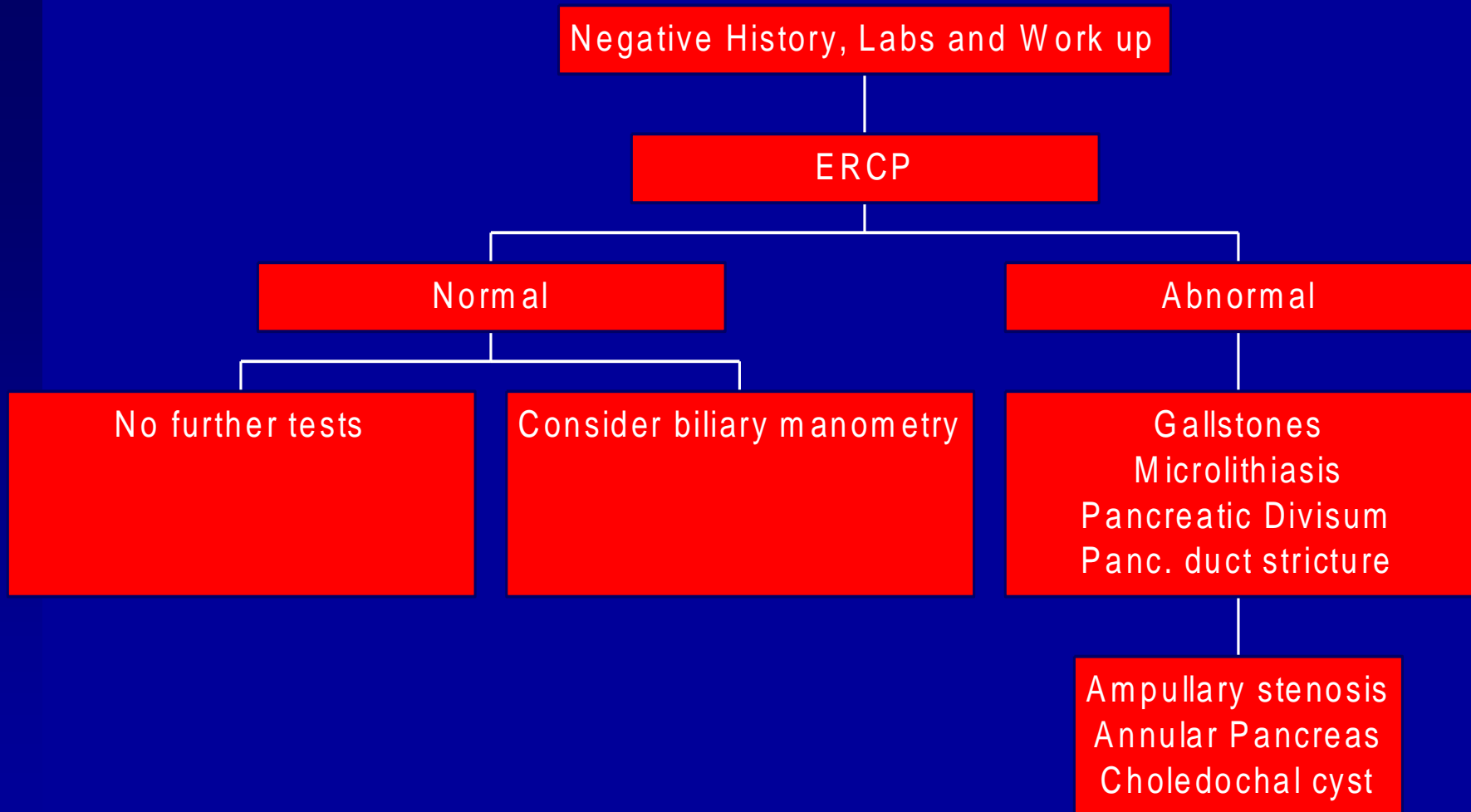
# Recurrent Pancreatitis

## Hereditary Pancreatitis

- Autosomal dominant
- Childhood onset
- Starts initially as acute attacks then they develop calcifications by the second decade.
- High risk of carcinomas

# Recurrent Pancreatitis

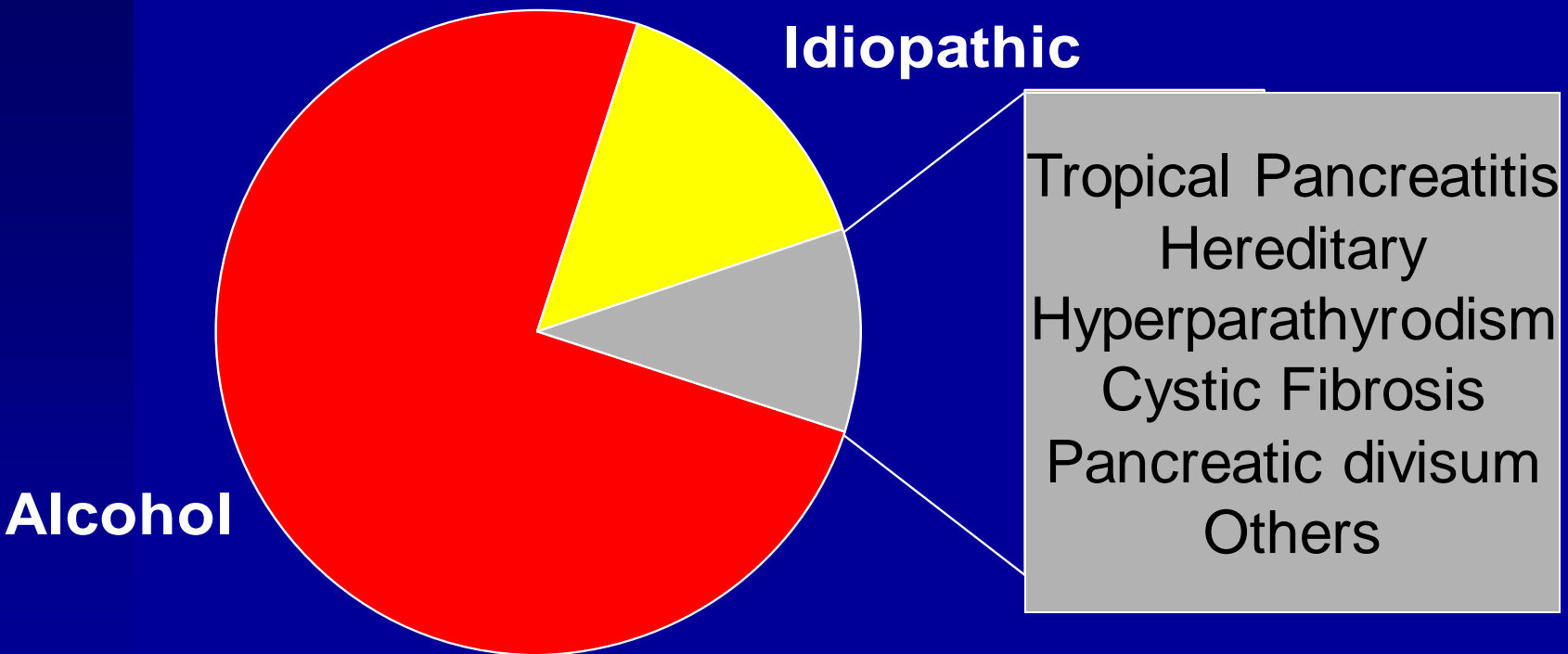
Work up for unexplained and recurrent Pancreatitis





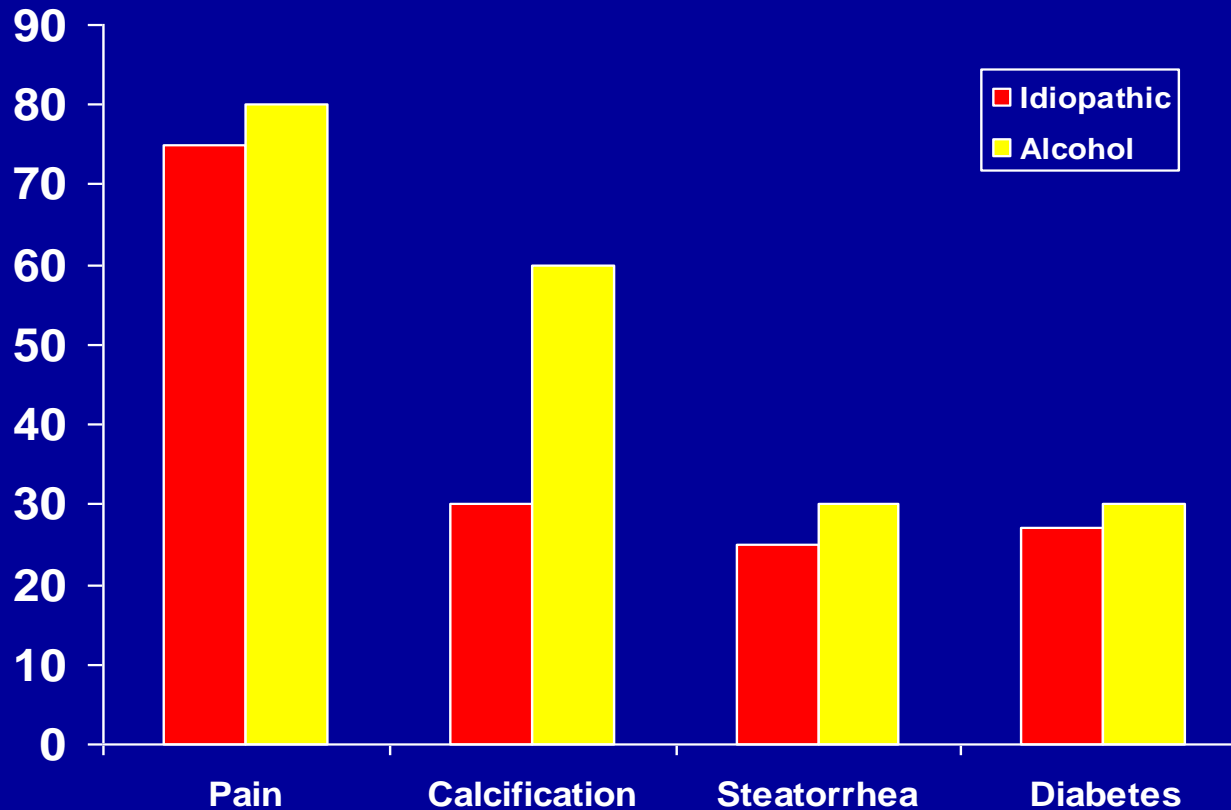
# Chronic Pancreatitis

## Etiology



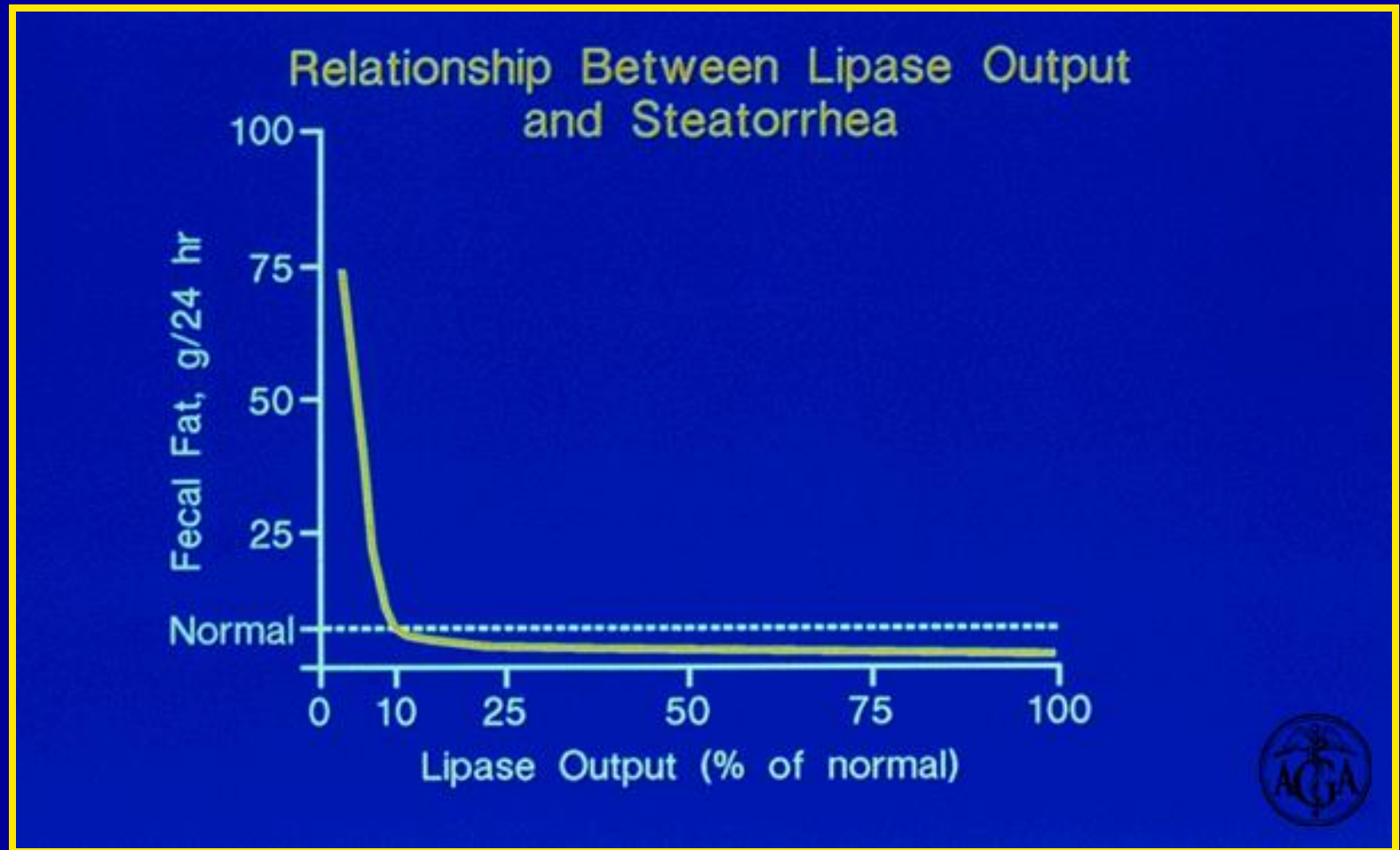
# Chronic Pancreatitis

## Clinical Presentation



# Chronic Pancreatitis

## Clinical Presentation



# Chronic Pancreatitis

## Diabetes

- Brittle
- Loss of Insulin and Glucagon
- Only in severe disease
- Insulin requirement low
- Ketoacidosis rare

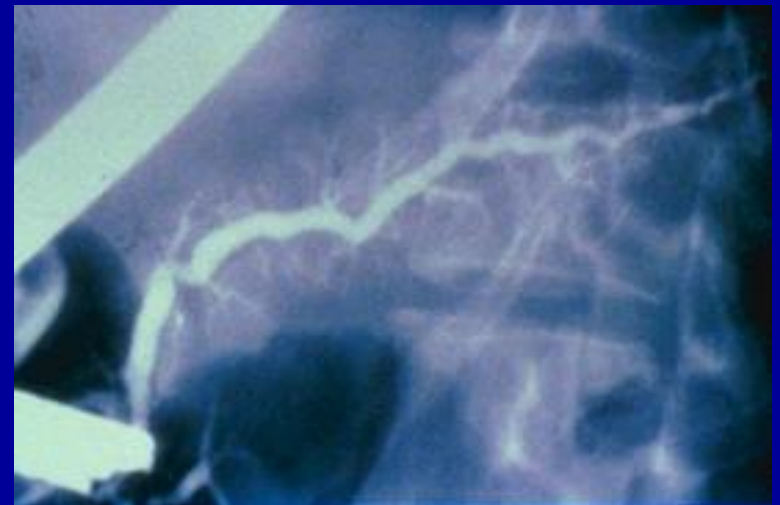
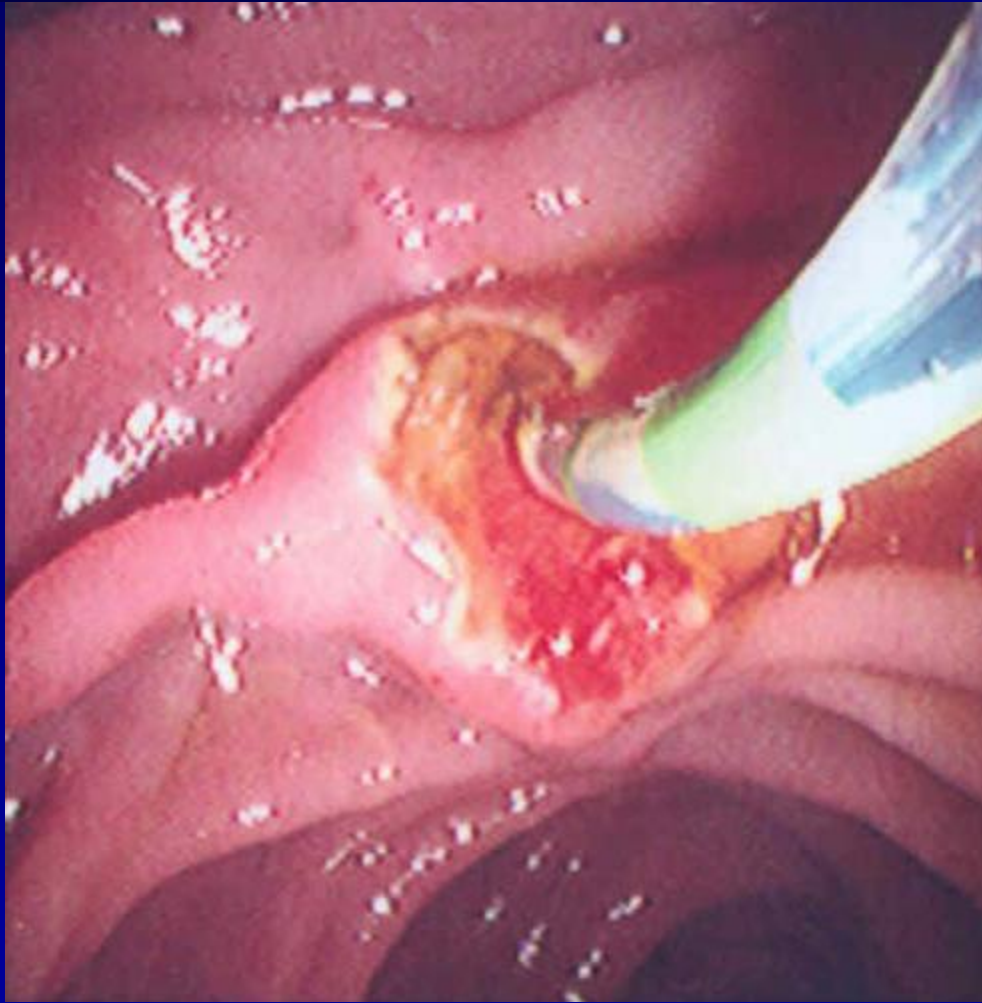
# Chronic Pancreatitis

## Diagnostic test

Sensitivity	Structure	Function
Most	Endoscopic US ERCP	Secretin test
Less	CT Scan US	Bentiromide(PABA) Serum Trypsinogen Fecal Chemotrypsin
Least	Abdomina X-Ray	Fecal Fat

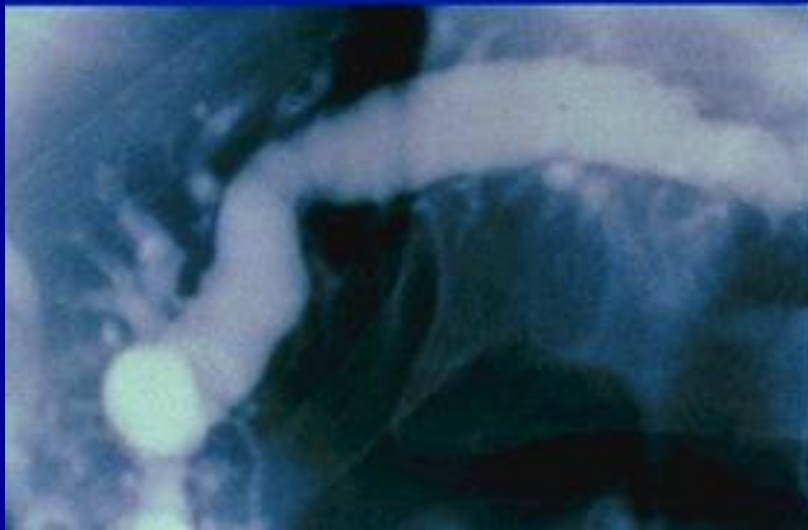
# Chronic Pancreatitis

Diagnosis: ERCP



# Chronic Pancreatitis

Diagnosis: ERCP



# Chronic Pancreatitis

Diagnosis: X-Ray





# Chronic Pancreatitis

## Treatment

- Discontinue Alcohol
- Suppress secretion
  - (Pancreatic Enzymes)
- Modify neurotransmission
  - (nerve block)
- Relieve Obstruction
  - (Surgery, Stenting)

# Chronic Pancreatitis

## Complications

- Common Bile duct stenosis
- Duodenal Obstruction
- Splenic vein thrombosis
- Pleural effusion
- Pseudocyst
- Pancreatic ascites

# Chronic Pancreatitis

## Natural History

### Natural history of Alcohol Pancreatitis

