eFAST SCAN

5/2017
Richmond Ultrasound Course

thanks to
Dr. Sutijono
Dr. VanTonder
for images

Objectives

- **Discuss indications for the FAST exam**
- **Review the relevant anatomy**
- **Understand scanning technique**
- **Review relevant images and pathology**
- **Unique aspects of the E-FAST**
- **Review Pitfalls**

Let's start with a case

- 3:00 AM
- 32 yo female with low back pain
- BP 124/86 104 20 98%
- Evaluated by resident
- “ She looks pretty good… I think she can go…”

I go in .....

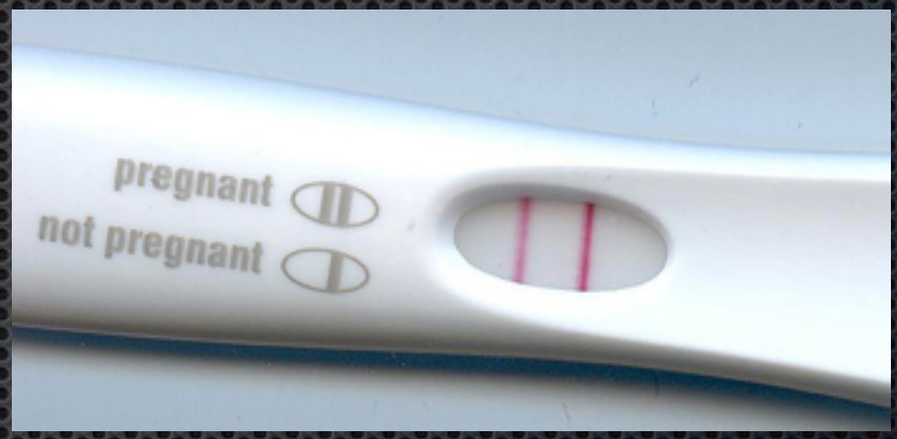
Patient is collapsed on the floor unresponsive....

THREADY PULSE

After cursing under my breath…

- I ask the resident to grab the ultrasound machine
- I find out from the husband the patient had a D and C at Outside facility about 8 weeks prior.

We only did 2 things for disposition



The patient was in the OR in 15 minutes


4:06:05 PM
Abd/General
C4-1/CH4MHz
DR60/M3/P2
G74/E1/100%
MI1.2 TIs0.4
14.0 cm
12 Hz
ZSI 0

What is eFAST?

extended

Focused

Assessment with

Sonography for

Trauma

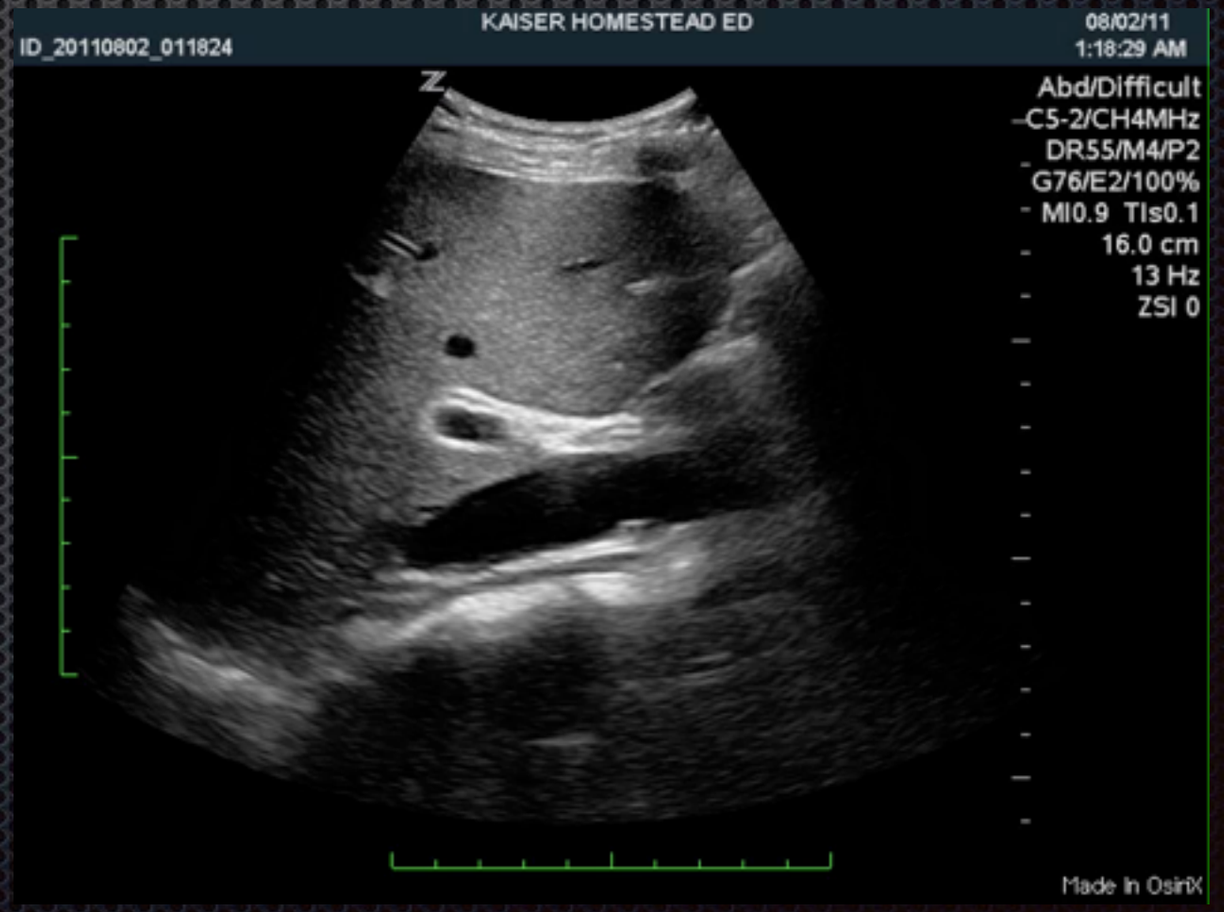
A Little History

- 1971 – reports on the use of ultrasound to detect splenic injury in trauma patients
- 1980's – becomes more widespread in Europe, begins to replace DPL at many centers in the US
- 1990's – studies show the utility of sonography (FAST exam) in blunt trauma patients
- 1997 – becomes part of ATLS guidelines
- 2001 – US training becomes a mandatory part of EM residencies

What questions are we trying to answer with eFAST?

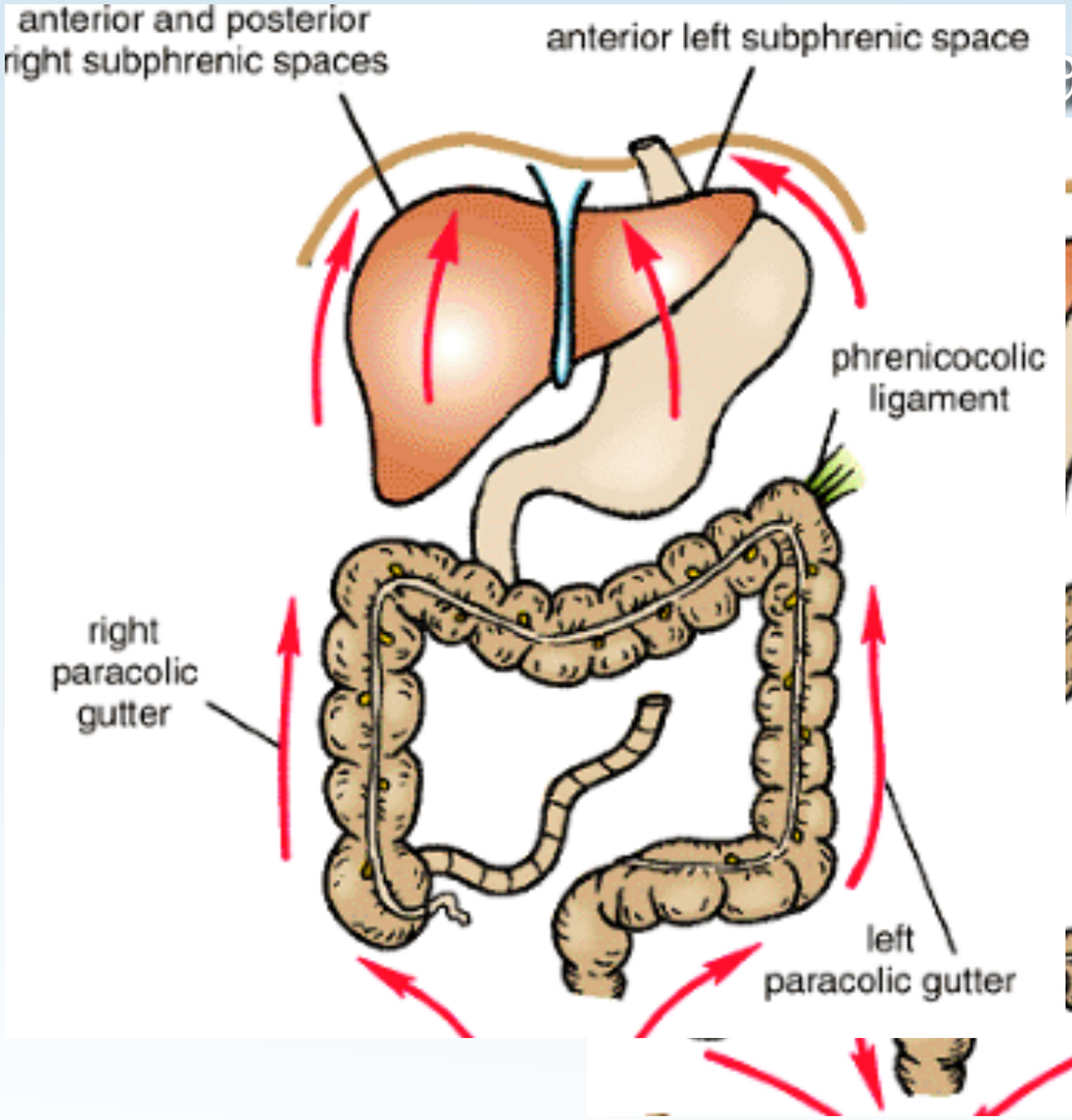
1) Is there free fluid in the peritoneum?
2) Is there fluid in the pericardium?
3) Is there fluid in the thorax?
4) Is there a pneumothorax?

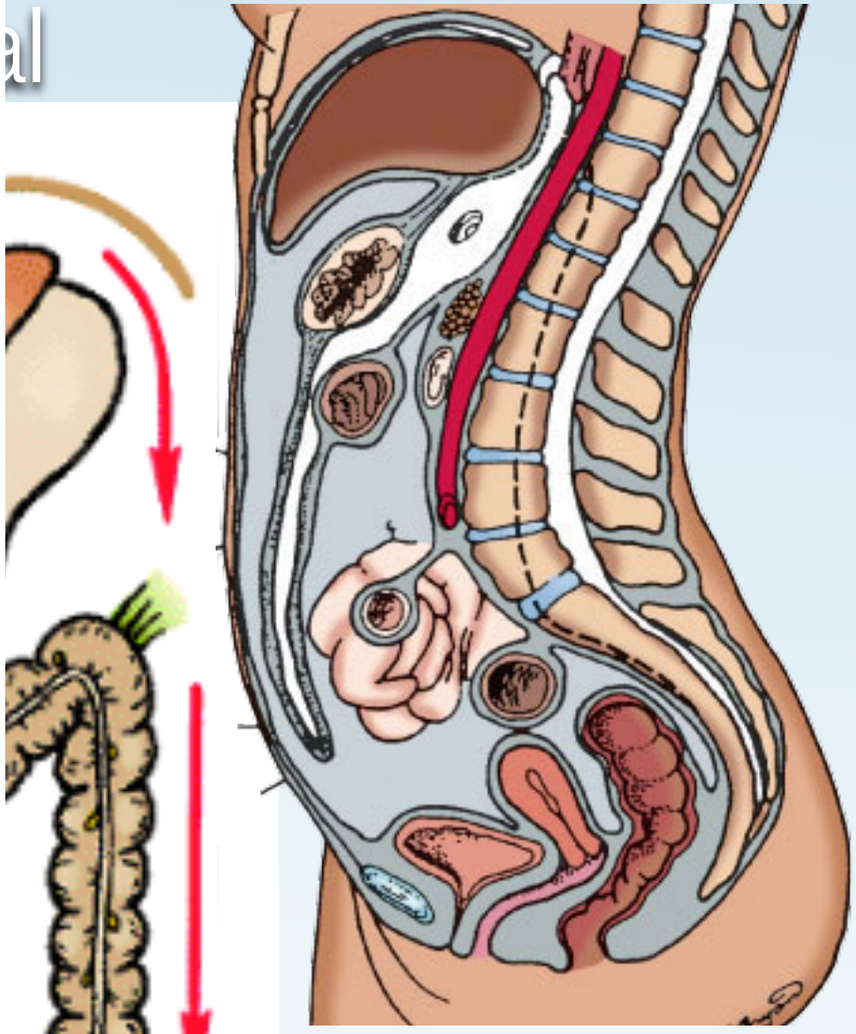
Peritoneal Free Fluid:What does it look like?



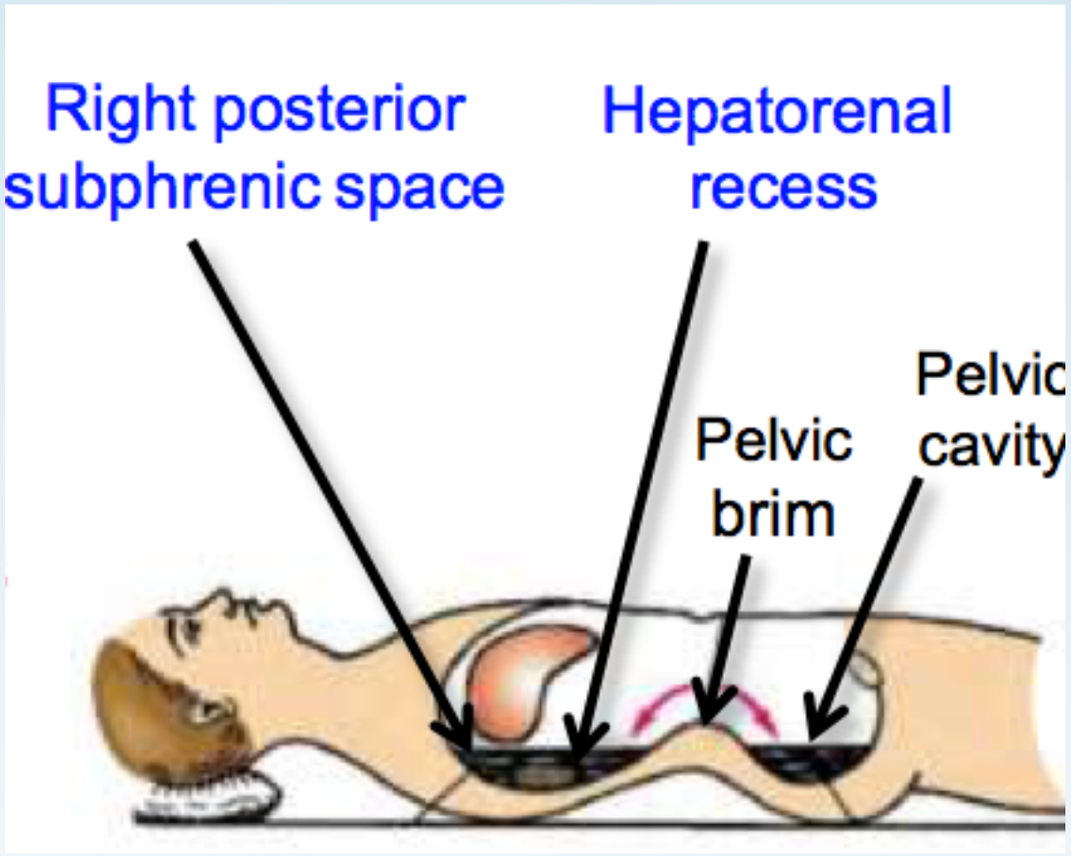
Why does this work?

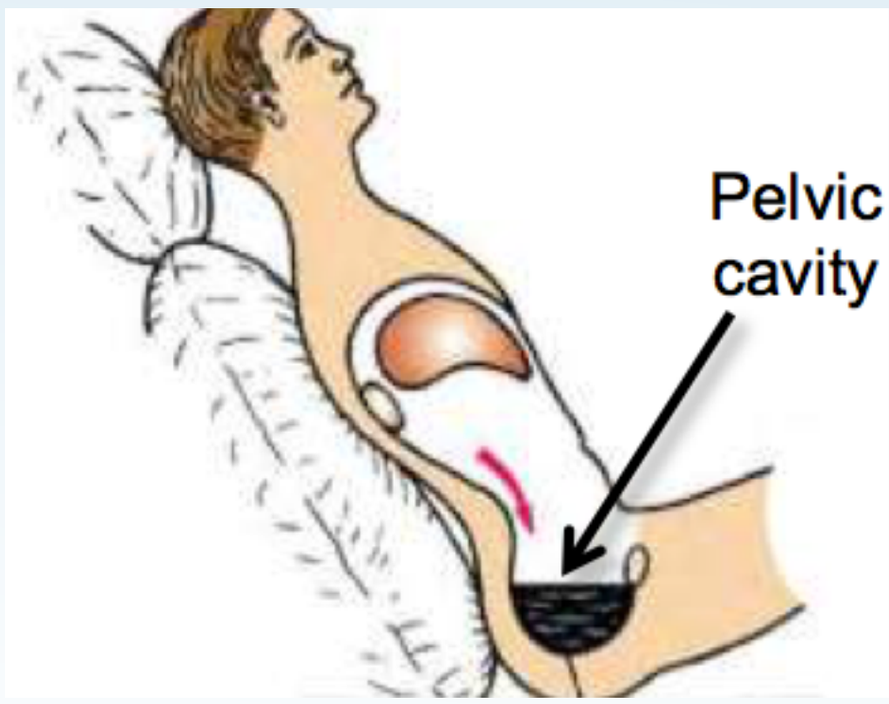
Normal





Look HERE!


Right posterior subphrenic space
Hepatorenal recess
Pelvic brim
Pelvic cavity


Pelvic cavity

Which probe?

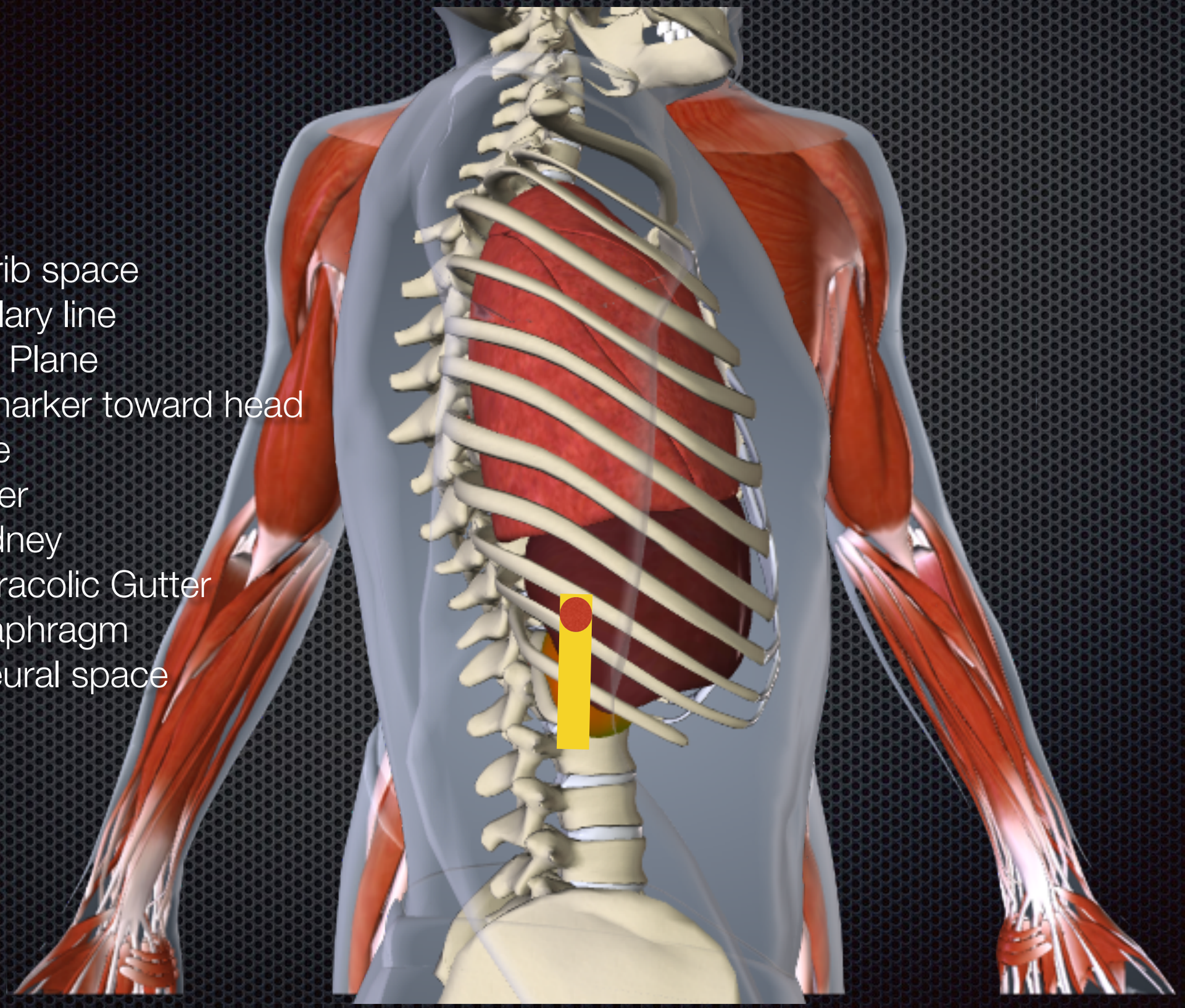
Limitations

- The FAST exam does NOT identify **specific organ** lesions
  - Does not tell you the **source** of bleeding
- Poor test for detection of **retroperitoneal bleeding**
- Does not distinguish blood vs **other types of fluid**:
  - Ascites, bladder perforation, ruptured cyst
- May be **technically limited**:
  - obesity
  - post-op patients (adhesions)
  - subcutaneous emphysema

Scan positions

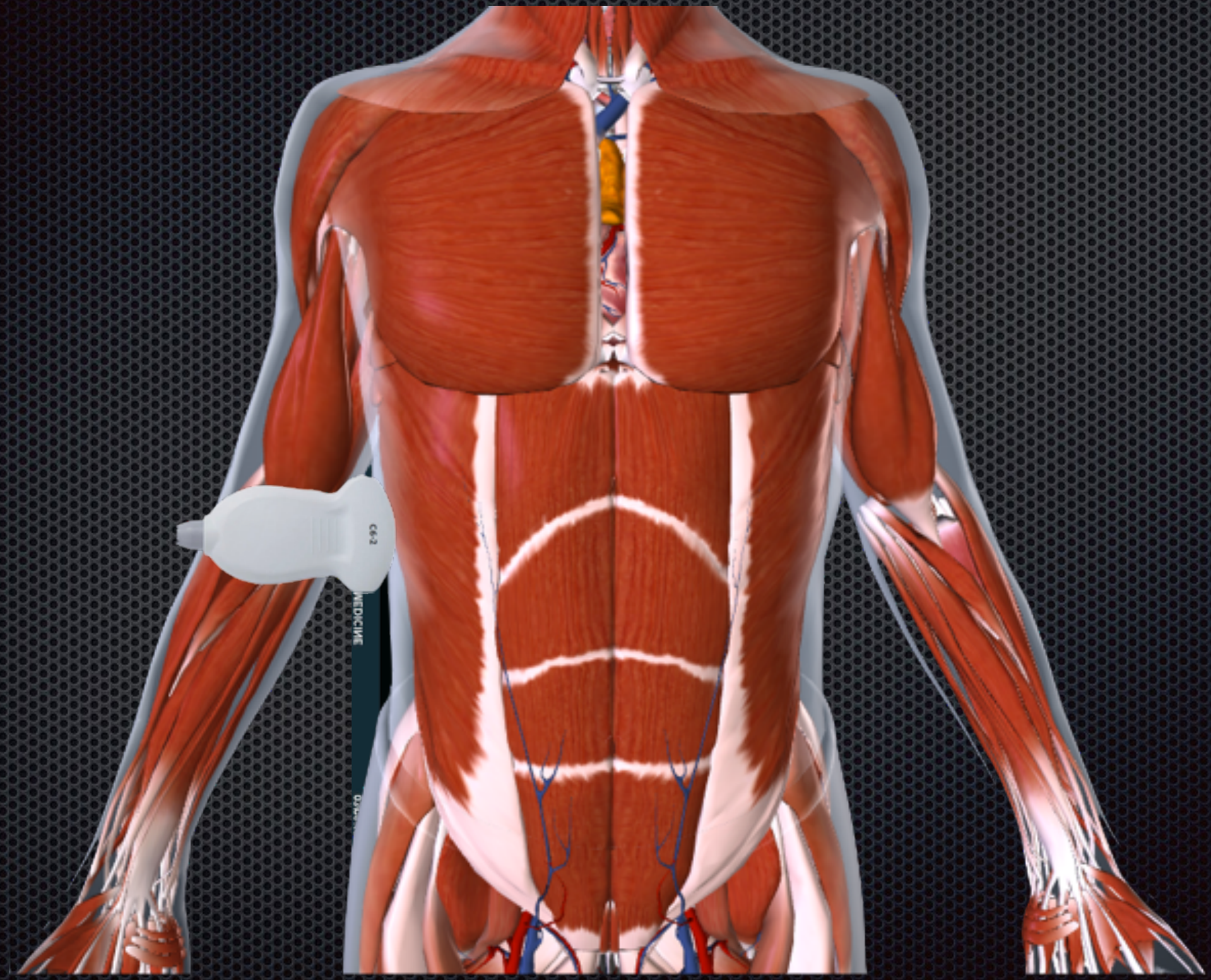
RUQ

RUQ



- 8-11th rib space
- Mid-axillary line
- Coronal Plane
- Probe marker toward head
- Visualize
  - -Liver
  - -Kidney
  - -Paracolic Gutter
  - -Diaphragm
  - -Pleural space

RUQ

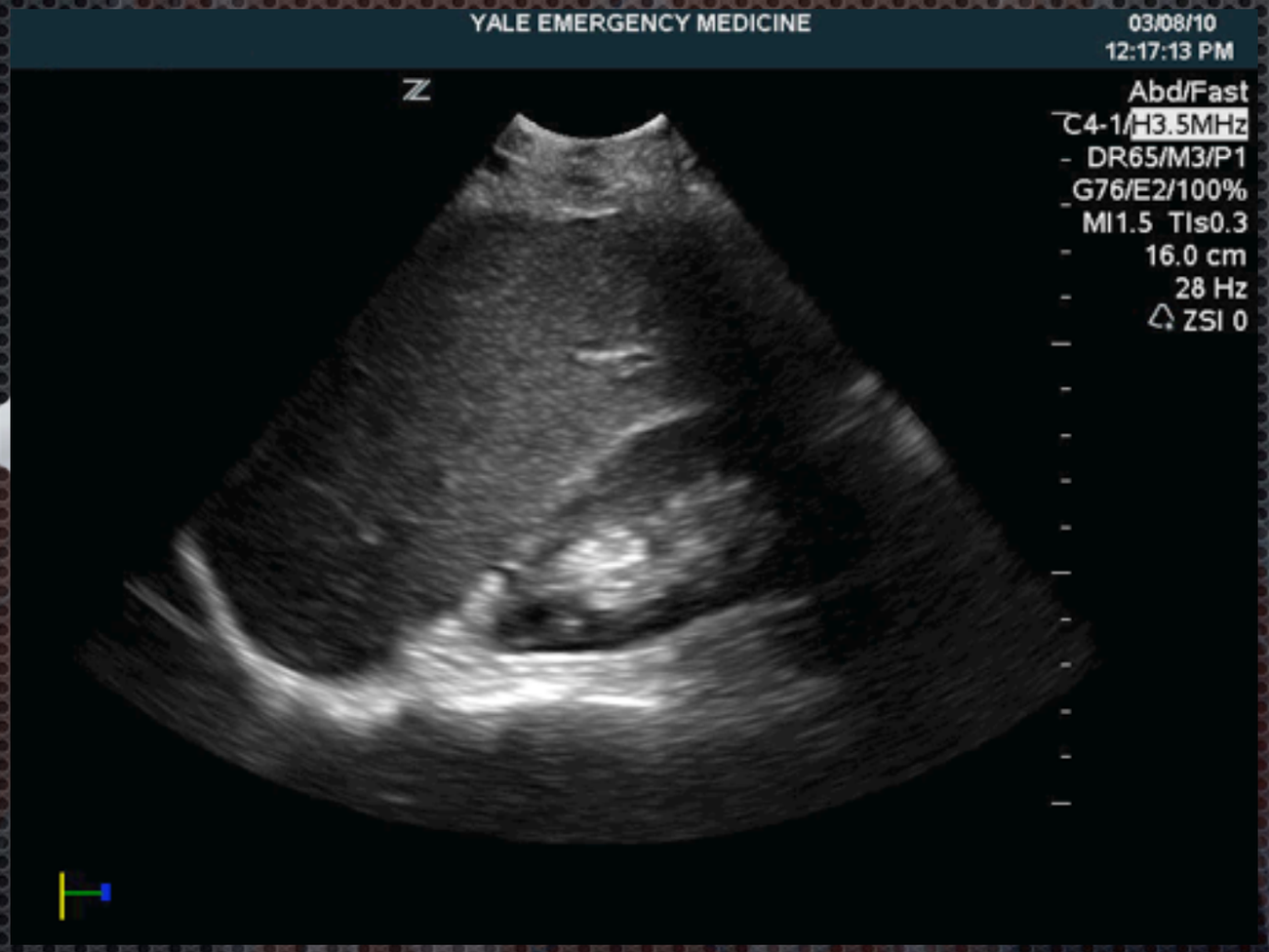


RUQ anatomic to US orientation

head

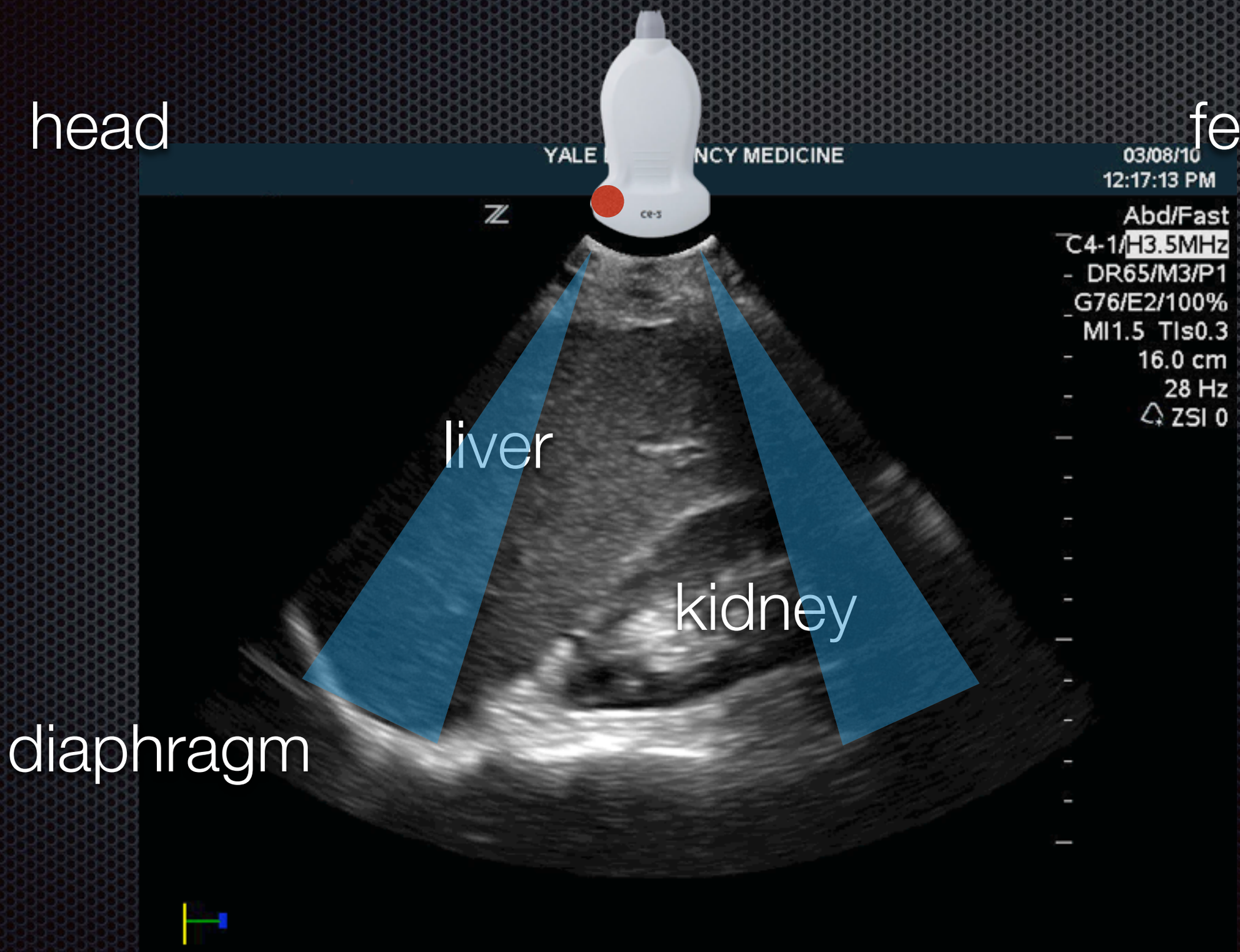
head

toe



feet

RUQ organs


head
feet
YALE NCY MEDICINE
03/08/10
12:17:13 PM
Abd/Fast
C4-1/H3.5MHz
DR65/M3/P1
G76/E2/100%
MI1.5 TIs0.3
16.0 cm
28 Hz
ZSI 0
liver
kidney
diaphragm

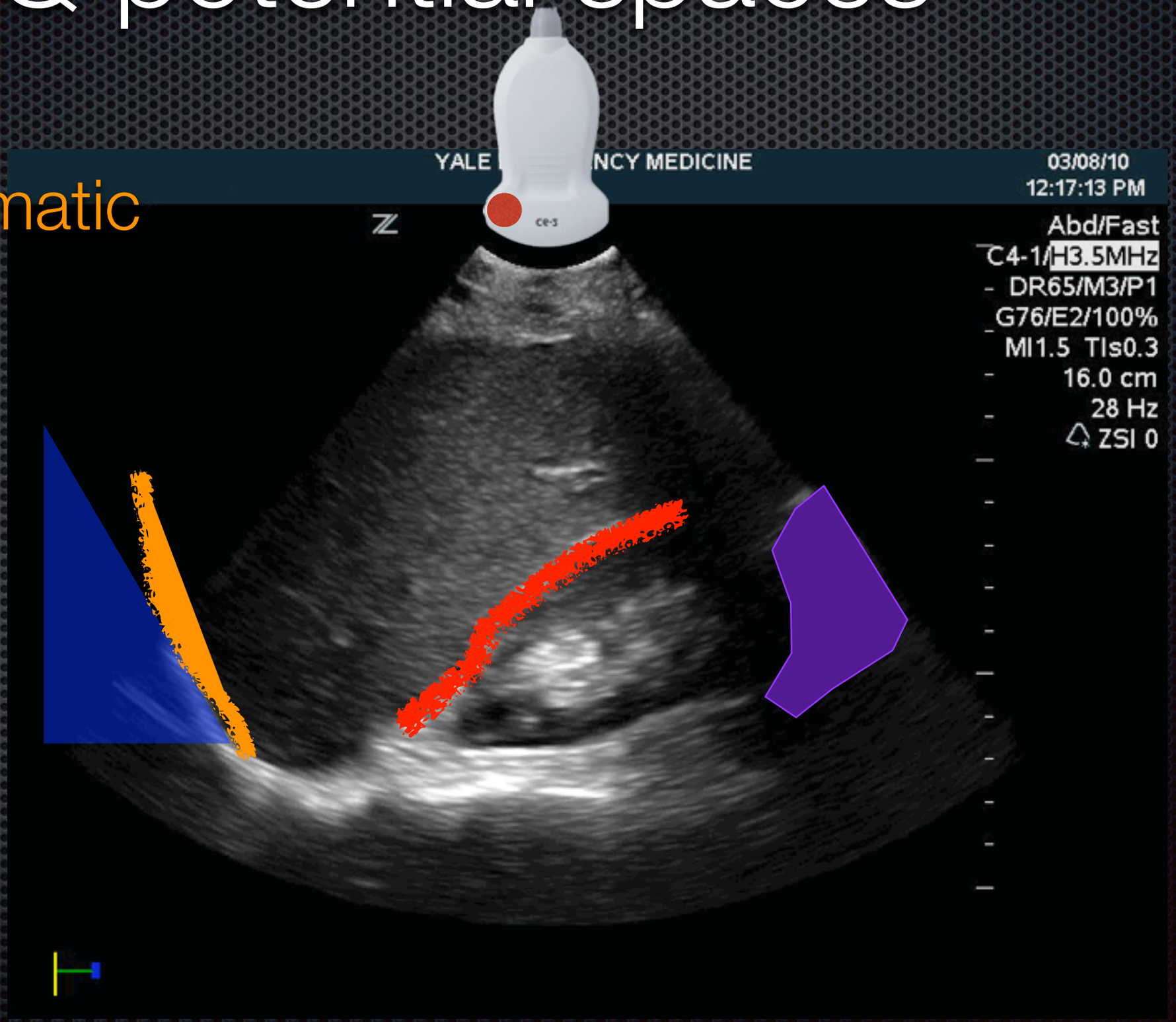
RUQ potential spaces

Pleural

Sub diaphragmatic

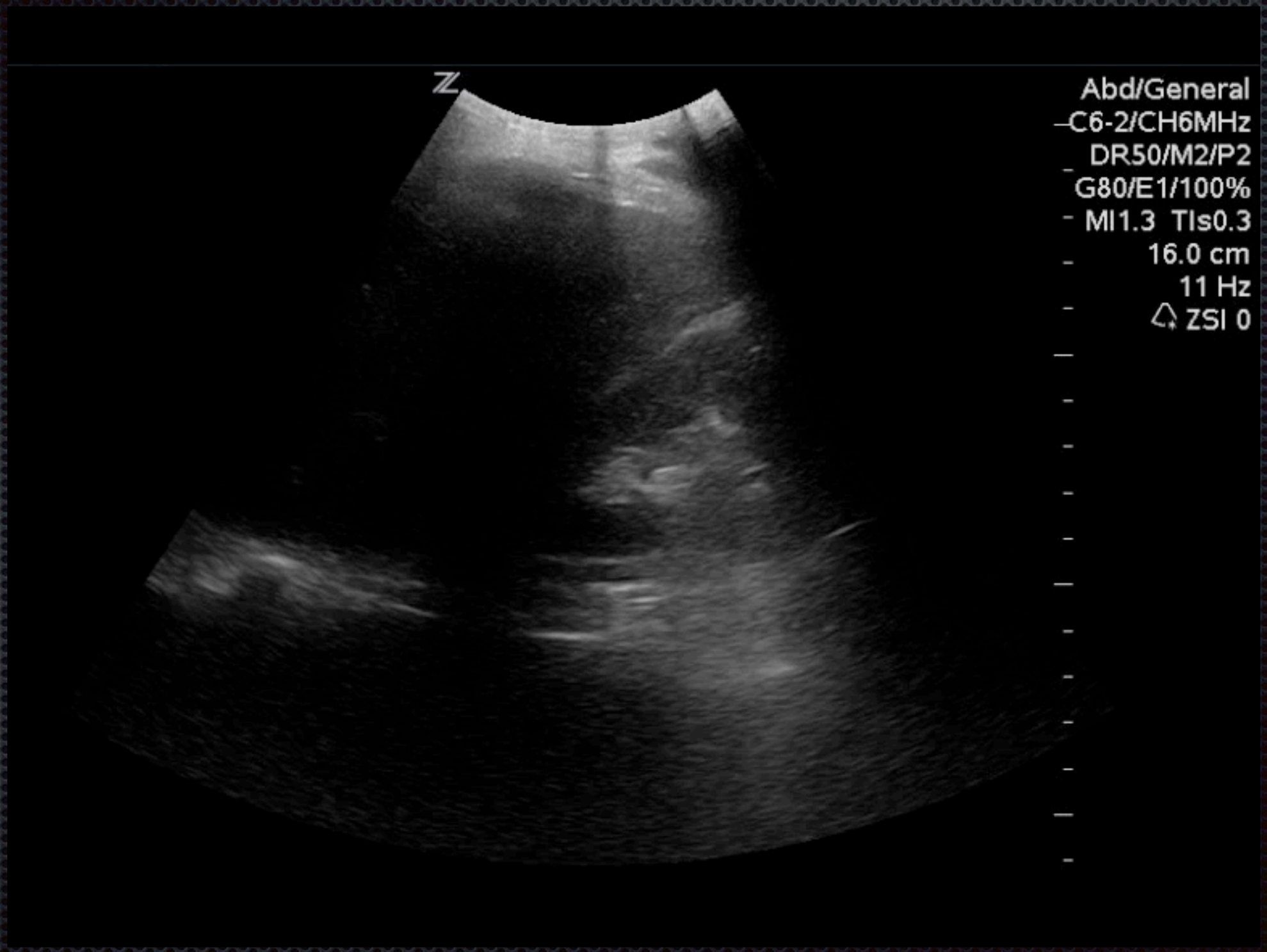
Morison's

Paracolic gutter

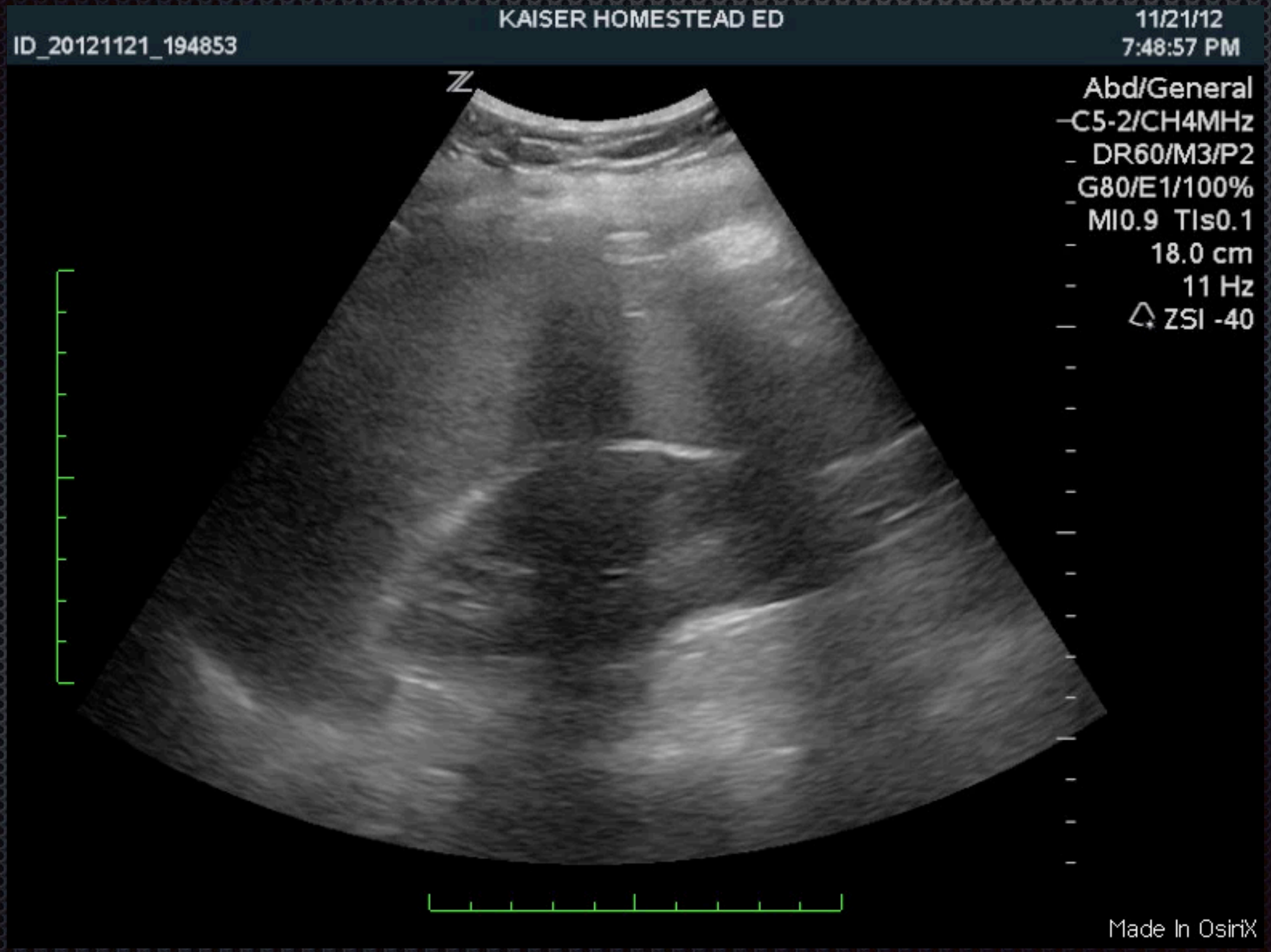


Find the fluid

Find the fluid



Find the fluid



Find the fluid

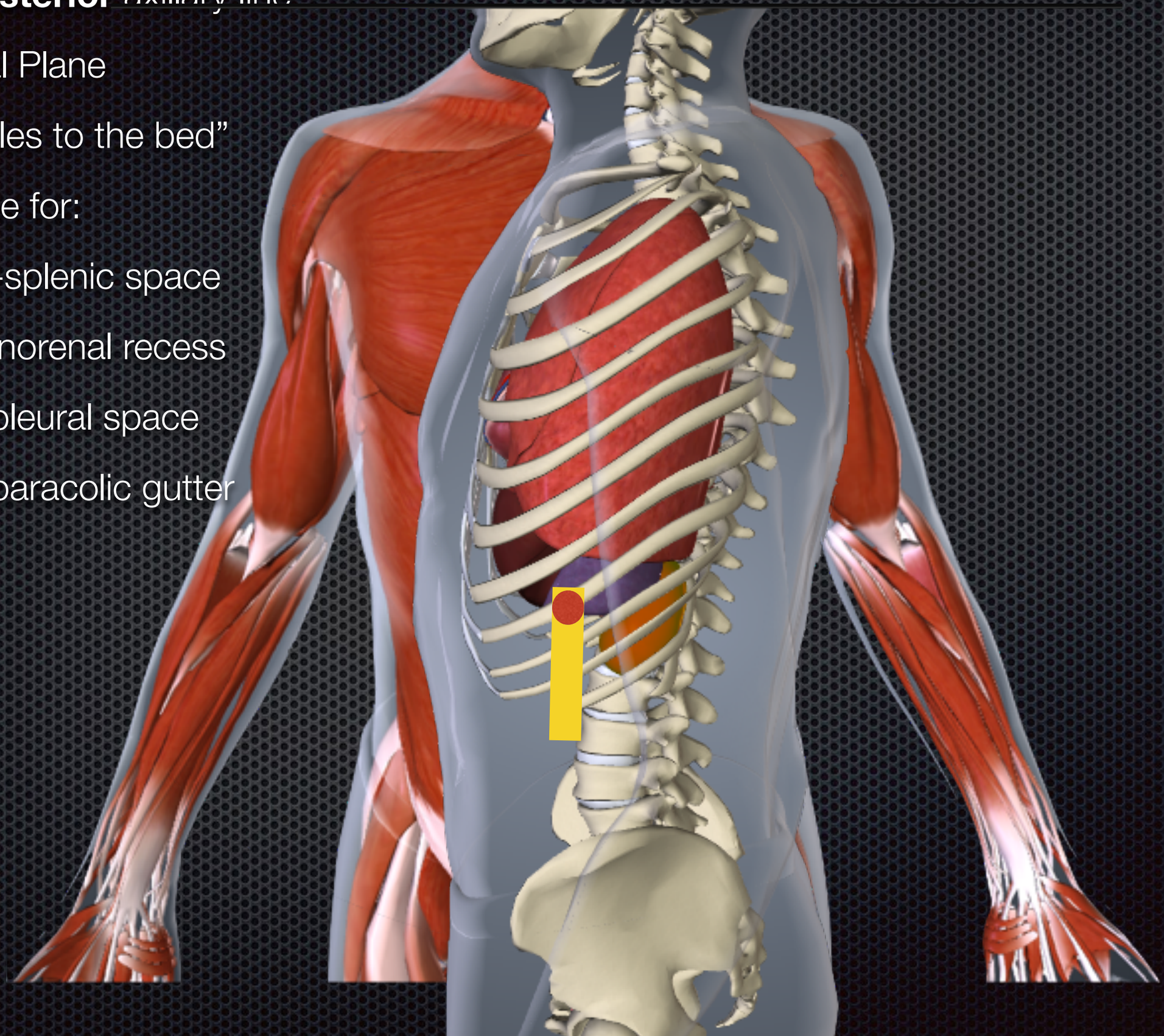
Find the fluid

Know your anatomy
Look at all 4 spaces
Fluid is pointy

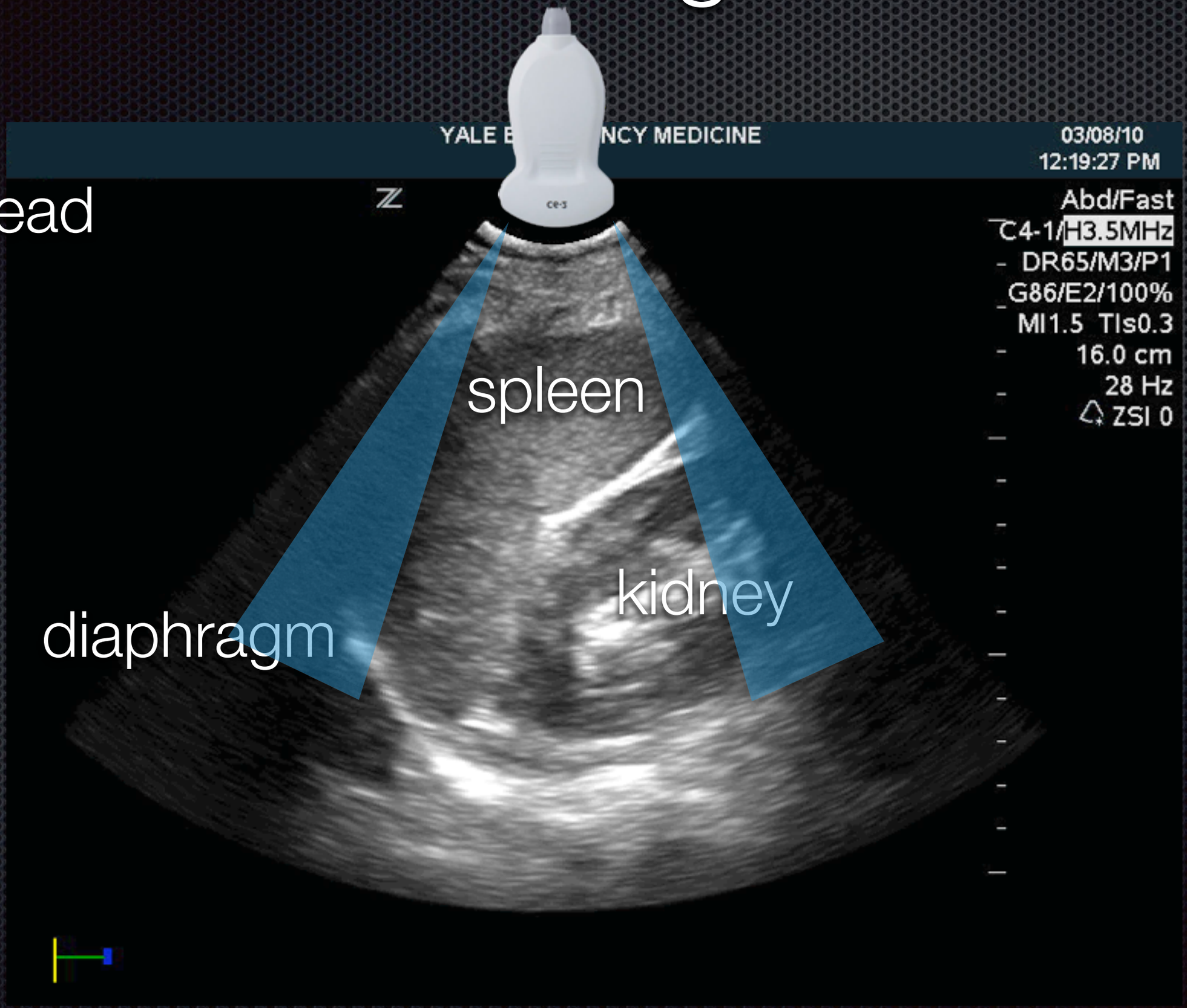
LUQ

LUQ

- **6-9th** rib space
- Left **posterior** axillary line
- Coronal Plane
- “Knuckles to the bed”
- Examine for:
  - peri-splenic space
  - splenorenal recess
  - left pleural space
  - left paracolic gutter



LUQ organs


YALE E NCY MEDICINE
03/08/10
12:19:27 PM
Abd/Fast
C4-1/H3.5MHz
DR65/M3/P1
G86/E2/100%
MI1.5 TIs0.3
16.0 cm
28 Hz
ZSI 0
head
feet
spleen
diaphragm
kidney

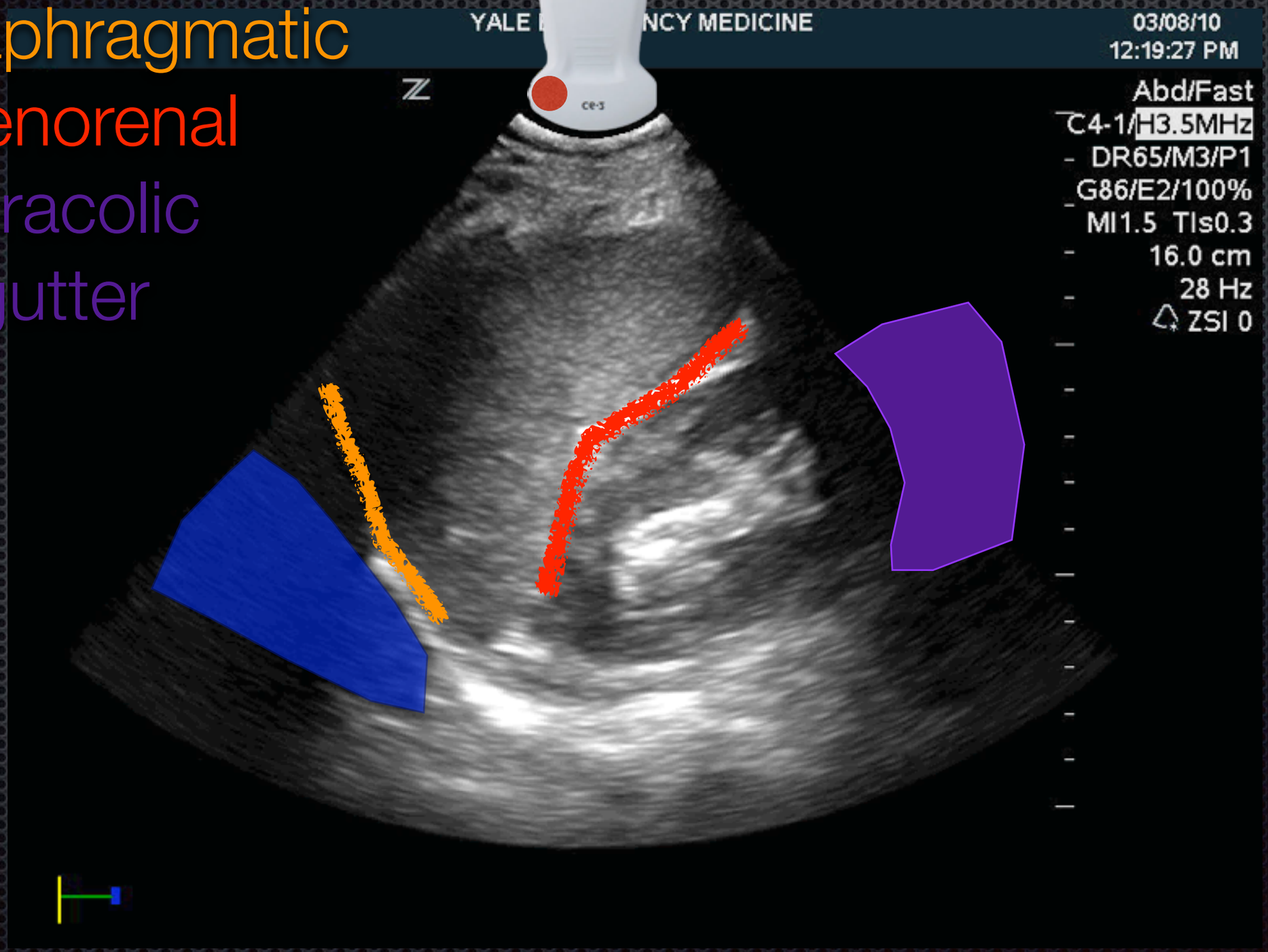
LUQ potential spaces

Pleural

Sub diaphragmatic

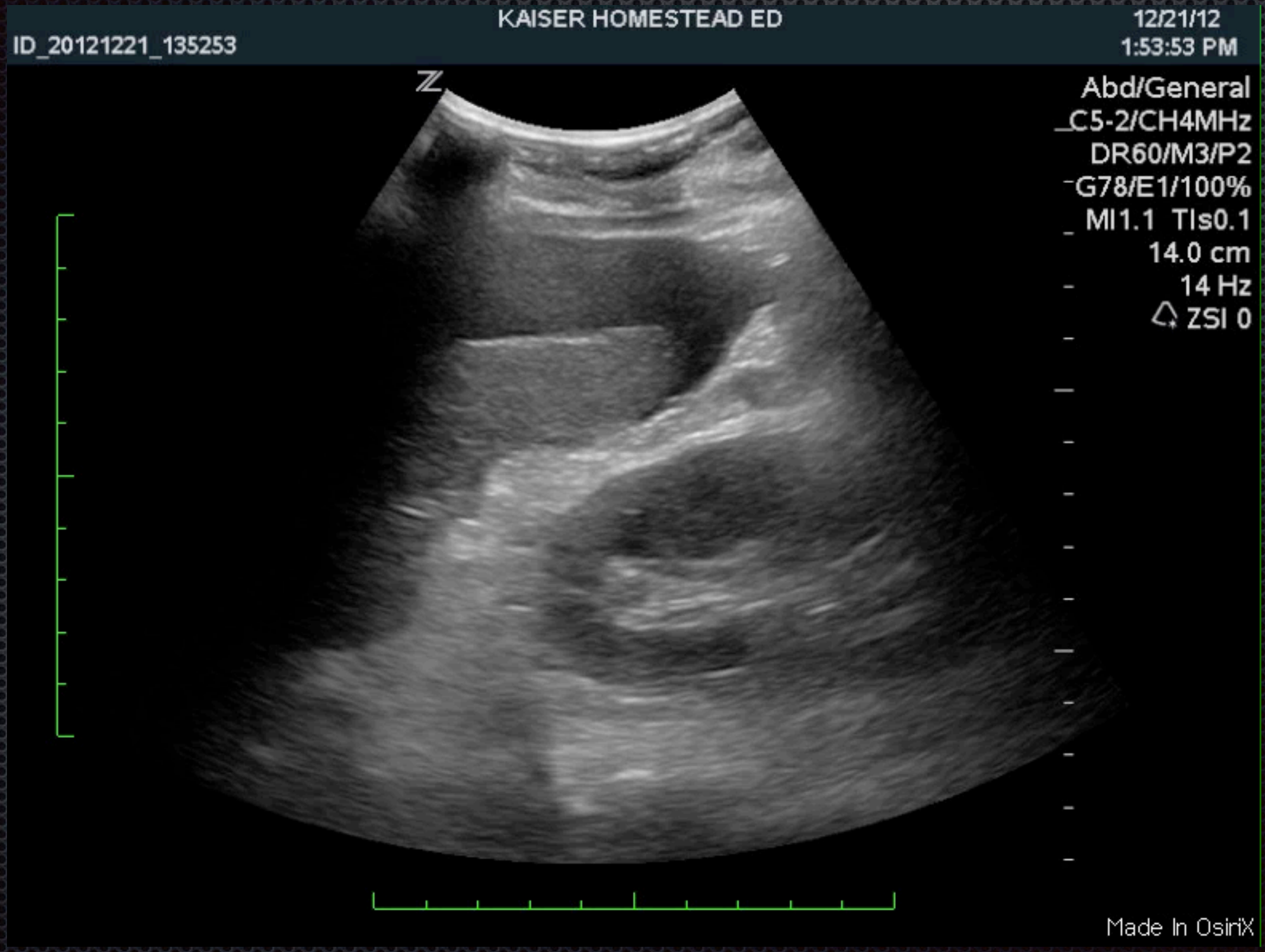
Splenorenal

Paracolic gutter

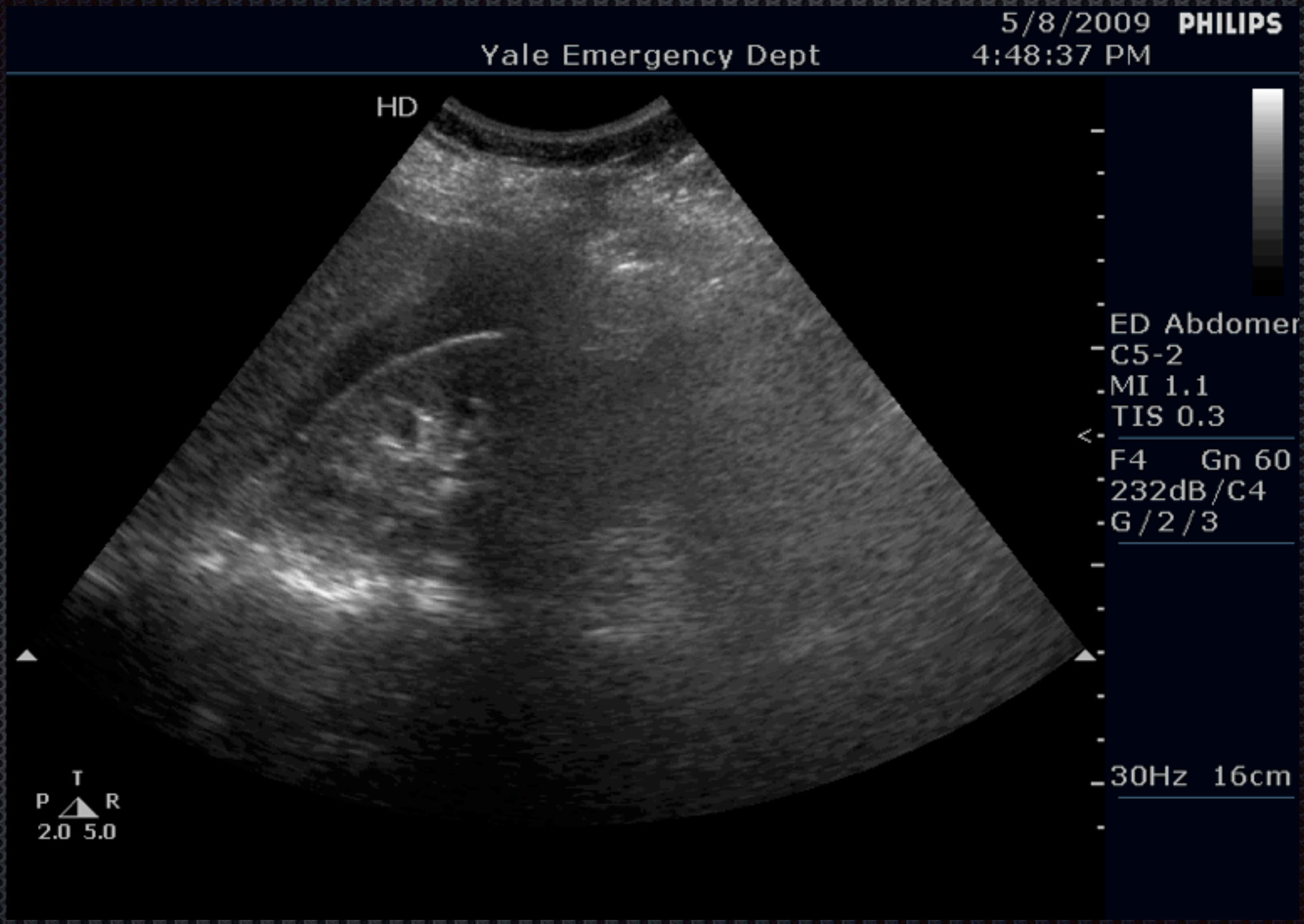


Find the Fluid

Find the Fluid



Find the Fluid

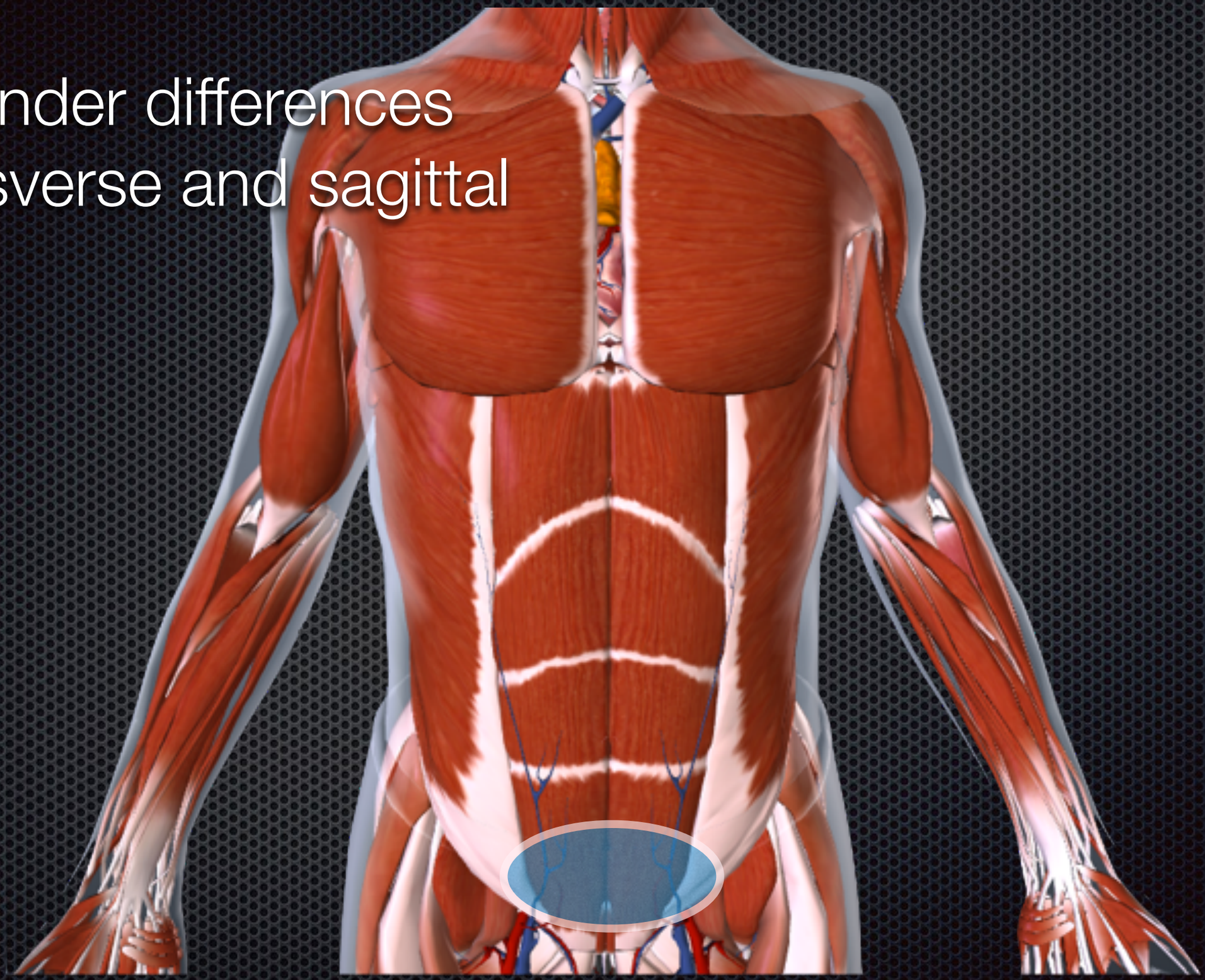


Find the Fluid

Higher up
"knuckles to the bed
Look above the spleen

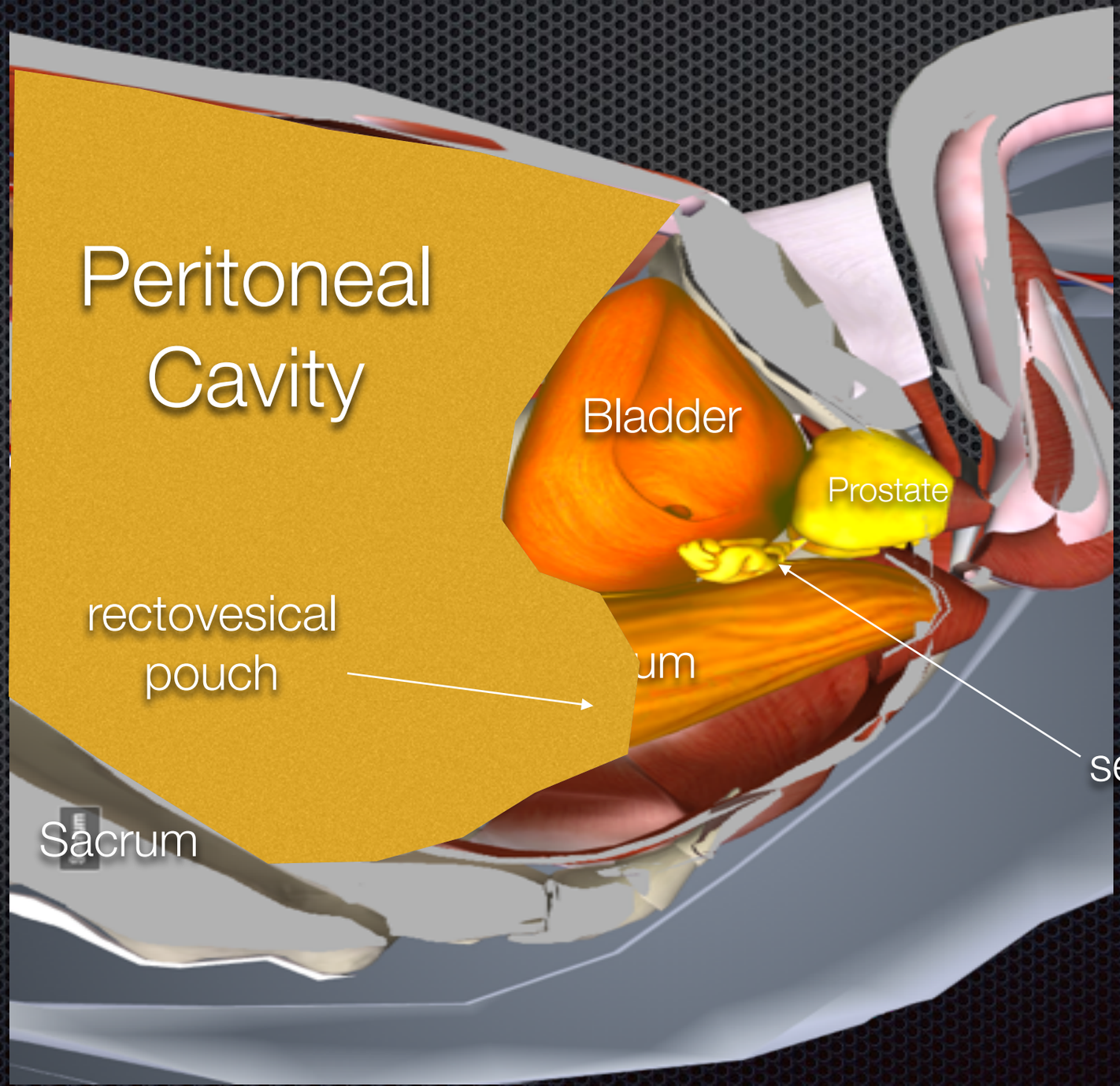
Pelvic Views

gender differences
transverse and sagittal

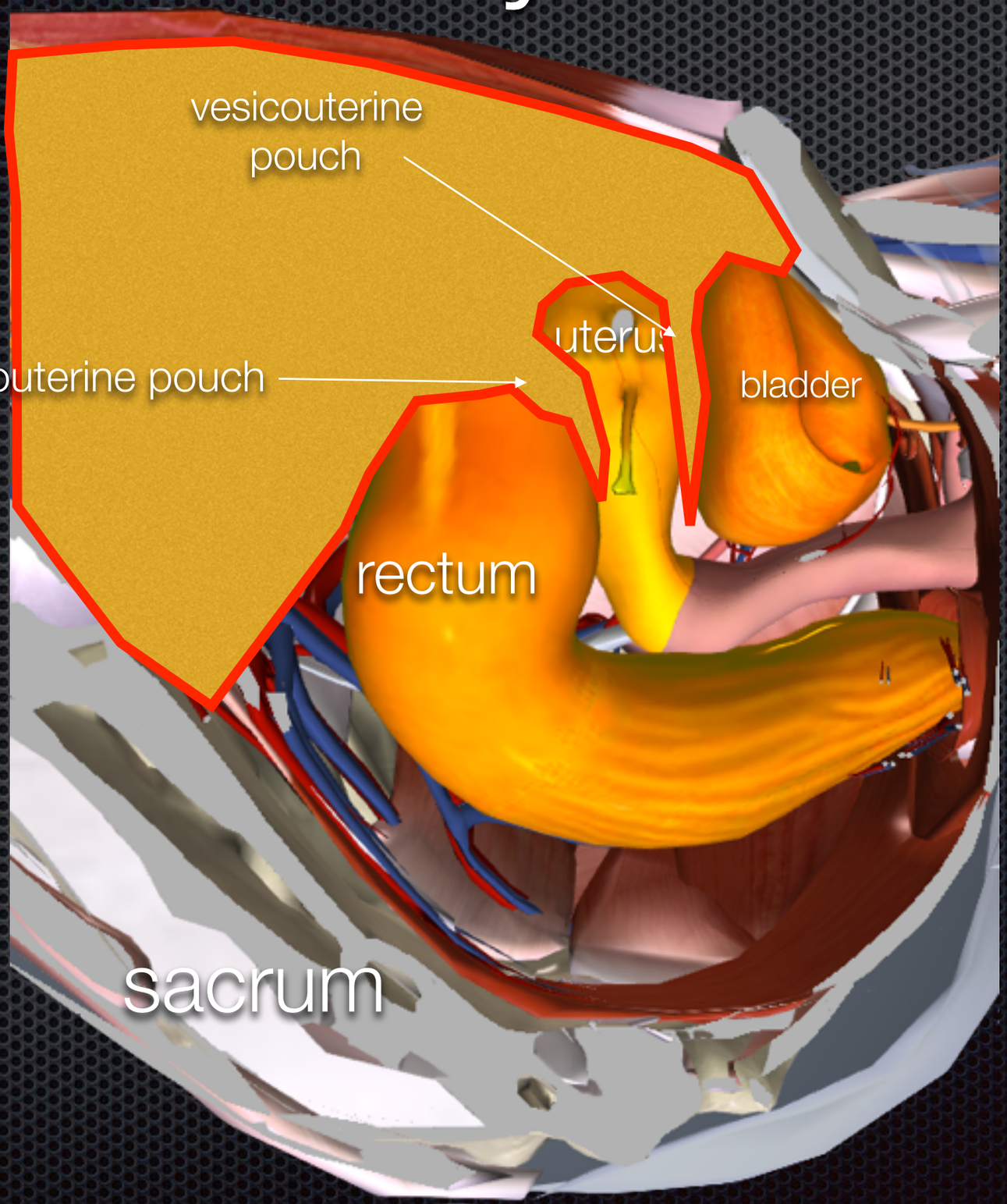


Pelvic Views

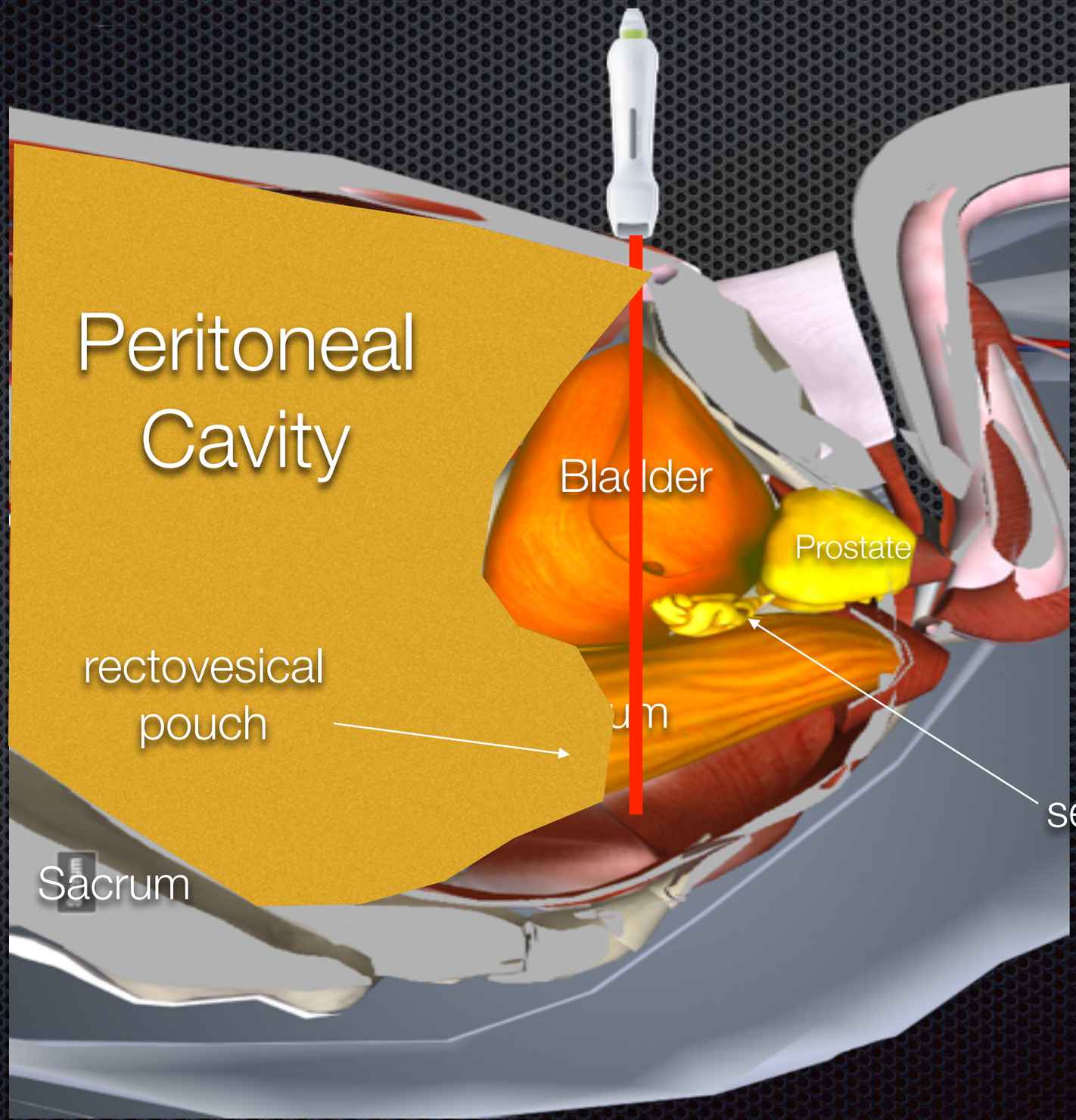
Pelvic anatomy: Male



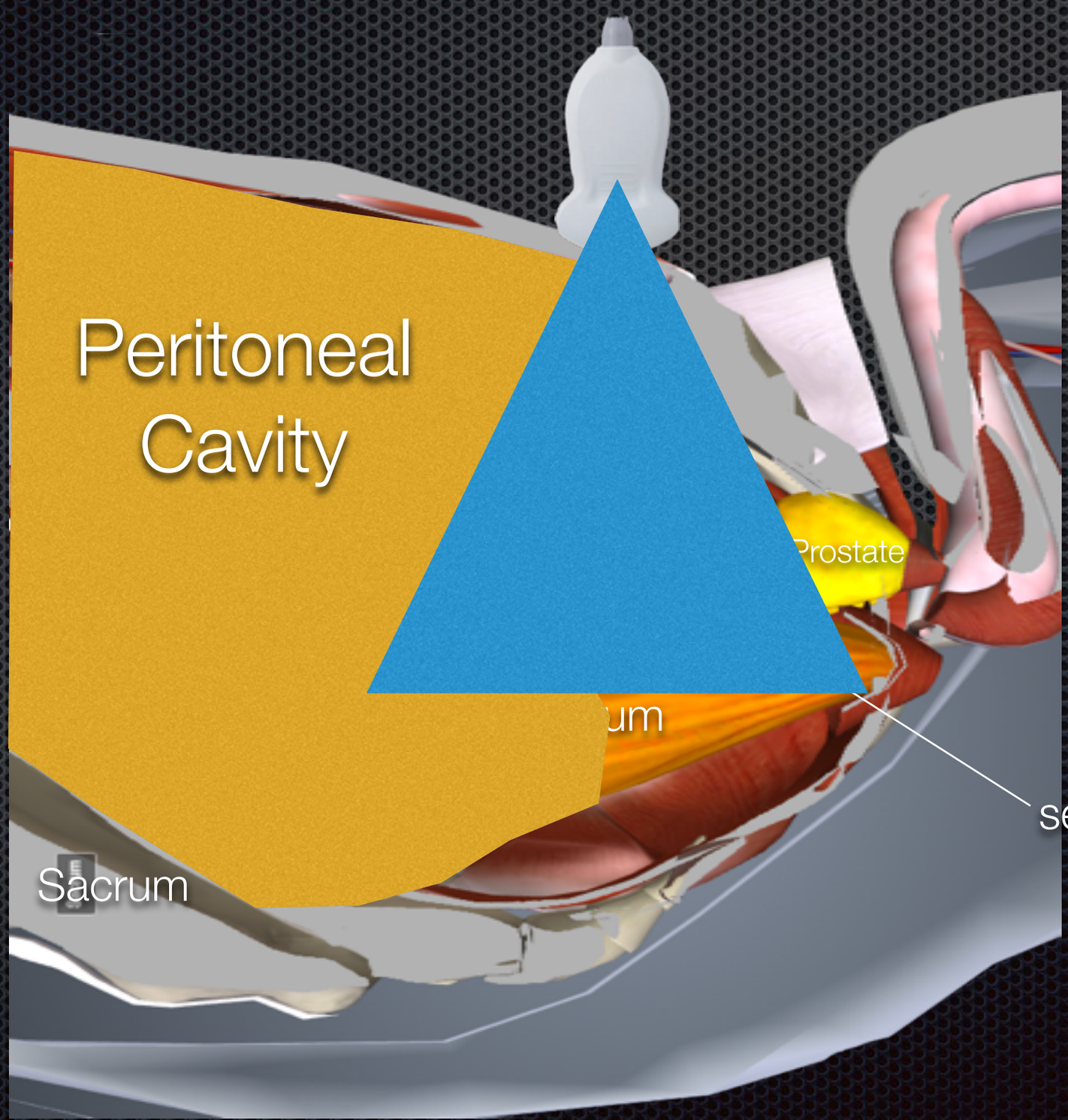
Pelvic Anatomy: Female



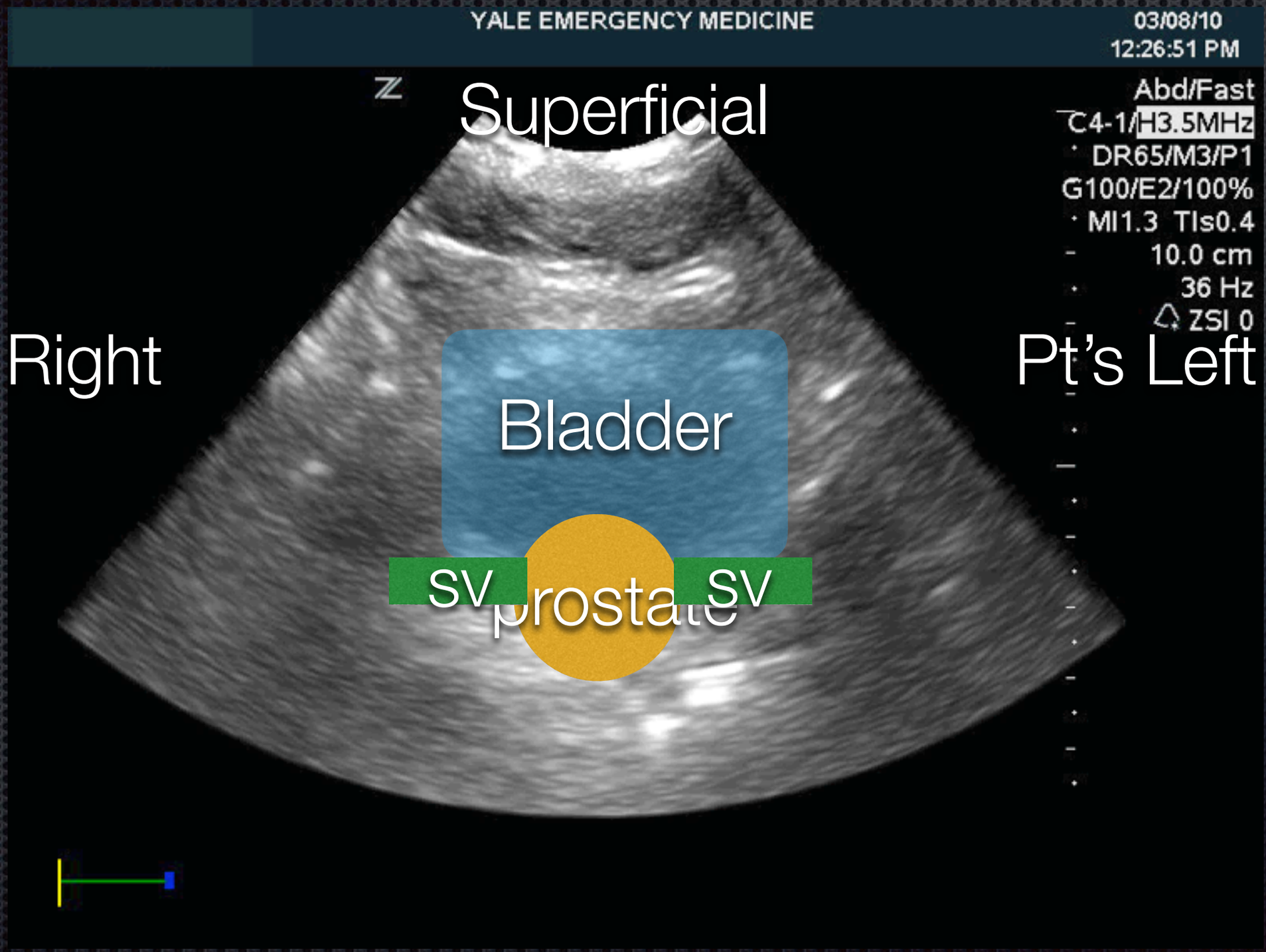
Pelvic anatomy: transverse



Pelvic anatomy: sagittal

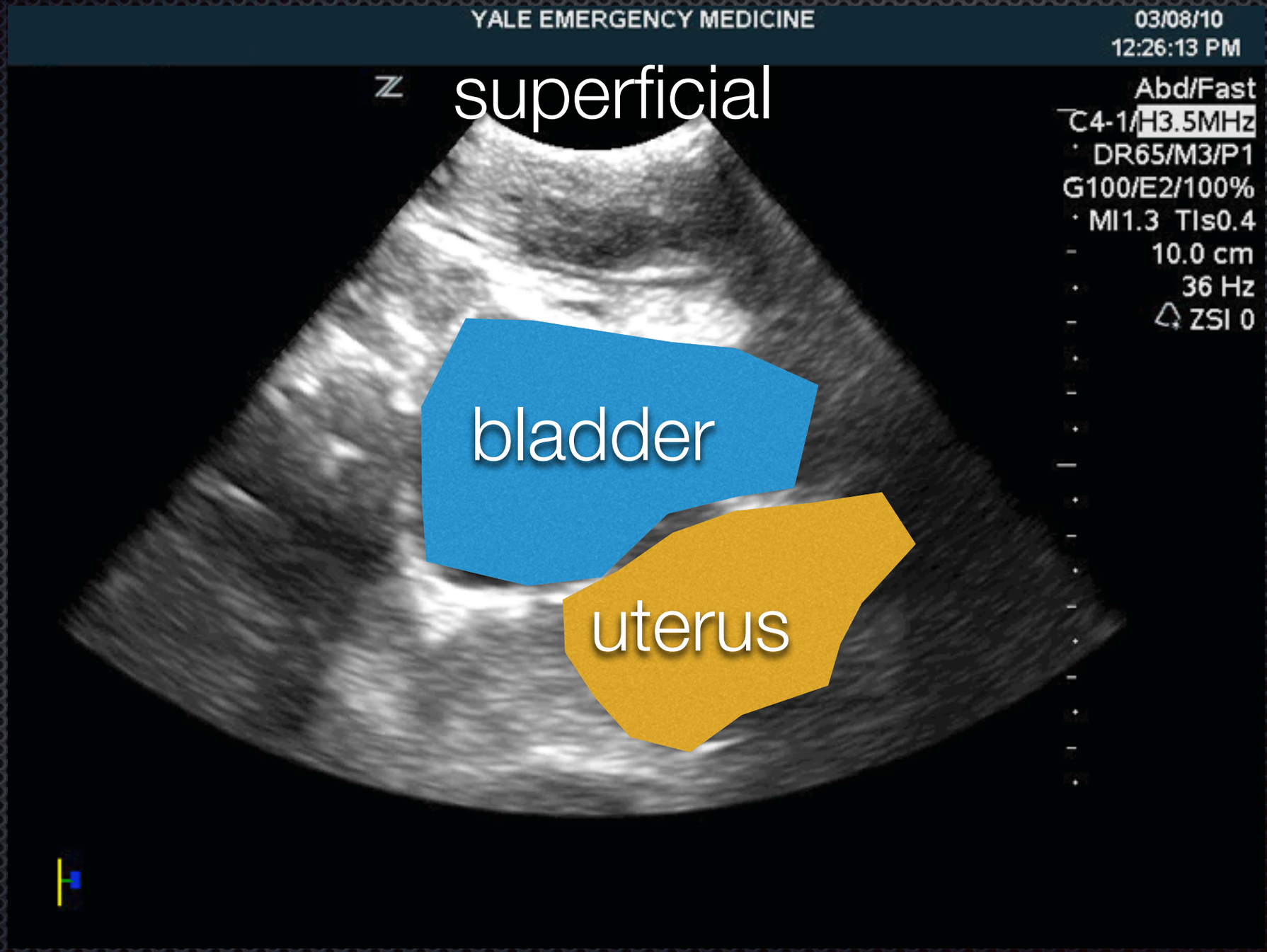


US transverse



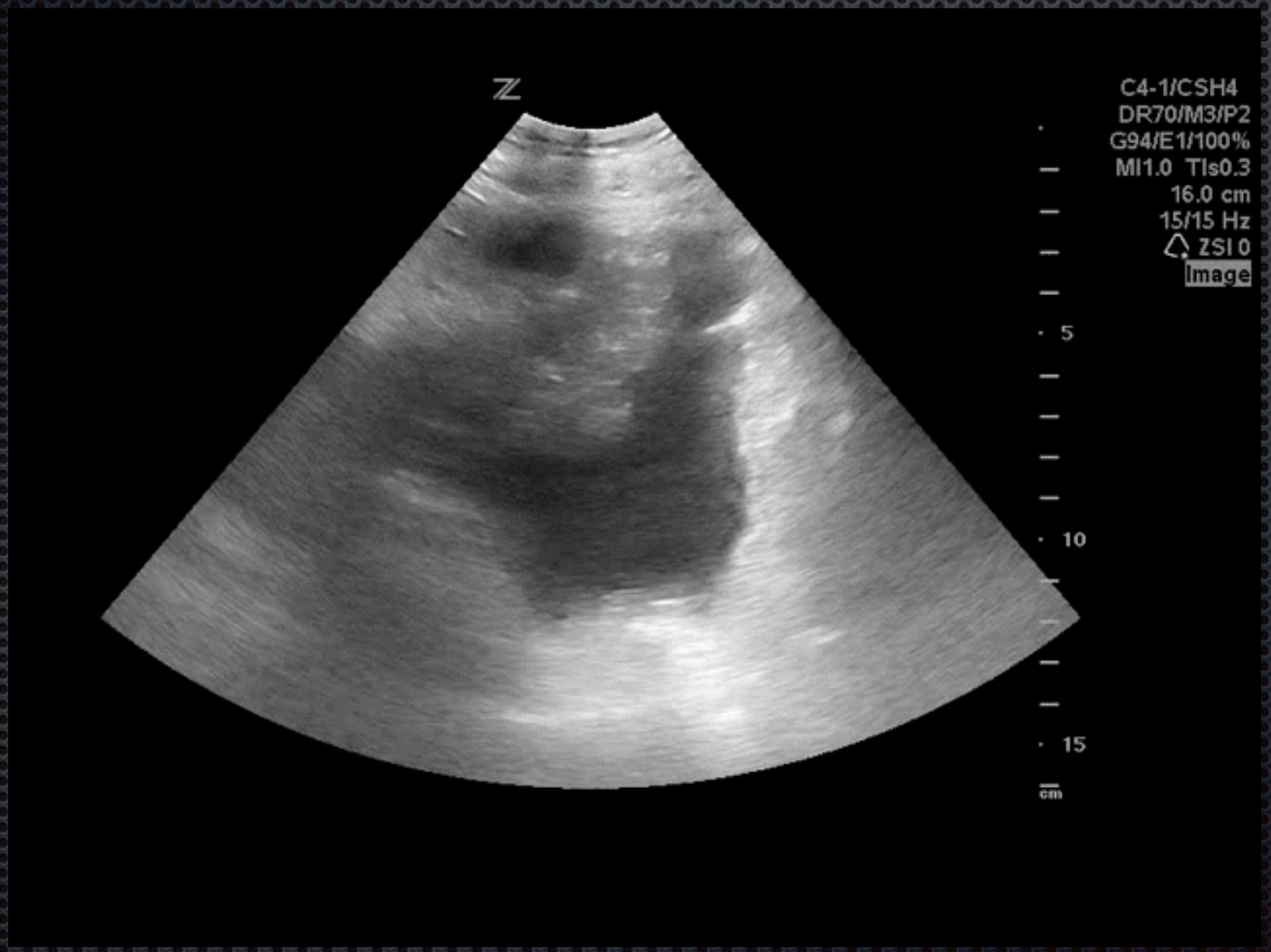
US sagittal

head

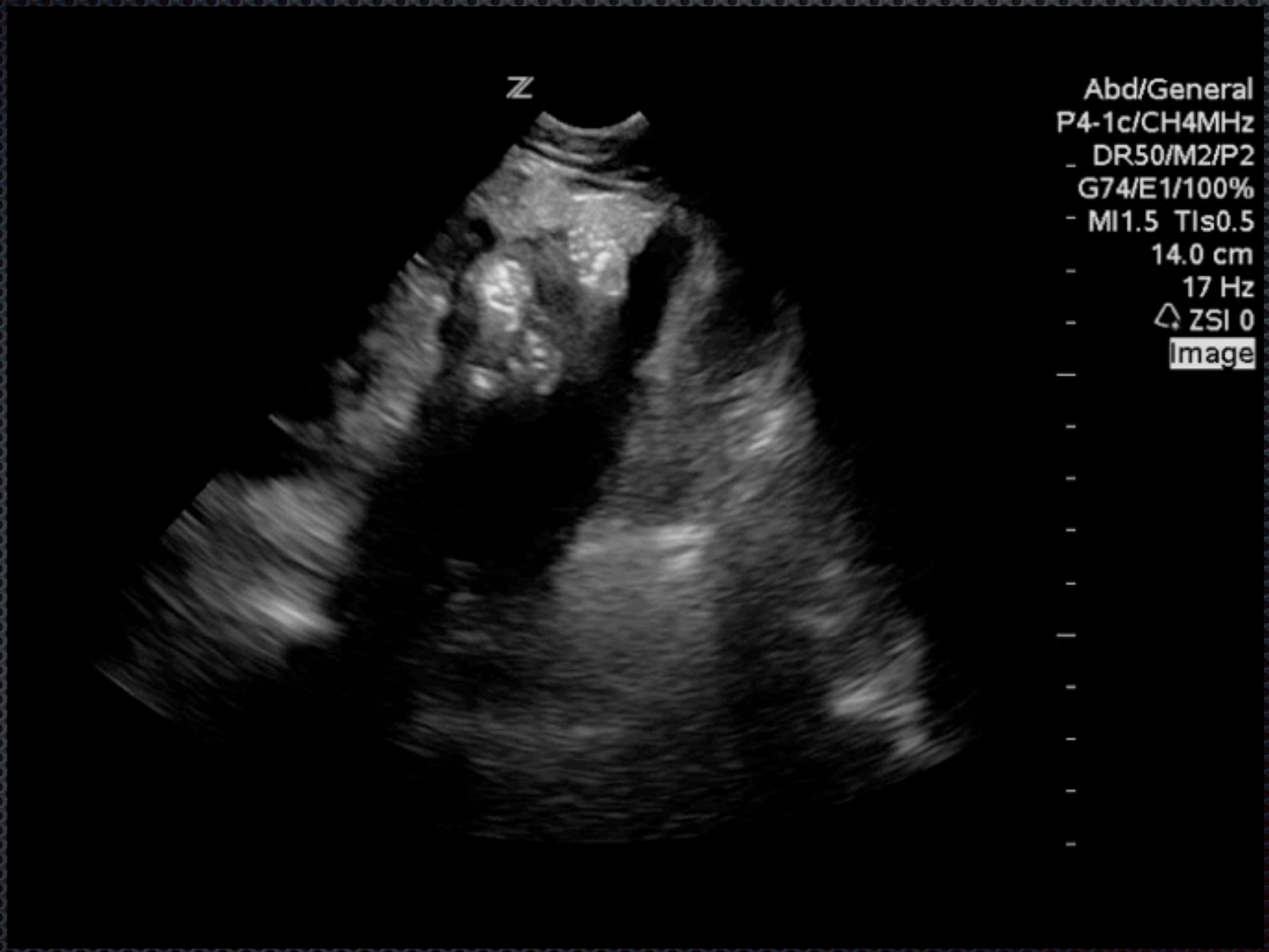


feet

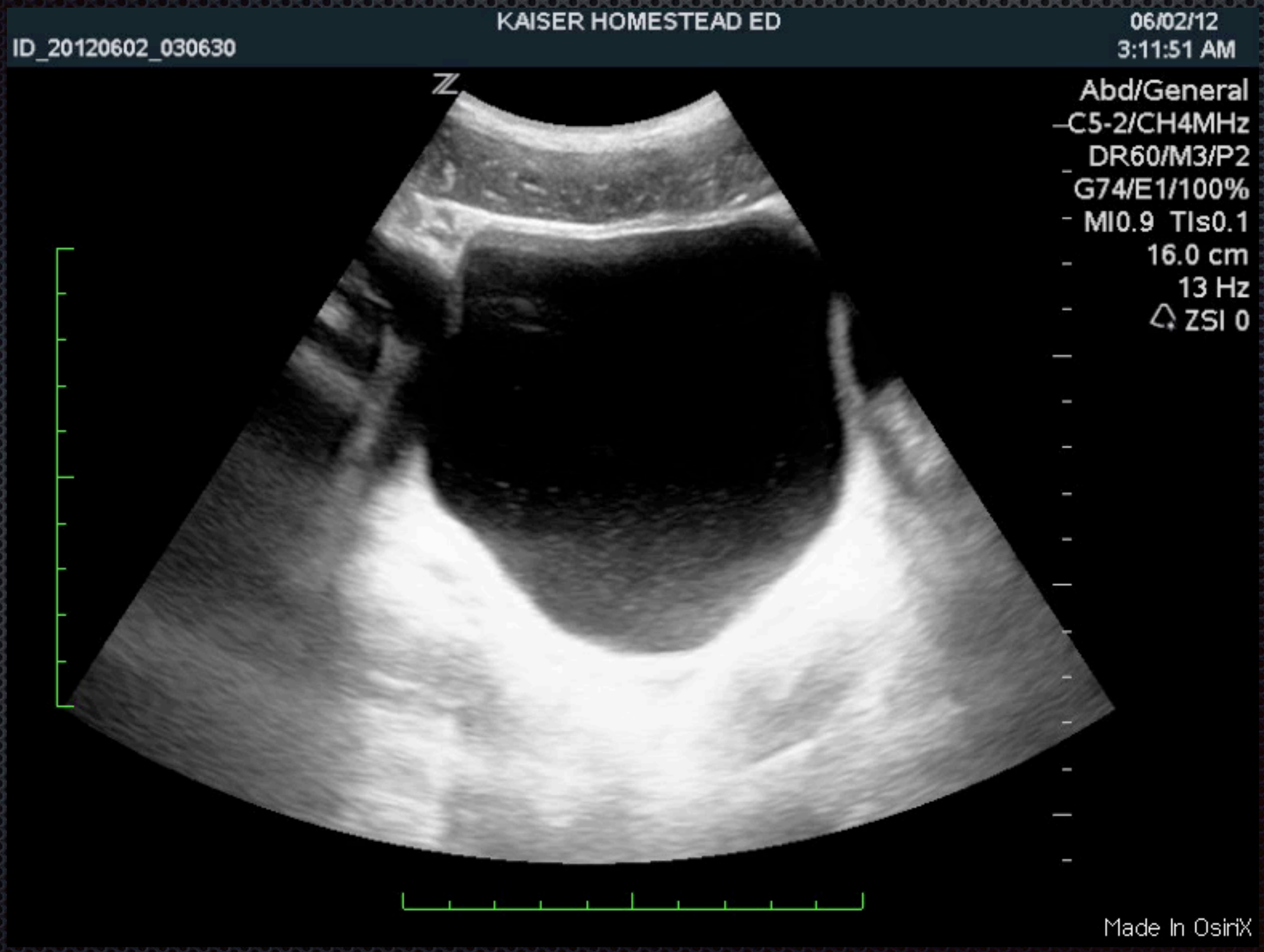
Find the fluid



Find the fluid



Find the fluid



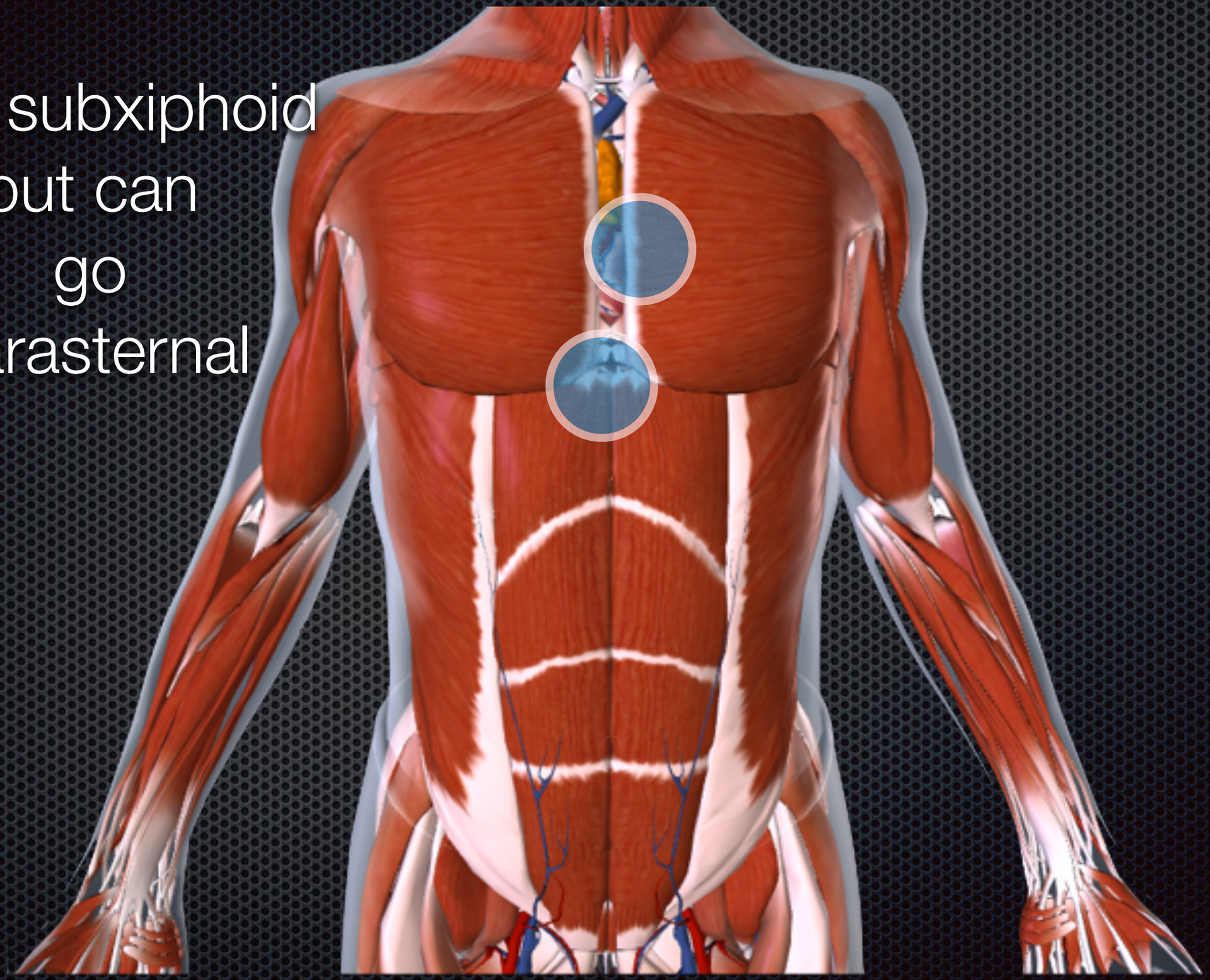
Find the fluid

scan completely
in two planes
watch gain
beware of seminal
vesicles

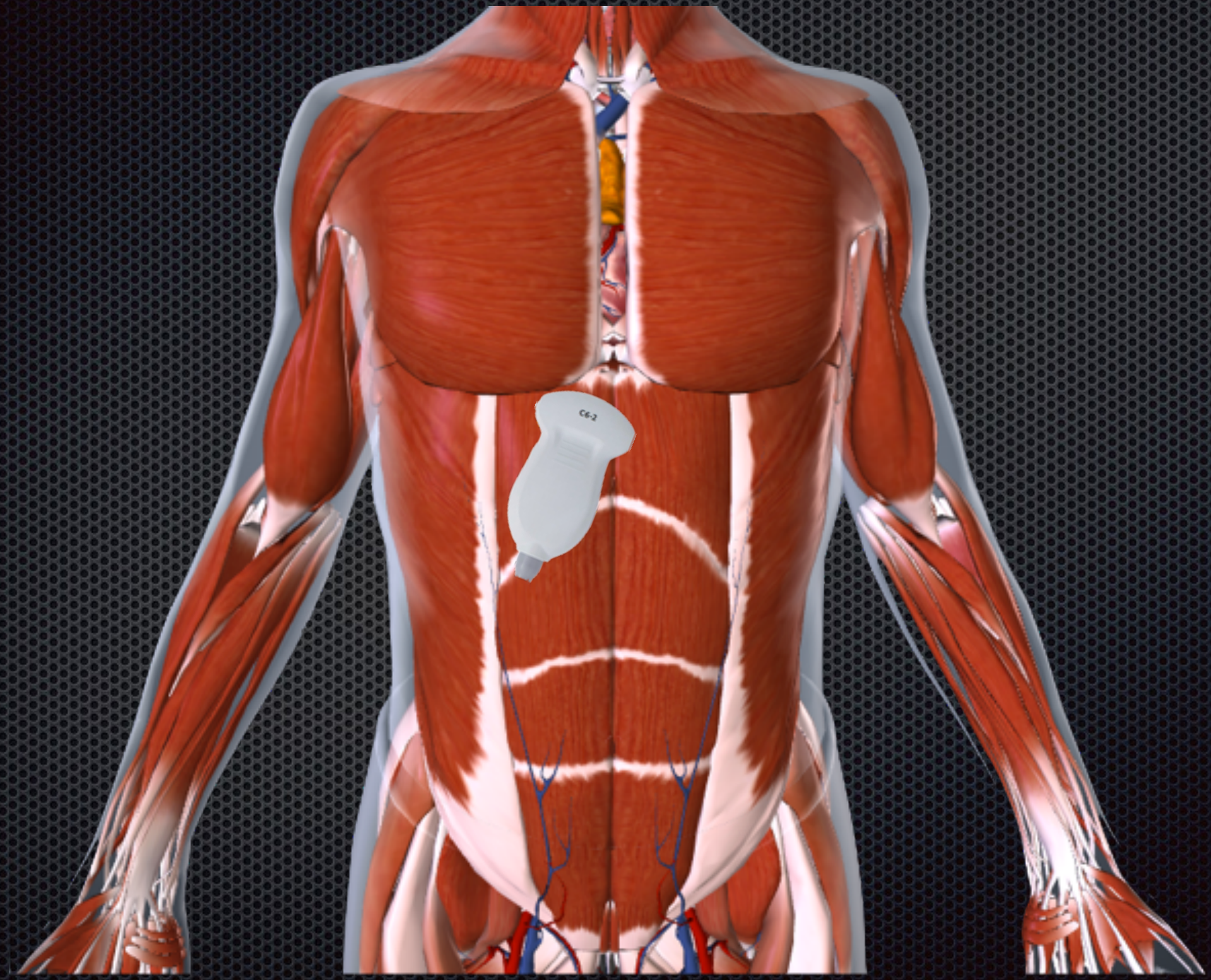
Pericardial Views

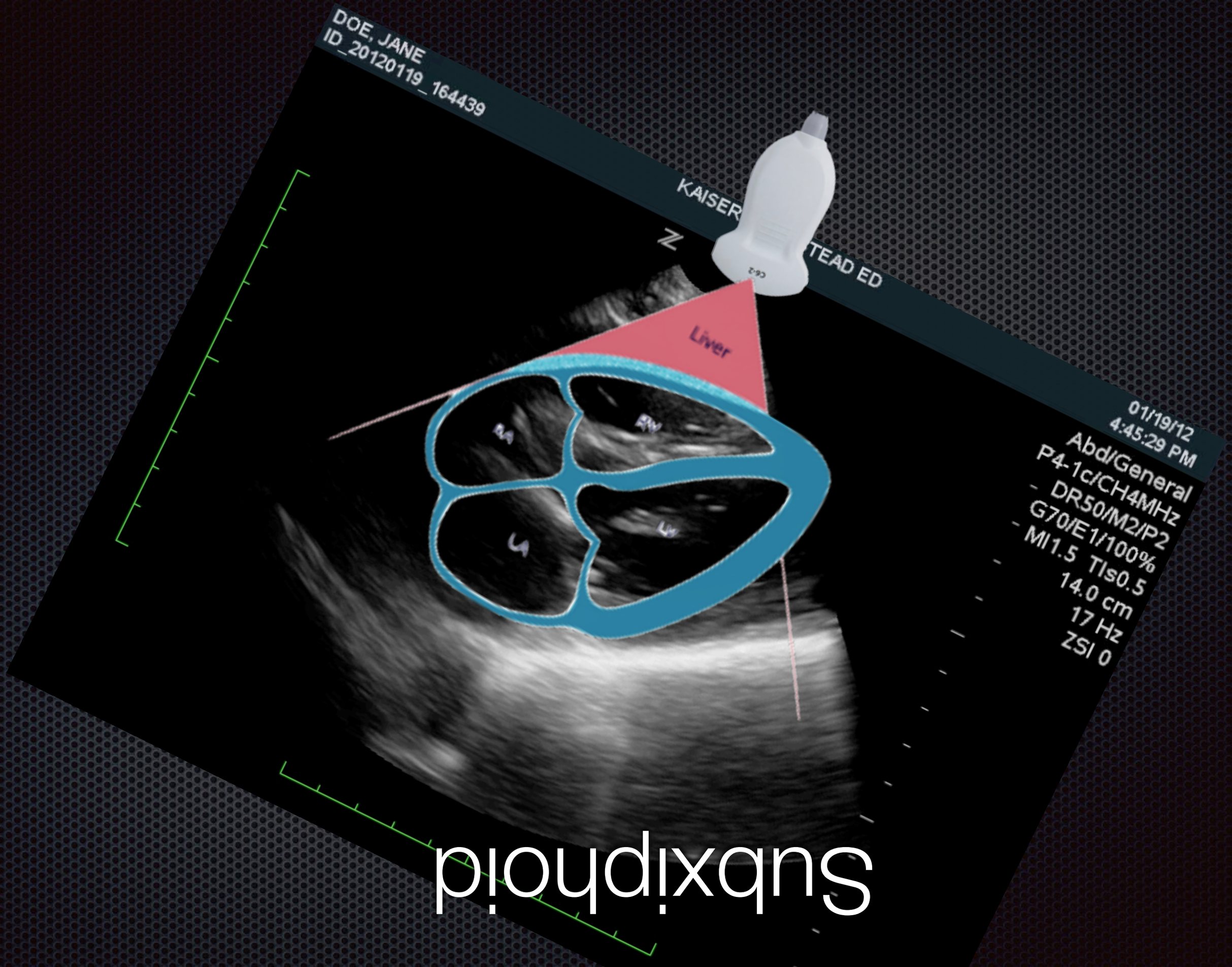
Pericardial views

start subxiphoid
but can
go
Parasternal

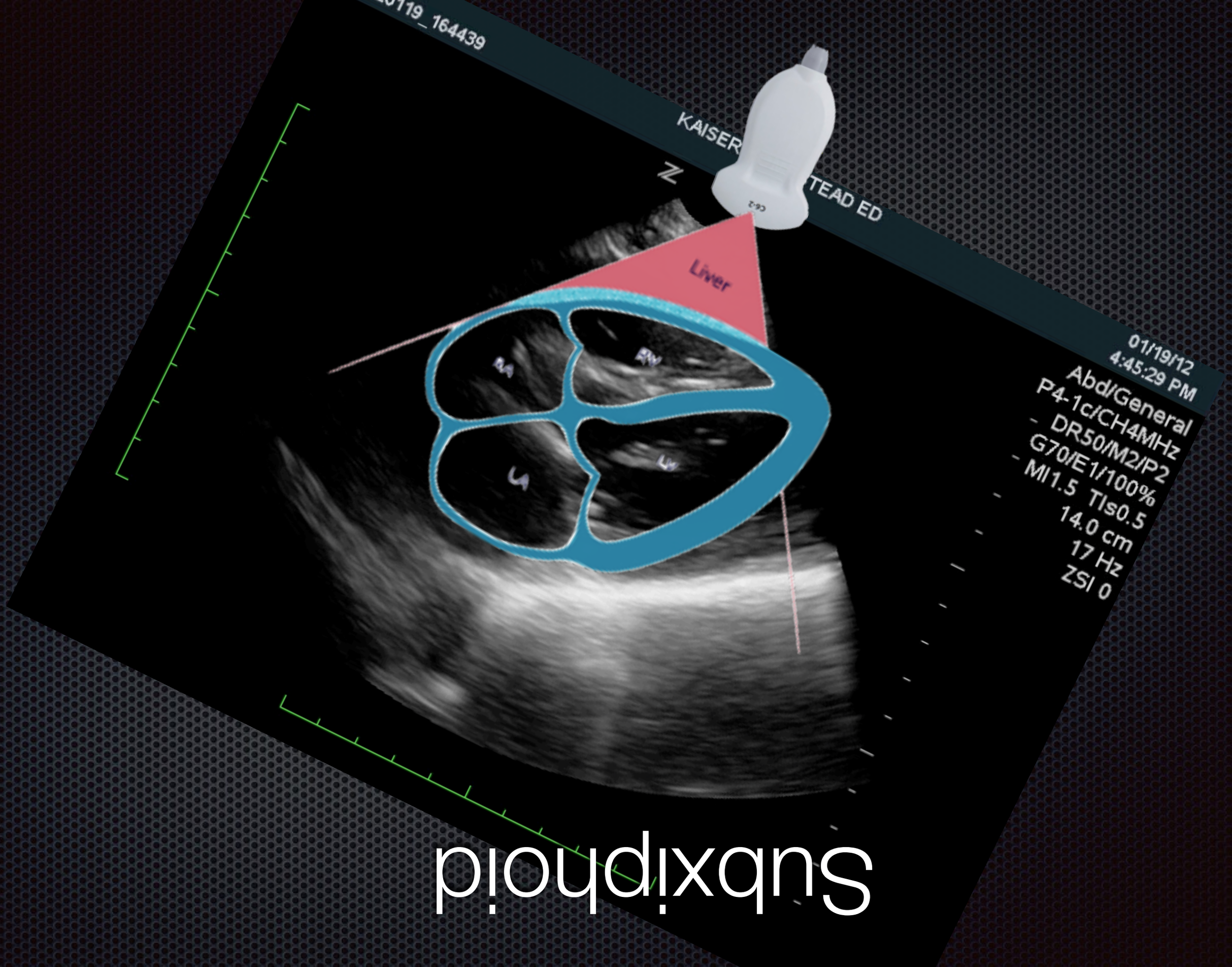


Subxiphoid




DOE, JANE
ID_20120119_164439
KAISER
TEAD ED
Liver
RA
RV
LA
LV
01/19/12
4:45:29 PM
Abd/General
P4-1c/CH4MHz
DR50/M2/P2
G70/E1/100%
MI1.5 TIs0.5
14.0 cm
17 Hz
ZSI 0

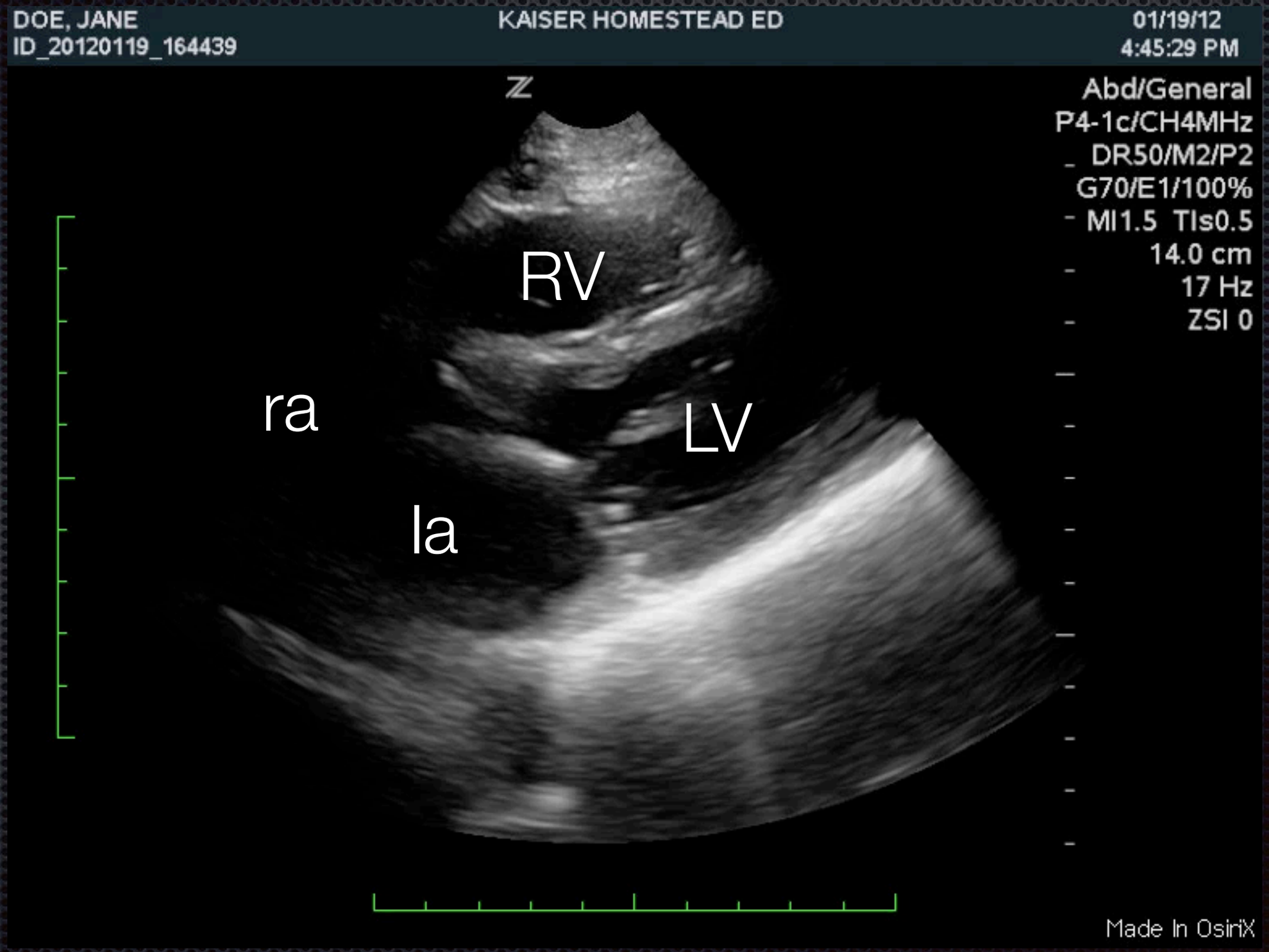
subxiphoid


KAISER
TEAD ED
Liver
01/19/12
4:45:29 PM
Abd/General
P4-1c/CH4MHz
DR50/M2/P2
G70/E1/100%
MI1.5 TIs0.5
14.0 cm
17 Hz
ZSI 0

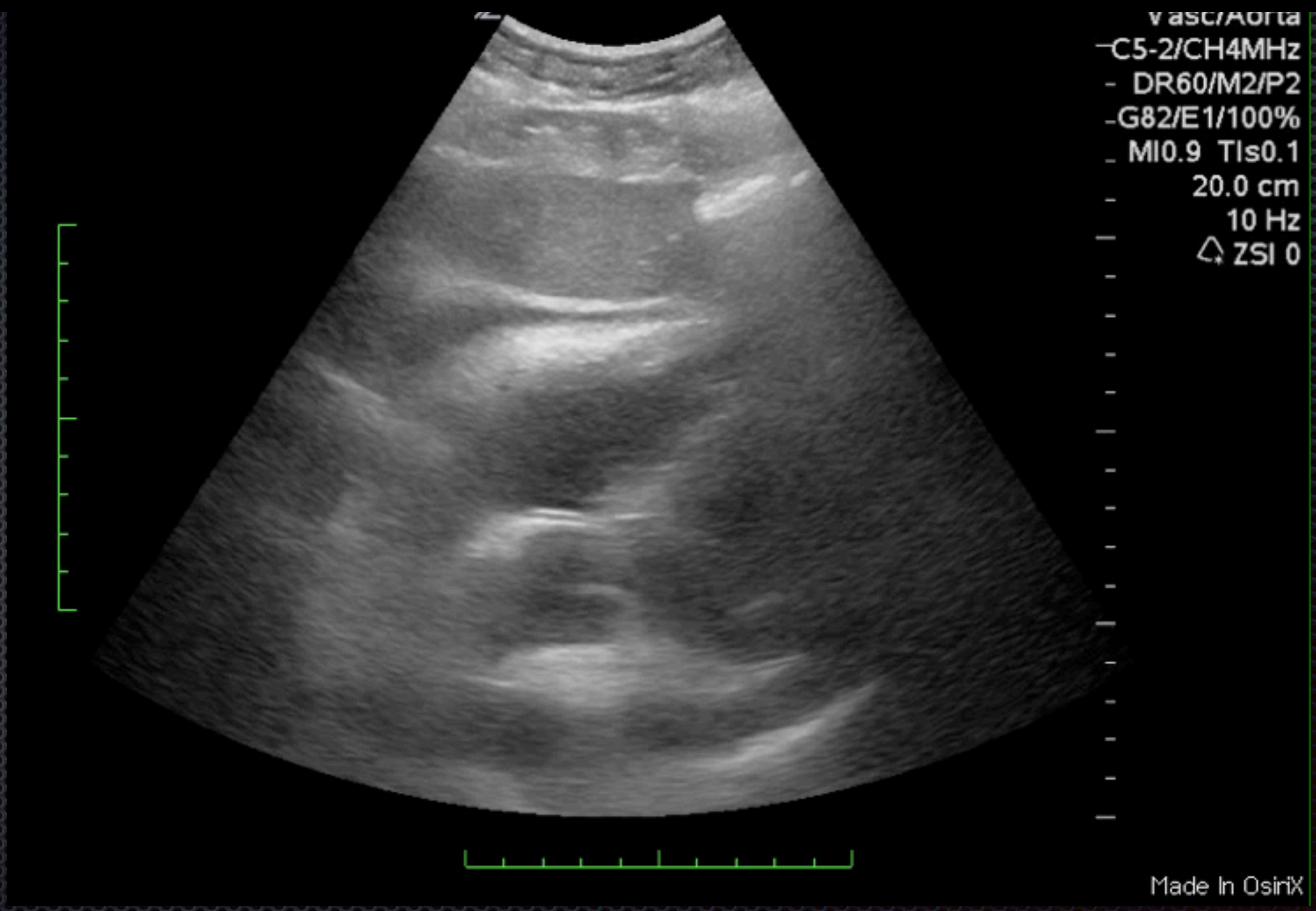
Subxiphoid


HOSTED AT
NOTHINGTOXIC.COM
UNDER the Sternum

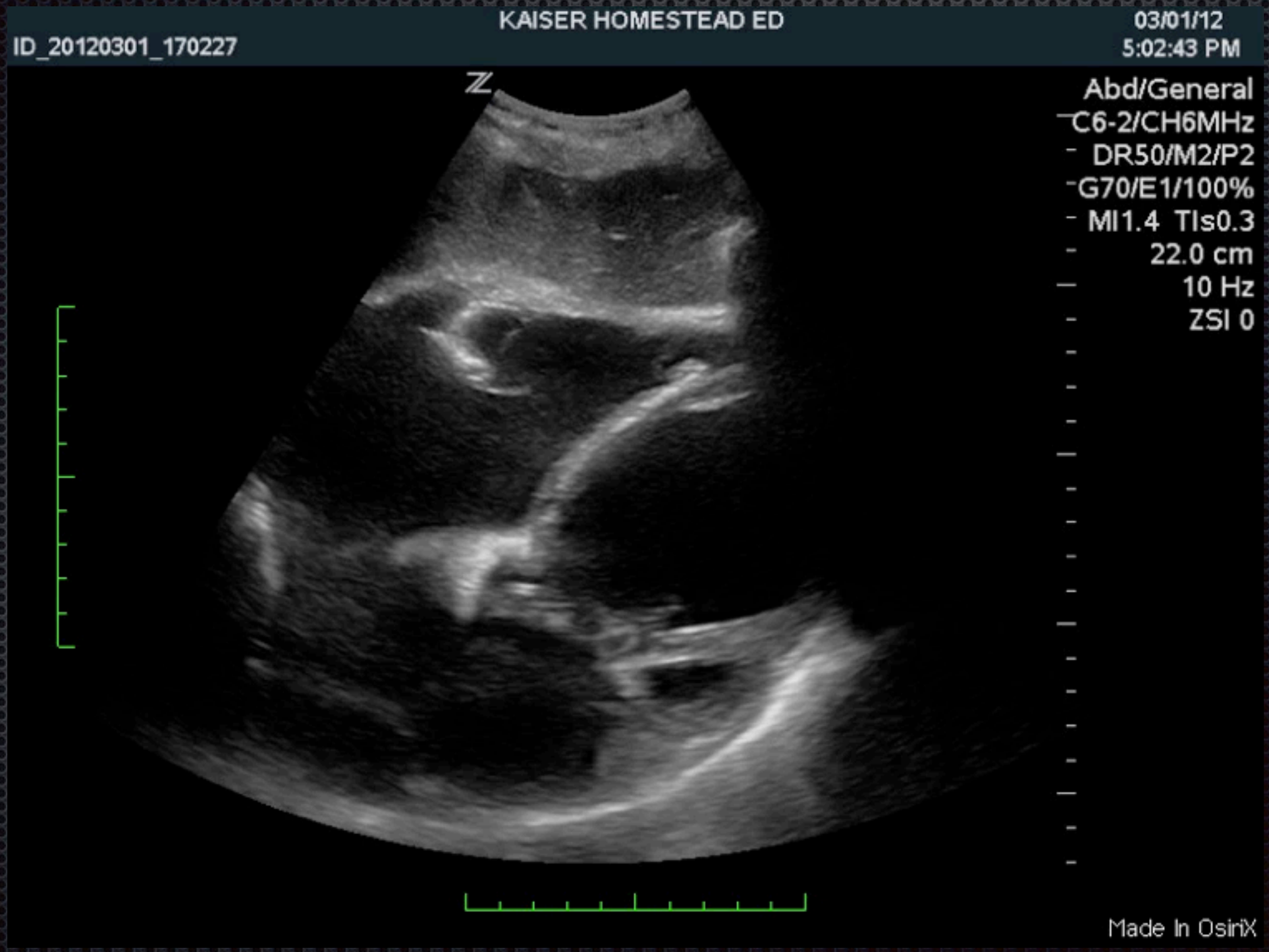
Subxiphoid


DOE, JANE
ID_20120119_164439
KAISER HOMESTEAD ED
01/19/12
4:45:29 PM
Abd/General
P4-1c/CH4MHz
DR50/M2/P2
G70/E1/100%
MI1.5 TIs0.5
14.0 cm
17 Hz
ZSI 0
RV
ra
LV
la
Made In OsiriX

Subxiphoid


Vasc/Aorta
C5-2/CH4MHz
DR60/M2/P2
G82/E1/100%
MI0.9 TIs0.1
20.0 cm
10 Hz
ZSI 0
Made In OsiriX

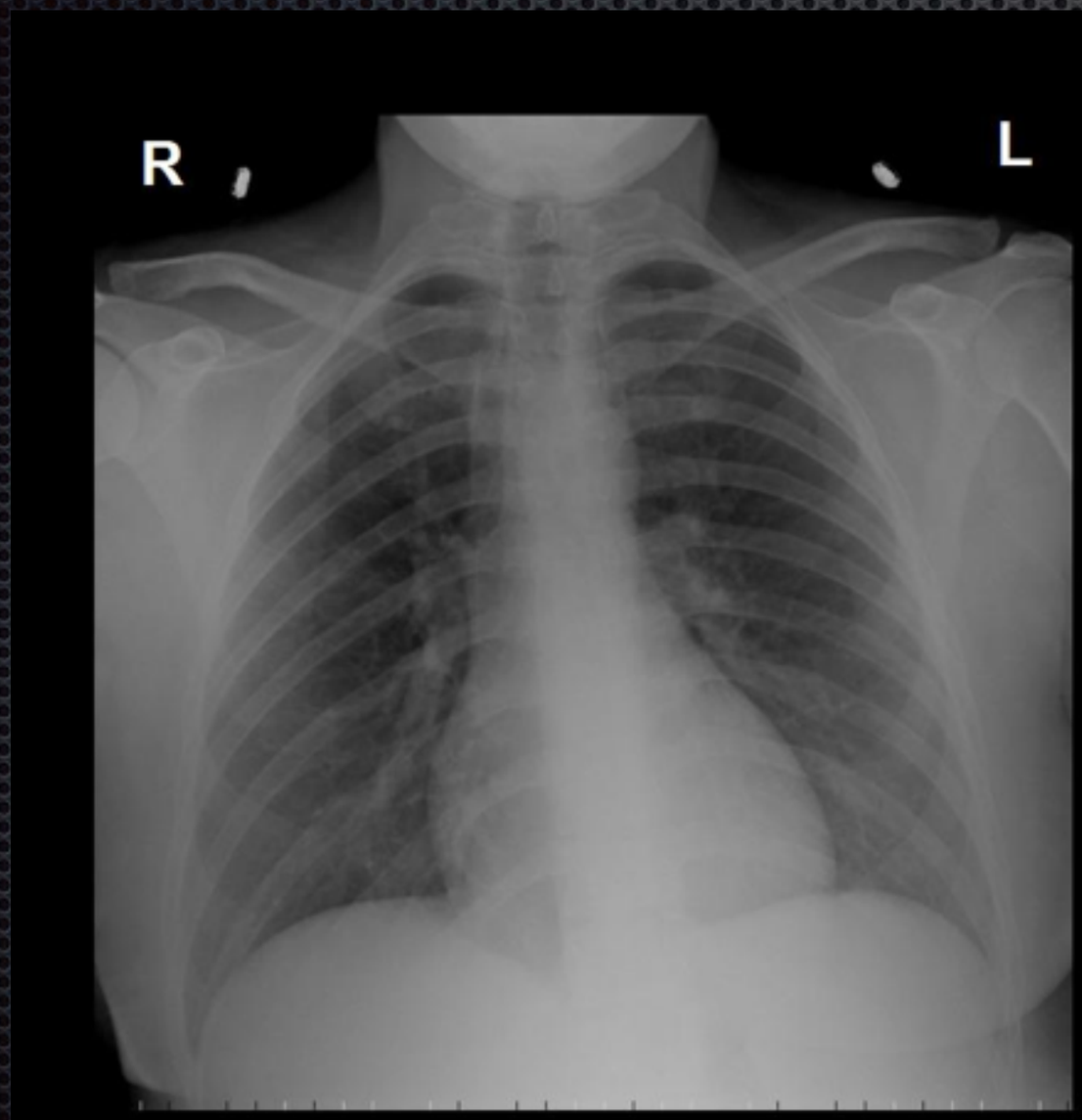
Subxiphoid

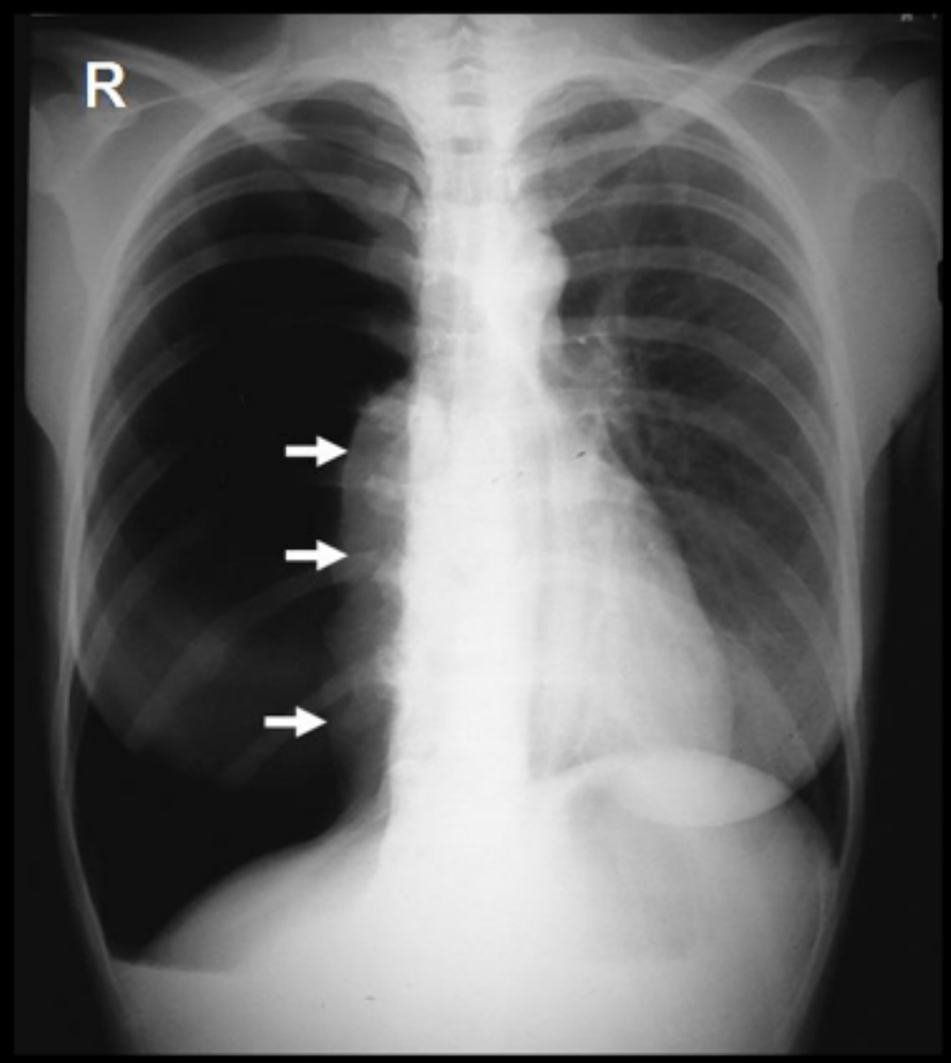

KAISER HOMESTEAD ED
ID_20120301_170227
03/01/12
5:02:43 PM
Abd/General
C6-2/CH6MHz
DR50/M2/P2
G70/E1/100%
MI1.4 TIs0.3
22.0 cm
10 Hz
ZSI 0
Made In OsiriX

Subxiphoid

scan completely
use other windows
under the sternum

Pleural Views:
The Search for Air?



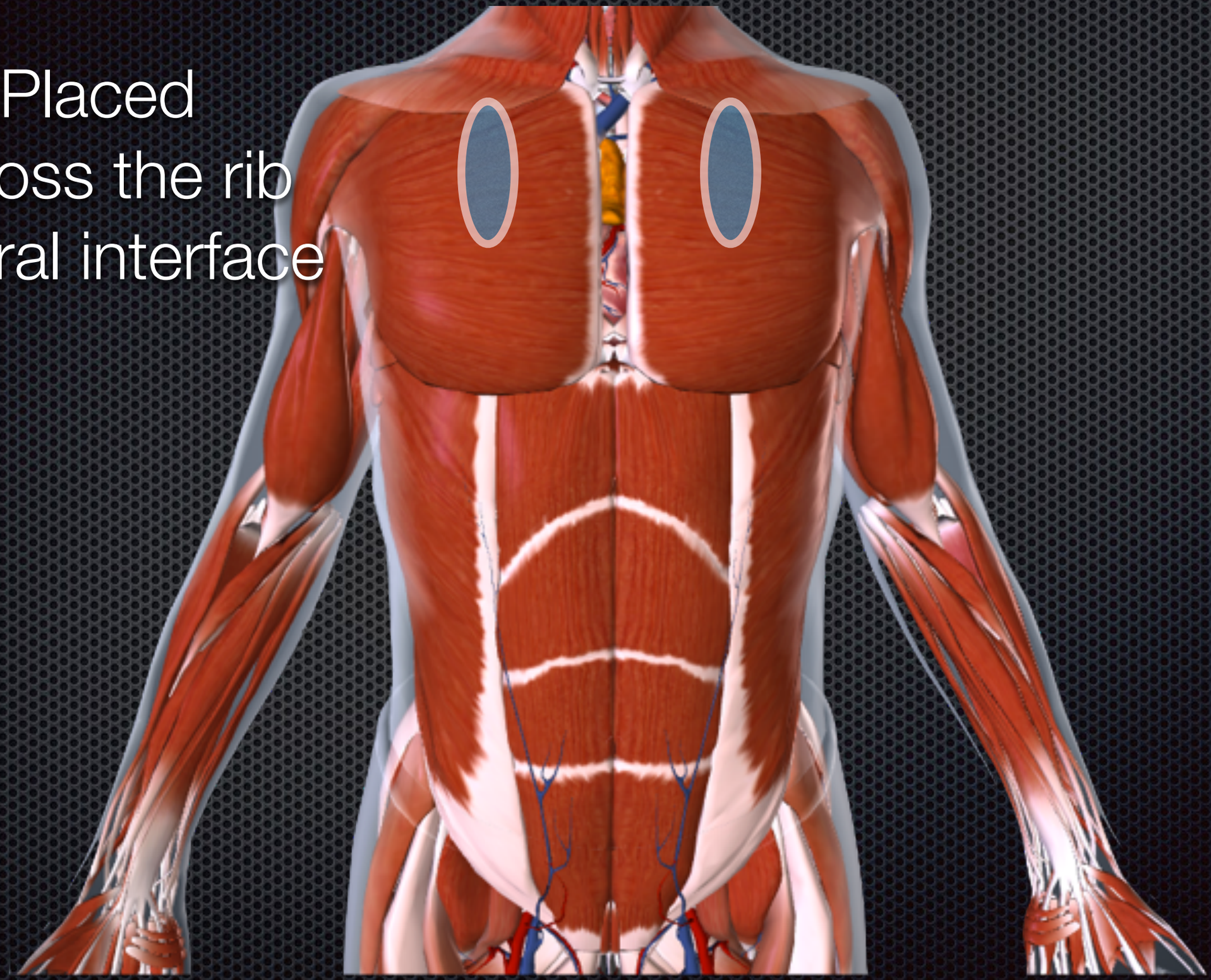


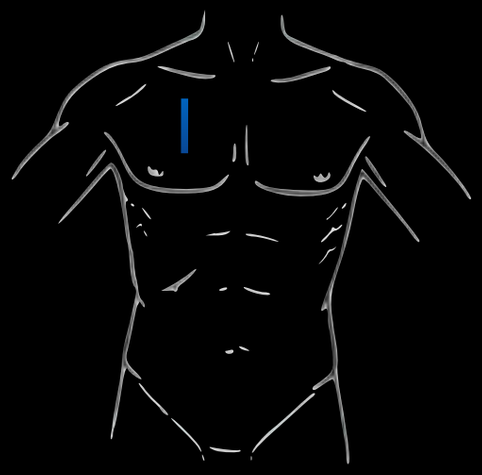
Not exactly.

We use the pleural interface as our analog to a lung being up

Pleural

Placed
across the rib
pleural interface



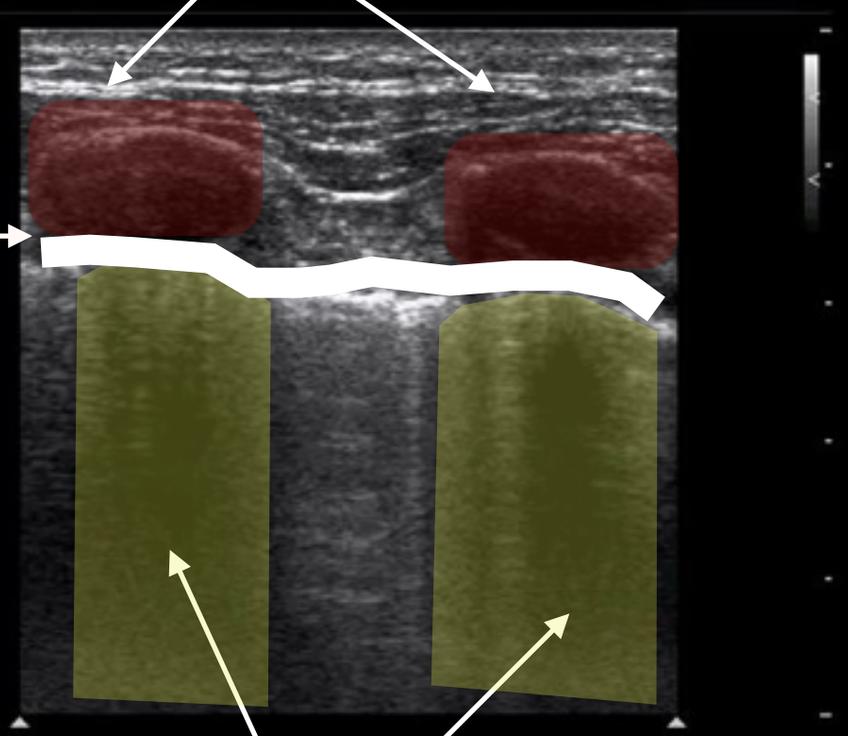


Ground Zero

head

feet

Ribs



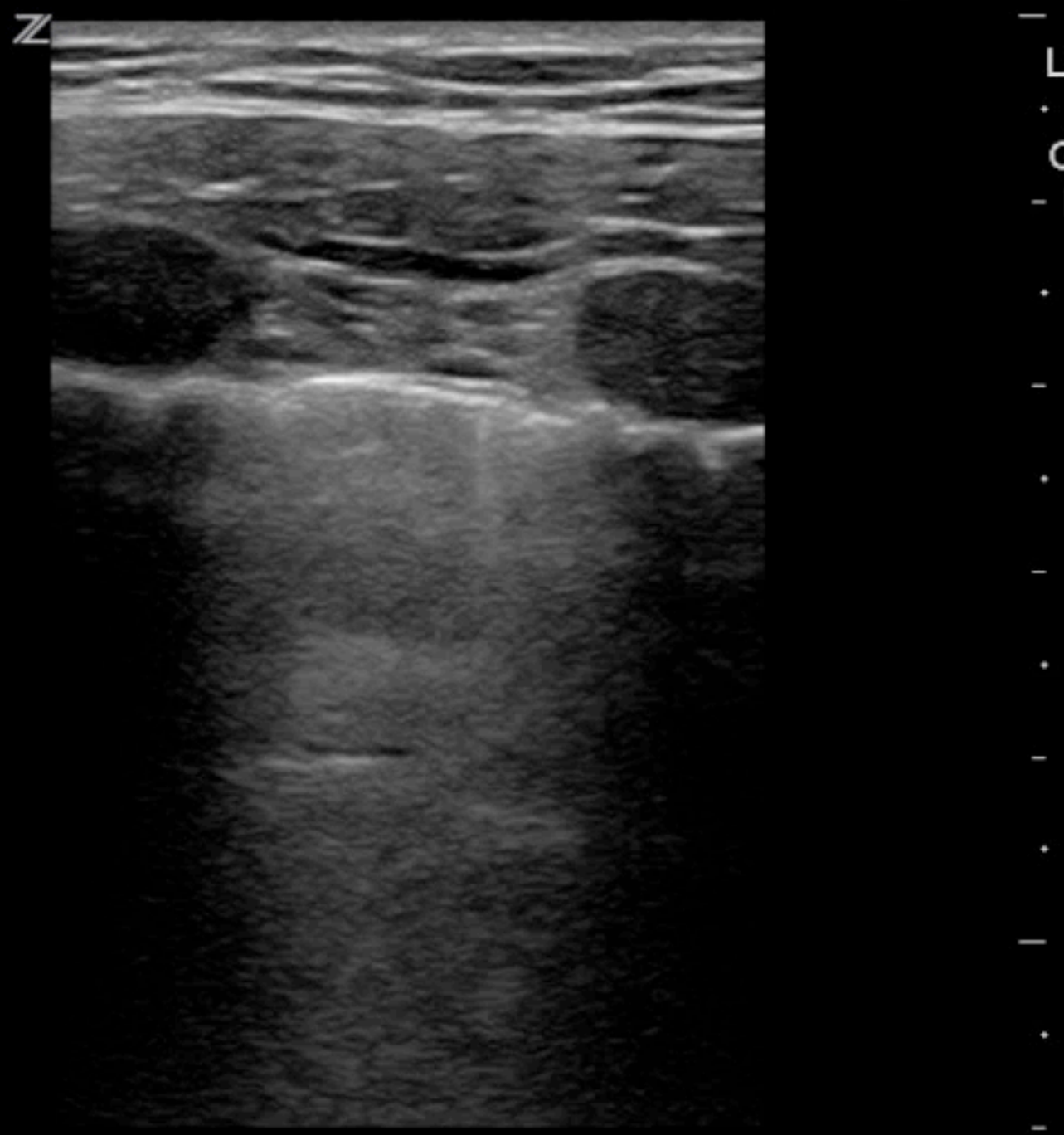
Pleural interface

Rib Shadows


C6-2

Pleural Sliding

interface of parietal and visceral pleura



What's going on here?

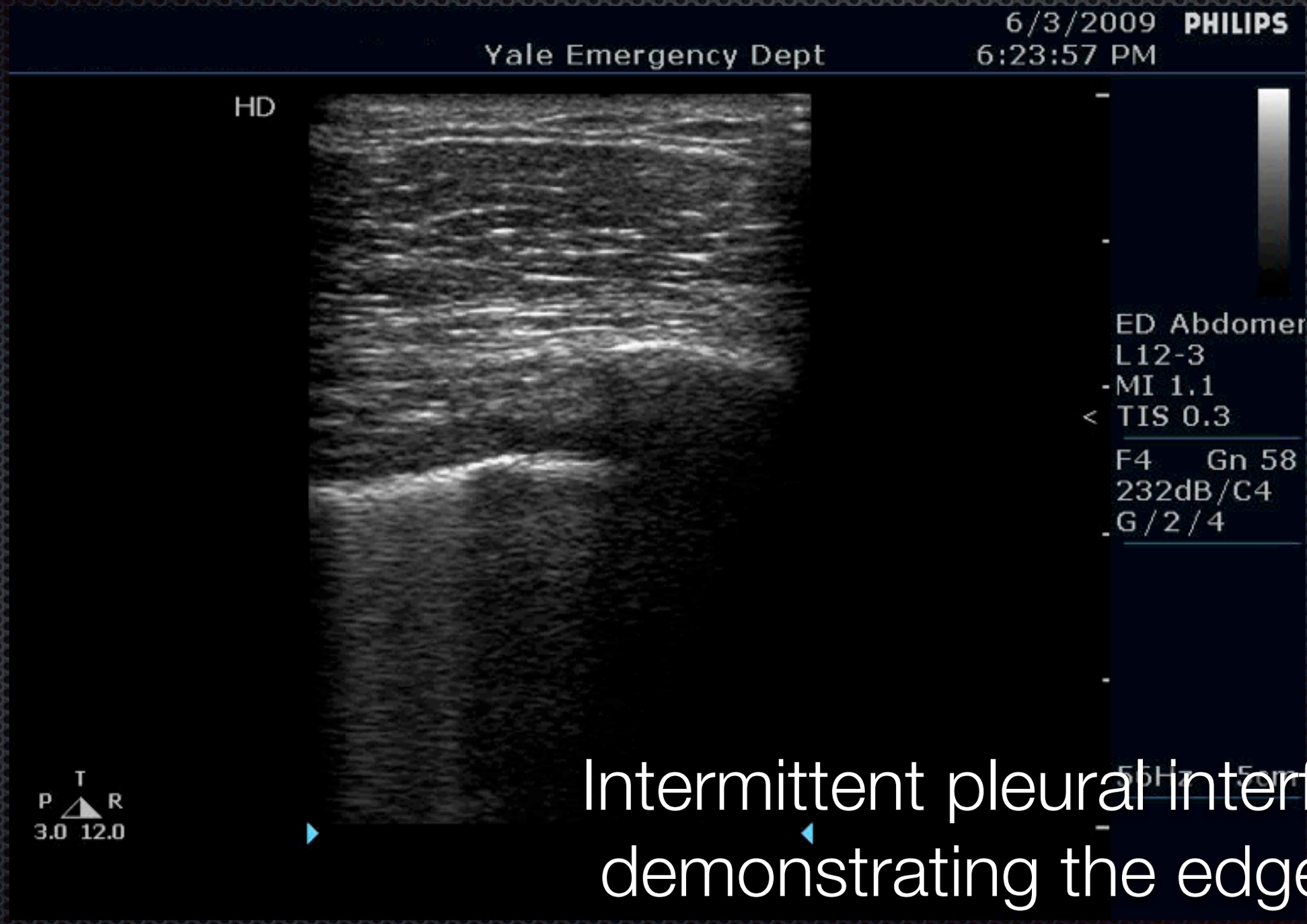
loss of the pl interface will cause lack of sliding

Compare


VAN TONDER GILMO.
7.24
2008Jul2
Res MB
Res
0
Auto Gain
MB
Clips...
Page 2...

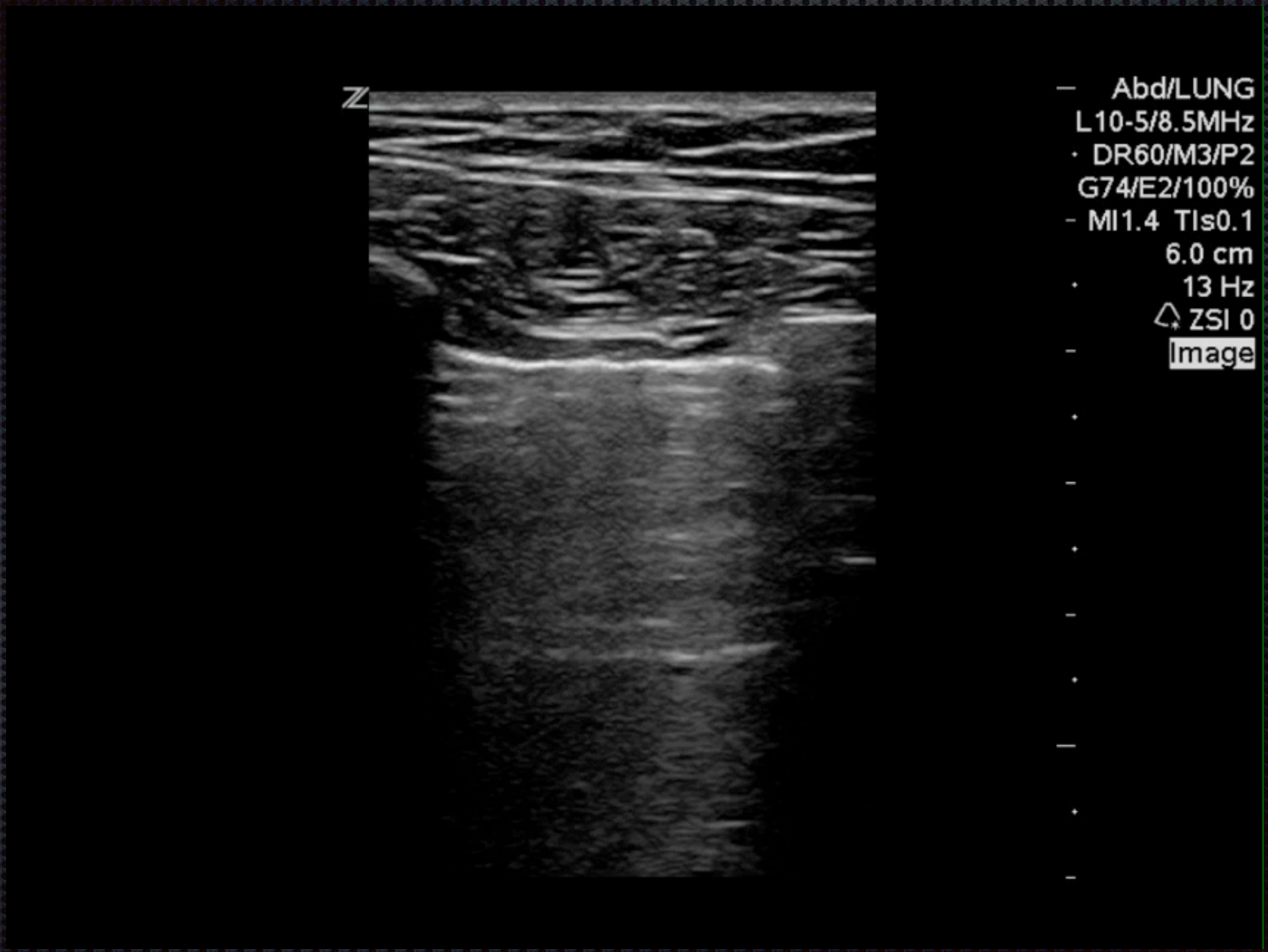

VAN TONDER
7.30 PTX
2008Jul28
22:18
Res MB
Vas
SLA
CF
95%
10
20
MI
0.7
2.6
Res
0
Auto Gain
MB
Clips...
Page 2...

Lung Point

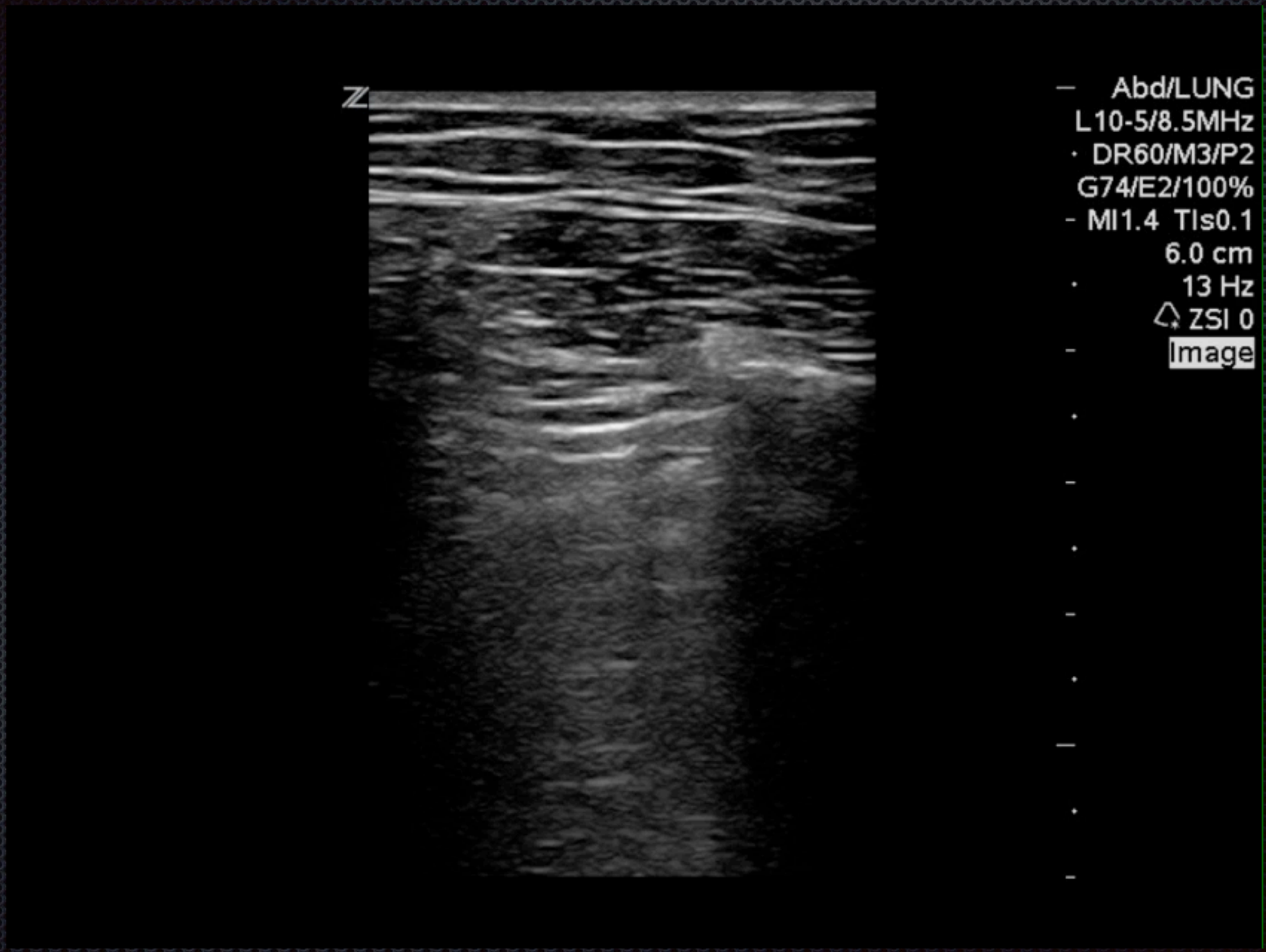


Intermittent pleural interfacing demonstrating the edge of a pneumothorax

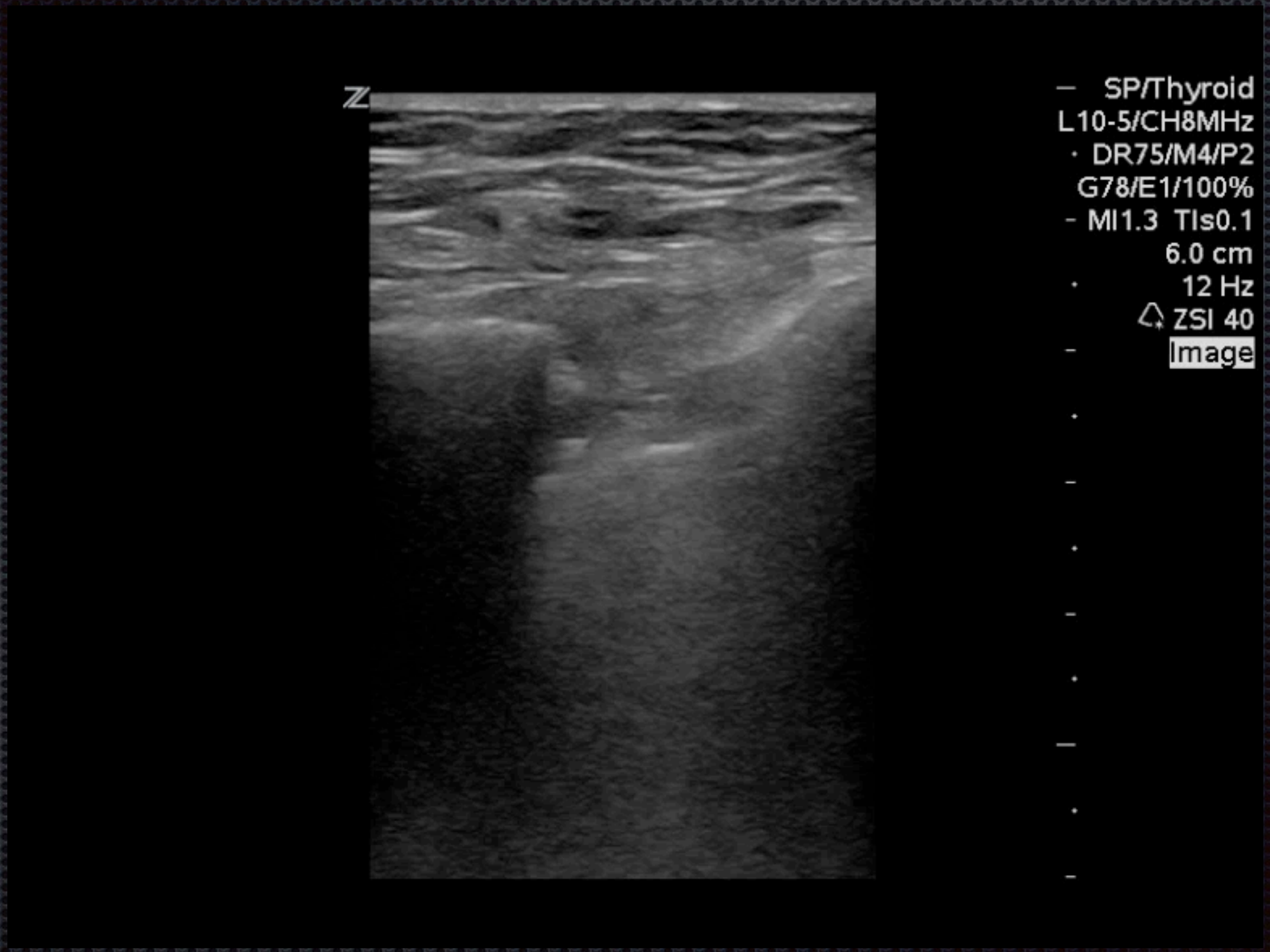
?


Abd/LUNG
L10-5/8.5MHz
DR60/M3/P2
G74/E2/100%
MI1.4 TIs0.1
6.0 cm
13 Hz
ZSI 0
Image

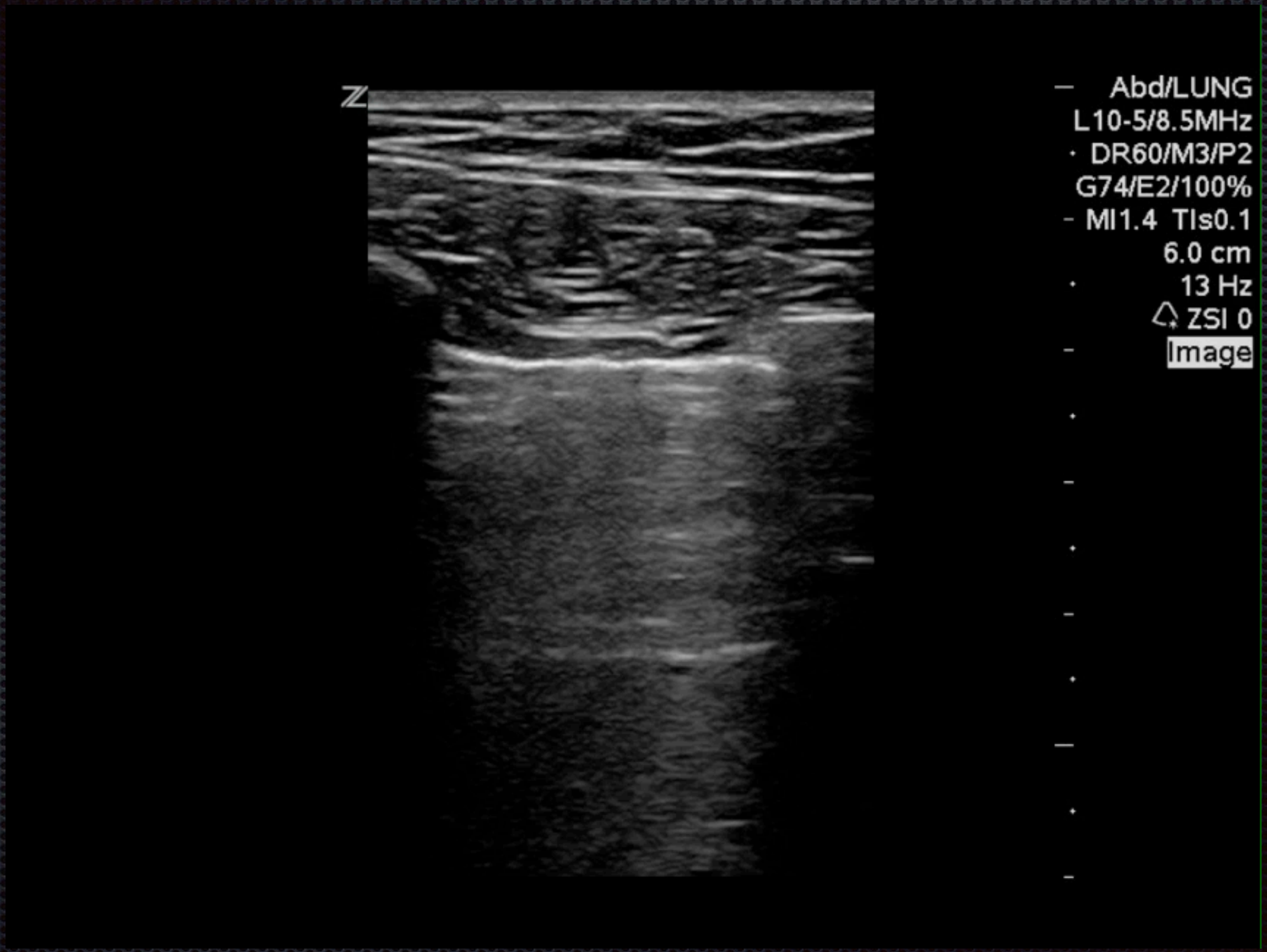
?


Abd/LUNG
L10-5/8.5MHz
DR60/M3/P2
G74/E2/100%
MI1.4 TIs0.1
6.0 cm
13 Hz
ZSI 0
Image

?


SP/Thyroid
L10-5/CH8MHz
DR75/M4/P2
G78/E1/100%
MI1.3 TIs0.1
6.0 cm
12 Hz
ZSI 40
Image

?

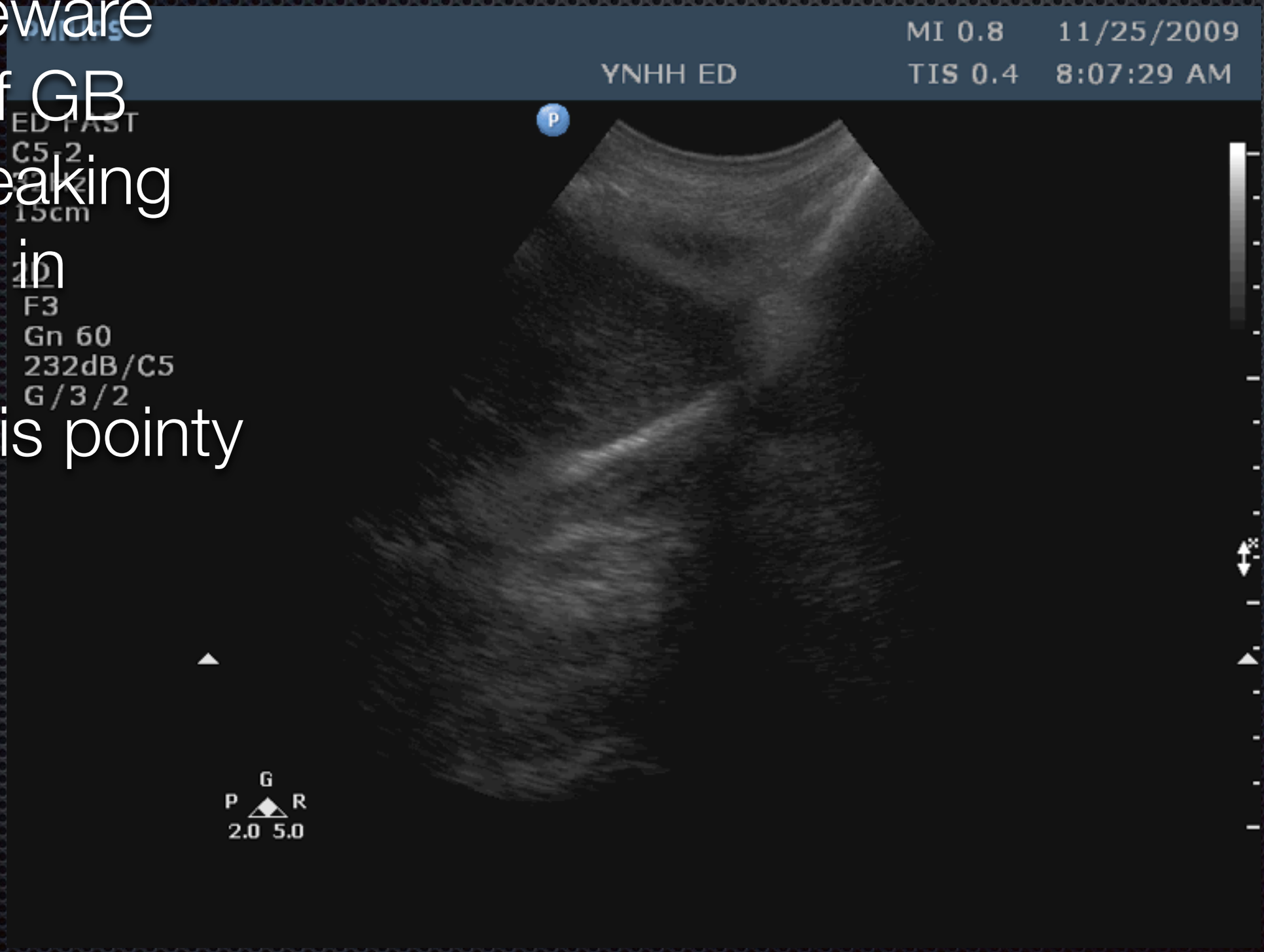

Abd/LUNG
L10-5/8.5MHz
DR60/M3/P2
G74/E2/100%
MI1.4 TIs0.1
6.0 cm
13 Hz
ZSI 0
Image

Pitfalls

RUQ

Beware of GB sneaking in

Fluid is pointy



RUQ

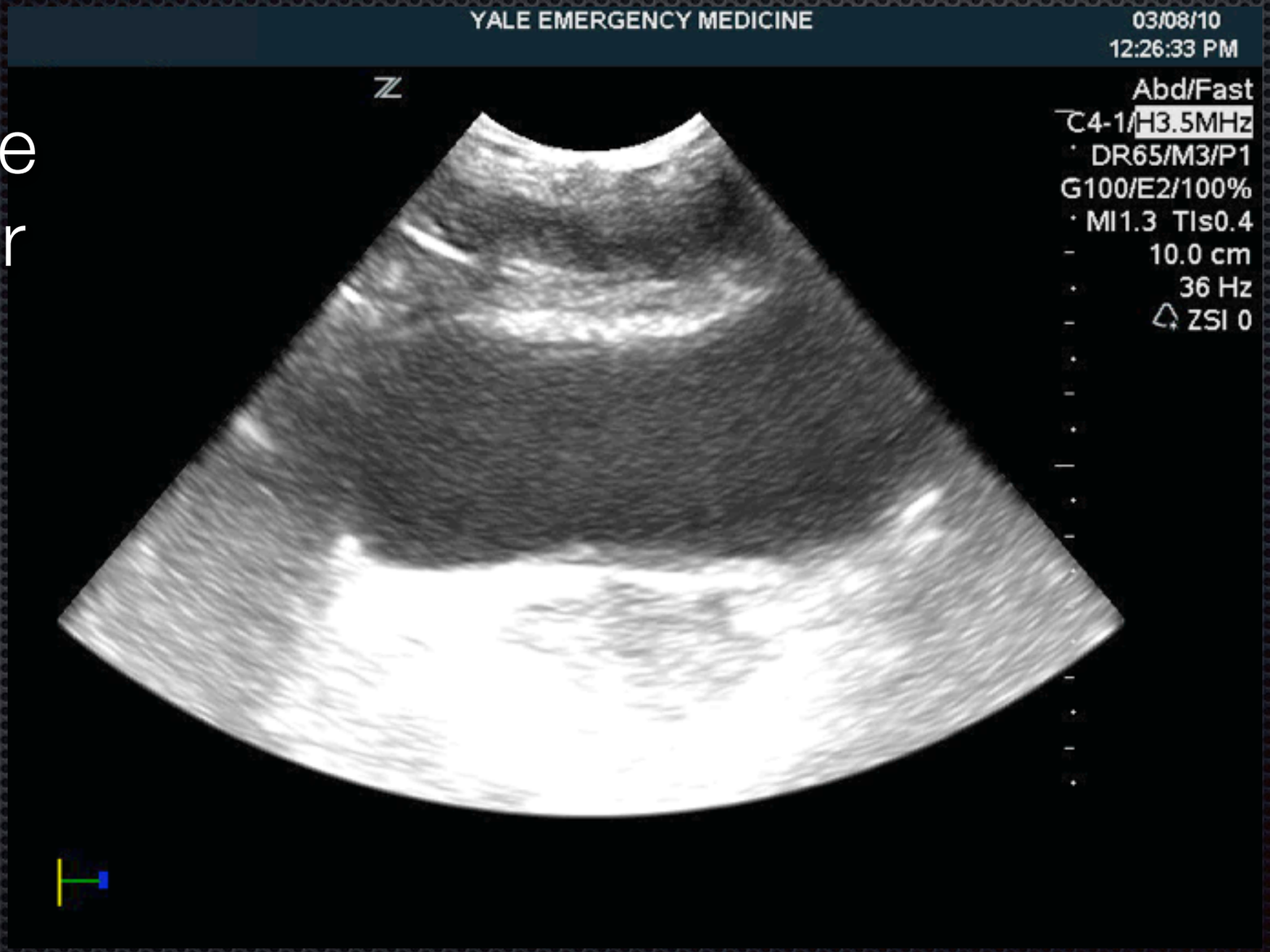
perinephric fat can sim clotted blood

LUQ

beware of fluid filled stomach

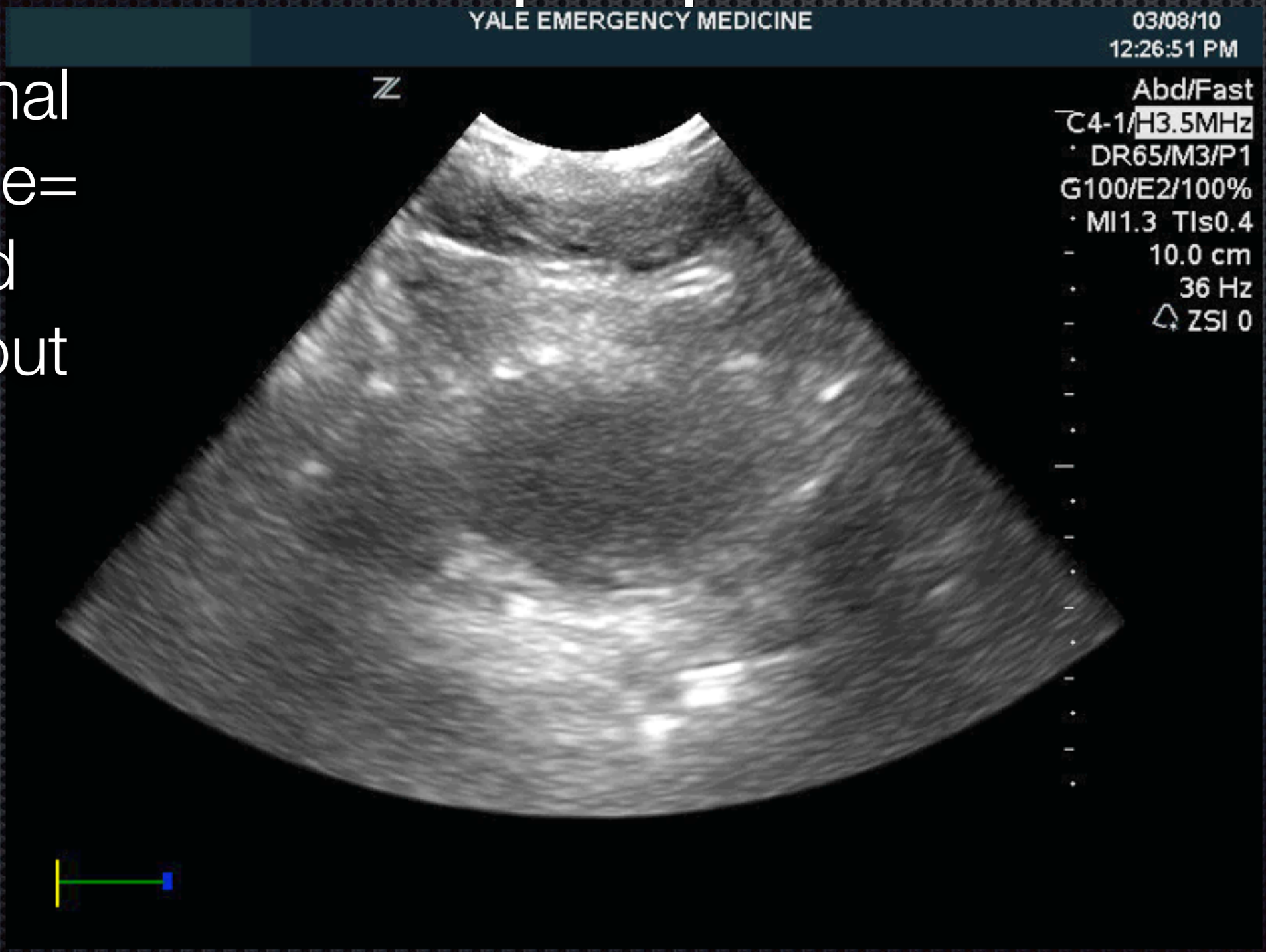
Suprapubic

Beware of over gain



Suprapubic

seminal vesicle= fluid fakeout

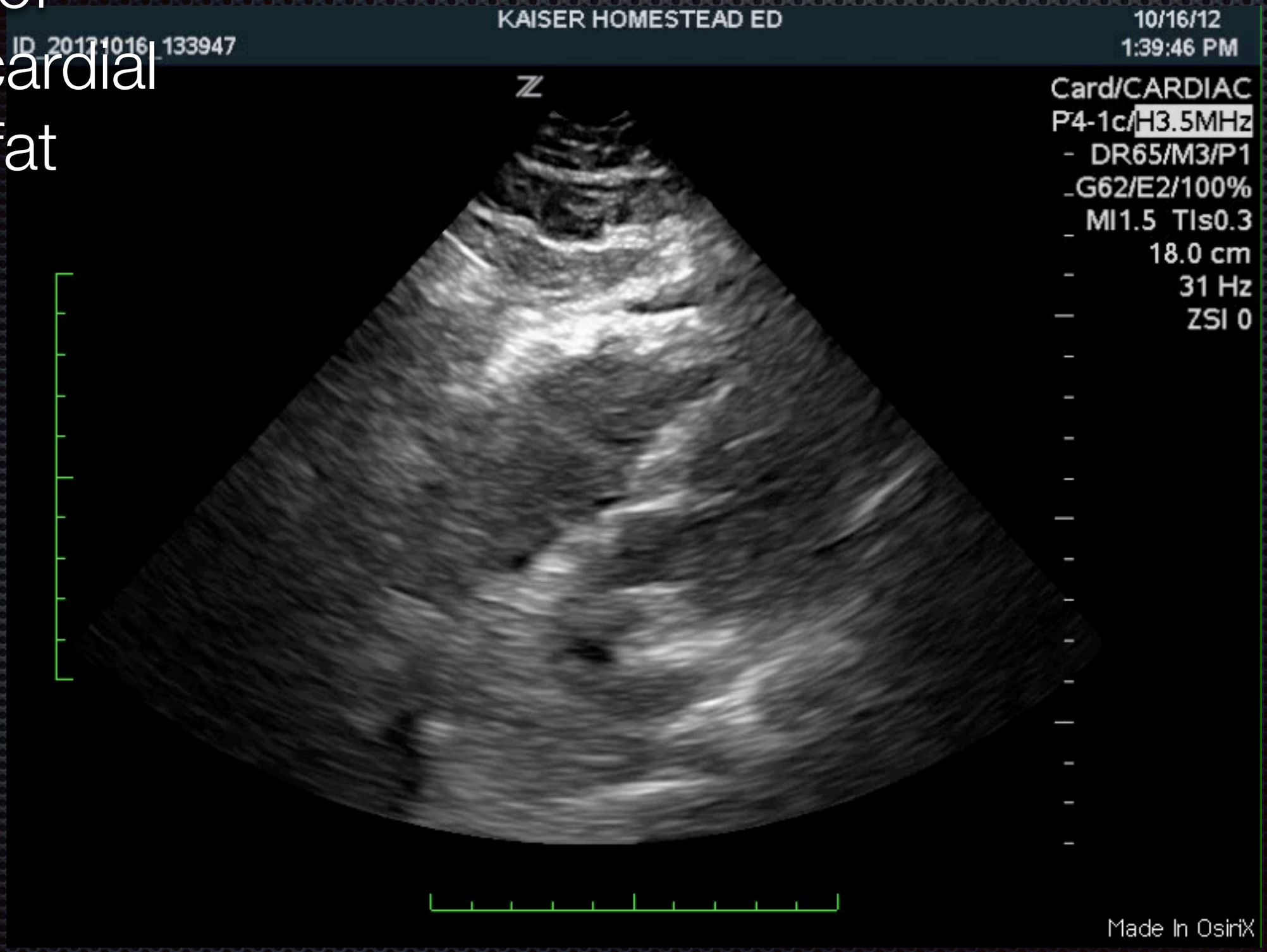


Pitfall: Pleura

Beware
over the heart!!
may look like Lung point

beware of epicardial fat

Subxiphoid



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Let’s get scanning!!

	US
Speed min	2-5
Cost	+
Bedside	+++
Repeatable	+++
Blunt Trauma	+++
Penetrating	++
Unstable pt	+++
ID site	+\-
Non operative	++
Retroperitoneal	+/-
Pelvic	+/-
Accuracy %	94-97
Safety	-

FAST
Not the most sensitive or specific

BUT

- [x] Rapid
- [x] Repeatable
- [x] Non-invasive
- [x] No-ionizing radiation
- [x] Too unstable for CT
- [x] Pregnant

How much and where?

- Single RUQ view: 619-668 ml
  - 1 cm stripe in RUQ: 1000 ml
- Trendelenburg: 444 ml
- Single Pelvic View: 157 ml
- Multiple views: 200-250 ml
- Pleural Fluid: 20 ml (CXR 200ml)