Pitfalls in coronary CT angiography with 64 VCT Light Speed – GE

- our initial experience

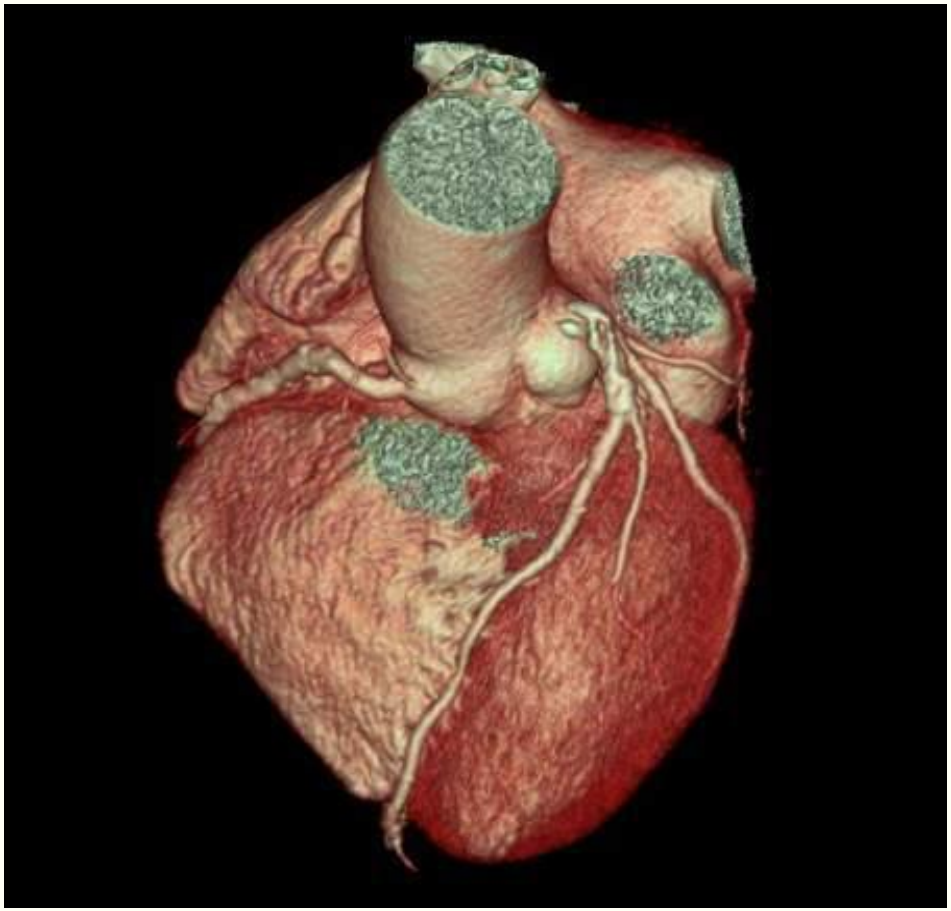
Rad.teh. Danijela Pejkovik

Special hospital for surgery diseases "Filip II"

Skopje, Macedonia

April, 2010

64 Cardiac MSCT



Noninvasive exact procedure comfortable for the patient ,

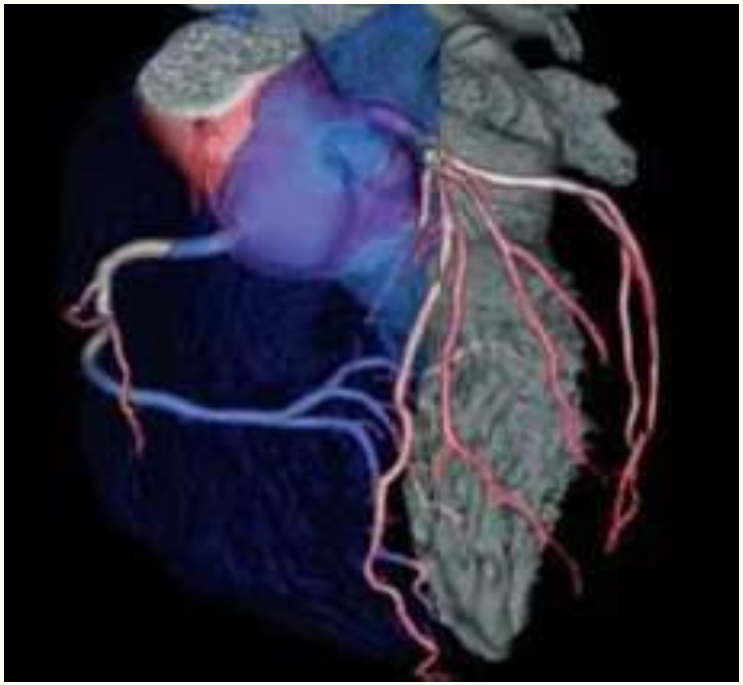
3-D or 4-D image for volumetric display of the coronary blood vessels.

64 Cardiac MSCT- Indications

- Detection of CAD for a patient with atypical chest pain/ angina
- Screening in asymptomatic patients with high risk for CAD
- Evaluation of suspected coronary anomalies before/after cath lab
- Coronary assessment before cardiac & vascular surgery
- Planning of interventions - stenting
- Stent & CABG follow up
- Triple rule out (aortic dissection,PE,CAD)
- Evaluation of valvular and ventricular function

64 Cardiac MSCT - our initial experience

- February to July 2008,
  - 254 coronary CTA
- performed by two radiological technologists and independently analyzed by two radiologists
- Cardiac SSegment 30 – 75 BPM ECG gated protocol



64 Cardiac MSCT

- High speed scanning (rot.time 0,35)
- High spatial and temporal resolution
- Thin slices - 0,625 mm,
- Visualization in all planes
  (*sagital, transversal, coronal*)
- Acquisition in diastolic phase

What more we need?

- 3D postprocesing
- ECG gating
- An injector
  - Blood pressure monitor
  - Anti shock therapy

  (*allergic reaction, chest pain*)

64 Cardiac MSCT

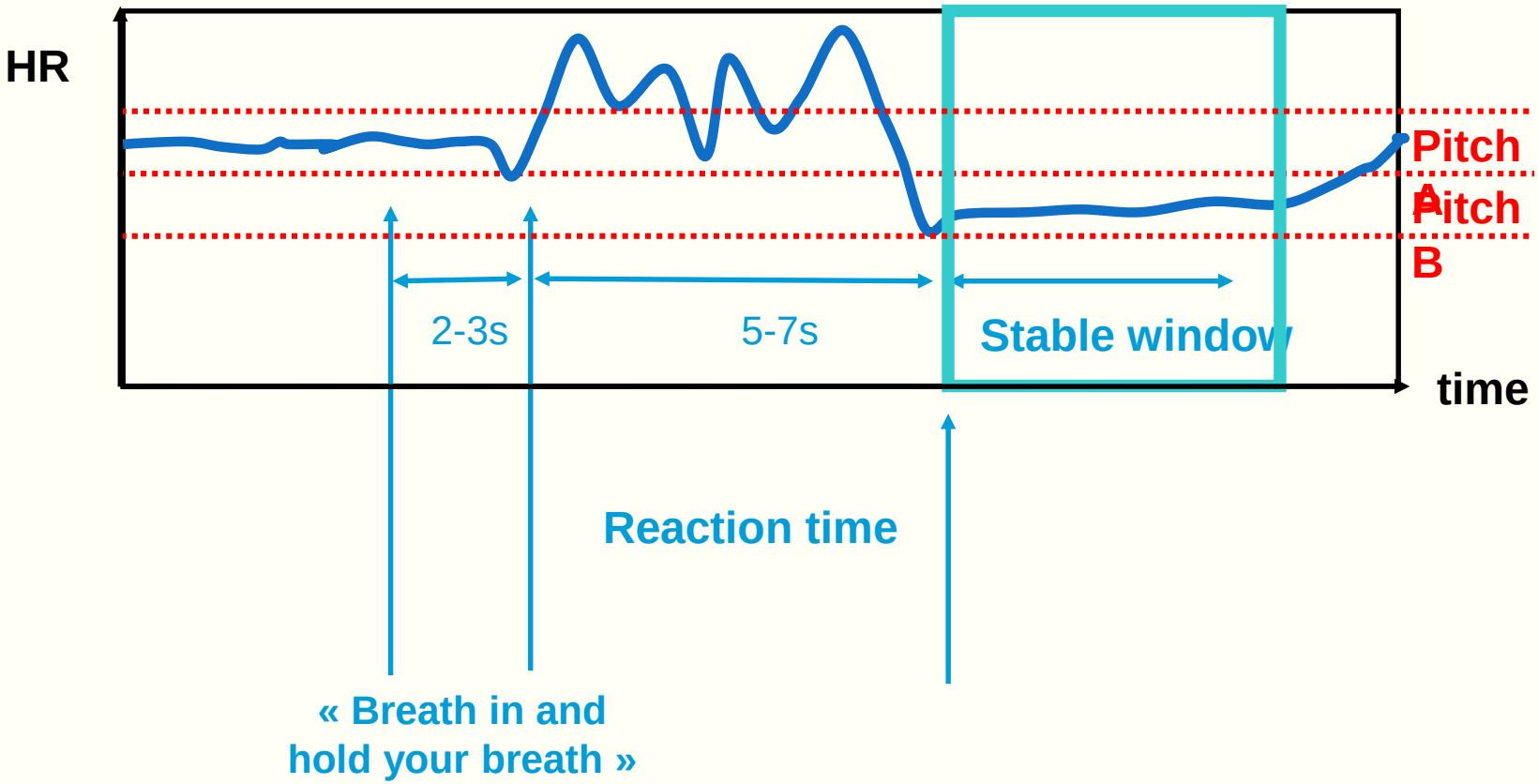
- patient preparation:
  - getting an accurate patient history, - *ECG / HR / TA/ TT*
  - explain to the patient the CT examination

  (*Instructions for breath hold: test the breath-hold of the patient before the acquisition 8-20 sec, contrast enhancement effects*)

- *medical premedication*

  (if it is necessary)

64 Cardiac MSCT – Breath - hold instructions

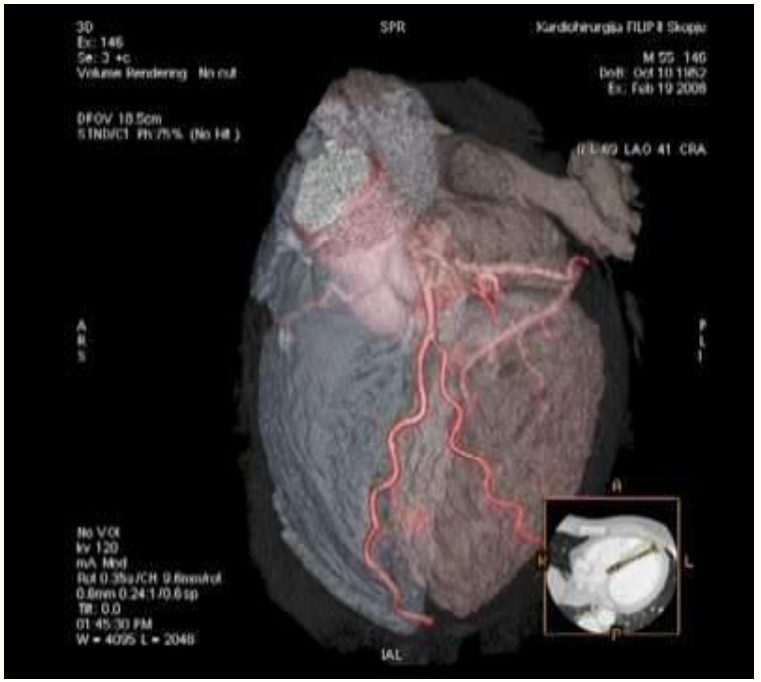


64 Cardiac MSCT - Positioning

Patient feet first

- Reference point: SN
  IV in the right arm: *c*anila: 20G / 18G
  (injection rate = up to 5 ml/s)
- ECG far from the injector, screen to face the acquisition console
  - 3 Leads : (*on bone contact*)

❖ *Very usefull to fix all the wires to avoid a bad ECG trace. (avoid artifacts)*

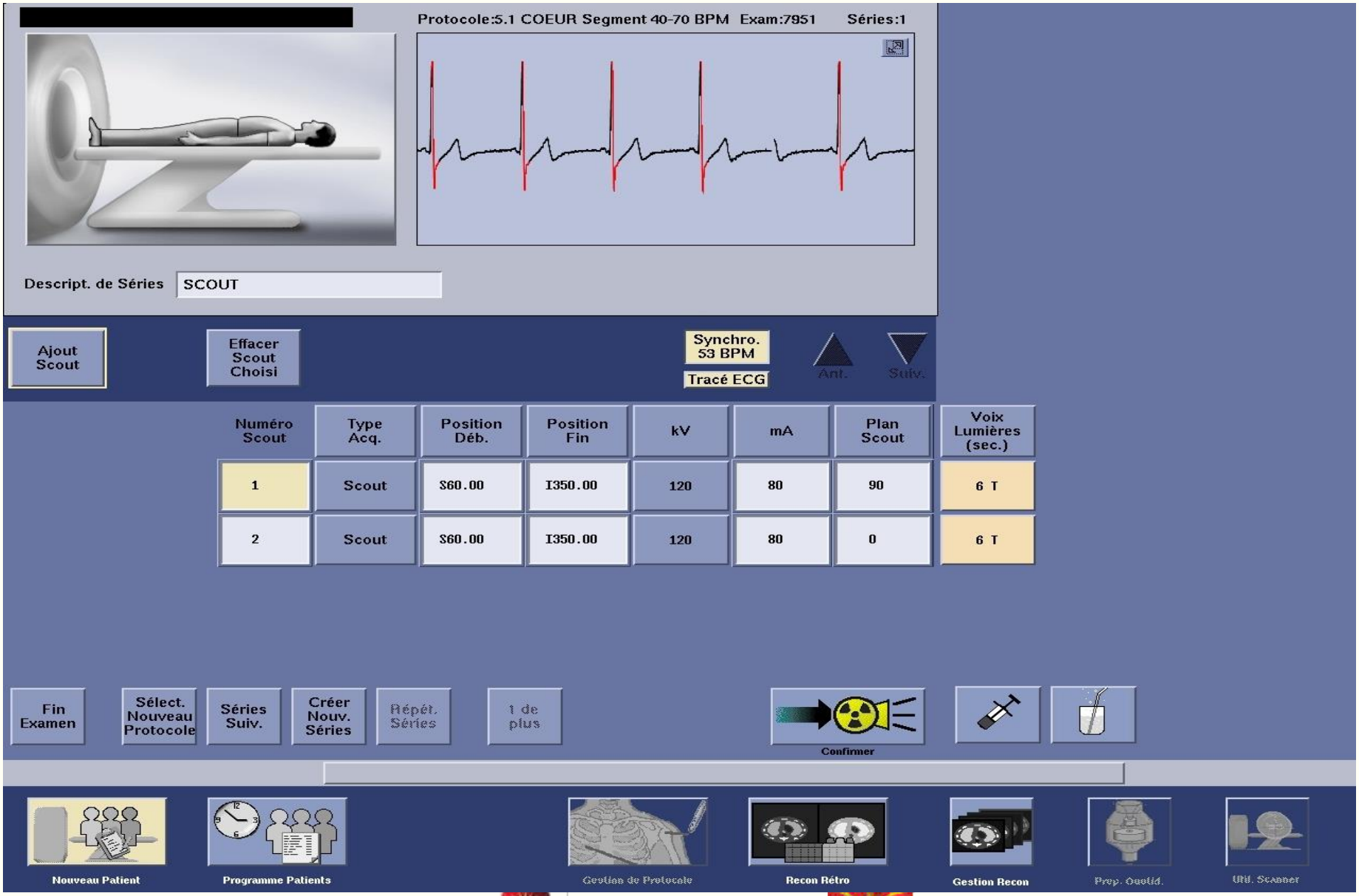


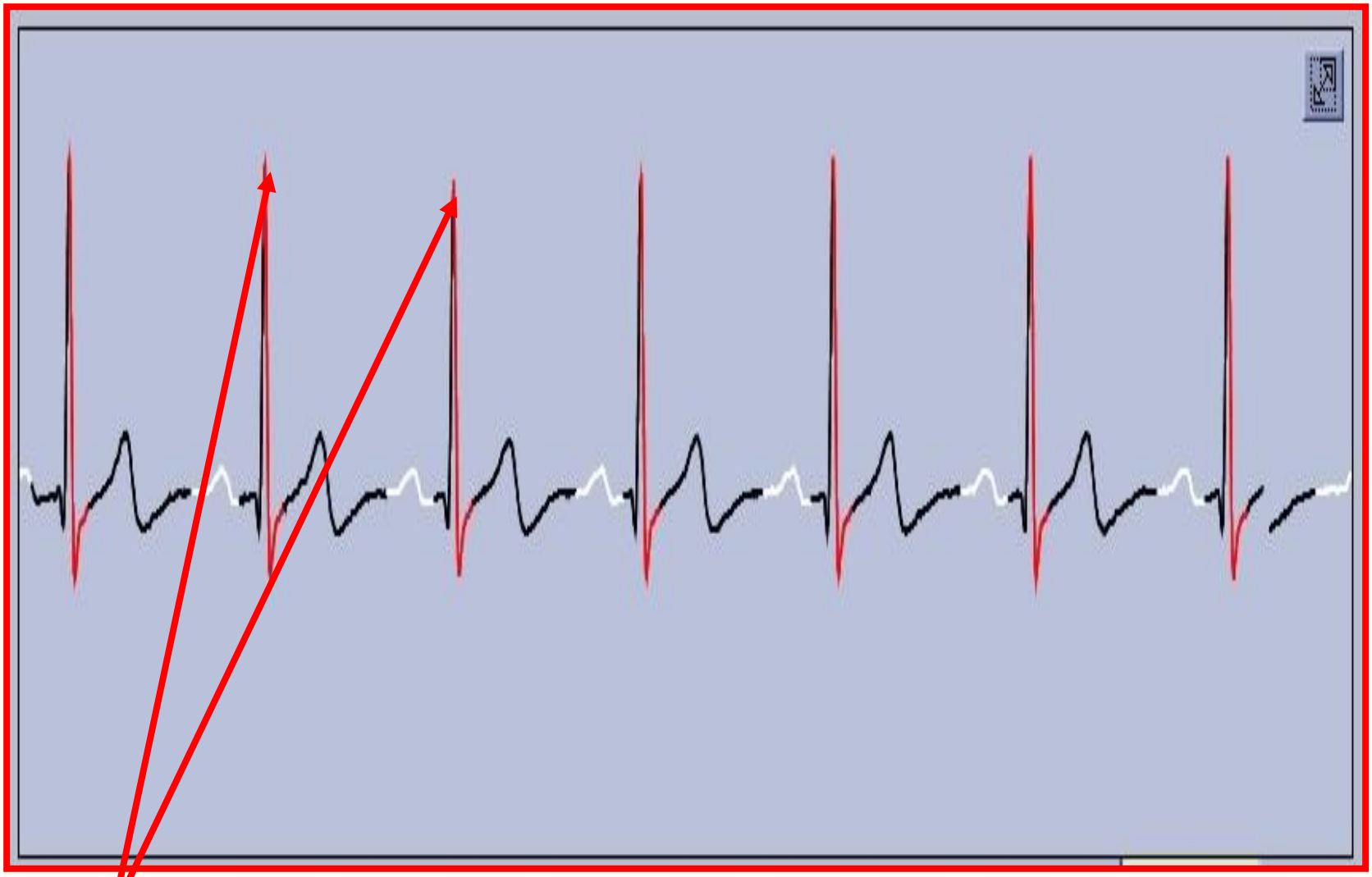
64 Cardiac MSCT

SS Segment 45 – 70 BPM 0.625mm

Scan Type	Scout
Num. Scout	2
Start Loc.	S 60.00
End Loc.	I 300.00
kV	120
mA	10
Scan Type	Cardiac
Rotation Time	0.35
Cardiac Mode	Snap Shot Segment(Helical)
Detector Coverage	40.0mm
Helical Thickness	0.625
Gantry Tilt	S 0.0S
FOV	Cardiac Large
kV	120
mA	EKG Modulated mA
Total Exposure Time	12.6
Prep Group	Smart Prep
Interval	0.625

64 Cardiac MSCT - Scout

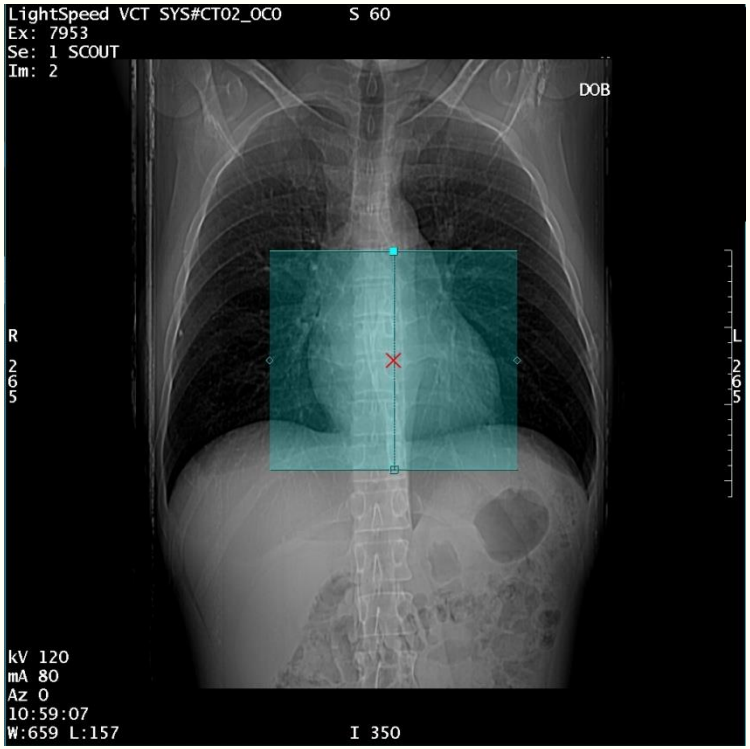


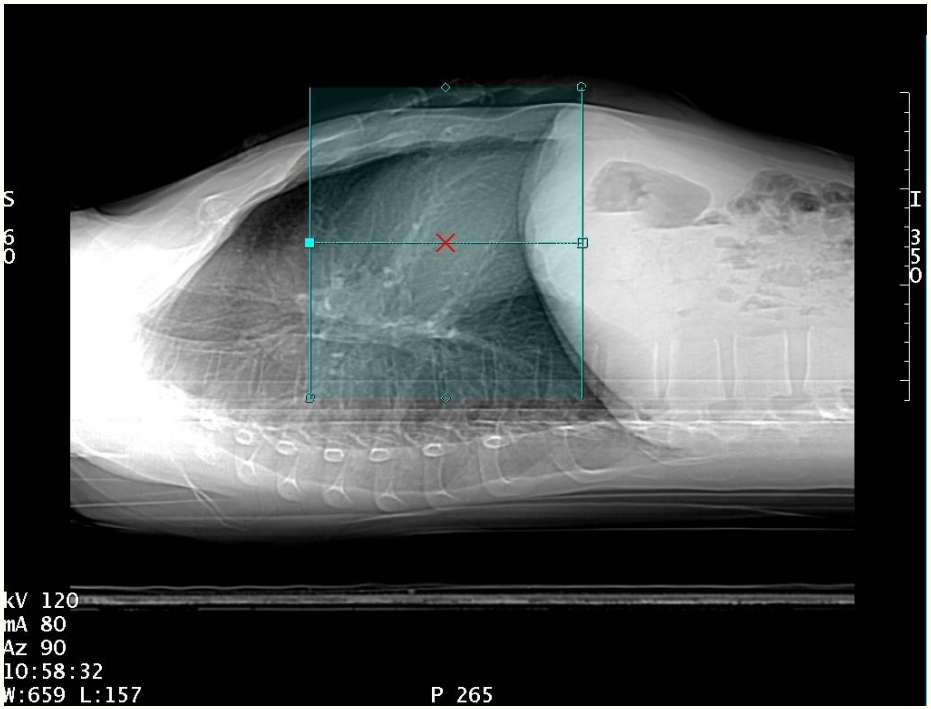


- R-R peak

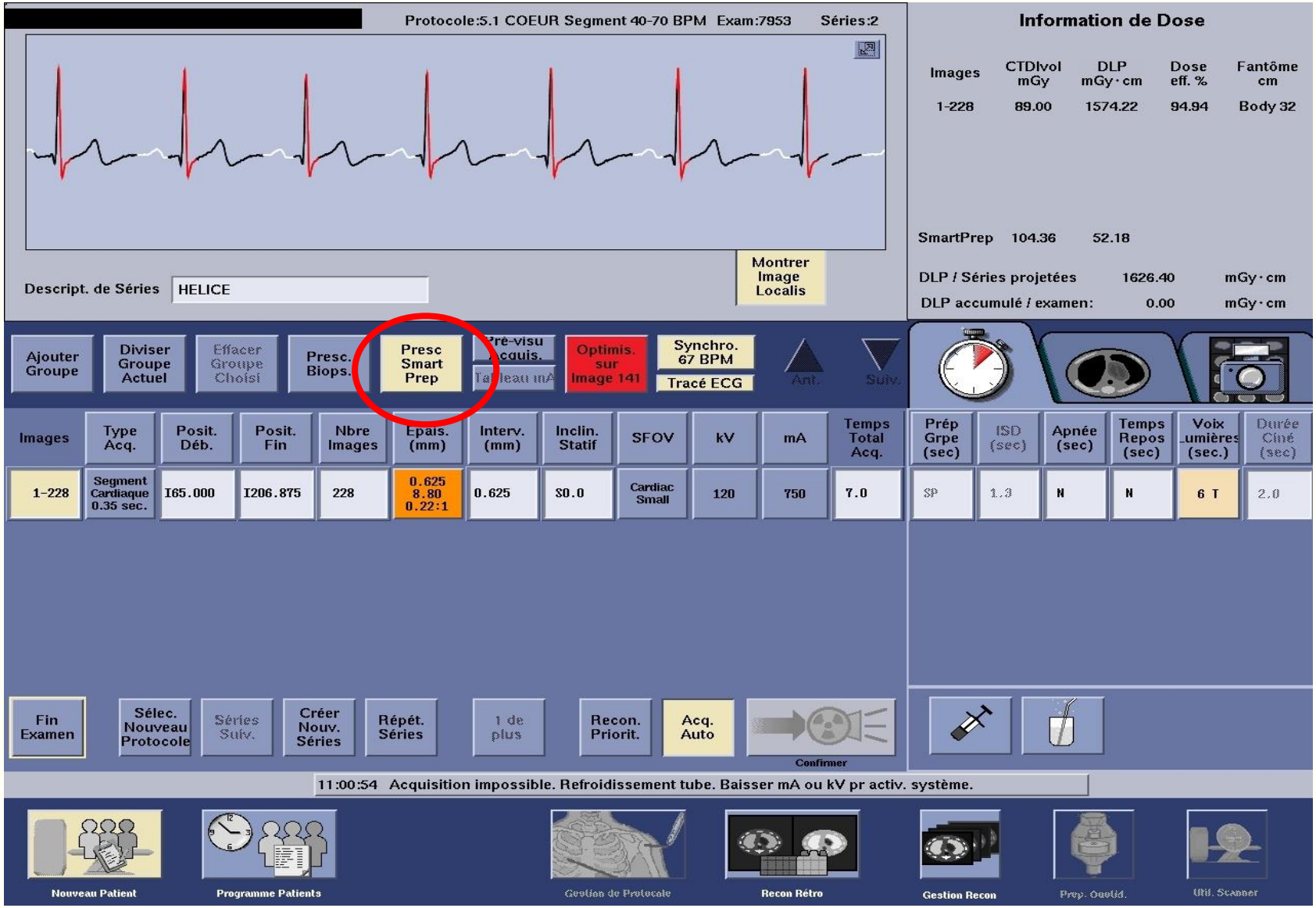
64 Cardiac MSCT

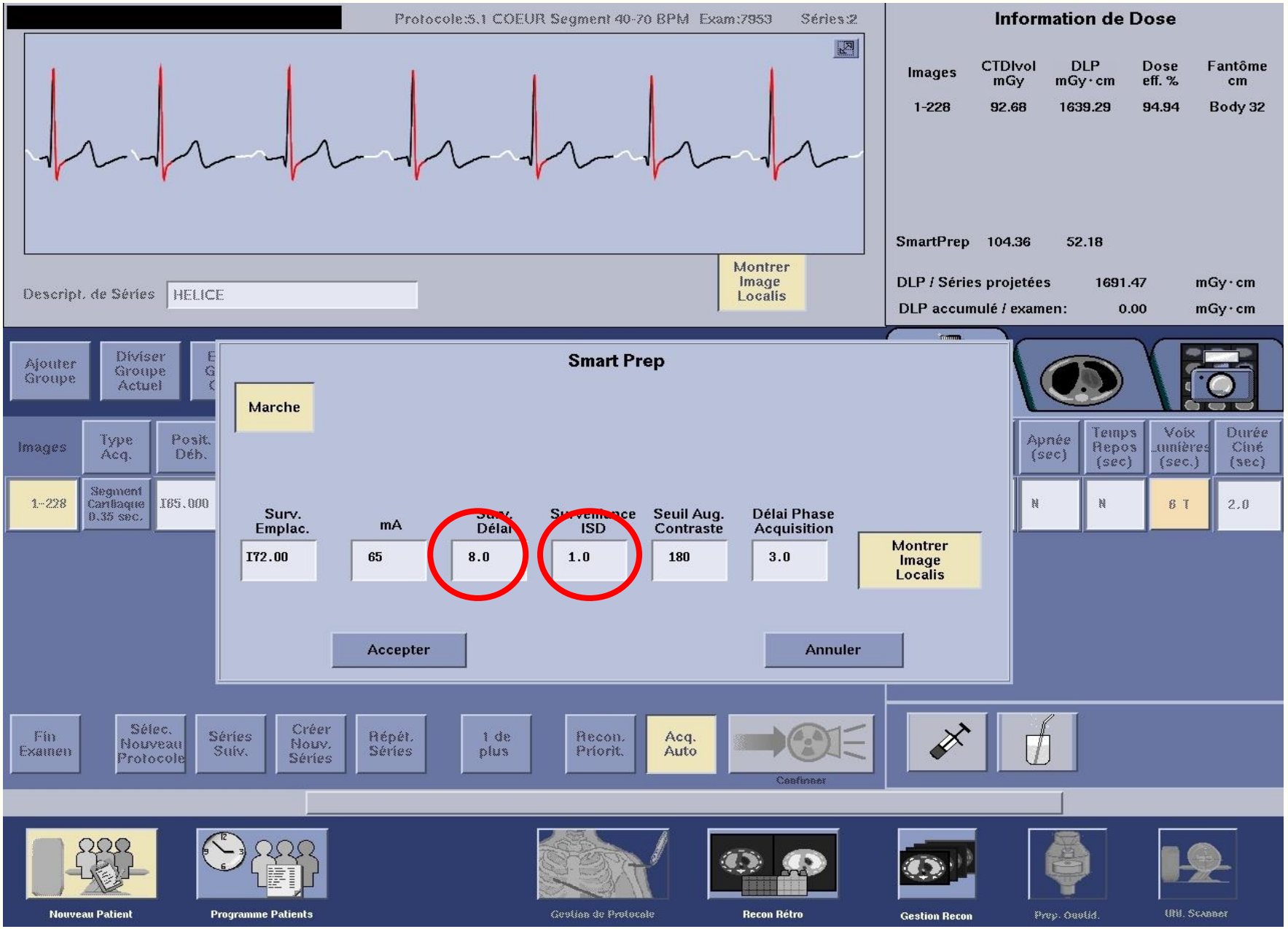
- Setting the acquisition field of the patient's scout



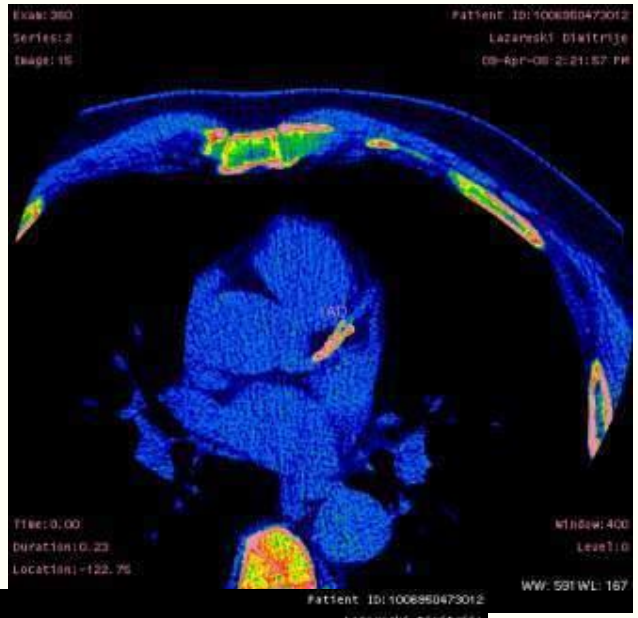


64 Cardiac MSCT - Positioning the reference image on the Smart Prep

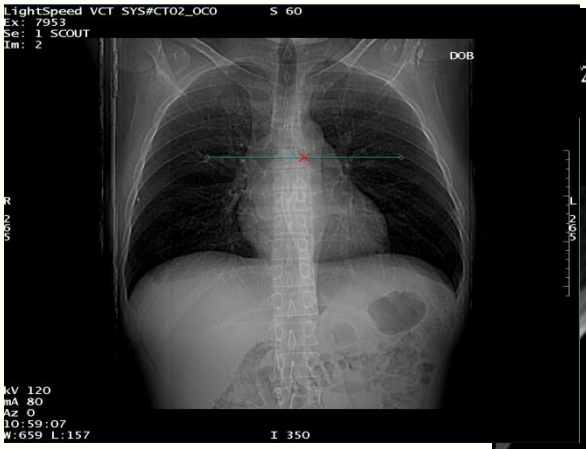



Protocole:5.1 COEUR Segment 40-70 BPM Exam:7953 Séries:2
Information de Dose
Images CTDIvol mGy DLP mGy·cm Dose eff. % Fantôme cm
1-228 92.68 1639.29 94.94 Body 32
SmartPrep 104.36 52.18
DLP / Séries projetées 1691.47 mGy·cm
DLP accumulé / examen: 0.00 mGy·cm
Descript. de Séries HELICE
Montrer Image Localis
Smart Prep
Marche
Surv. Emplac.
mA
Surv. Délai
Surveillance ISD
Seuil Aug. Contraste
Délai Phase Acquisition
I72.00
65
8.0
1.0
180
3.0
Montrer Image Localis
Accepter
Annuler
Ajouter Groupe
Diviser Groupe Actuel
Images
Type Acq.
Posit. Déb.
1-228
Segment Cardiaque 0.35 sec.
I65.000
Apnée (sec)
Temps Repos (sec)
Voix Lumières (sec.)
Durée Ciné (sec)
N
N
8 T
2.0
Fin Examen
Sélec. Nouveau Protocole
Séries Suiv.
Créer Nouv. Séries
Répét. Séries
1 de plus
Recon. Priorit.
Acq. Auto
Confirmer
Nouveau Patient
Programme Patients
Gestion de Protocole
Recon Rétro
Gestion Recon
Prep. Oauld.
Util. Scanner

64 Cardiac MSCT
- Ca scoring

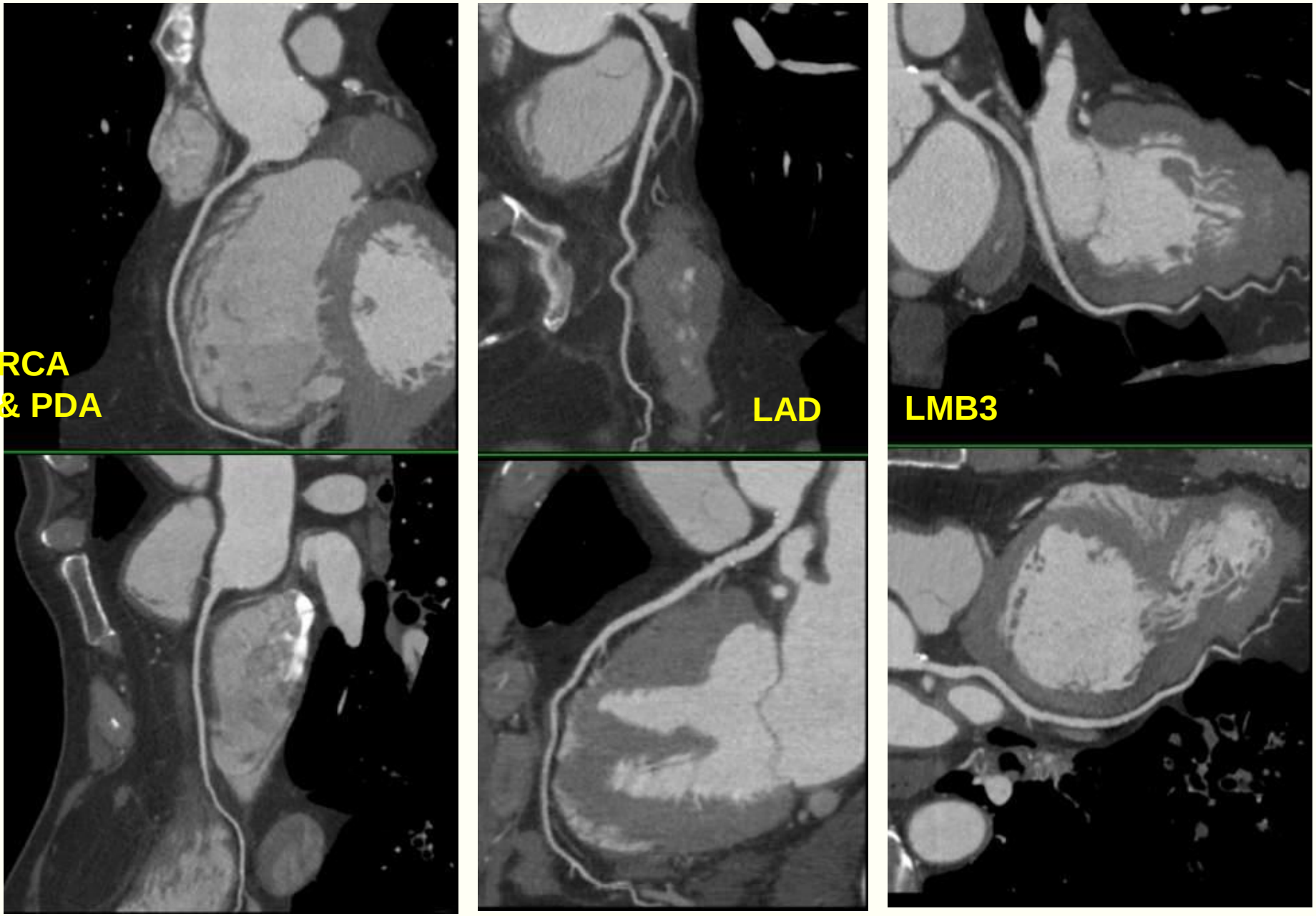


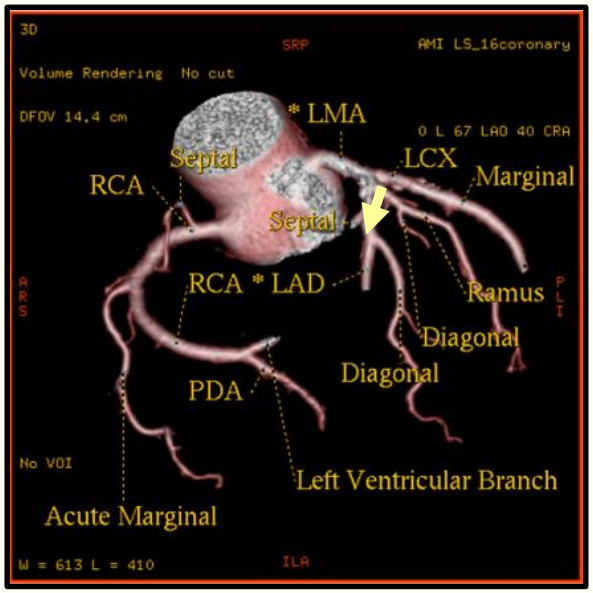
64 Cardiac MSCT - Producing Timing Graph

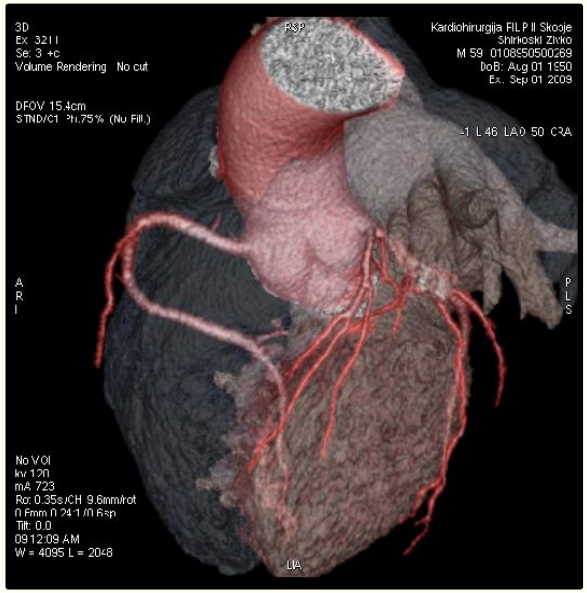


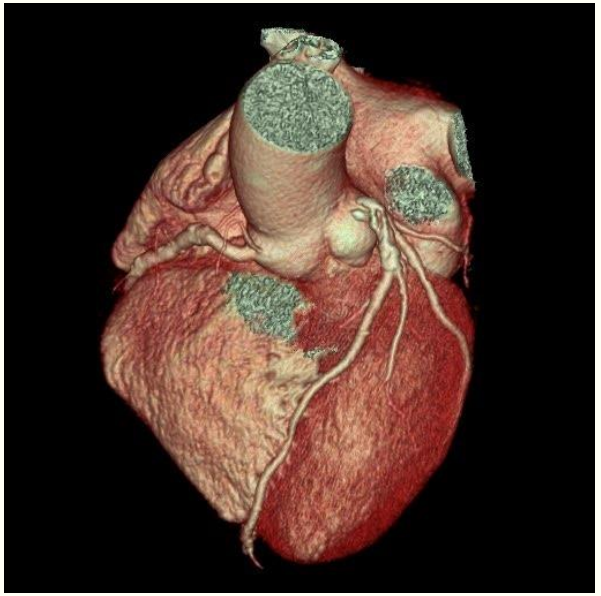
ROI on Aorta

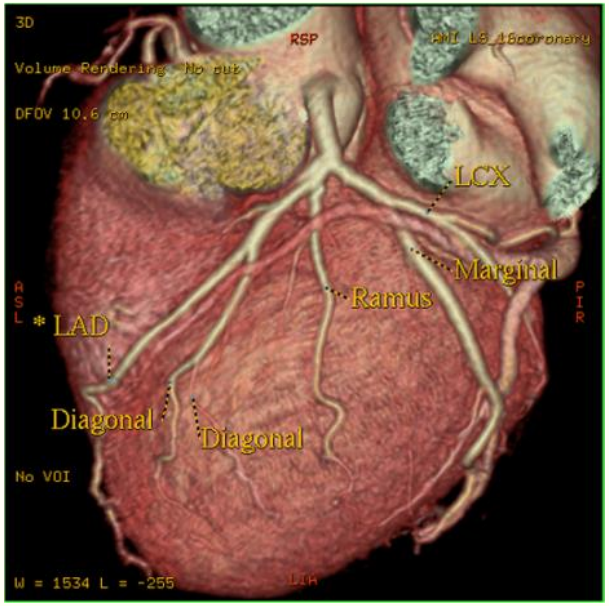
In our hospital we use the "**smart prep**" option (setting the localizer 2cm above the carina - the point for extrapolating similar slices in predetermined intervals and for observing the concentration of the contrast material in the ascending aorta)

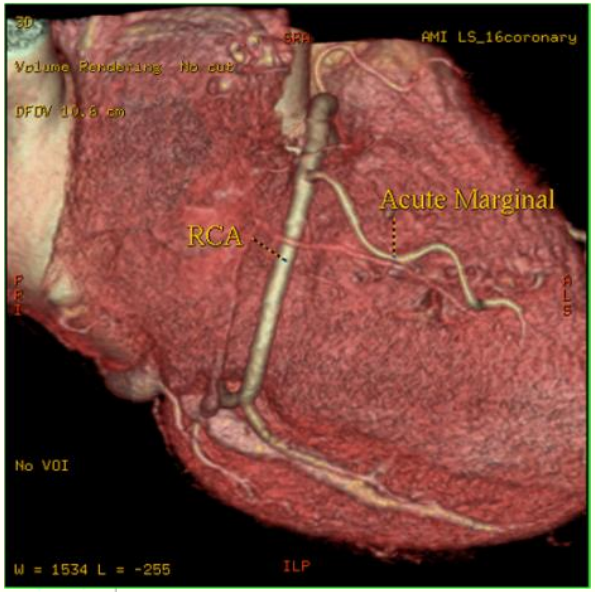

RCA
& PDA
LAD
LMB3


3D
SRP
AMI LS_16coronary
Volume Rendering No cut
DFOV 14.4 cm
* LMA
0 L 67 LAO 40 CRA
Septal
LCX
Marginal
RCA
Septal
RCA * LAD
Ramus
Diagonal
Diagonal
PDA
No VOI
Left Ventricular Branch
Acute Marginal
W = 613 L = 410
ILA

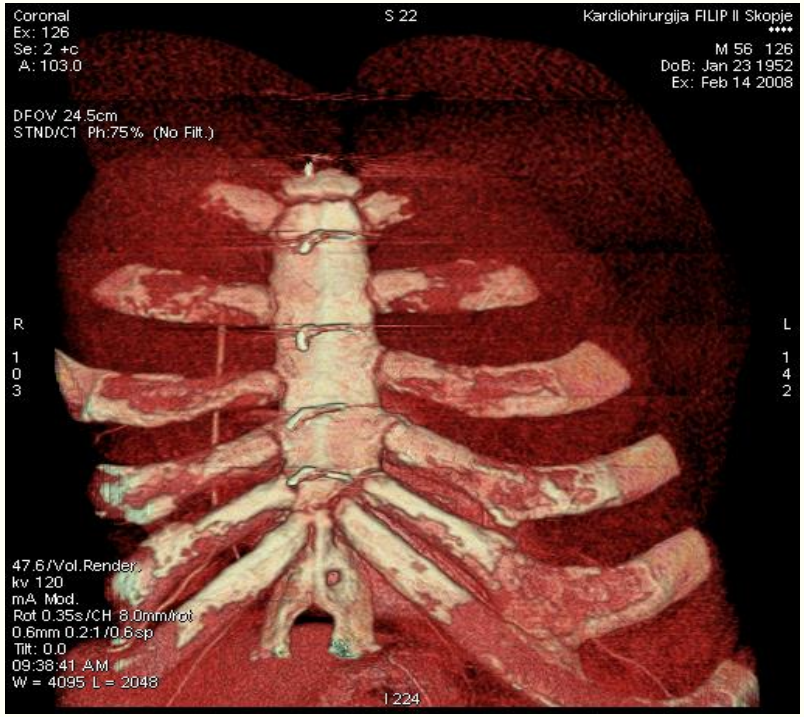

3D
Ex: 3211
Se: 3 +c
Volume Rendering No cut
Kardiohirurgija FILP II Skopje
Shirkoski Zhivko
M 59 0108950500269
DoB: Aug 01 1950
Ex. Sep 01 2009
DFOV 15.4cm
STND/C1 Pr75% (No Fill)
-1 L 46 LAO 50 CRA
No VOI
kv 120
mA 723
Rot 0.35s/CH 9.6mm/rot
Tilt: 0.0
09 12:09 AM
W = 4095 L = 2048
LPA

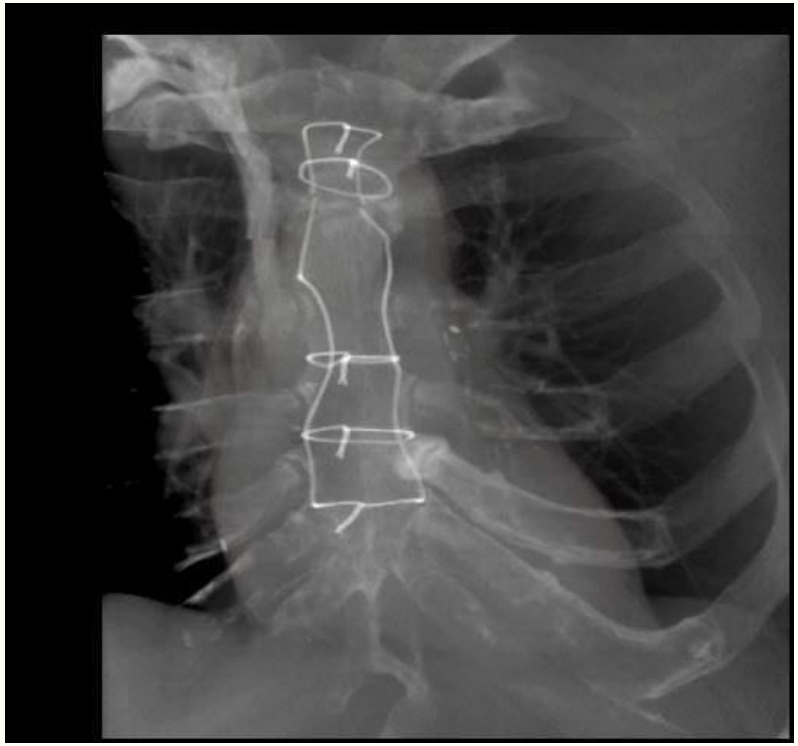



3D
RSP
AMI LS_16coronary
Volume Rendering No cut
DFOV 10.6 cm
LCX
Marginal
Ramus
* LAD
Diagonal
Diagonal
No VOI
W = 1534 L = -255
ILA


3D
SRP
AMI LS_16coronary
Volume Rendering No cut
DFOV 10.8 cm
Acute Marginal
RCA
No VOI
W = 1534 L = -255
ILP

64 Cardiac MSCT



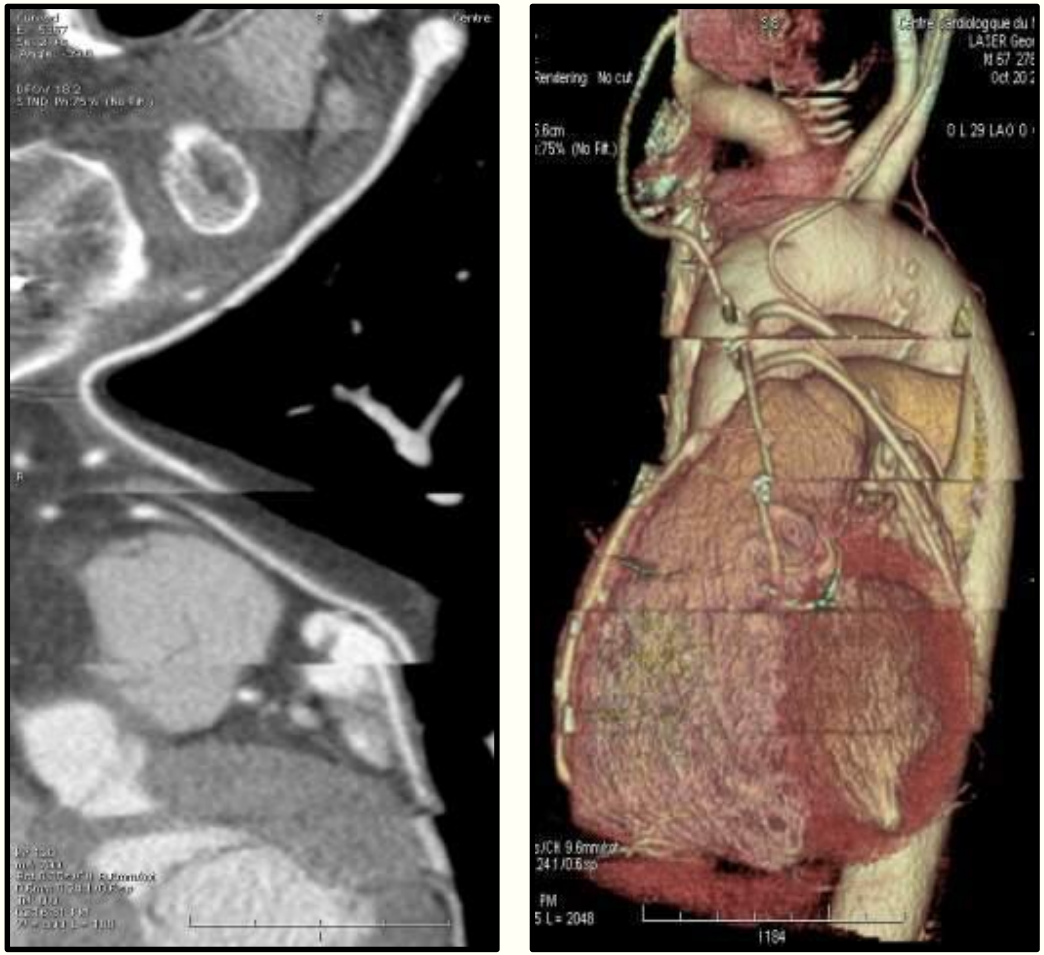


Coronary by-pass grafts

64 Cardiac MSCT - Results:

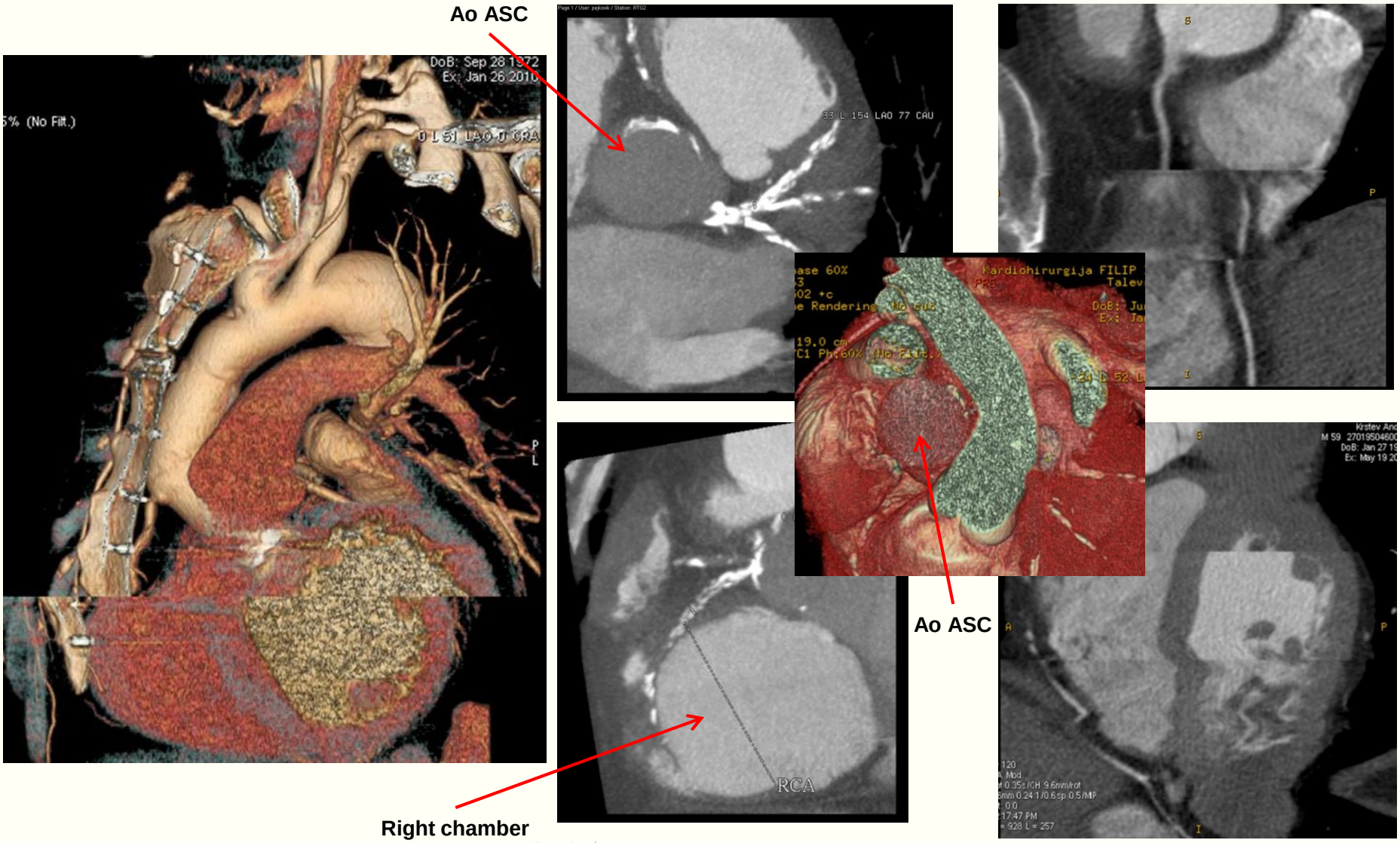
Out of 254 performed examinations :

- 48 (18,8%) - ***motion artifacts*** and high noise,
- In 10 (3,9%) - ***obesity*** of the patients,
- 11 (4,3%) CTA - ***breathing artifacts***,
- 9 (3,5%) ***non-optimal enhancement*** (early or late scanning),
- In 7 (2,7%) ***communication*** with the patients and
- In 11 (4,3%) - ***heart rate*** (over 80 BPM).



Breathing artifacts

Heart rate. Obesity. Non-optimal enhancement



64 Cardiac MSCT

- **Limitations:**
  - Heart frequency above 65-70 bpm
  - Uncooperative patient
  - Obese patients

- **Unwanted reactions**:
  - Extravasations of the contrast under the skin
  - Iodine allergy

- **Relative contraindications:**
  - Oversensitivity to the contrast material (premedication needed)
  - Arrhythmia

Conclusion

- *For a correct accomplishment of coronary CTA, the main goal is a good cooperation and communication with the patients in their preparation and during the examination.*

- *As well as a good educated technologist for correct following of the parameters (ECG triggering, optimal enhancement, scan delay)*