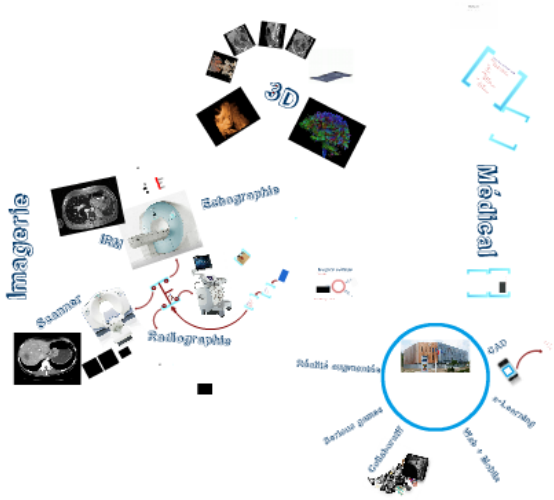
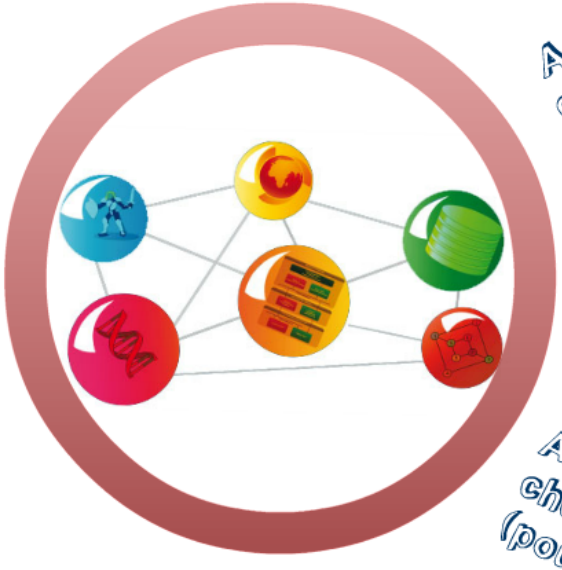
MIBI, Montpellier
04 67 13 01 59
contact@imaios.com



Imagerie médicale

Denis HOA

Systèmes d'acquisition et modalités d'imagerie



Applications cliniques (pour le médecin)

Applications chez IMAIOS (pour l'informaticien)

Master Informatique - IMAGINA

Denis Hoa
denis.hoa@imaios.com

Médecin
radiologue

Dirigeant
IMAIOS SAS

Systèmes d'acquisition et modalités d'imagerie

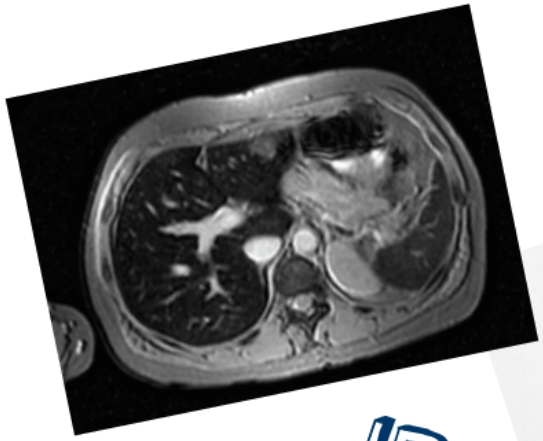
Applications cliniques (pour le médecin)

Applicatio
chez IM
(pour

Applicatio
cliniques (p
le médecin)

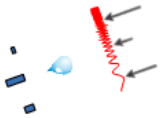
Applications
chez IMAIOS
(pour l'informaticien)

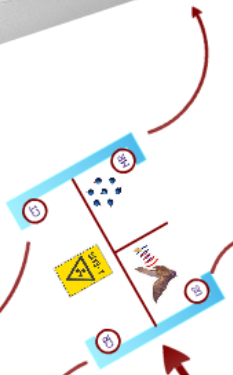
Imagerie

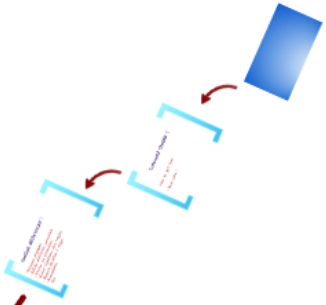


IRM

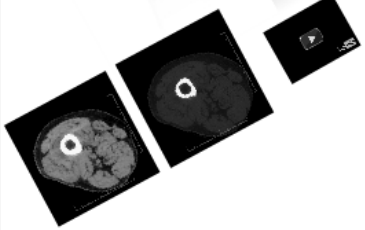
Echographie



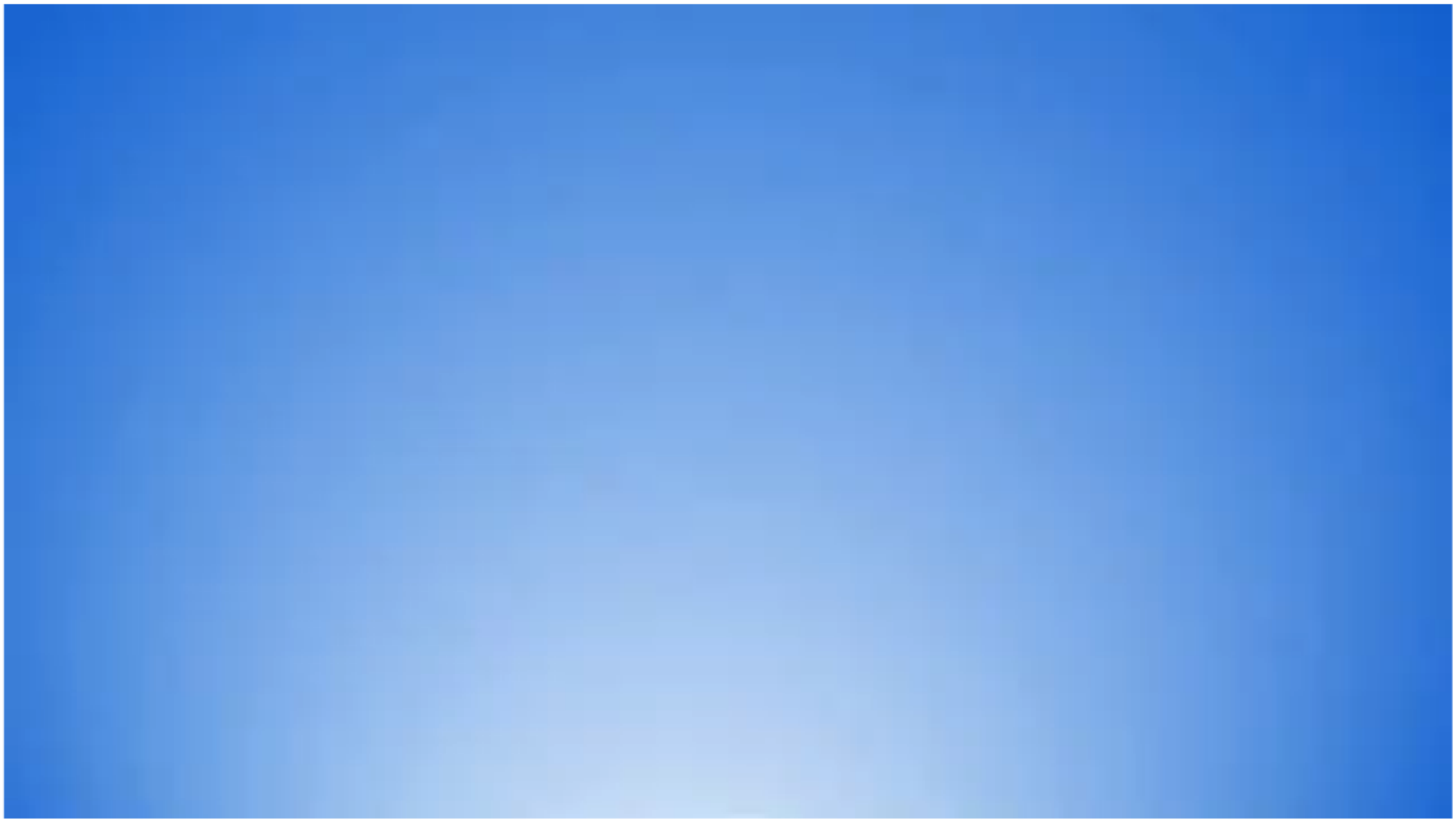




Scanner



Radiographie



Comment choisir ?

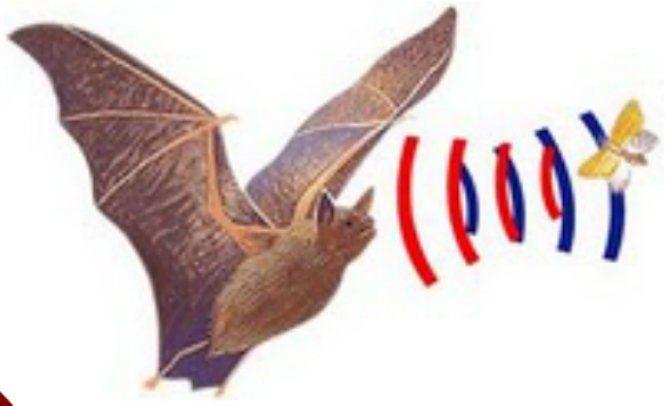
- Voir ce qu'il faut
- Sans nuire !

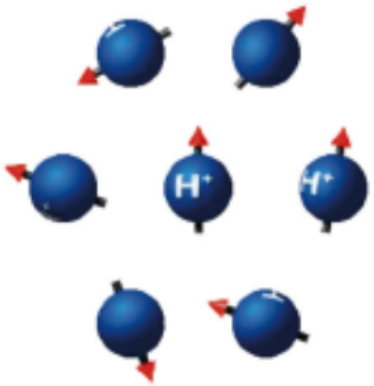
Quelles différences ?

- Principes physiques
- Effets délétères potentiels
- Principe de précaution
- Eviter répétition des risques
- Rapport bénéfice / risque
- Accessibilité
- Prix

CR

CT

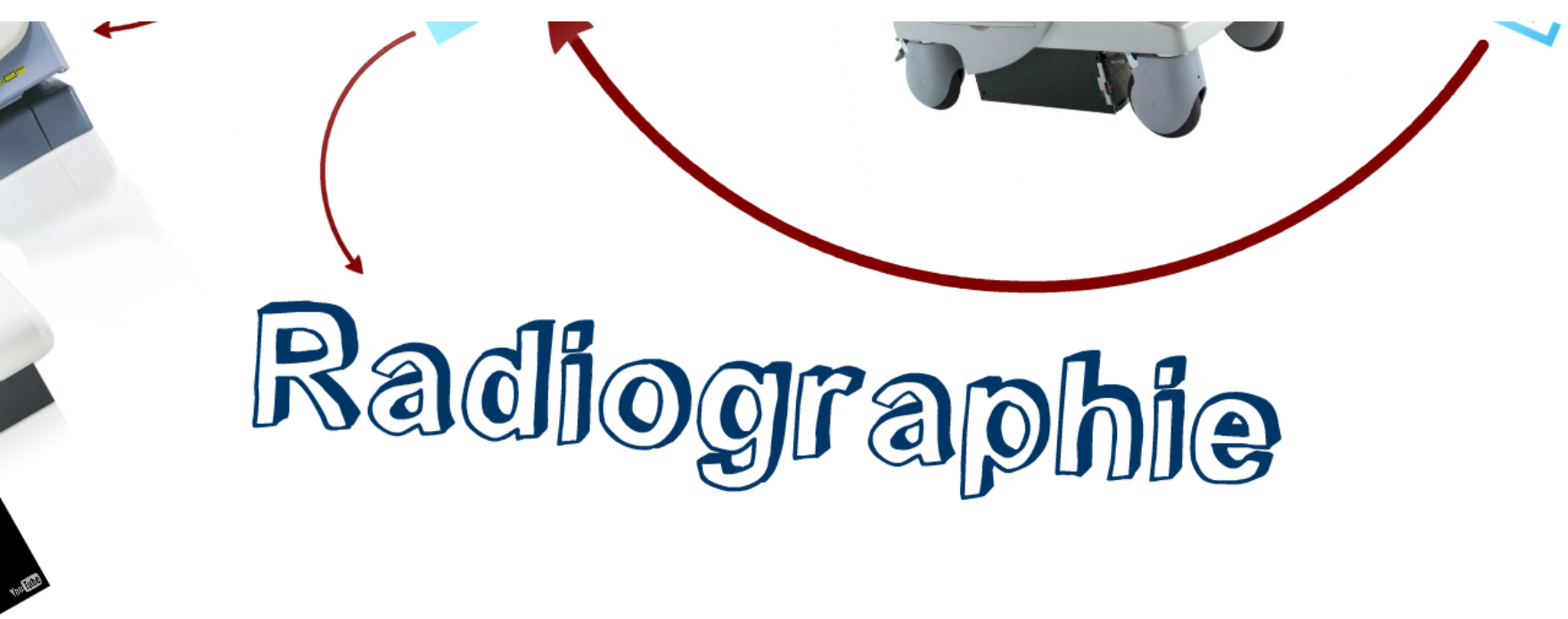




US

MR

CR



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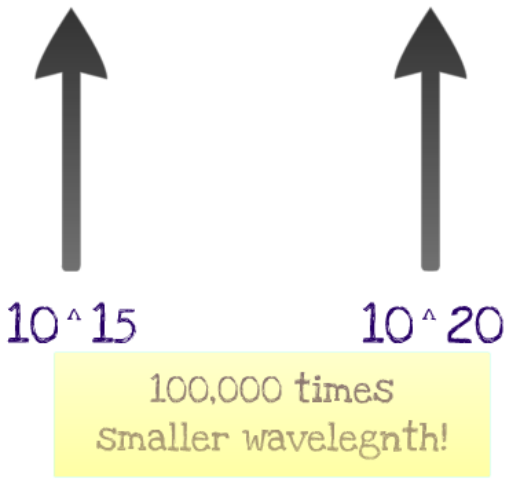
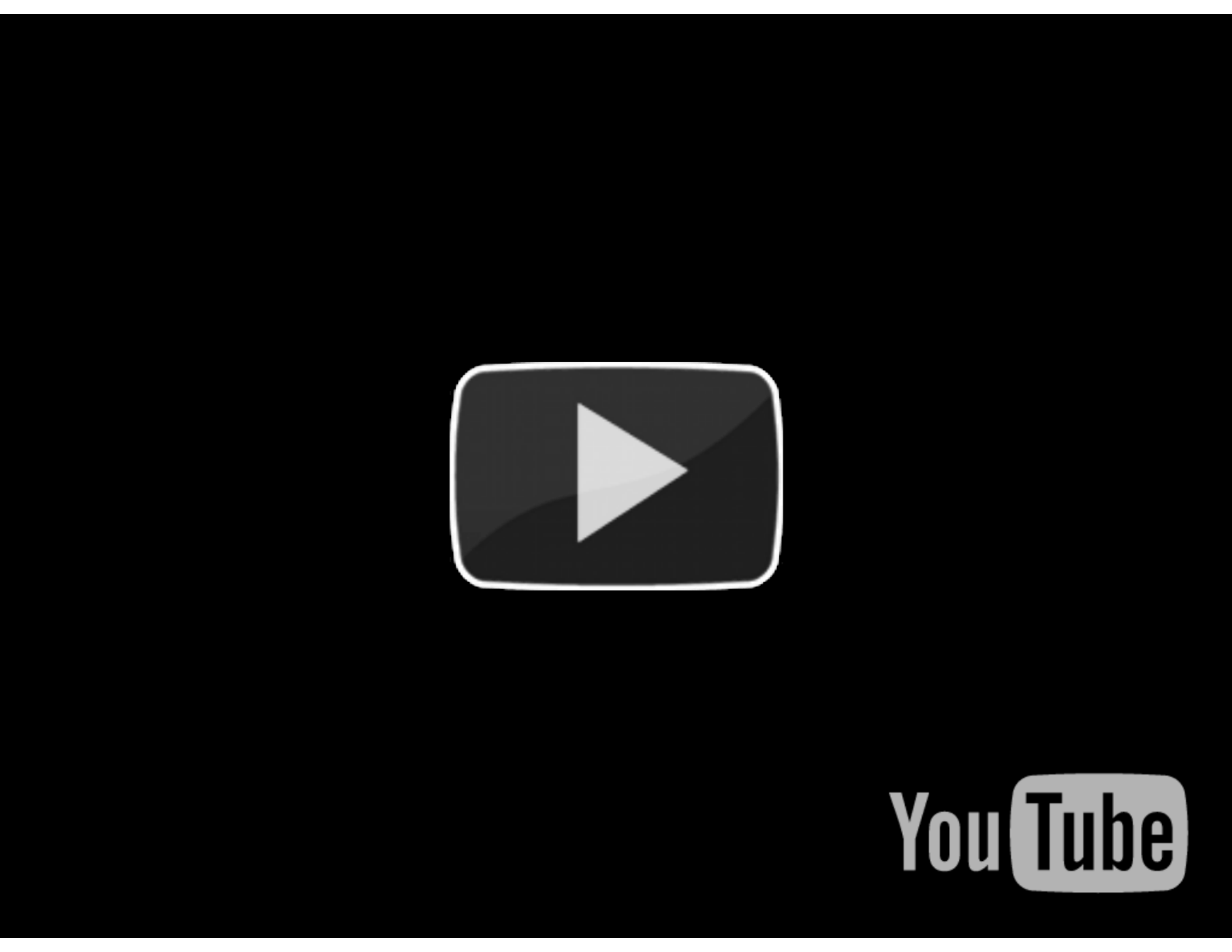
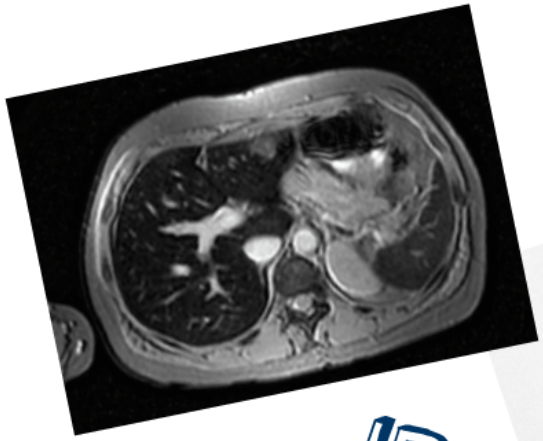

10^15
10^20
100,000 times
smaller wavelegnth!

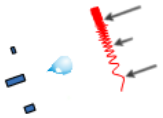

YouTube

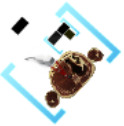
Imagerie

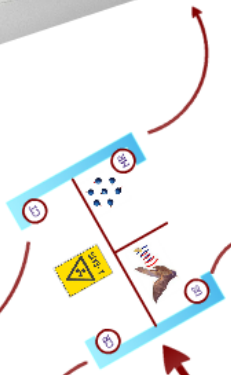


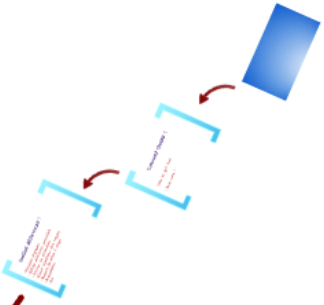
IRM

Echographie

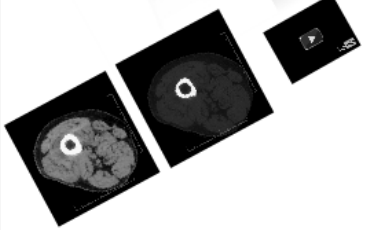






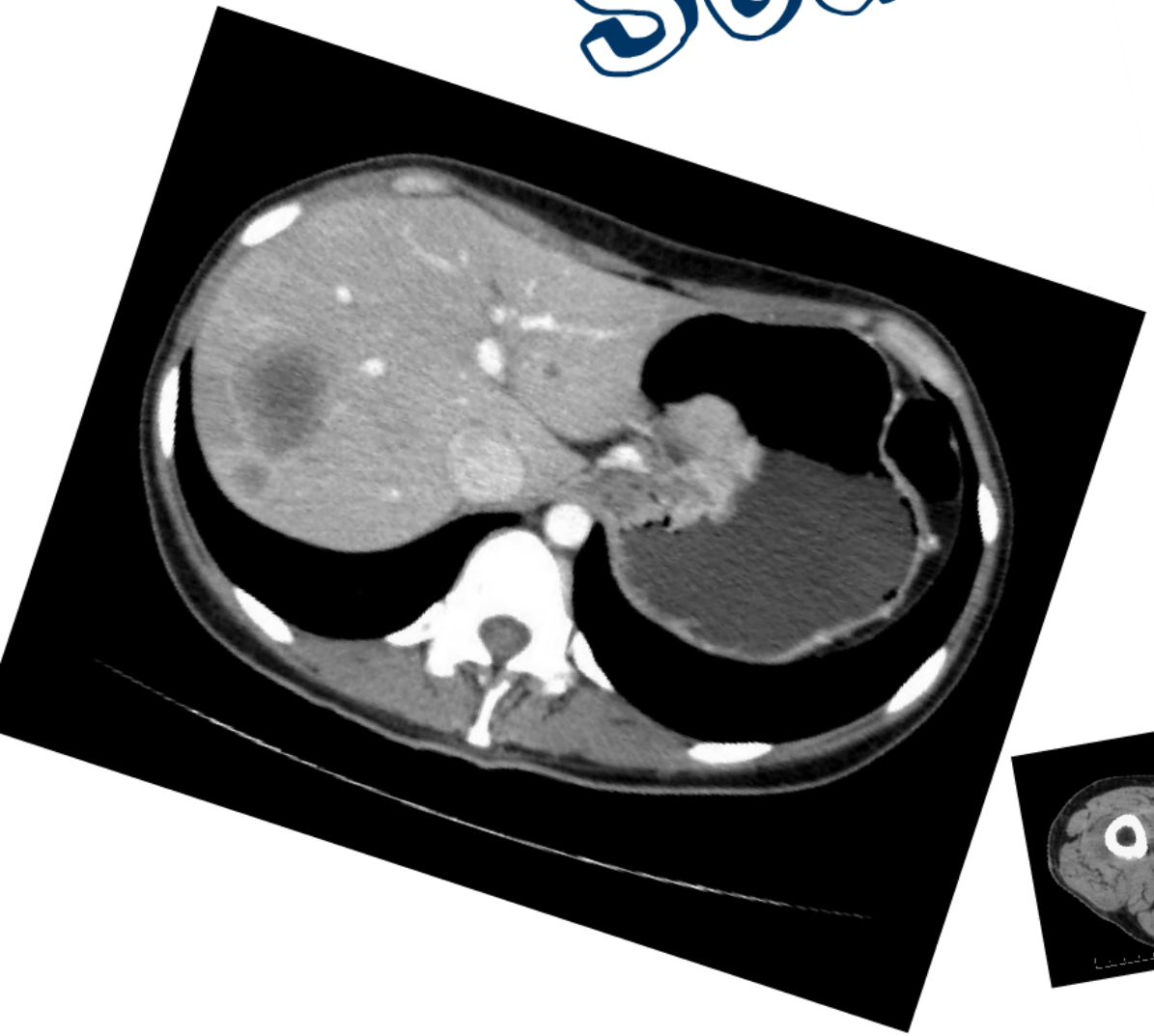


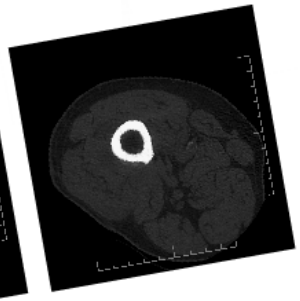
Scanner



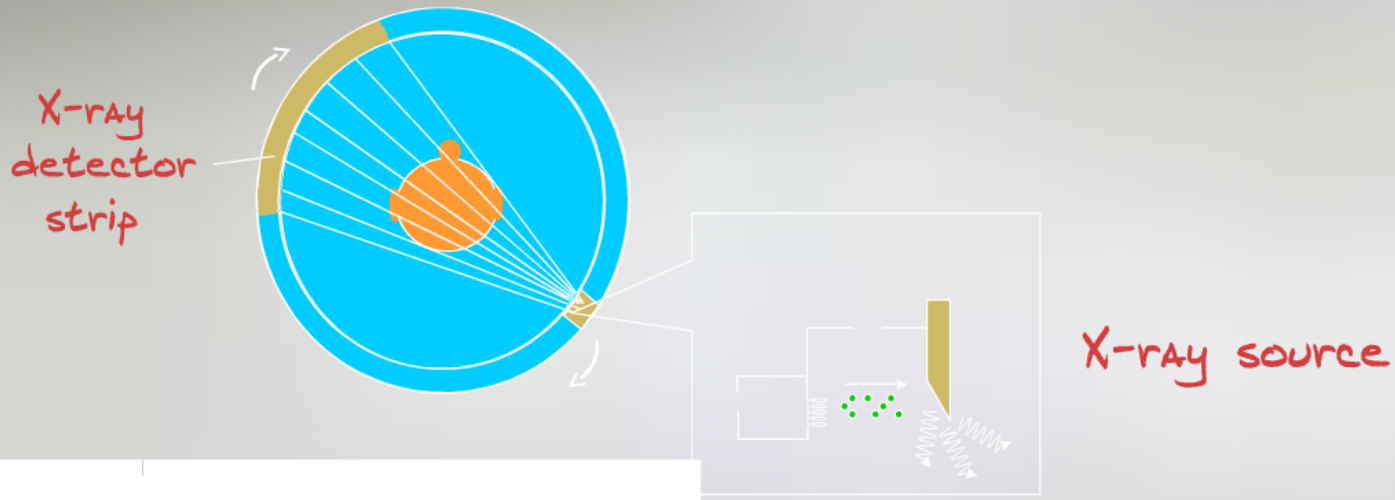
Radiographie

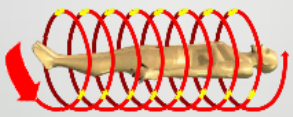
Scanner





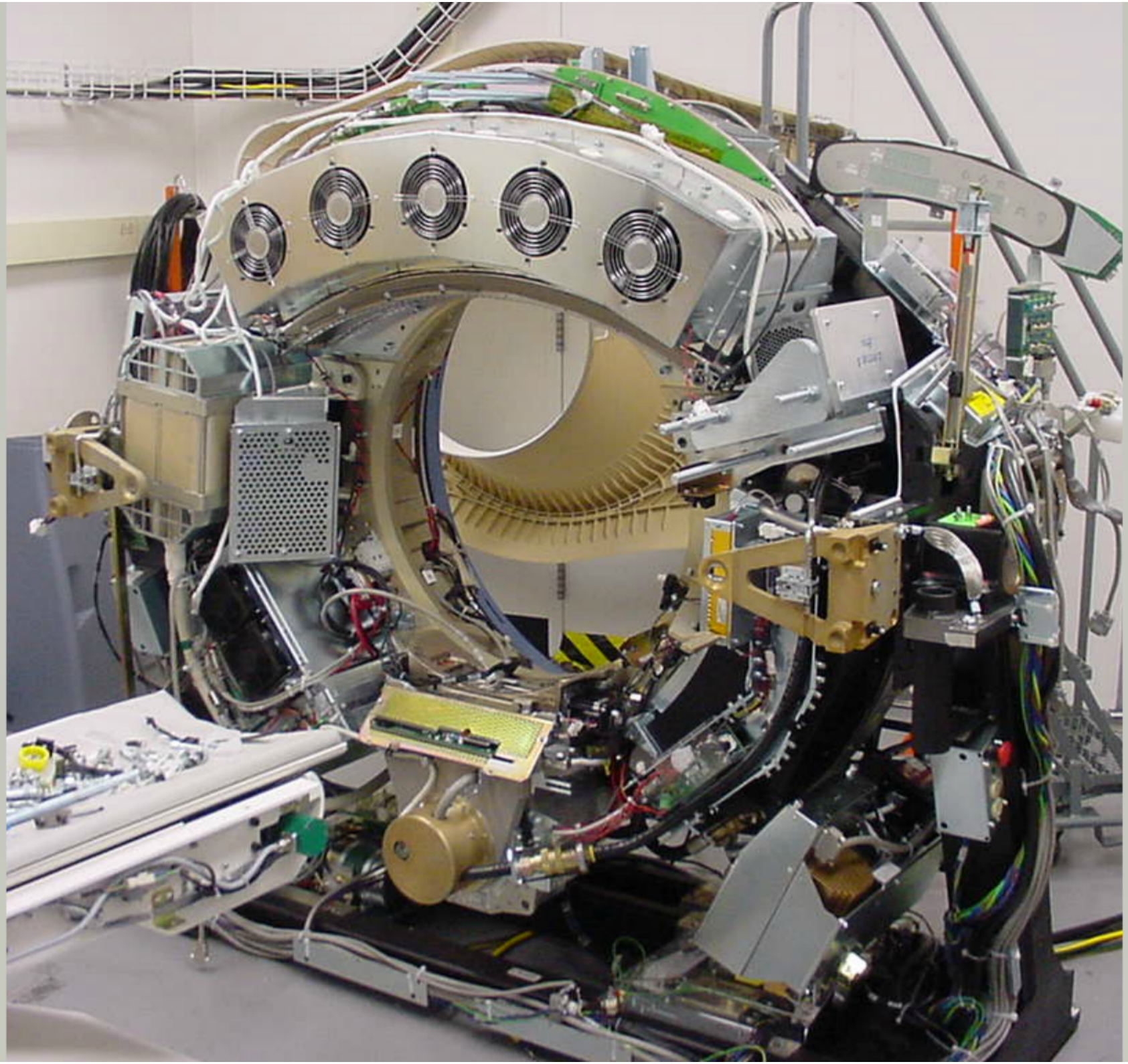

SIEMENS

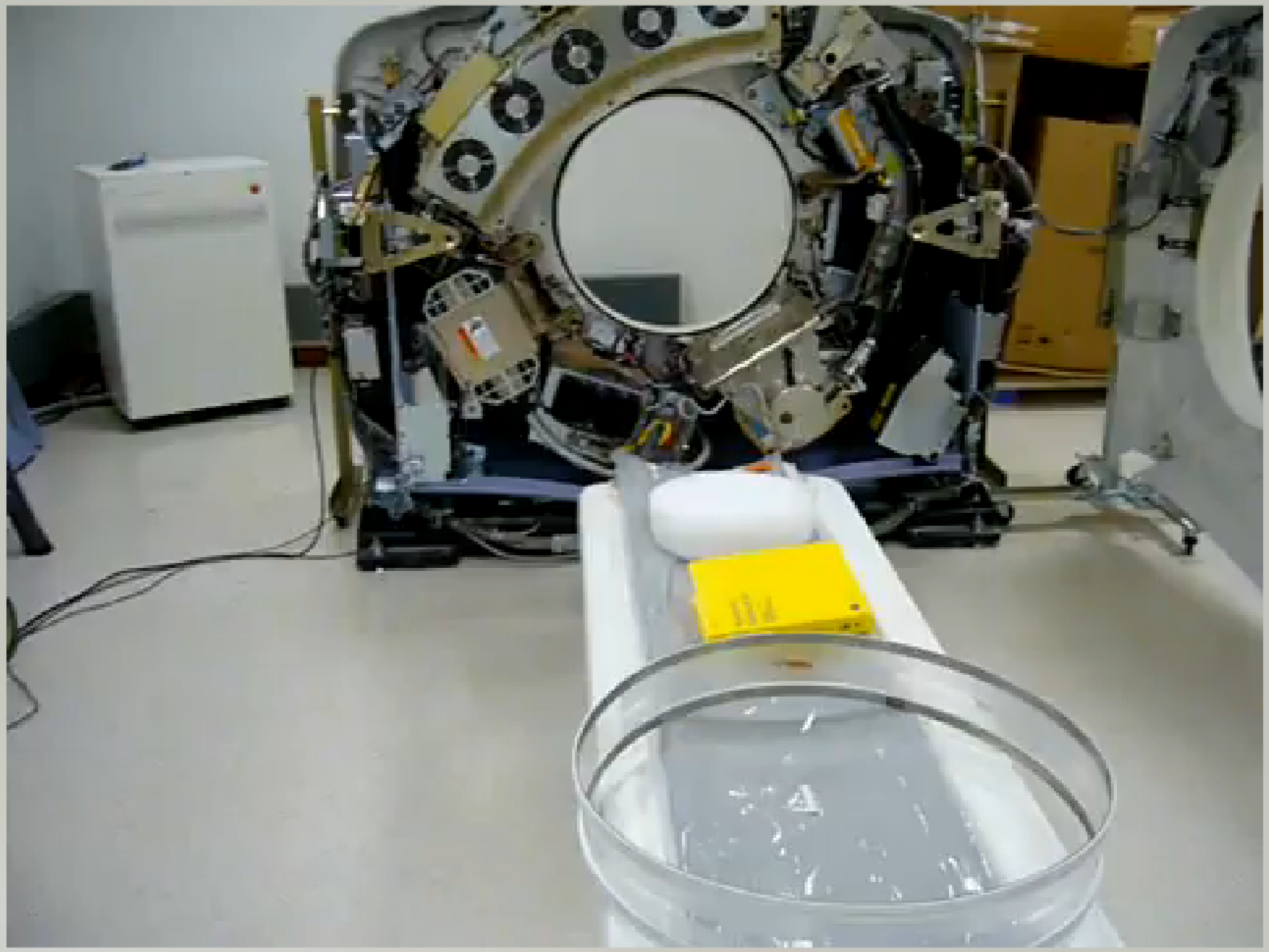

X-ray
detector
strip
X-ray source



Acquisitions Synchronisées

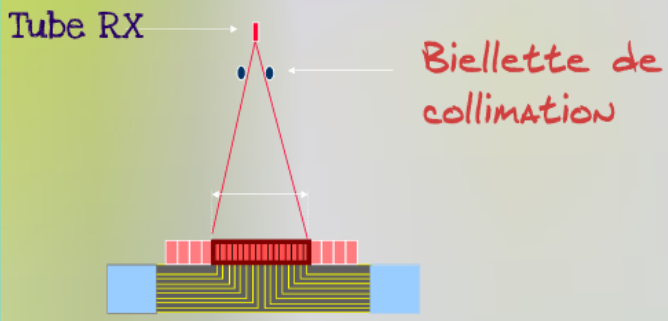
Acquisition séquentielle utilisant le gating en prospectif.





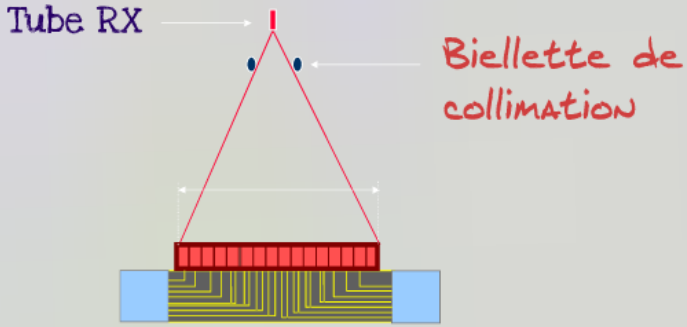
Détecteurs et collimation

Configuration 16 x 0,625 mm
Collimation = 10 mm

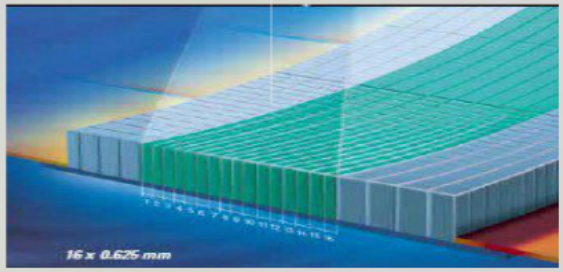


Collimation 10mm

Configuration 16 x 1,25 mm
Collimation = 20 mm



Collimation 20mm



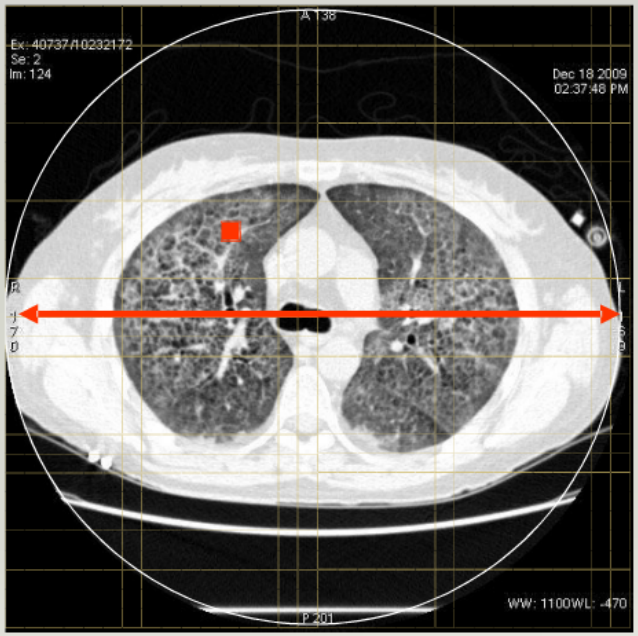
10mm

20mm

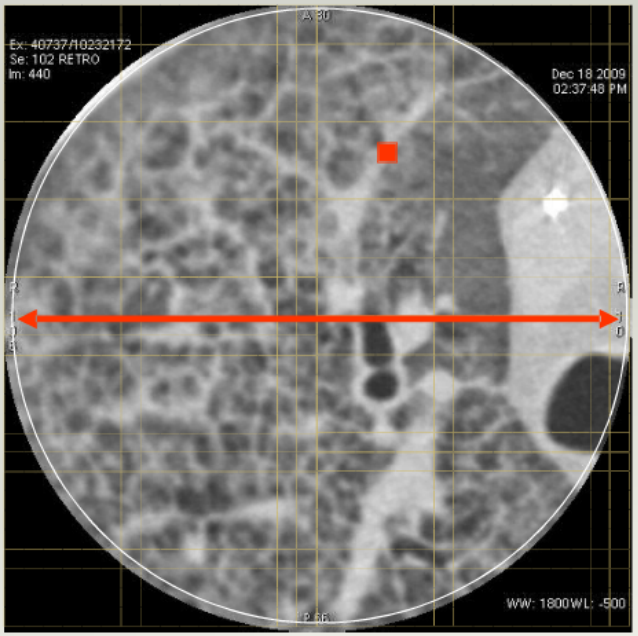

Object
Medical Training Solutions
Video
Projections
Sinogram

Matrice de reconstruction

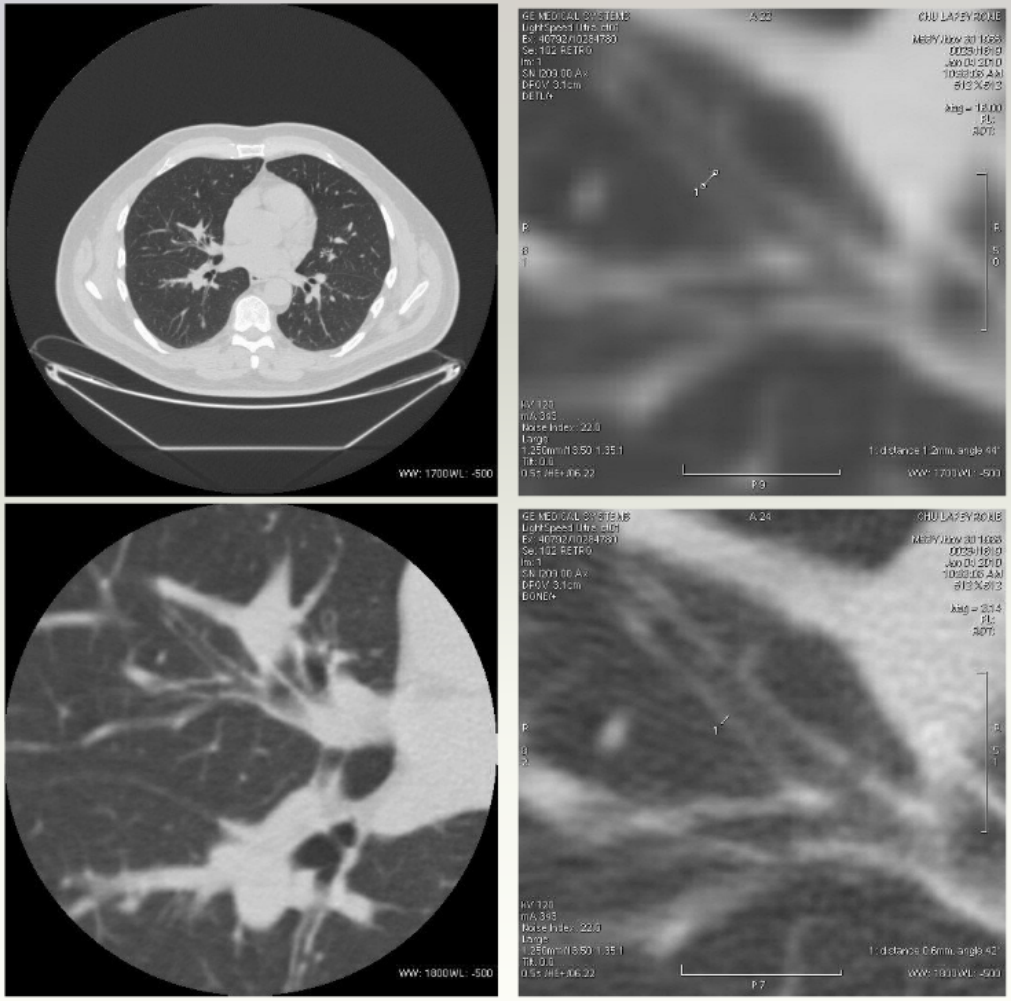
Matrice 512x512
DFOV 50cm -> pixel = 1mm



Matrice 512x512
DFOV 9cm -> pixel = 0,2mm



Matrice de reconstruction



Filtres de reconstruction

SOFT

STANDARD

DETAIL

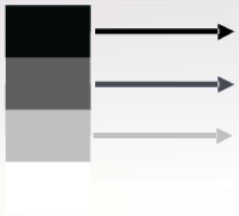
LUNG

BONE

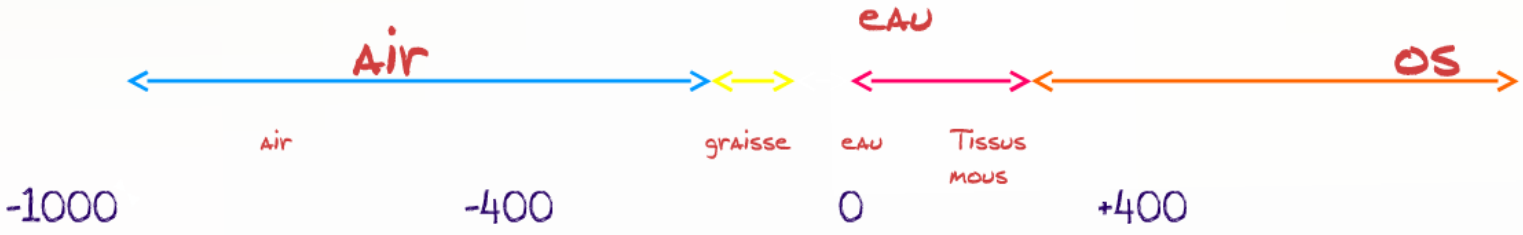
BONE +

EDGE

Echelle d'Hounsfield



Air = -1000 (noir)
Graisse = -60 à - 120
Eau = 0
Calcium = + 1000 (blanc)



Fenêtrage

- WL (window level - centre - niveau) :

valeur UH de la densité moyenne à visualiser.

- WW (window width - fenêtre) :

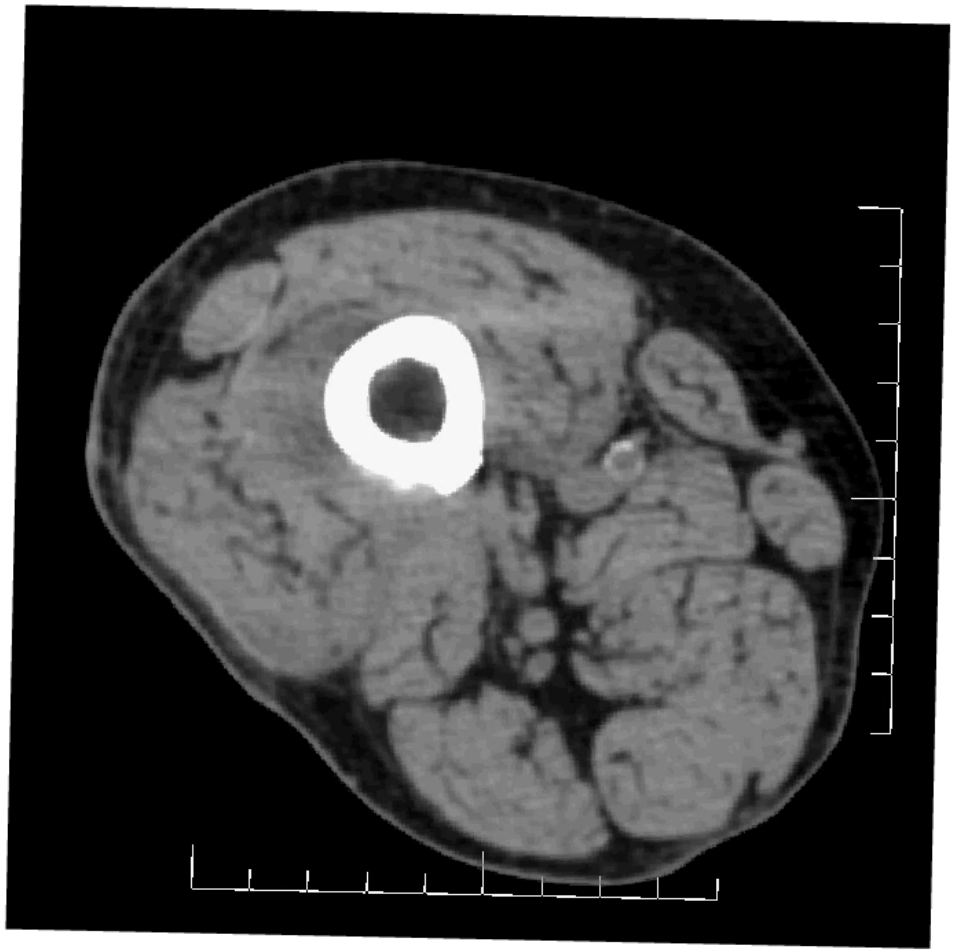
détermine le nombre d'unités Hounsfield représentées par chaque niveau de gris.

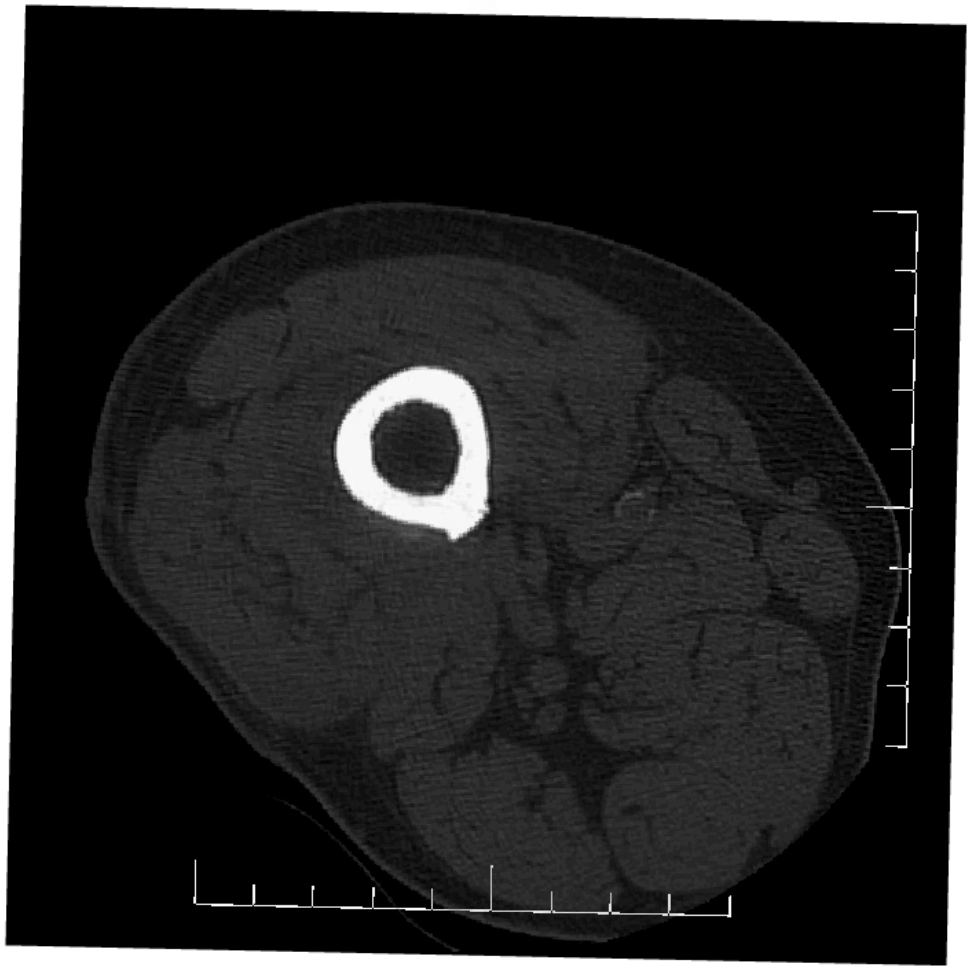
Cerveau	WW 135	WL 45
Abdomen	WW 400	WL 40
Médiastin	WW 350	WL 50
Poumon	WW 1700	WL -600
Os	WW 2500	WL 500
Rachis	WW 250	WL 35
Oreille Moyenne	WW 4000	WL 400

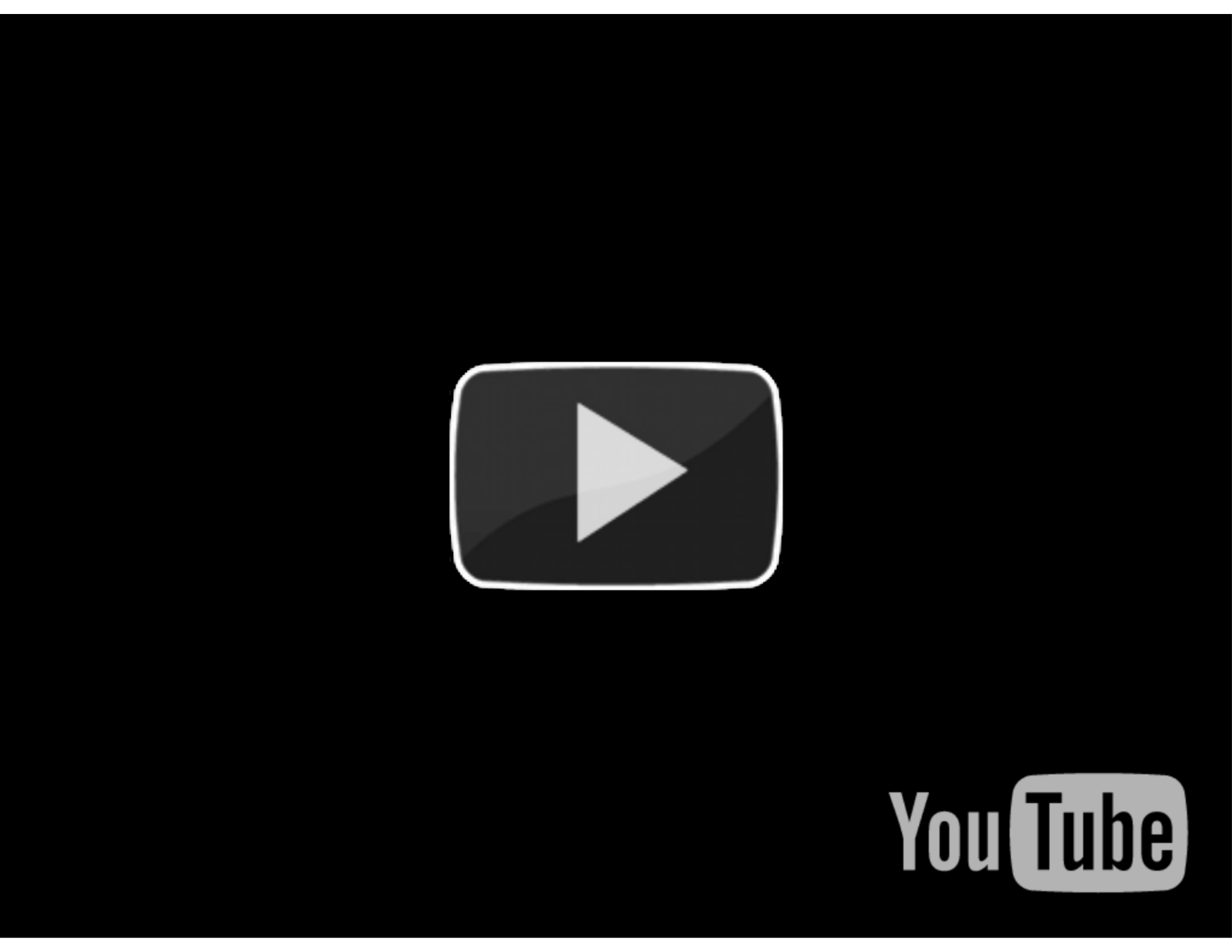
Fenêtrage

Fenêtre parenchymateuse
-500 . 1800 uh

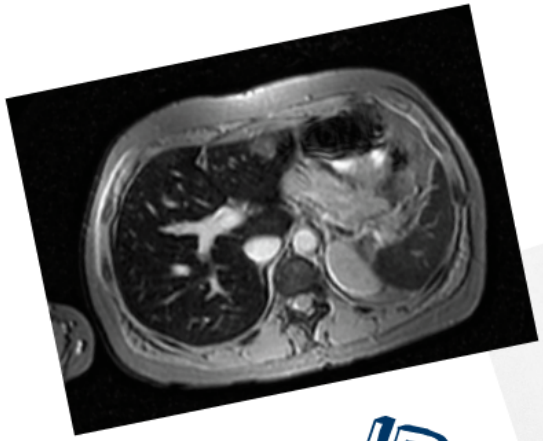
Fenêtre médiastinale
50 . 450 uh





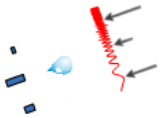

YouTube

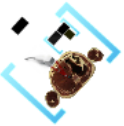
Imagerie

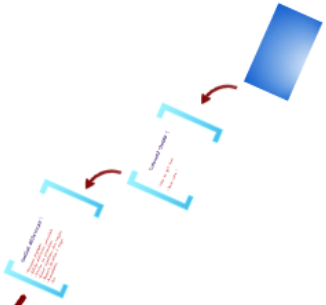


IRM

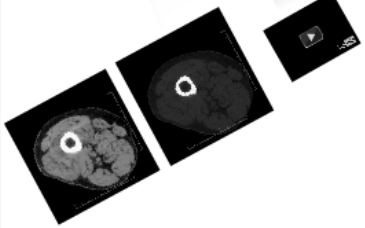
Echographie





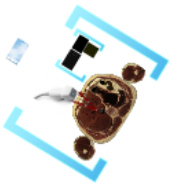


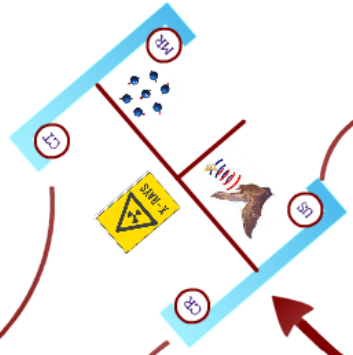
Scanner

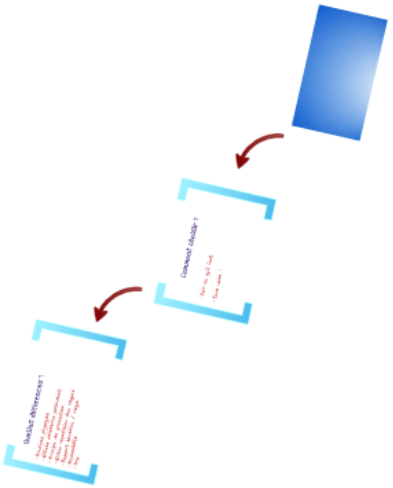


Radiographie

Echographie

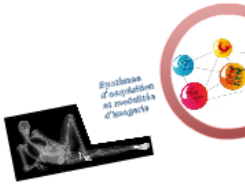






Imagerie méd

Denis HOA



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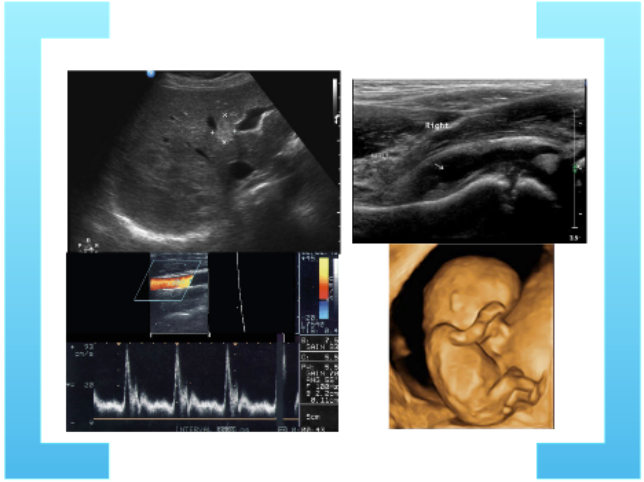
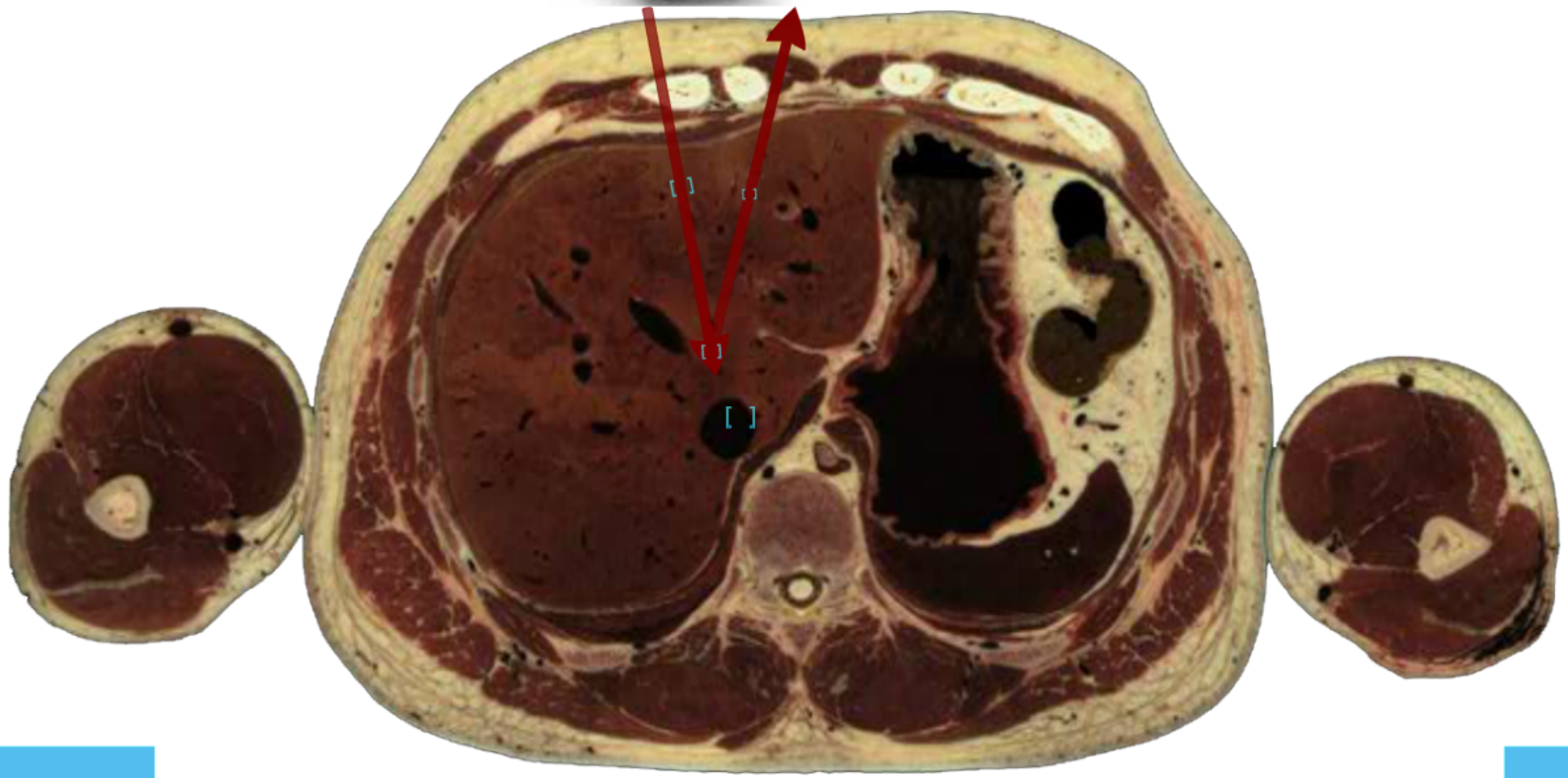
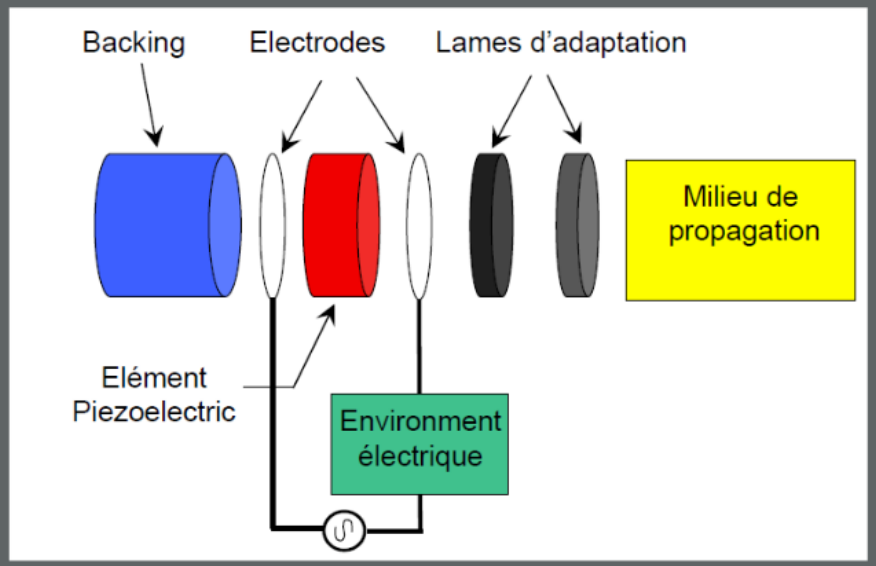
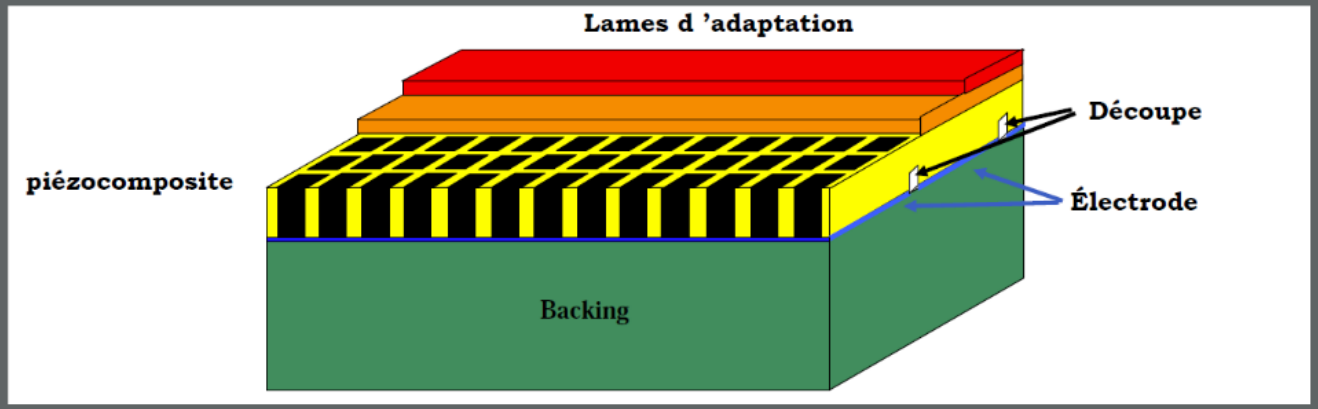




Sondes


Backing
Electrodes
Lames d'adaptation
Milieu de propagation
Elément Piezoelectric
Environment électrique

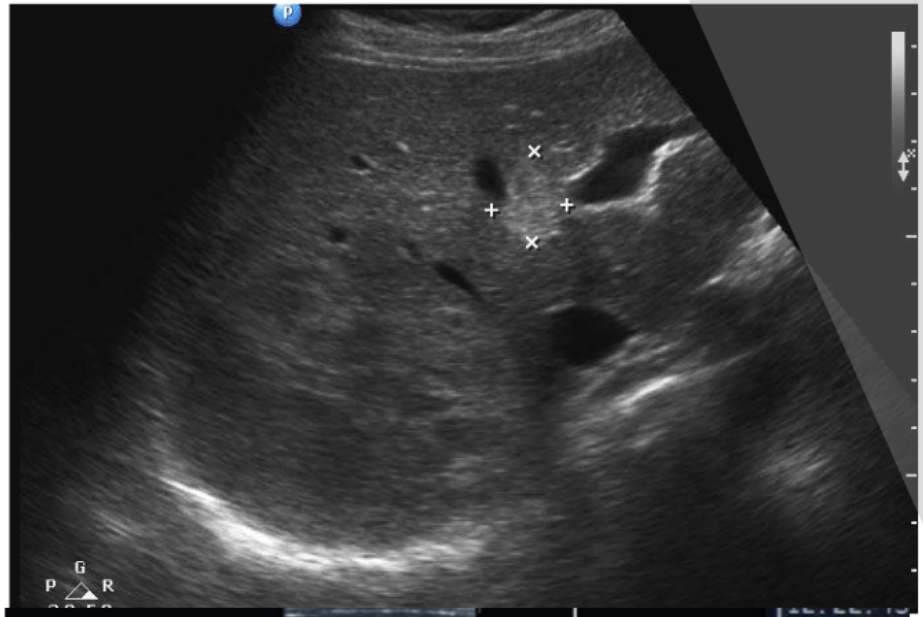

Lames d 'adaptation
Découpe
piézocomposite
Électrode
Backing

Focalisation

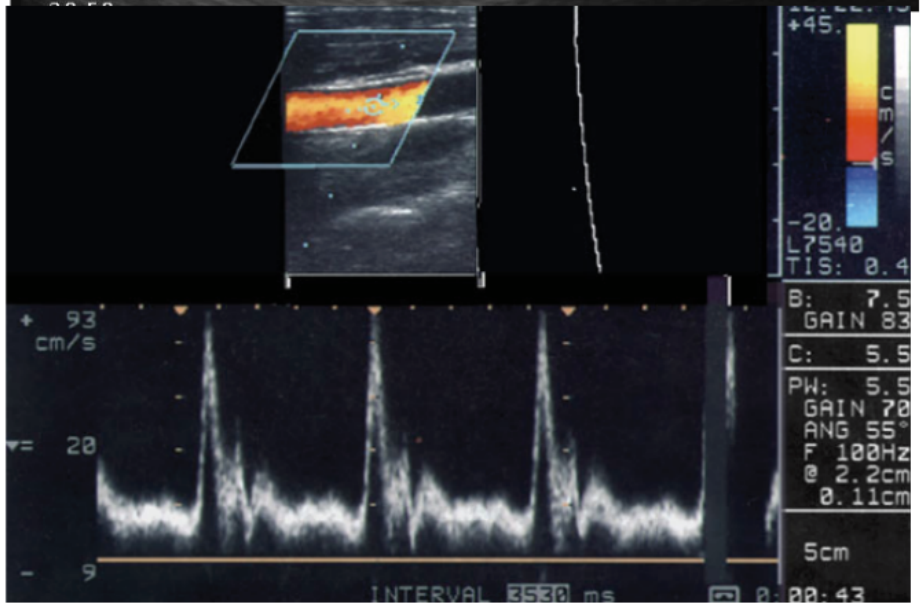
Vitesses de propagation dans le corps humain

Doppler et flux

Construction de l'image

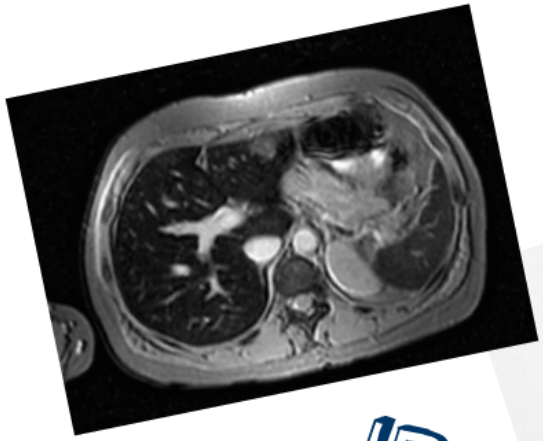



Right
fluid
3.5


+45.
cm/s
-20.
L7540
TIS: 0.4
B: 7.5
GAIN 83
C: 5.5
PW: 5.5
GAIN 70
ANG 55°
F 100Hz
@ 2.2cm
0.11cm
5cm
93
cm/s
20
9
INTERVAL 3530 ms

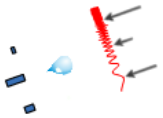

IMAIOS

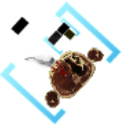
Imagerie

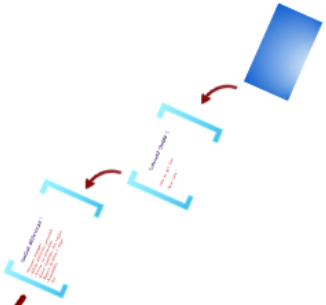


IRM

Echographie







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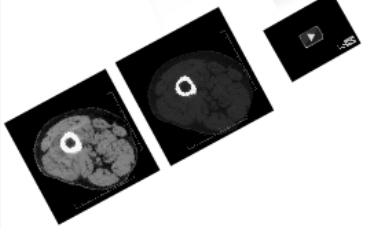
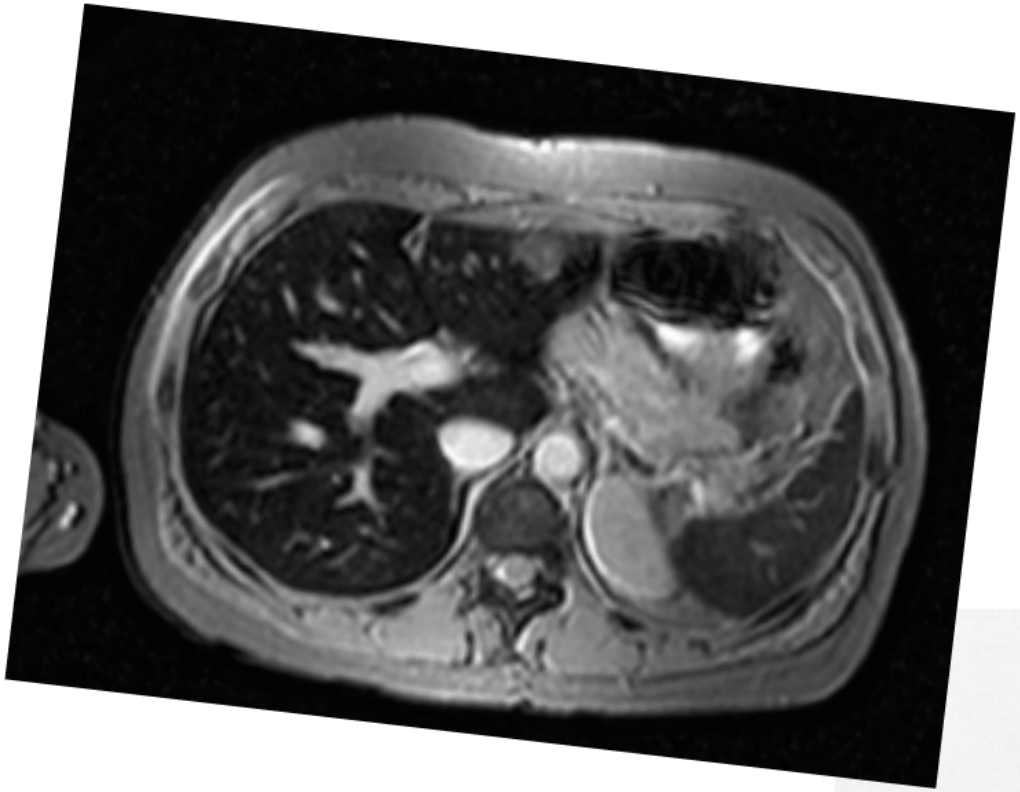
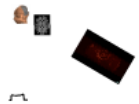
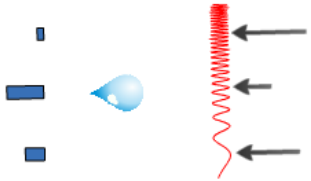


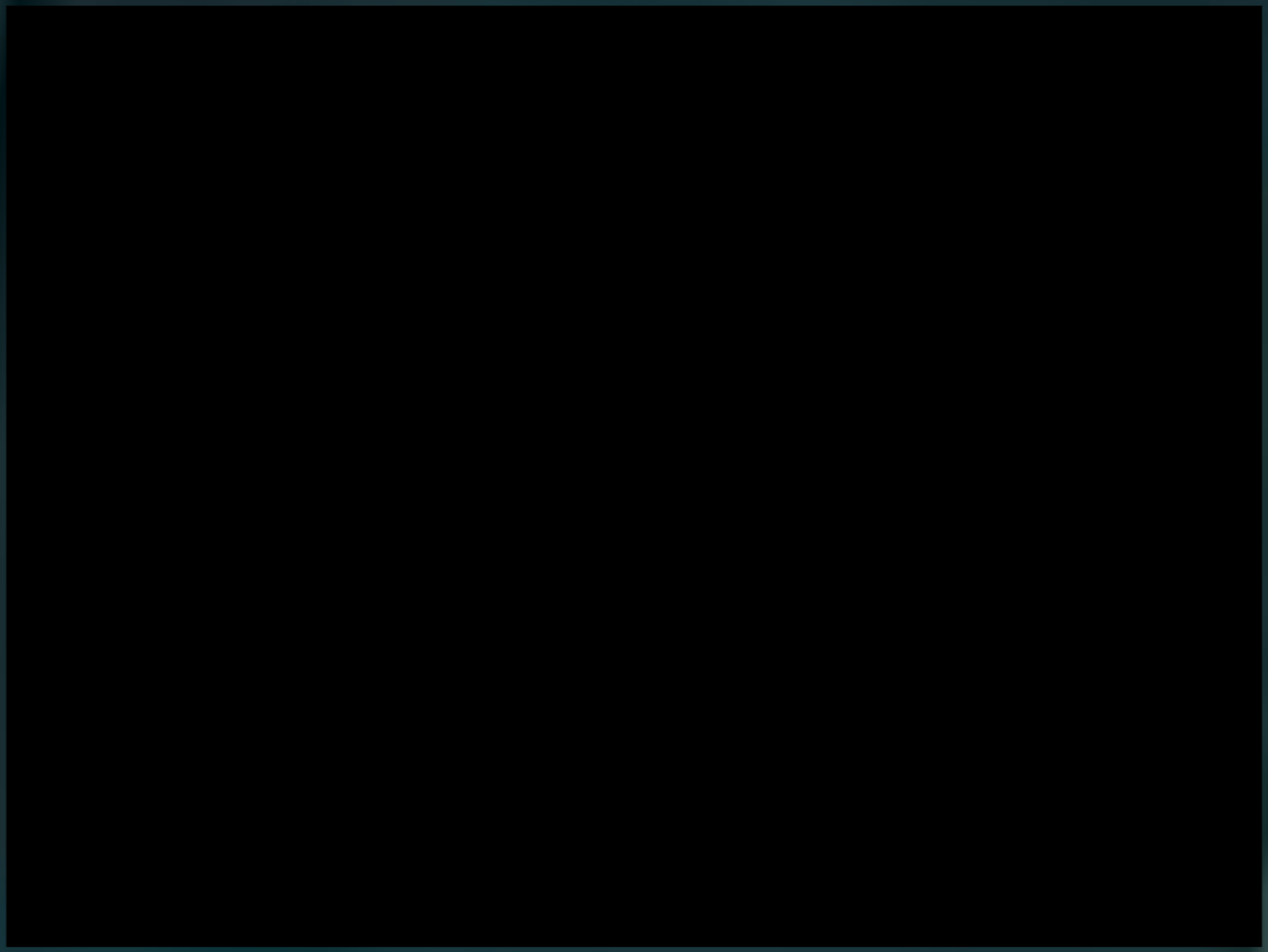
Radiographie

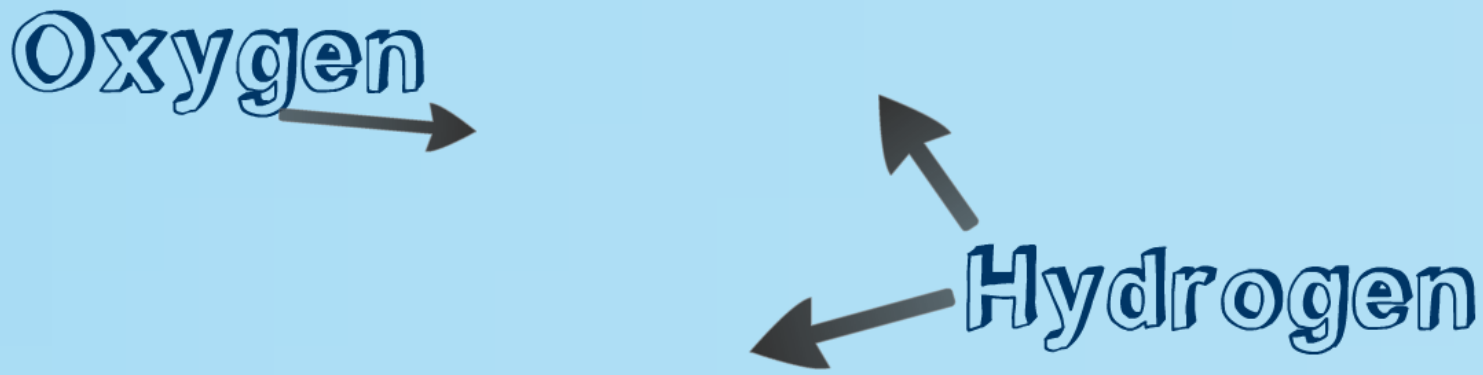






IRM




Oxygen
Hydrogen

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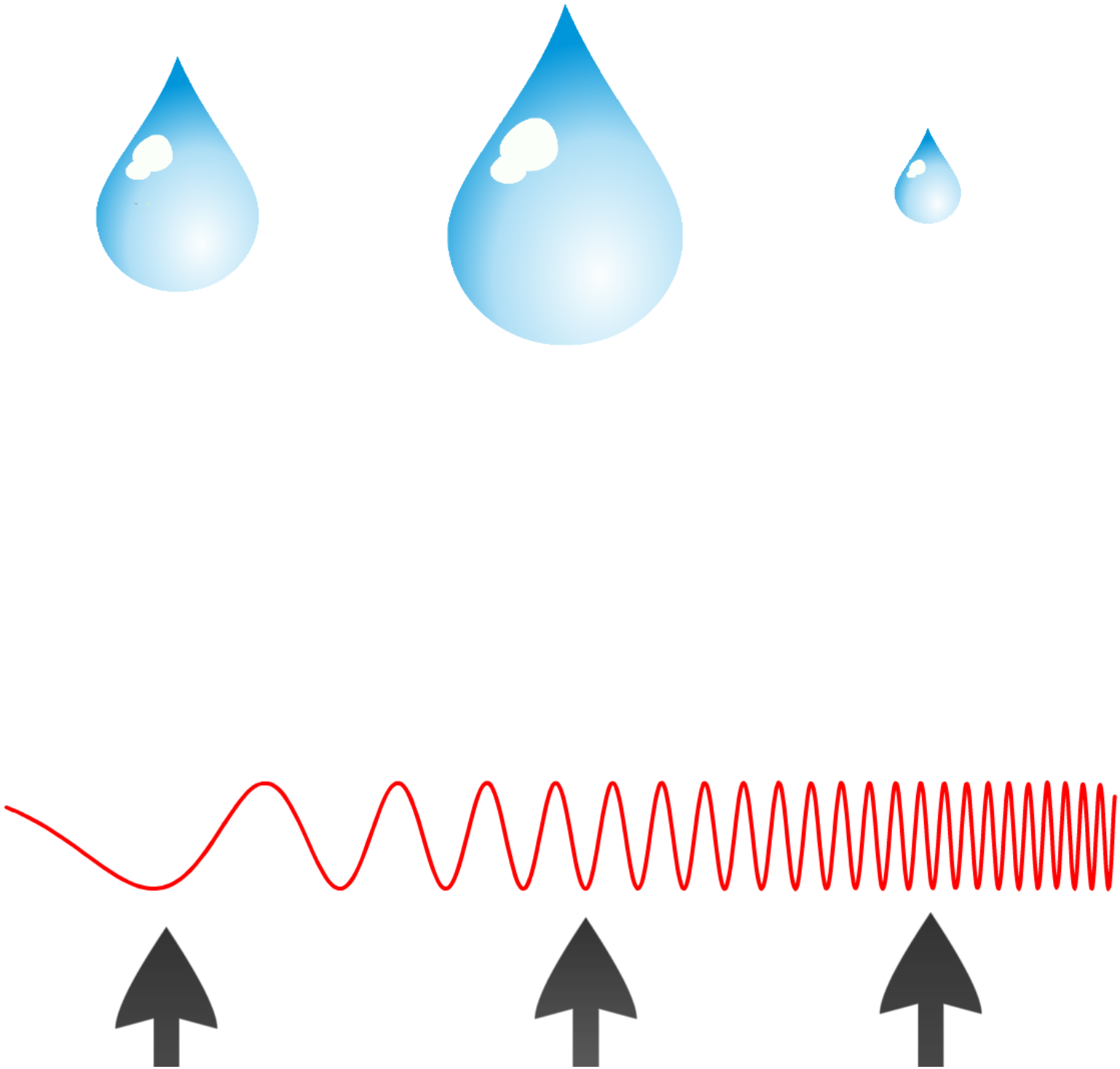
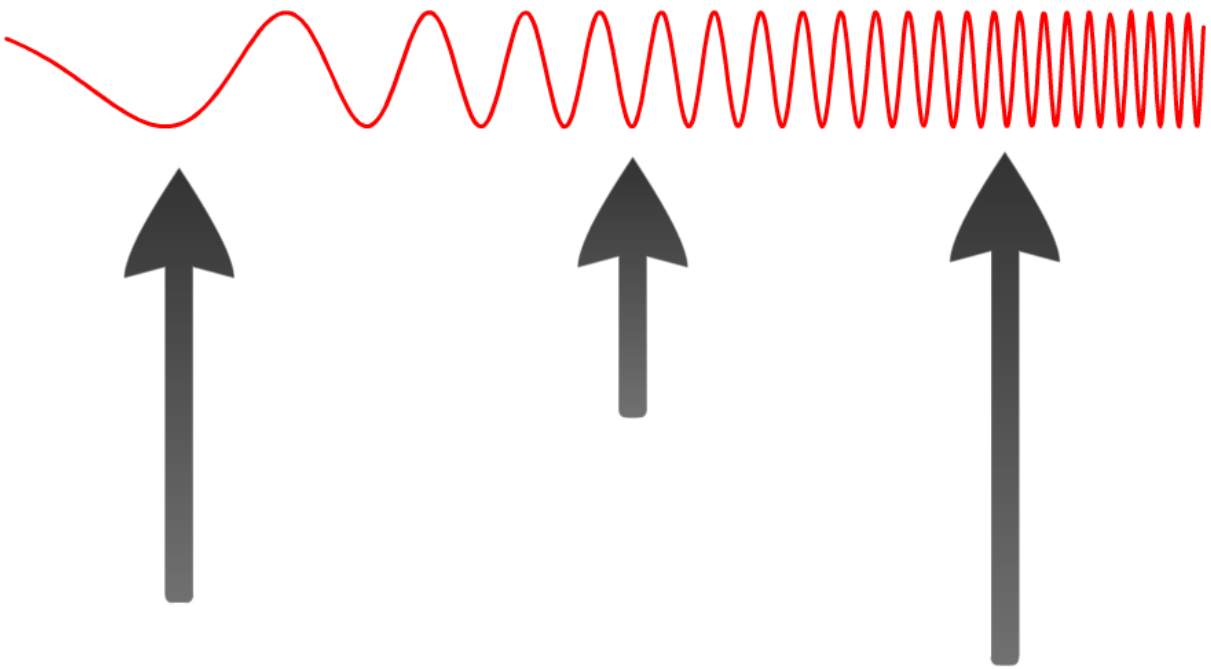
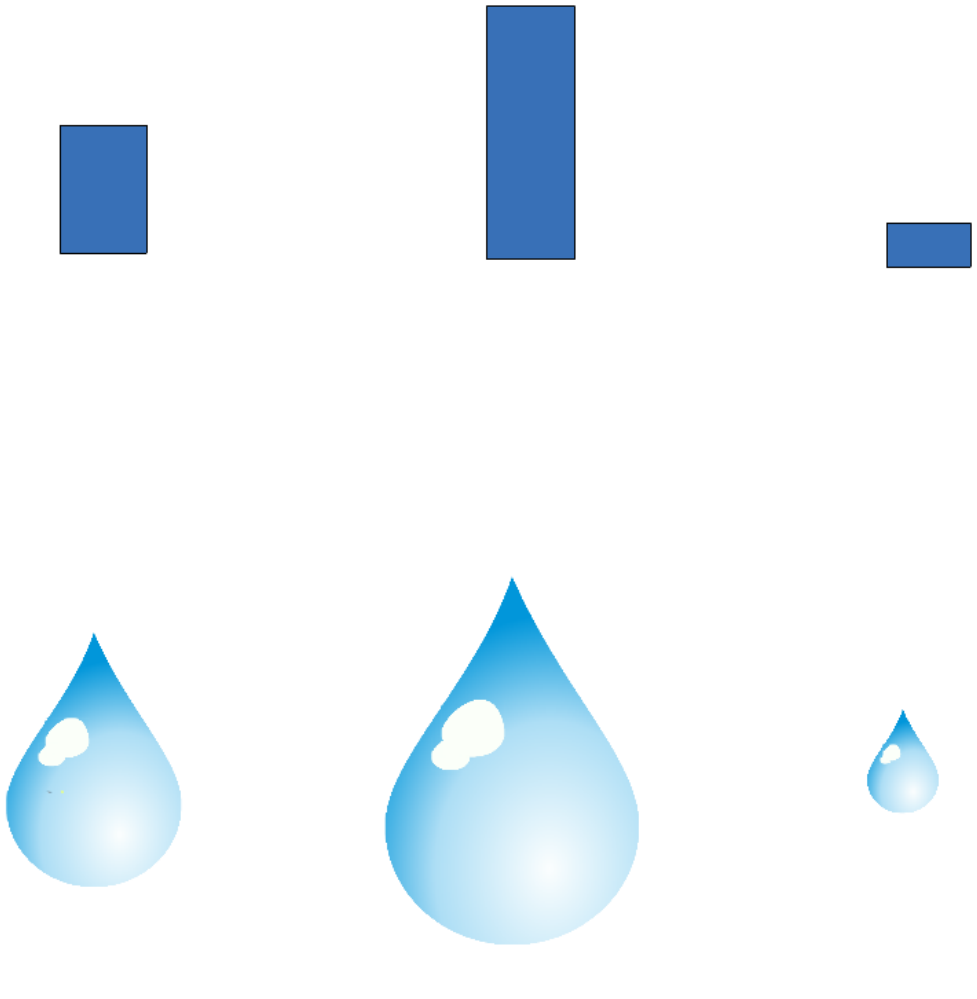
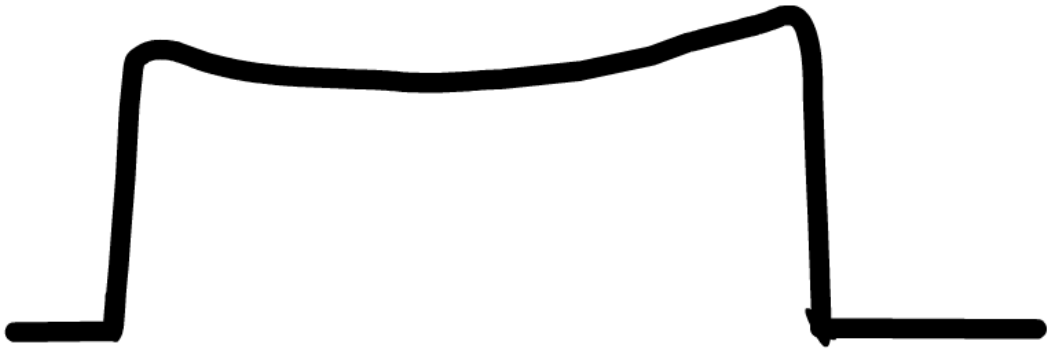








Demonstration of the powerful magnetic field of a clinical 1.5 Tesla MR scanner

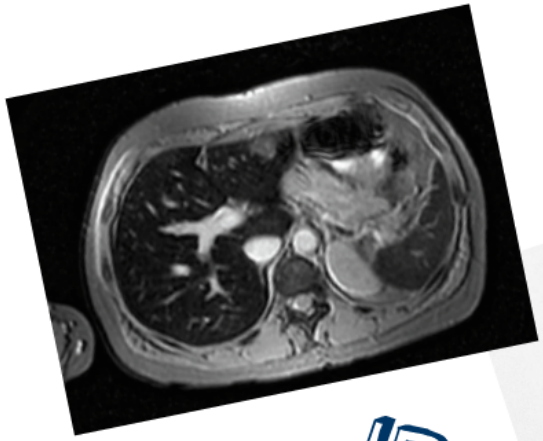
Part II - Oxygen bottle

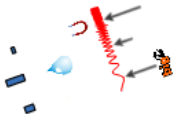
by
G. Starck, B. Vikhoff-Baaz, K. Lagerstrand,
E. Forssell-Aronsson och S. Ekholm

SAHLGRENSKA
UNIVERSITY HOSPITAL

2004

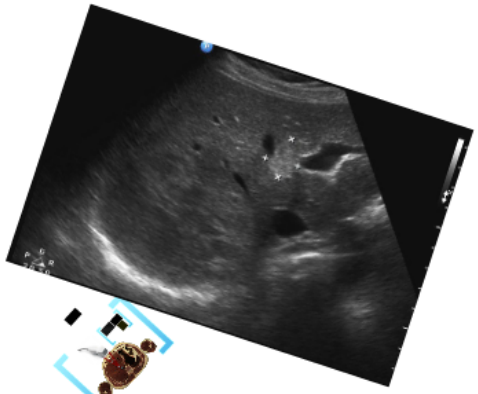
Imagerie

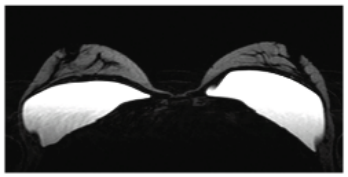


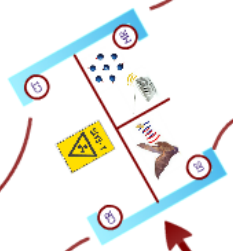


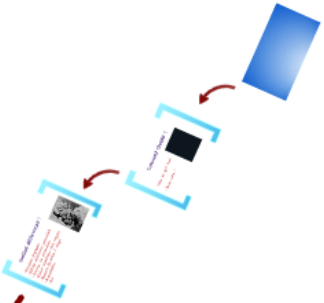
IRM

Echographie









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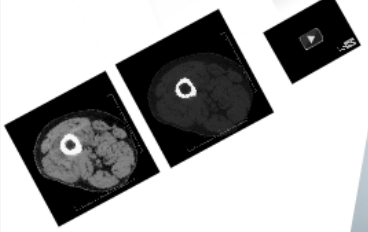
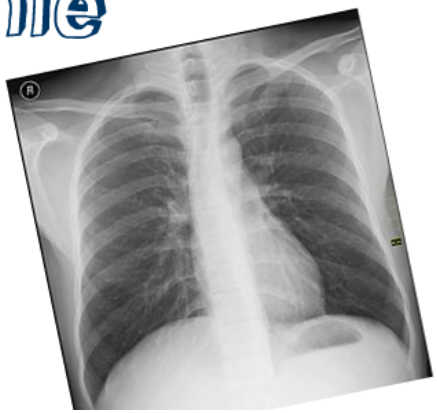
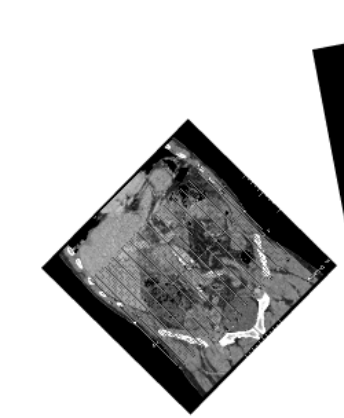
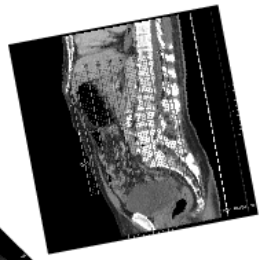
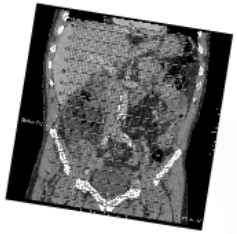


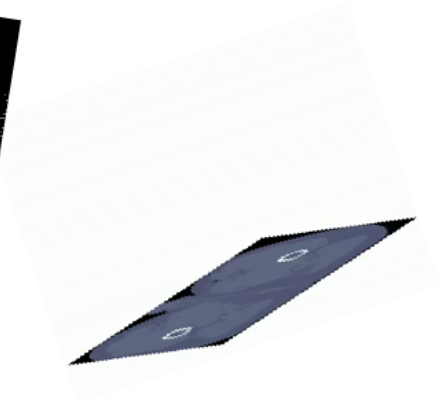
Radiographie

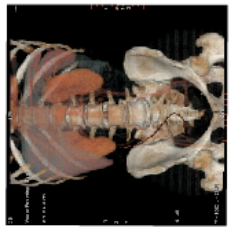




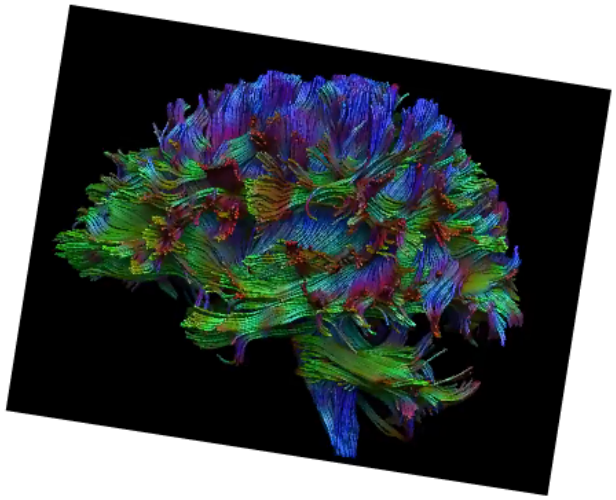


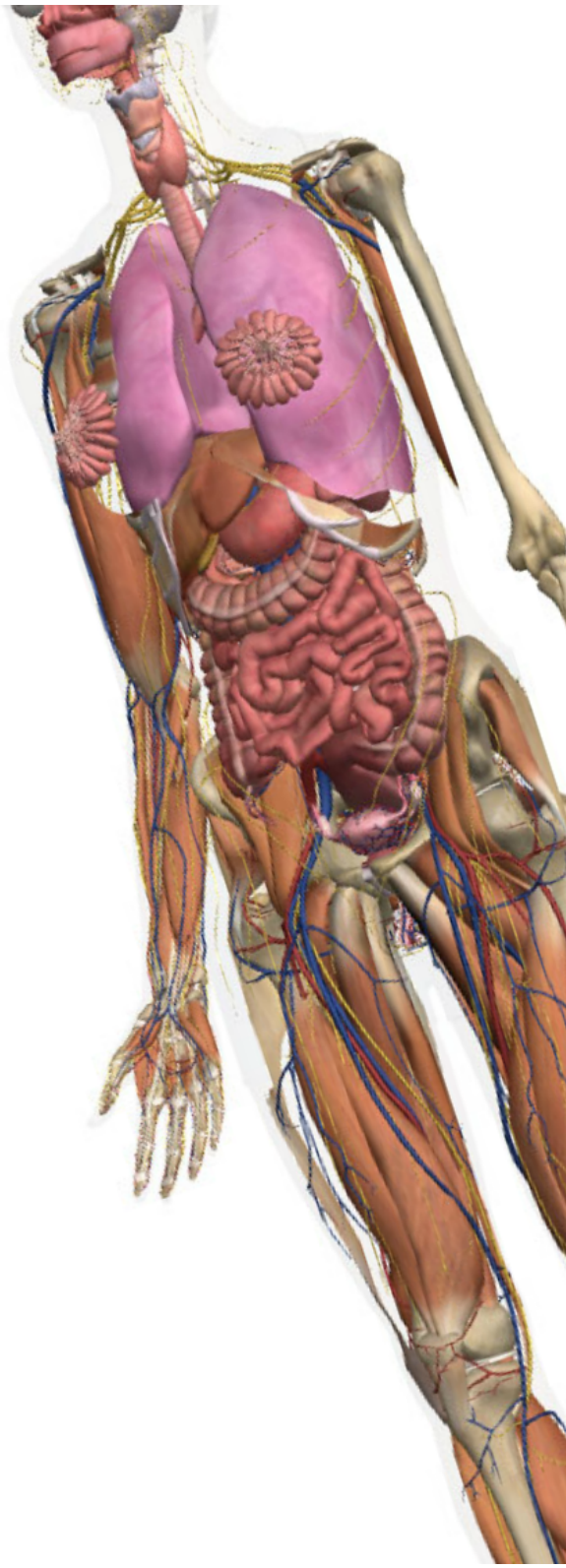






3D





CR

CT

US

MR

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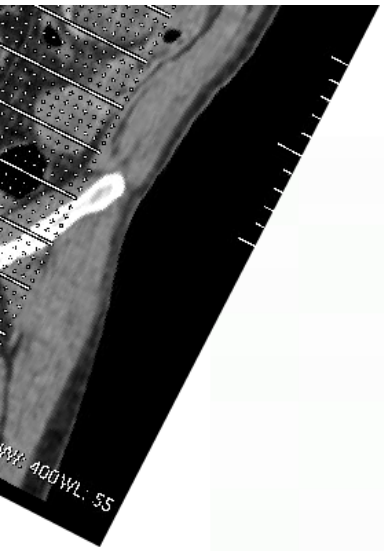
CT

US

MR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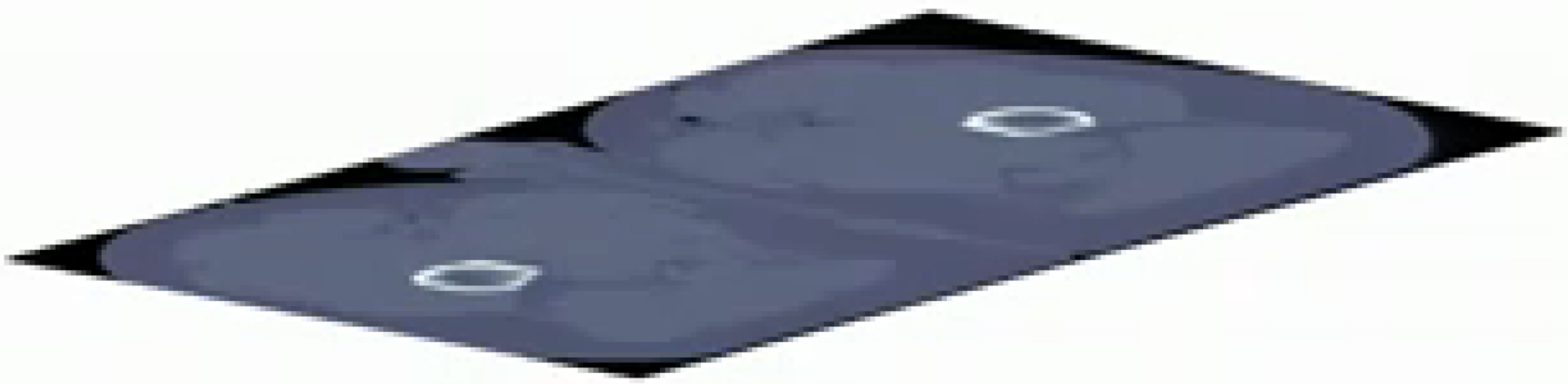

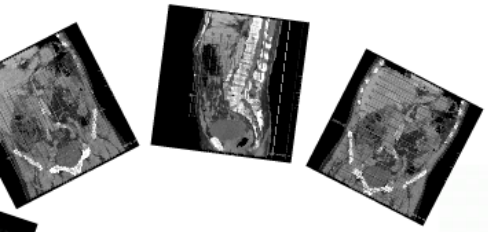

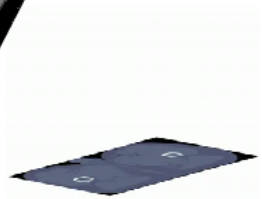

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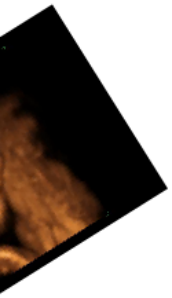
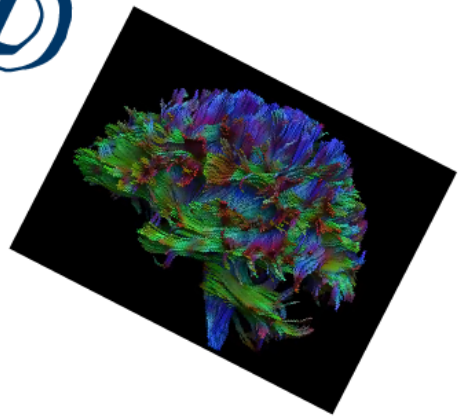
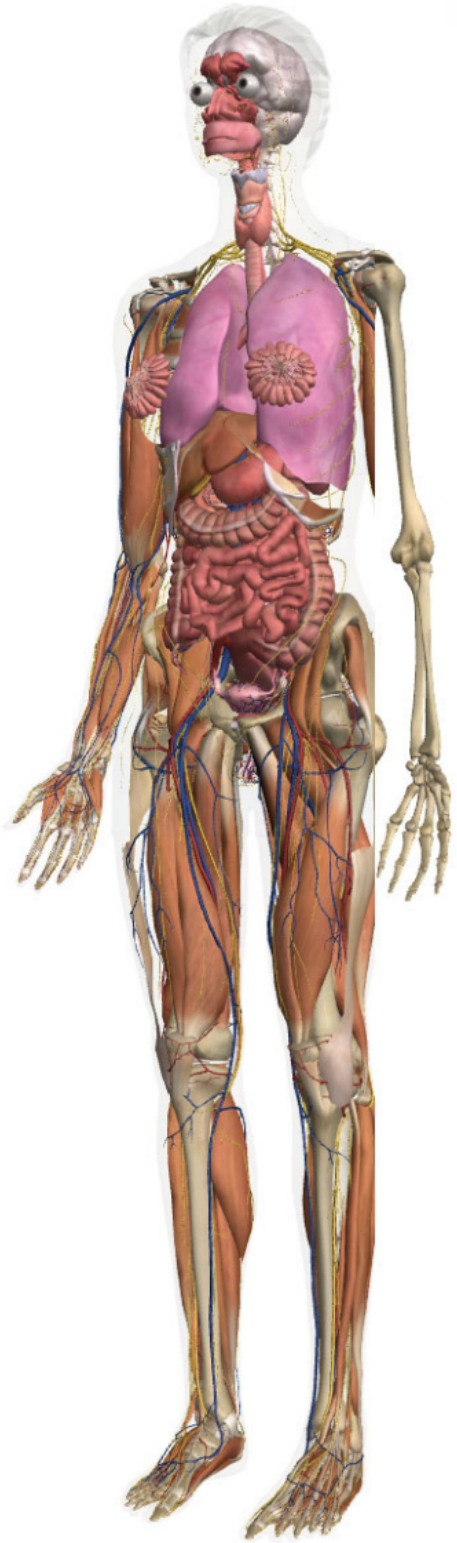
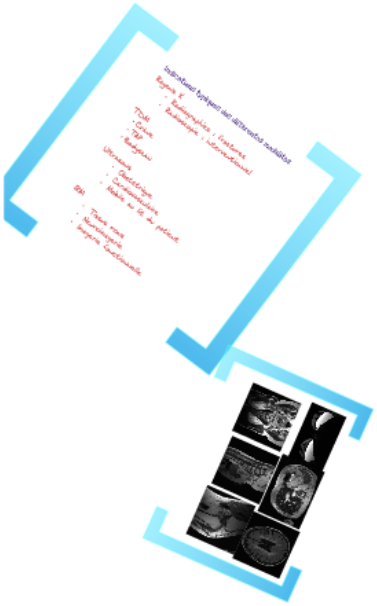
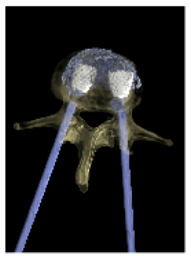


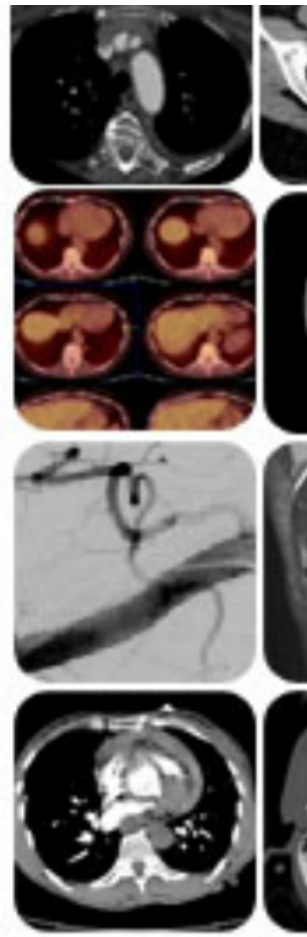






Médical





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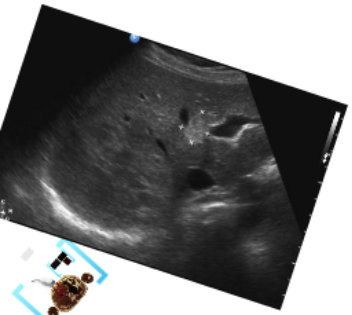

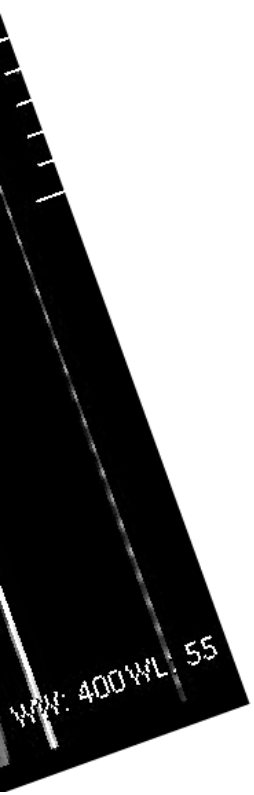
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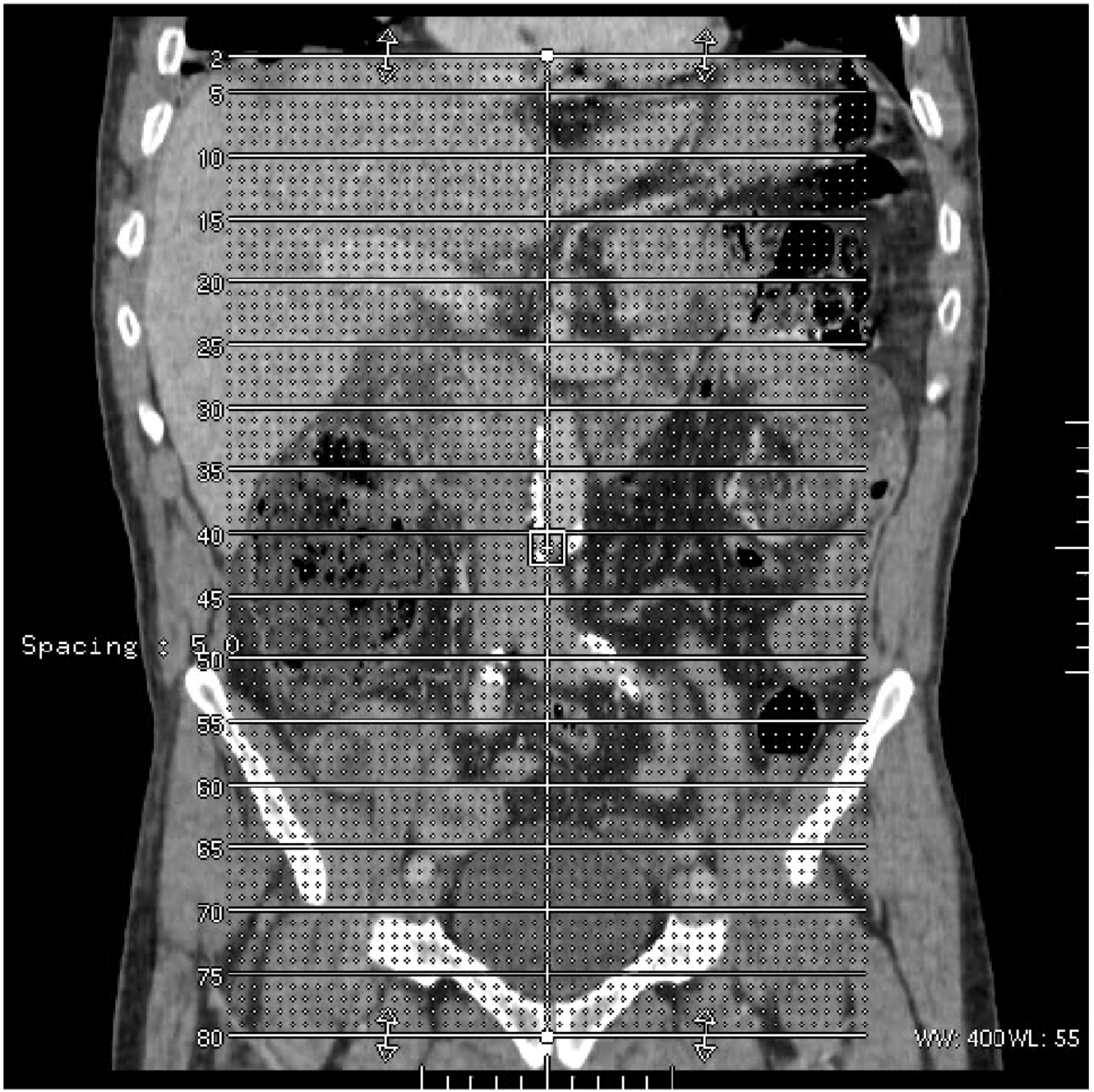
2
5
10
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25
30
35
40
45
50
55
60
65
70
75
80
Spacing : 5.0
WW: 400 WL: 55


2
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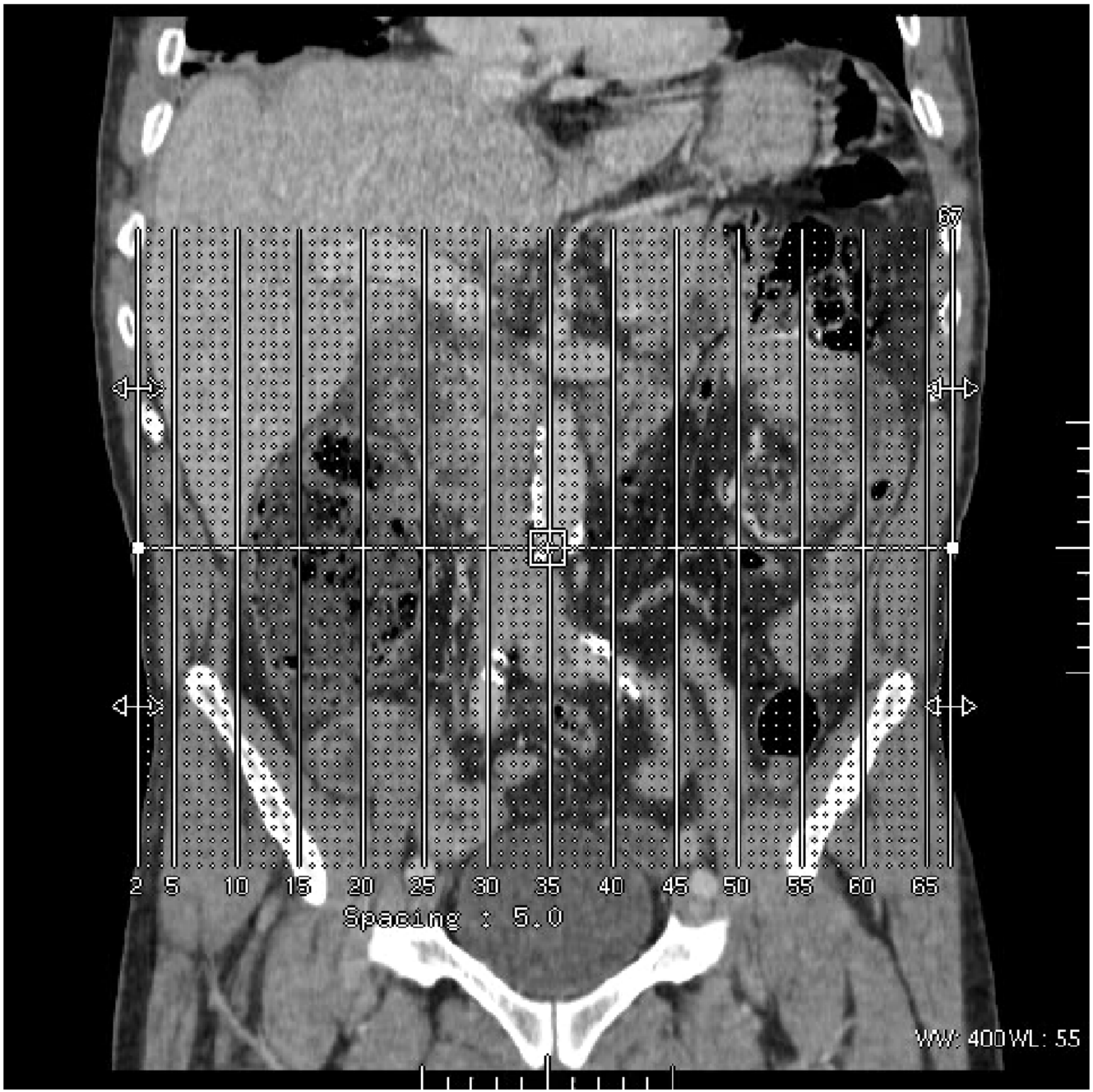
20
25
30
35
40
42
WW: 400 WL: 55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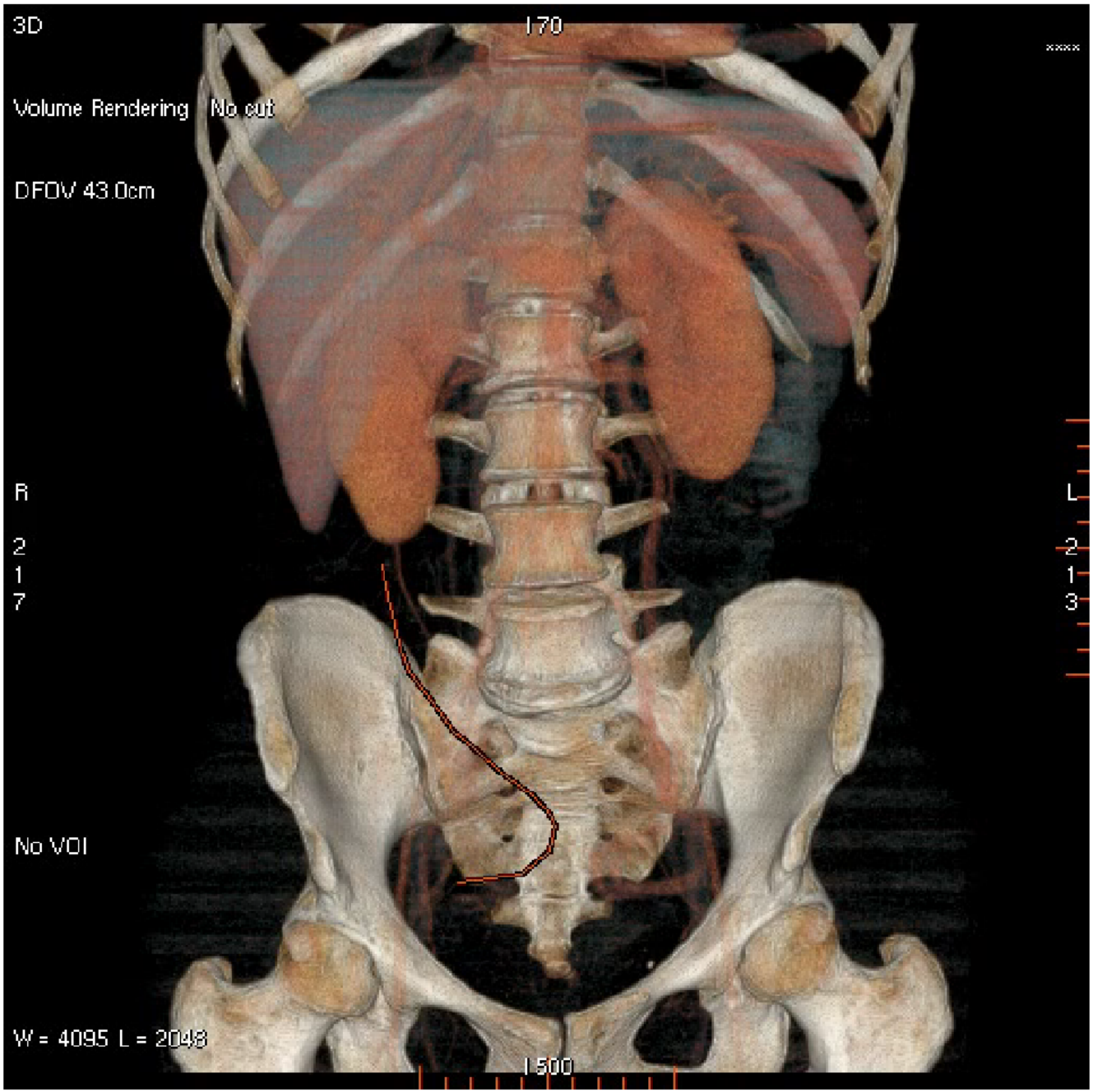
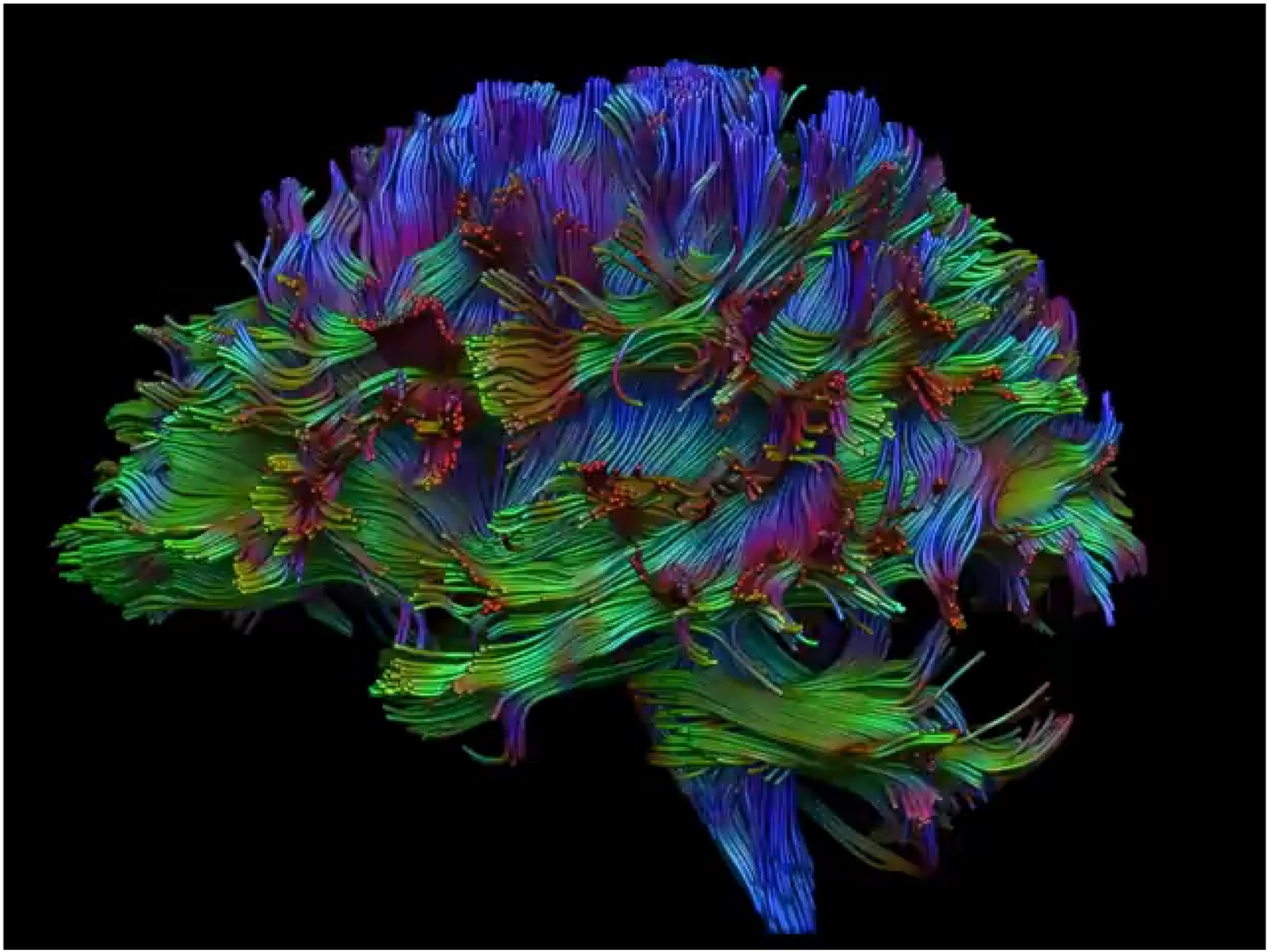
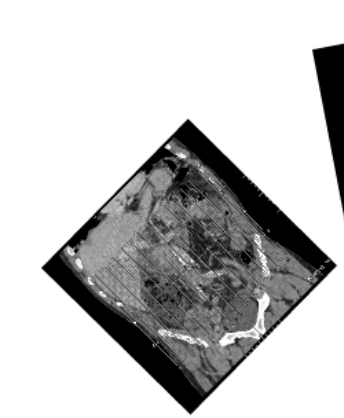
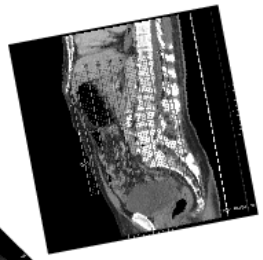
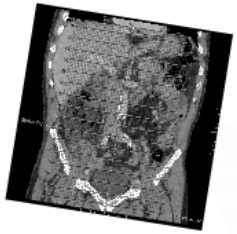
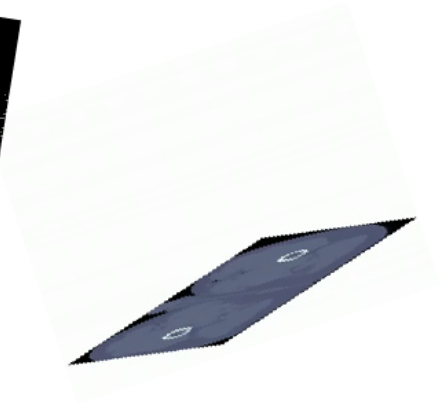

3D
I 70
Volume Rendering No cut
DFOV 43.0cm
R
2
1
7
L
2
1
3
No VOI
W = 4095 L = 2048
I 500

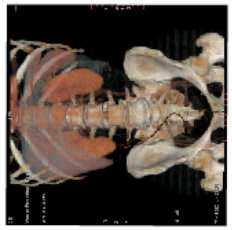












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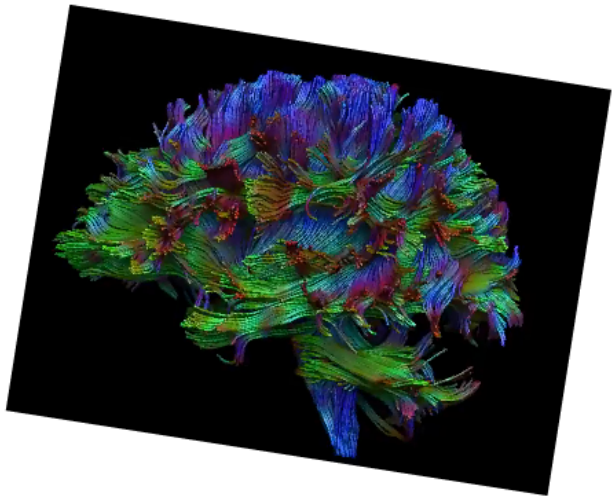
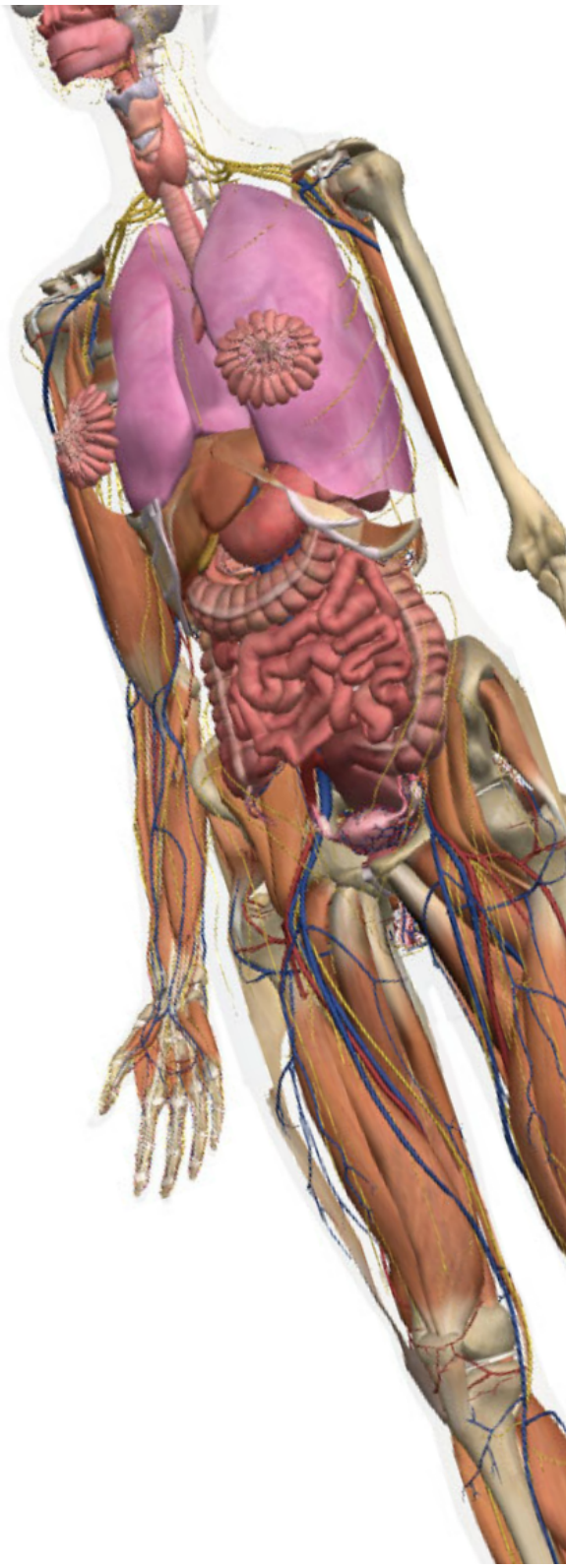
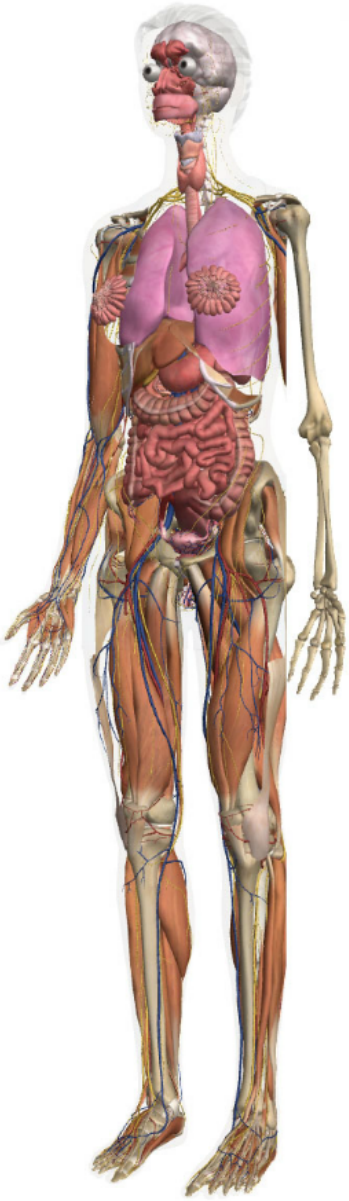
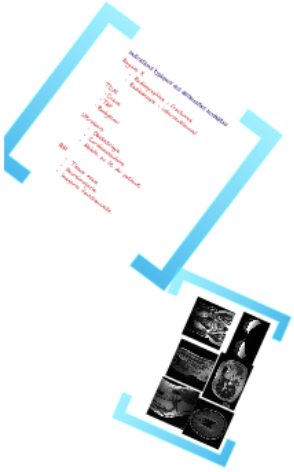


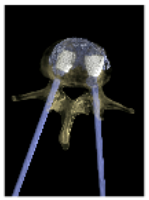




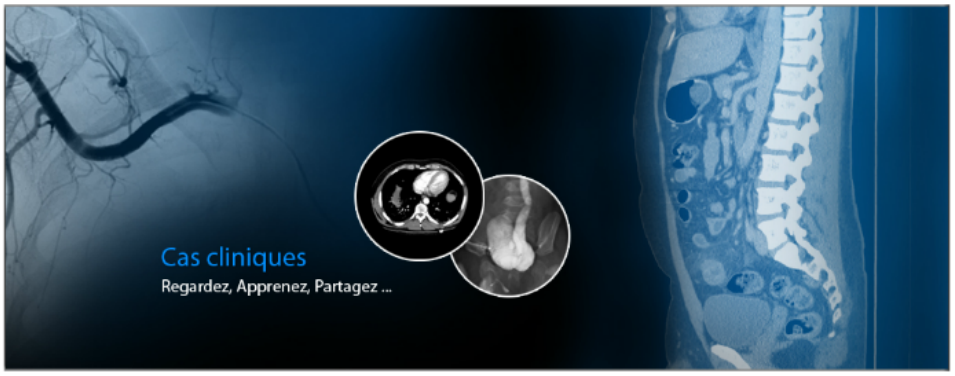

Interactive MRI Visualization for Neurosurgical Planning
Golby, A.J., et al.
Video Supplement

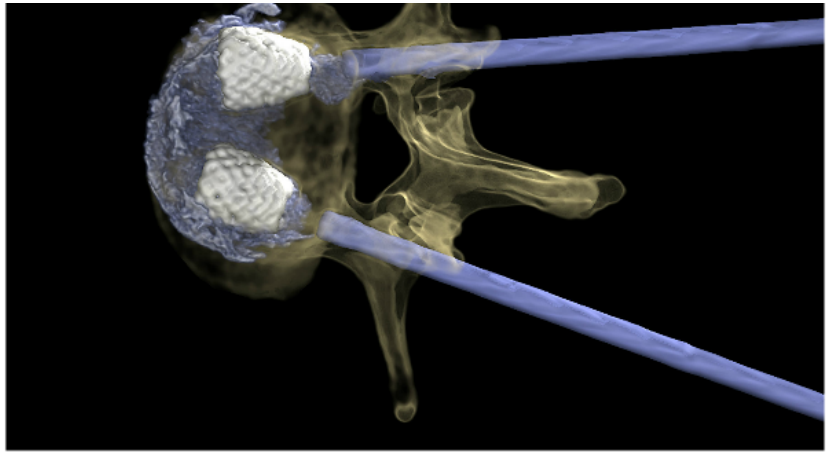


Médical




Cas Cliniques


Cas cliniques
Regardez, Apprenez, Partagez ...



Médical

Indications typiques des différentes modalités

Rayons X

- Radiographies : fractures
- Radioscopie : interventionnel

TDM

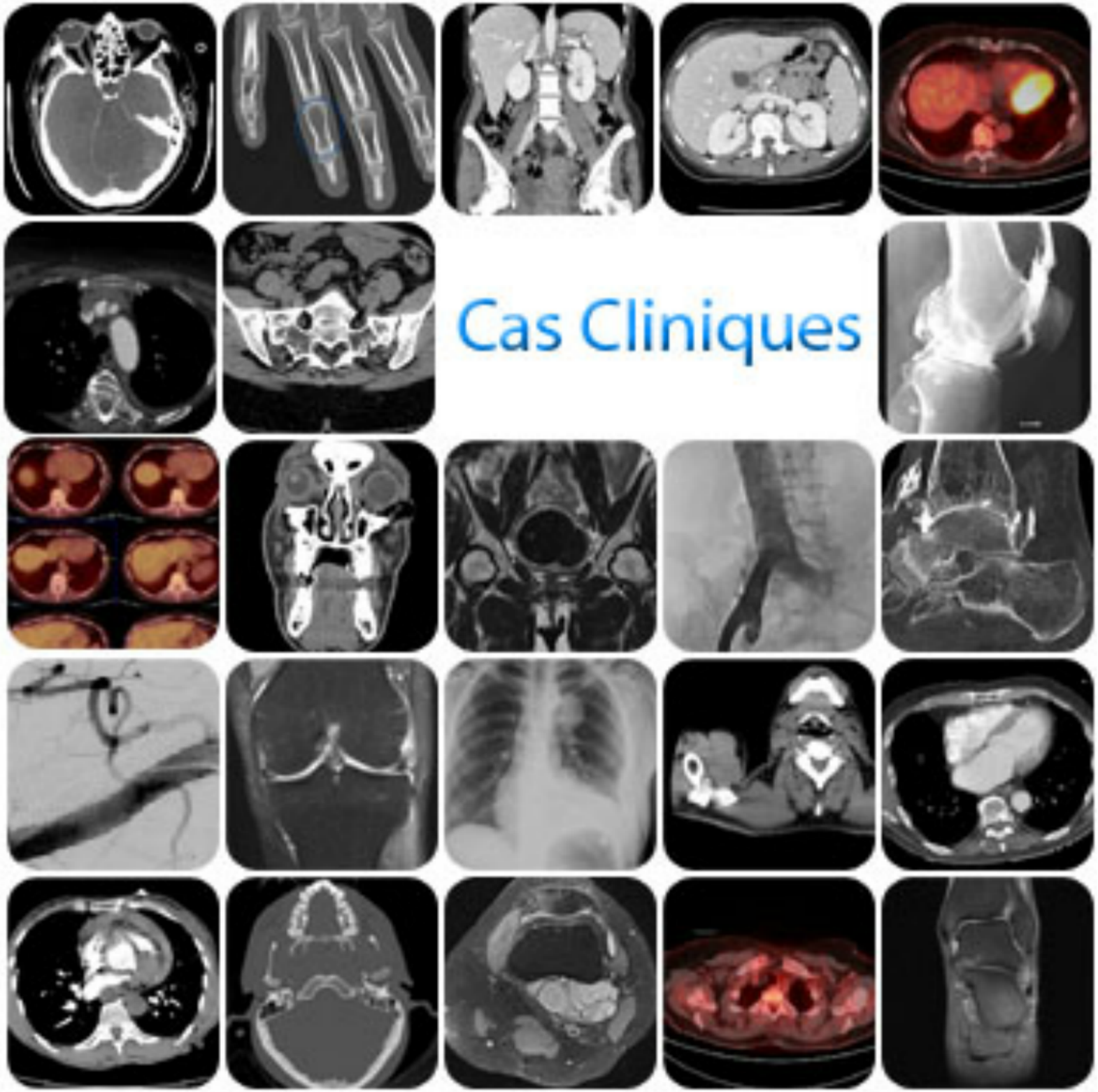
- Crâne
- TAP
- Bodyscan

Ultrasons

- Obstétrique
- Cardiovasculaire
- Mobile au lit du patient

IRM

- Tissus mous
- Neuroimagerie
- Imagerie fonctionnelle

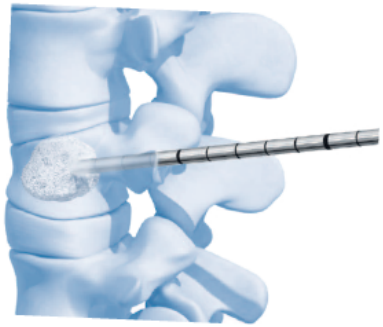

Cas Cliniques

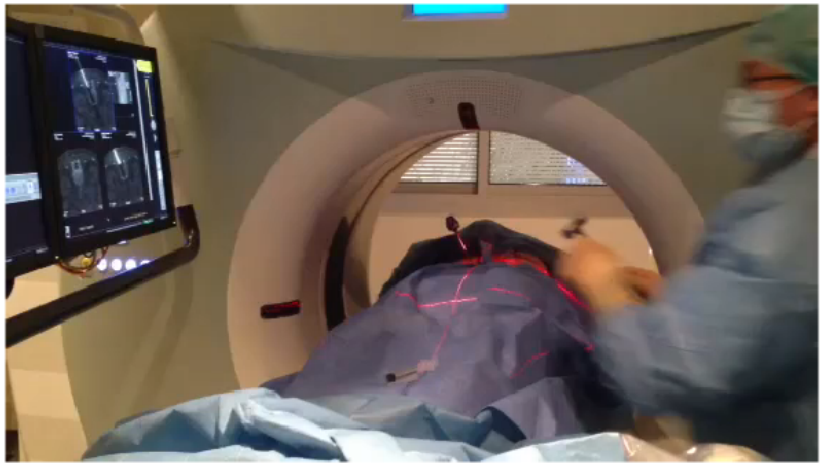
Interactive DTI Visualization for Neurosurgical Planning

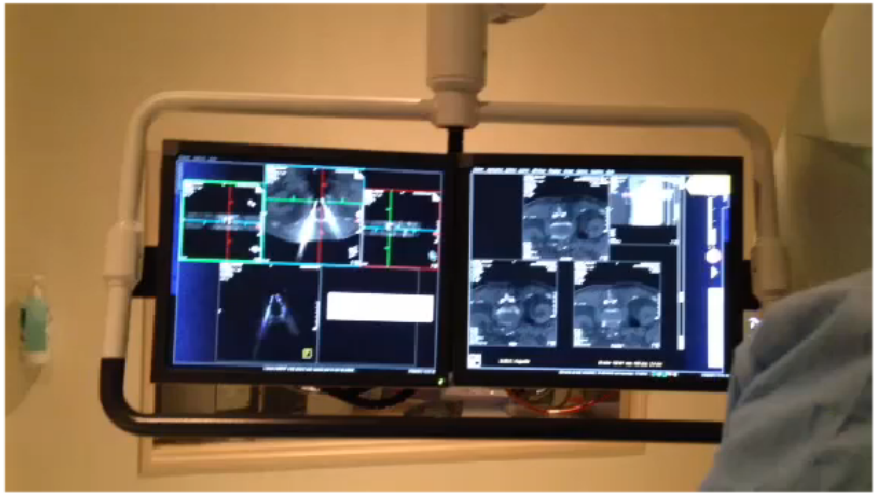
Golby, A.J., et al.

Video Supplement

Interventionnel guidé par TDM







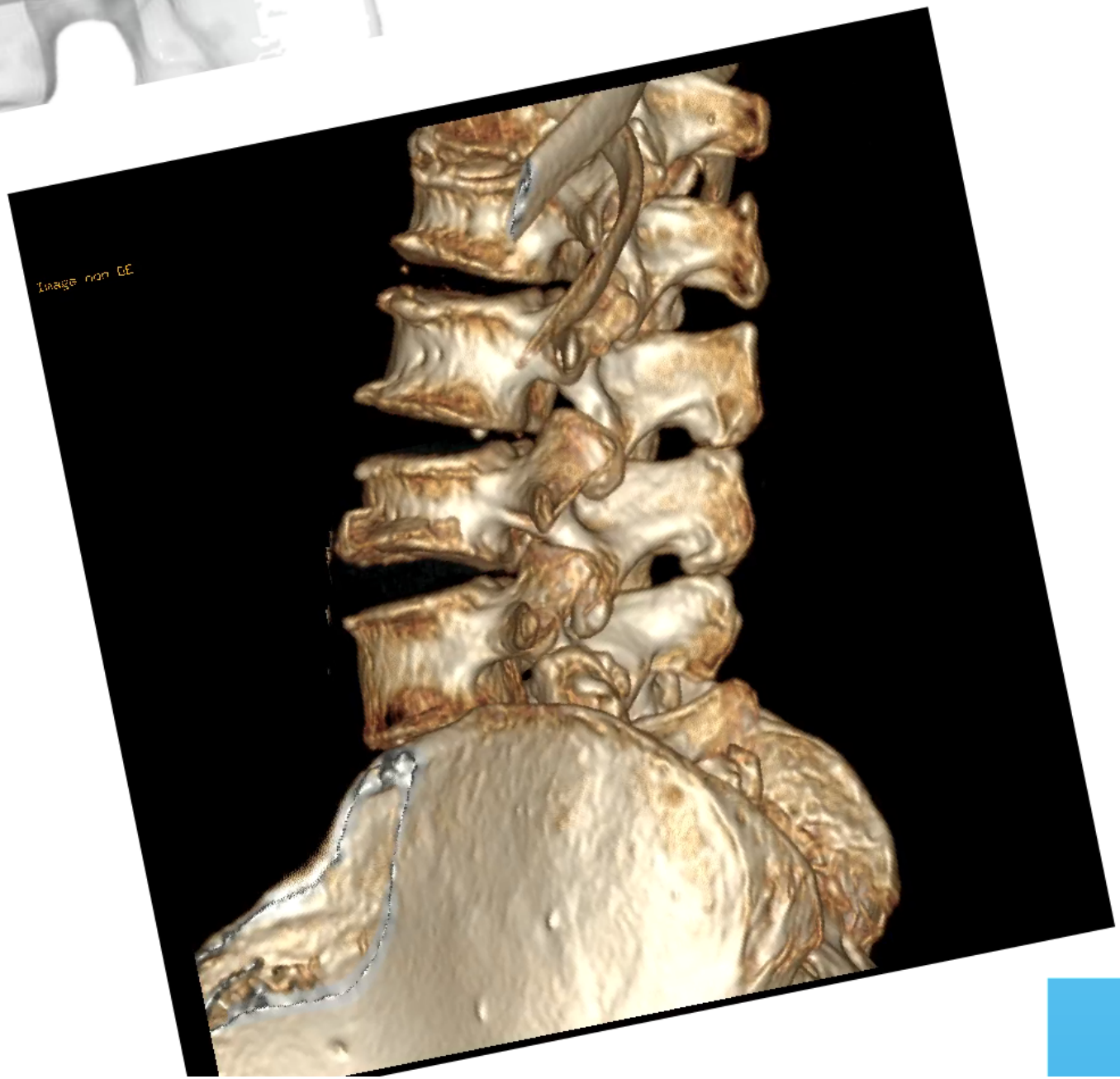


Image non GE


Cas cliniques
Regardez, Apprenez, Partagez ...


Imagerie
IRM
Scanner
Radiographie
Echographie
3D
Médical
Cas Cliniques
Réalité augmentée
Serious games
IMAIOS
CAD
Collaboratif
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e-Learning
ANATOMY Ninja


Imagerie médicale
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ANATOMY Ninja
Jouer
Continuer
Paramètres
Difficulté

IMAIOS

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CAD

e-Le

ames


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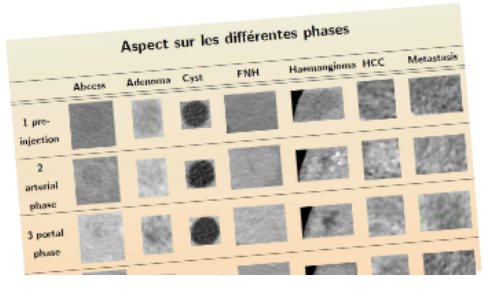
Paramètres
Difficulté

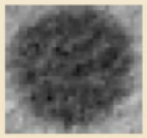
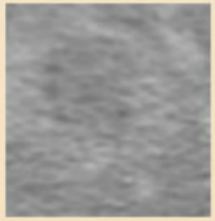
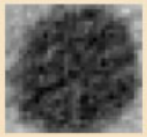
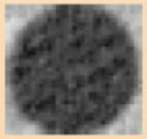
CAD

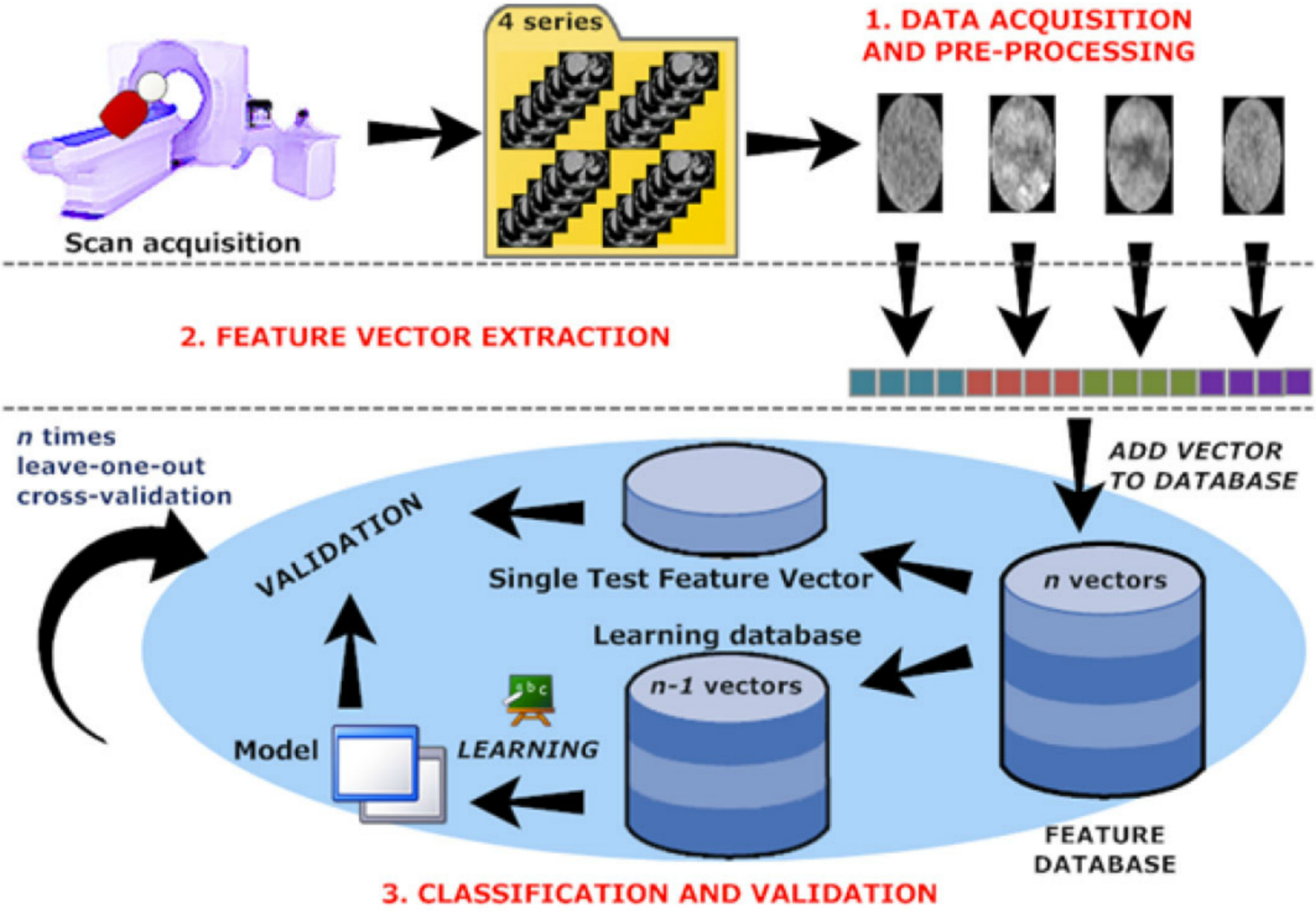


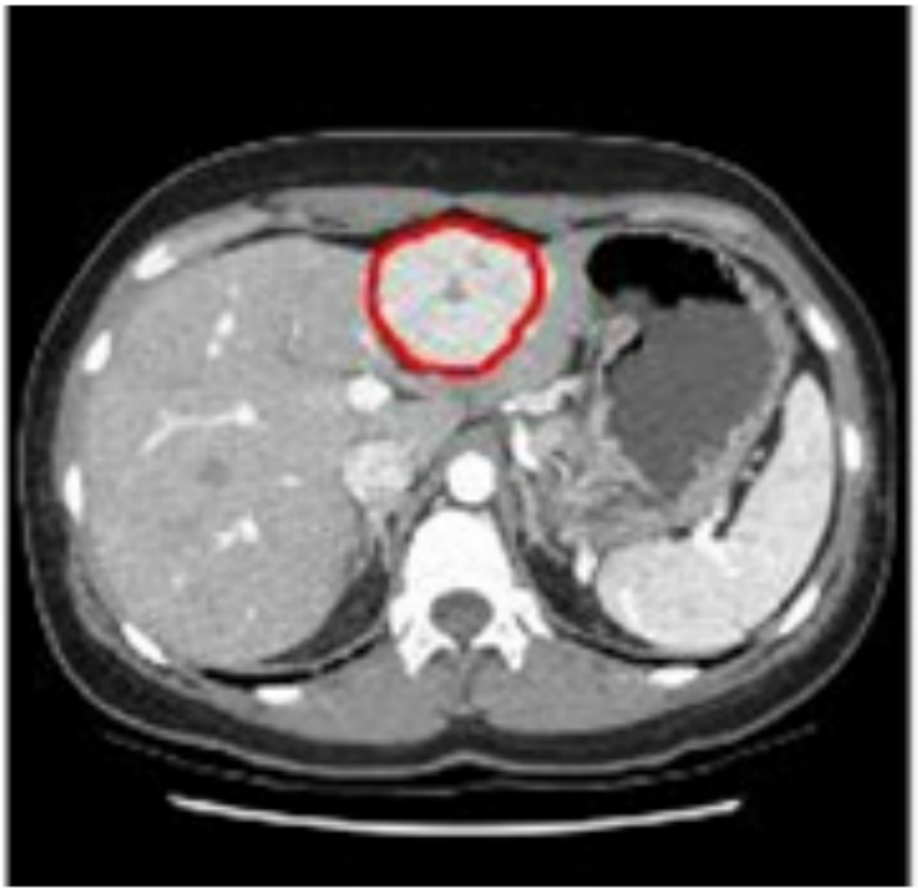
Scan acqui

2.

Aspect sur les différentes phases

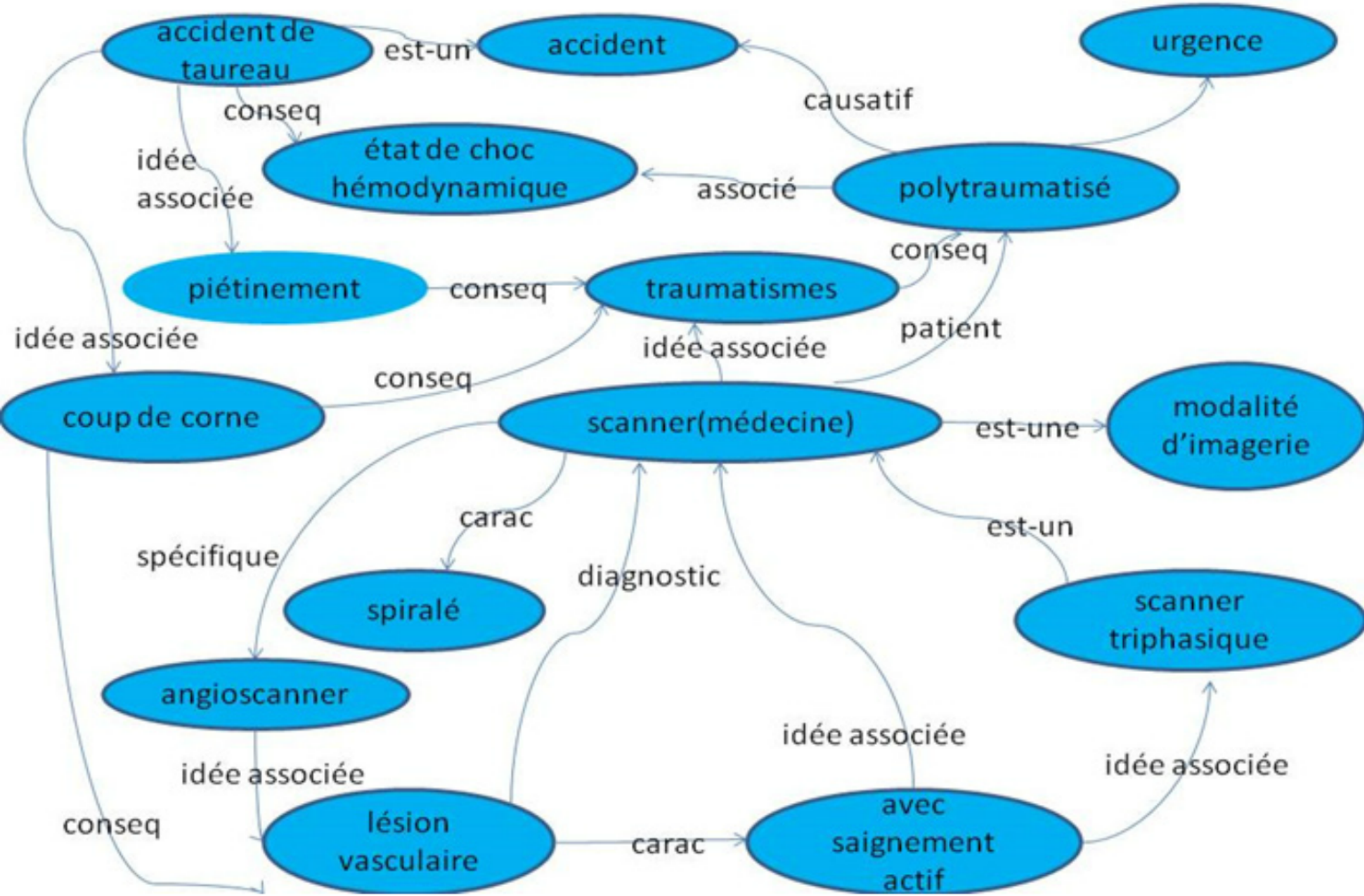
	Abcess	Adenoma	Cyst	FNH	Haemangioma	HCC	Metastasis
1 pre-injection							
2 arterial phase							
3 portal phase							
4 late phase							

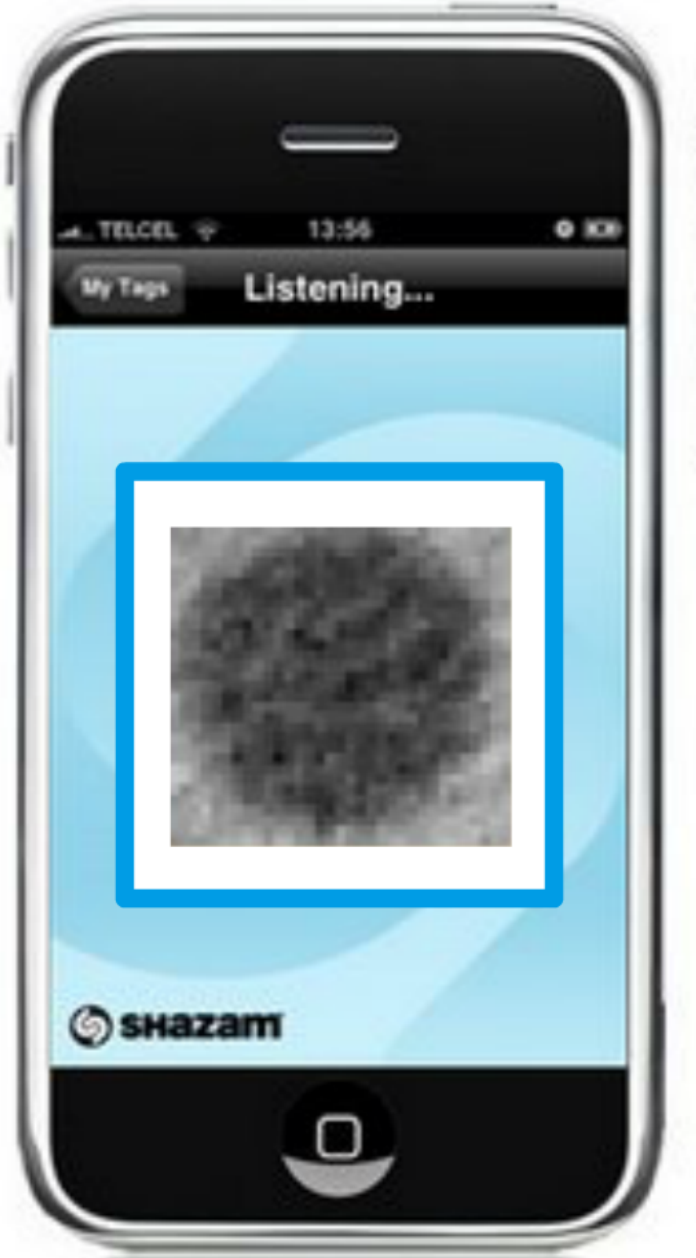

4 series
1. DATA ACQUISITION
AND PRE-PROCESSING
Scan acquisition
2. FEATURE VECTOR EXTRACTION
n times
leave-one-out
cross-validation
ADD VECTOR
TO DATABASE
VALIDATION
Single Test Feature Vector
n vectors
Learning database
n-1 vectors
Model
LEARNING
FEATURE
DATABASE
3. CLASSIFICATION AND VALIDATION

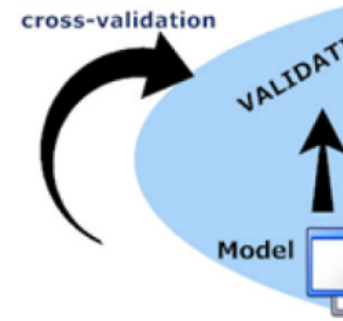


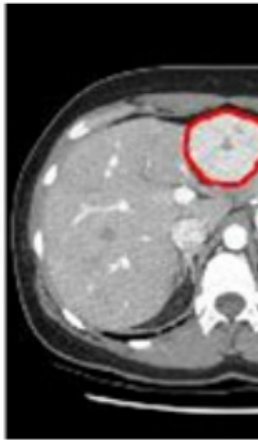
Semantic terms

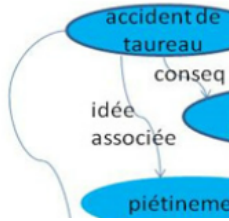
- ☑ heterogeneous
- ☑ perilesional vessels
- ☑ absent rim
- ☑ ovoid
- ☑ circumscribed margin
- ☑ homogeneous fade
- ☑ solitary lesion


accident de taureau
est-un
accident
urgence
causatif
conseq
état de choc hémodynamique
idée associée
associé
polytraumatisé
conseq
piétinement
conseq
traumatismes
idée associée
patient
idée associée
conseq
coup de corne
scanner(médecine)
est-une
modalité d'imagerie
carac
est-un
spécifique
diagnostic
spiralé
scanner triphasique
angioscanner
idée associée
idée associée
idée associée
conseq
lésion vasculaire
carac
avec saignement actif


TELCEL
13:56
My Tags
Listening...
shazam


cross-validation
Model




accident de
taureau
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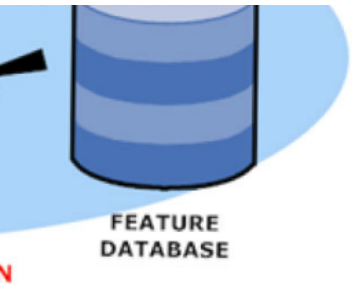
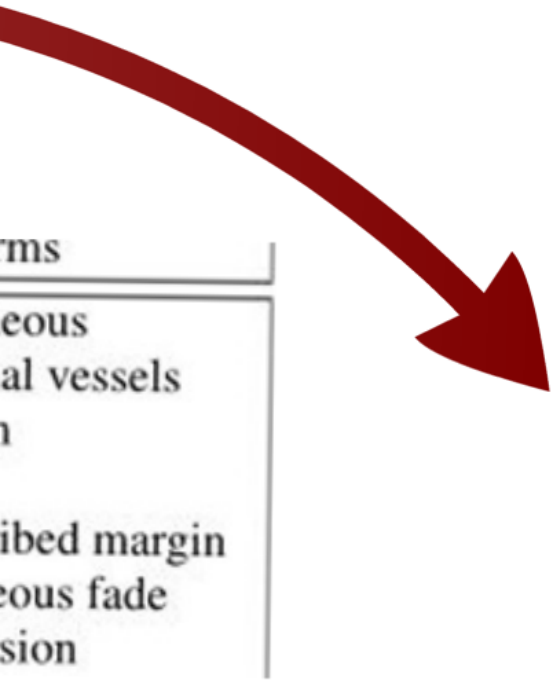

FEATURE
DATABASE


rms
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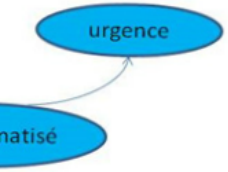
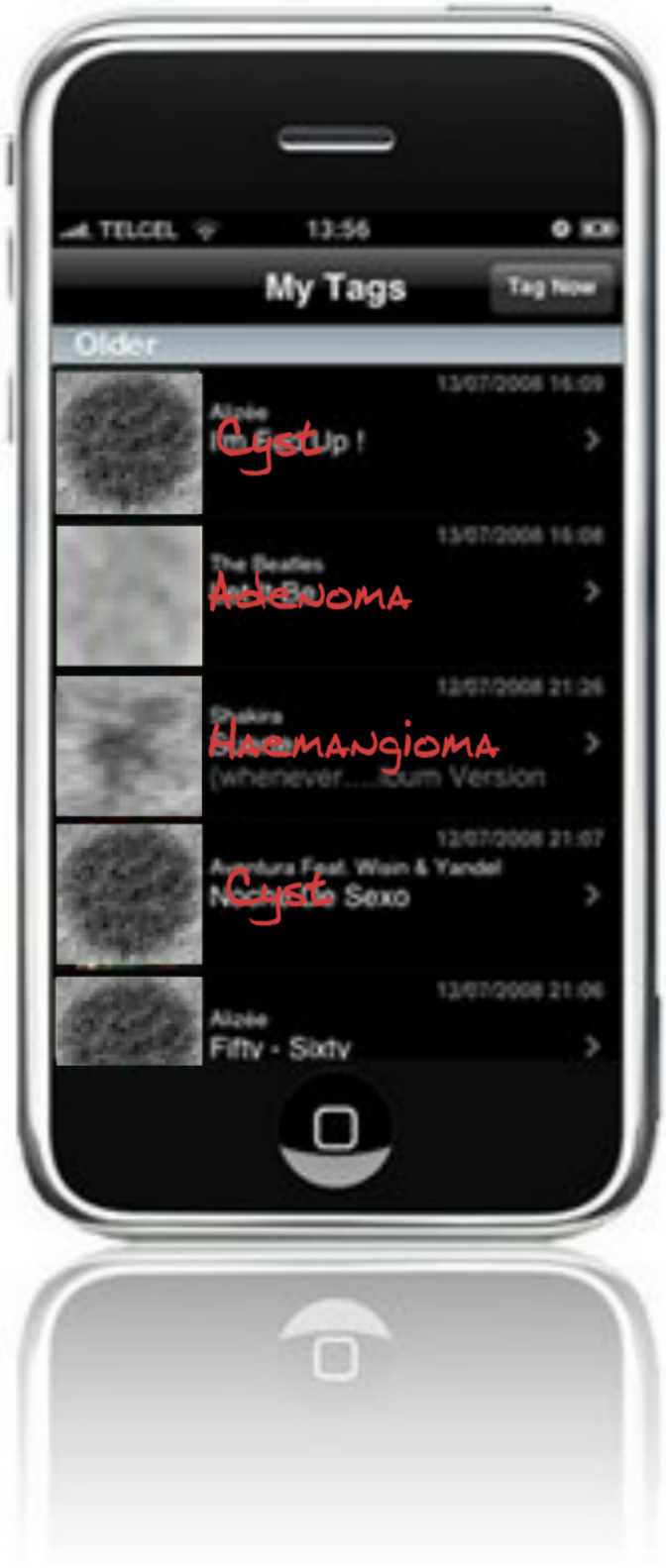
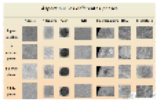
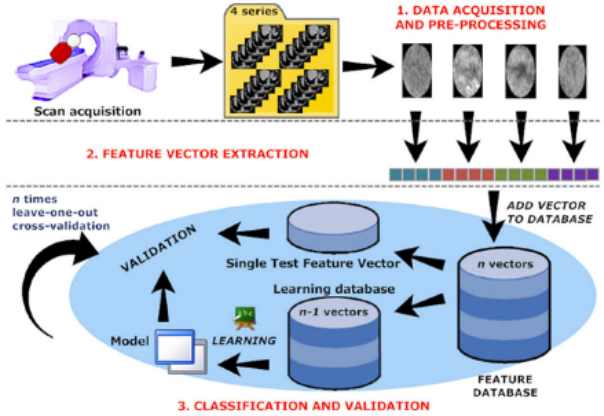

urgence
natisé

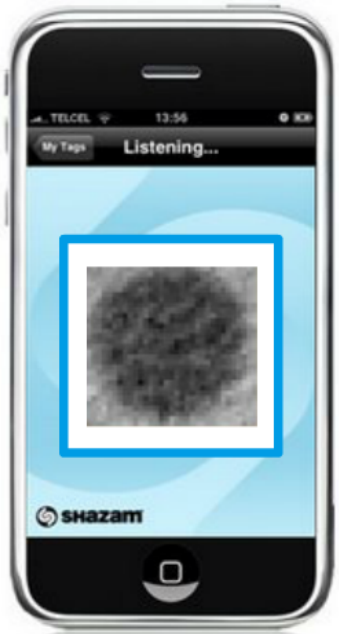

une
modalité
d'imagerie

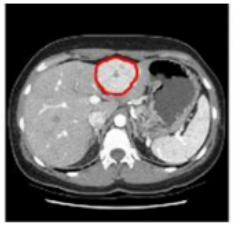

TELCEL
13:56
My Tags
Tag Now
Older
Cyst
Adenoma
Haemangioma
Cyst
Fifty - Sixty

CAD









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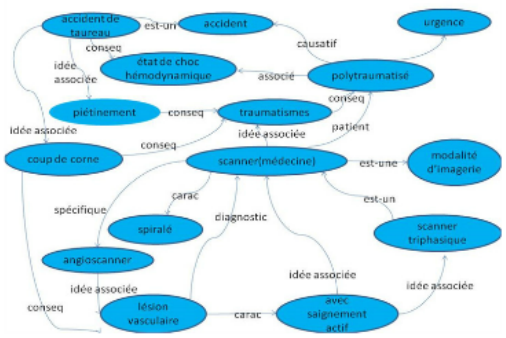
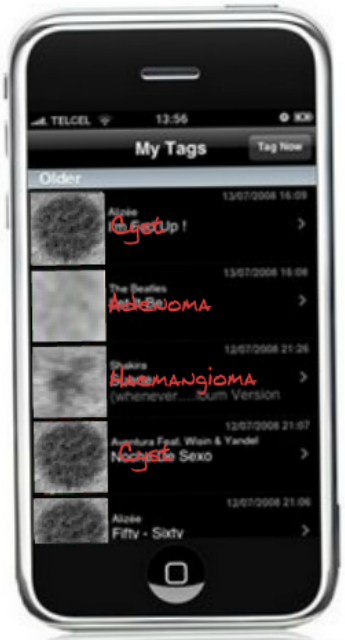
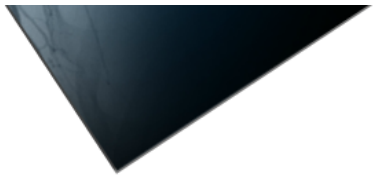
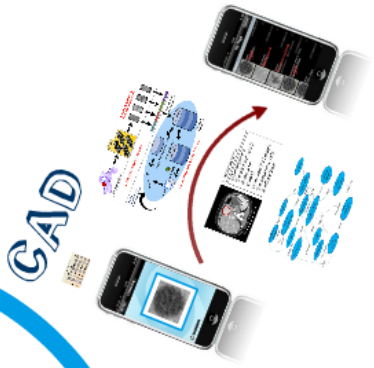




e-Learning

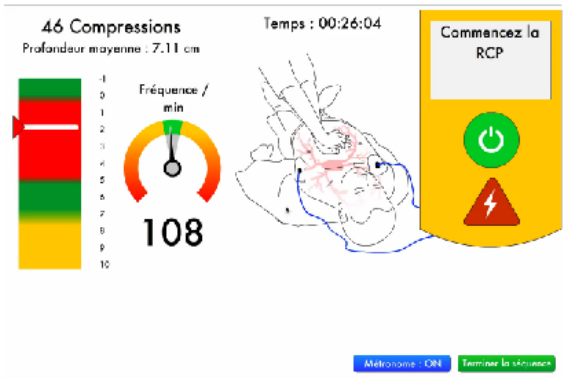
Web + Mobile

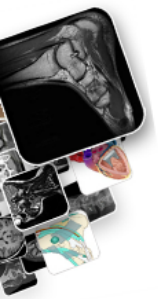


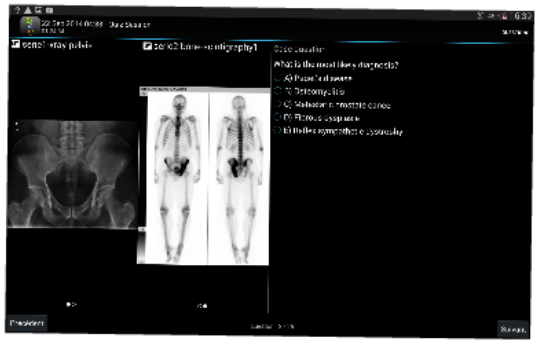


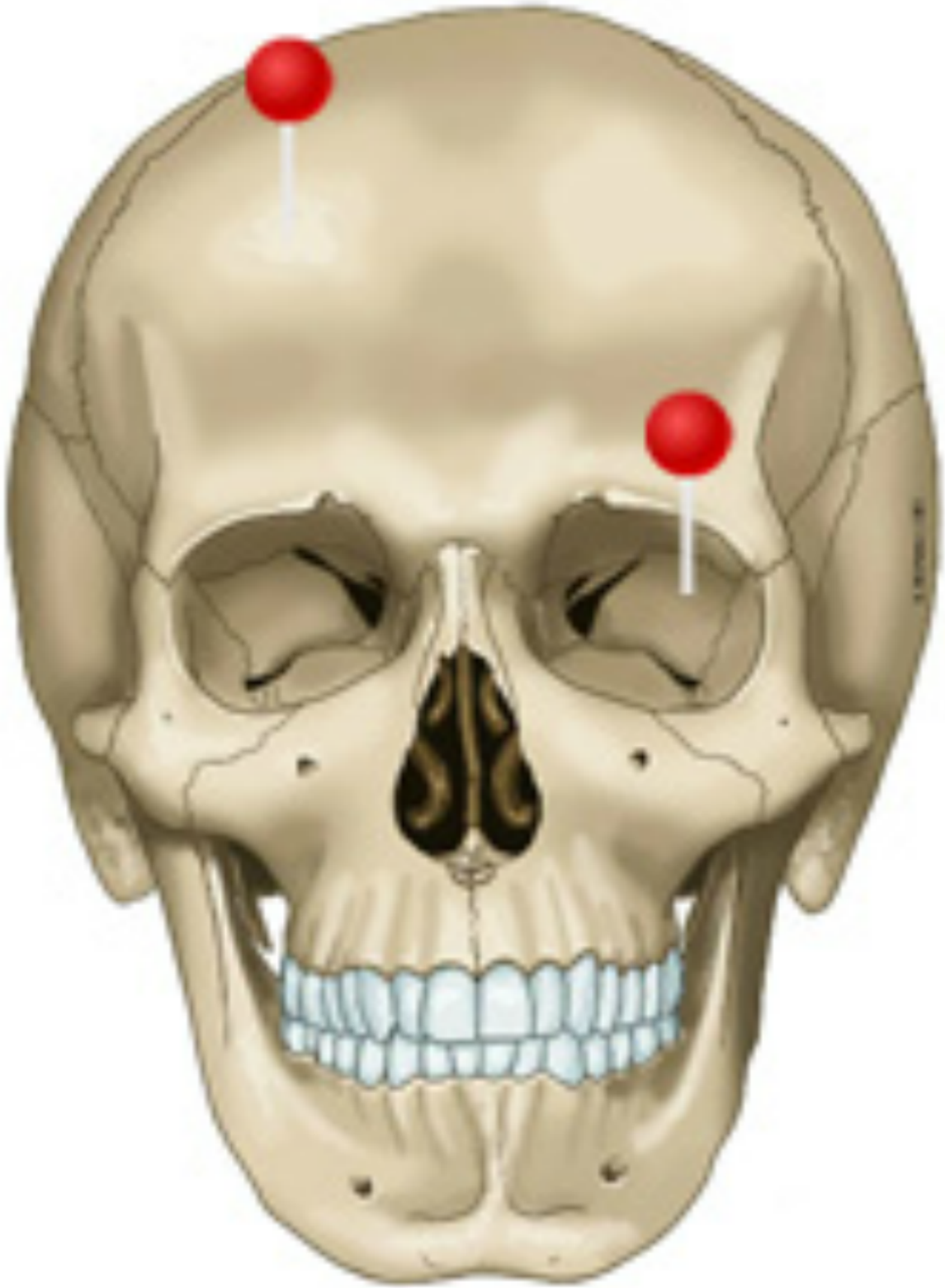
e-Learning

Web + Mobile

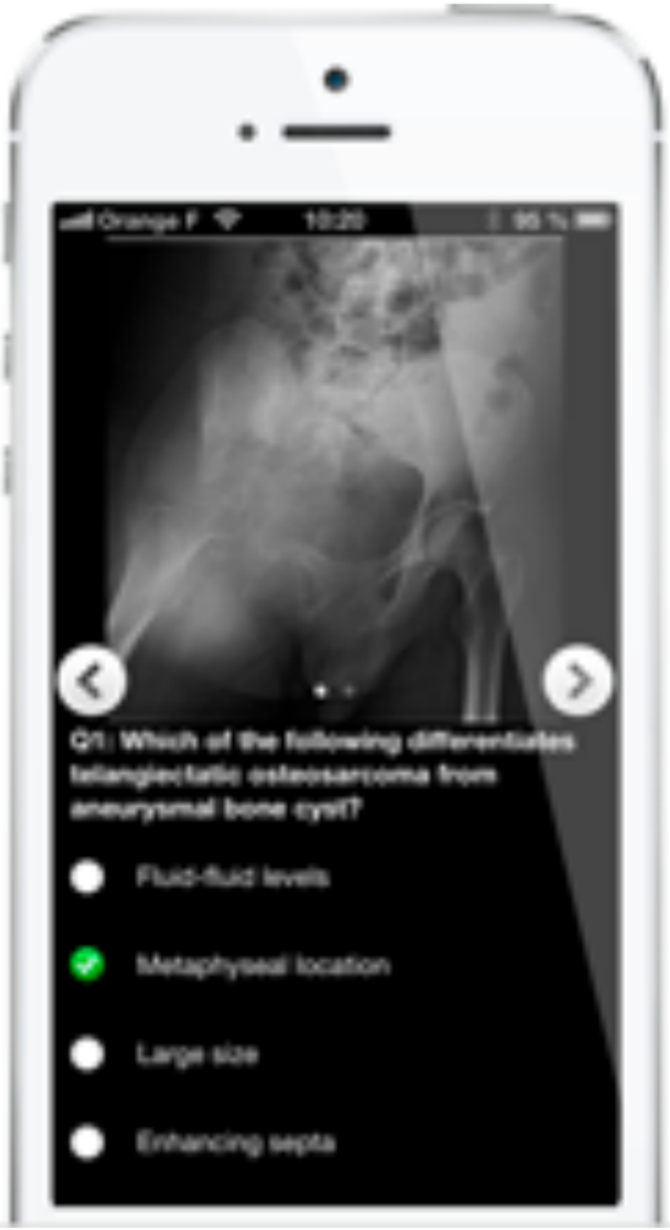








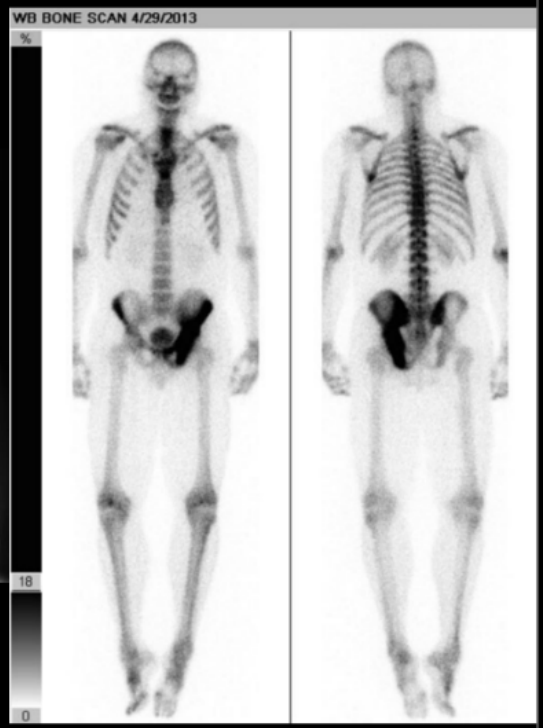

Orange F
11:19
96 %
Custom Session
Next
Select the organ systems you would like to focus on:
All
Breast
0 questions
Cardiac
0 questions
GI
12 questions
MSK
0 questions
Neuro
0 questions
Peds
1 question
Thorax
0 questions
Repro - Endo
0 questions
Urinary
18 questions for current selection
Sessions
History
Progress
Bundles


Orange F
10:20
96 %
Q1: Which of the following differentiates telangiectatic osteosarcoma from aneurysmal bone cyst?
Fluid-fluid levels
Metaphyseal location
Large size
Enhancing septa


Orange F
10:20
96 %
Q1: What radiotracer was used in this examination?
In-111 WBC
Tc99m-MDP
Tc99m-HIDA
Tc99m sestamibi

serie1-xray-pelvis

serie2-bone-scintigraphy1



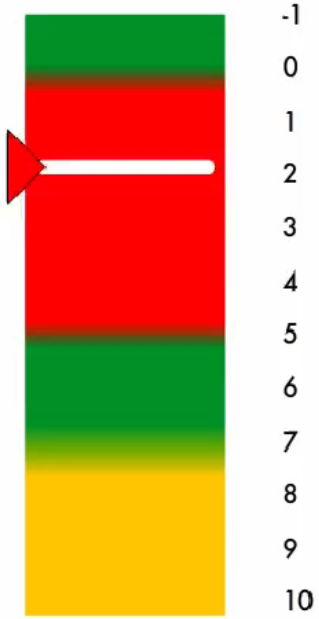
Case question

What is the most likely diagnosis?

- A) Paget's disease
- B) Osteomyelitis
- C) Metastatic prostate cancer
- D) Fibrous dysplasia
- E) Reflex sympathetic dystrophy

46 Compressions

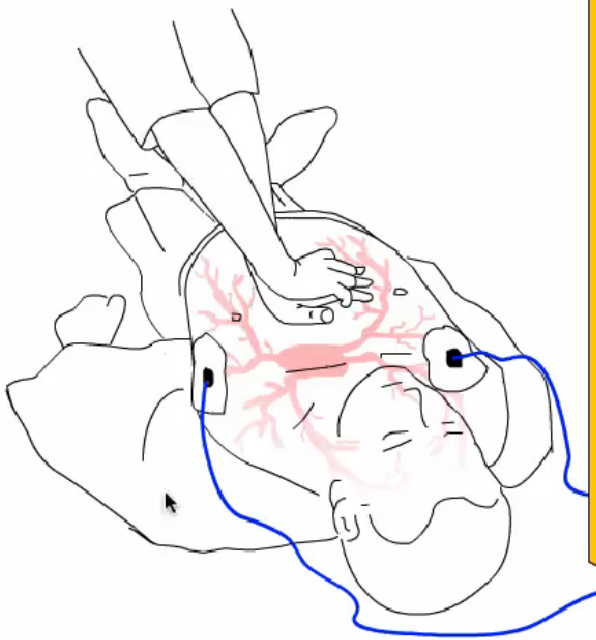
Profondeur moyenne : 7.11 cm



Fréquence / min

108

Temps : 00:26:04



Commencez la RCP

Métronome : ON

Terminer la séquence

Métronome : ON

Terminer la séquence

Initiation au massage cardiaque et à l'utilisation d'un défibrillateur semi-automatique

Apprentissage

Evaluation

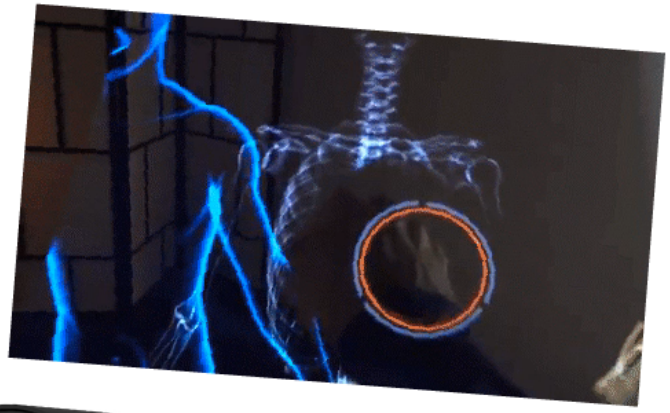
*Avertissement

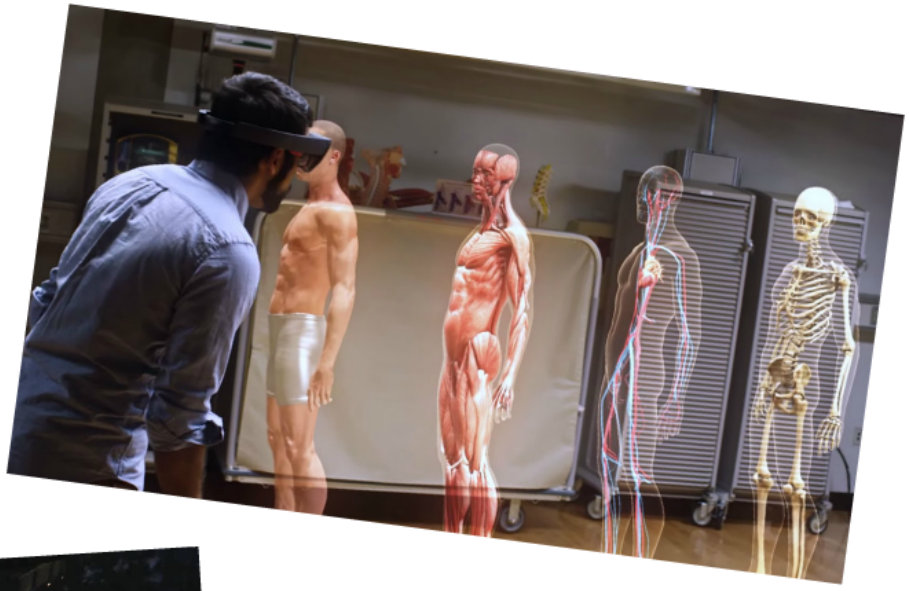
IMAIOS

Collaboratif

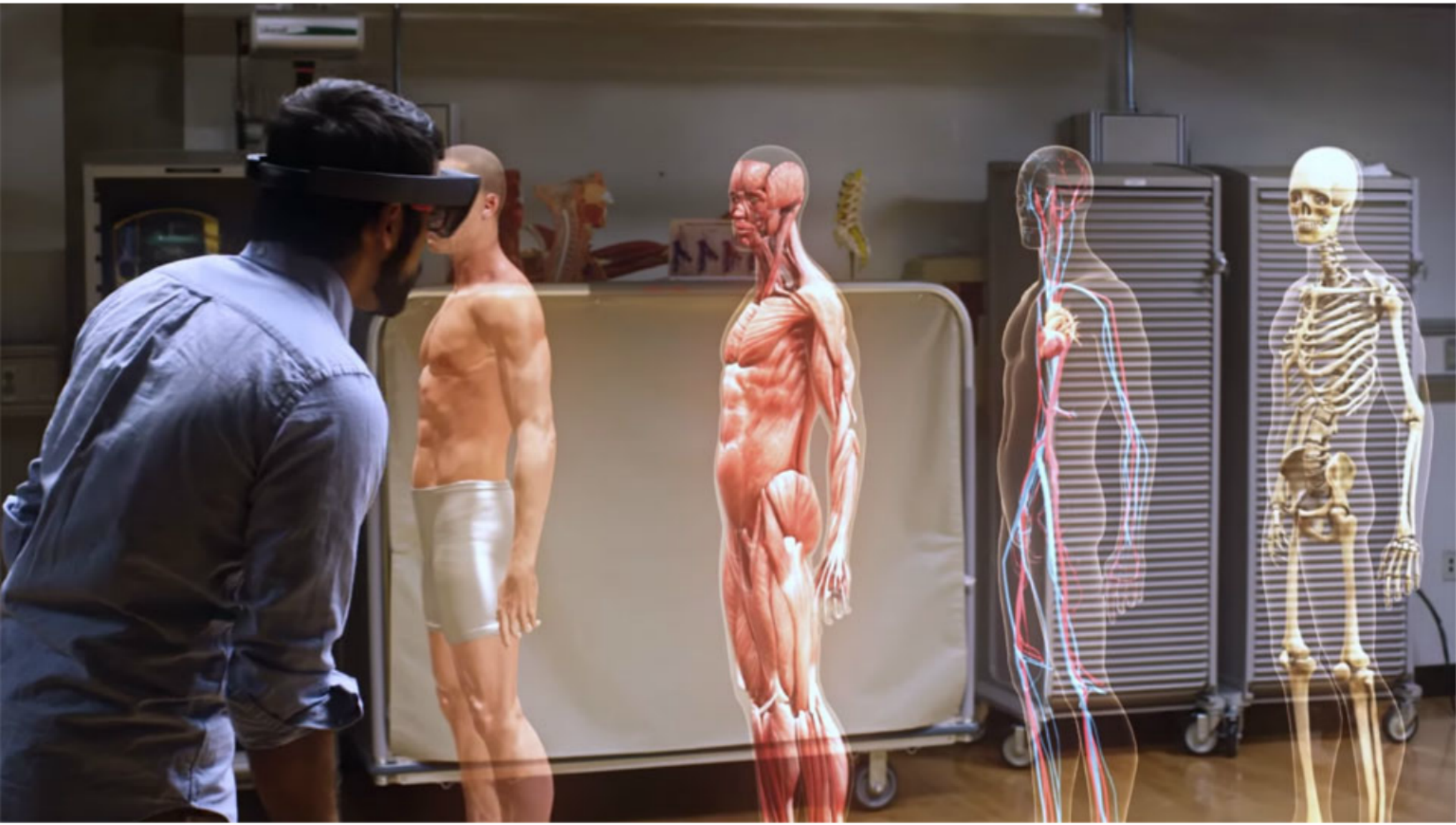
Serious games

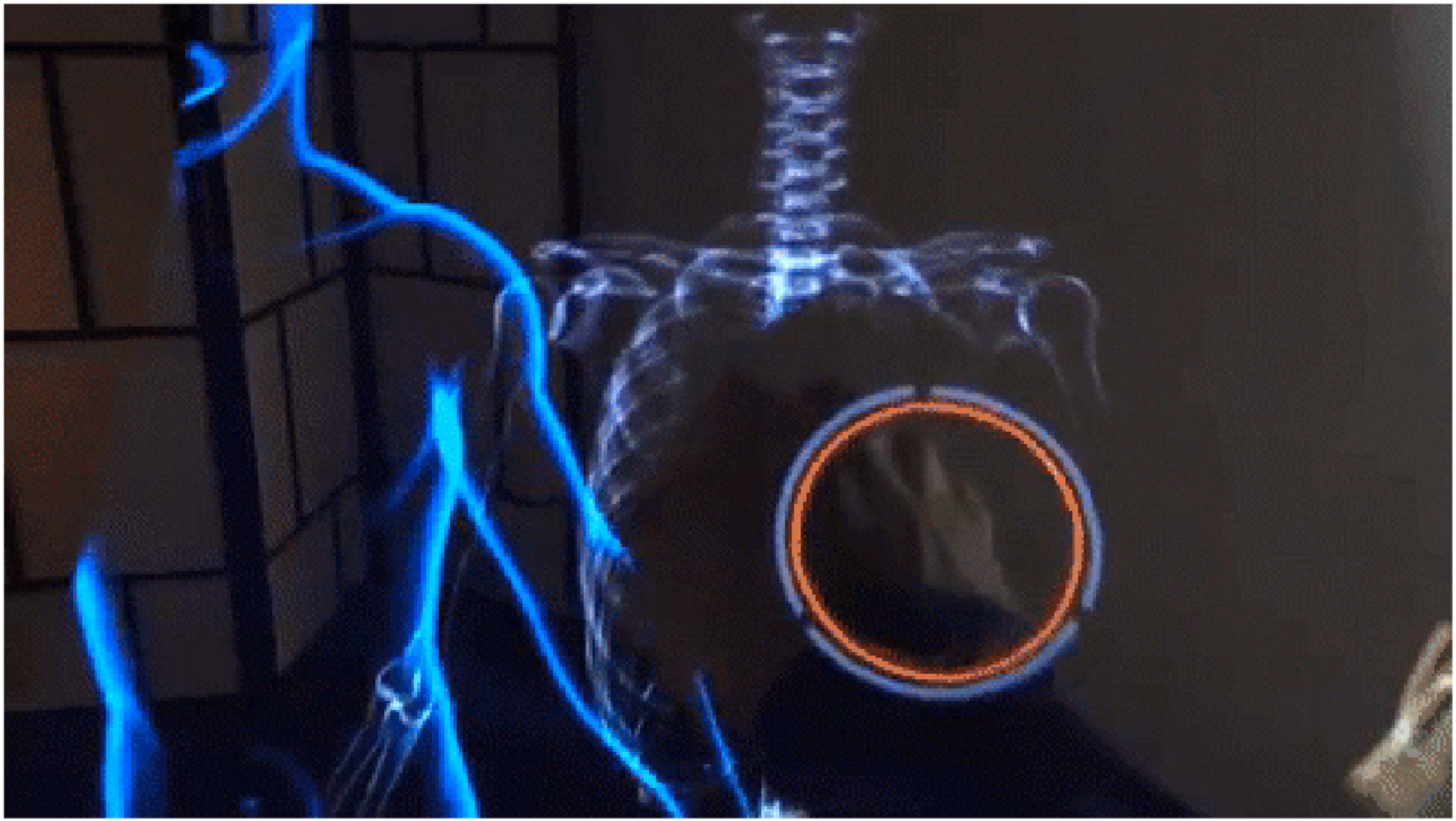

ANATOMY Ninja
Jouer
Continuer
Paramètres
Difficulté





Réalité augmentée



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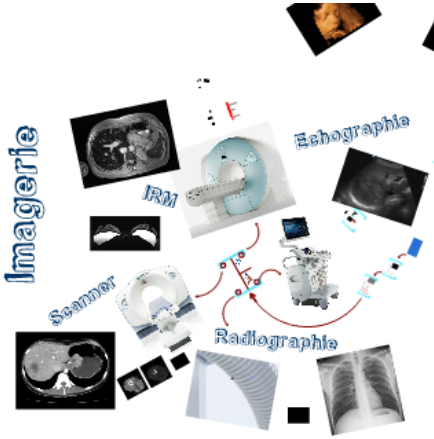

Merci

IMAIOS

MIBI, Montpellier
04 67 13 01 59
contact@imaios.com