

Navigační systém pro UZ

J. Foukal

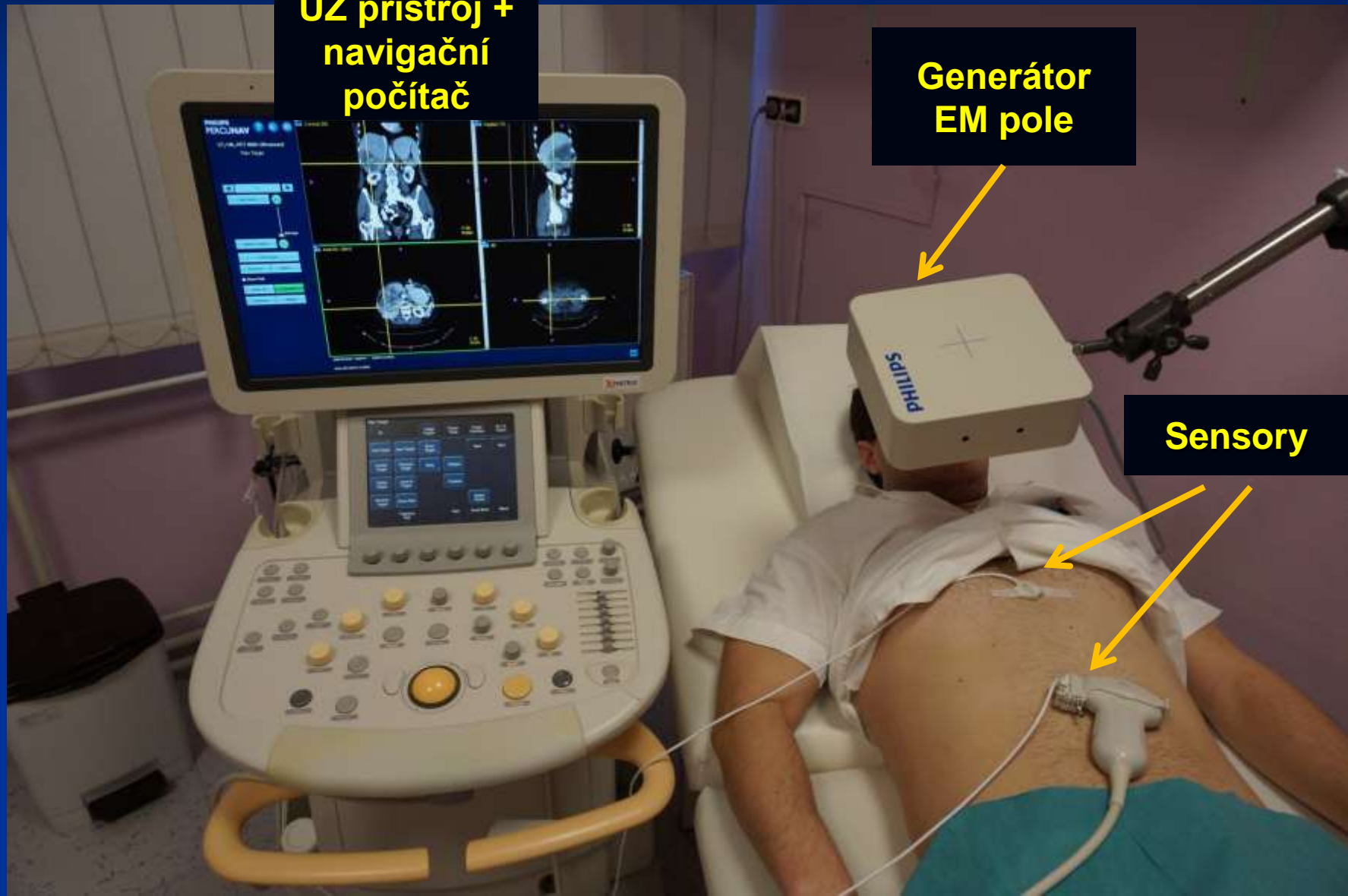
Radiologická klinika FN Brno a LF MU

Součásti systému

UZ přístroj +
navigační
počítač

Generátor
EM pole

Sensory



Funkce systému

- Fúze real-time UZ/CEUS zobrazení a předchozího vyšetření (CT, MR, PET/CT)
- Navigované intervence pomocí speciálních jehel které, systém dokáže detekovat v prostoru
 - Biopsie
 - Ablace
- Kombinace obou metod



Fúze - instrumentárium



Fúze CT +UZ

- Nahraní CT do UZ přístroje
 - CD, Query (UZ přístroj), Send (Archiv)

The screenshot displays the PHILIPS PERCUNAV DICOM interface. On the left, there are navigation buttons: 'Import', 'DICOM Query Retrieve', 'Refresh', 'Sort Slices', and 'Delete'. Below these is a 'Co-registry Datasets' section. The main area contains two tables. The top table lists patient and study information, with the row for 'Philips1' (Study ID: 2009-01-01-00-00-00) highlighted. The bottom table provides a detailed view of the selected study, showing it is a CT scan with 12 slices.

Patient Name	Patient ID	Birth date	Gender	Study ID	Study Date	Accession#
No Name 20081120151105_549902...	NO		0	0700011...	2008-11-20 07:51:20	A700011708...
EXTREME1	MP1463	1962-06-01 00:00:00	F	17277	2008-09-10 18:27:13	ACC4536
PHANTOM	000	NA	0	1001	2011-07-19 12:52:00	1001
PHANTOM_02	0000000...	NA	0	1000	2011-07-19 11:52:00	1000
Philips	3	2009-01-01 00:00:00	0	1	2009-05-06 17:04:55	Abdomen'AB...
Philips1	1	2009-01-01 00:00:00	0	1	2009-05-06 17:11:49	Abdomen'AB...
Philips2	2	2009-01-01 00:00:00	0	1	2009-05-06 17:15:25	Abdomen'AB...
Philips4	4	2009-01-01 00:00:00	0	1	2009-05-06 17:21:51	Abdomen'AB...
TRUCAL PHANTOM	00192000	NA	0	7134	2008-08-18 14:44:45	7134

Patient Name	Patient ID	Series#	State	Study ID	Modality	Series Date	Series Description	# Images	VIEW/Plan	Phase Number
Philips1	1	1	1	1	CT	2009-05-06 17:15:05	Patient's Abdomen	1	NA	
Philips1	1	1	1	1	CT	2009-05-06 17:12:18	Topogram	1	NA	
Philips1	1	2	1	1	CT	2009-05-06 17:13:58	ABD Routine CT	12	NA	

Local Disk (C:) Total Size: 290.09 GB Free Space: 211.92 GB

Fúze CT +UZ

■ Registrace – Plane Match

The screenshot displays the Philips Percunav software interface for CT and US registration. The interface is divided into several sections:

- Top Left:** Philips Percunav logo and navigation icons. Below it, the text "CT, MR, PET With Ultrasound" and "Match Ultrasound plane" is visible. There are "Live" and "Freeze" buttons.
- Top Right:** A large ultrasound (US) image showing a cross-section of tissue. The text "US Cine F# 73/73" and "07:57:11.109" is displayed at the top. A "Current" label is present on the image.
- Center:** A large CT scan image showing a cross-section of a vertebral body. The text "C 40 W400" and "Ezoni 100" is visible.
- Bottom Left:** A control panel with the following options:
 - "Choose a plane:" with checkboxes for "Axial" (checked), "Sagittal", and "Coronal".
 - "Match" button.
 - "Drag To Match" and "Delete" buttons.
 - "Clear Match" and "Exclude Point" buttons.
 - "Point (mm): 0.0" and "Overall fit (mm): 0.0" readouts.
 - "Blend:" section with a slider and up/down arrow buttons.
 - "Gate:", "Flip", and "Beep" buttons.
- Bottom Right:** A smaller CT scan image showing a different view of the vertebral body. The text "C 40 W400" is visible.
- Bottom Center:** "Distance to Point: N/A" text.
- Bottom Left (Yellow Bar):** "US inactive..." status indicator.
- Bottom Center:** "Plan.20131015.075451" text.
- Bottom Right:** A small "IT" logo.

Fúze CT +UZ

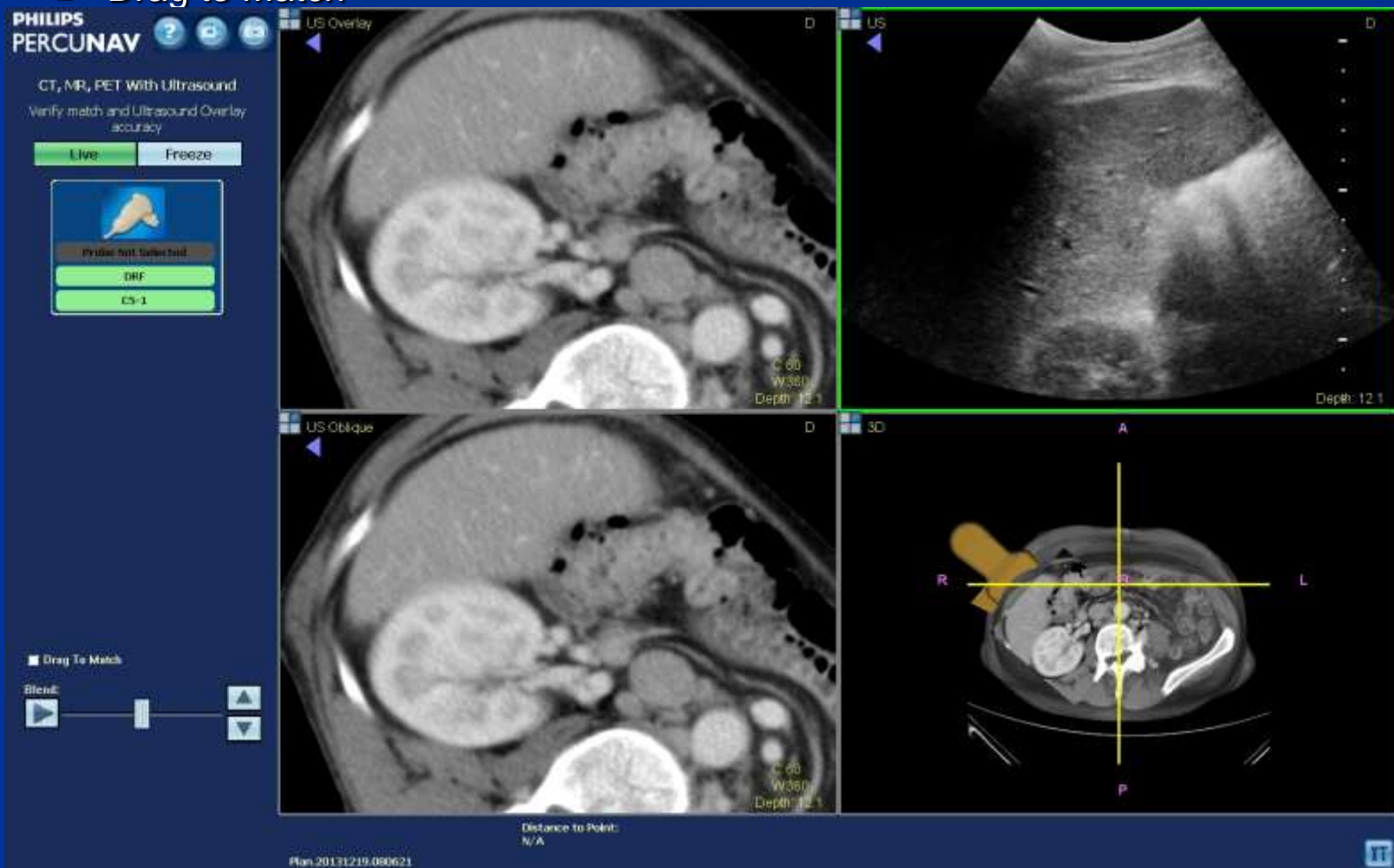
- Registrace – Point Match

The screenshot displays the Philips Percunav software interface for CT and US registration. The interface is divided into several sections:

- Top Left:** Philips logo and navigation icons. Text includes "PHILIPS PERCUNAV" and "CT, MR, PET With Ultrasound".
- Top Center:** "Match internal points" section with "Live" and "Freeze" buttons. Below are "Probe Out of View", "DRF", and "C5-1" buttons.
- Top Right:** US Cine FW 150/150 window showing an ultrasound image with a "Current" label.
- Middle:** CT Axial 30 / -502.3 window showing a cross-sectional CT scan of the abdomen with a yellow registration grid.
- Bottom Left:** Control panel with "Match Point", "Exclude Point", "Delete", and "Clear Match" buttons. It also shows "Point (mm): N/A", "Overall fit (mm): 3.9", and "Blend:" controls.
- Bottom Center:** "Distance to Point: N/A" label.
- Bottom Right:** "C 60 W360" label.
- Bottom Left Bar:** "US inactive." status bar.
- Bottom Center Bar:** "Plan.20130806.133146" text.

Fúze CT +UZ

- Kontrola a oprava nedokonalé registrace
 - Drag
 - Rotate
 - Drag to Match



Fúze CT +UZ



Fúze CT +UZ

PHILIPS PERCUNAV ?

CT, MR, PET With Ultrasound

Live Freeze

Probe Not Selected

DRF

C5-1

Offset: 0.0 mm Roll: 0.0 deg

Layout ▾

Target:

Add Delete

◀ ▶

Rename Show Current ▾

Blend:

Gate

Flip

Beep

2013-10-15 08:09:15 Contrast Timer

US Overlay Drag: 584 mm D

US D

C 40 W400 Depth: 14.1

Depth: 14.1

Anonymized: Press Name ID key to redisplay. Distance to Target: N/A

Plan:20131015.075451

Fúze CT + CEUS

PHILIPS PERCUNAV ?

CT, MR, PET With Ultrasound

Live Freeze

Probe not selected

DRF

C5-1

Offset: 0.0 mm Roll: 0.0 deg

Layout

Target

Add Delete

Rename Show Current

Blend:

Gate

Flip

Beep

2013-05-28 09:23:34

Contrast Timer

US Overlay C 0:14 Drag 123 mm D

US C 0:14 D

C 60 W360 Depth 12.1

Depth 12.1

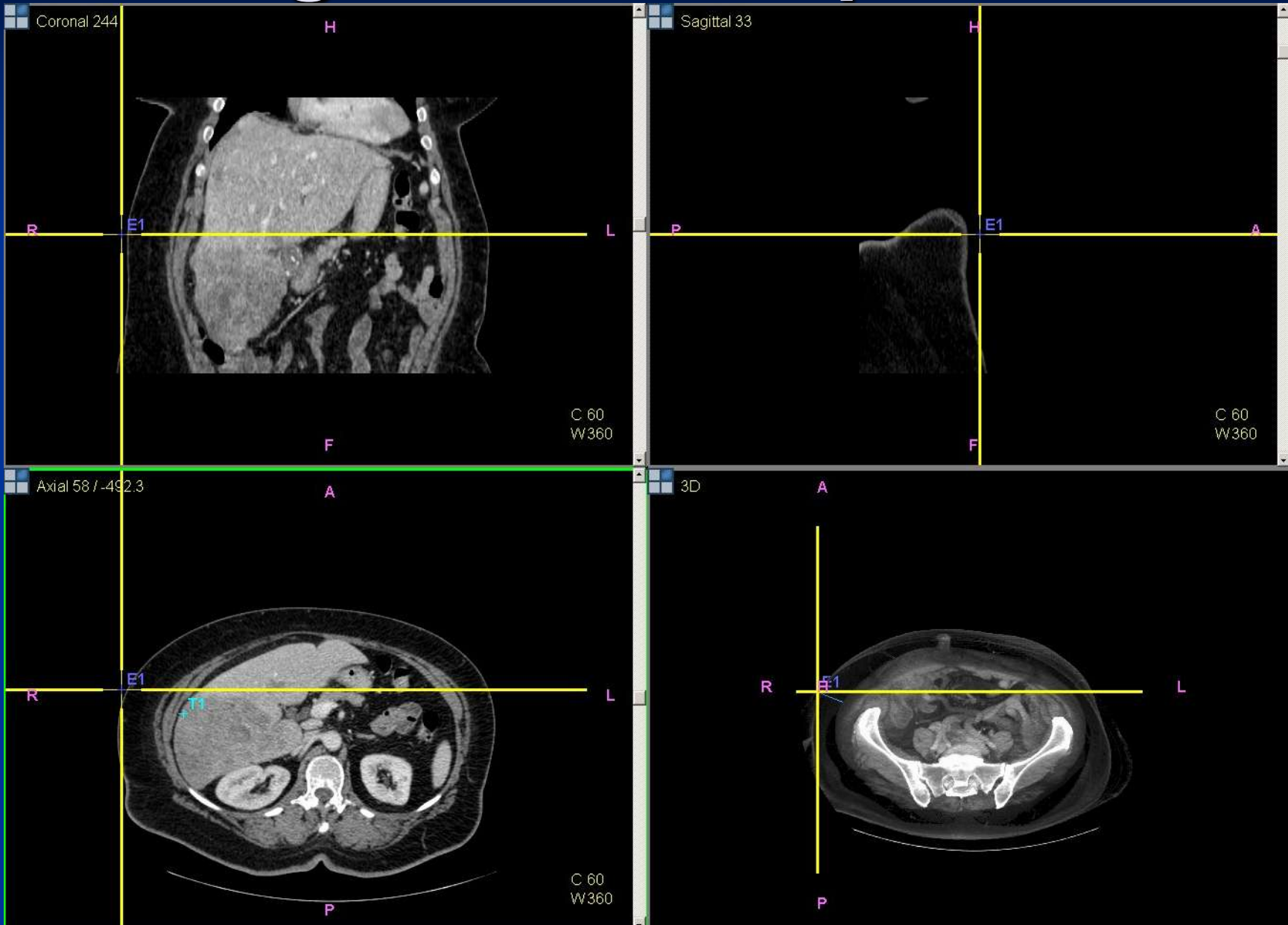
KYSELKA JAROSLAV (490703/051) Distance to Target: N/A

Plan.20130528.090348

Navigace - instrumentárium



Navigace + fúze - plánování



Navigace + fúze

PHILIPS PERCUNAV ? [Icons]

CT, MR, PET With Ultrasound

Live Freeze

Probe not Selected

DRF

C5-1

Offset: 0.0 mm Roll: 0.0 deg

Layout

Target

Add Delete

T1


Rename Show Current

Blend:


Gate Flip Beep

2013-09-06 14:10:28 Contrast Timer


US Overlay Drag: 22 mm D



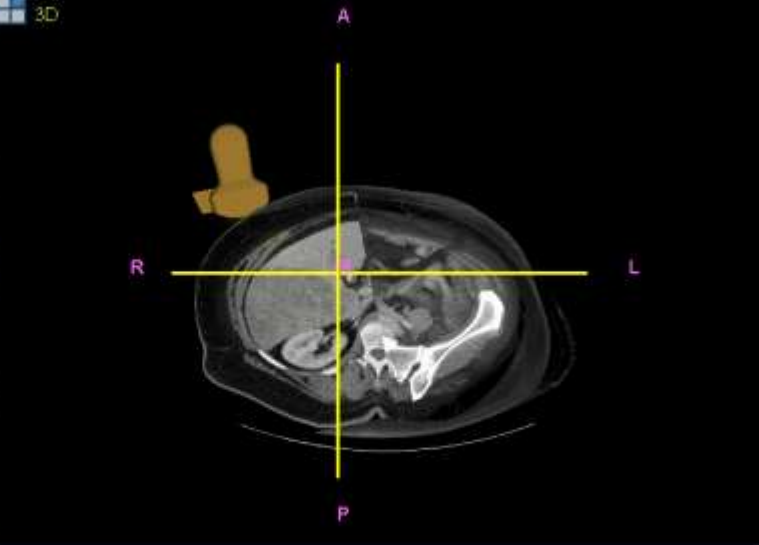
US



US Oblique Drag: 22 mm D




3D

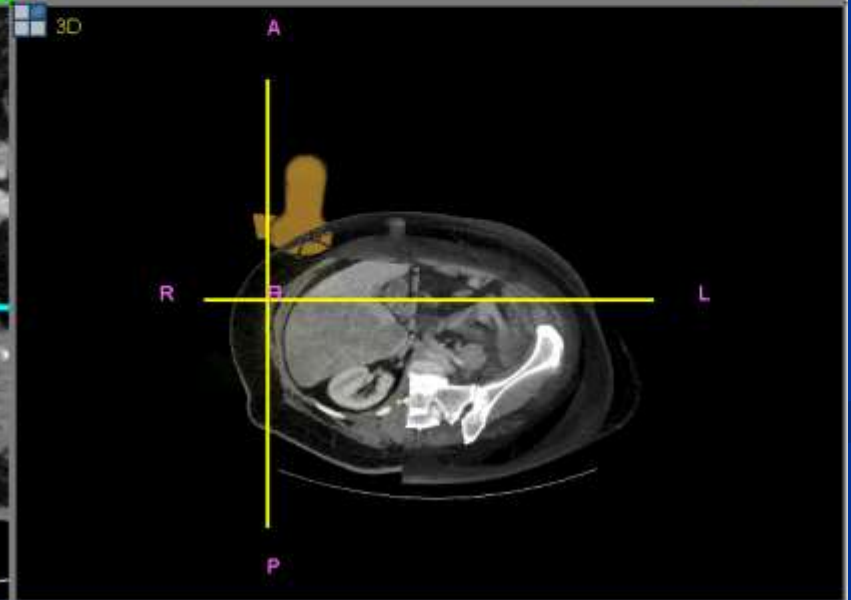
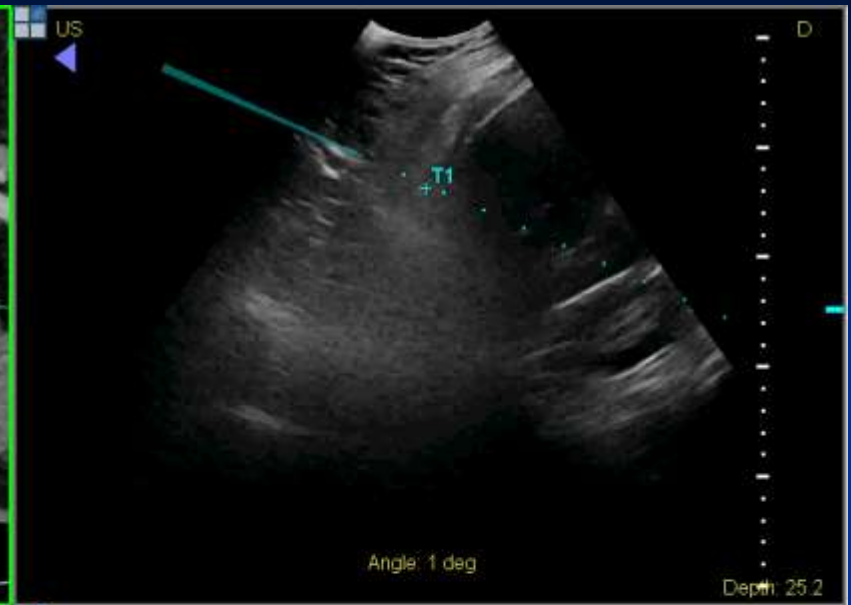
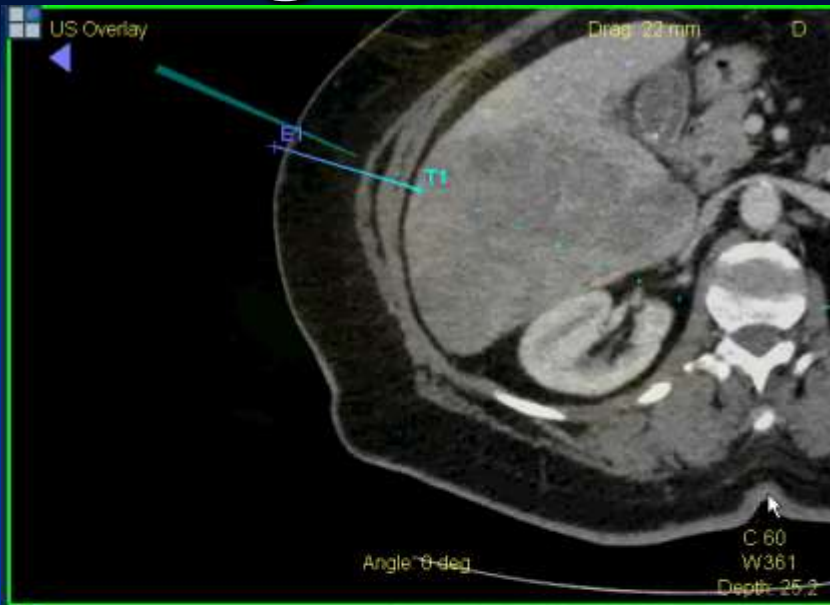


Distance to Target: N/A

Plan: 20130806.133146



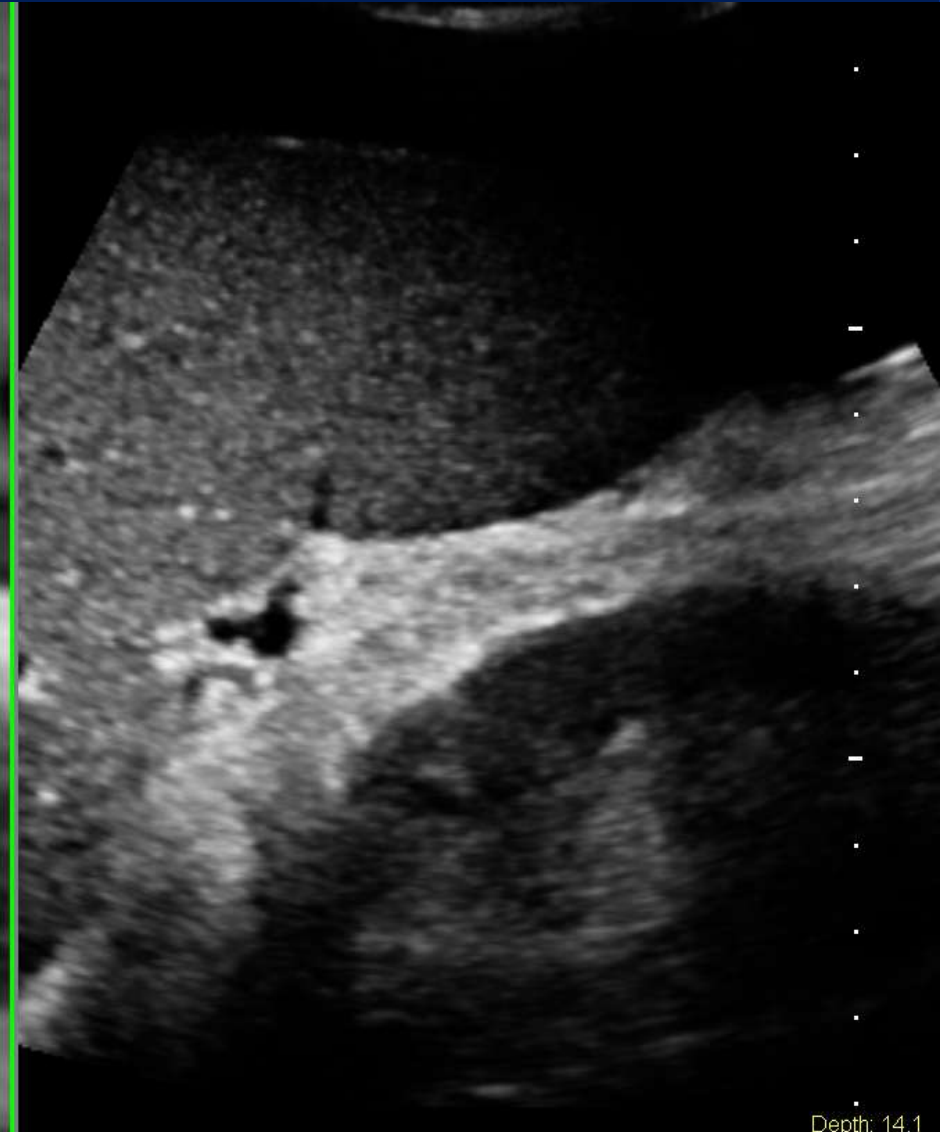
Navigace + fúze - intervence



/442)

Distance to Target:
32.2 mm

Využití fúze



Využití fúze

PHILIPS PERCUNAV ?

CT, MR, PET With Ultrasound

Live Freeze

Probe not selected

DRF

CS-1

Offset: 0.0 mm Roll: 0.0 deg

Layout

Target

Add Delete

Rename Show Current

Blend:

Gate

Flip

Beep

2013-11-12 09:16:51 Contrast Timer

US Overlay Drag: 115 mm D

US C 0:06 D

C 60 W360 Depth: 14.0

Depth 14.0

Anonymized: Press Name ID key to redisplay. Distance to Target: N/A

Plan:20131112.074925

Využití navigace

PHILIPS PERCUNAV

CT, MR, PET With Ultrasound

Live Freeze

Probe
DRF
CS-1

Introducer

Setting
1 2

Offset: 0.0 mm Roll: 0.0 deg

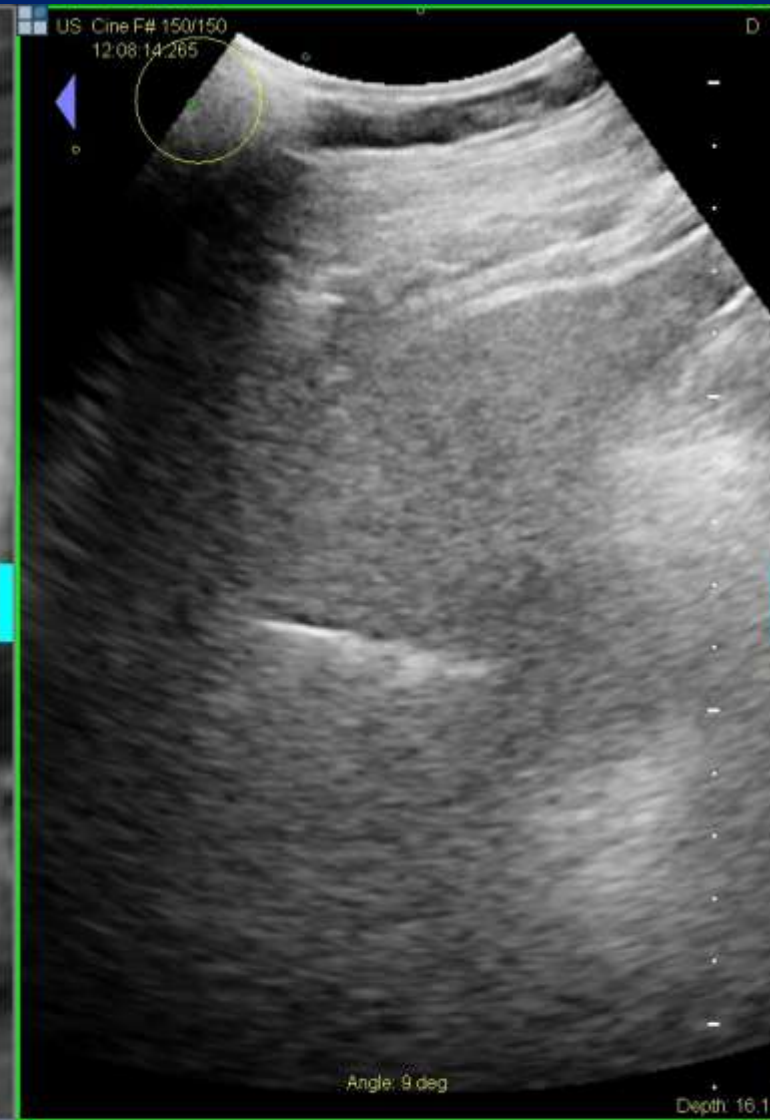
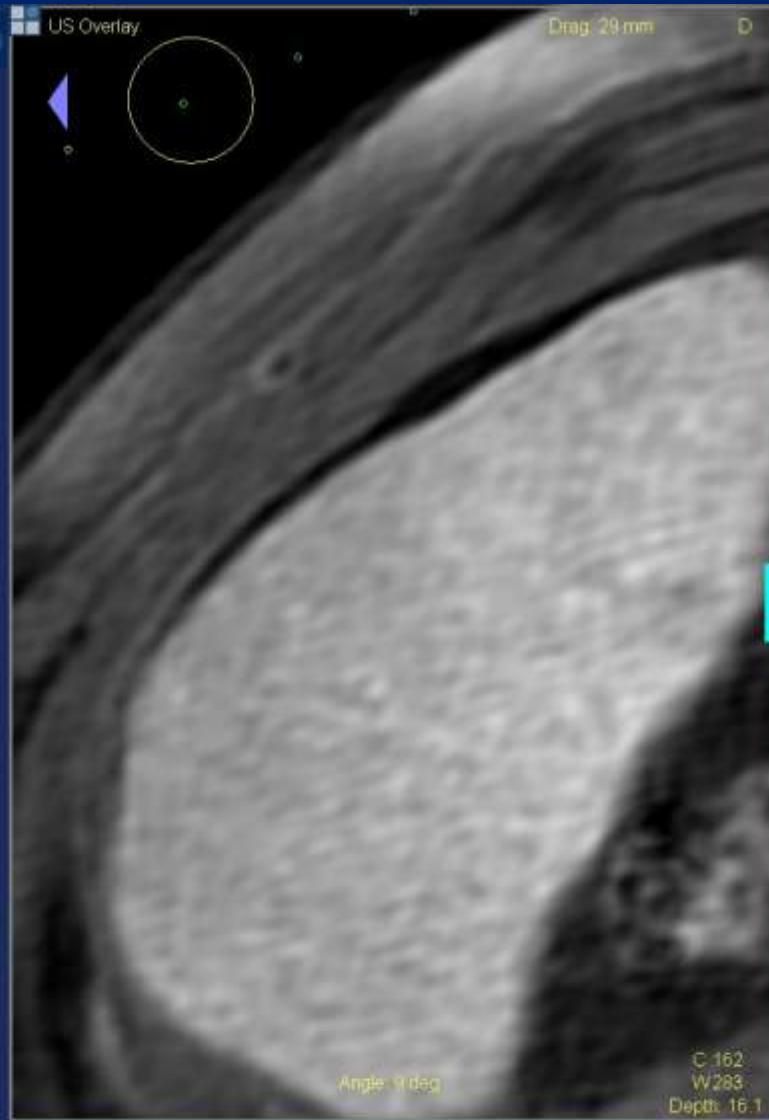
Layout

Target
Add Delete
T1
Rename Show Current

Blend:

Gate
Flip
Beep

2013-09-10 12:08:15 Contrast Timer



Anonymized: Press Name ID key to redisplay.

Distance to Target:
162.0 mm

Shrnutí

Fúze

- Vyhledání nejasných drobných ložisek z CT/MR
 - Játra, ledviny
 - Pokud nejde o cystu, pak CEUS

Navigace + Fúze

- Kombinace výhod UZ a CT
 - Real-time intervence
 - Jednoduchý výběr libovolné roviny při plánování
 - Dobrý přehled o strukturách v průběhu trajektorie
- Odpadají nevýhody UZ intervence
 - Pevná poloha sondy při intervenci přes nástavec
 - Obtížné plánování při použití free-hand
- Cílení na vaskularizovanou část ložiska

Děkuji za pozornost

