

New trends in X-ray and CT-scanning

Multislice and fast scanning

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THOMAS SKÅRUP KRISTENSEN, MD PH.D
DEPARTMENT OF RADIOLOGY,
RIGSHOSPITALET
COPENHAGEN UNIVERSITY HOSPITAL

Computed Tomography

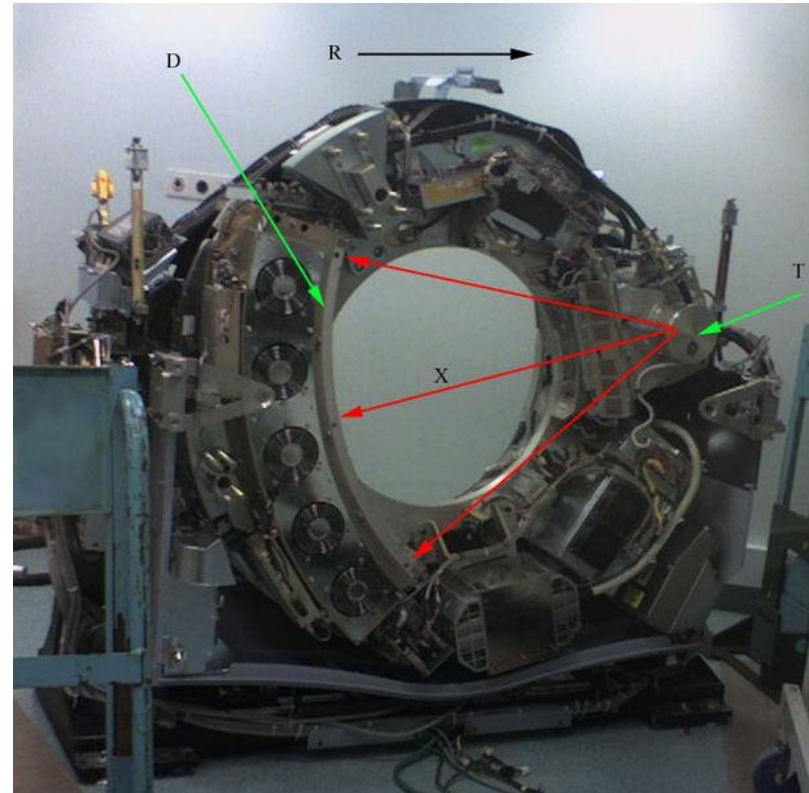
2

Tomografi:

X-ray tube and detector
Rotation around the patient

Computer:

Calculation of CT-values
(Hounsfield units)



- Sir Godfrey Hounsfield : first CT-scanner in 1972
- Nobels price in medicine in 1979 (together with Alan Cormack)

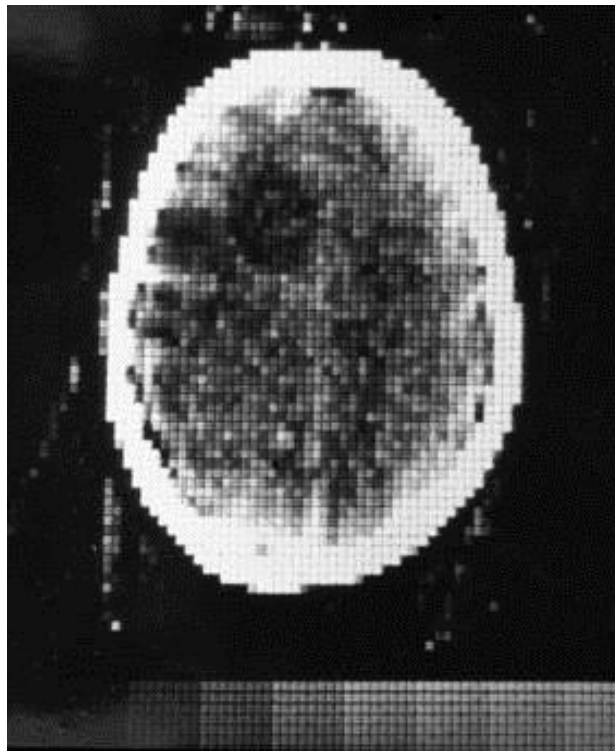


1972:

Rotationstid: 4min

Rekonstruktionstid:

"klar næste morgen"

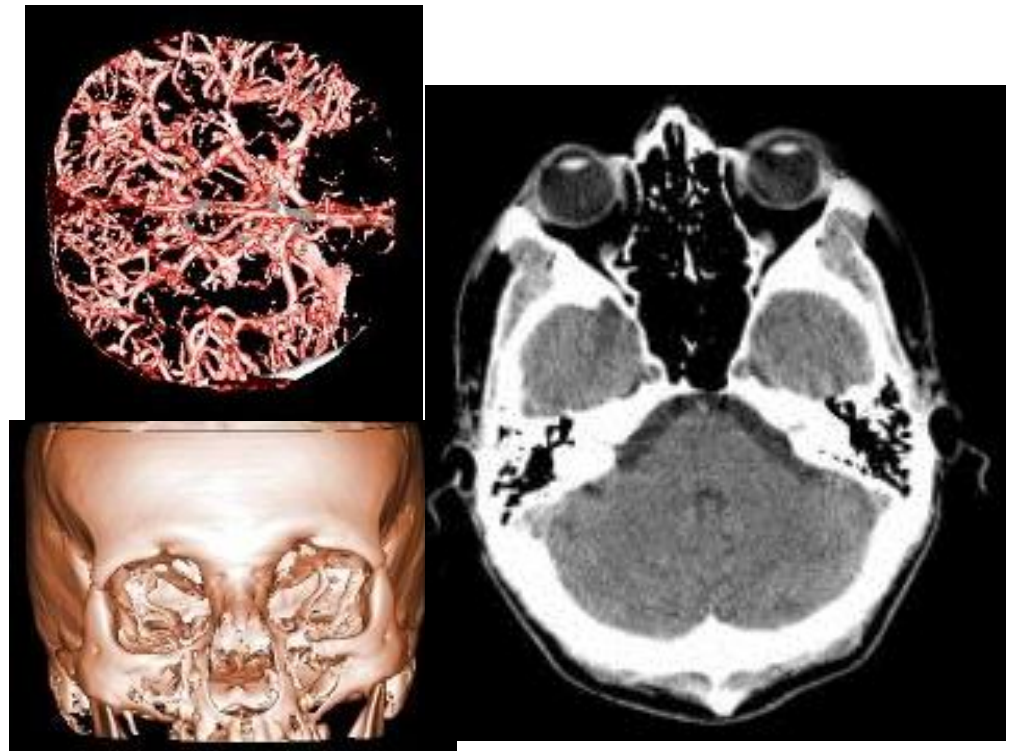


2014:

Rotationstid: 0.27 s

Rekonstruktionstid:

" få sekunder "



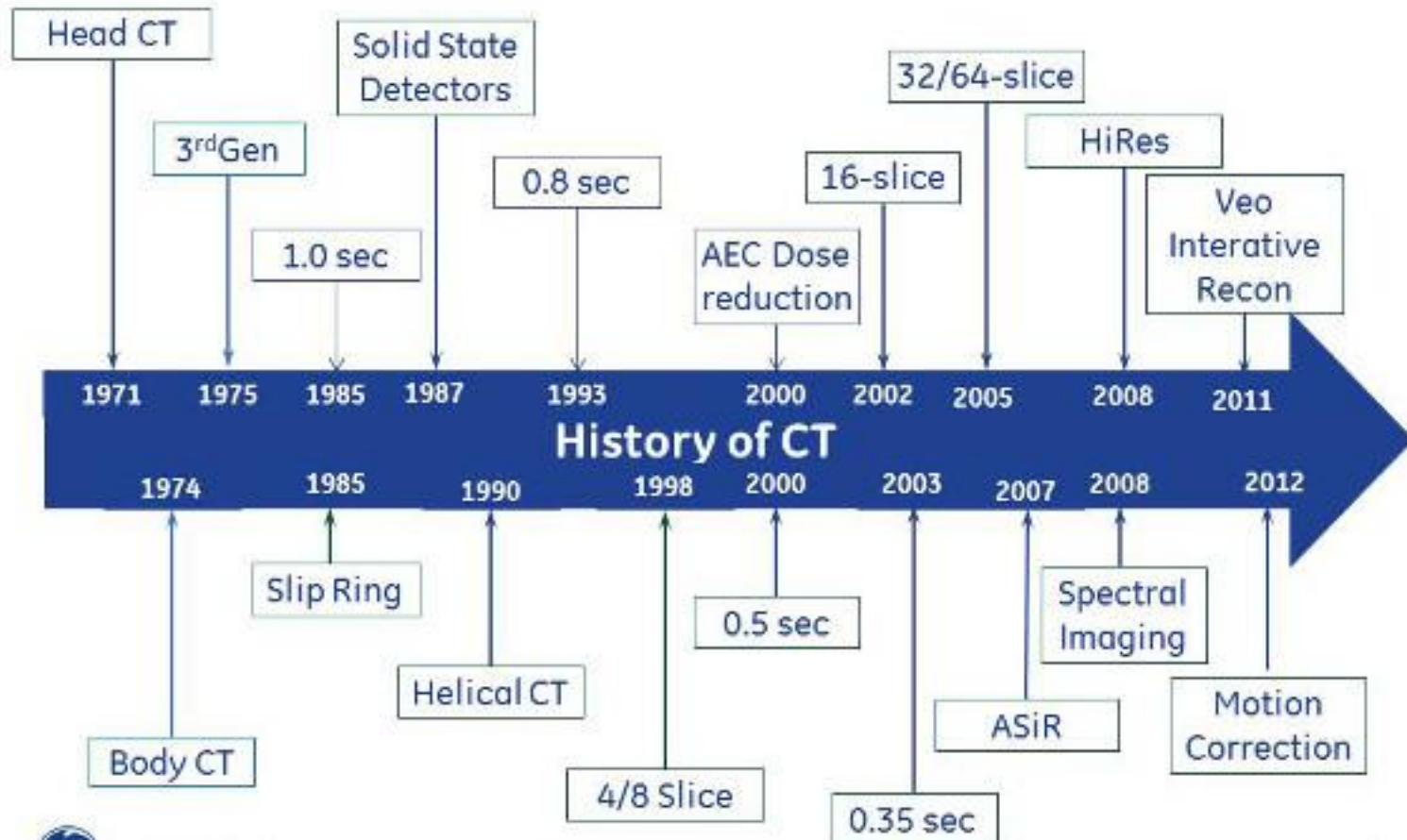
- **Fast CT**

- Timing of contrast
- No breathing artefacts
- Reduction of motion artefacts (pulsation, breathing...)

- **Spatial resolution**

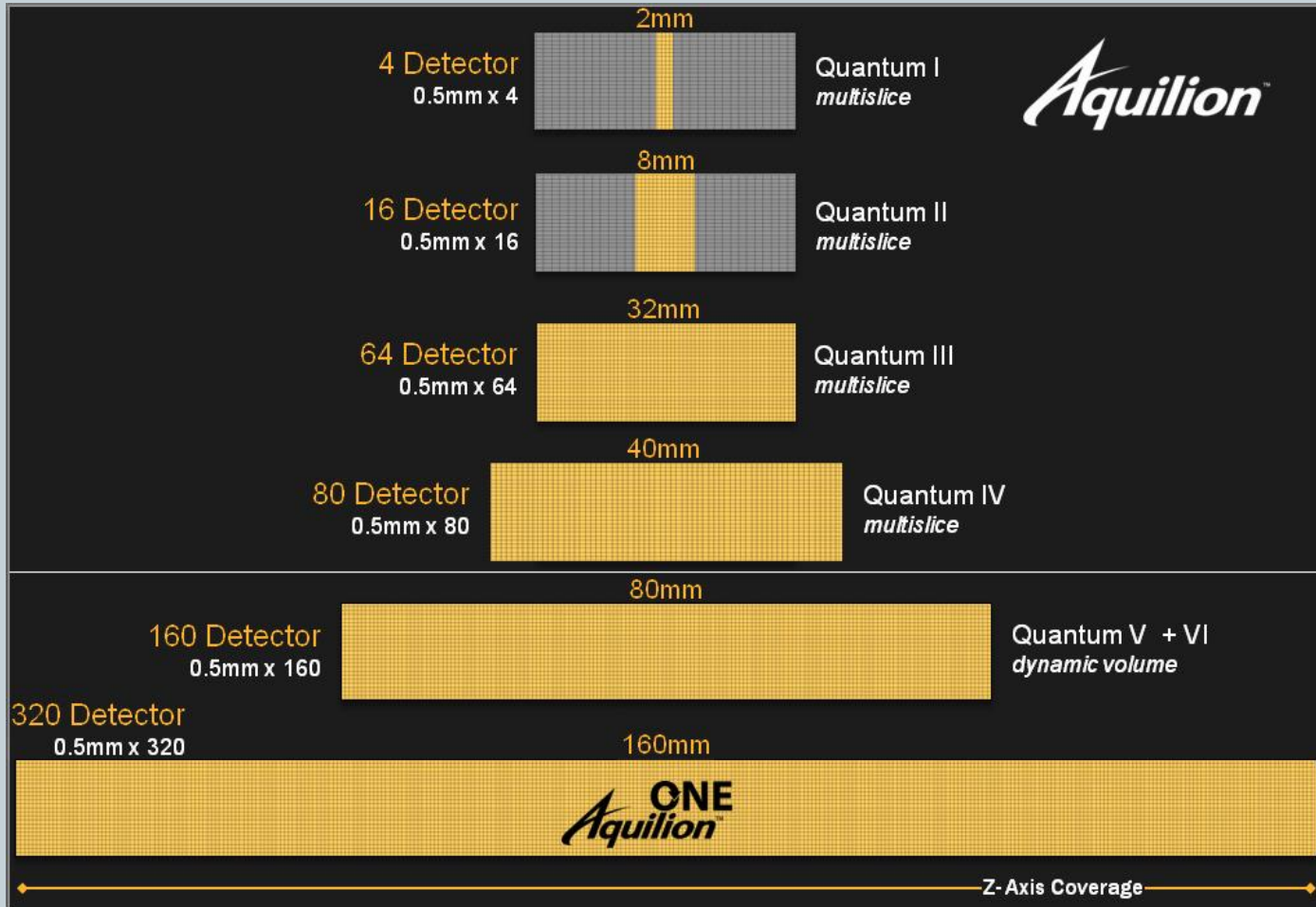
- Visualization of small structures with high resolution in all planes (X-Y-Z)

Timeline of CT



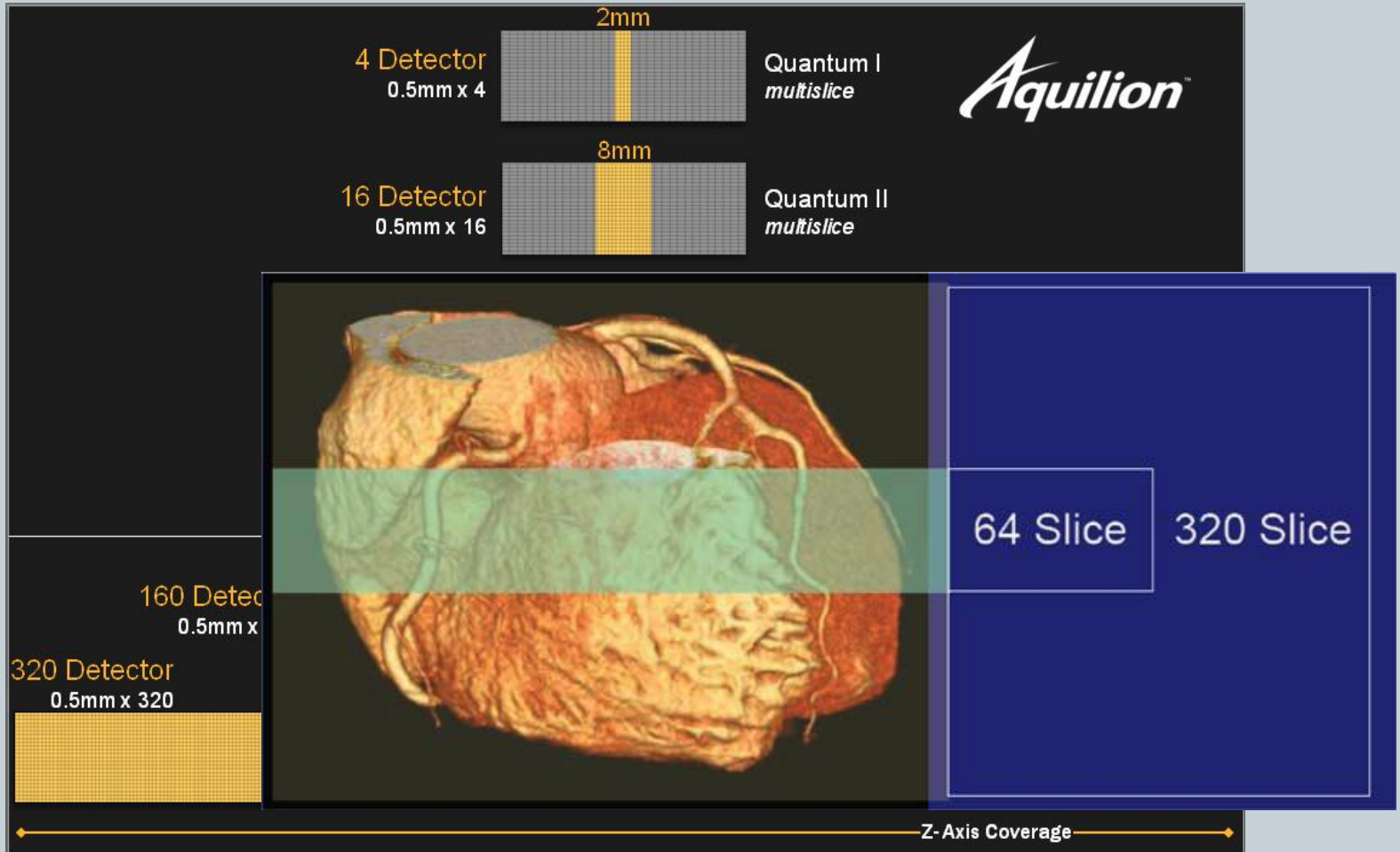
Multidetector CT/multislice CT (MDCT/MSCT)

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Multidetector CT/multislice CT (MDCT/MSCT)

8



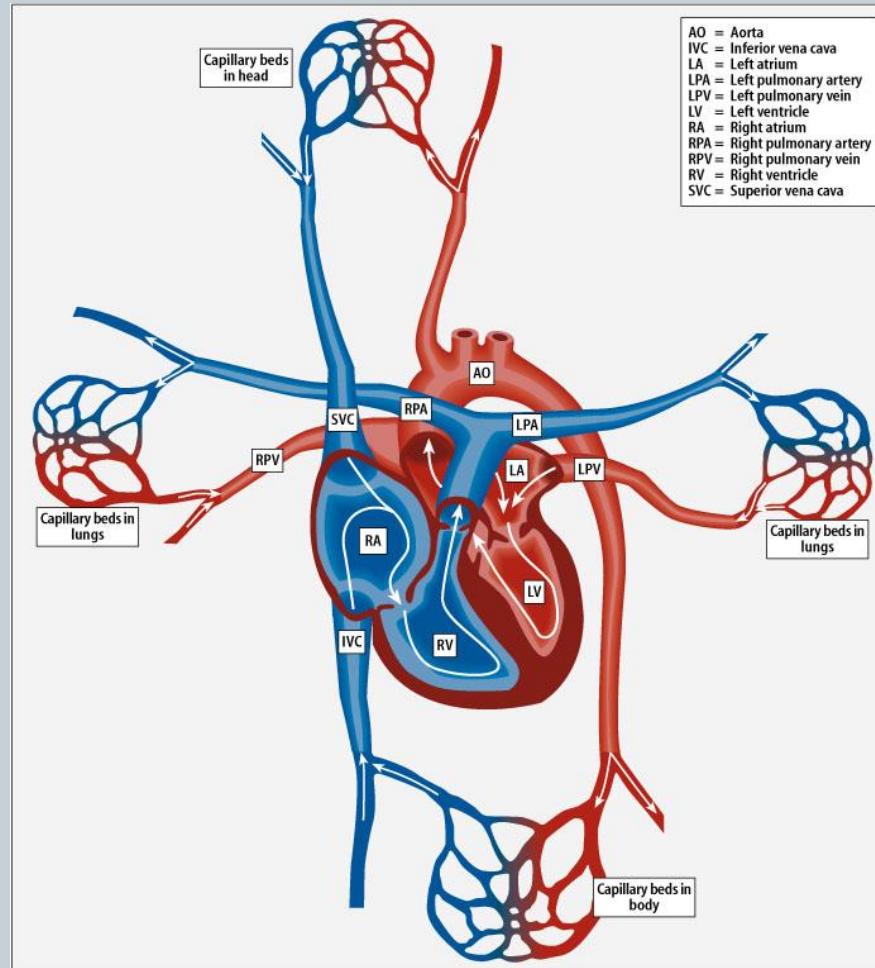
MDCT

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- Submillimeter resolution in all planes
Isotropic imaging of larger volumes with an acceptable scantime
- Imaging of one or more contrast phases
(non-contrast, arterial, venous, wash-out)

Contrast injection

10



MDCT – performance (64-slice)

11

- High spatial resolution (0.5mm x 0.5mm x 0.5 mm)
- Coverage: 3,2 – 4 cm per rotation
- High temporal resolution (175 ms)
(rotation time/2)
- Scantime:
 - Heart: 10 sec (320 slice: 135 ms)
 - Thorax and abdomen: 20 sec

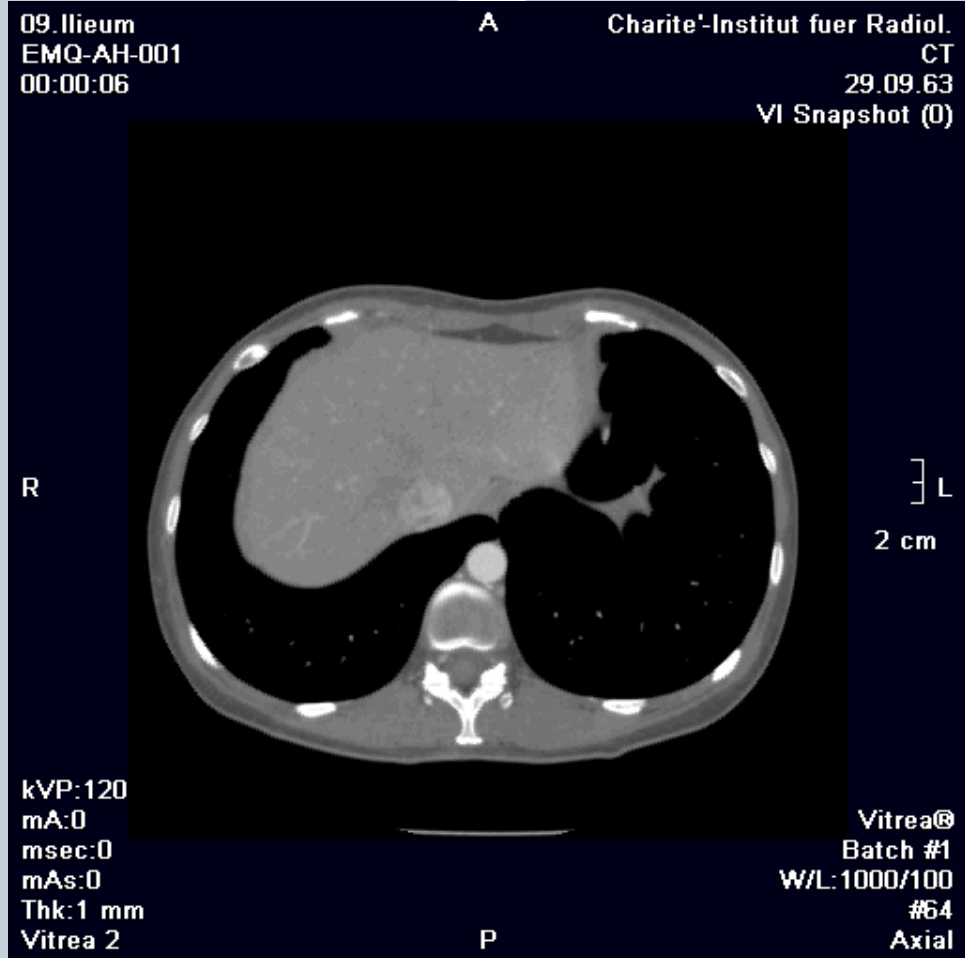
Clinical examples

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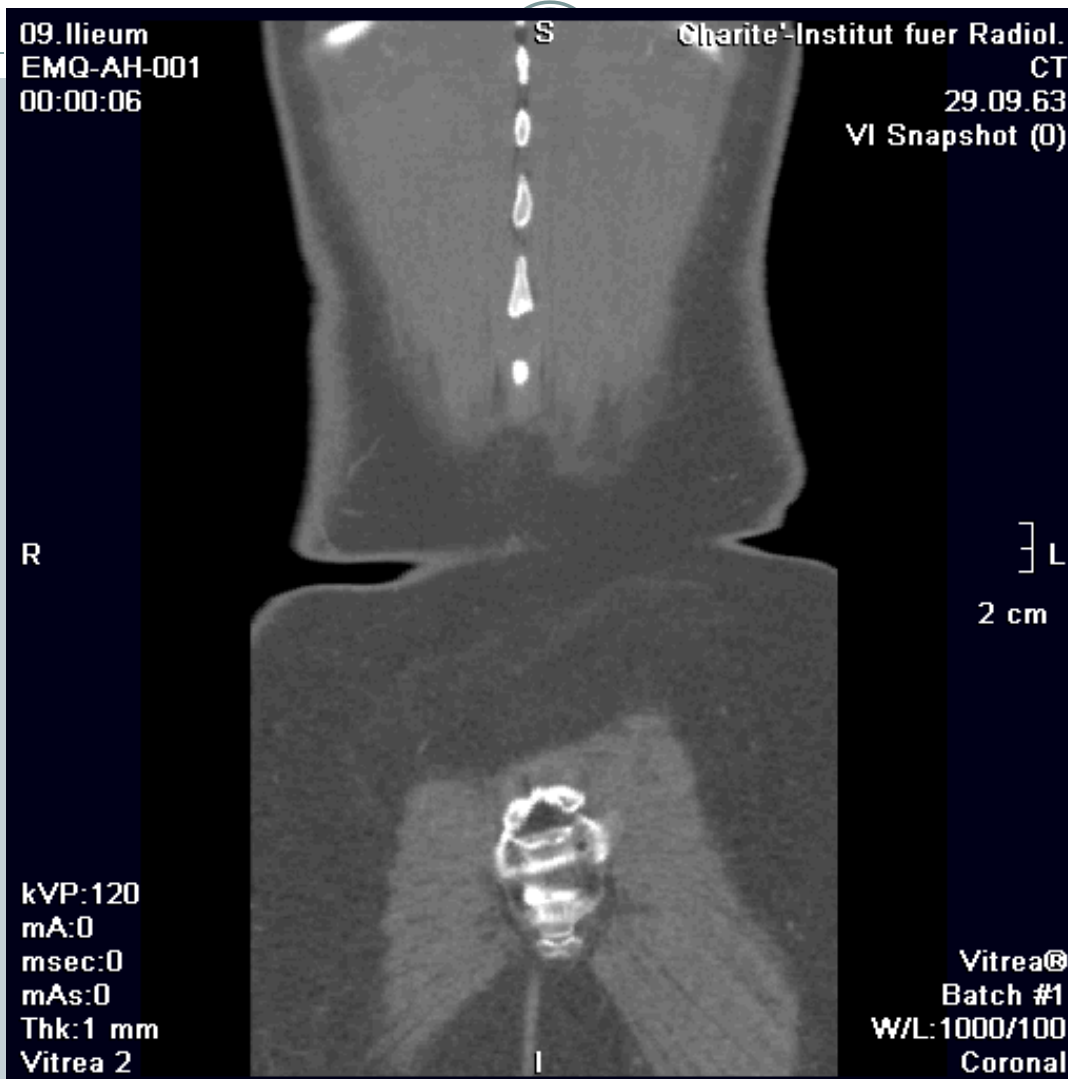
- Oncology
- Angiography
- CT of the urinary system
- CT of the abdomen
- Traumapatienten

Abdomen

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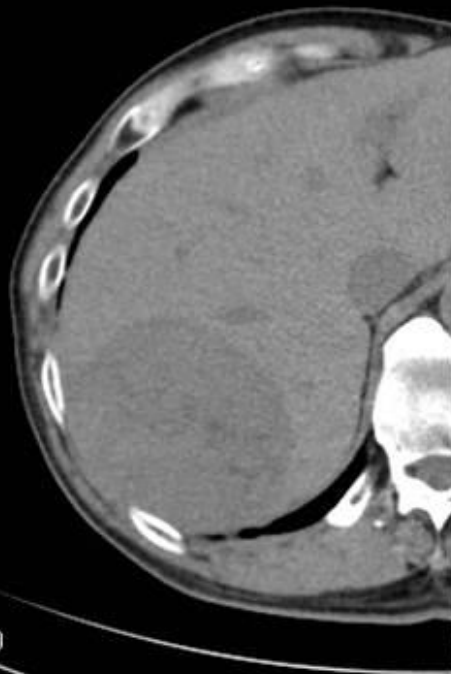
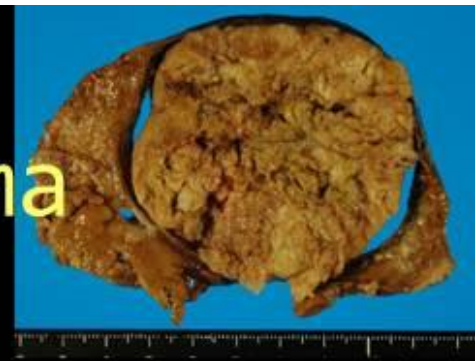


Abdomen

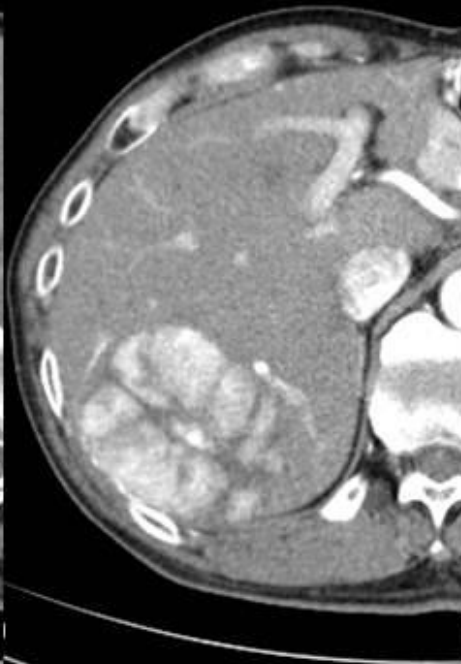


Hepatocellular Carcinoma

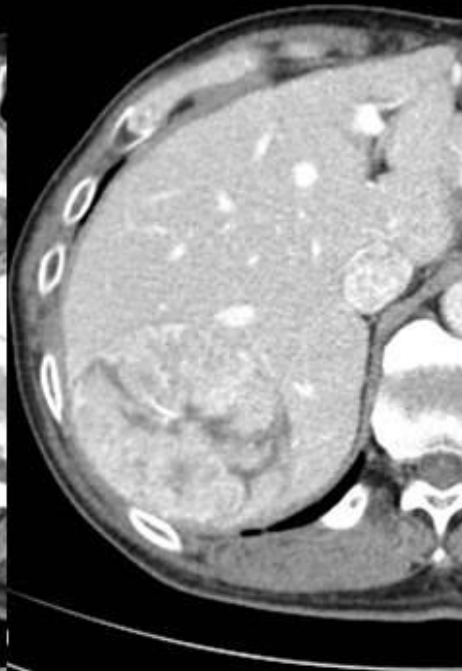
Moderately differentiated hepatocellular carcinoma



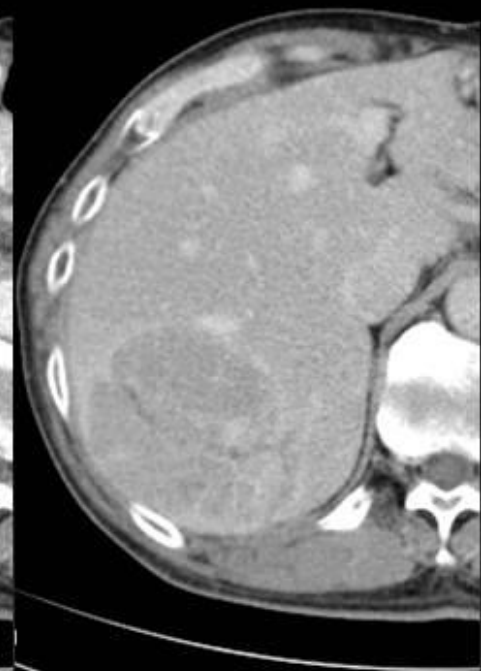
Plain



Arterial phase

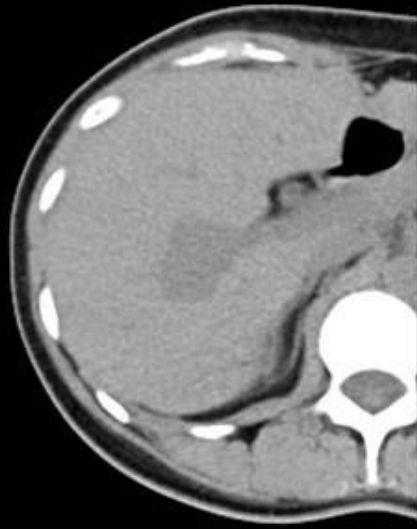


Portal phase

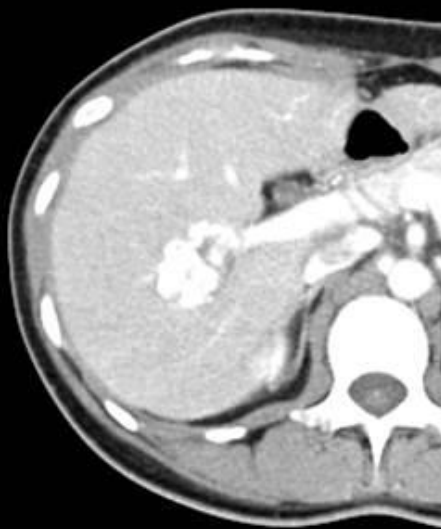


Equilibrium phase

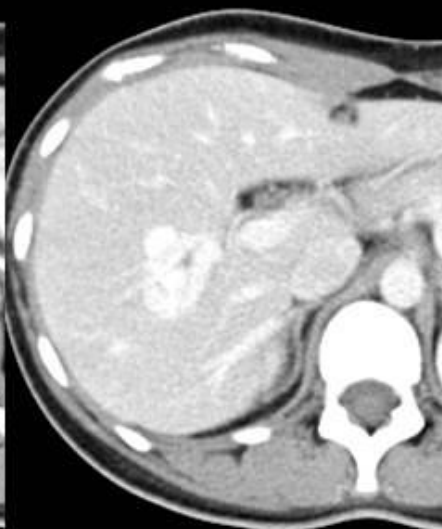
Hepatic hemangioma



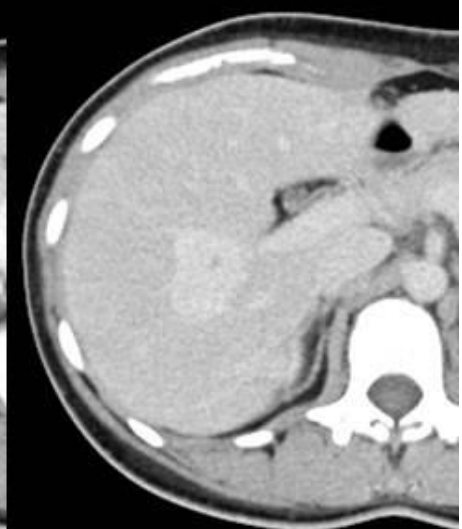
Plain



Arterial phase



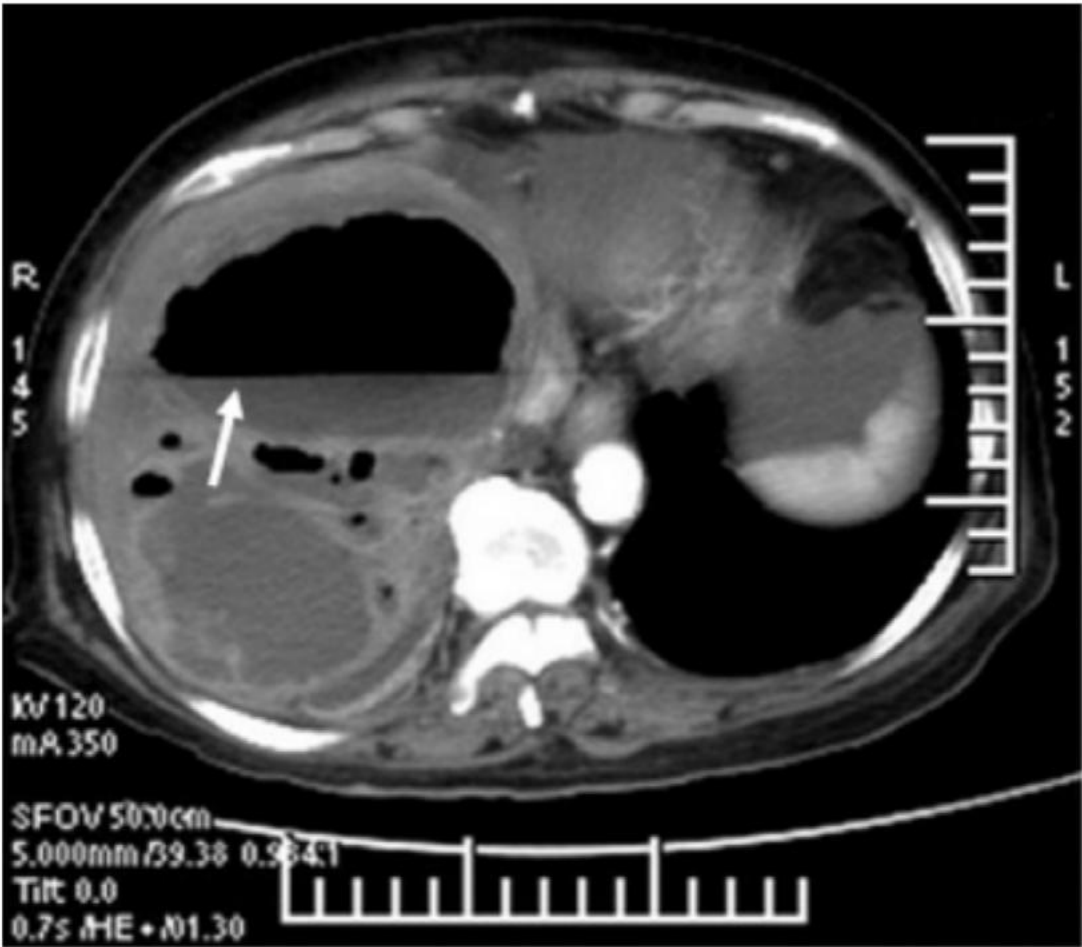
Portal phase



Equilibrium phase

Liver abscess

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Angiography

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- Stenosis
- Rupture
- Thrombosis
- Aneurismes
- Growth of tumors around/in to vessels

Angiography

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- Fast scantime to "catch" the contrast in the right phase.
- High spatial resolution
- High temporal resolution (movement)

Angiography



14. Carotis stenosis left
JM32-NH-001
Age:79 years
F
17 Nov 2003
13:39:02

S

FUJITA_HEALTH_UNIV.
CT
2-4

R

L

kVP:135
mA:260
msec:500
mAs:130
Thk:1 mm
Aquilion
Orient: 6°,10°,-1°

Vitreax®
W/L:223/-805
Segmented
Vessel 1



14.Carotis stenosis left
JM32-NH-001
Age:79 years
F
17 Nov 2003
13:39:02

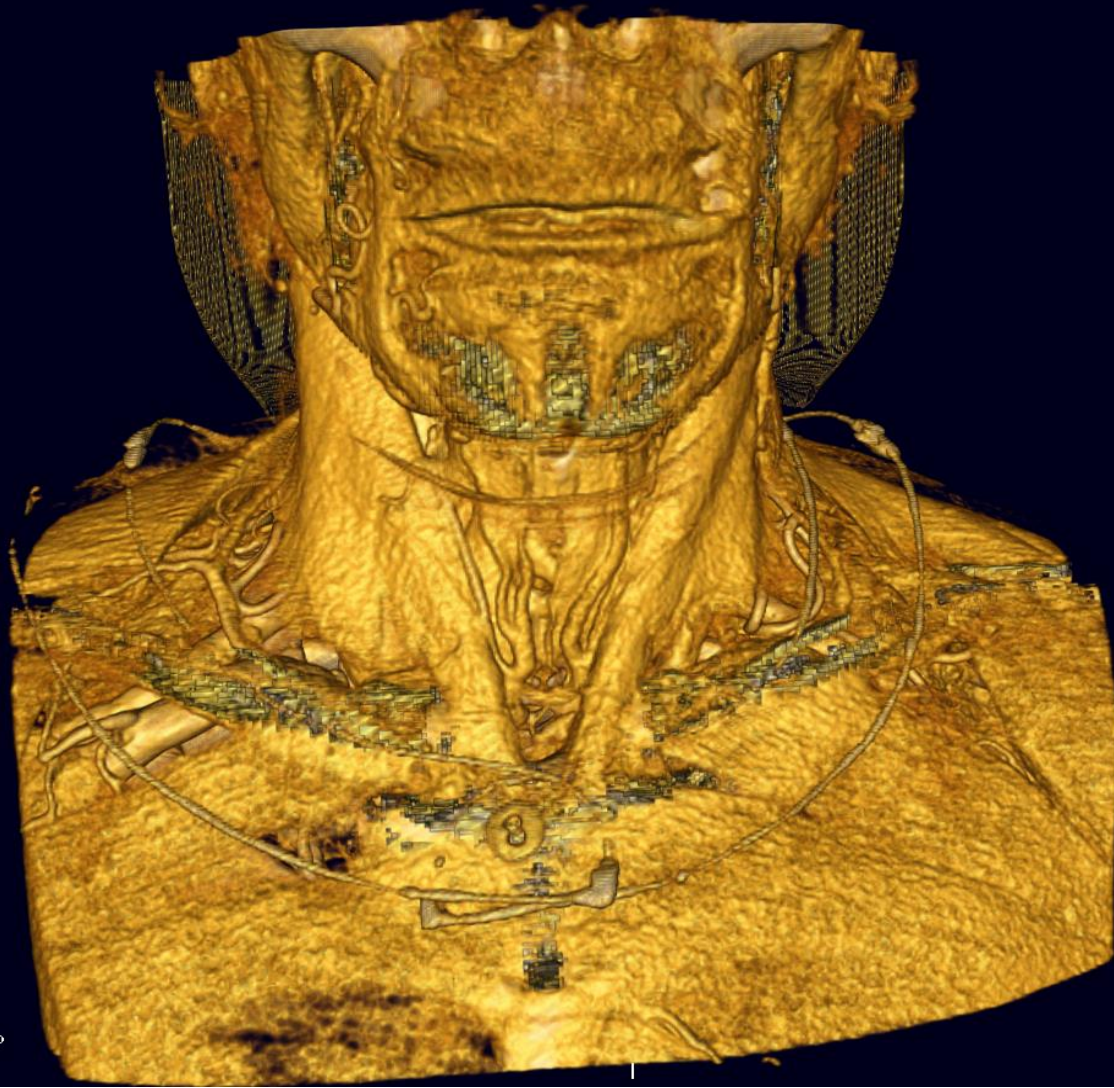
S

FUJITA_HEALTH_UNIV.
CT
2-4

R

L

KVP:135
mA:260
msec:500
mAs:130
Thk:1 mm
Aquilion
Orient: 6°,10°,-1°



Vitrea®
W/L:225/59
Segmented
Vessel 1

14.Carotis stenosis left
JM32-NH-001
Age:79 years
F
17 Nov 2003
13:39:02

S

FUJITA_HEALTH_UNIV.
CT
2-4

R

L

kVP:135
mA:260
msec:500
mAs:130
Thk:1 mm
Aquilion
Orient: 6°,10°,-1°



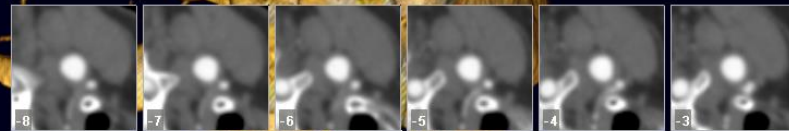
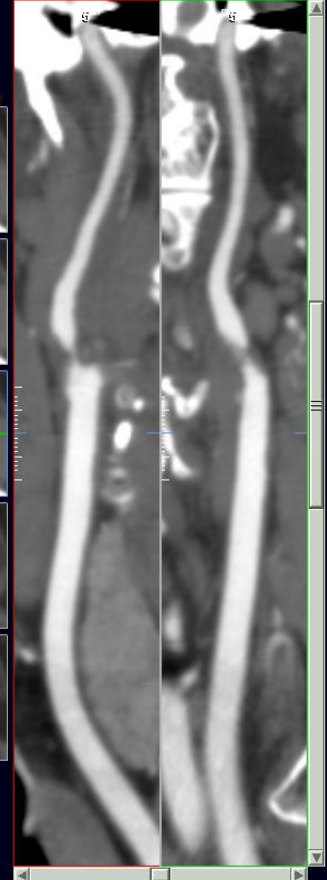
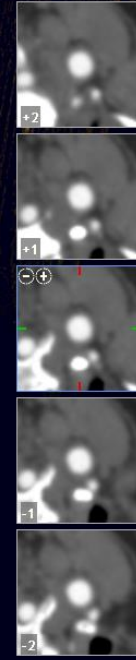
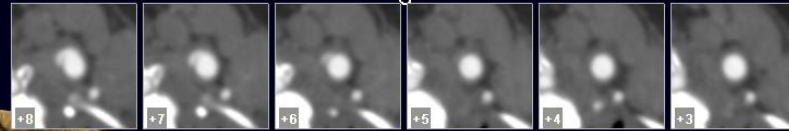
Vitrea®
W/L:227/160
Segmented
Vessel 1

14.Carotis stenosis left
JM32-NH-001
Age:79 years
F
17 Nov 2003
13:39:02

FUJITA_HEALTH_UNIV.
CT
2-4

A

kVP:135
mA:260
msec:500
mAs:130
Thk:1 mm
Aquilion
Orient: -69°,14°,9°



Vitrea®
W/L:227/160
Segmented
Vessel 2

14.Carotis stenosis left
JM32-NH-001
Age:79 years
F
17 Nov 2003
13:39:02

S

FUJITA_HEALTH_UNIV.
CT
2-4

A

P

kVP:135
mA:260
msec:500
mAs:130
Thk:1 mm
Aquilion
Orient: -58°,9°,13°

Vitrea®
W/L:227/160
Segmented
Vessel 2

24., Aorta Fem Runoff to feet
Mater H QLD 3
Age:83
F
29 Sep 2005
13:35:16

QLD XRAY - Mater Townsville
CT
/Vol./VISIPAQUE/FC03/Q06/

L

R

kVP:120
mA:80
msec:500
mAs:40
Thk:1 mm
Aquilion
Orient: -180°,0°,0°

Vitrea®
W/L:325/270
Segmented



24., Aorta Fem Runoff to feet
Mater H QLD 3
Age:83
F
29 Sep 2005
13:35:16

S
QLD XRAY - Mater Townsville
CT
/Vol./VISIPAQUE/FC03/Q06/

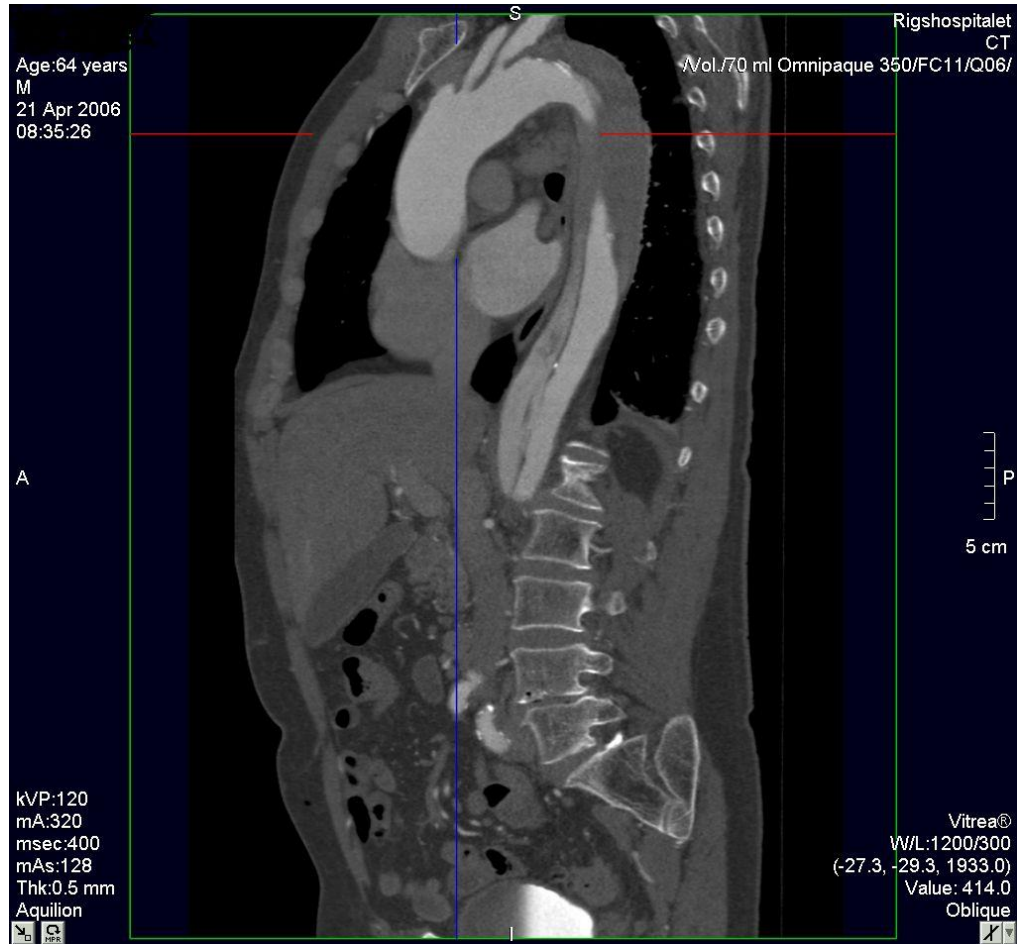
R

L

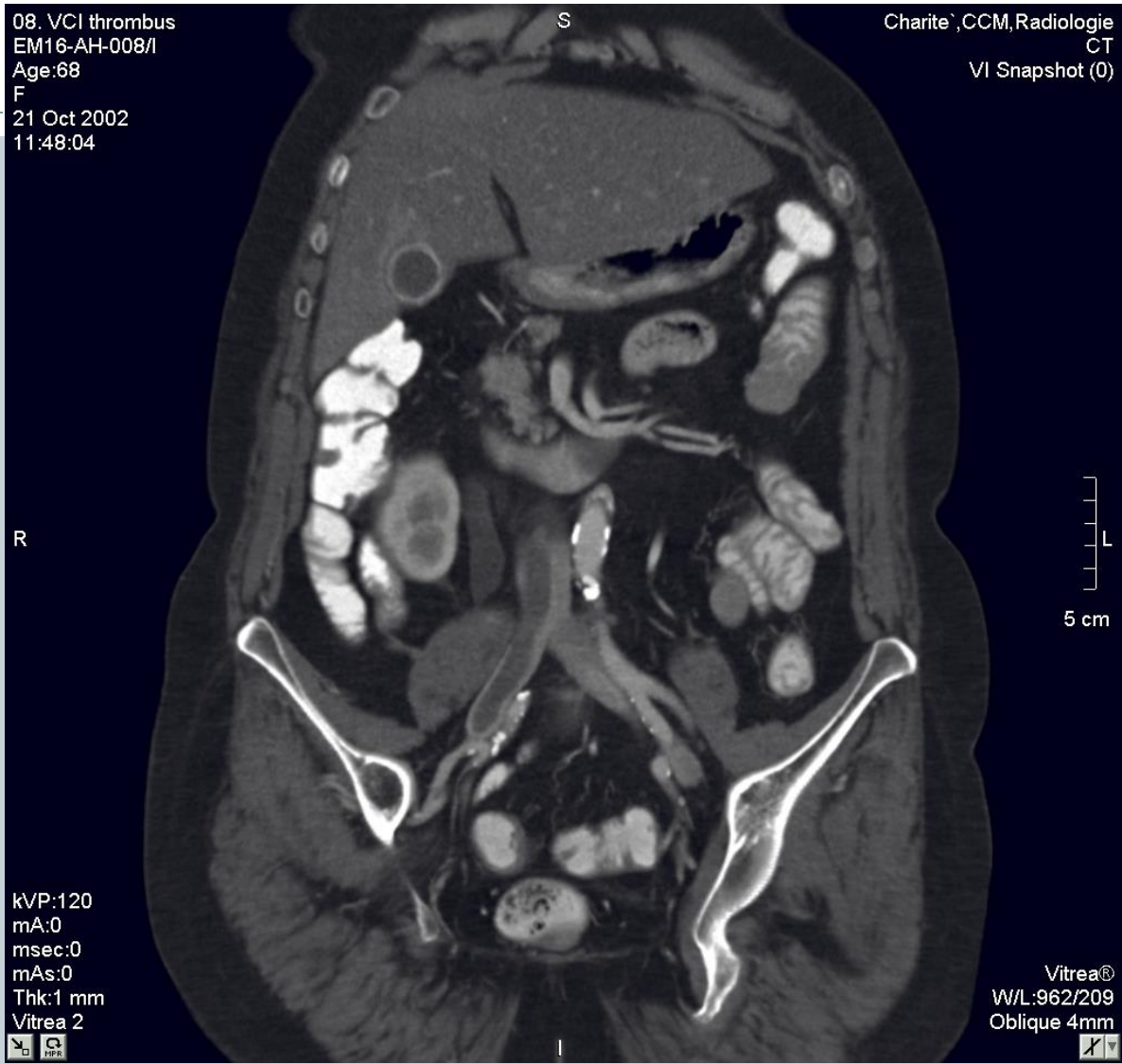
kVP:120
mA:80
msec:500
mAs:40
Thk:1 mm
Aquilion
Orient: -17°,1°,4°

Vitrea®
W/L:1000/300
MIP Segmented

Aortic dissection

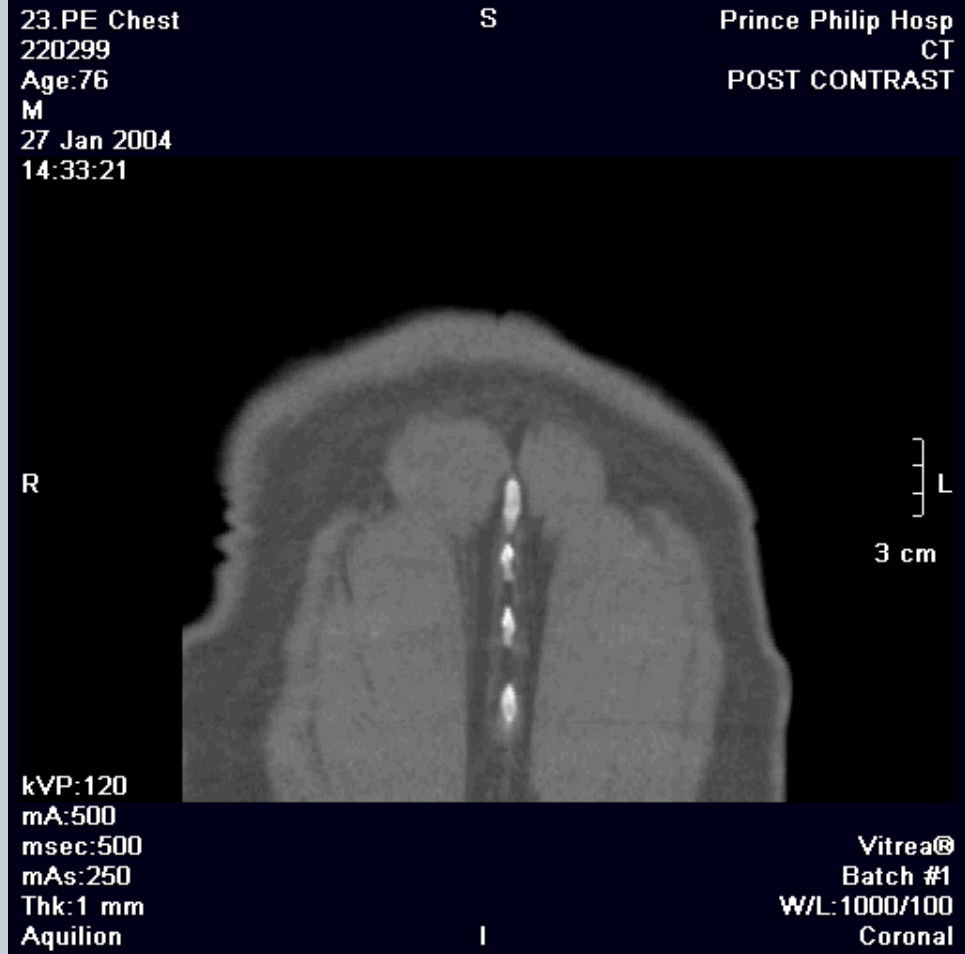


Vena cava thrombus



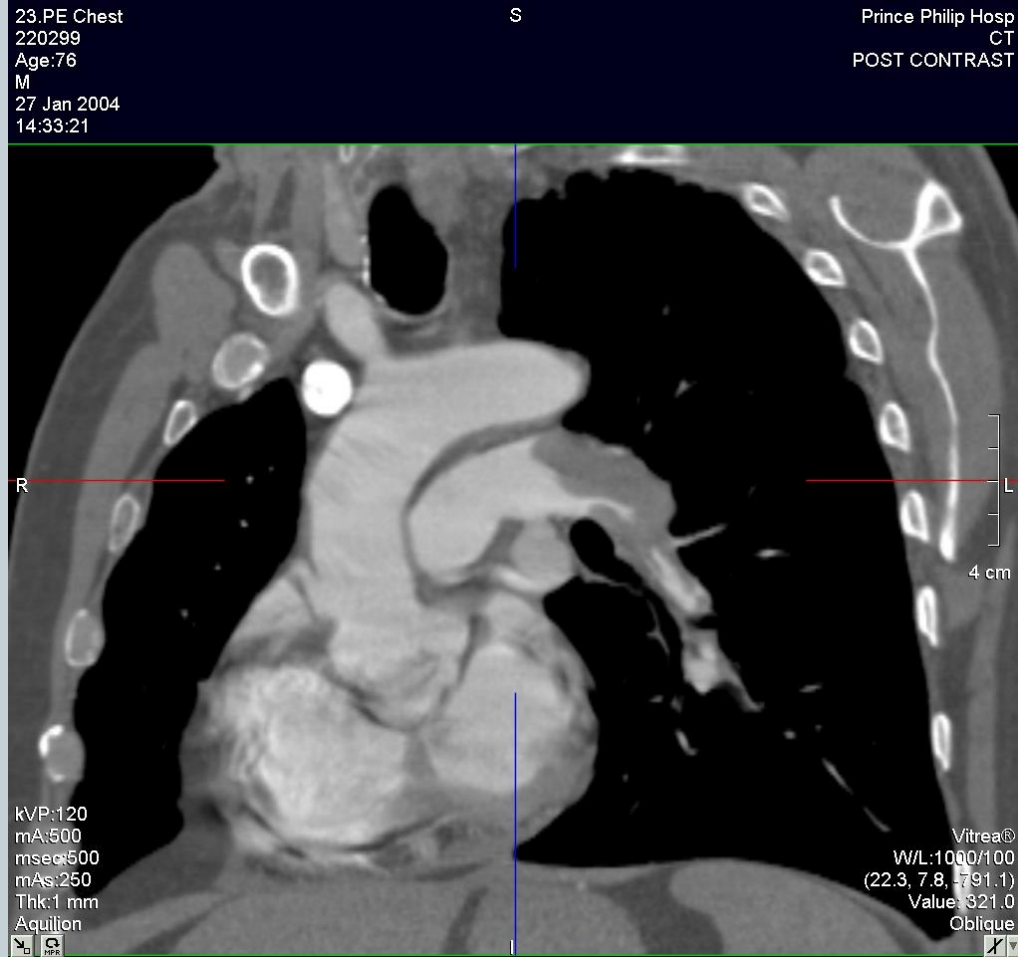
Lung emboli

29

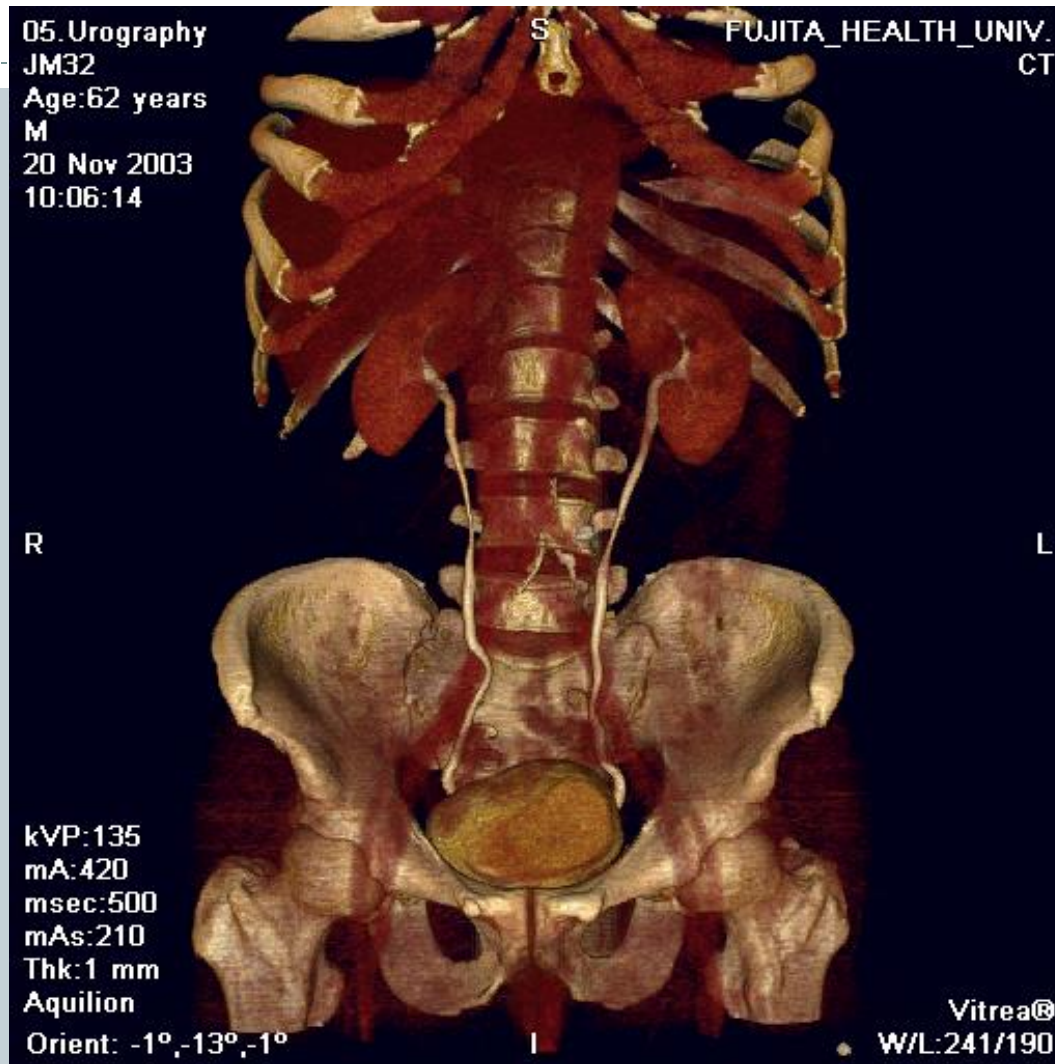


Lung emboli

30

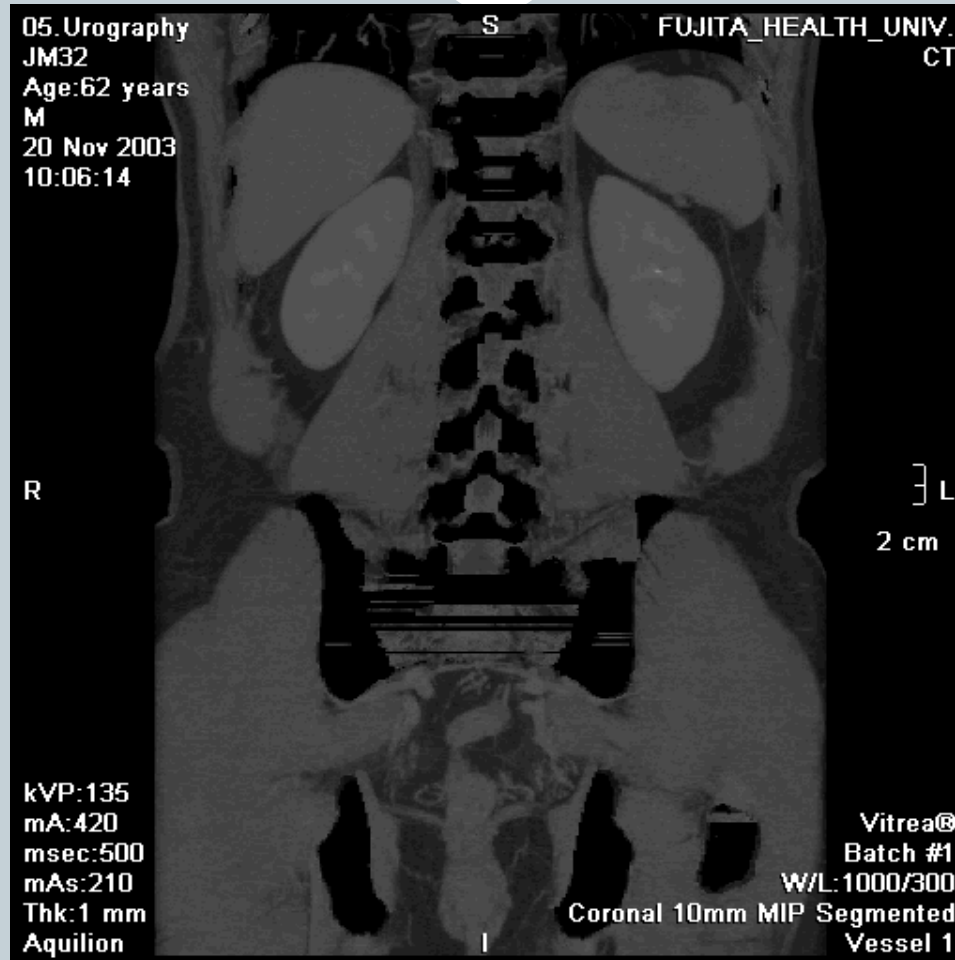


CT of the urinary system



CT of the urinary system

32



CT of the urinary system

33



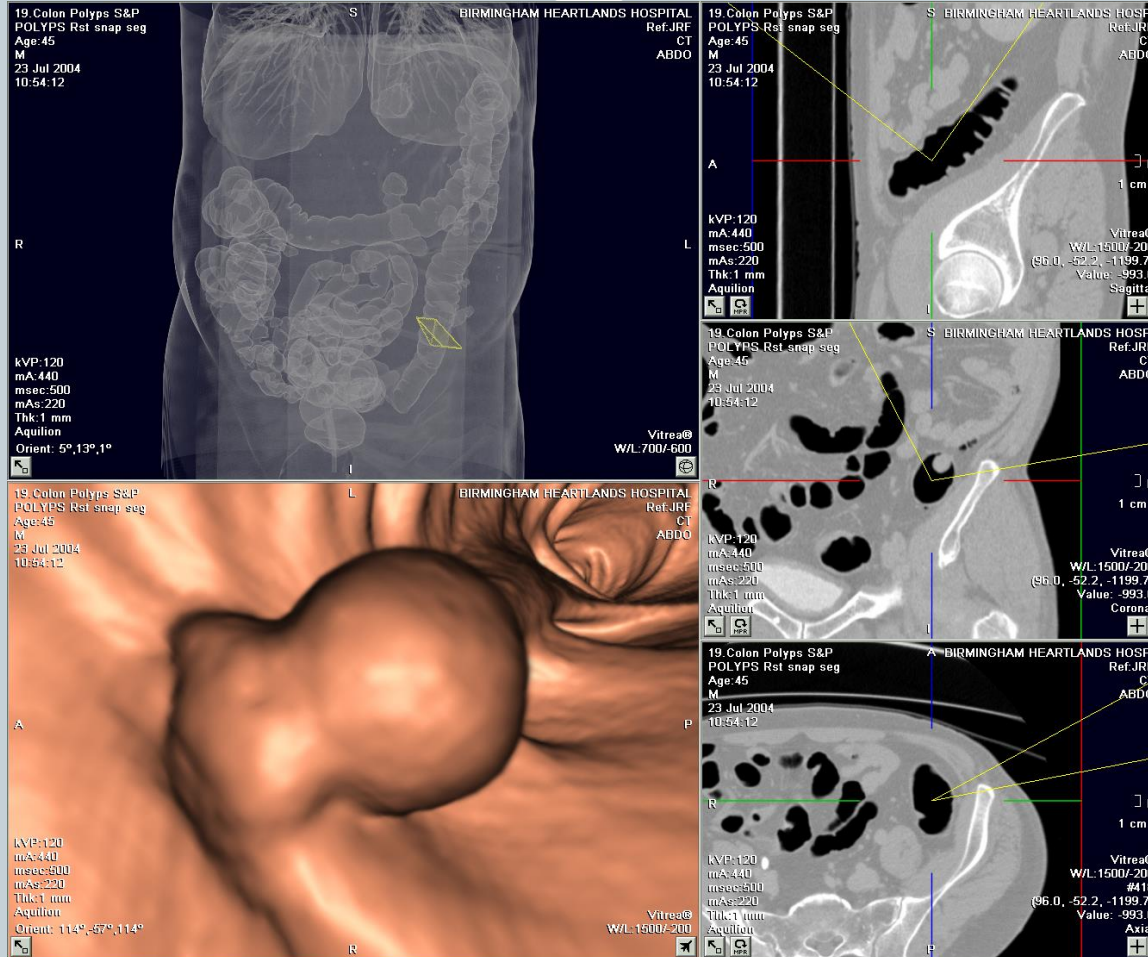
CT of colon

34



CT of colon

35



Traumapatienten

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- Timefactor is crucial
- Aquisitiontime/reconstructiontime
- MPR reconstruction

Trauma patients

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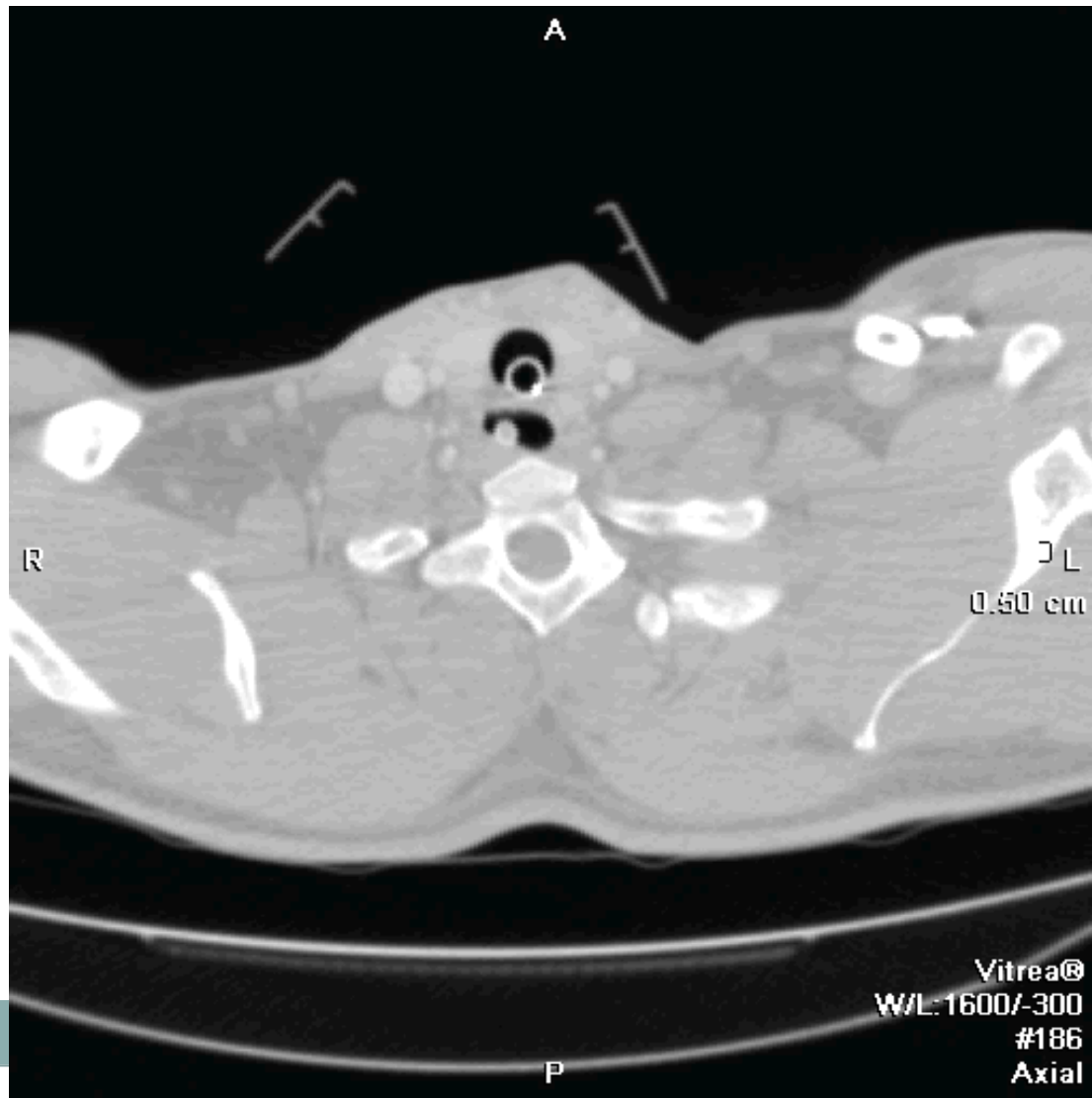


Traumapatienten



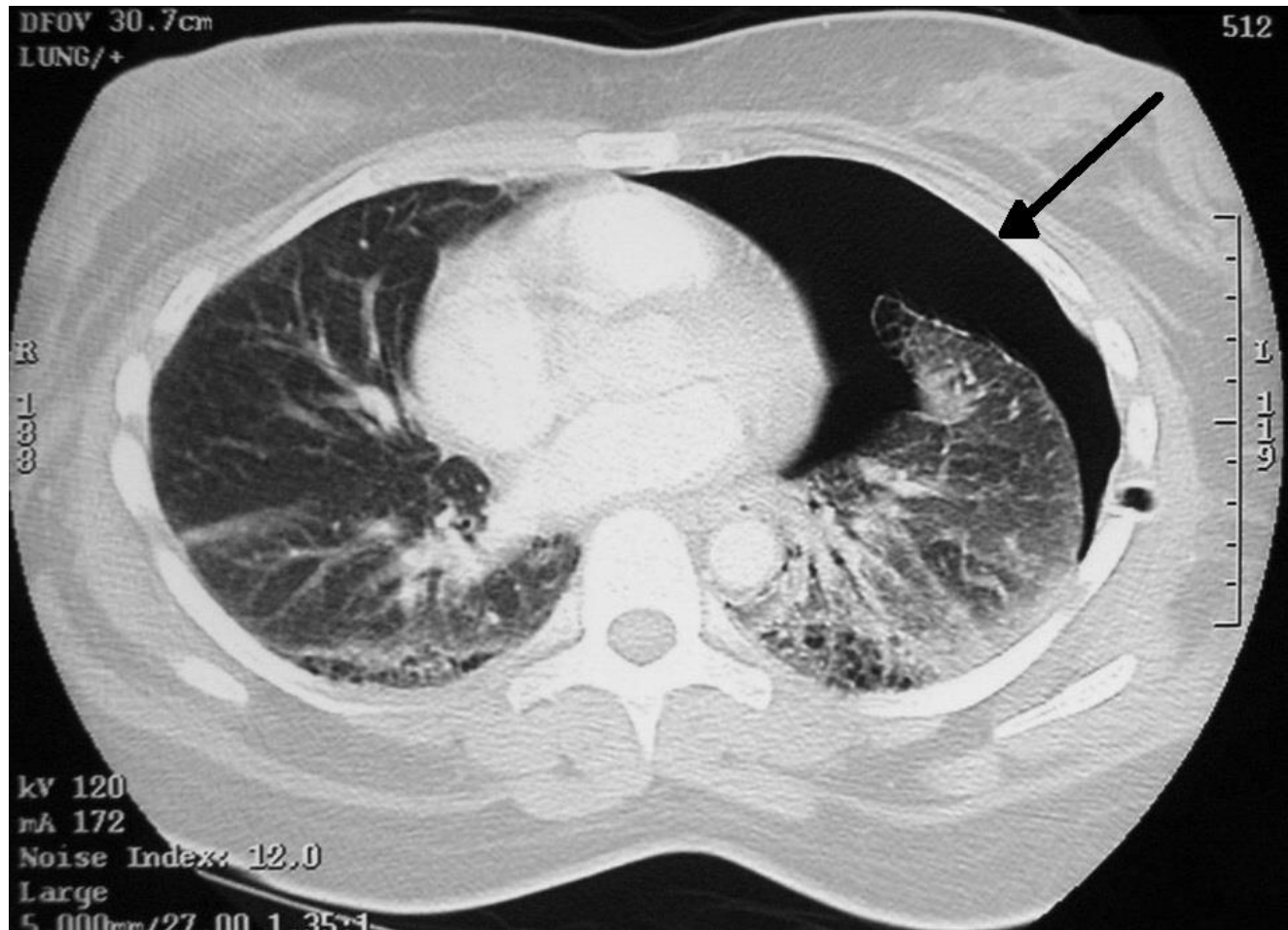
Traumapatienten

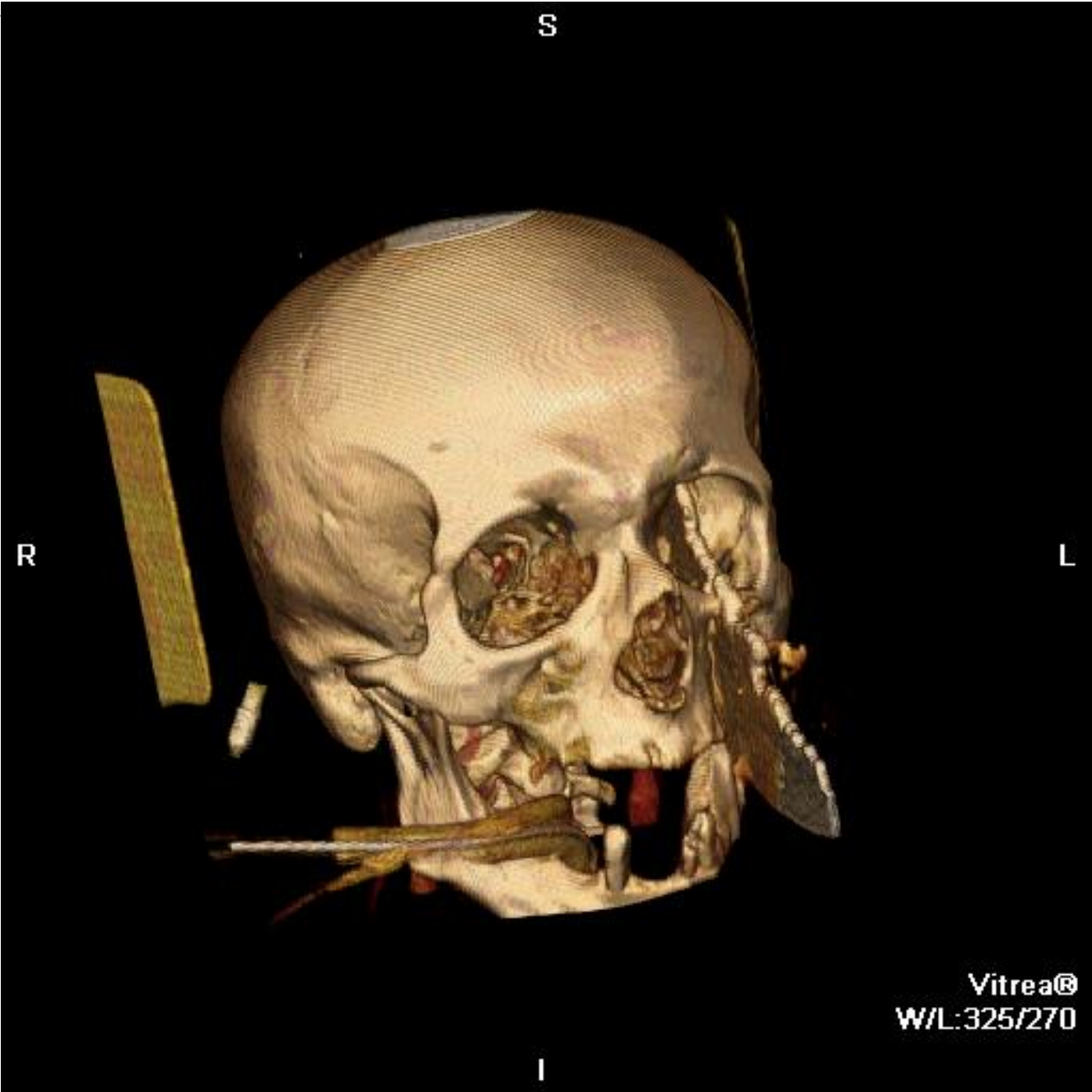
39



Pneumothorax

40





S

R

L

I

Vitrea®
W/L:325/270

