QA for pTx coils

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Methods

- Method : acquisition of B1+ maps and comparison to a reference B1+ map

- Installation :

  Predefined phantom : Agar (no fluid movement)
  short T1 : ~650ms

  Reproducible positioning : holder available + automatic position detection
  with a profile measurement in 3 main directions

- Sequence : based on an XFL acquisition

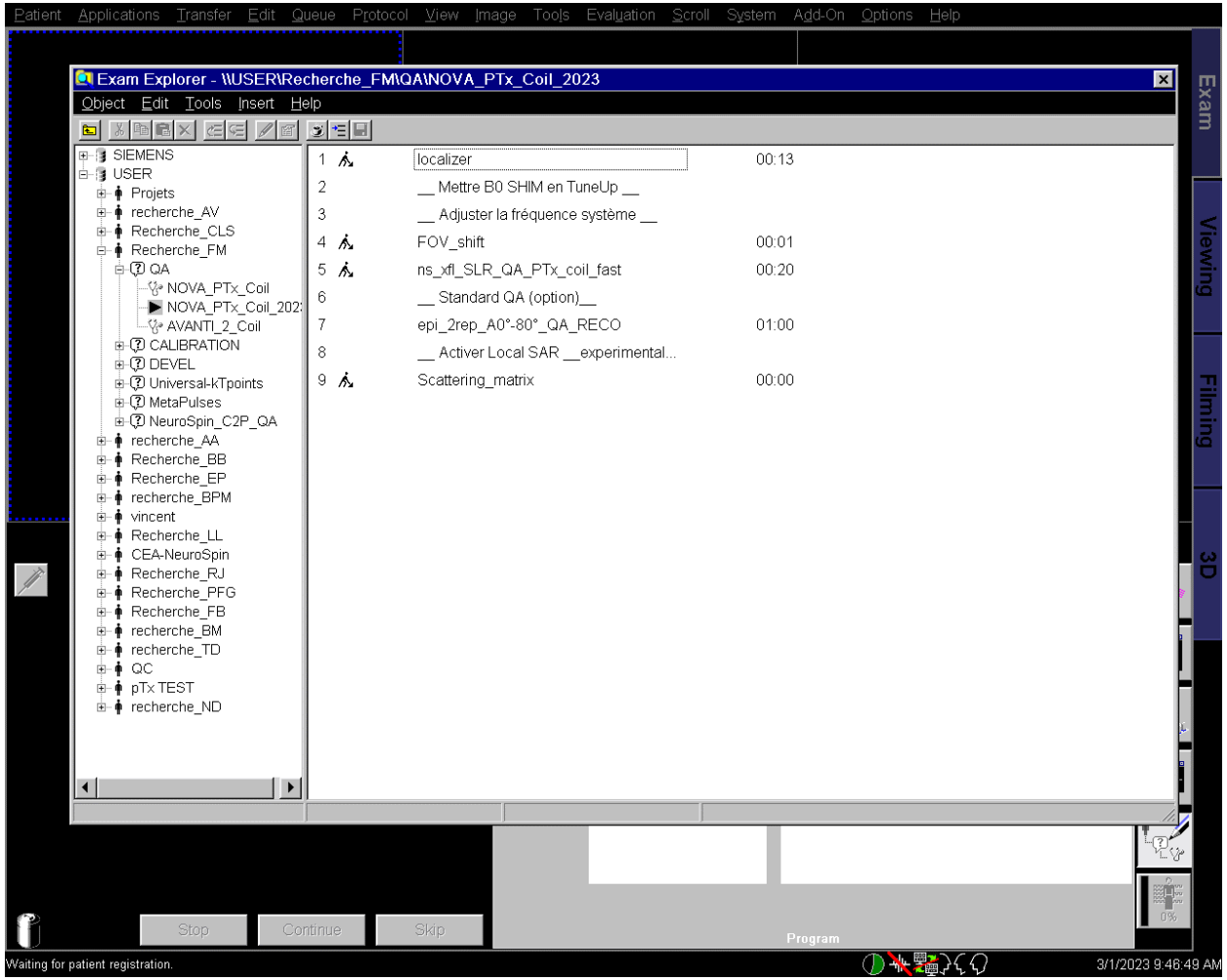
  (Fast mode = 9 gre + 1 saturated gre)

- Protocol : must be fixed in advanced for comparison and rapid to execute

  5 slices, TR = 2s, XFL fast mode => 20s total acquisition time (for 8 Tx channels)

Methods

List of protocols used for the QA of a pTx coil



Reconstruction process

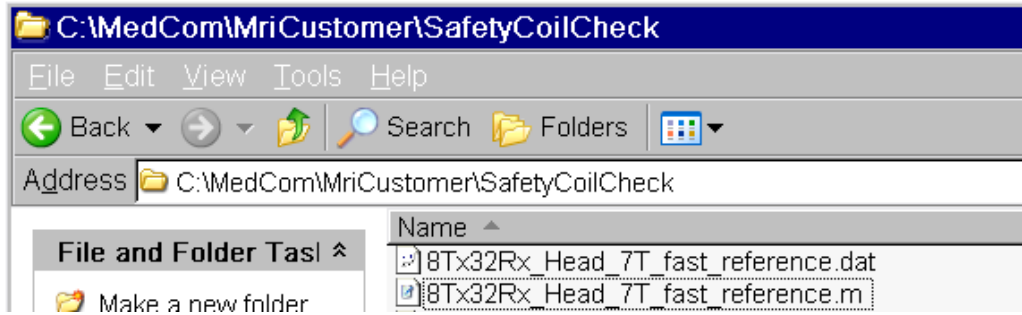
Reference file :

location : %CustomerSeq%/SafetyCoilCheck/

filename : [COILNAME]_fast_reference.dat

ex : 8Tx32Rx_Head_7T_fast_reference.dat

➔ Each coil will have its reference file



Measurement file :

Standard reconstruction from our B1 mapping XFL sequence

location : %CustomerSeq%/RECO_B0B1/

This measurement is compared to the reference file in ICE

Results :

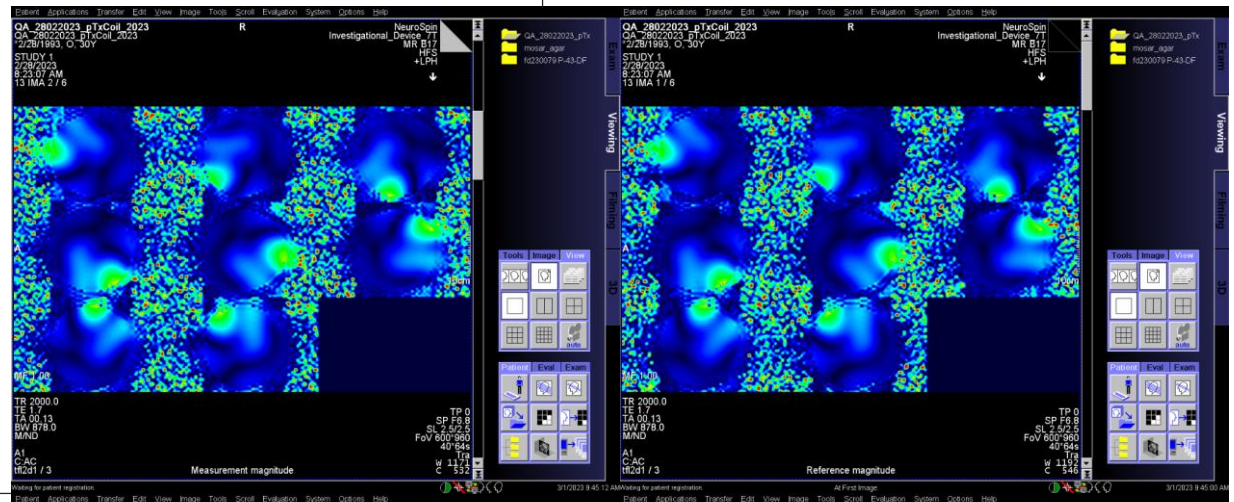
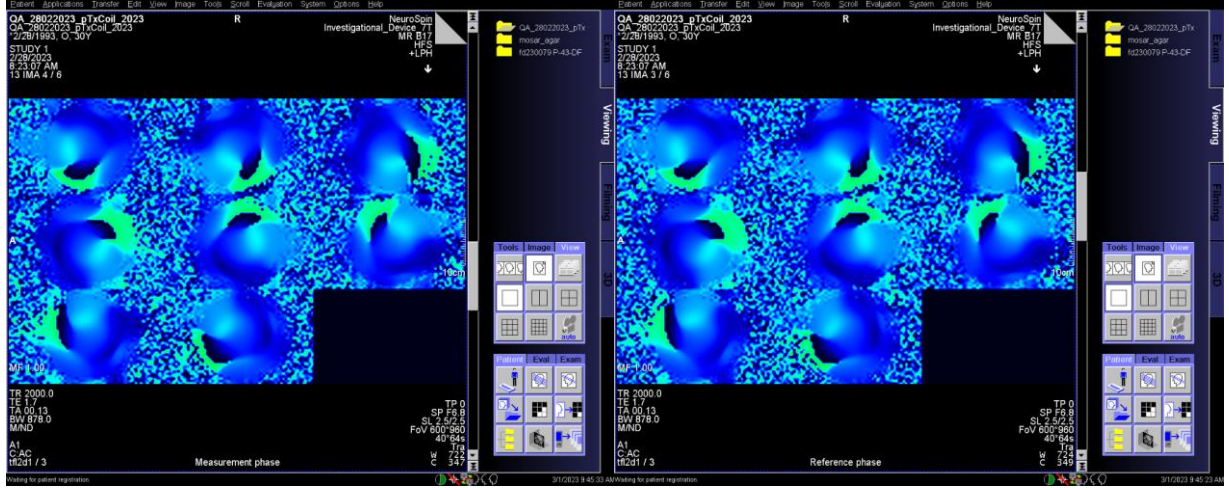
Dicom series :

- [PROTOCOL_NAME]_CHECK-PTX-COIL -> Visual check of the magnitude and phase images
- [PROTOCOL_NAME]_FOLLOWUP-PTX-COIL -> Follow-up graphs and validity of the measurement

Followup data saved in %CustomerSeq%/QA/[COILNAME]/

Visual check

Dicom series [PROTOCOL_NAME]_CHECK-PTX-COIL

	REFERENCE	MEASUREMENT
MODULE		
PHASE		

Reference = saved data from day 1

Visual check : no global changes between reference and measurement

Data comparison

Dicom series [PROTOCOL_NAME]_CHECK-PTX-COIL

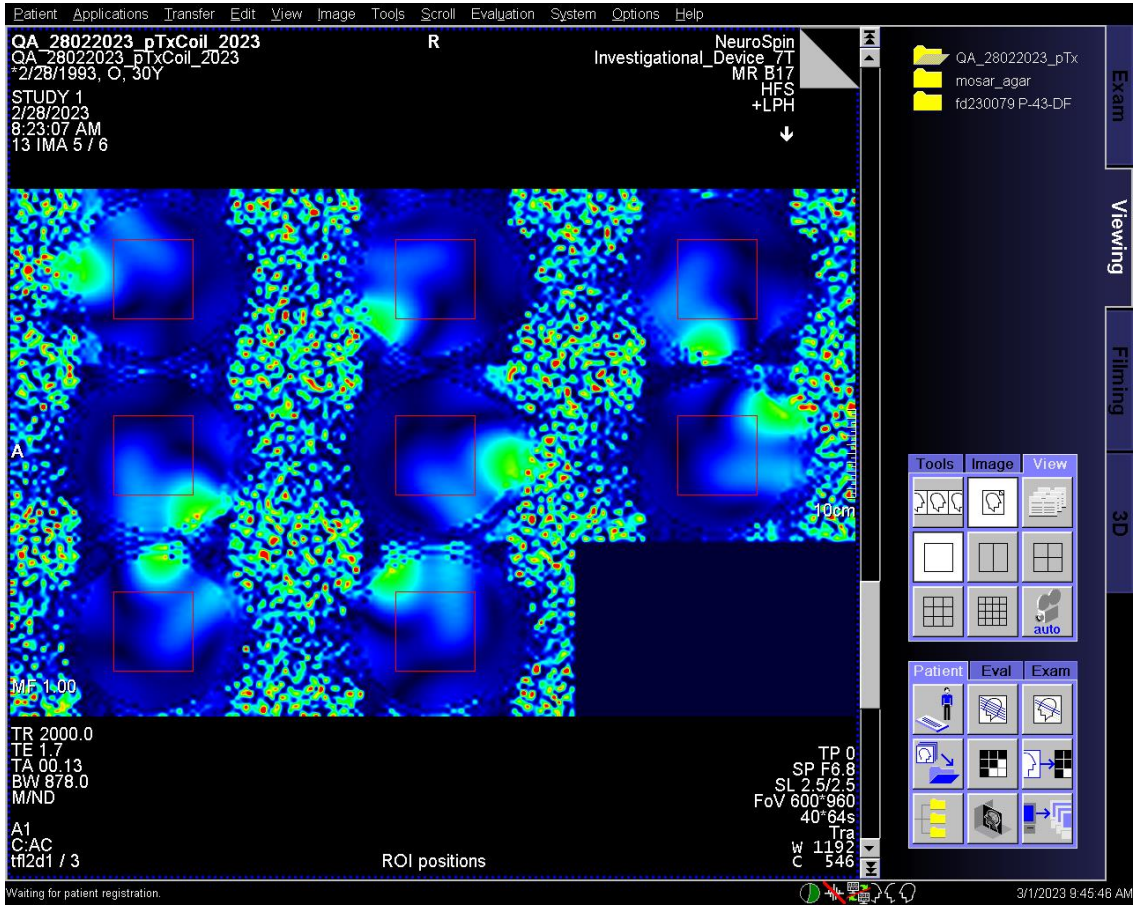
Predefined ROI

channel by channel comparison

Correlation (mag+phase) between reference and measurement in ROI

RMSE between reference and measurement in ROI

=> thresholds to be determined



Data comparison

Dicom series [PROTOCOL_NAME]_CHECK

Predefined ROI

channel by channel comparison

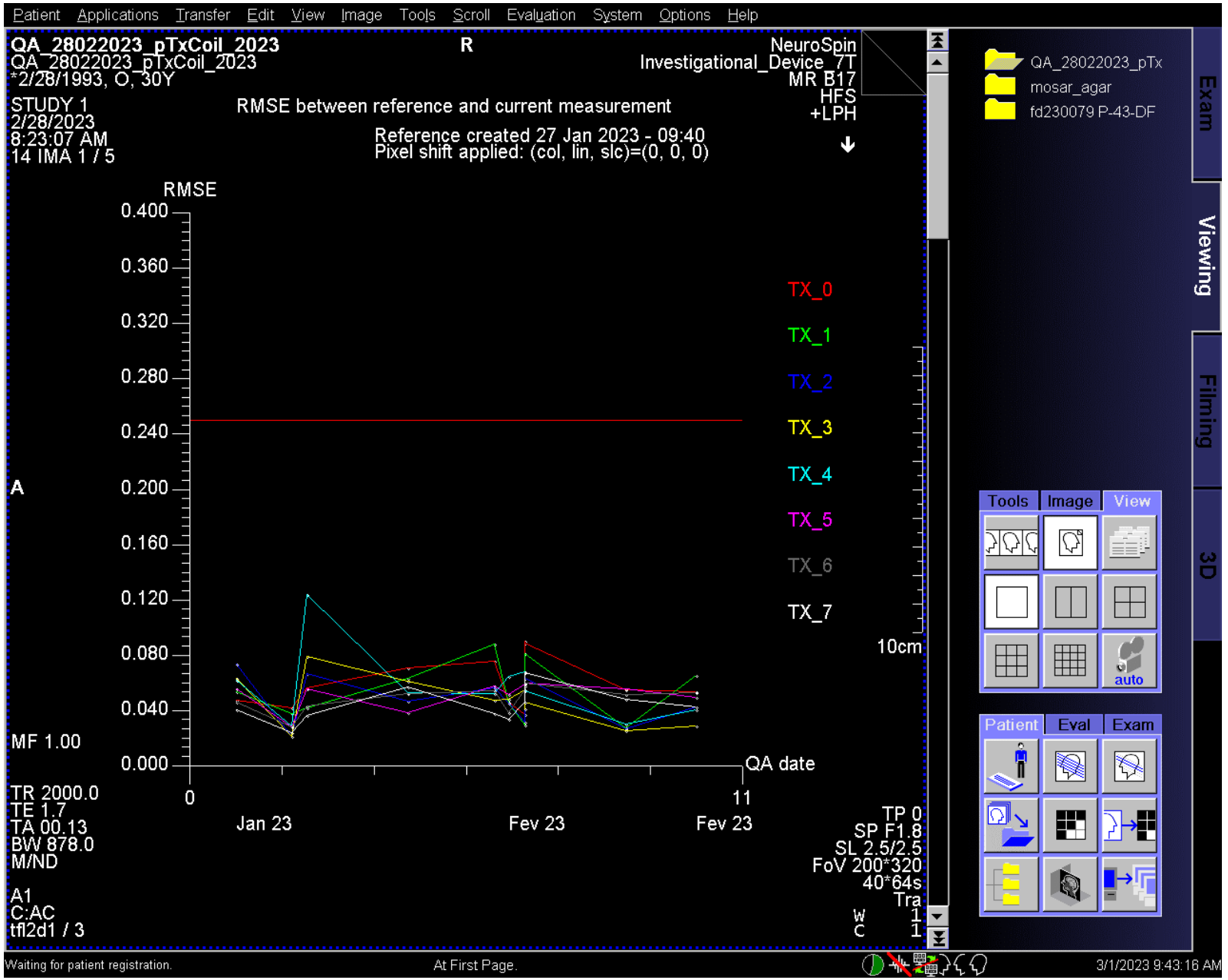
Correlation (mag+phase) between reference measurement in ROI

RMSE between reference and measurement in

=> thresholds to be determined

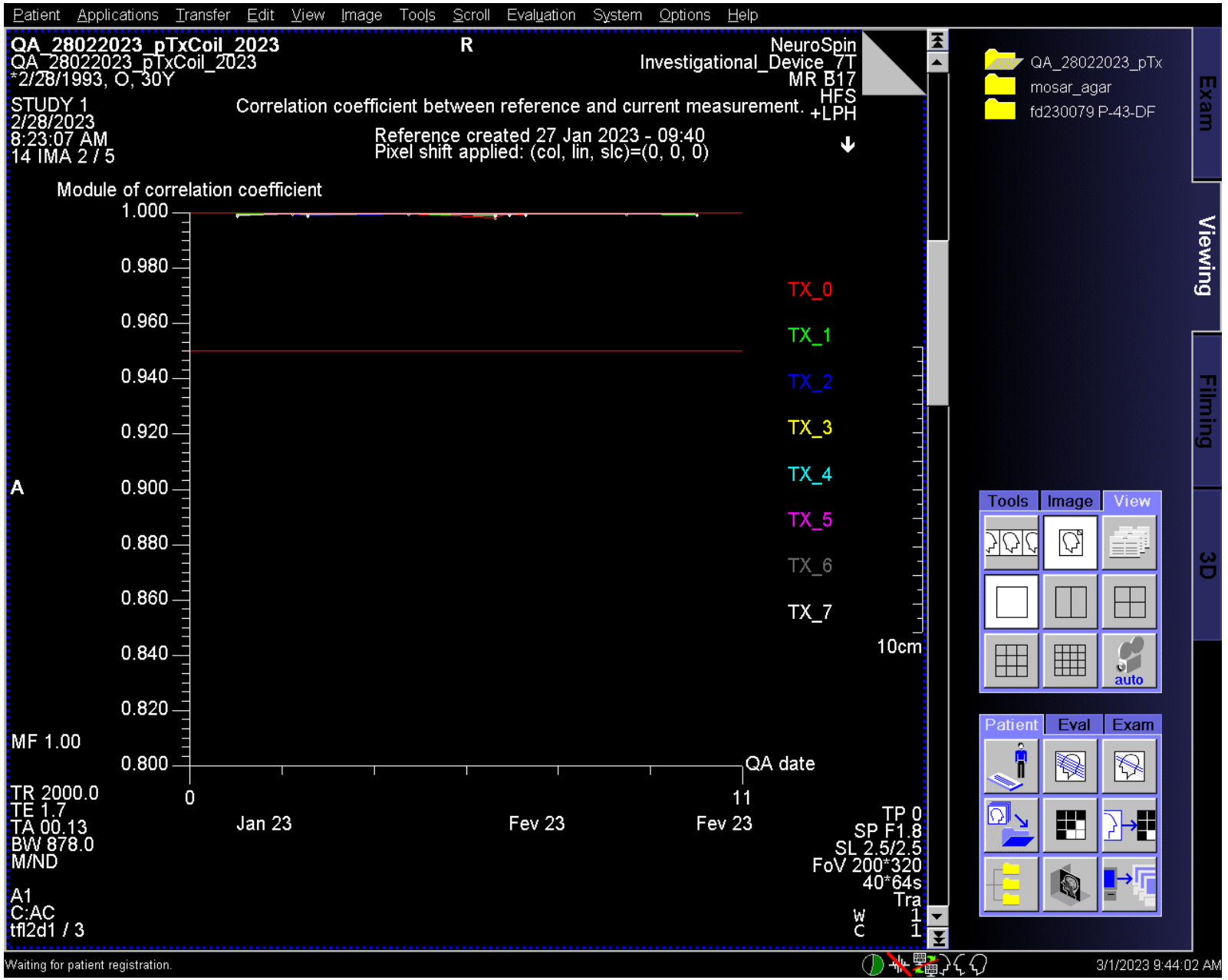
Dicom series [PROTOCOL_NAME]_FOLLOWUP-PTX-COIL

Follow-up RMSE



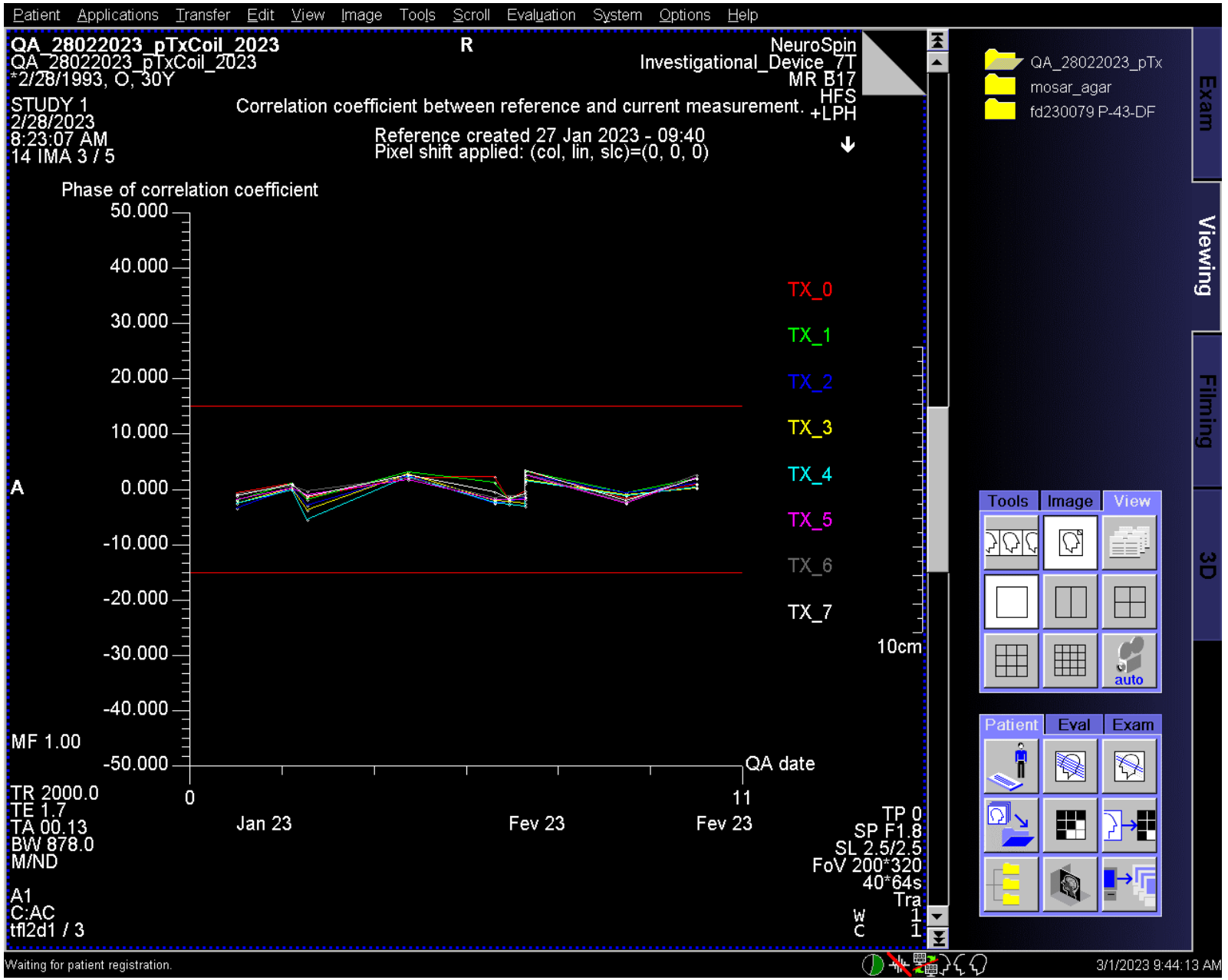
Dicom series [PROTOCOL_NAME]_FOLLOWUP-PTX-COIL

Follow-up Corr. Coef. magnitude



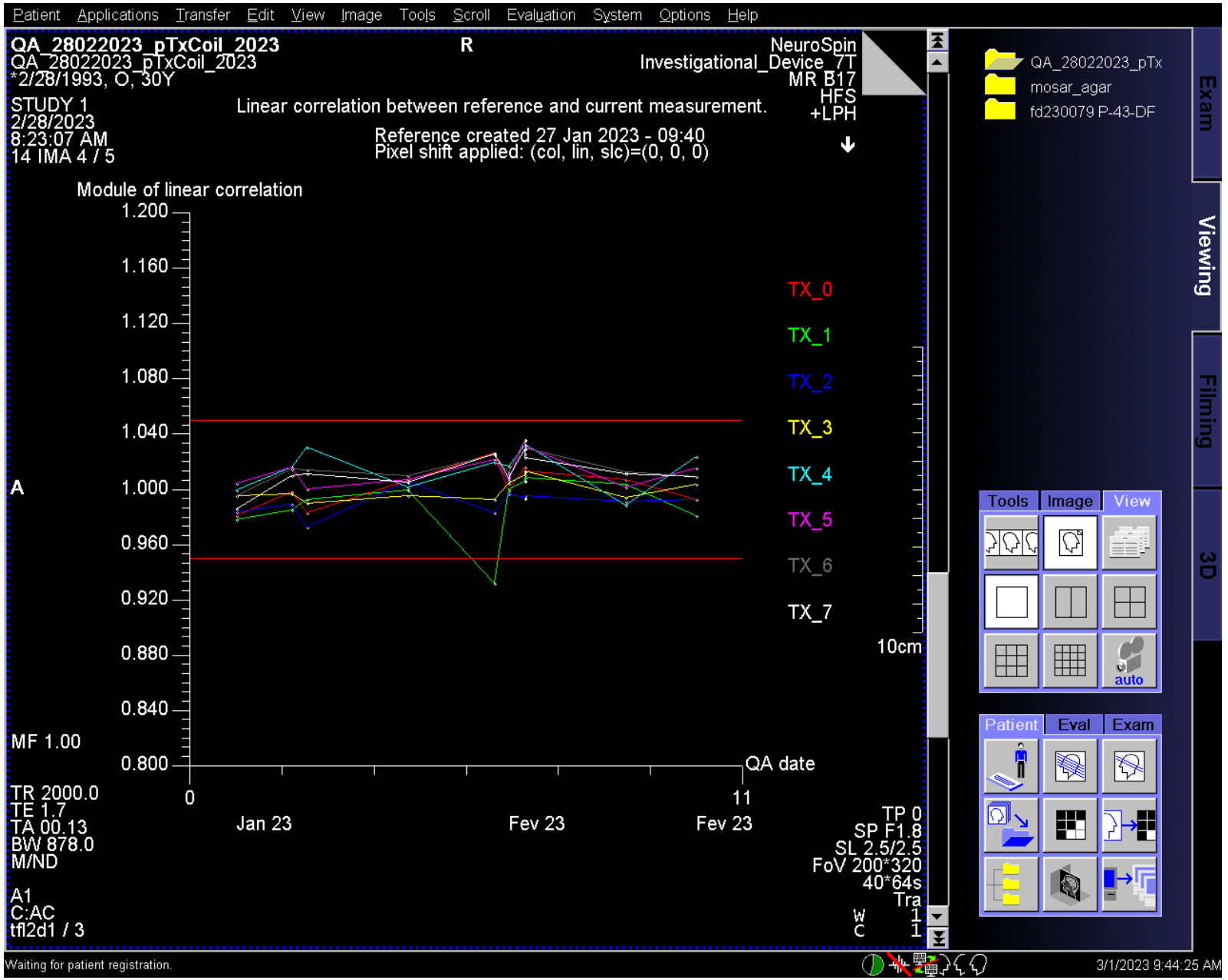
Dicom series [PROTOCOL_NAME]_FOLLOWUP-PTX-COIL

Follow-up Corr. Coef. phase



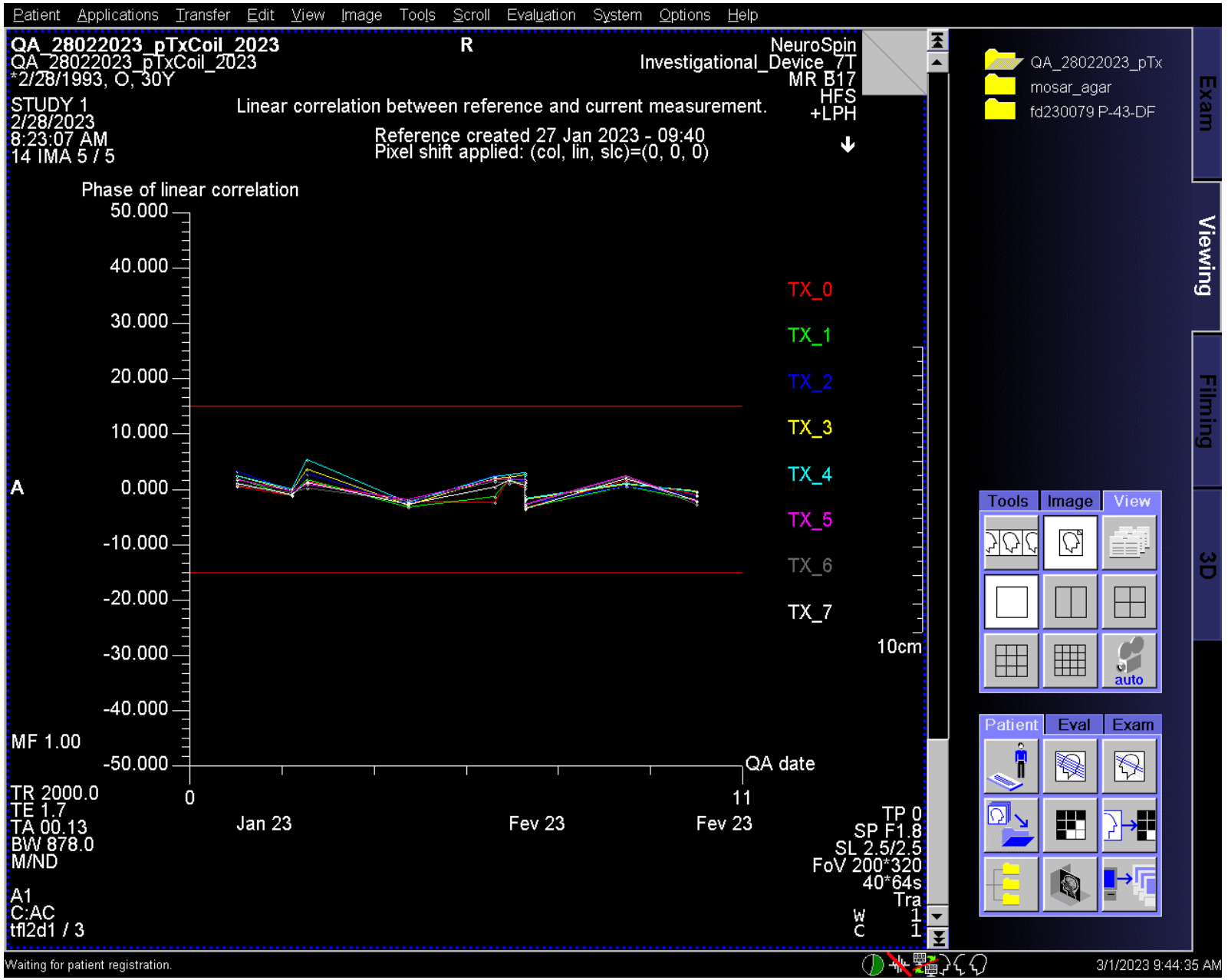
Dicom series [PROTOCOL_NAME]_FOLLOWUP-PTX-COIL

Follow-up linear cor. module



Dicom series [PROTOCOL_NAME]_FOLLOWUP-PTX-COIL

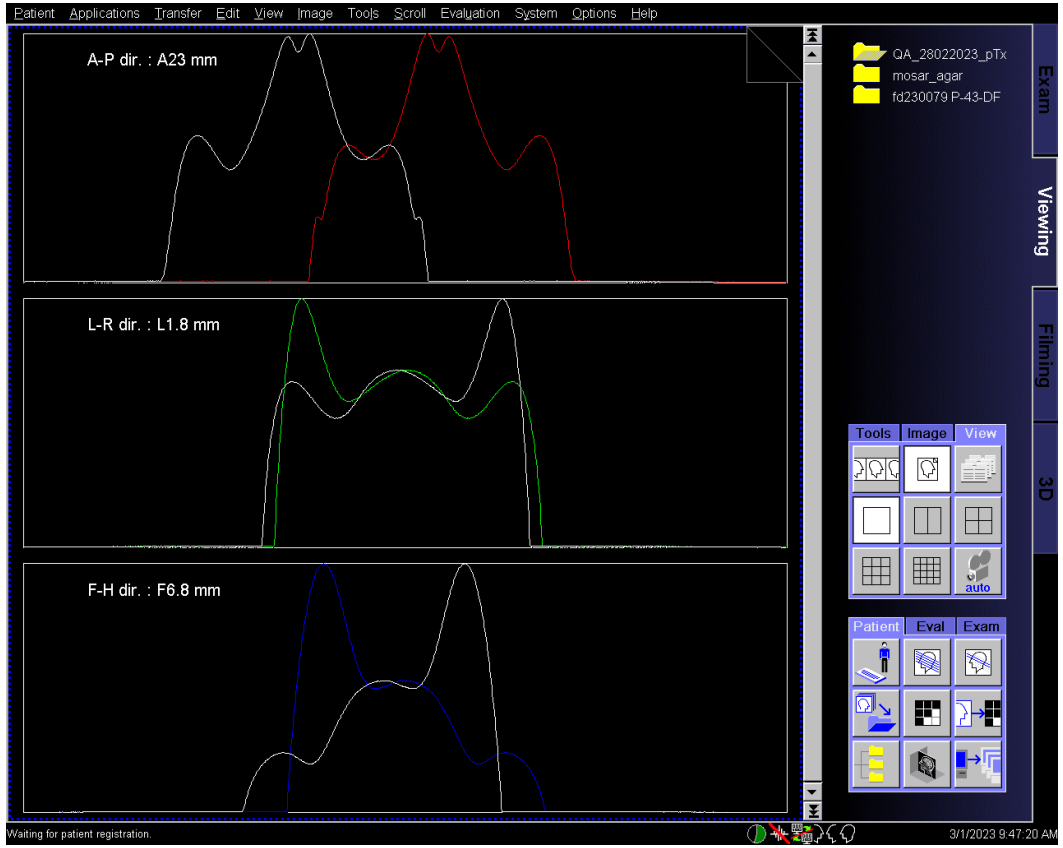
Follow-up linear cor. phase



Addiontional info

To reduce variability of B1 map comparison due to phantom positionning relative to isocenter, phantom position is determined using 3 line scans and B1 maps are acquired by shifting the FOV with this data

Phantom profiles in 3 main directions
And shift estimation using these profiles



Addiontional info

In addition to B1 map comparison, a scattering matrix is computed using Dico forward/reflected measurements on every channel. This matrix should inform about transmit coil stability over time. It should also be possible to use the scattering matrix computed by the Siemens calibration (VE12U).