

# ULTRASOUND ASSESSMENT OF THE PANCREAS

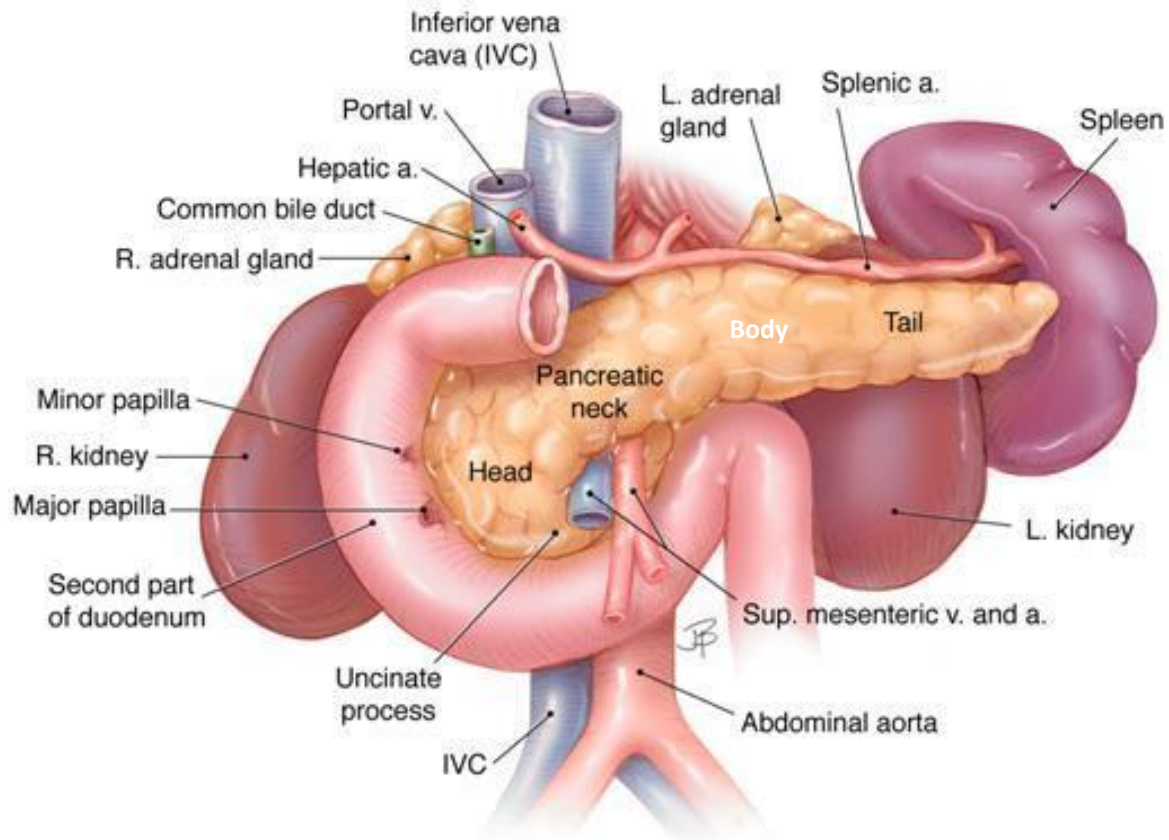


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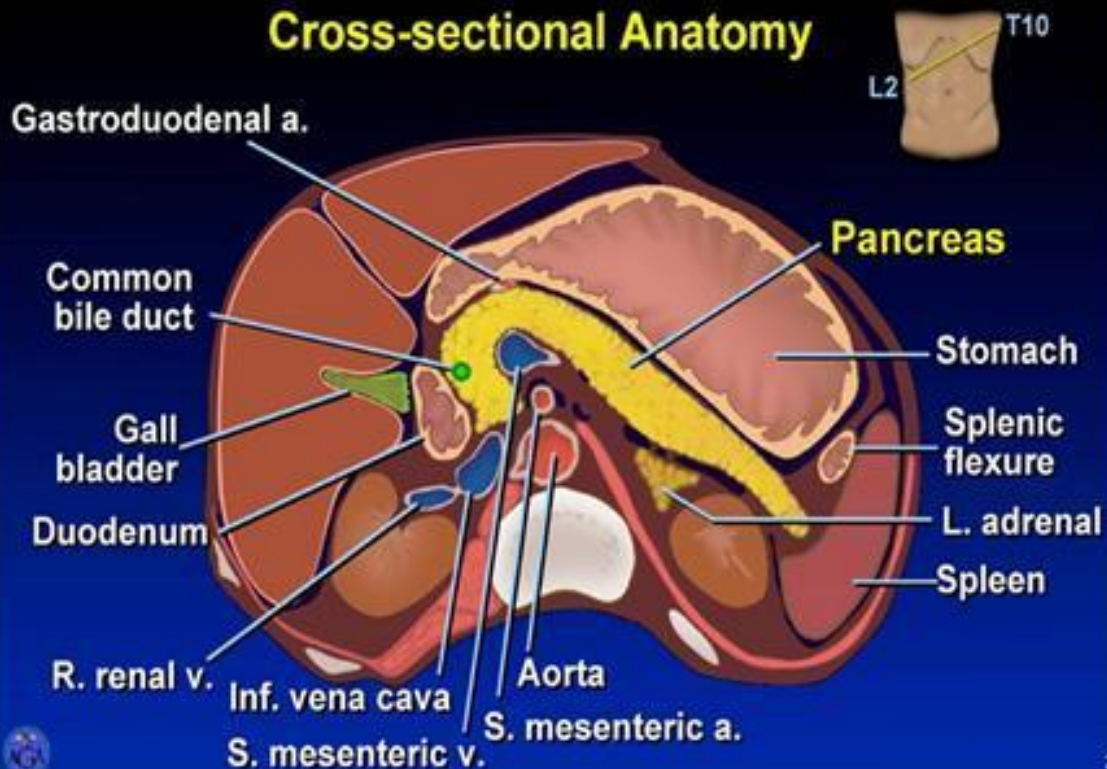


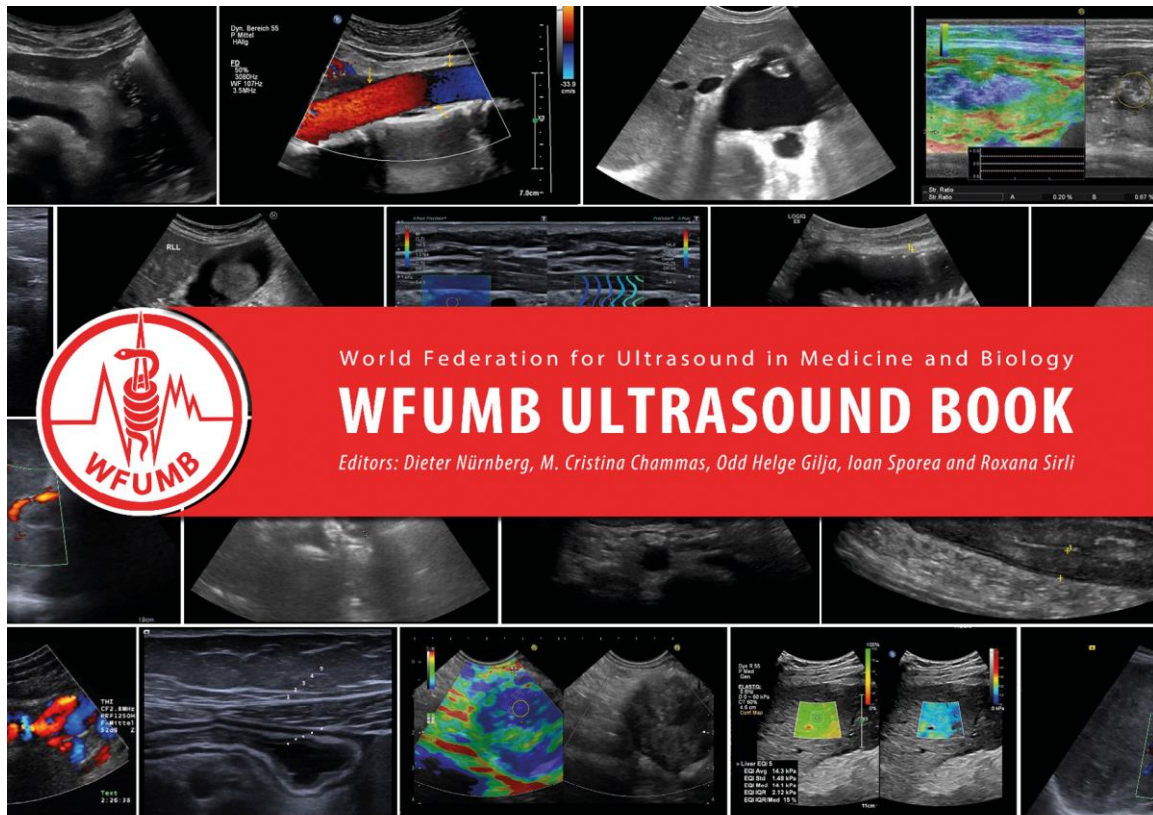
**ULTRASOUND**  
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**TIMIȘOARA**

“Victor Babeș” University of Medicine and Pharmacy Timișoara, Romania



## Cross-sectional Anatomy





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## 8. Ultrasonographic Evaluation of the Normal Pancreas

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**Keywords:** Normal pancreas, Ultrasound anatomy, Pancreatic ultrasonography

### 8.0. Introduction

The study of the pancreas by imaging methods has always represented one of the most difficult challenges, especially for beginners. Pancreatic ultrasonography (US) is the method of choice in the initial approach to diagnostic imaging in patients with clinical suspicion of pancreatic diseases, given its versatility, speed and ease of execution.

Pancreas US is of great importance in every day practice, but it is necessary to carry out hundreds of pancreatic exams before being able to distinguish between normal and pathological pancreas, and to correctly interpret images.

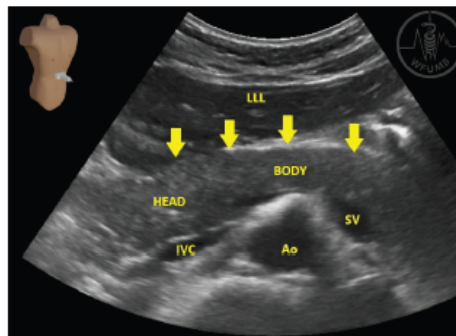
### 8.1. Examination technique

The pancreas is examined using convex transducers, with a fundamental frequency of 3.5 MHz, ranging from 2 to 6 MHz. Linear transducers of higher frequencies can be used to observe organ contour or in very slim persons.

In order to reduce diagnostic errors, especially false negatives, the examiner should be highly skilled and trained in US anatomy, to be able to perform a systematic US examination to overcome the anatomically complex relations of the pancreas with the stomach and the colon. It is worth mentioning that this exam requires extreme persistence and discipline from the examiner.

Given the pancreatic topography, specific acoustic windows should be used. The best ultrasound window is obtained by using high epigastric transverse sections (which avoid the colon), also by using transgastric transverse sections or incidences which use the left liver lobe as an acoustic window (Fig 8.1a).

There are two major factors preventing optimal visualization of the pancreas: obesity and interfering gastrointestinal gas. In may also be necessary to create a better acoustic window (by still water ingestion), in order to enable adequate diagnostic performance.



**Fig 8.1a**  
Transverse view of the pancreas - normal echogenicity. The left liver lobe was used as the acoustic window

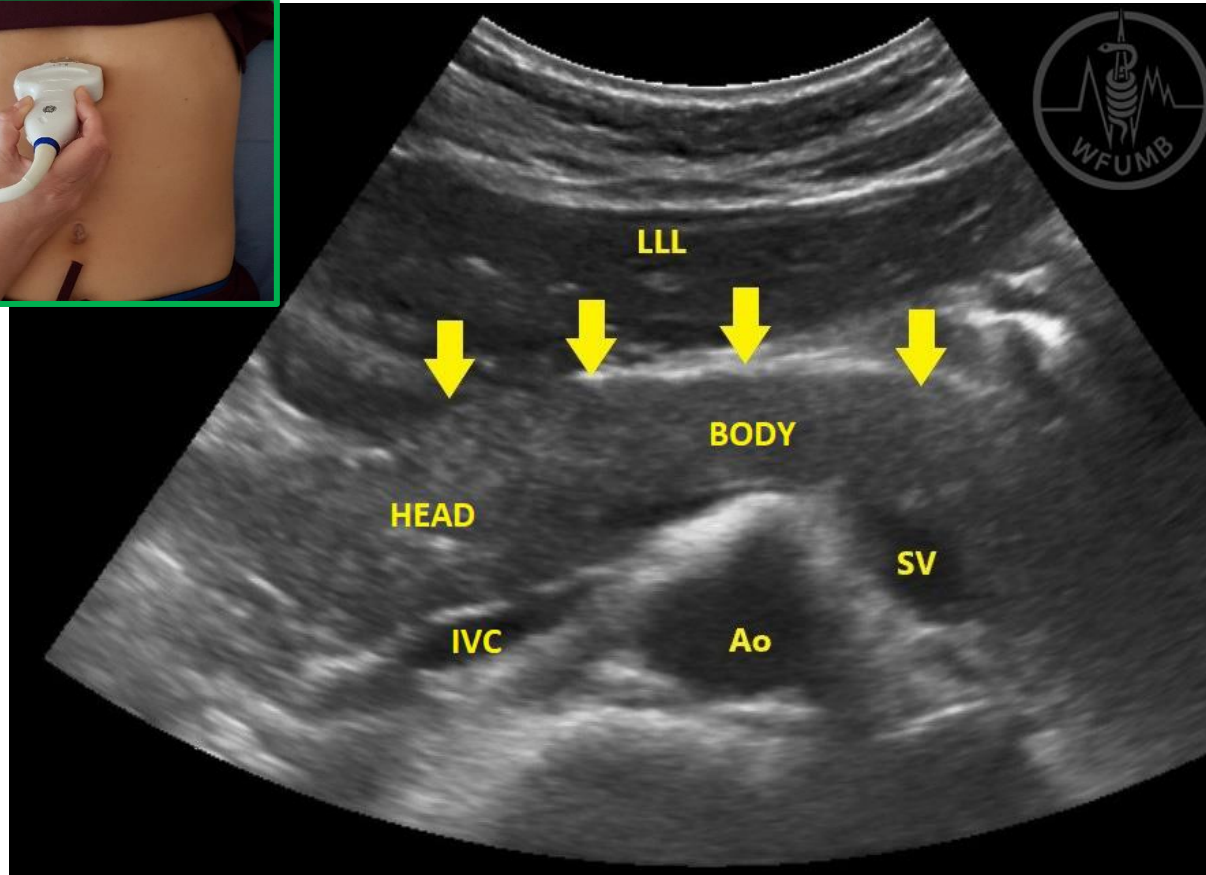
#### 8.1.1. Preparation

The preparation includes a 4-6 hour fasting period before the US examination. Ingestion of liquid is allowed, as long as it does not include carbonated fluids (the gas as well as the food in the stomach can make difficult or even prevent a proper examination of the organ).

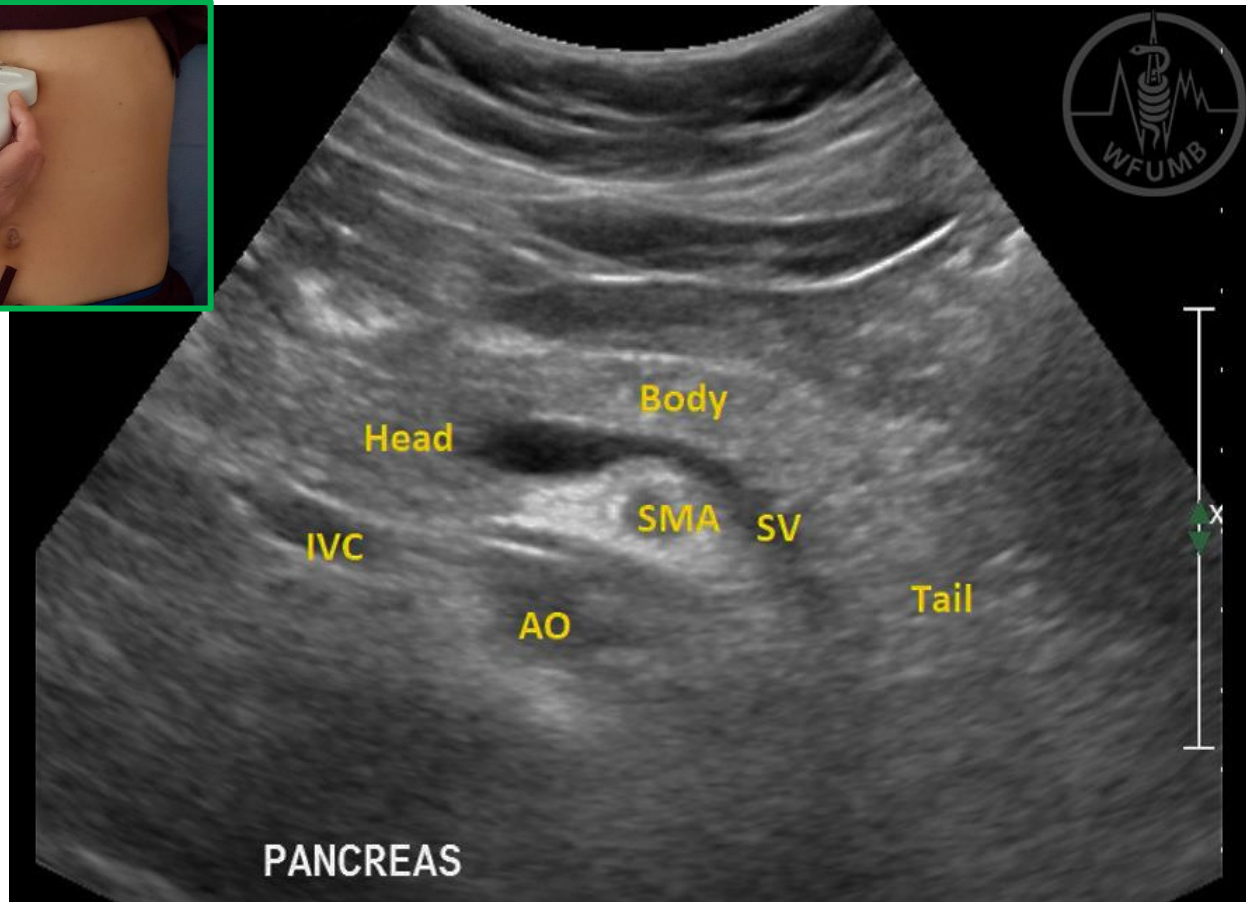
If the examination is performed in emergency, fasting can be waived. Often it is necessary to fill the stomach with water or other fluids to be able to visualize the pancreas (Fig 8.1b). Hence, in practice, when the pancreas is difficult to visualize, the patient is invited to drink 500-700 mL of still water and examined 10-15 minutes later. If the examination were to be performed immediately after water ingestion, the stomach would be filled with a hypoechoic and not transonic fluid, due to the small air bubbles that form during swallowing.

Therefore, after 10-15 minutes, once the air bubbles have disappeared and the stomach is filled with transonic liquid, a perfect "acoustic window" is formed for the examination of the pancreas. Sometimes the water is not found in the antrum, especially if the examination is made with the patient in dorsal decubitus. Then the patient should be invited to sit, so that the water gathers in the antrum, which is the ideal anterior landmark of the pancreas.

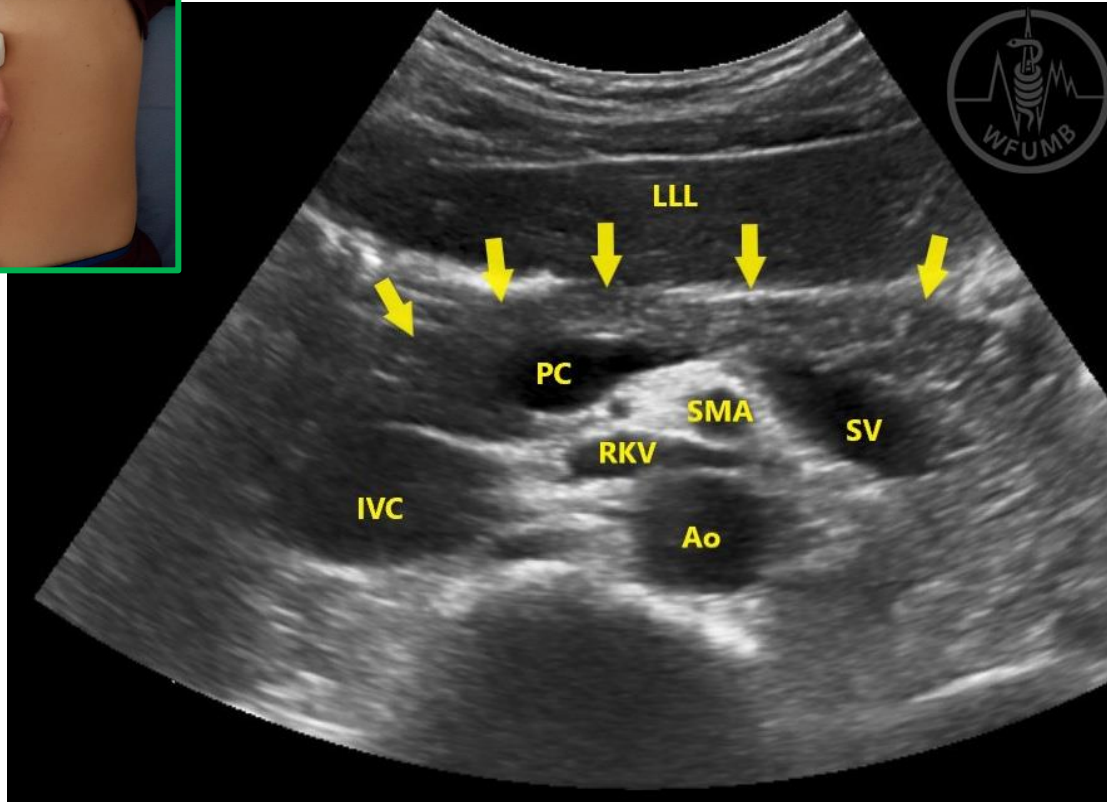
# US normal pancreas



# US normal pancreas

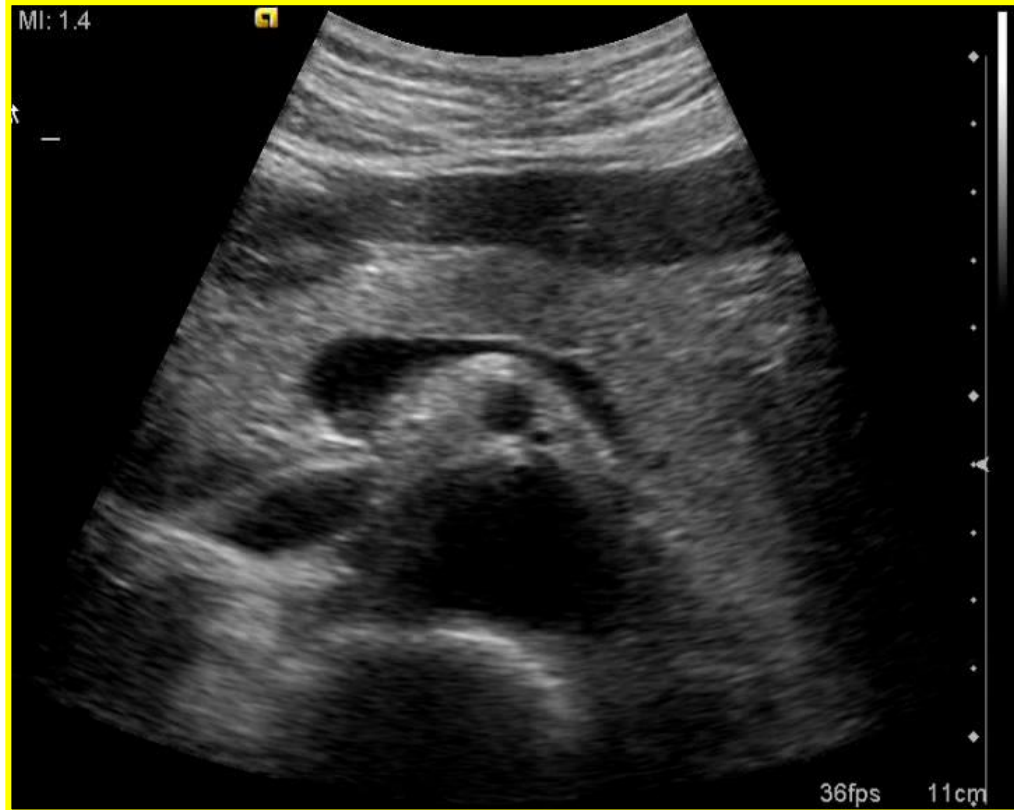
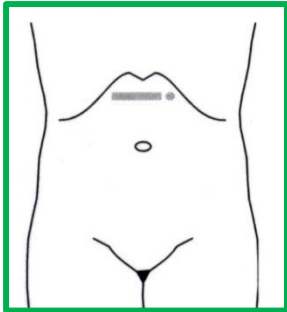


# US normal pancreas- vascular structures

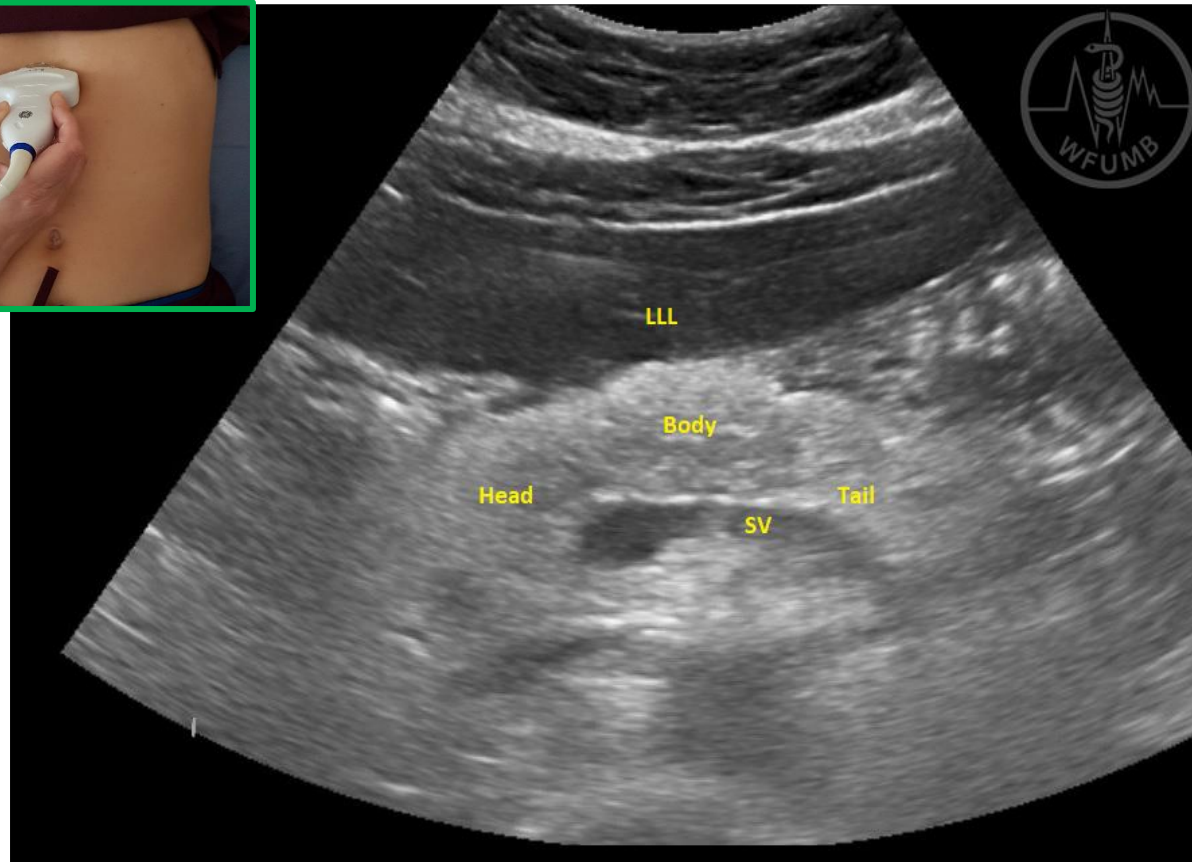




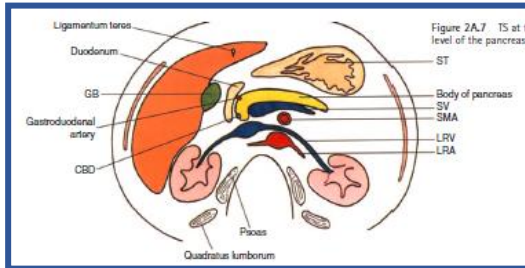
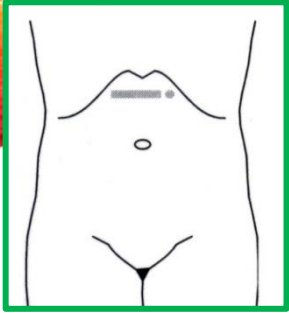
# Normal pancreas- fatty pancreas



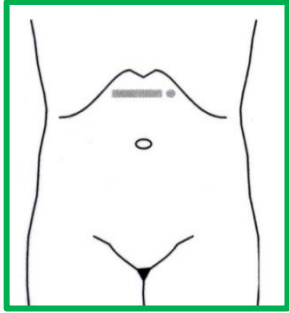
# Lipomatous pancreas (hyperechoic)



# Epigastric transverse section

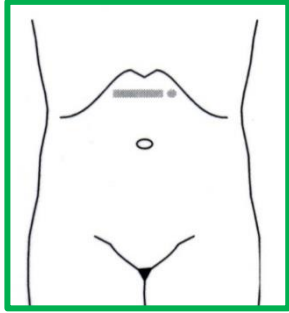


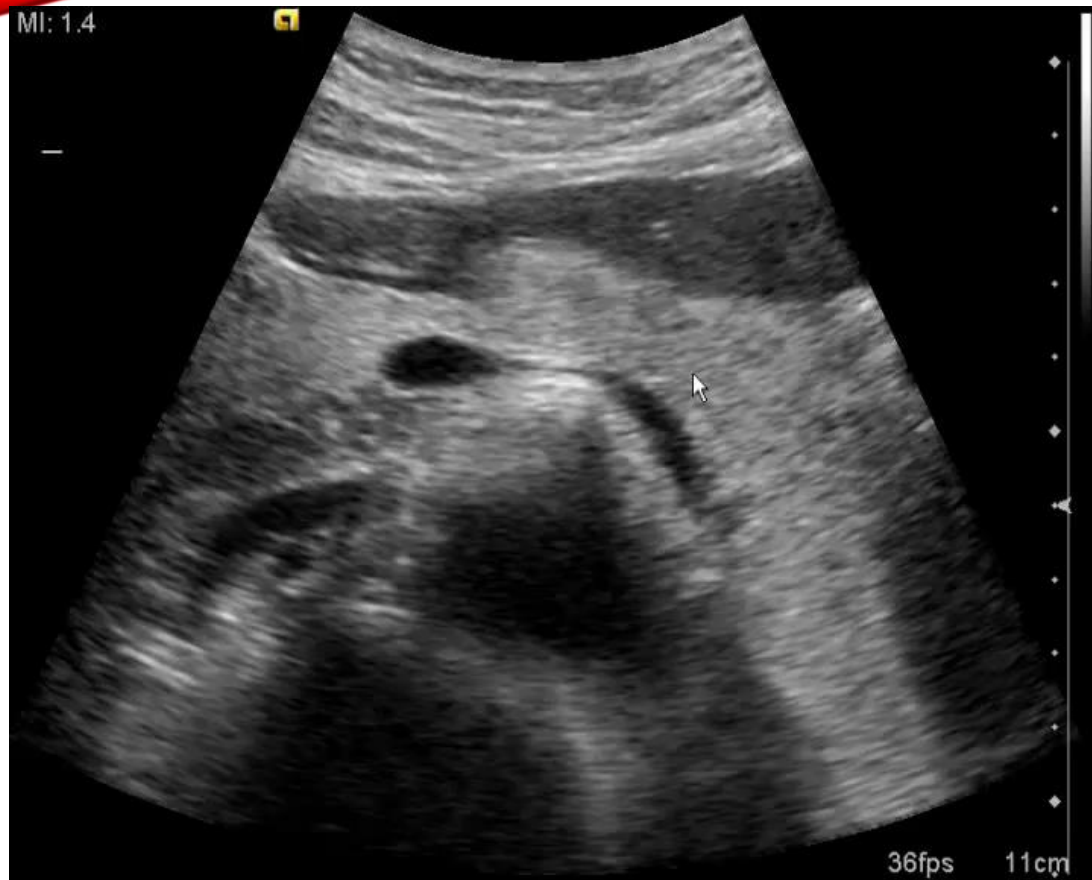
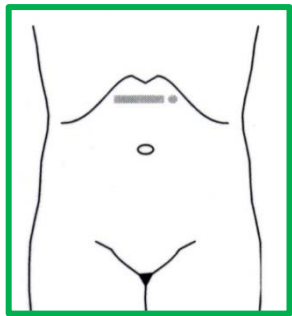
# Epigastric transverse section





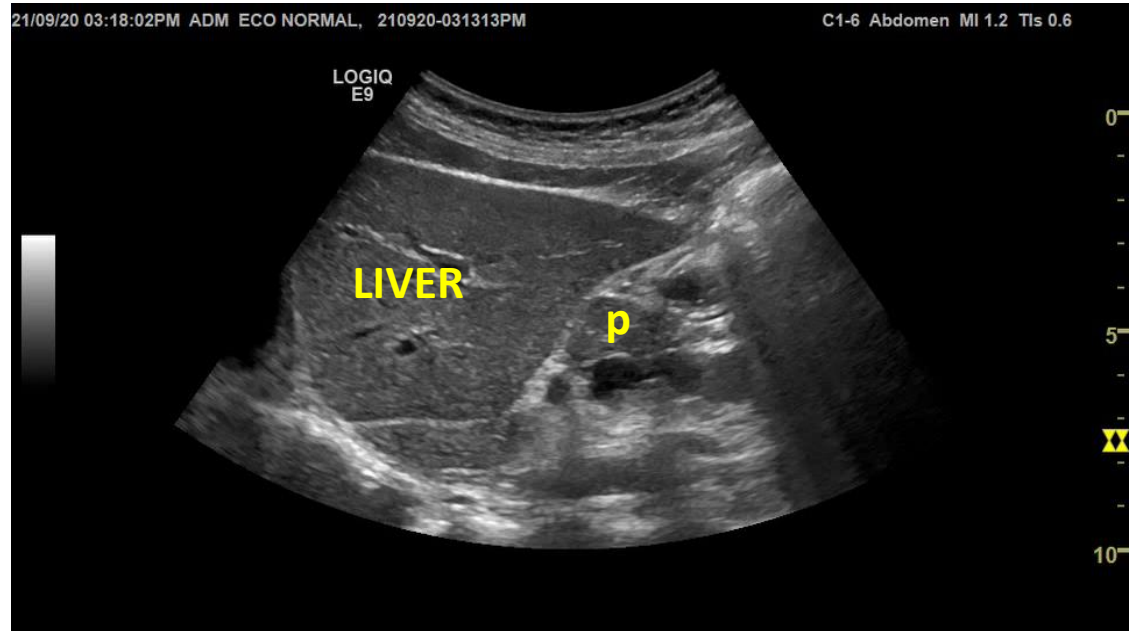
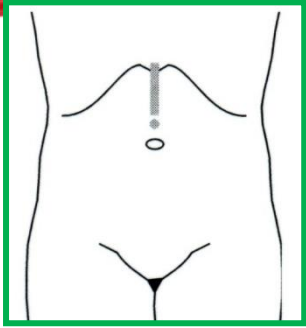
# EPIGASTRIC TRANSVERSE SECTION





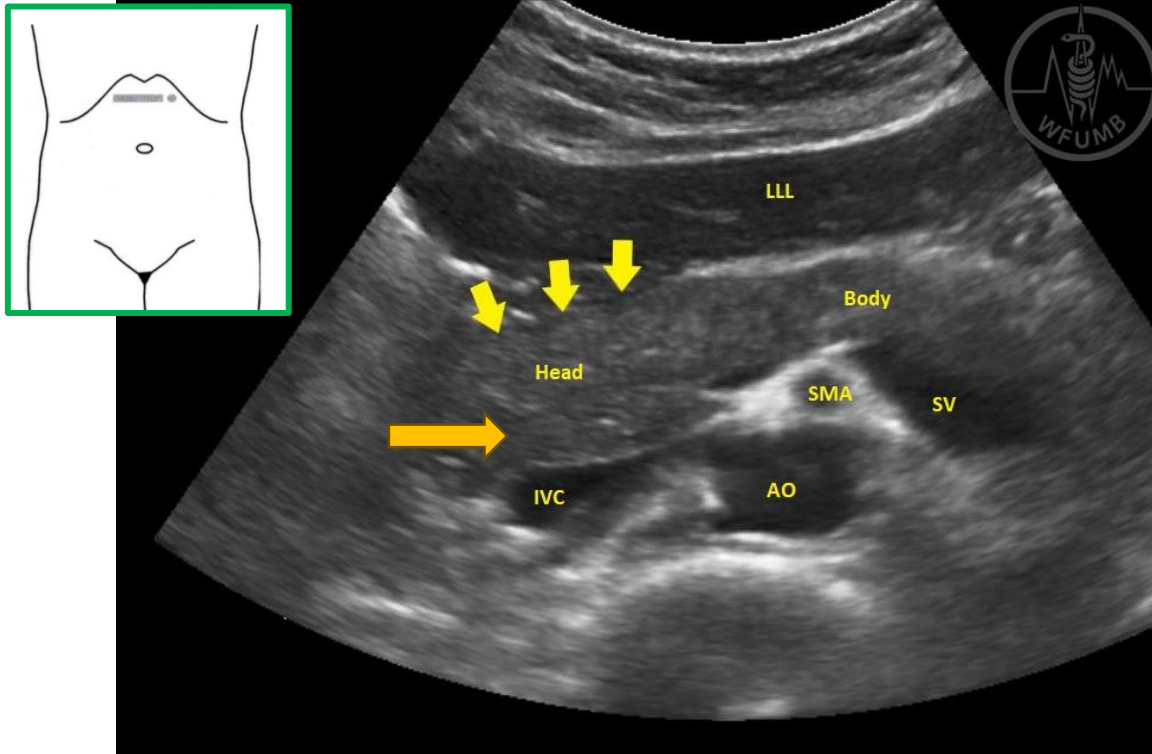


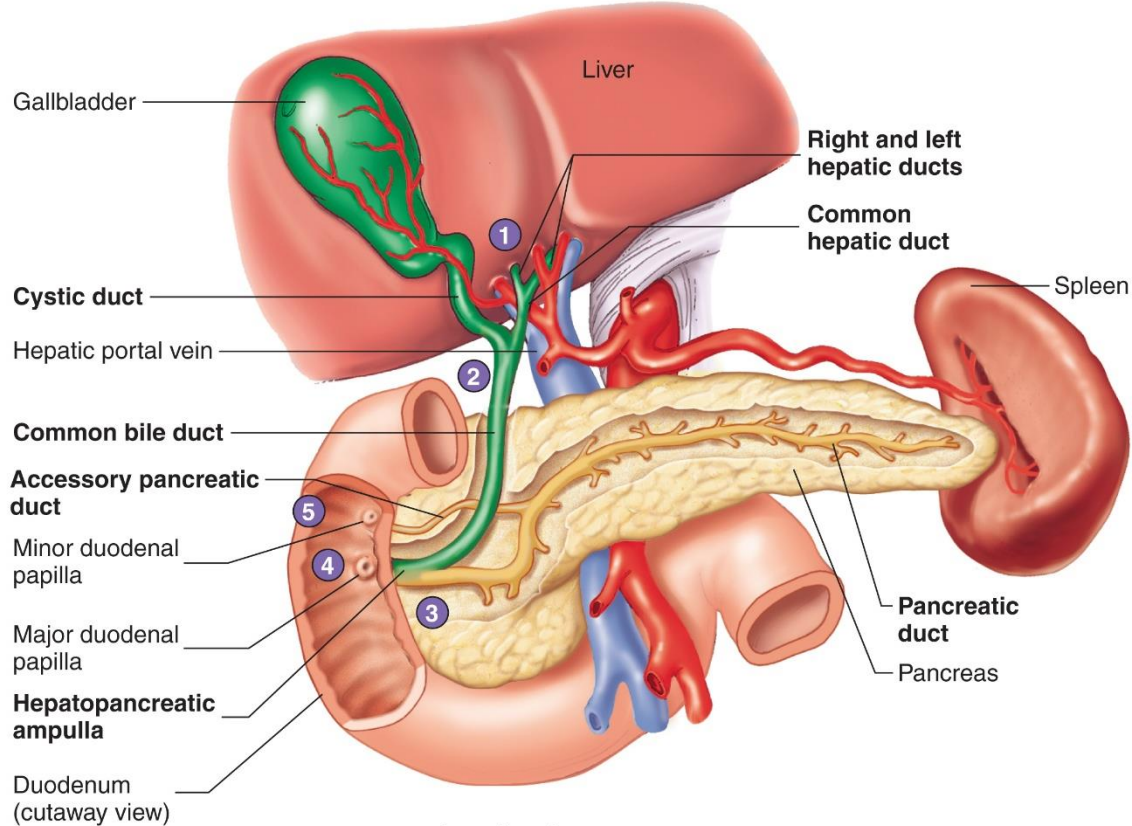
# EPIGASTRIC LONGITUDINAL SECTION





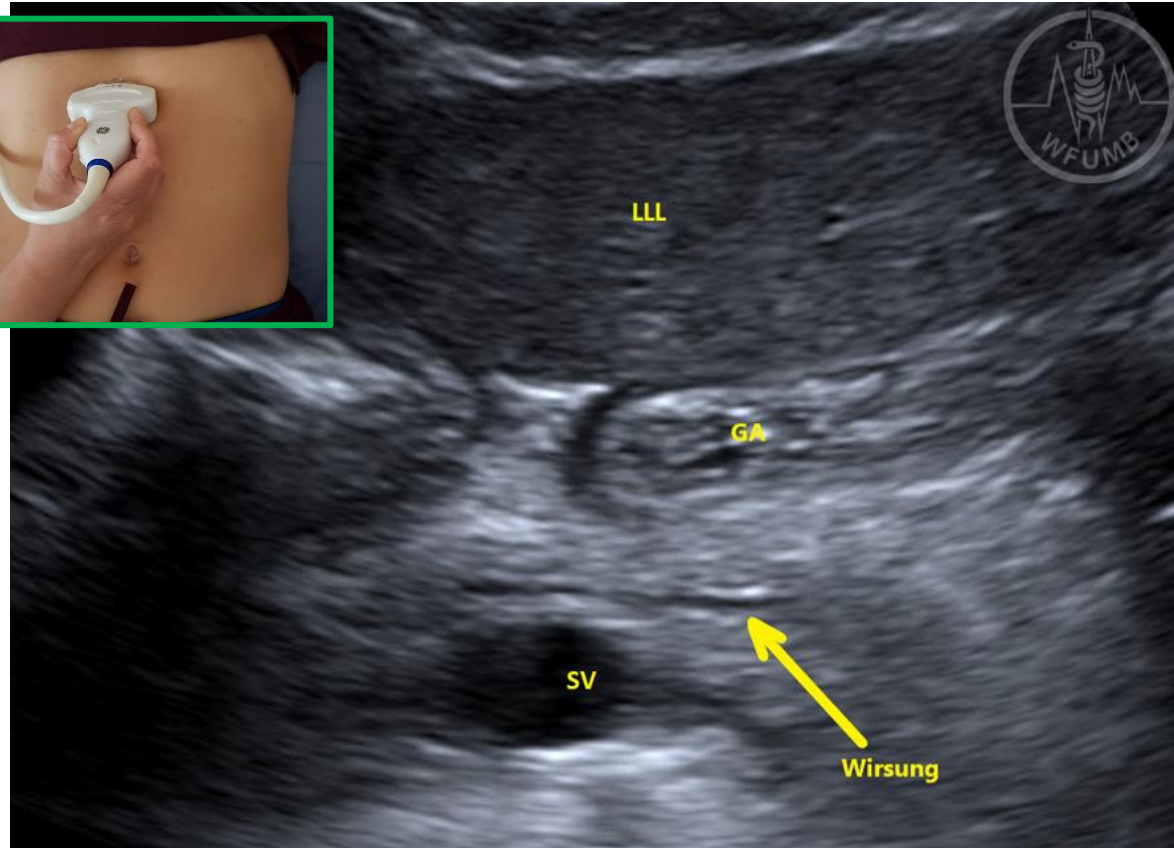
# Head of the pancreas and uncinete processus





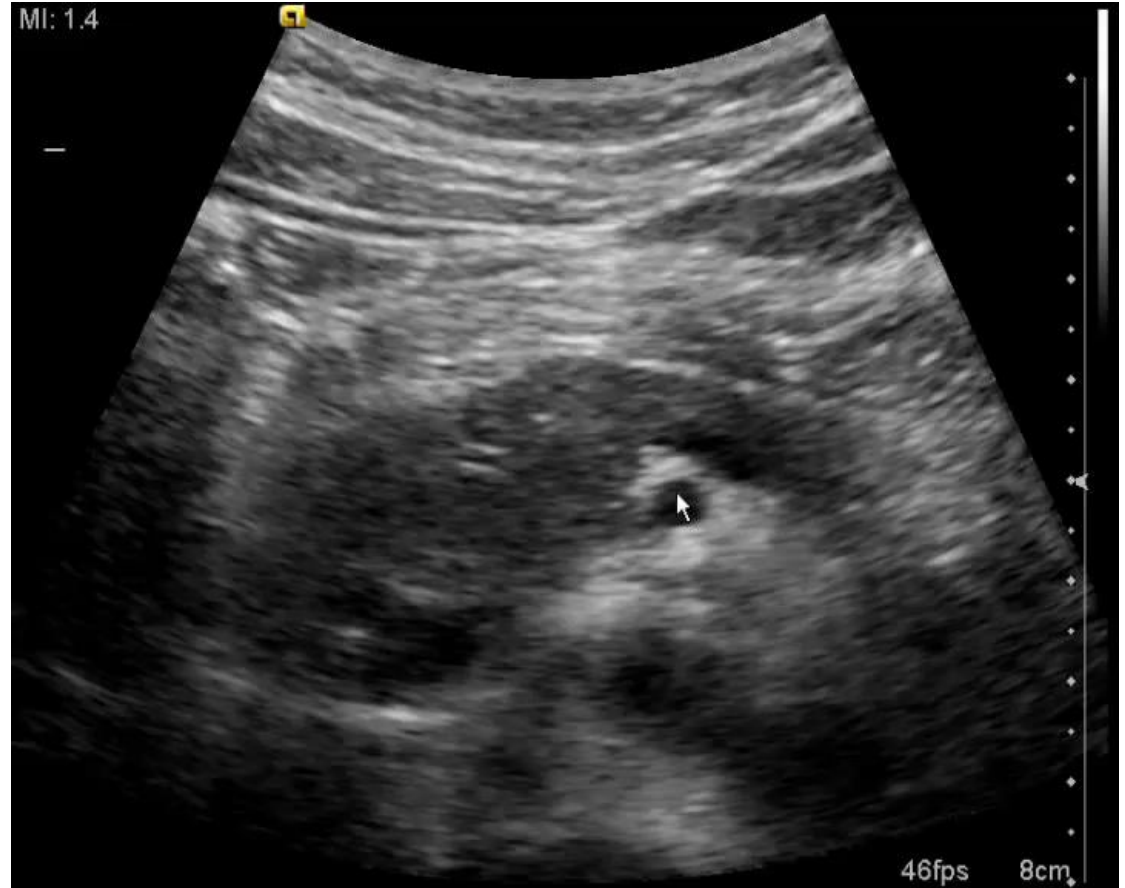
Anterior view

# Wirsung duct – till 2 mm in size



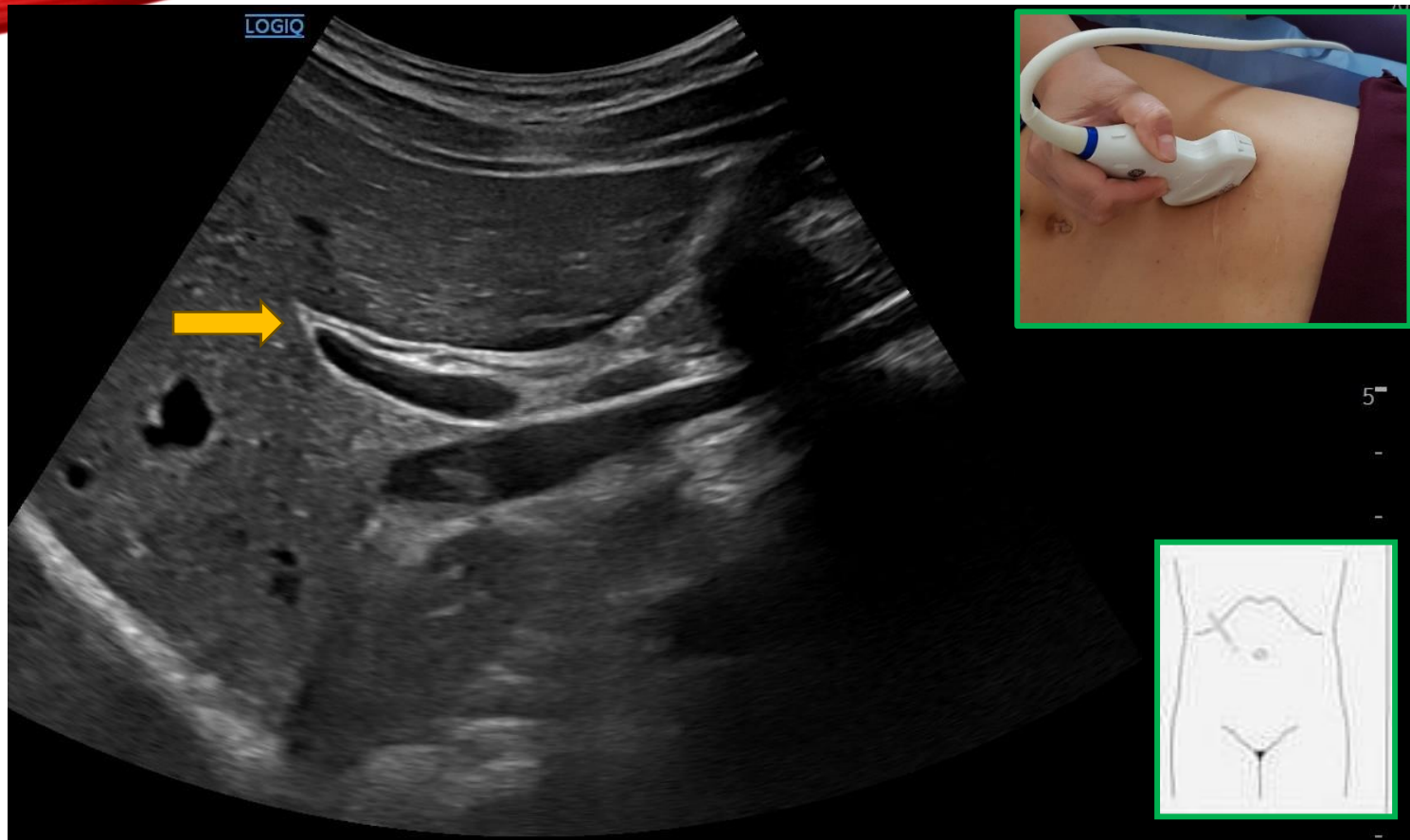
# Wirsung duct

Not More than 2 mm





# MBD: Perpendicular on the ribs for the hilum



Abd Gen  
C5-1  
47Hz  
RS

TIS0.5 MI 1.1

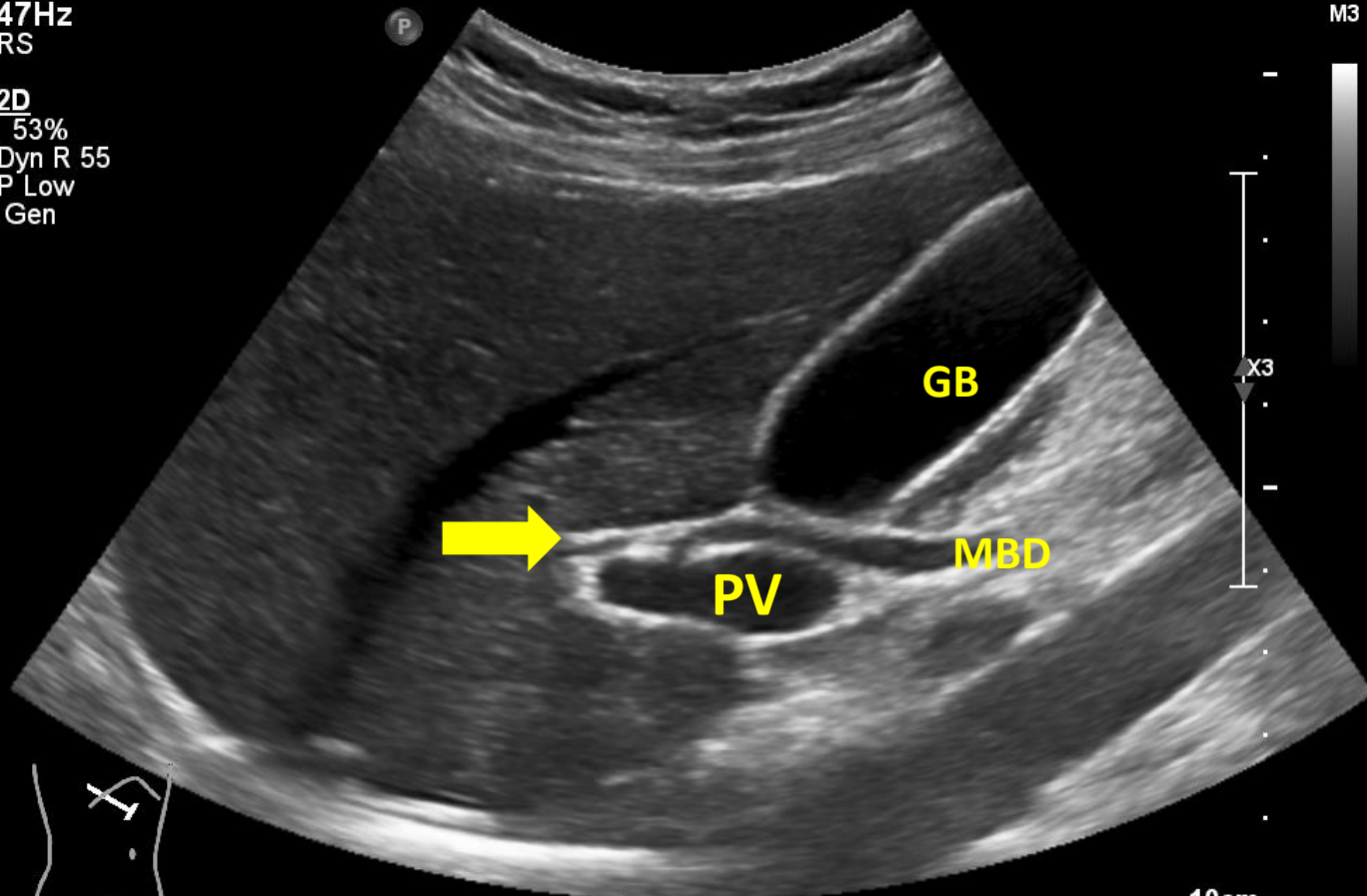
**MBD**

< 7 mm

2D  
53%  
Dyn R 55  
P Low  
Gen

P

M3



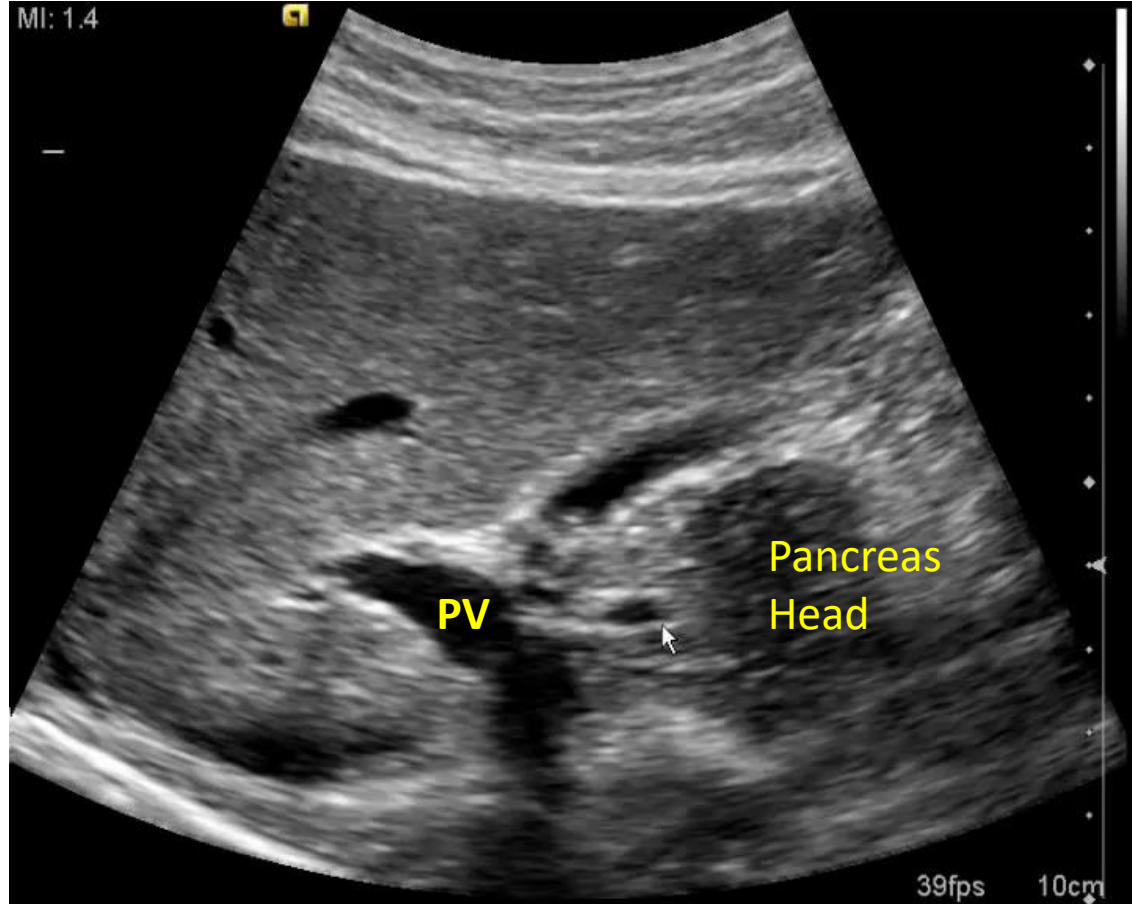
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10cm-

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# Main biliary duct



# Difficulties

- **Bowel gas**
- **Obesity**
- **Lack of acoustic window**
- **Different echogenities related to age and volume of the adipose tissue in the pancreatic parenchyma (fatty pancreas)**

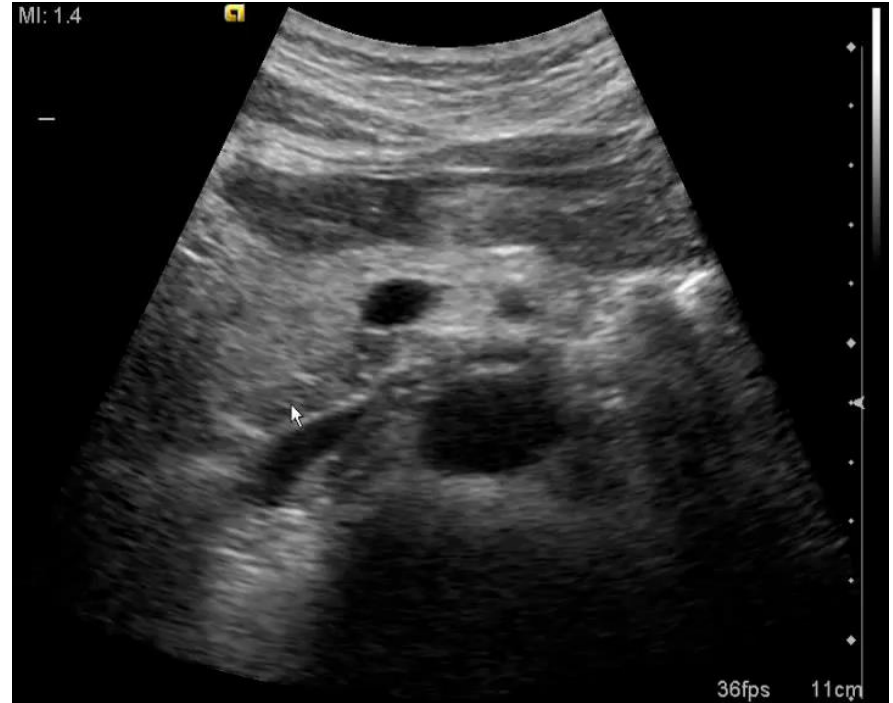


# How to overcome

- Patient on fasting, at least for beginners
- Compress gently to avoid the gas
- Some angulation of the probe for the tail of the pancreas
- Lower frequencies to increase penetration
- Fill the stomach with 600-800 ml of still water to create acoustic window

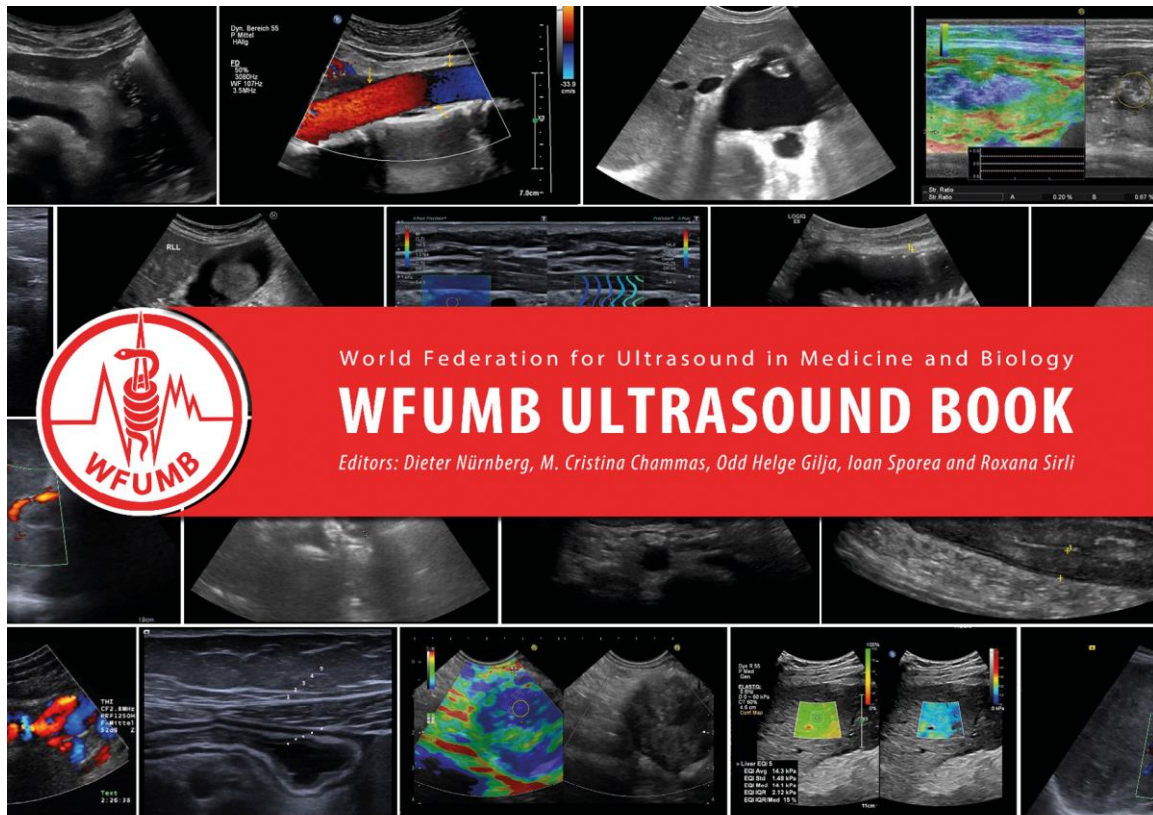
# The uncinate process

- **May be hypoechoic as compared to the rest of the gland.**
- **Different embryologic origin**
- **Lower number of fat cells.**



## **In conclusion**

- **Despite ultrasound examination of the pancreas seem to be difficult, knowing vascular markers and with some experience can have a good view of the pancreas in aprox. 90% of cases.**
- **When pancreas is not seen in totality, in clinical suspicion, others imaging methods must be used!**

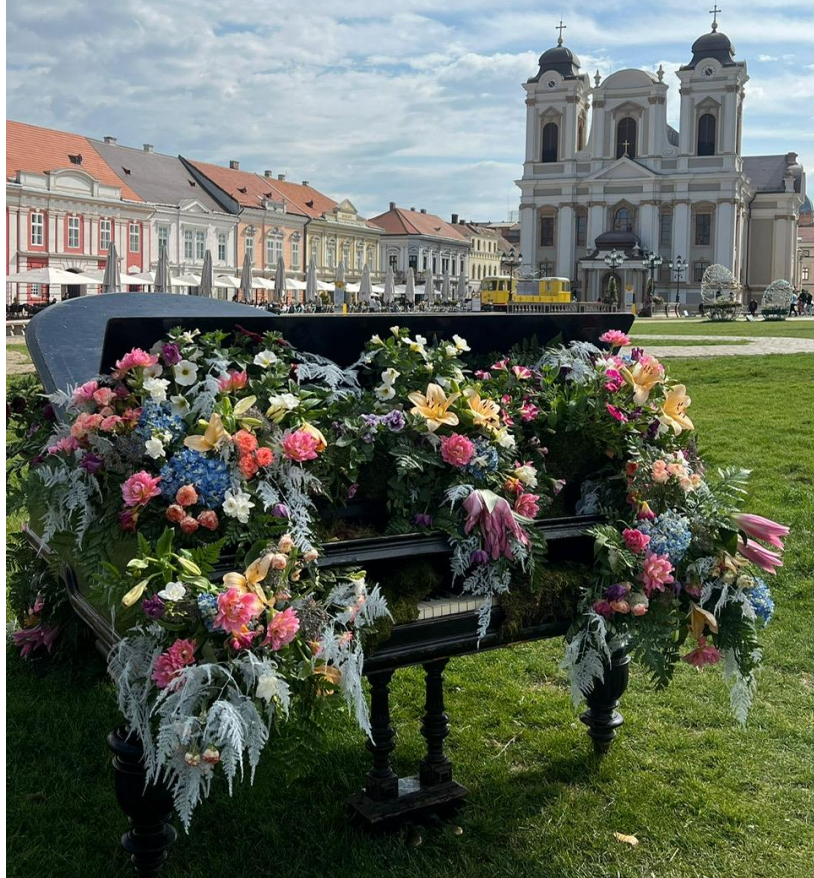


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**Thank you!**

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