



# Nasjonalt Senter for Gastroenterologisk Ultrasonografi

National Centre for Ultrasound in Gastroenterology  
Haukeland University Hospital, Bergen, Norway

## Ultrasound of the Pancreas

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Professor

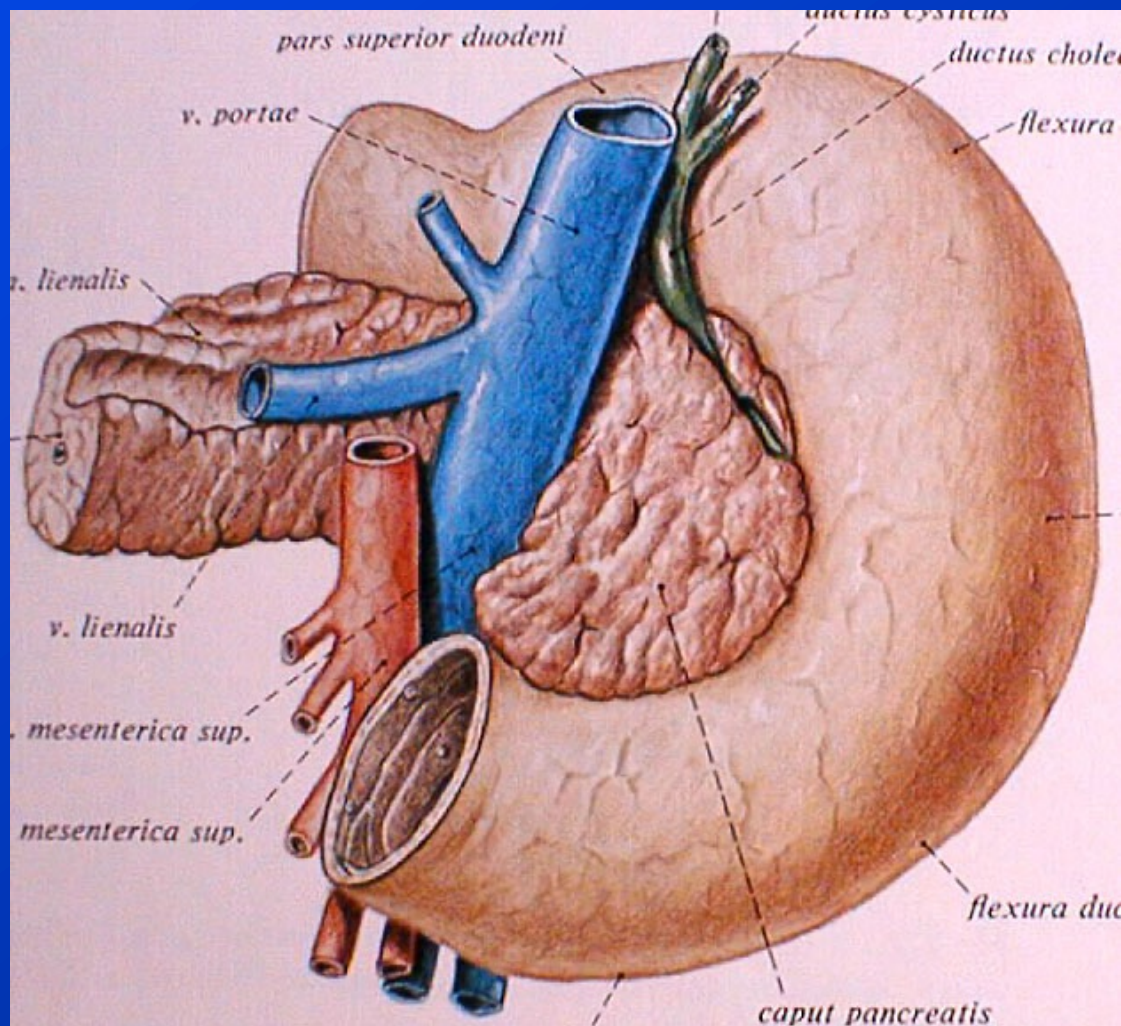
Department of Medicine

Haukeland University Hospital

Bergen, Norway



# Pancreas viewed from behind



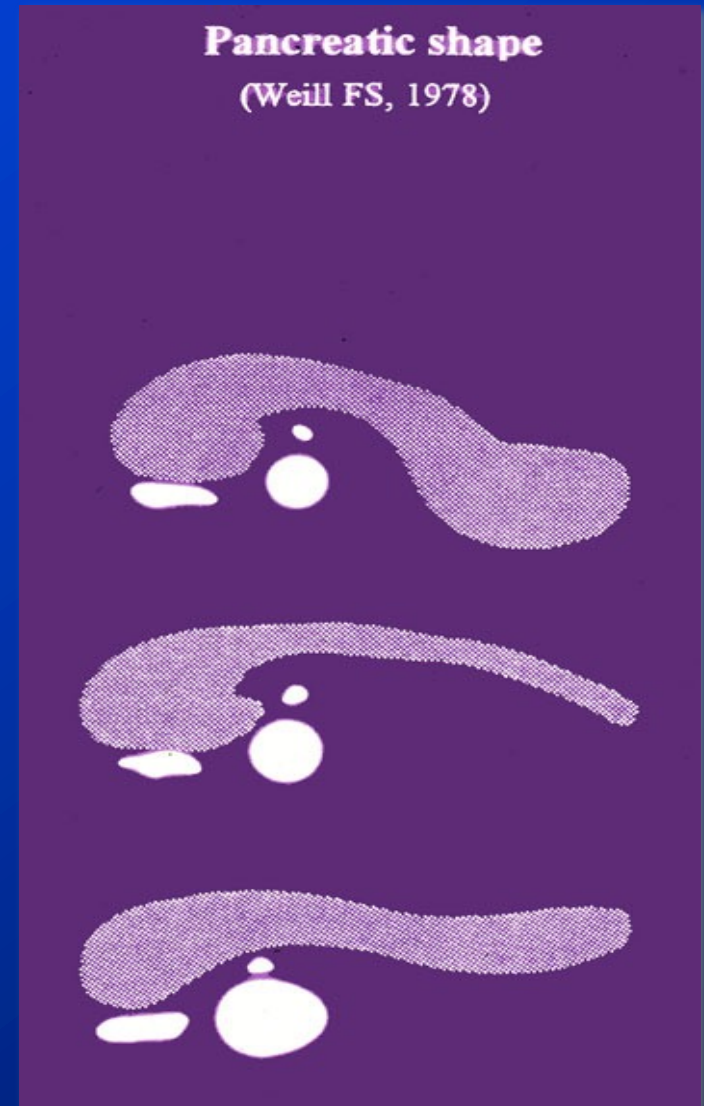


# Pancreatic size and shape

- Antero-posterior diameter - considerable variation - decreasing with increasing age
  - Head - 25 mm
  - Body - 15 mm
  - Tail - 35 mm

DeGraff C et al. Radiology  
1978

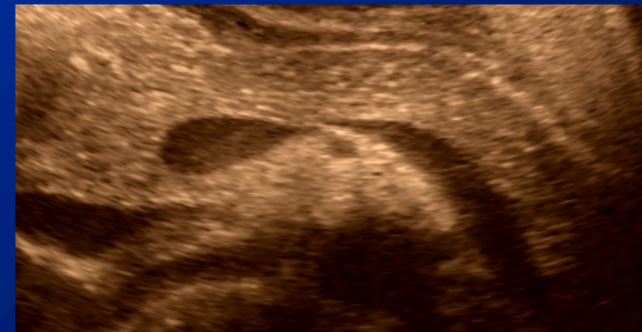
Niederau C et al. Radiology  
1983





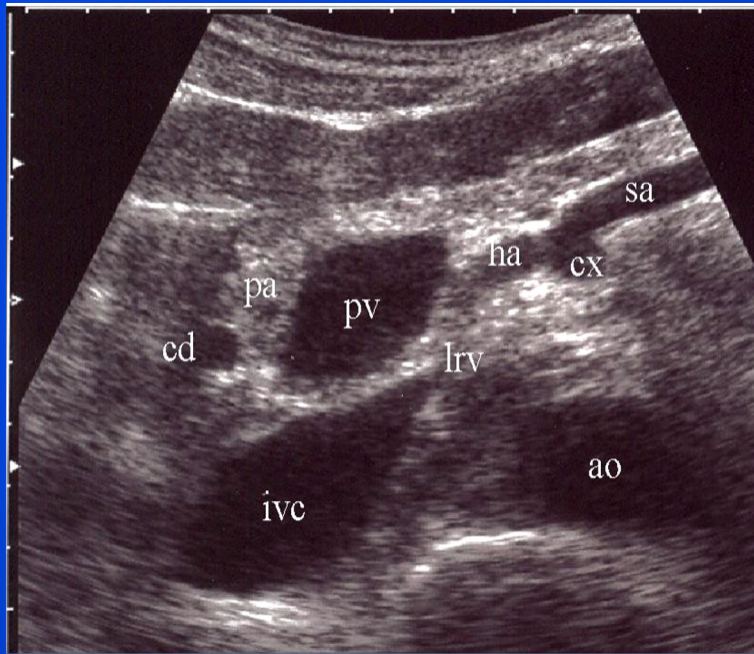
# Scanning Technique

- Patient in supine position
- Start with curvilinear scanhead 3-5 MHz
- Transversal, oblique and sagittal scanning
- Problem:
  - Air in stomach, duodenum, or colon
- Solution:
  - Let the patient sit or stand
  - Let the patient drink 150-300 ml of fluid
- Examine the tail through the spleen !





# Pancreatic Sonoanatomy



- ”Pancreas is most easily defined by its surrounding blood vessels”

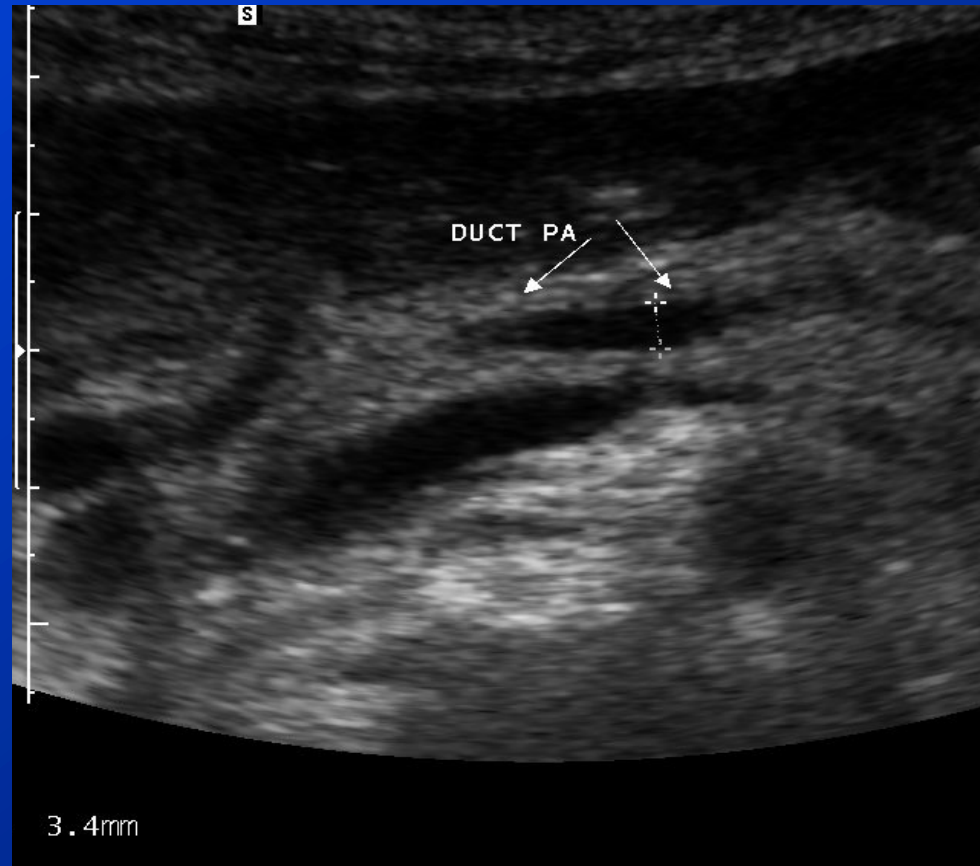
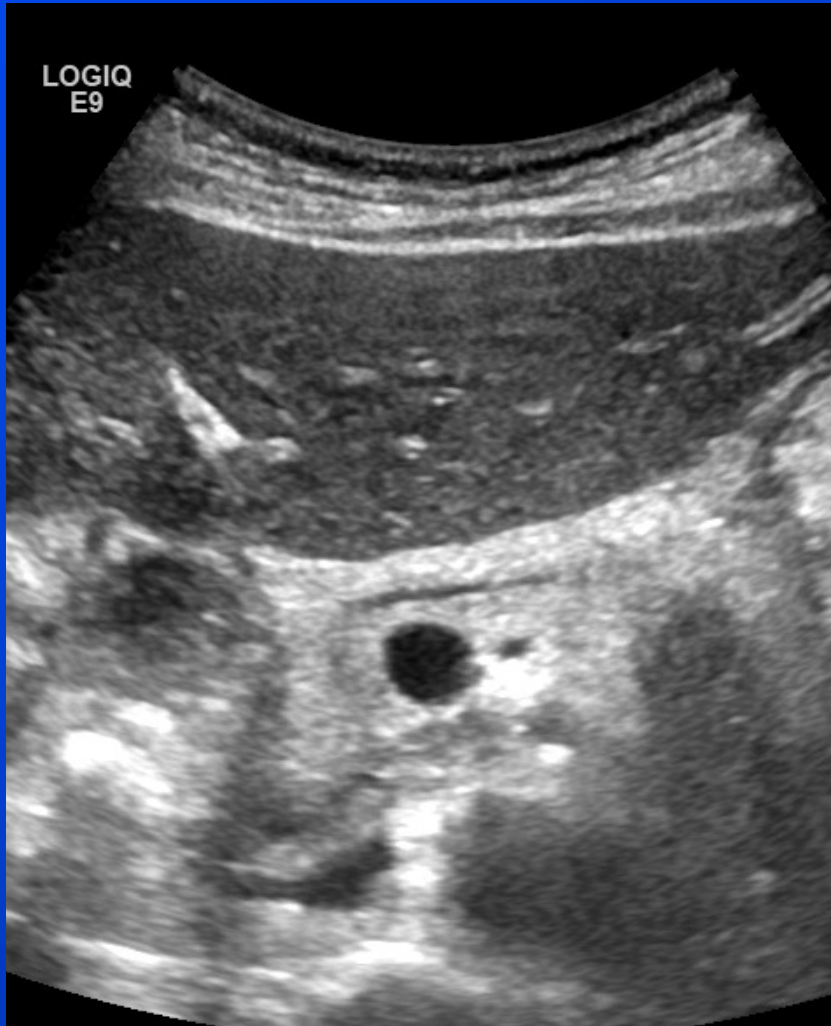


# Elderly persons have more echogenic pancreas





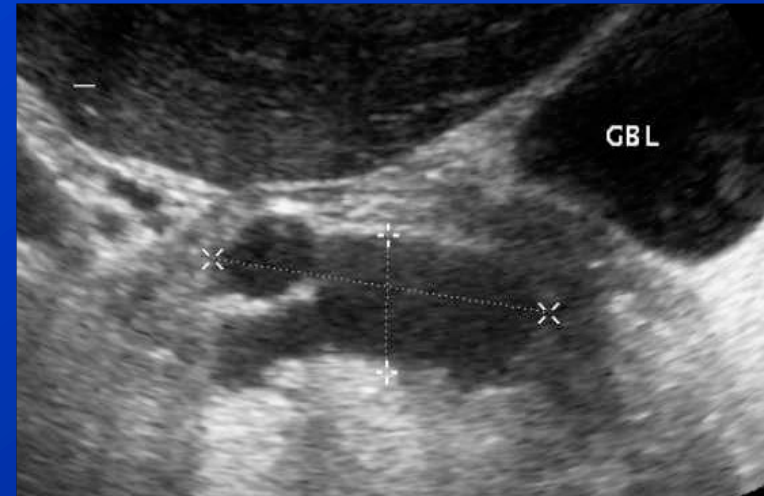
# Ductus Pancreaticus





# Acute Pancreatitis

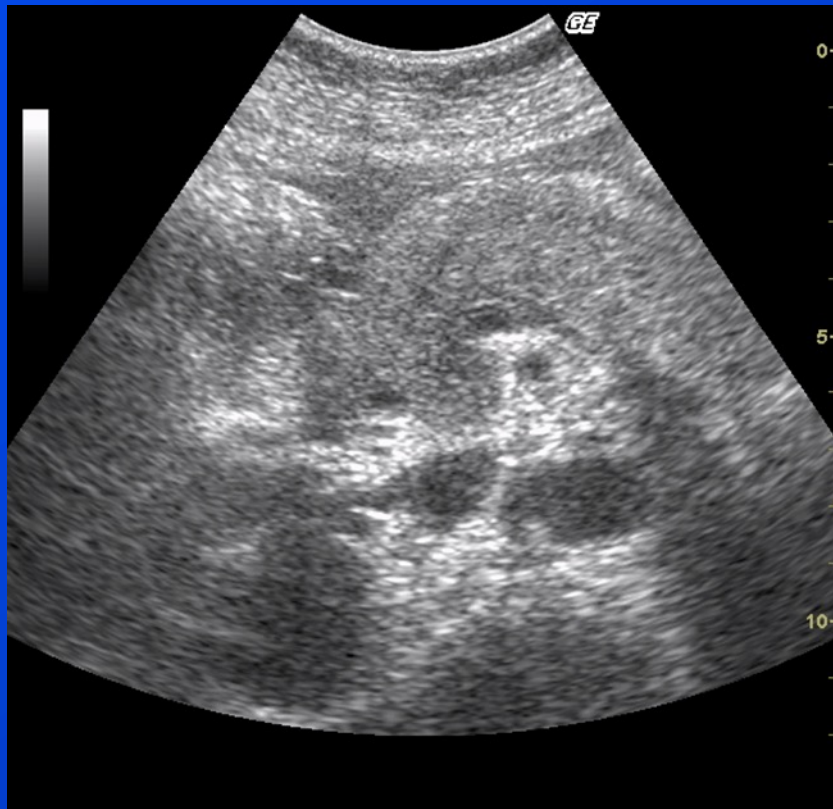
- Oedema, diffuse or focal, in peripancreatic fat
- Poorly defined margins
- Hypoechogenic texture
- Free intraperitoneal fluid
- Compression of veins
- Fluid migration to pleura, mediastinum and pericardium
- CT is the best method in acute pancreatitis



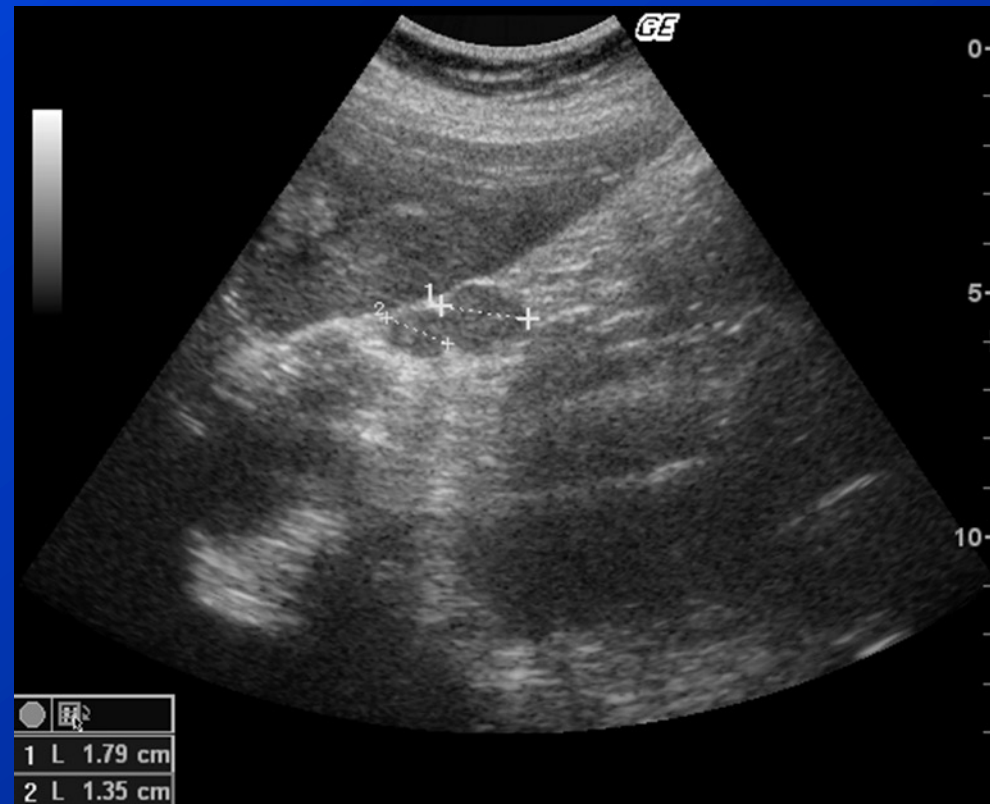




# Acute Pancreatitis



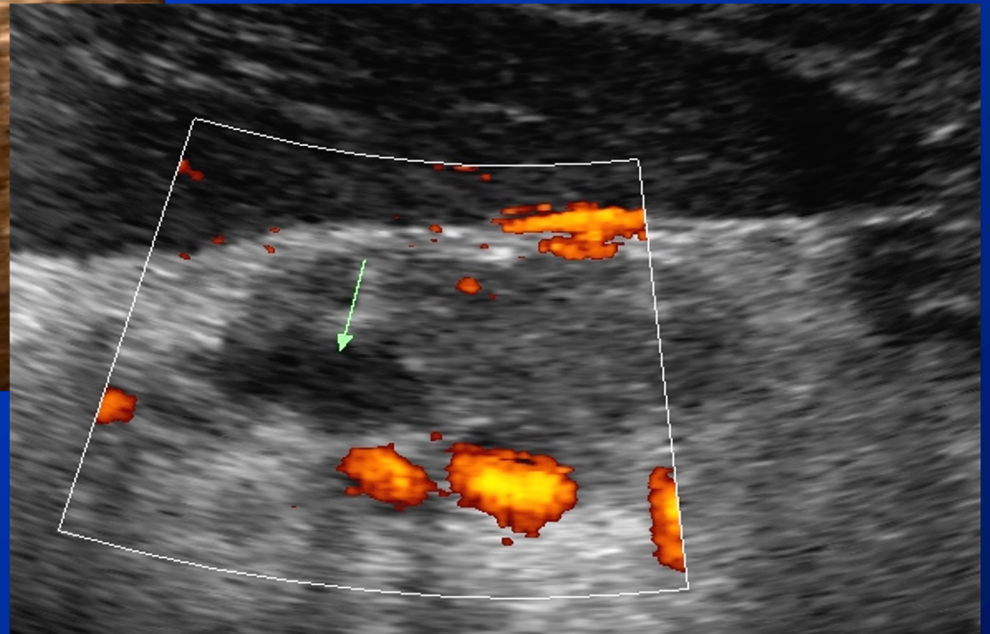
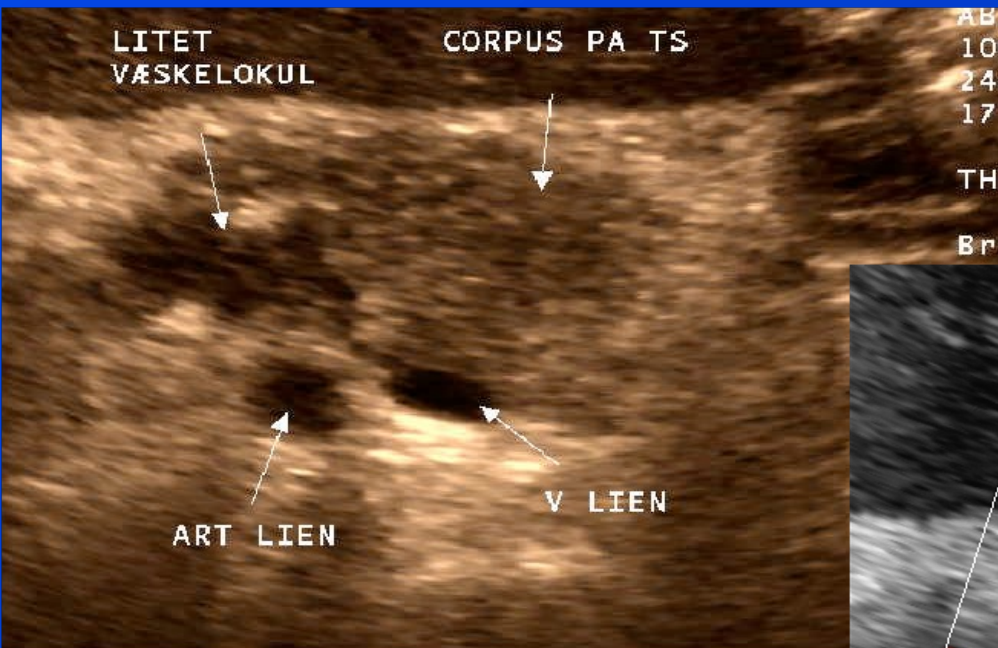
Enlarged pancreas



Enlarged Lymphnodes



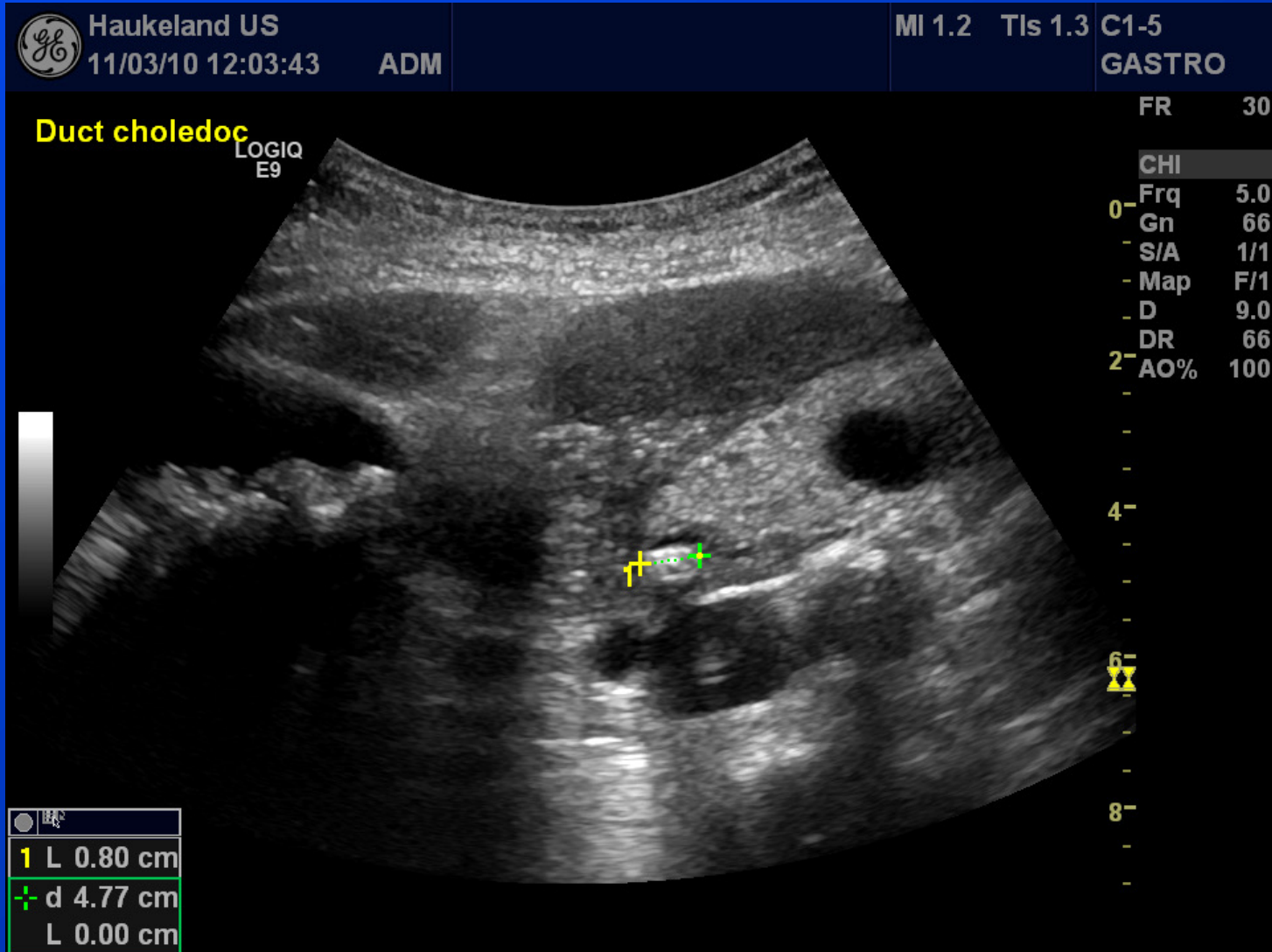
# Transabdominal ultrasound in acute pancreatitis



Fluid collections



# Look for the cause of acute pancreatitis!





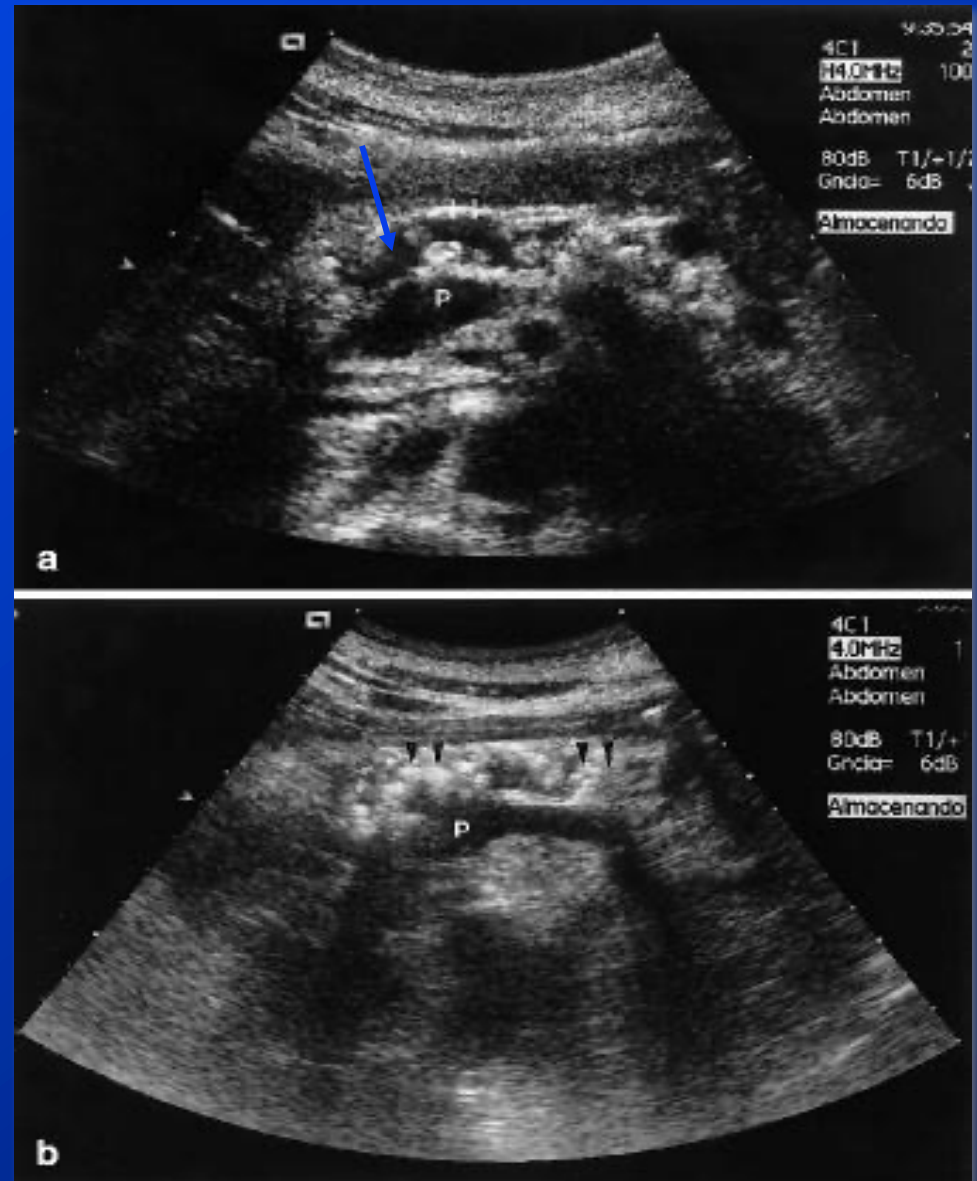
# Chronic Pancreatitis

- Heterogeneous and nodular texture
- Non-enlarged pancreas, often atrophic
- Irregular borders and ductal systems
- Hyperechoic pattern
- Deformation of retropancreatic veins
- Calcifications (parenchyma and ducts)
- Hypoechoic areas: “acute on chronic” pancreatitis



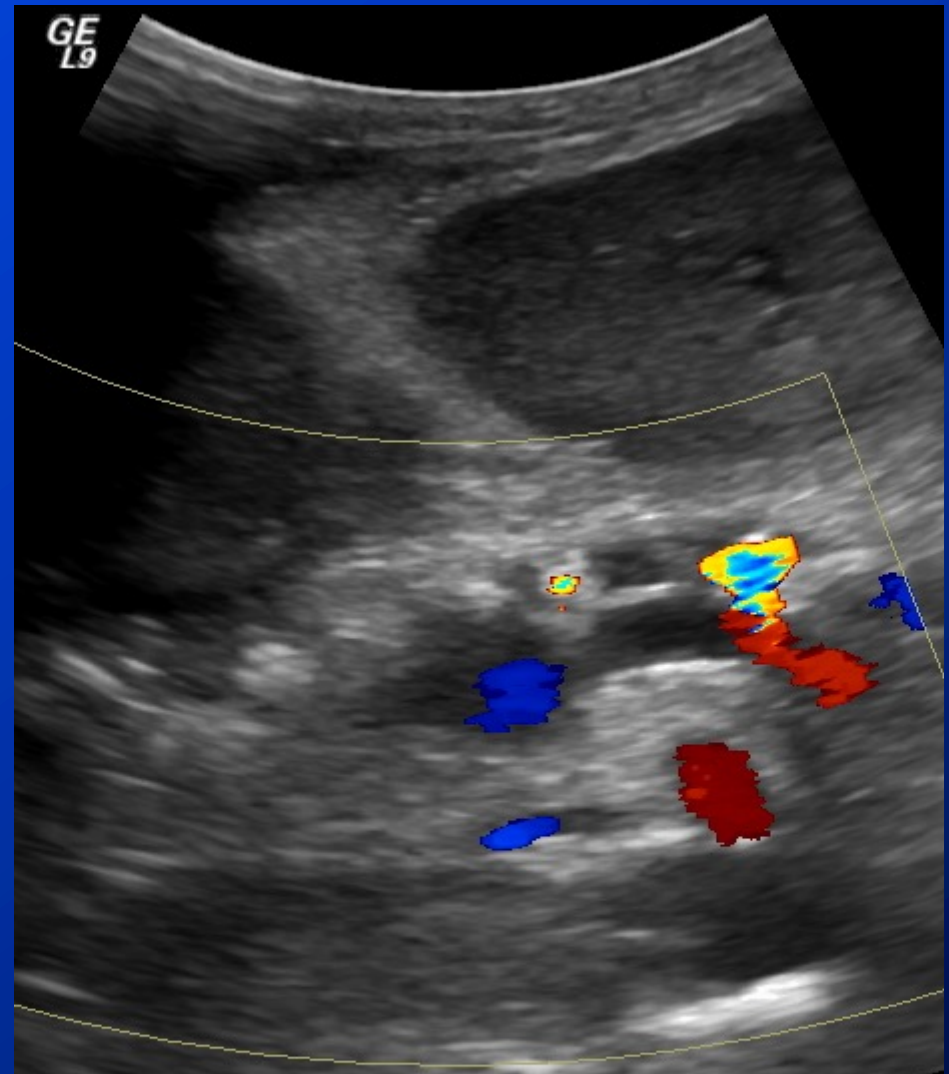
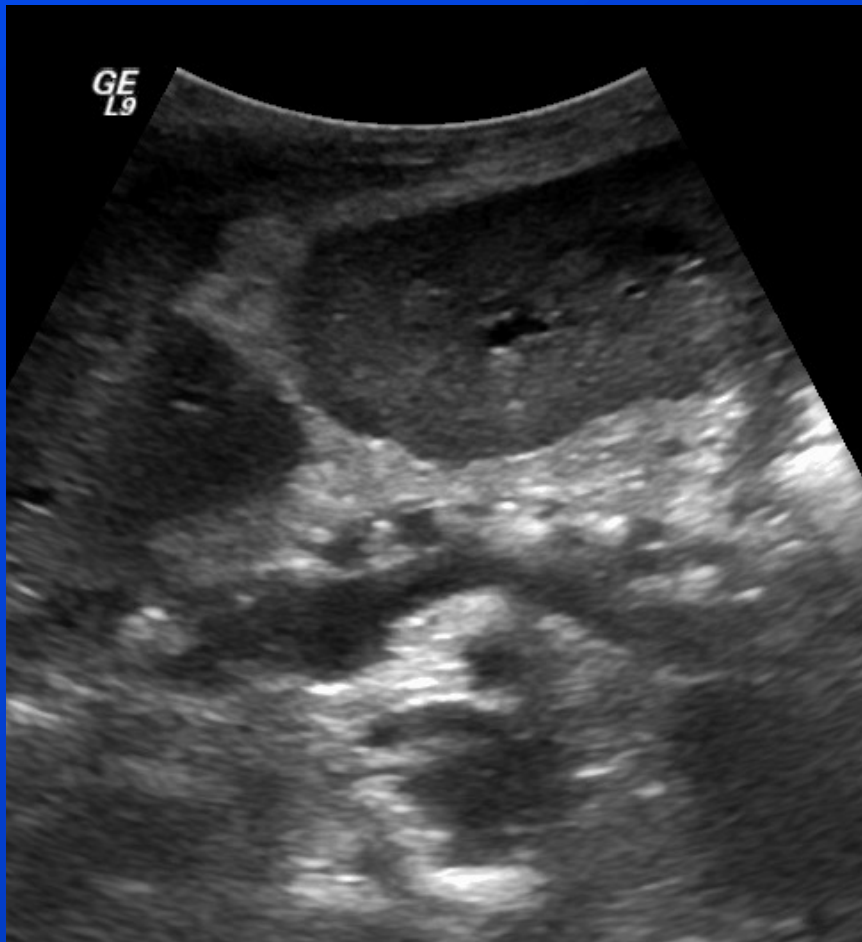
# Chronic pancreatitis

- Observe
  - Dilated pancreatic duct with calculi (white arrowhead)
  - Massive calcifications (black arrowheads)





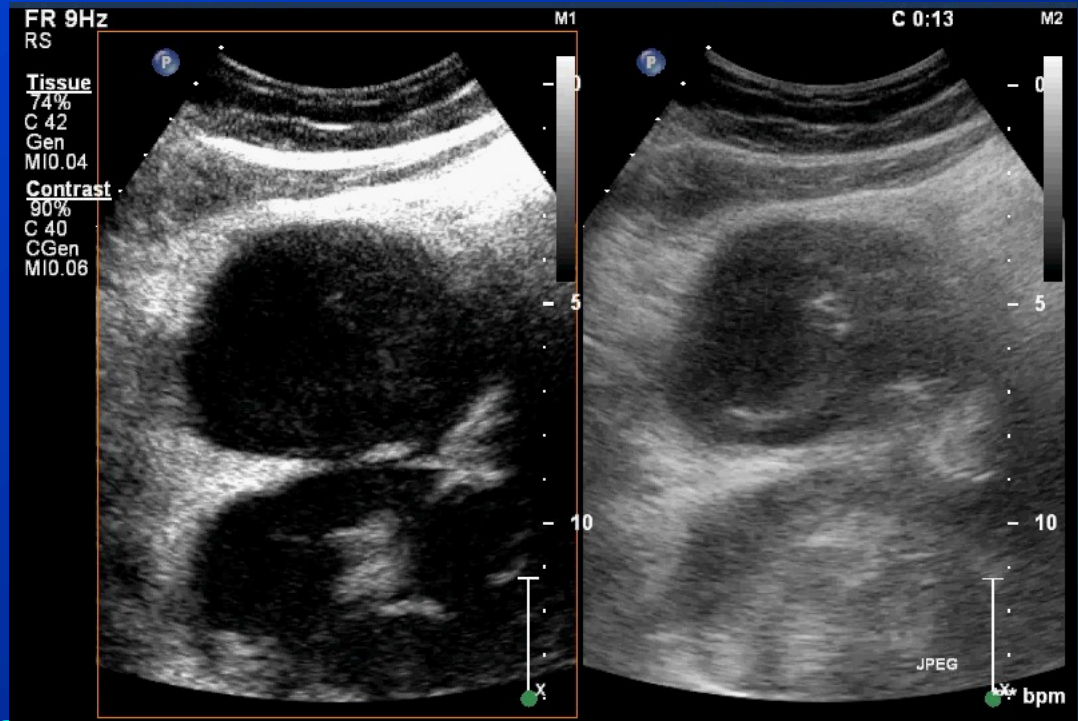
# Chronic Pancreatitis – Twinkling artifact





# Pancreatic pseudocyst

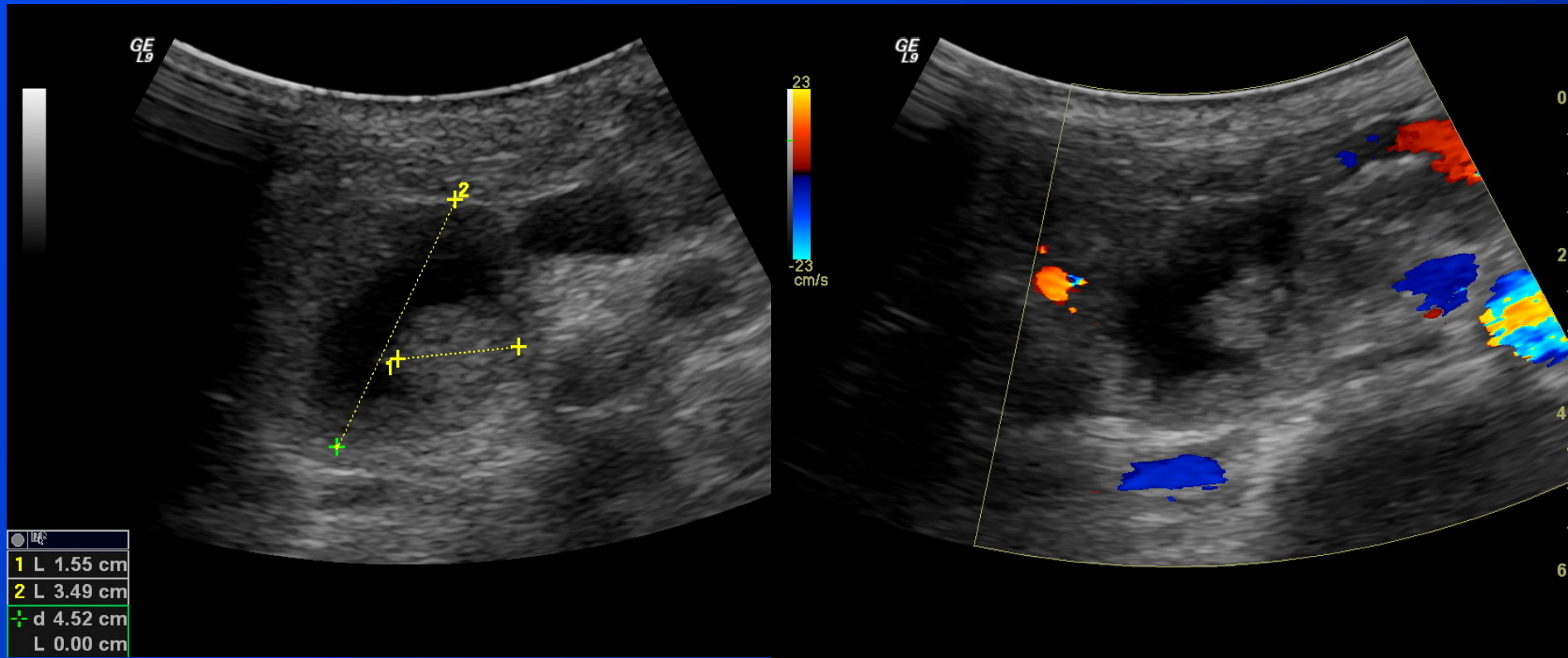
- A pancreatic pseudocyst is a circumscribed collection of fluid with no capsule rich in pancreatic enzymes, blood, and necrotic tissue, typically located in the lesser sac of the abdomen





# Extreme duct dilatation in chronic pancreatitis

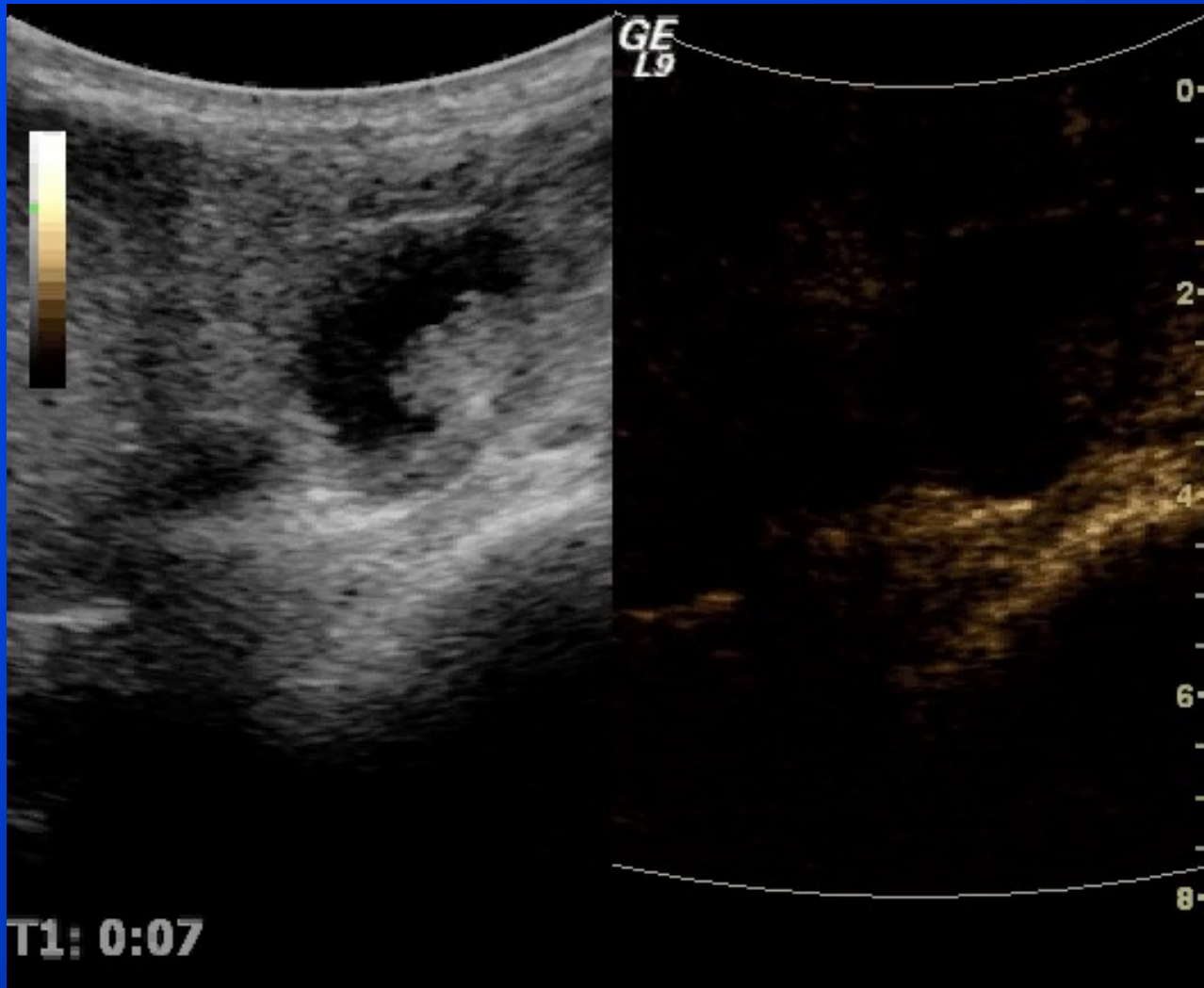
## Male, 71 years







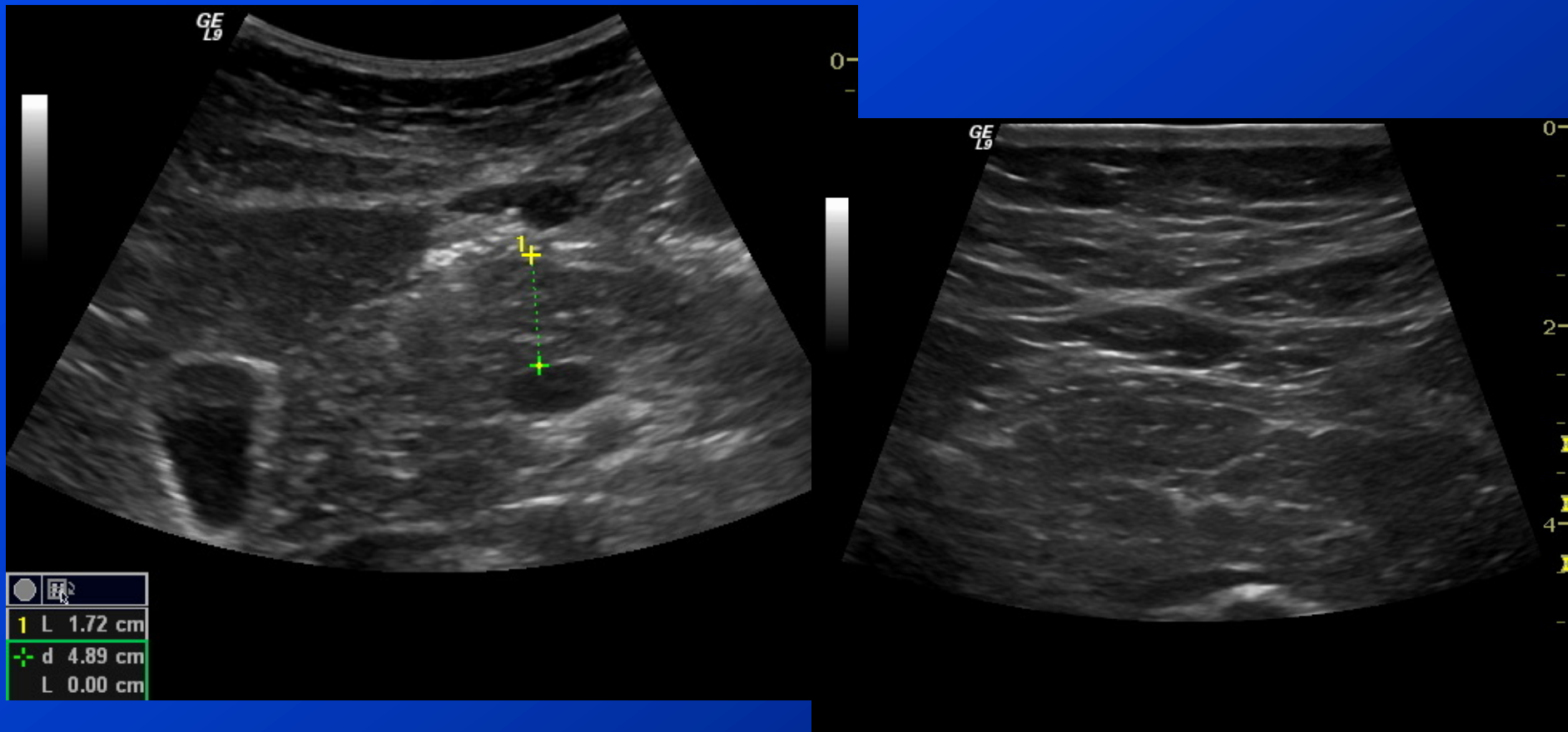
# CEUS of the Pancreas



IPMN? Intraductal Papillary Mucinous Neoplasia

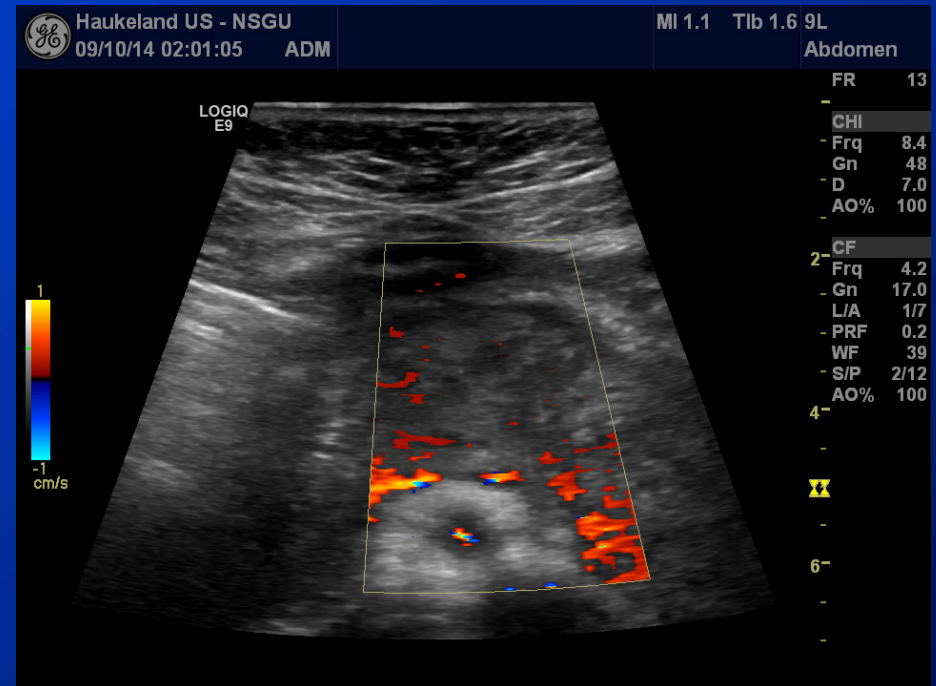


# Autoimmune Pancreatitis



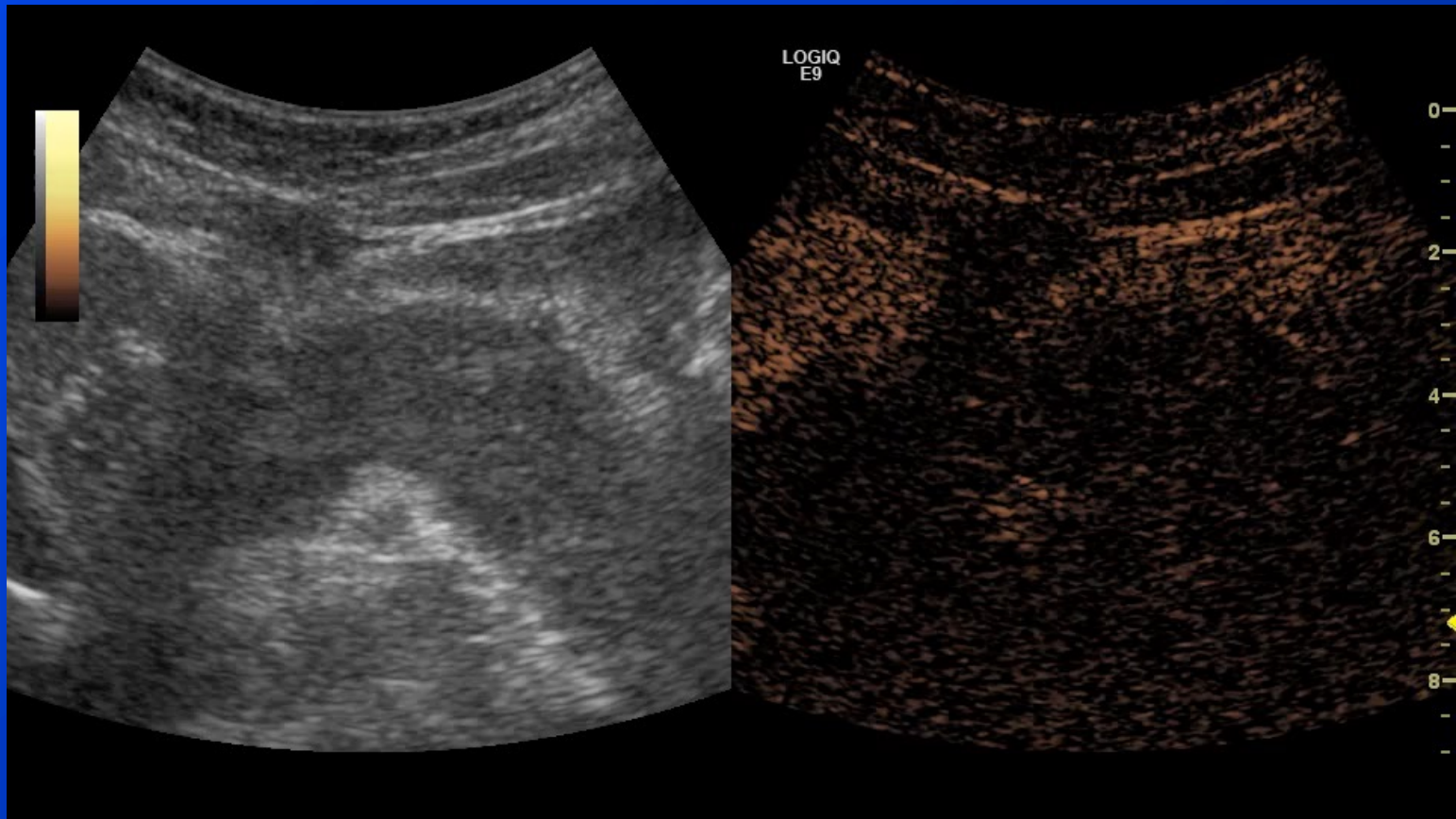


# AIP



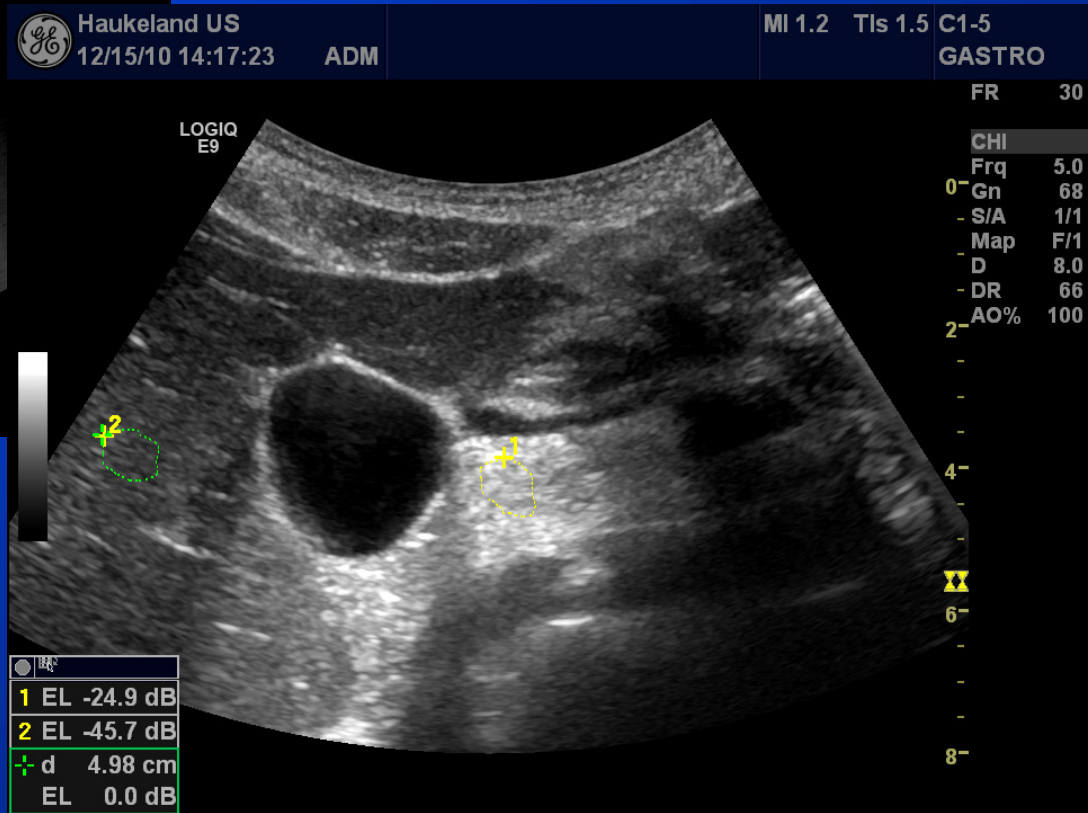
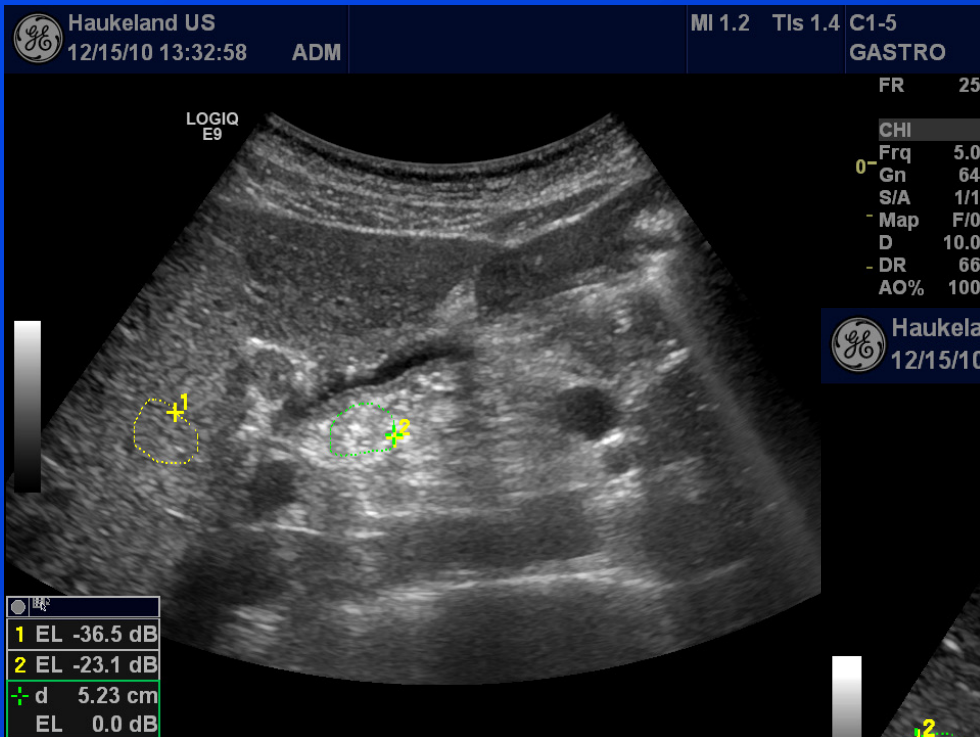


# CEUS – SNZ – Arterial phase





# Lipomatosis in Cystic Fibrosis





# Pancreatic tumors

- True cysts
- Cystadenomas
- Cystadenocarcinomas
- Adenocarcinomas
- Lymphomas
- Endocrine tumors
  - Insulinomas
  - Gastrinomas

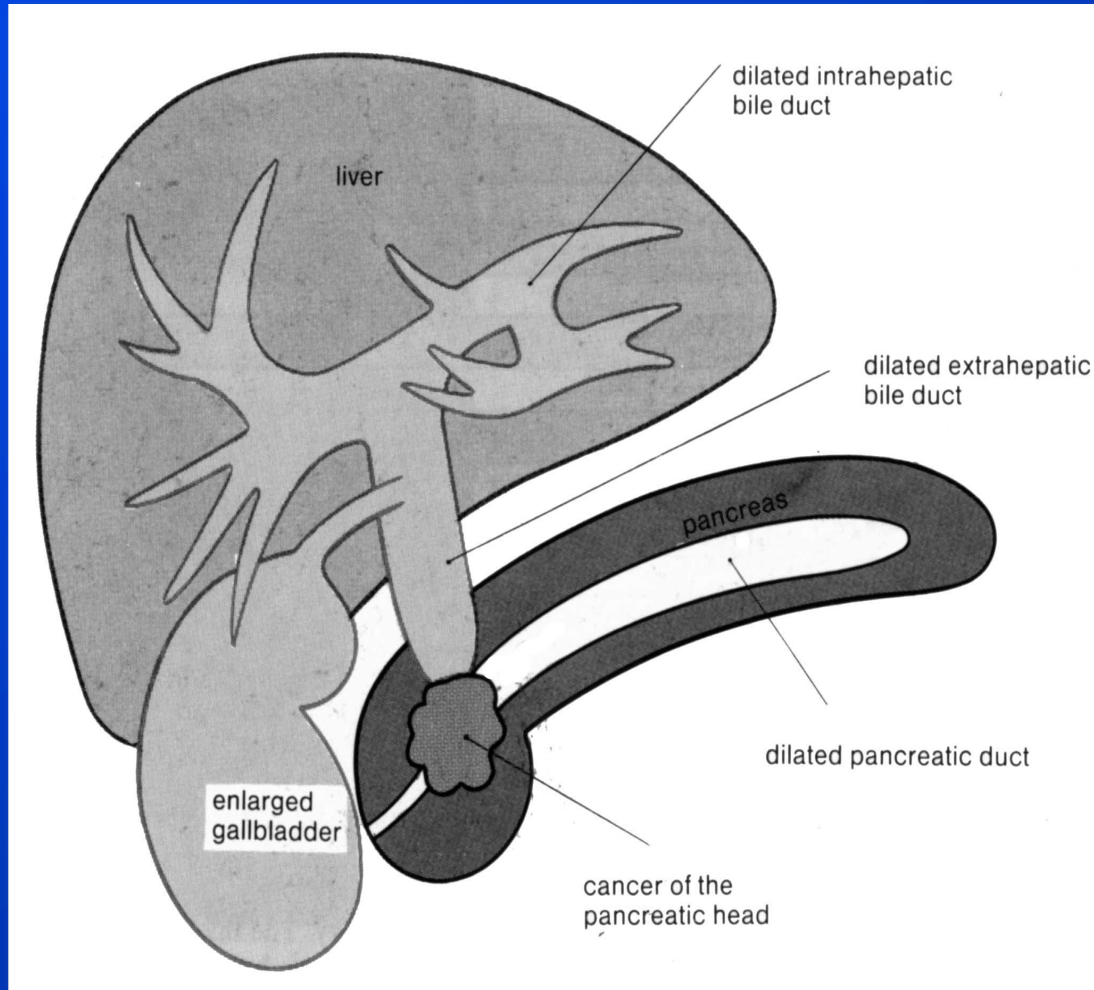


# Pancreas Cystadenom





# Tumor in the pancreatic head







# Pancreatic cancer

- Pancreatic adenocarcinoma represents 95% of all pancreatic carcinomas
- Head 61%
  - Here US may detect tumors as small as 1.0 cm or even smaller when both duct systems (CD and PD) are dilated ("double duct system")
- Body 13%
- Tail 5%
- Combination 21%
  
- US detect pancreatic cancer with approximately 70 – 95% sensitivity and more than 90% specificity



# Cancer of the Pancreas



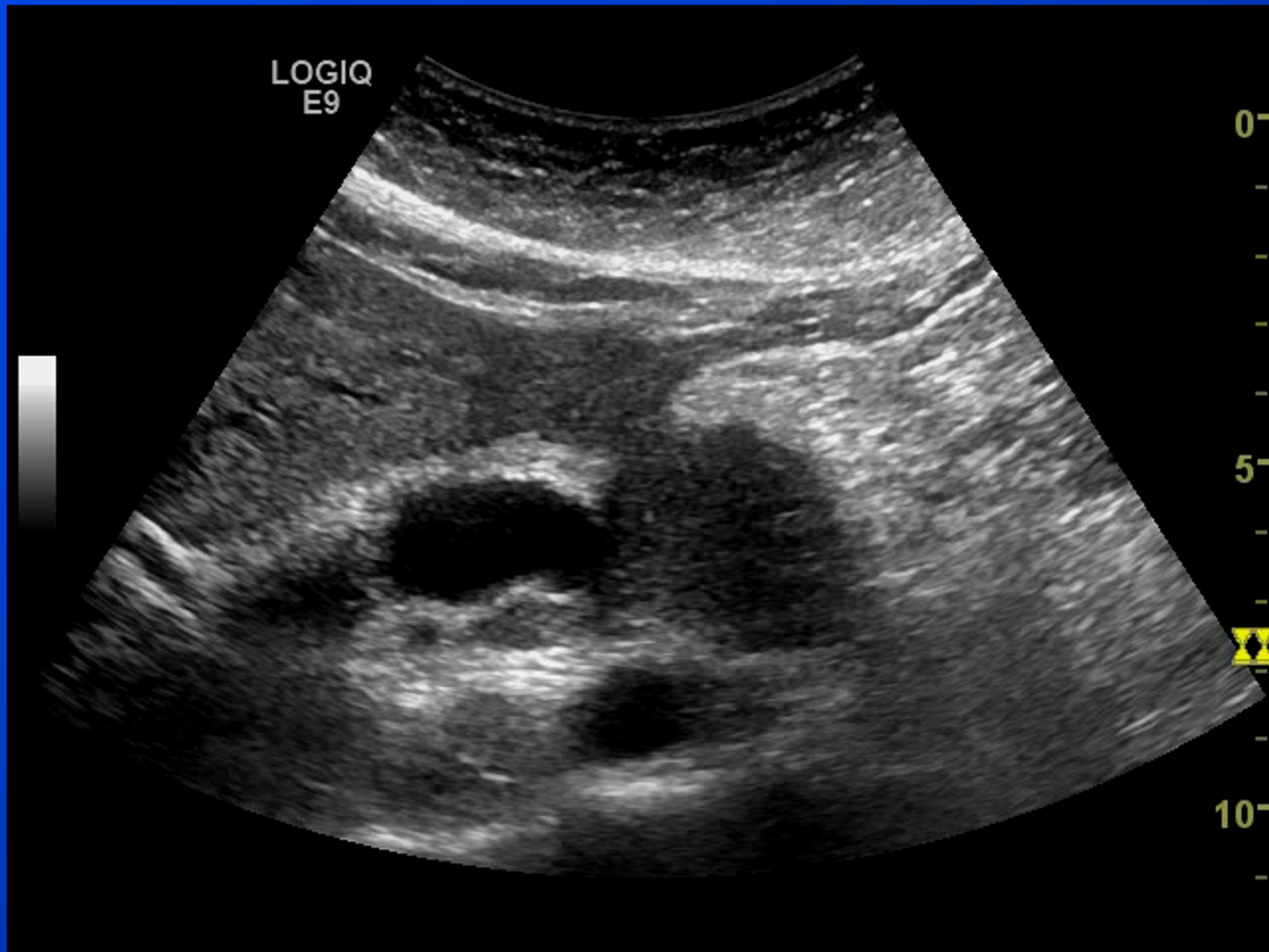


# Cancer corporis pancreatis



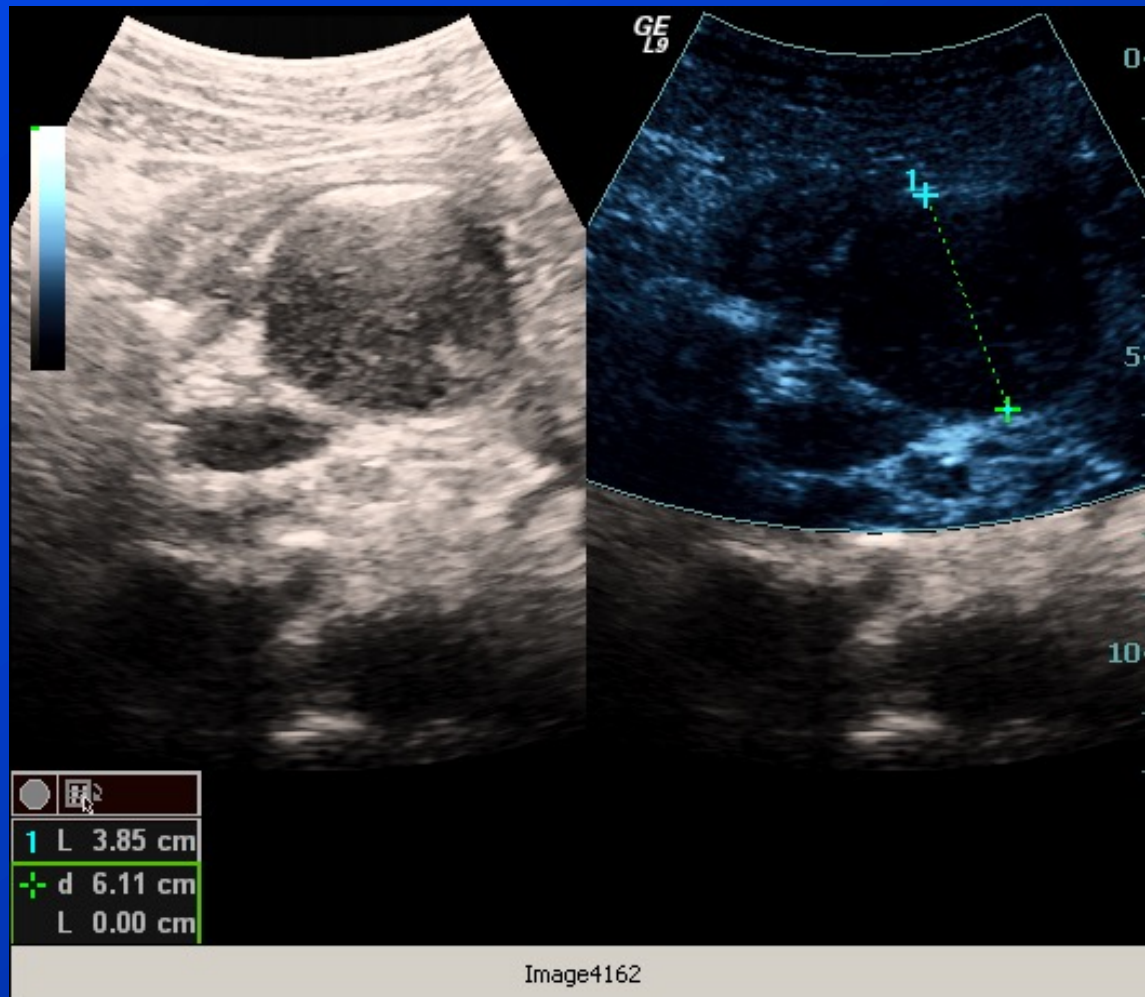


# Pancreatic Cancer





# CEUS of Arterial Phase



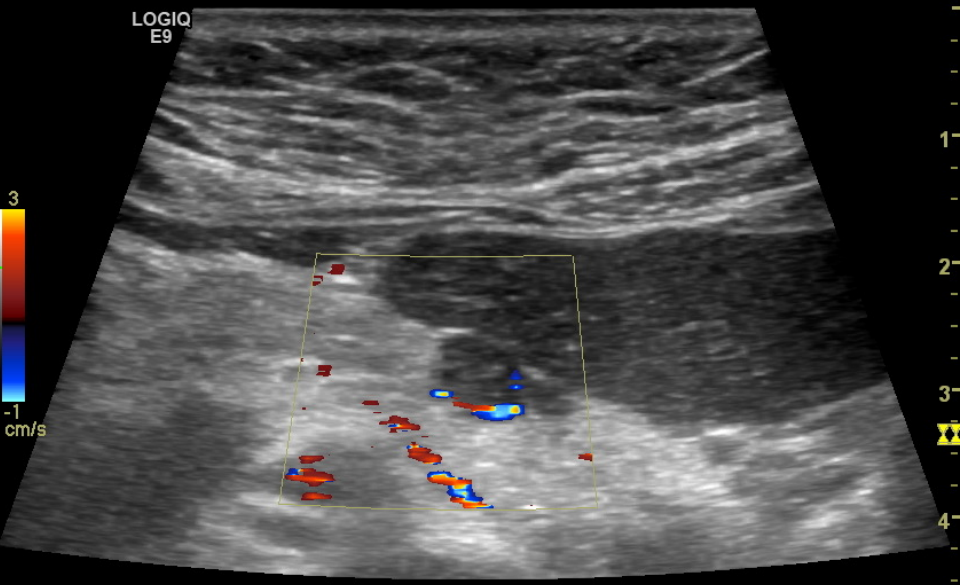
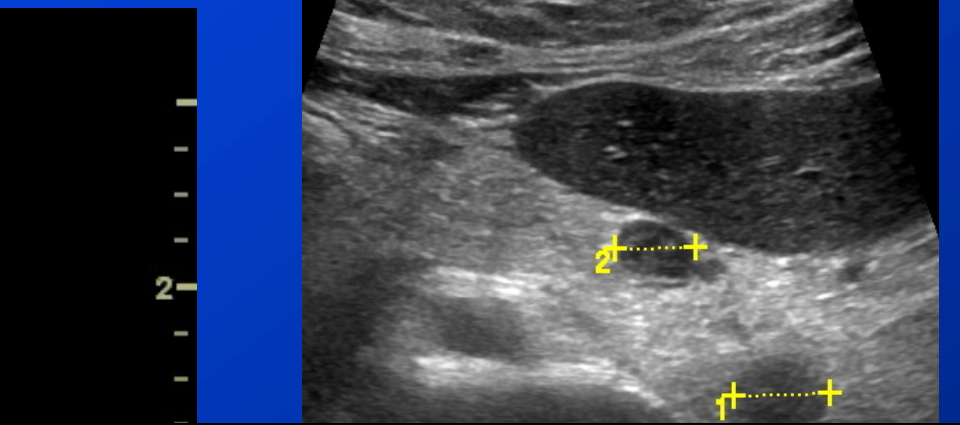


# Patient History

- Female, born 1961
- Watery diarrhea since spring 2009
- Weightloss 10 kg
- CT: One lesion in the tail of the pancreas
- EUS: Showed 2 lesions in the pancreas
- External ultrasound...

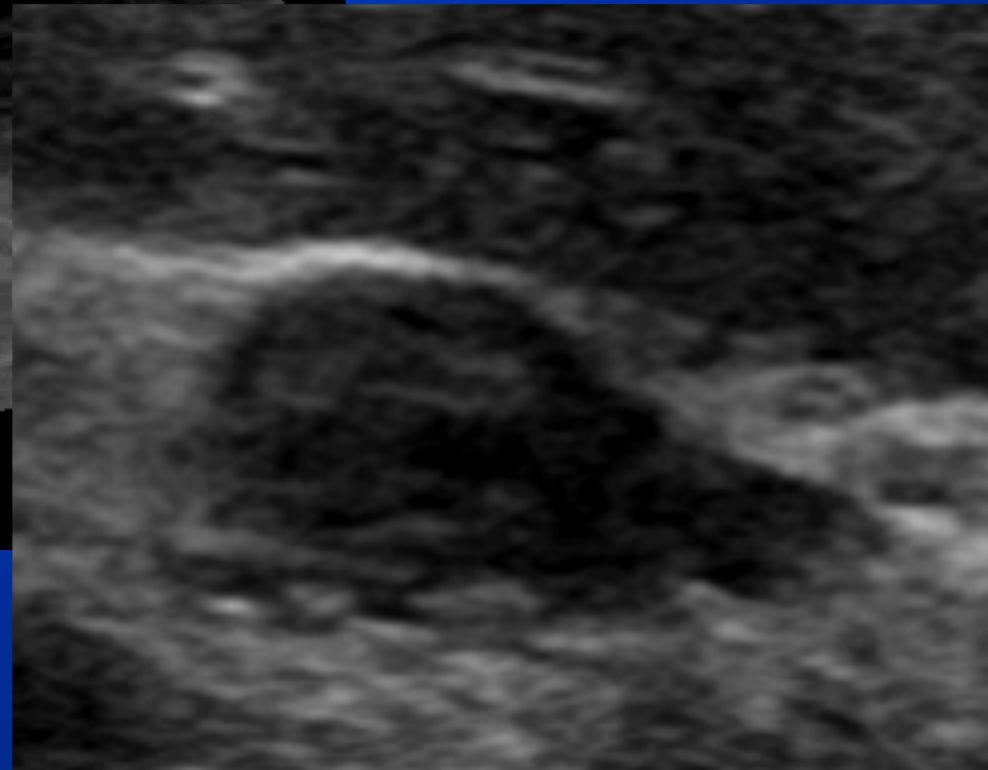
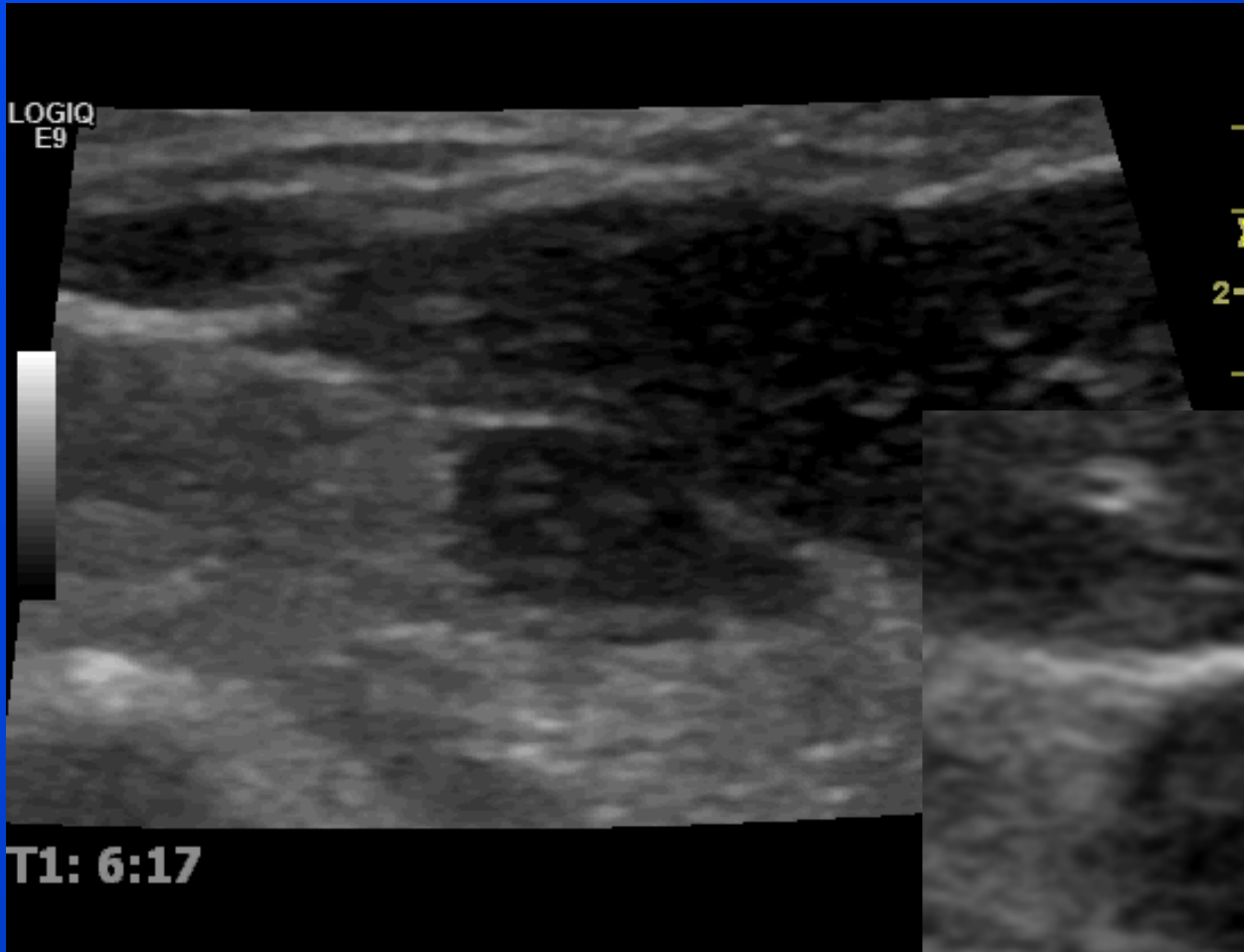


# B-mode Pancreas: 4 Lesions !





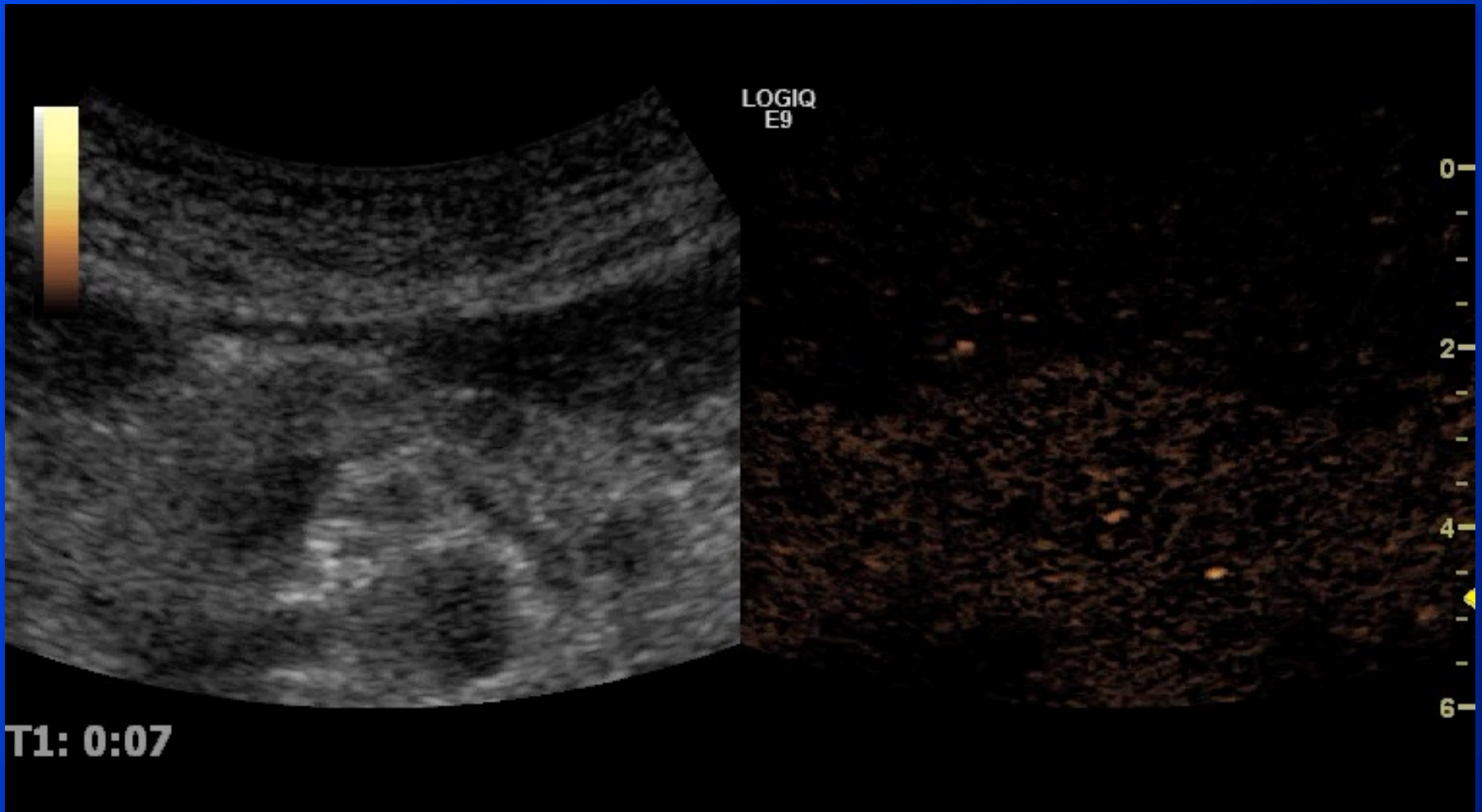
# Tumor with Cystic Components





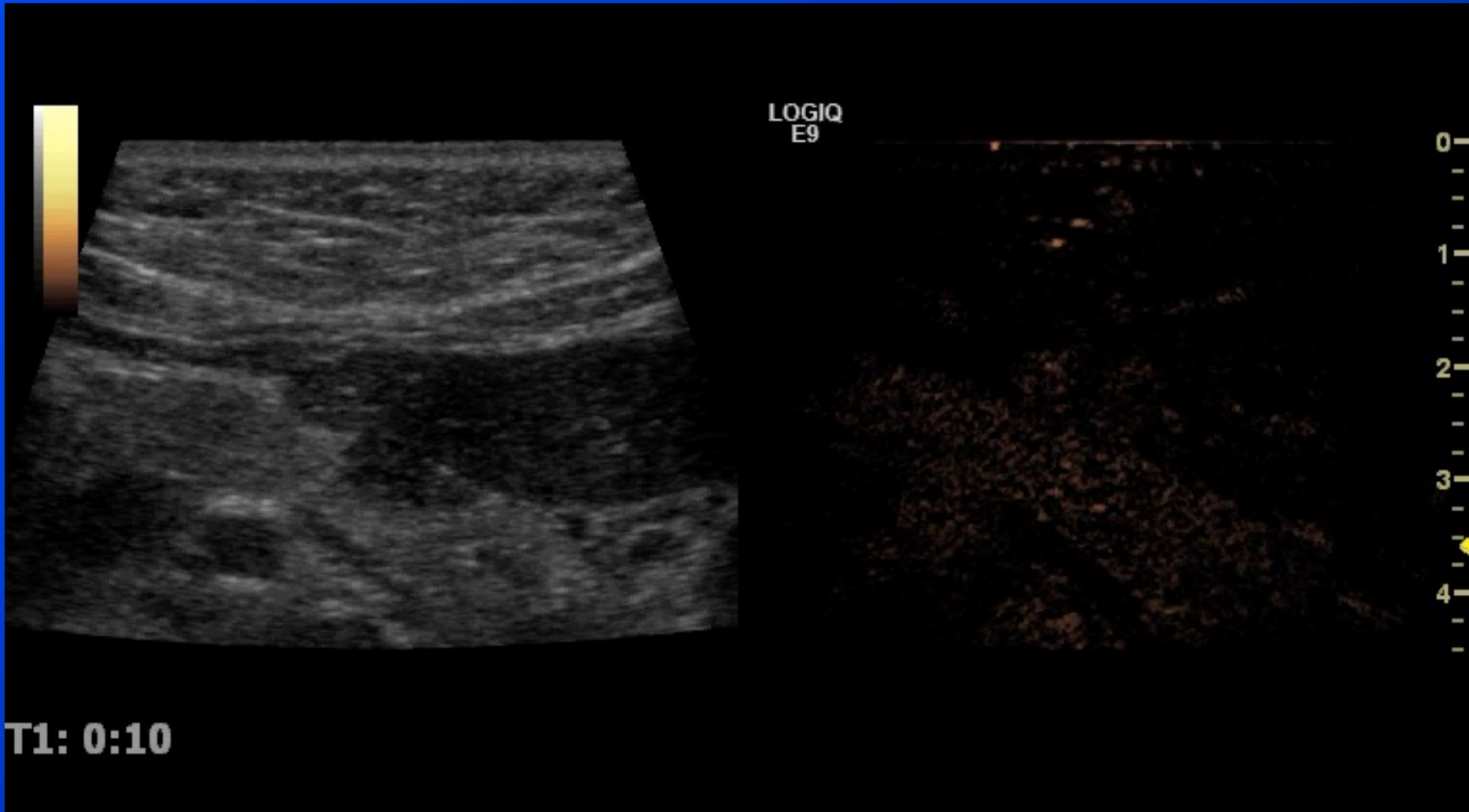


# CEUS with 3,5 MHz CLA probe





# MEN-1 Pancreatic Tumor





# Conclusion

- In most patients, ultrasound enables detection and follow-up of pancreatic inflammatory lesions and focal lesions
- Adding CEUS may help in characterisation of lesions, particularly to detect avascular areas
- CT and/or EUS is often required for a complete work-up of the patient



# Dangerous or not ?

