MANUAL

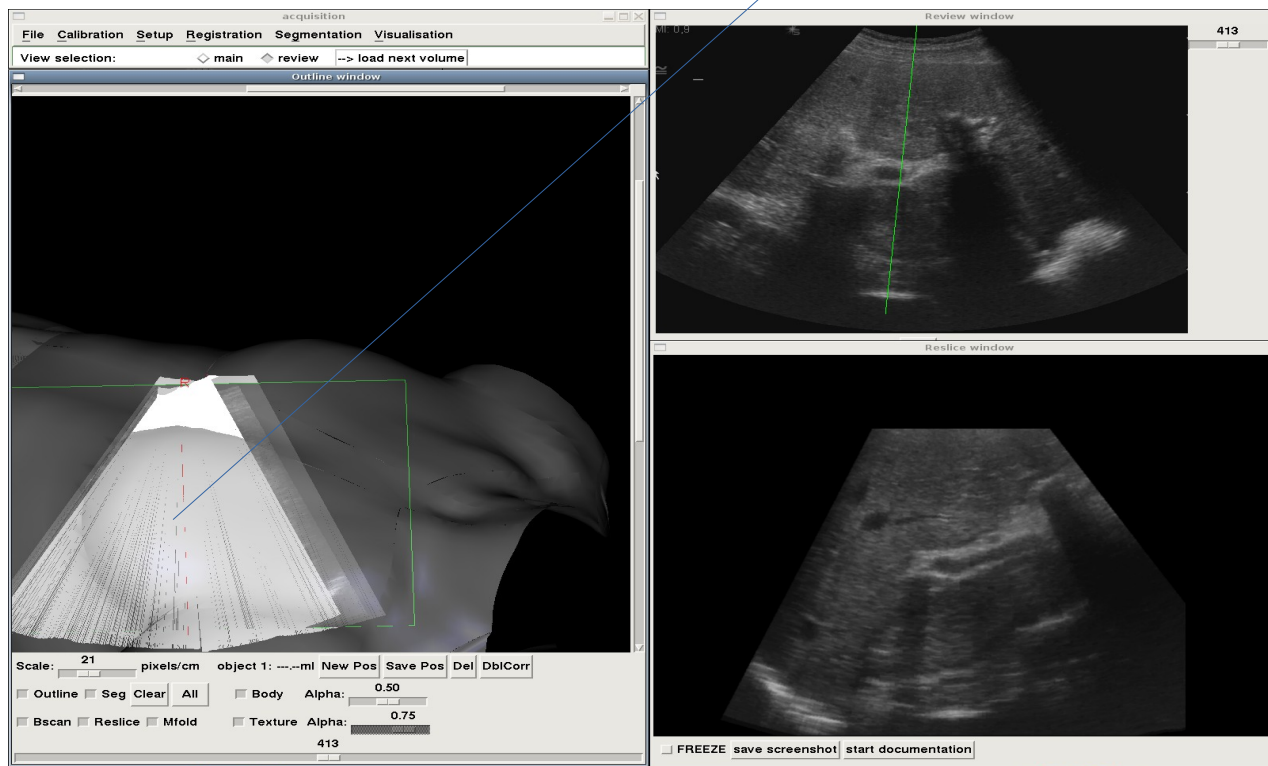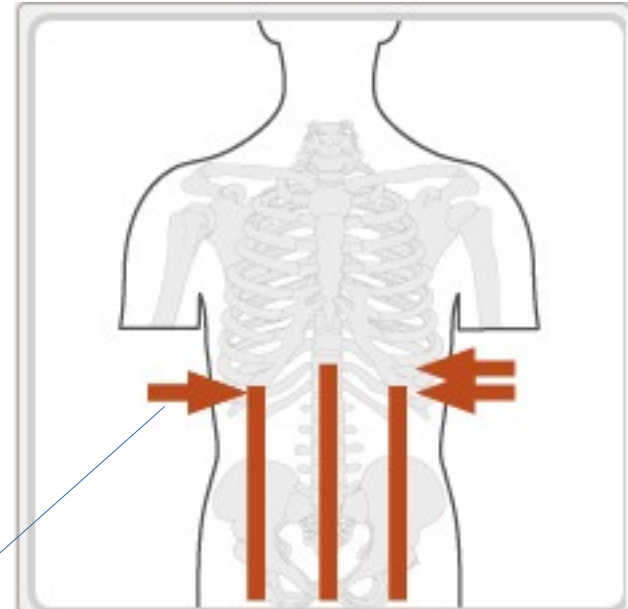Schallware Ultrasound Simulator:
station 128
Version 201601

Content

Description:

The Schallware Ultrasound Simulator allows your doctors to practice ultrasound diagnosics just as under real conditions. Moving the dummy transducer over the torso produces the exact B-scans of the selected case. Our exclusive lossless multi-volume reslicing algorithm computes these B-scans in real-time from the actual patient scan data. The scan data are organized into thematic modules ranging from beginner to advanced difficulty. With three torsos and five dummy transducers available, our system covers ultrasound diagnosis scenarios in the internal medicine, emergency, cardiology (TTE/TEE) and gynaecology (abdominal and transvaginal) departments. The Core System includes one dummy torso, three modules and corresponding transducers. Various add-on modules are available from our continuously growing library produced by our affiliated clinics. Each module is served with a tutorial including documented patient cases.

The ultrasound simulator is able to load single or multiple volumes (multi-volume-mode). In multi-volume-mode the volume changes automatically to the position of the probe dummy on the manikin.
Moreover the ultrasound simulator is able to load virtual animated models in addition to clinical data.

Volume acquisition on real patients as clinical data,
Here for example fan volume at right side intercostal
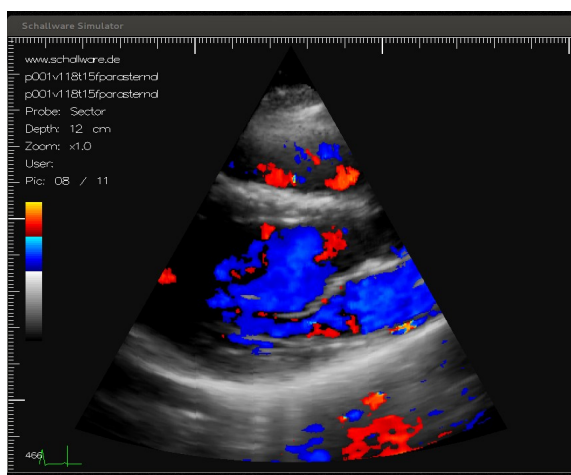

Reconstructed plane shows volume *quality* (green line)

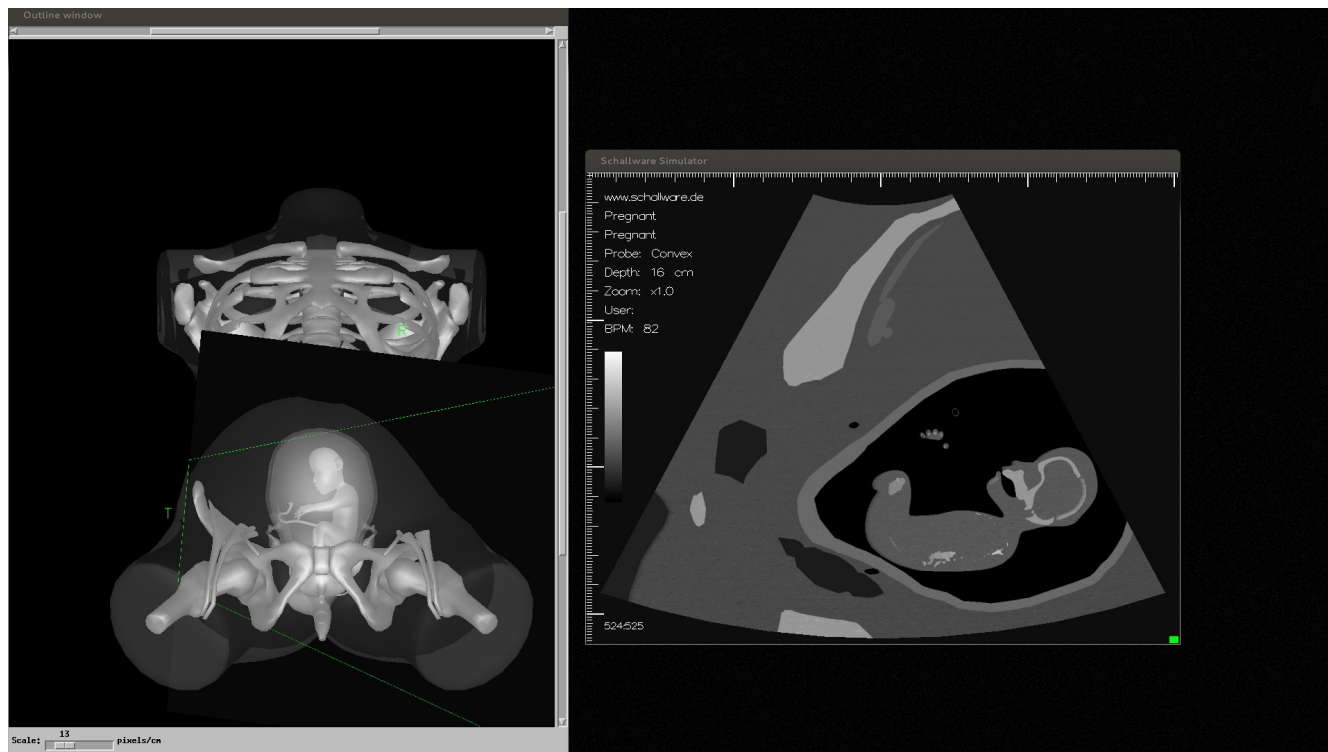Image modi of Schallware Ultrasound Simulator:
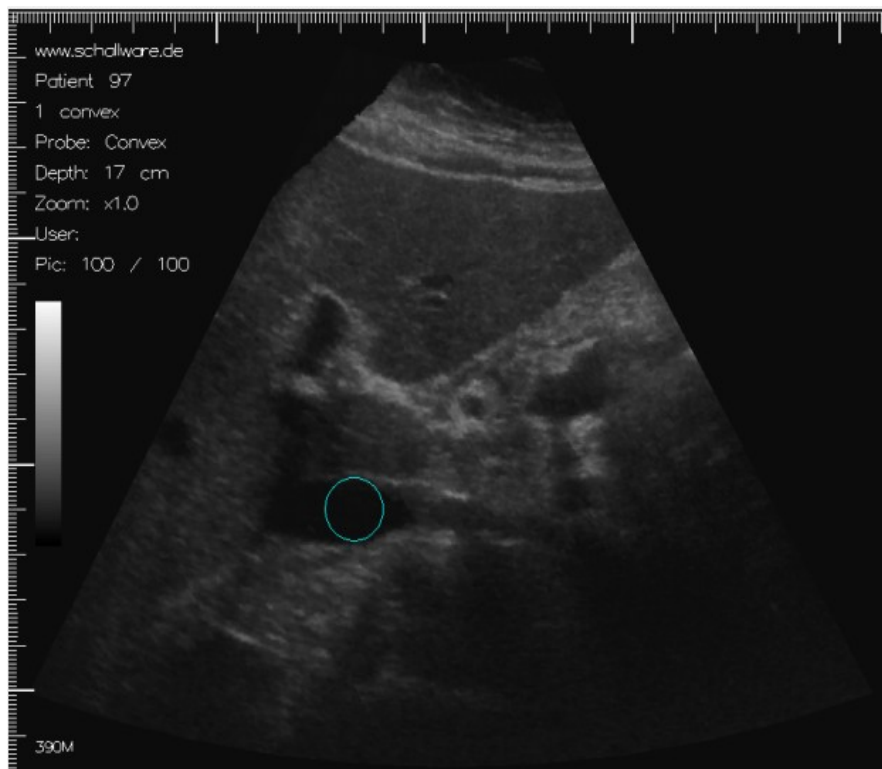
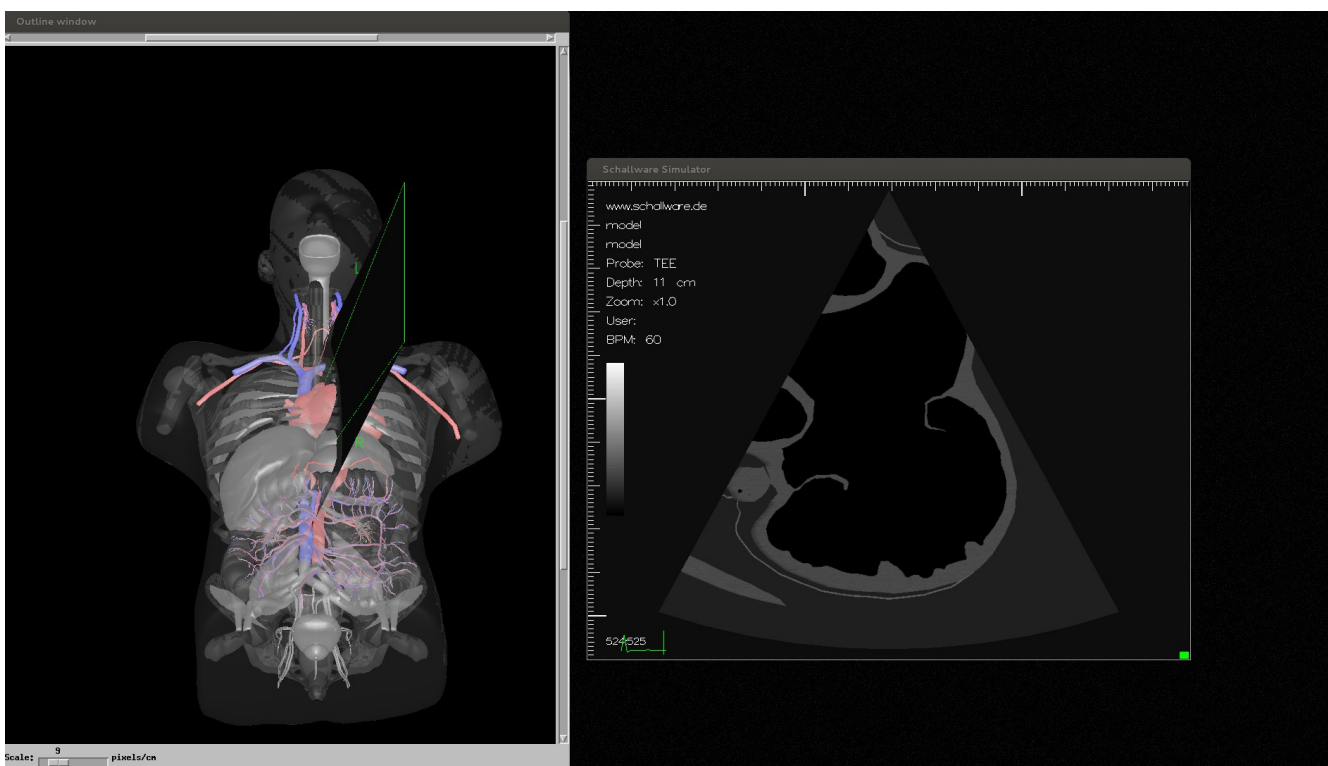*B-Mode image static and 4D, as well M-Mode*

Abbildung 1: color doppler, static and 4D

4D volumes heart, fetal heart

virtual data for obstetrics, fetus 20th week of gestation

virtual data of animated heart, lungs, whole male abdomen

Components:

Schallware Ultrasound Simulator Station 128-8 consisting of:

1 x Crate / Box with
- − 2 x Package with 1 LCD Monitor   12.4 kg
- − 1 x Basic Unit on Rolls   32.3 kg
- − 1 x Male Manikin   7.3 kg
- − 1 x Female Manikin   8.2 kg
- − 1 x Table (black, glued wood)   4.4 kg
- − 4 x Dummy Probes (packed with table)   0.6 kg

1 x Carton with
- − Male TEE Manikin   6.0 kg
- − Dummy Endoscope   1.0 kg

Package / Size: 1 crate of (LxWxH) 1200 x 800 x 766 mm^3
                        1 carton of (LxWxH) 1030 x 530 x 330 mm^3

Package / Weight: 1 crate of 120 kg (gross), 80 kg (net)
                            1 carton of 8 kg (gross), 7 kg (net)

Set up system as pictures show: upper screen

Lower screen:
first plug in all cables: hdmi, usb and power
last mount table as shown in above picture

- **Station 128** with two monitors:
– 		lower touch screen serves as a *control panel*
– 		upper screen shows the simulated ultrasound image
– 		track ball works as the main user interface in order to control and load different patient situations on the *control screen* as well as to perform measurements on the *simulation screen*
– 		*keyboard for writing investigation and for administration work as documenting cases or labeling measurements or ROIs (region of interest)*

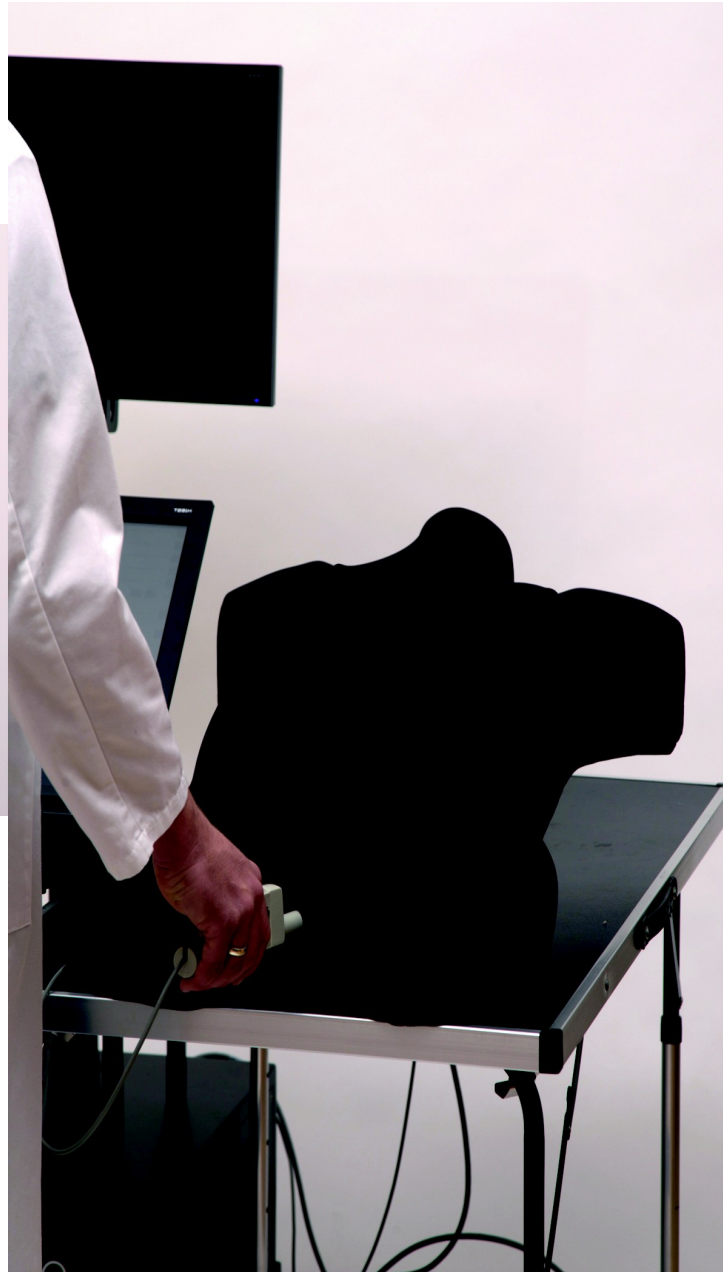
station 128

mobile system
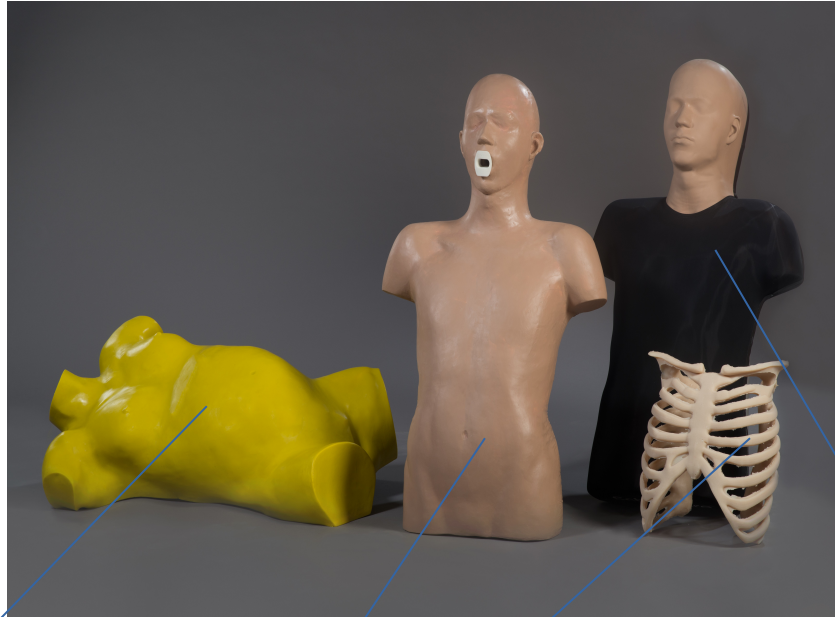
Female manikin

TEE manikin with esophagus and chest and hips

Abdominal male manikin

abdominal scanning on female manikin

transvaginal scanning on female manikin
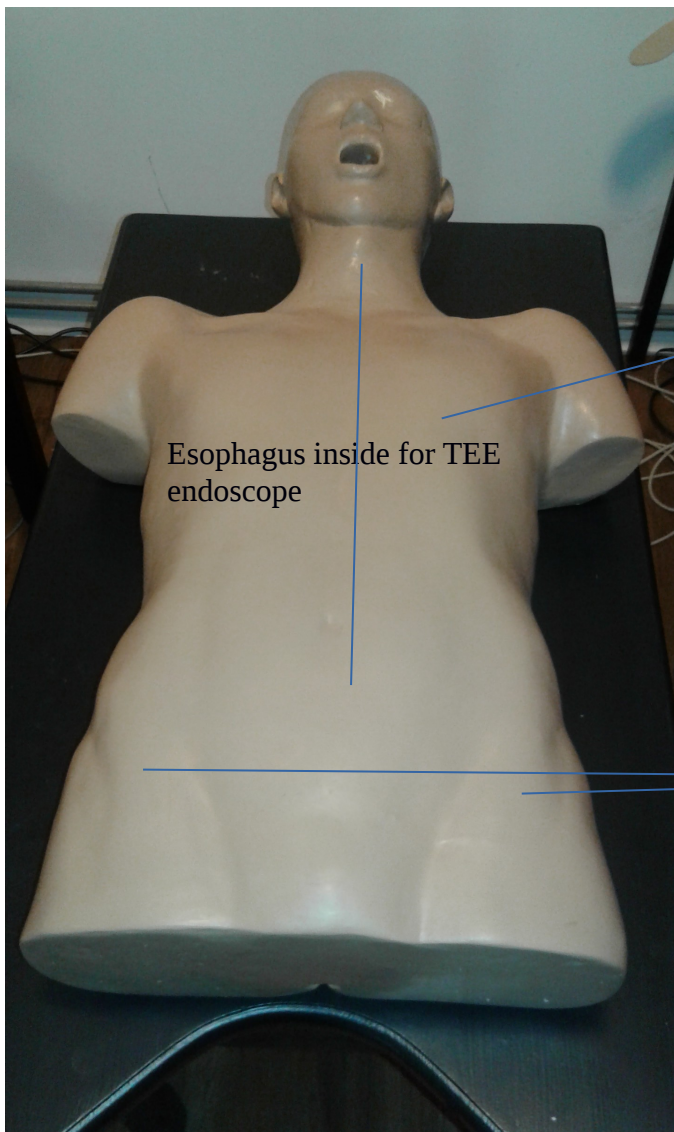
Palpable chest inside

Esophagus inside for TEE
endoscope

Hips

TEE manikin with esophagus and chest and hips

Down side of manikin

SOURCE plug to station 128

Transmitter cube integrated in table fits any manikin
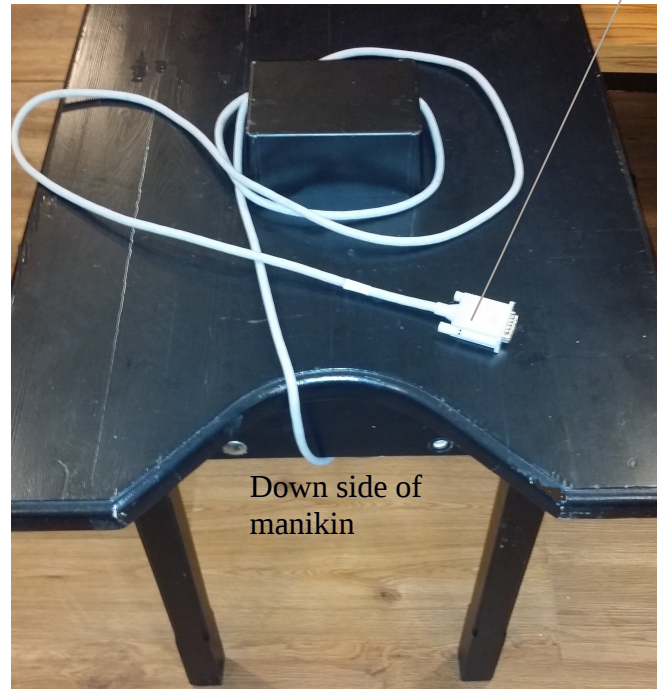
Down side of manikin

Schallware manikin table suited for all manikins

Back side of manikin with inside frame for transmitter cube of table.
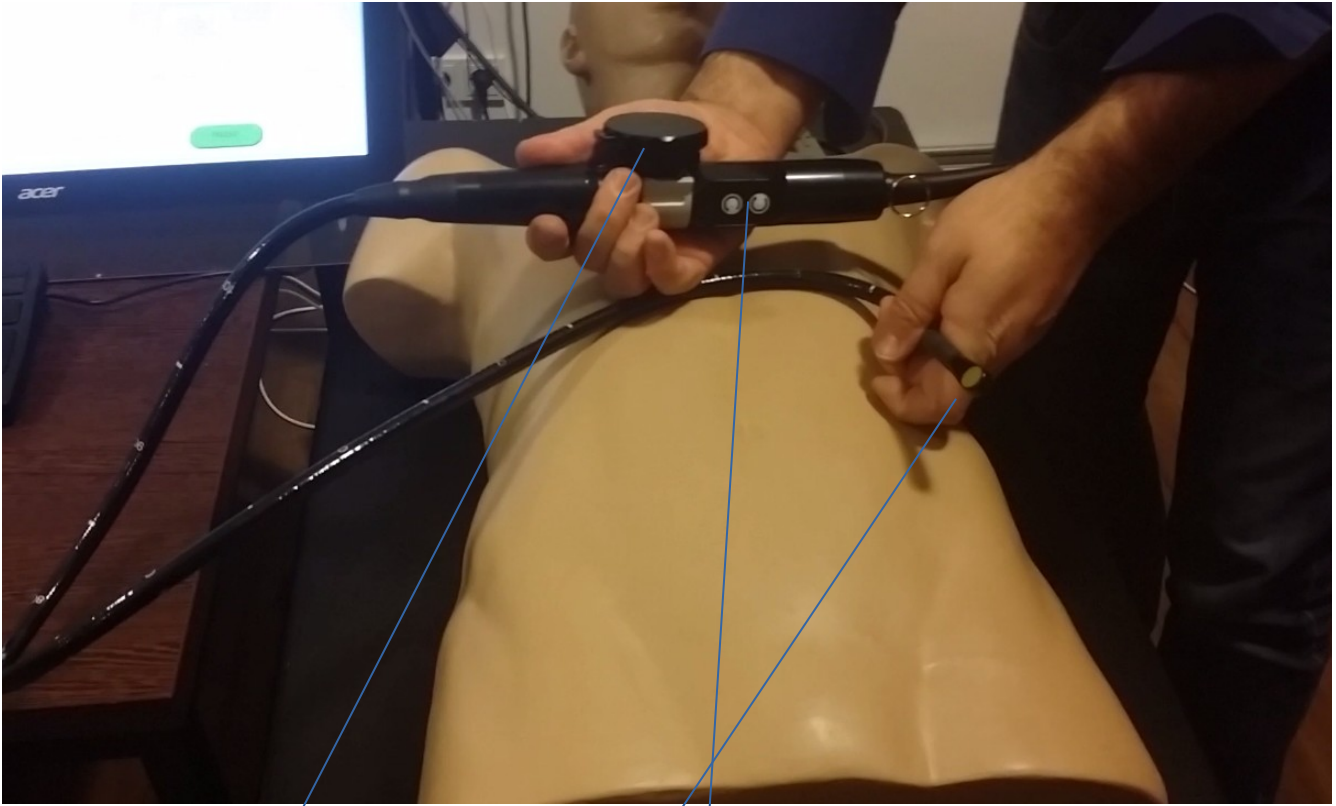
TEE application with endoscope
Real mechanic wheels for benting endoscope tip. Rotation buttons plus and minus (USB connection)

Schallware dummy probes

TEE endoscope

Sector probe

Linear probe

Convex probe

Transvaginal probe
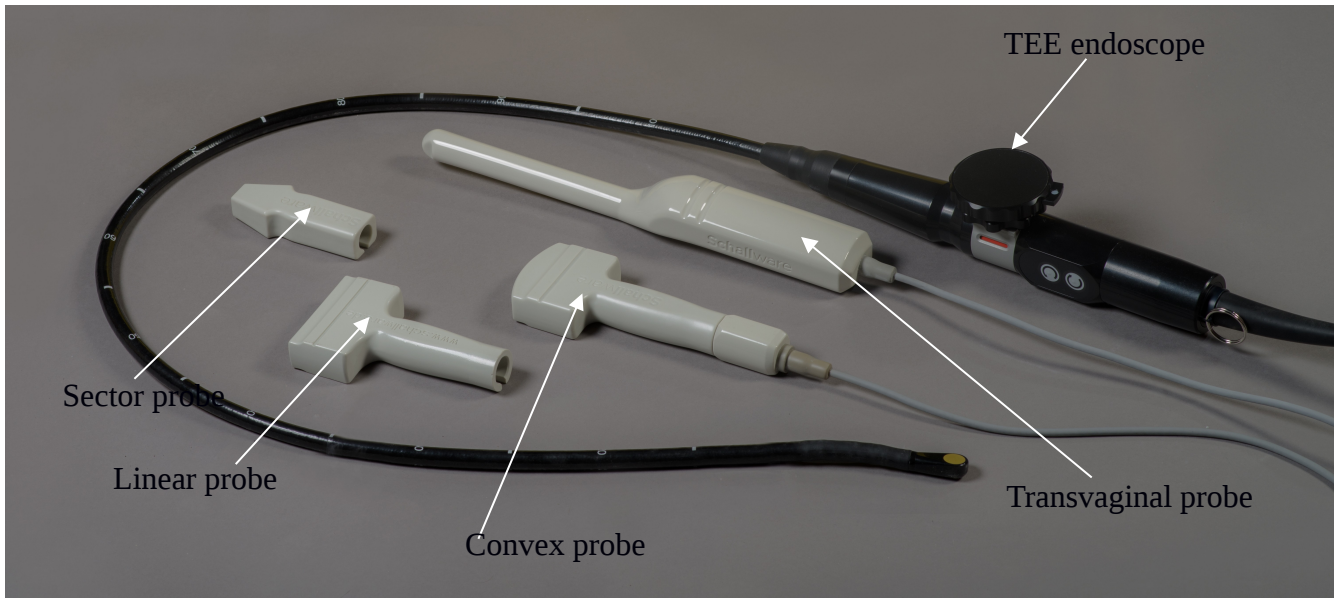
Connection to station 128:
sensor adapter to SENSOR 1
transvaginal probe to SENSOR 2
TEE endoscope to SENSOR 2 plus USB plug

Schallware probe adapter: SENSOR cable 1 for
convex, sector, linear

SENSOR 1
Sensor
adapter

SENSOR 2
TV probe or TEE
endoscope

SOURCE, from table

Power plug,
110-230 V, 3-
6 A

HDMI output
for beamer

USB for TEE
endoscope

Ethernet

External SSD
hard disk slot

Power switch**,
first shut
down system
with panel
screen:
software
button 'power
off'**

How to Start the Simulator:

1. connect *sensor cable* to station (labeled as *SENSOR*)
2. connect *manikin* to station (labeled as *SOURCE*)
3. switch the station's hardware power button onto position '1' (light turns on)
4. system starts up automatically, checks hardware and after 60 seconds, system is ready.

Remark:
The system is highly sensitive to any external magnetic fields including all material being able to influence such fields, i.e.:
– ferromagnetic materials on the floor,
– table construction or heating,
– cell phone etc.
It is highly recommended to position the manikin in an appropriate environment concerning the magnetic aspects mentioned.

Attention:
Please take care of the sensor cable (dummy probe connection),
– **do not bent the sensor cable on its top since it is very sensitive,**
– **it is not part of the warranty**
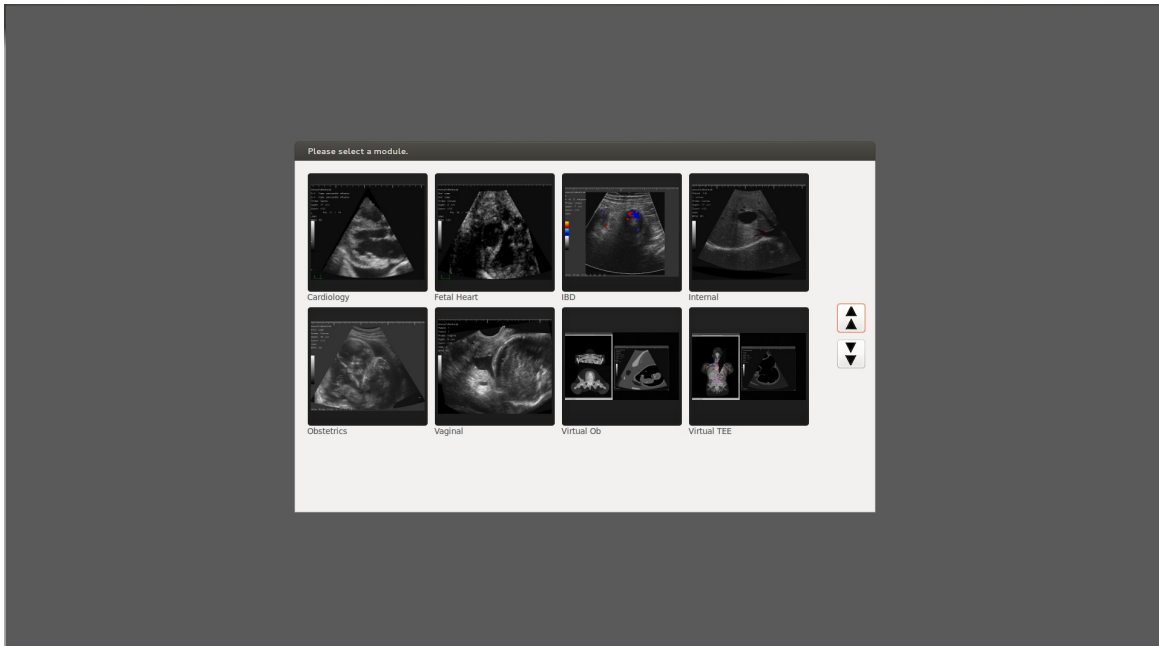 **Explain all users not to bent the cable.**
Successfully start of system can be assured if you can see lower screen like this without any error messages on upper screen:
Please check first if lower touchscreen works correctly.

Upper image screen

Lower panel screen

After starting simulator you will see on lower control screen the module dialogue for primarily selection
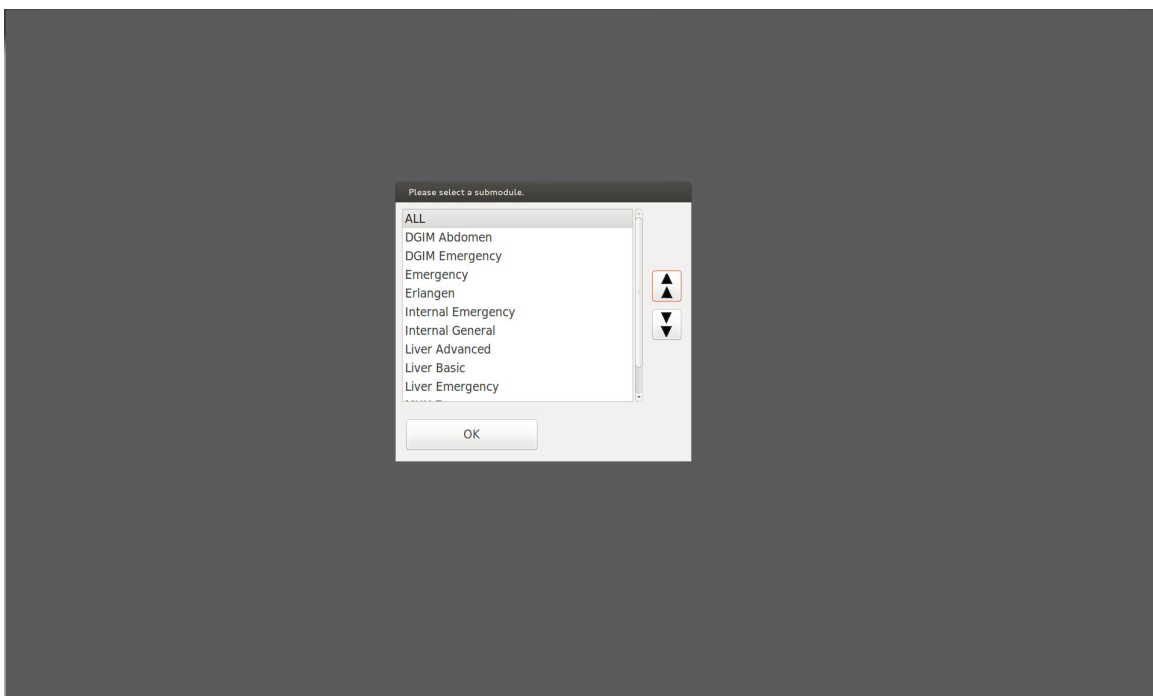
predefined submodules of a module

After selection of module, you can make your choice of predefined courses, called submodules
A course means a slection and order of cases within a module. .
You are able to create or change your submodules for all modules. Moreover you can easily print a pdf tutorial of any submodule with administration.

after selecting a case of choice press button **Start Examination** a popup dialogue appears, choose the type of investigation you want to start, press **Start** in order to start the examination, the respective case is loaded, watch out the progress window on the *simulation screen* since this procedure can take up to 20s, loading is completed when the familiar B-Mode mask appears in the simulation screen:
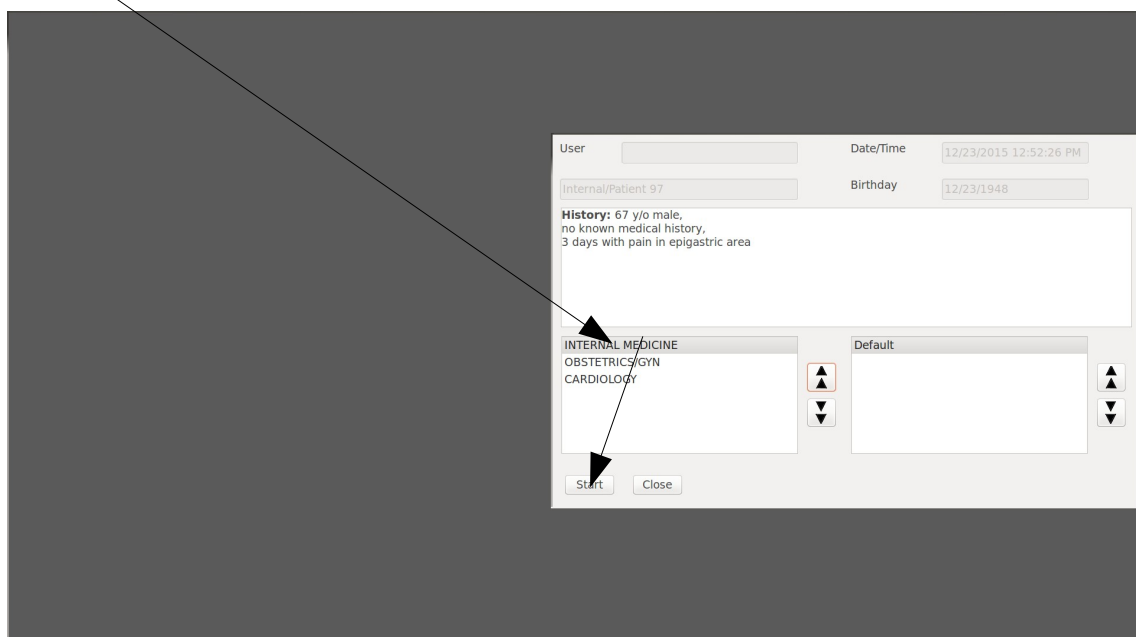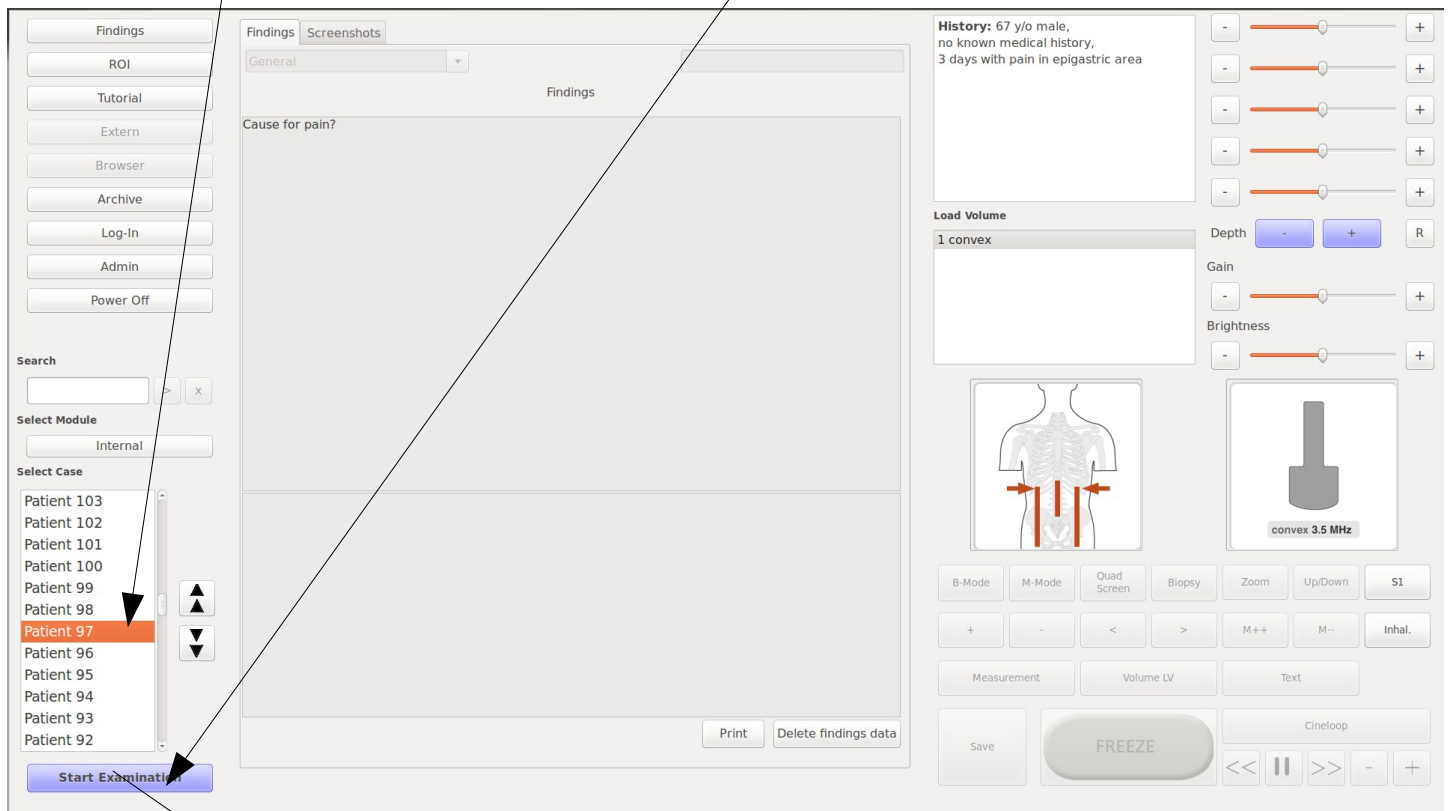
How to Shut Down the Simulator:

use always software shutdown or you can crash system!:

1. Press *Power Off* button on the Control Screen and confirm.
   Both Screens will show relevant shut down procedures.
2. After shut down has finished, set *hardware power off* to 'O' position (light turns off).
3. If a restart is considered necessary please wait at least 15 sec. before turning the station into On-mode!

Load Investigation (Control Touch Screen):

Use Button **Select Module** *and choose in popup dialogue your* **Module** and your submodule/course

Select patient/**Case** on list-box *Select Case* , different variants of scanned quadrants are visible in the **Load Volume box**, every volume is visualized by **icons** identifying the data available and the dummy probe to use within the case selected

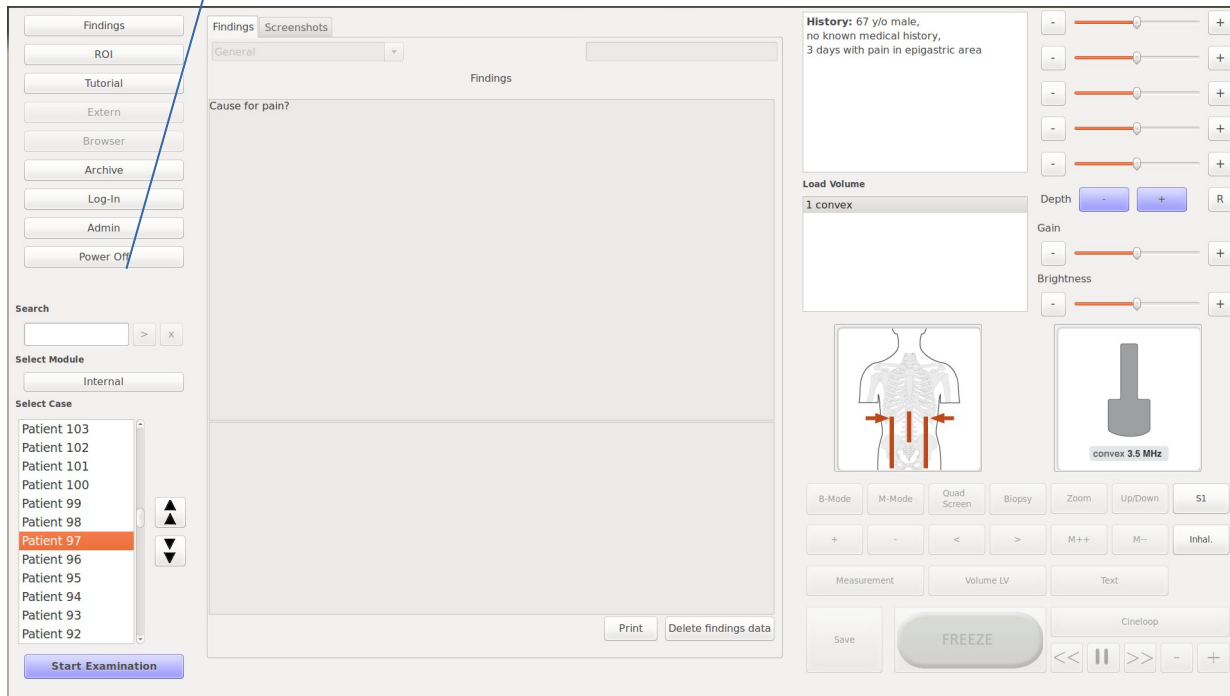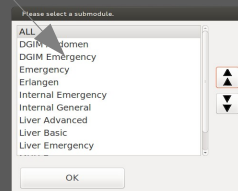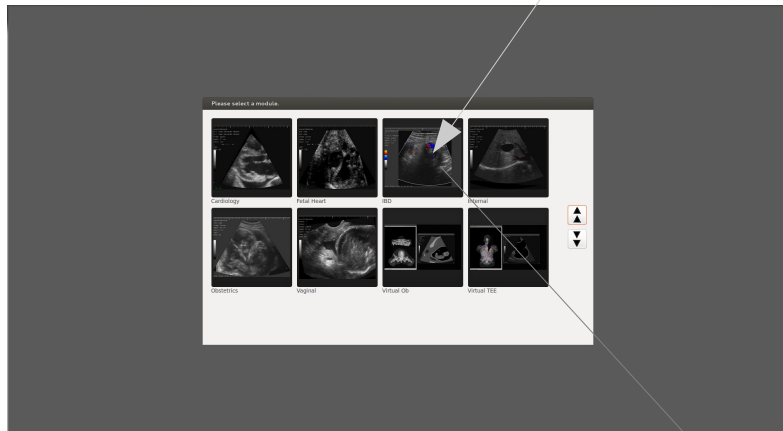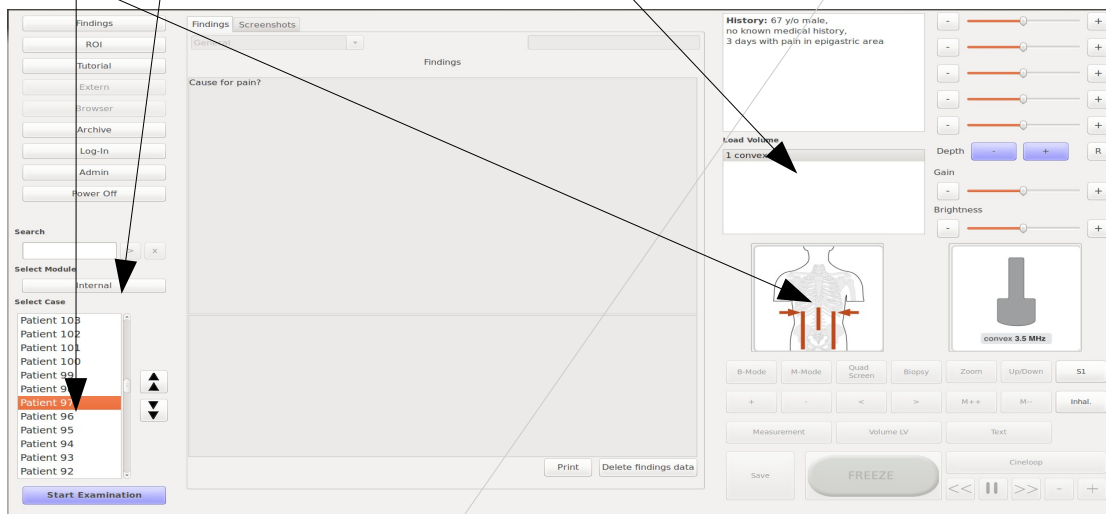## Load Volume

after selecting a case of choice, you can get explained history of the patient press button **Start Examination** a popup dialogue appears, choose the type of investigation you want to start, press **Start** in order to start the examination, the respective case is loaded, watch out the progress window on the *simulation screen* since this procedure can take up to 20s, loading is completed when the familiar B-Mode mask appears in the simulation screen:
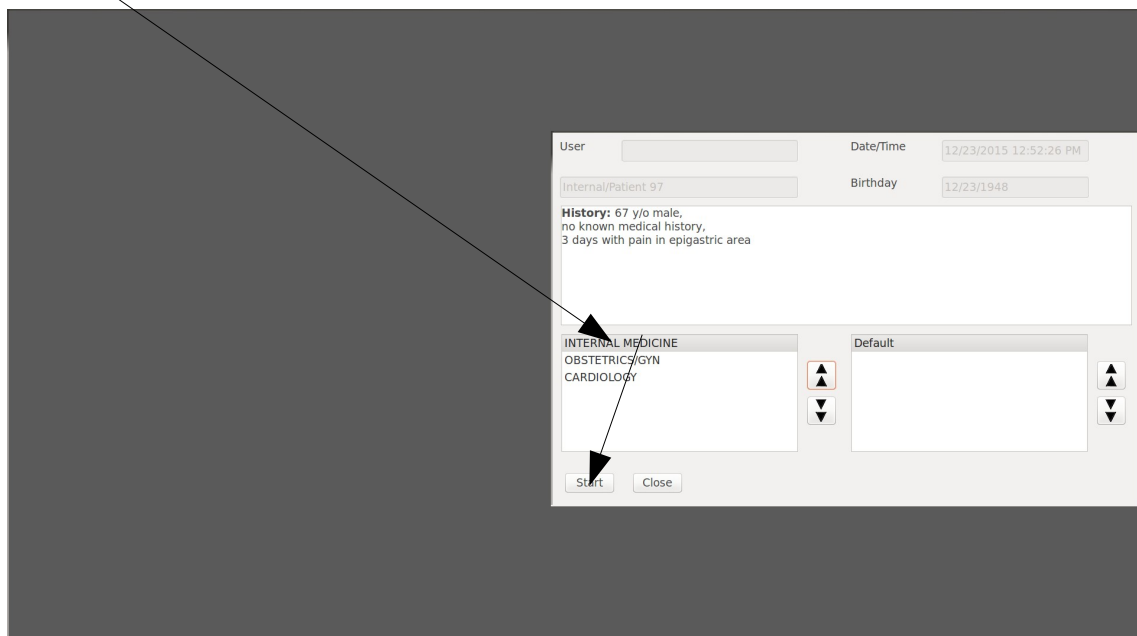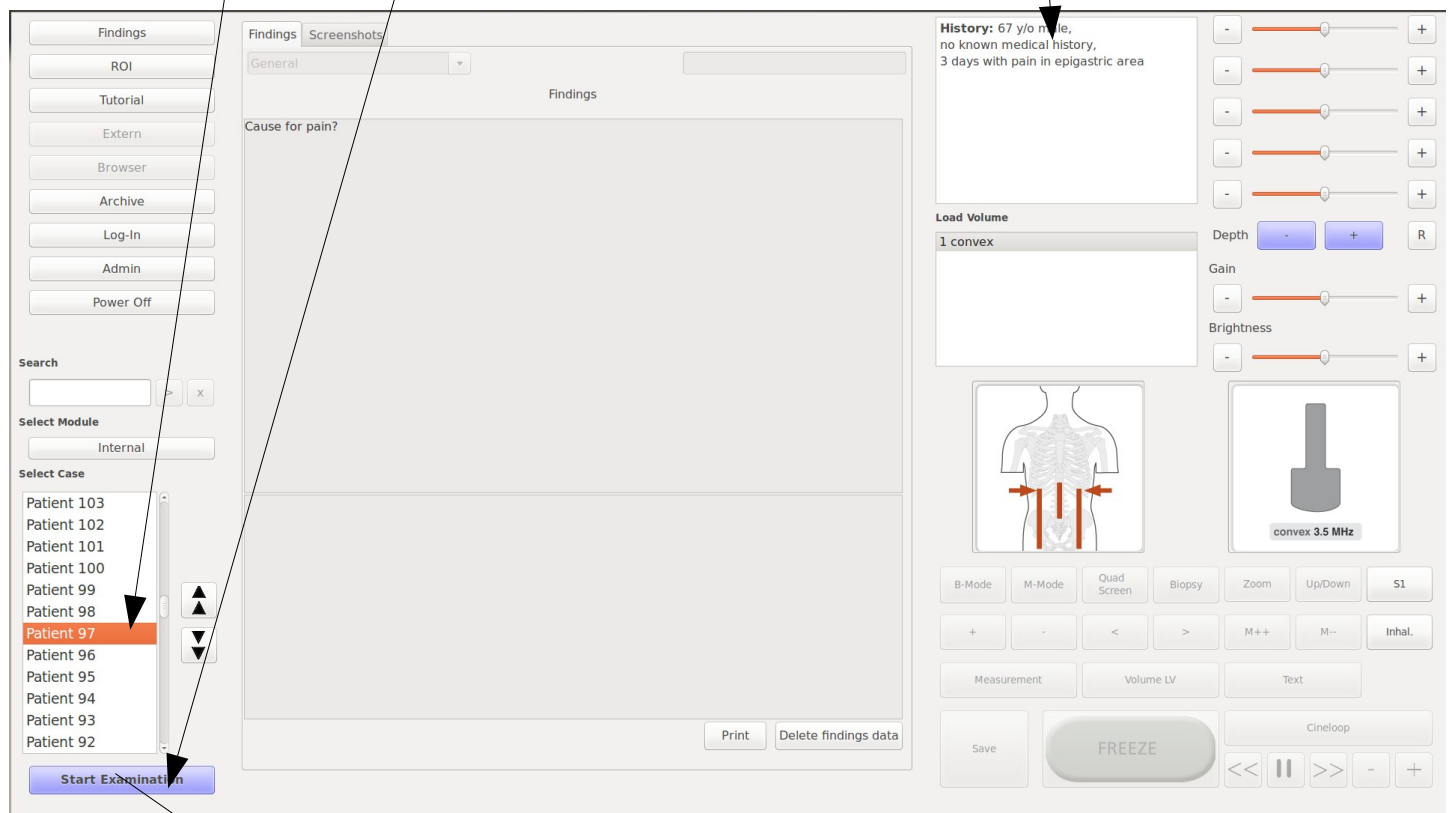
set the probe onto the manikin and look for data available, in order to get best results please hold the probe perpendicular, try to fill out the whole B-Scan,

start your investigation and try to find pathologic structures and work out your diagnosis.
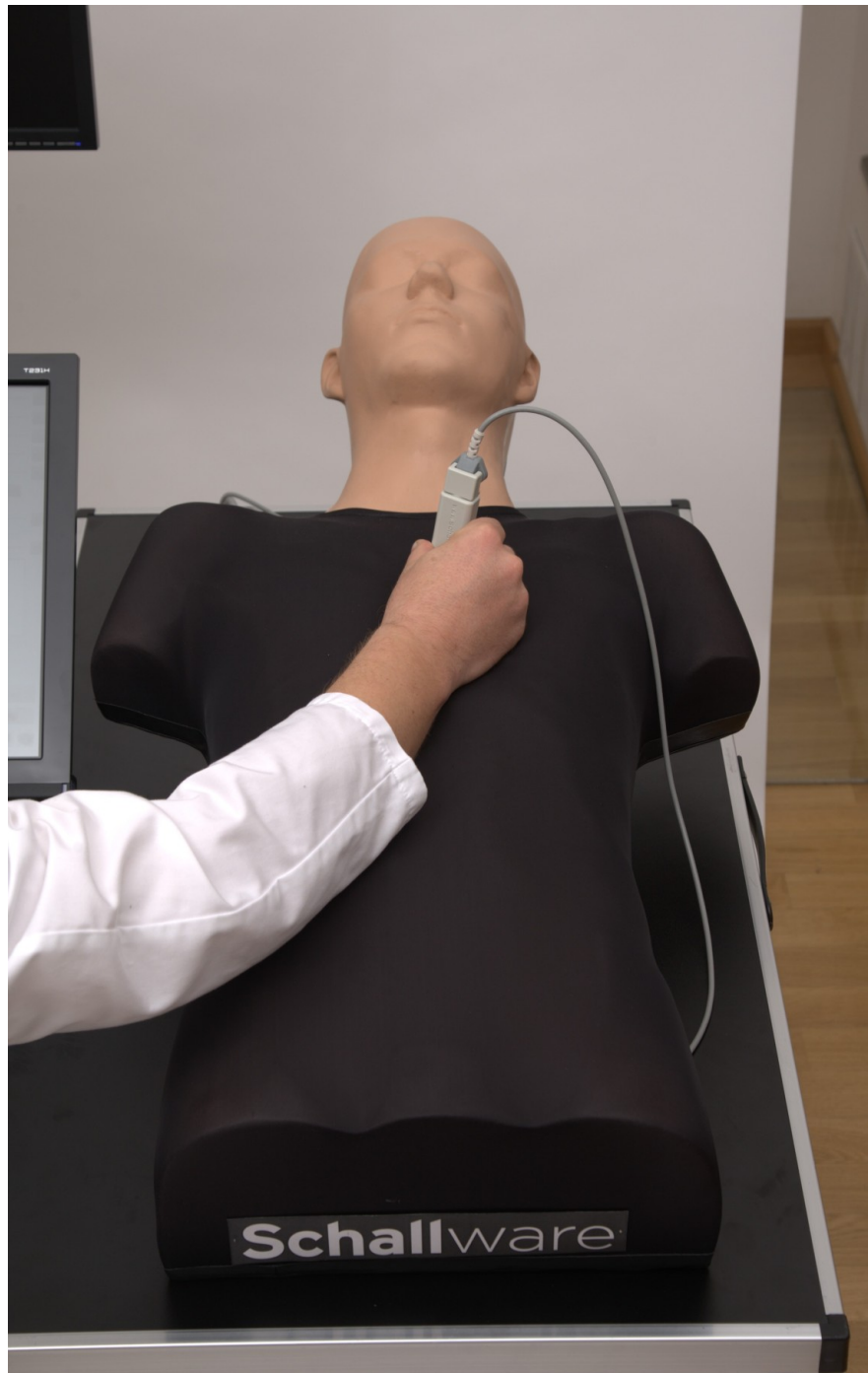
First Use of Simulation Application

move the probe to get the image representations of your choice,
press **FREEZE** *button* on Control screen, select **measurement**, a new
popup dialogue appears, choose the type of measurement, f.e.***distance***
and use then the track ball on the simulation screen:
just set the first point with set button (or left track ball button)
second point with set button (or left track ball button).
press **save** to store the image including measurement in your findings tab
Press **UNFREEZE** to return to normal scan mode.

station 128, version 201601
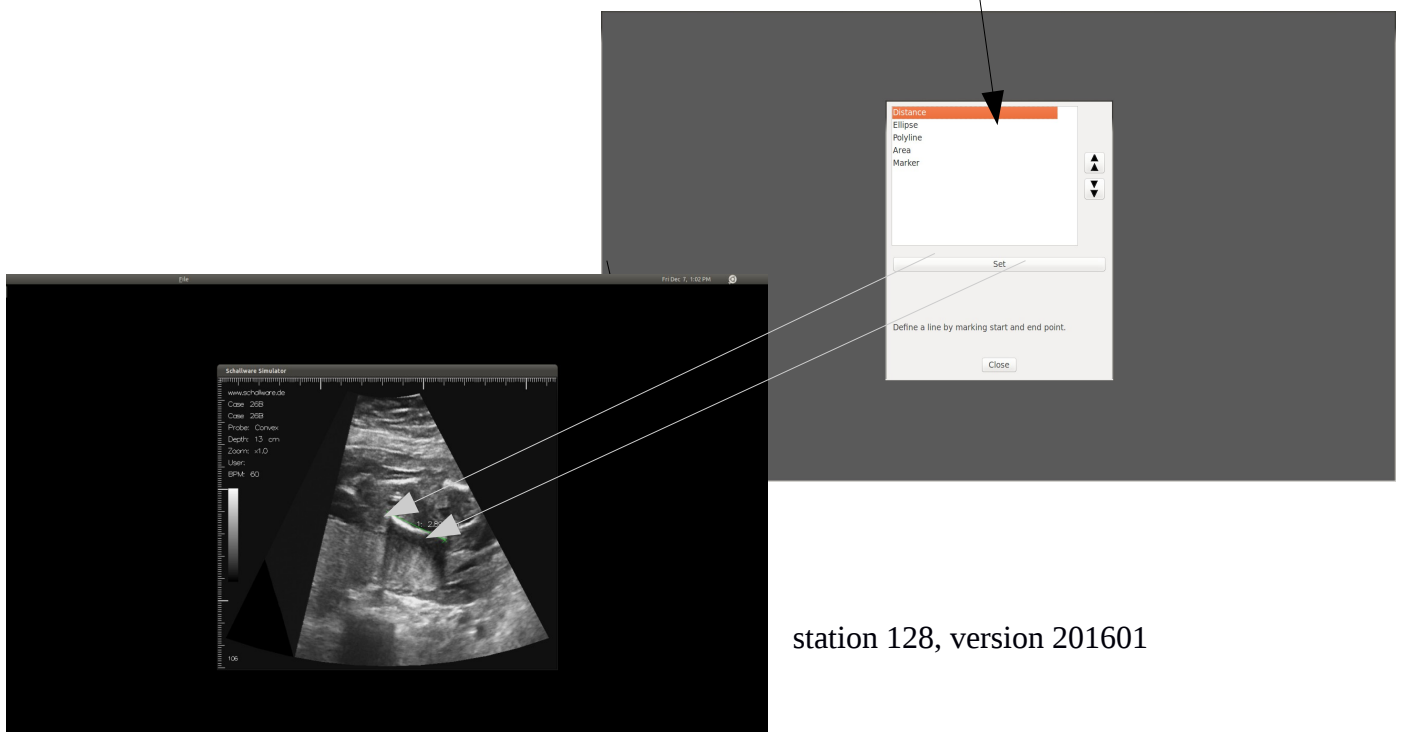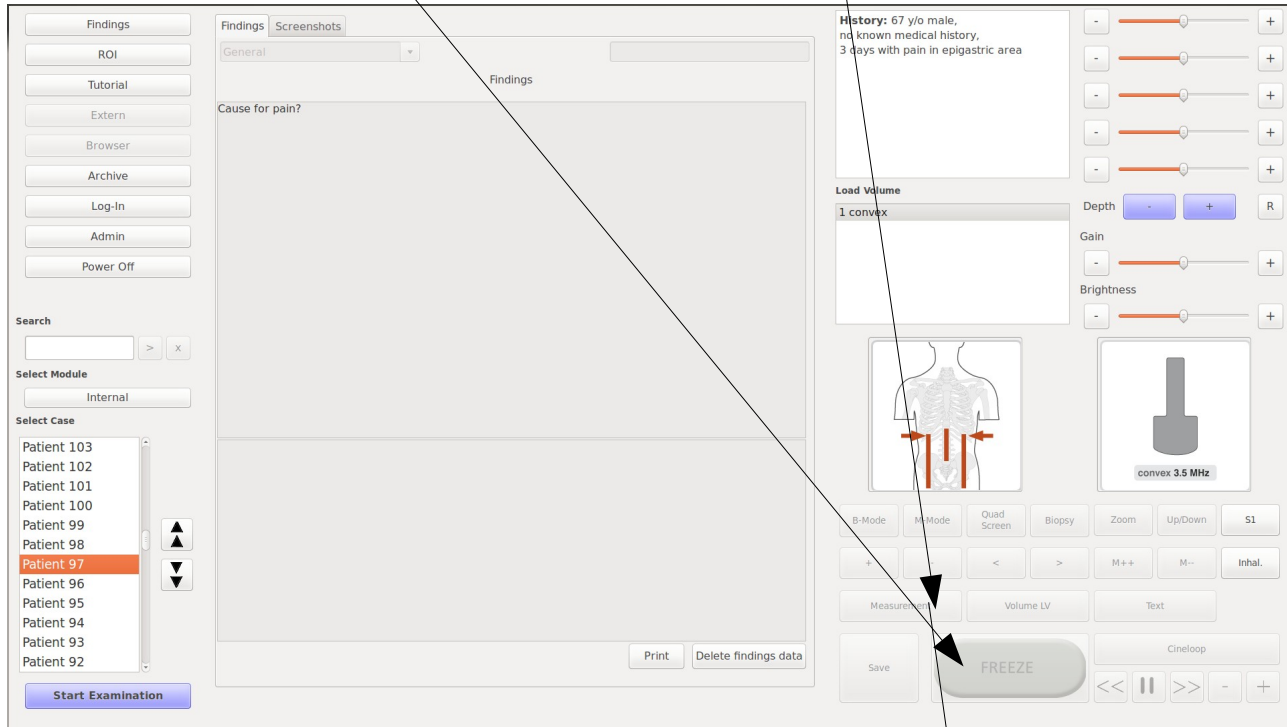
Menu Left side

upper section:

Findings: Write down your diagnosis and remarks here.
In obstetrics mode patient data as well as some calculations estimated and based on your measurements are shown.
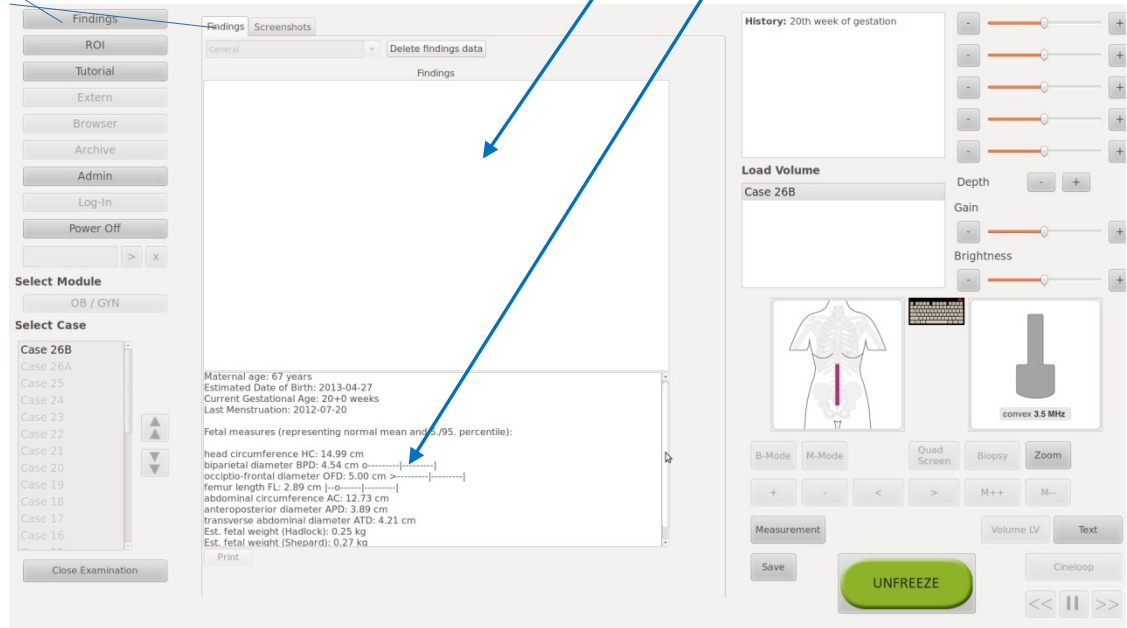
Findings/Screenshots: are saved next to the findings tab identified by *thumbnails*.
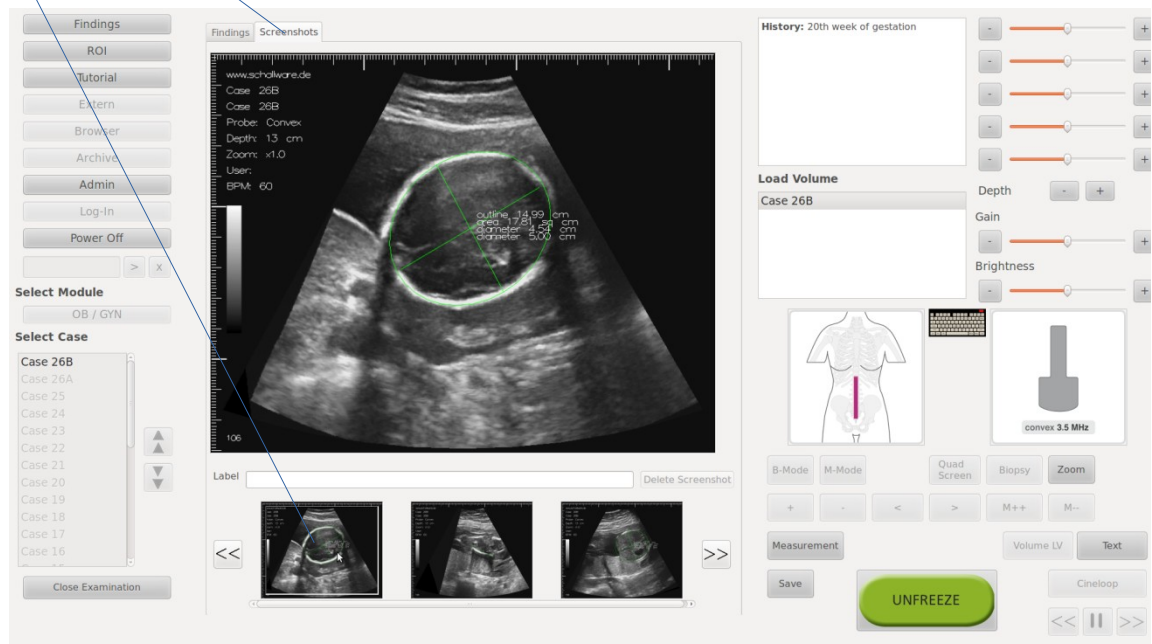
ROI: Region of Interest with preview guides you to defined points in space (target mechanism).
(*You can configure your own regions of interest in Administration Mode*)
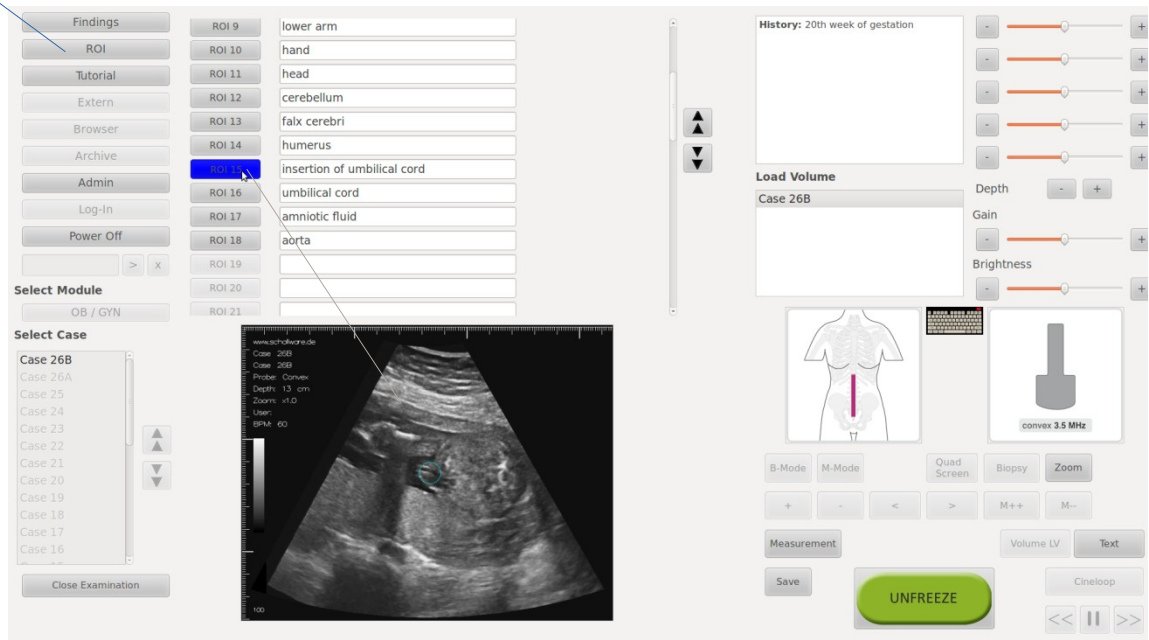
Tutorial: Here you find information about the patient and its case in order to solve the problem! Maybe you like the questions of our author, in the *remarks* section you find all facts you can get out of the ultrasound simulation. You should check all details to understand the case.

In the *pathology* section you may find more information about the results besides ultrasound diagnostics.
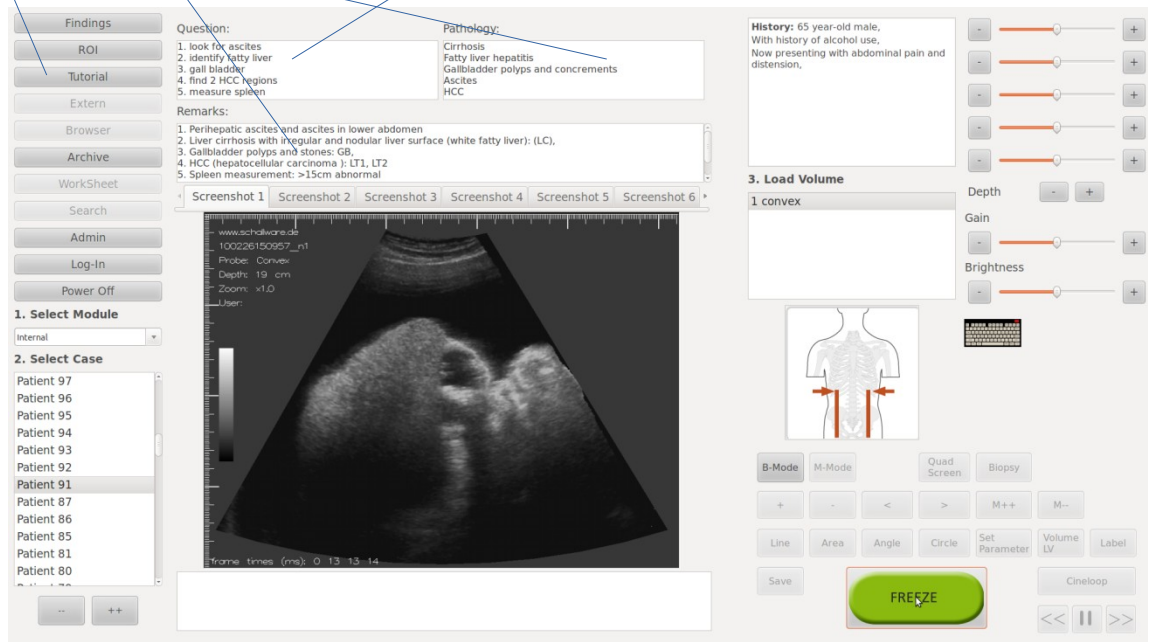
Extern: further data concerning choosen cases, only available in module Cardiology

Browser: shows images and cineloops recorded in Cardiology module only

Archive: if you are logged in, you can automatically store and review your investigations, if you are logged in as administrator, you will see all available users and their investigations. Investigations can be printed as pdf file.

Admin: Administration mode with password '*1968*',

Login: create new / login as user for tracking investigations

Power off: Always shut down with Power off button !!!

lower section:

Select Module: see 5.*Load Investigation*

Use slider or buttons to scroll through cases available

For some patients there are several volumes representing alternatives for samples being acquired:

with high resolution linear probe,

in colour doppler mode,investigation history.
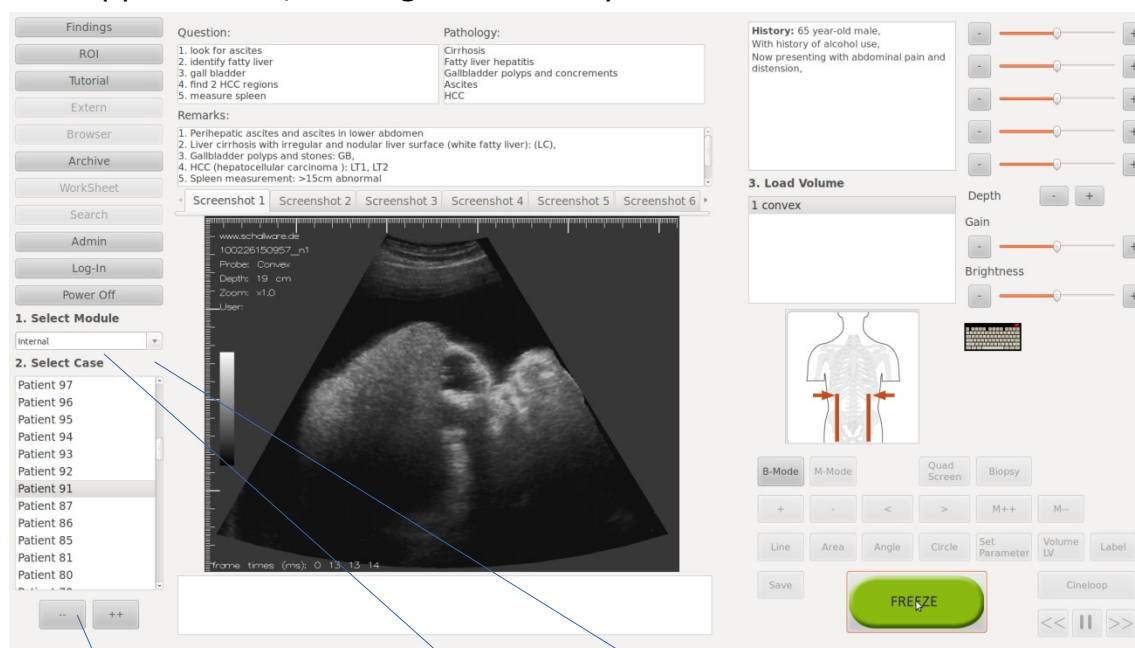
Close investigation

Search prompt for cases with full text searching:
Type in any keyword and you will receive a list of cases reffered to your keyword. You are able to copy such a list as a submodule. Reset filtering with X button

Menu Right side

Right upper section: Image manipulation:
Dephts, Gain, Brightness. Segment sliders for gain. Reset of all manipulations.
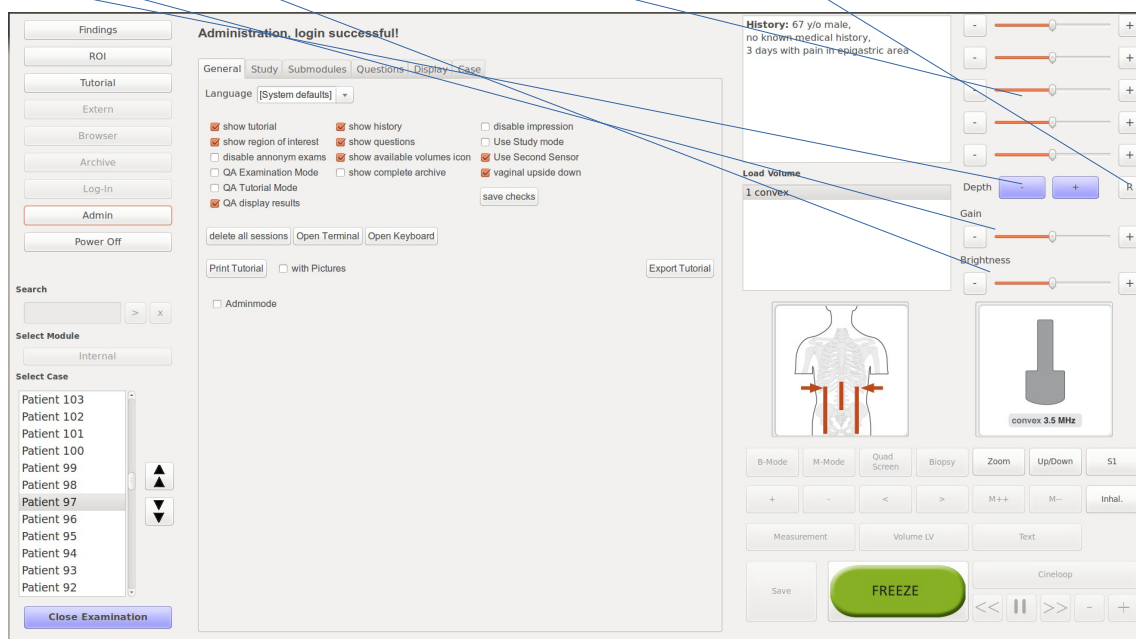
Rightlower side: you find the main controls:
B-Mode: regular US-Mode
M-Mode switch: cardiology only
Cineloop: acquires sequence in cardiology only,
cineloop is running in window (image number label counts ..)
you can pause, put forward or back single images for processing,
Save button: records images / cineloops
regular mode: into your finding dialogue as a tab
cardiology mode: in your browser menu
Volume LV: starts left ventricle measurement:
activate Volume LV button: you can see a list of parameters at simulation screen.
first save two cineloops sdgsd
reload with browser first cineloop and step to systole image
Line measurement of ventricle axis
press area button, press left track ball button down and draw curve around
     ventricle
now step to diastole image and press Line button
measure axis and press area button and draw curve
the results are visible at simulation screen
Press save button to restore images with measurements
Freeze: If you freeze an image, you are able to measure and to save
these (with or without measurement).
They are stored to you *findings* documents (tab control adds your screenshots).
Exhal: stops virtual model for TEE or TTE to exspiration, and keep

Administration

administration panel you have to log in first. Your password is *1968*.
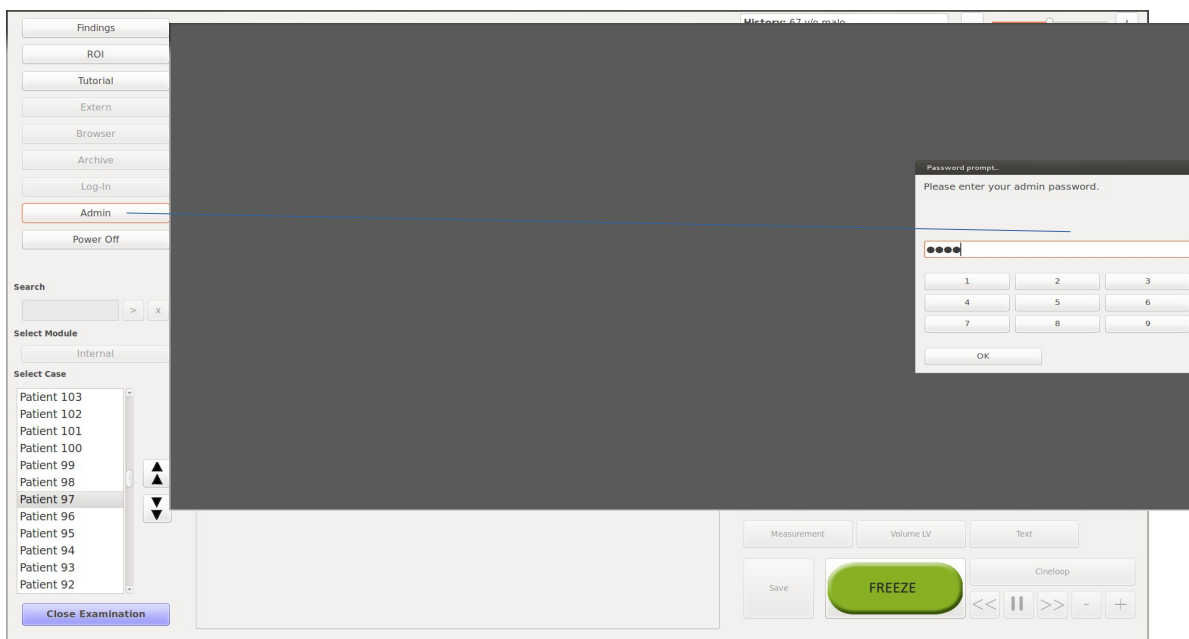
First administration tab: GENERAL
you can keep admin mode and are able to leave administration with this check
select language: predefined by Schallware
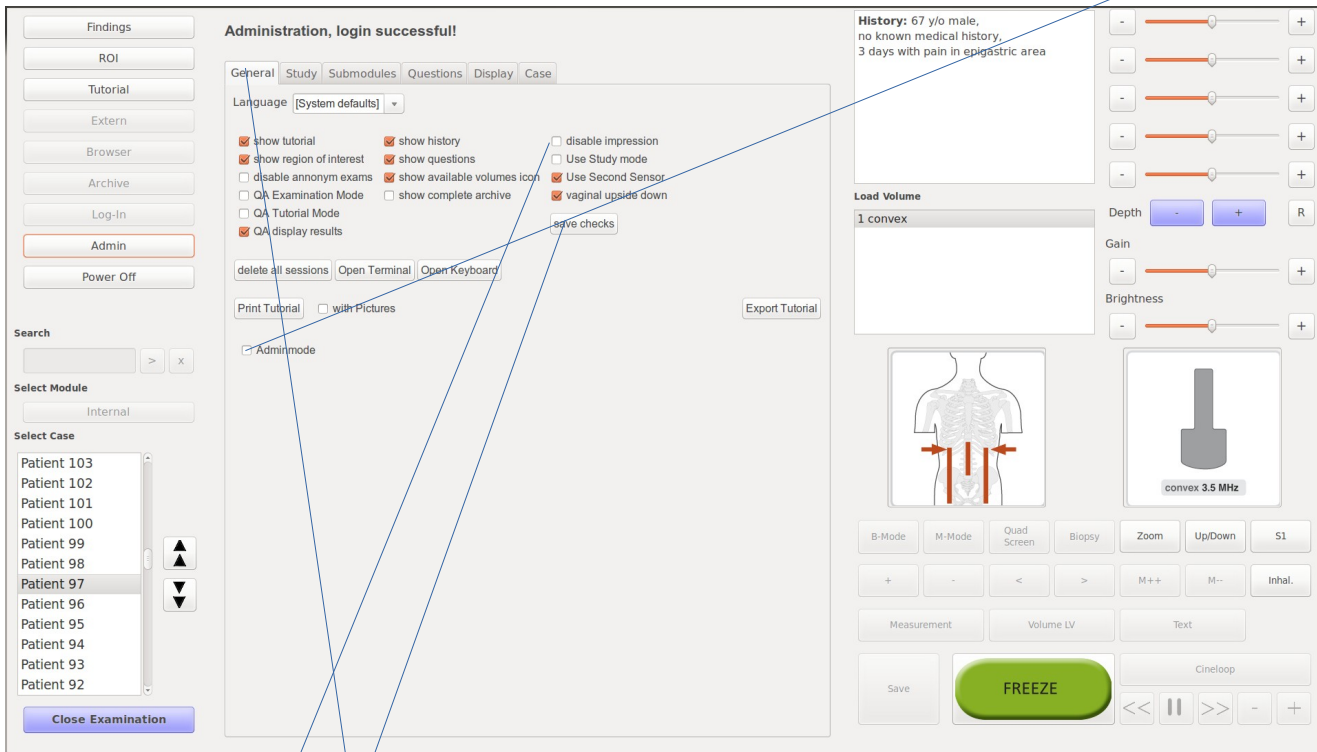
show tutorial: enable / disable access to tutorial button
show complete archive: enable / disable access to finished exams
show region of interest: enable / disable access to ROI-section
show history: history is visible / unvisible
show available volumes icon: data icons visible / unvisible
show questions: questions visible / unvisible
disable impression: enable / disable kind of transducer-manikin
     interaction
disable annonym examinations: you have to login

Question & Answer Mode
→ Examination mode without results
→ Tutorial mode with results
→ display results

show complete Archive:
as admin you can make visible all users with their investigations in ARCHIVE

save checks or checks will be in old status with new case loading
Print tutorial: current list of cases will be printed as pdf with or without ROI images

Administration tab : STUDY

You are able to log in and review or print your investigations. Furthermore you can set a study flag on investigations. On shown administration tab STUDY you can define just a study with creating a label for the study.
If study flag is set in adiminstration tab GENERAL , you will have the choice with log-in dialogue to select your study.
The admin can access, reload or print as pdf all investigations of a study in ARCHIVE with choosing study label flag.
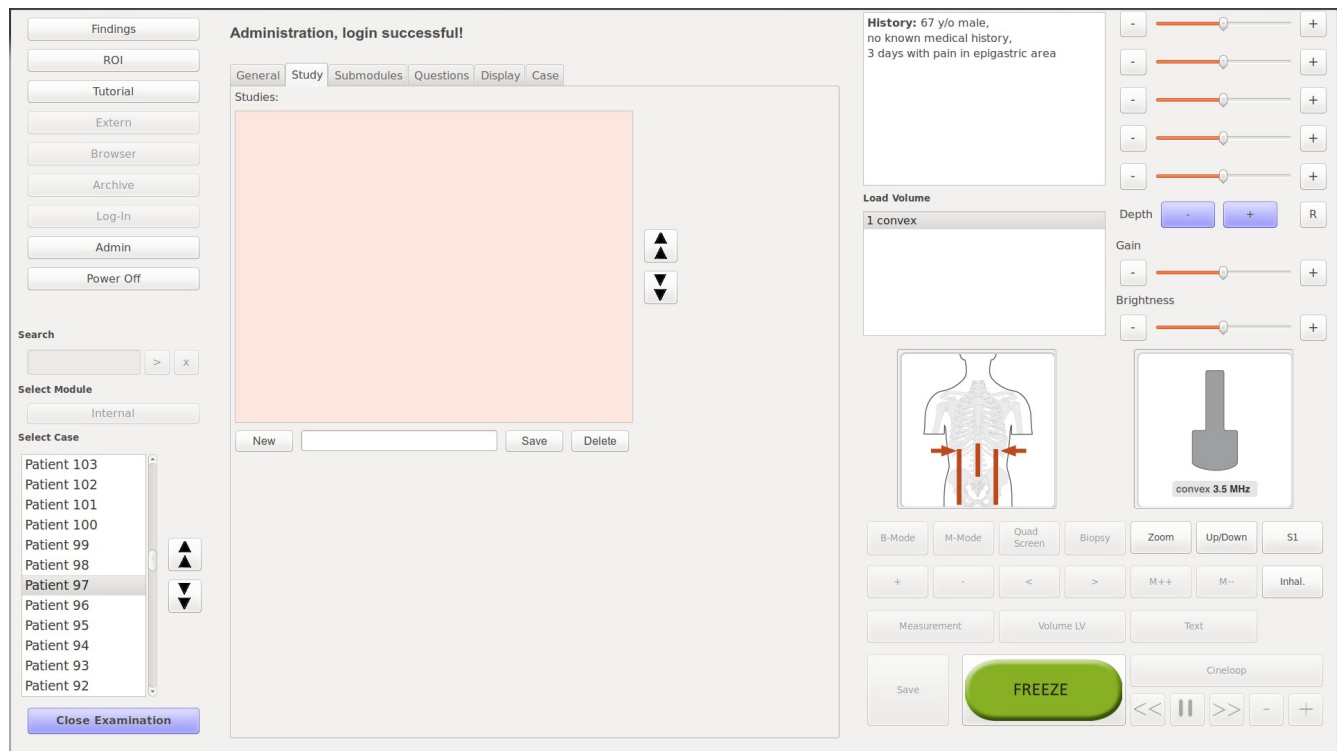
Administration tab: SUBMODUE

Here you can define your submodules. A submodule, also called a course, is a selection of cases with an order. To create such a submodule inside a modul, you can use the filtering prompt with keywords to receive a list of cases. Moreover you can change the order of the case list and write a remark for it. At administration tab GENERAL you can print current selected tutorial as pdf
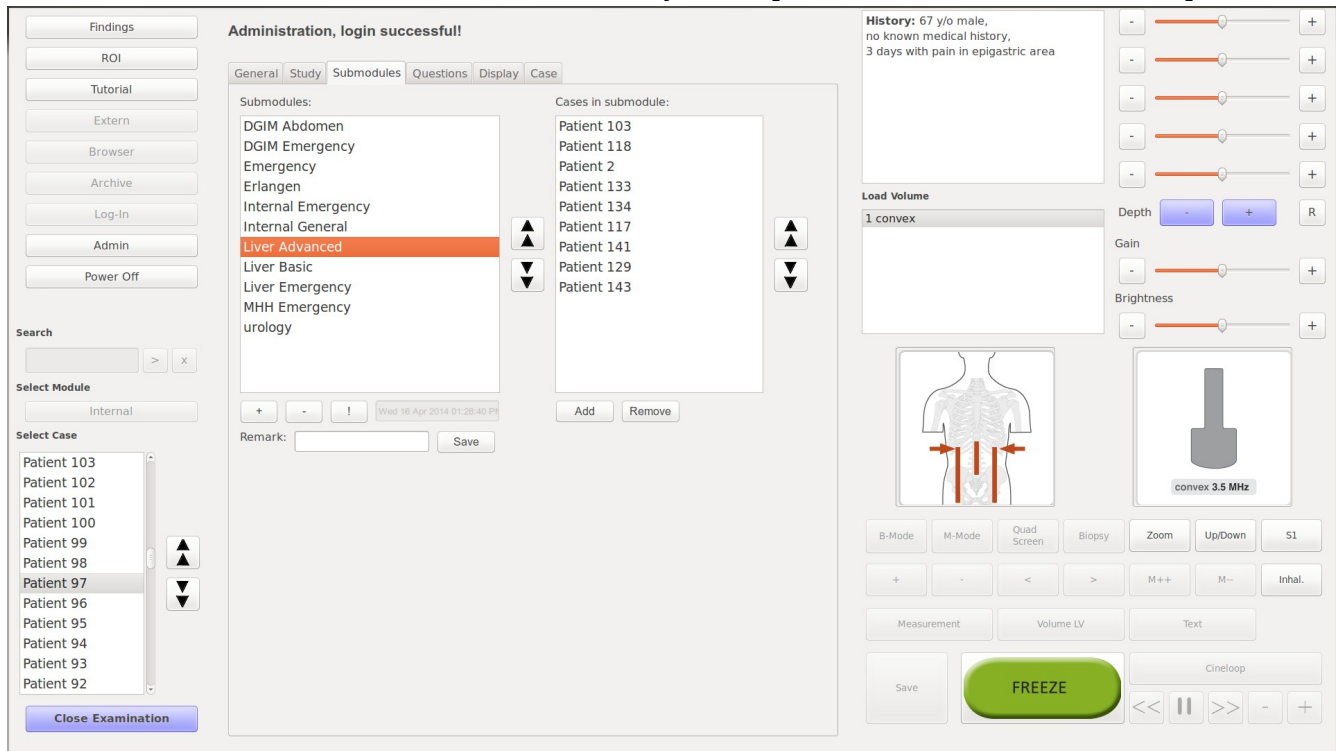
document with or without pictures (maybe huge document) or you can export whole tutorial as an html folder with linked content (copy to any pad).

Administration tab QUESTIONS

You are able to define a Question&Answer script for a submodule.
First define questions.

Second write the question here. Define a score for the question. Set the question type.

Define answers and explain which of these should be the right answer.

Start Q&A with Administration tab GENERAL: Q&A examination or tutorial.
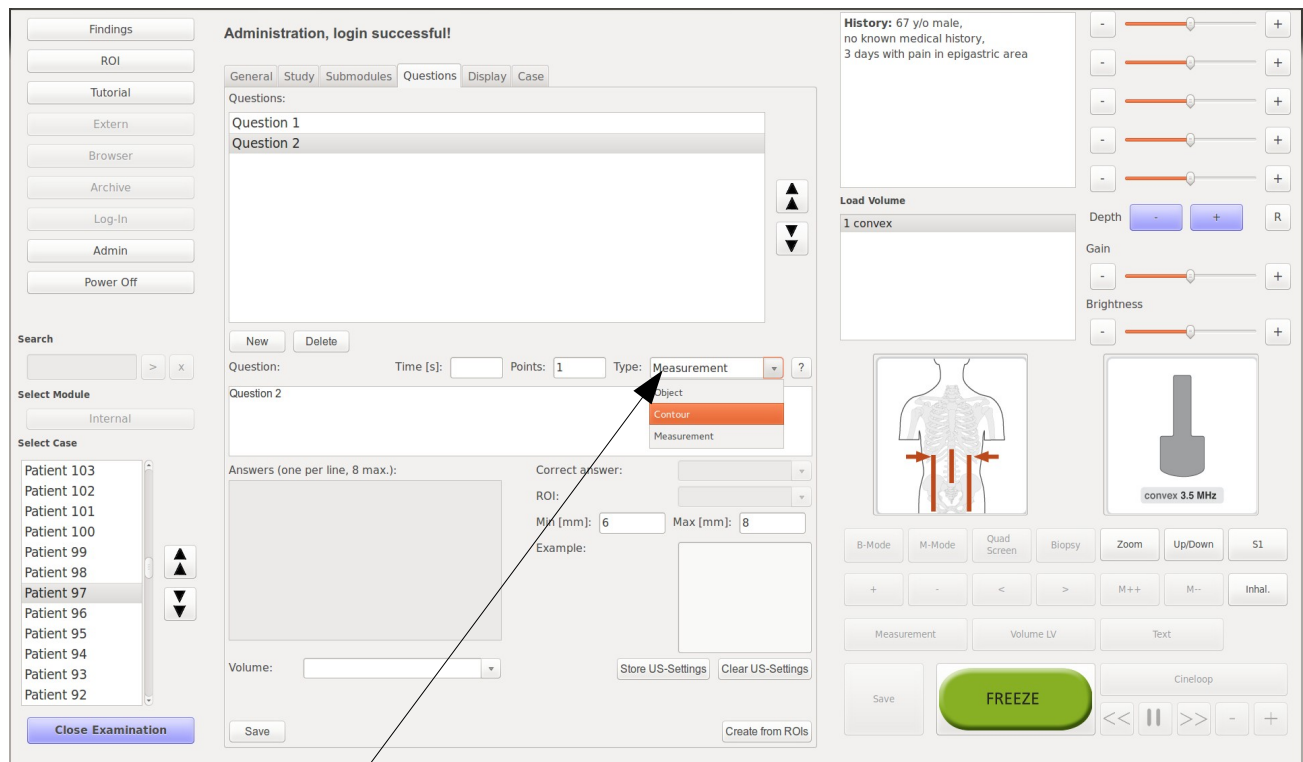
Select type of question:
Object:

Contour: shows up a rescliced 3D contour created with administration tab CASE,
User should answer what is visible or tip inside of invisble contour

Measurement: compares measurement values and shows image of measurement

Create automatically a Q&A with all available ROIs avaiable

Administration, login successful!

General | Study | Submodules | **Questions** | Display | Case

Findings
ROI
Tutorial
Extern
Browser
Archive
Log-In
Admin
Power Off

Questions:

Please mark pathologic structure parapelvic cysts left.
Please mark pathologic structure bladder.
Please mark pathologic structure jejunum ileum.
Please mark pathologic structure arteria iliaca externa.
Please mark pathologic structure vena iliaca externa.
Please mark pathologic structure coecum.
Please mark pathologic structure psoas.
Please mark anatomic structure blabla.
Please mark anatomic structure test.
Please mark anatomic structure ttyter.

New   Delete

Question: Time [s]:   Points: 1   Type: Object   ?

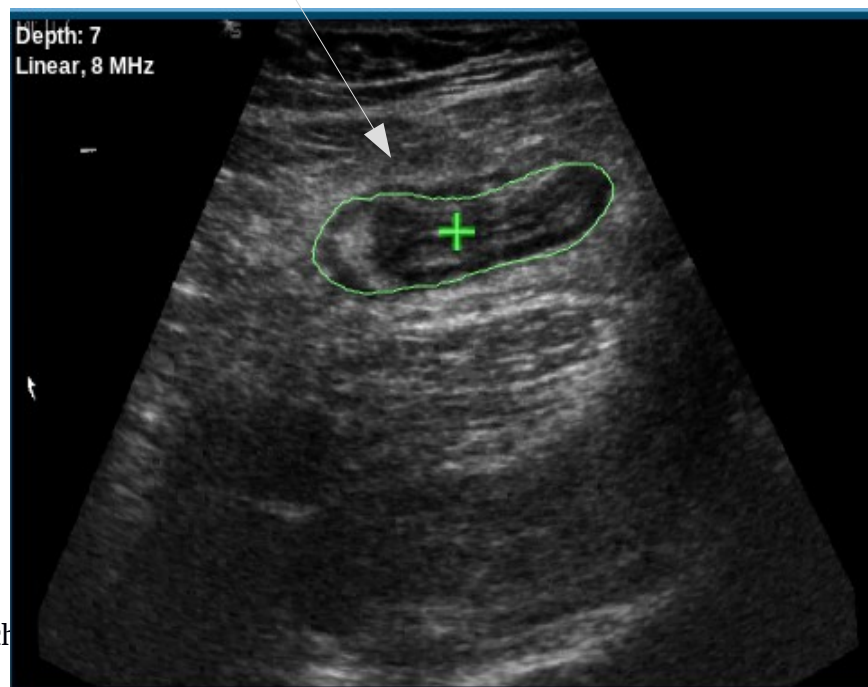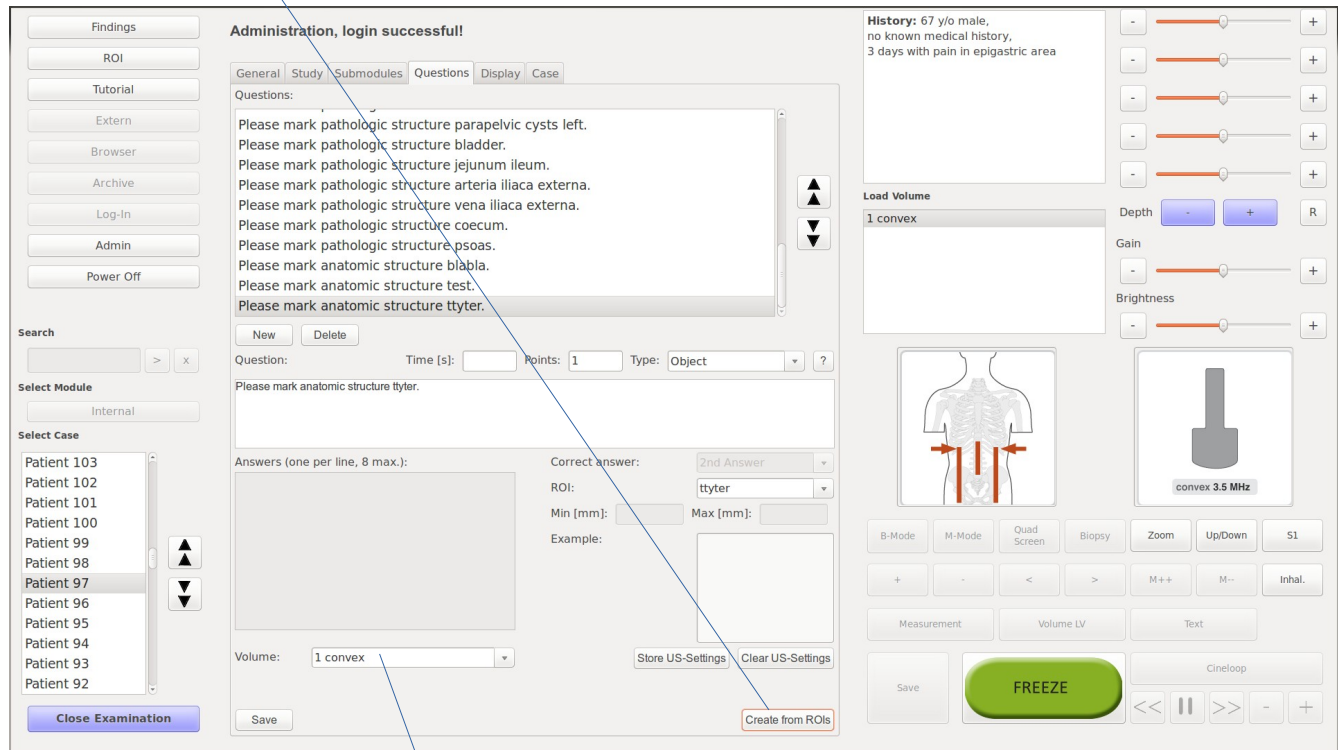Please mark anatomic structure ttyter.

Answers (one per line, 8 max.):   Correct answer: 2nd Answer

ROI: ttyter
Min [mm]:   Max [mm]:
Example:

Volume: 1 convex   Store US-Settings   Clear US-Settings

Save   Create from ROIs

Search
> x

Select Module
Internal

Select Case
Patient 103
Patient 102
Patient 101
Patient 100
Patient 99
Patient 98
Patient 97
Patient 96
Patient 95
Patient 94
Patient 93
Patient 92

Close Examination

History: 67 y/o male,
no known medical history,
3 days with pain in epigastric area

Load Volume
1 convex

-    +   R
Depth
Gain
-         +
Brightness
-         +

convex 3.5 MHz

B-Mode   M-Mode   Quad Screen   Biopsy   Zoom   Up/Down   S1

+   -   <   >   M++   M--   Inhal.

Measurement   Volume LV   Text

Save   FREEZE   Cineloop
<< || >> - +

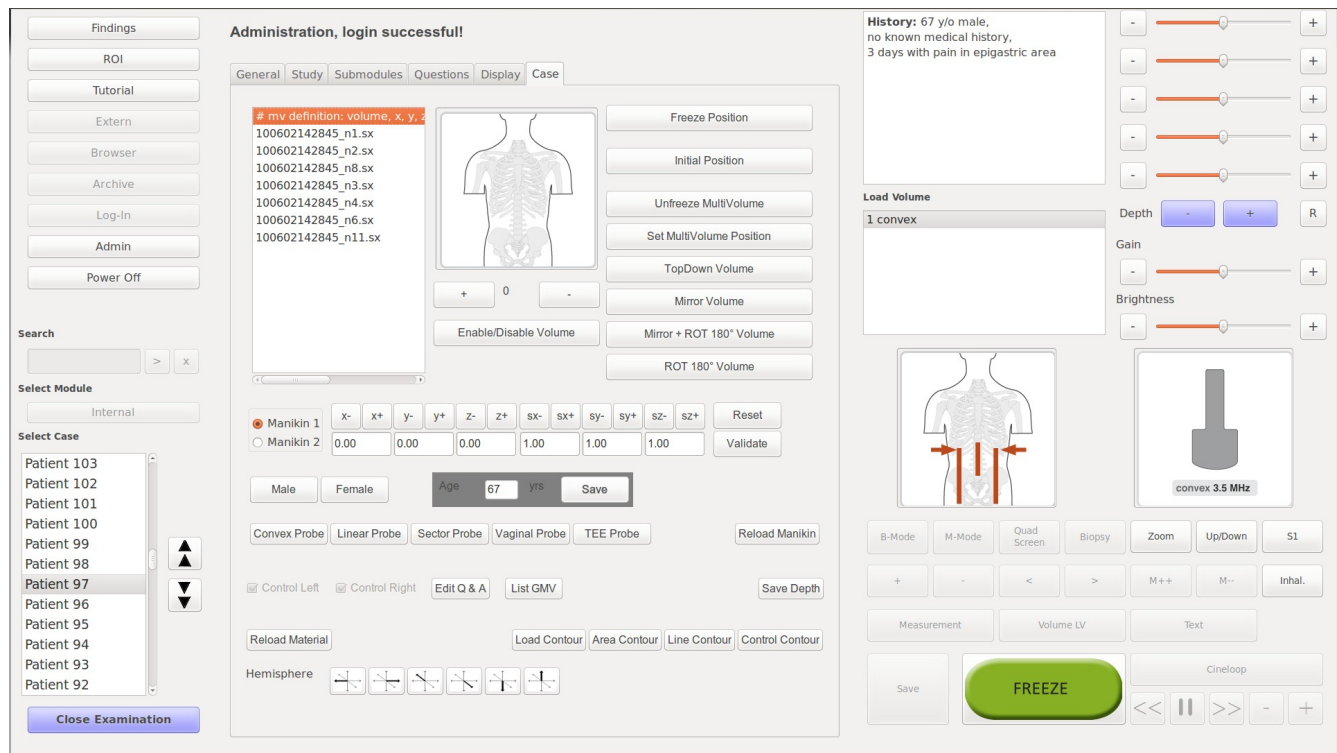explain which of the alternatives volumes should be used

Administration tab: DISPLAY
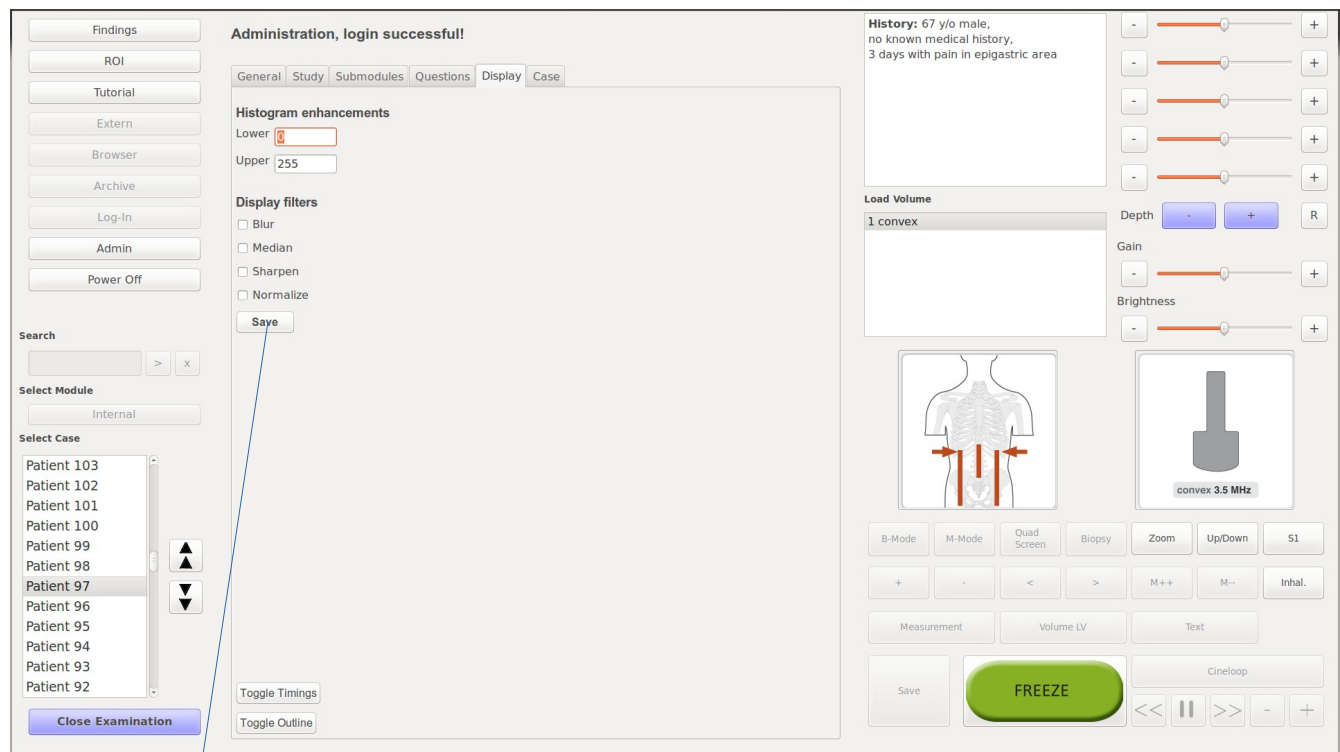
change image manipulation parameters
save parameters

Administration tab: CASE
here you can reposition a volume, change manikin coordinate source, set probe
mask and probe, set multi volume center point of a volume, set sex , set initial
depth

male:	male manikin preview
female:	female manikin preview
age, Last Period, save:	set patient data and save
Freeze Position:	1st pressing freezes the volume, 2nd calibrates this volume onto the manikin
Initial Position:	prepares center of volume for calibration
Unfreeze Multivolume:	disconnect every single volume
Set Multivolume Position:	set position within multivolume
Mirror Volume:	flip volume
Mirror + 180 degr Volume:	flip and half turn
ROT 180 degr Volume:	half turn
+, -:	choose image identifying data icon
x-, y-, z-, x+, y+, z+:	calibrate all cases within module in 3 directions
Convex Probe Mask:	define curvilinear probe
Linear Probe Mask:	define linear probe
Sector Probe Mask:	define sector probe (f.e. cardiology)
Vaginal Probe Mask:	endovaginal probe (f.e. gynecology)

define hemisphere of volume
create contour