TOSHIBA

Leading Innovation

PALAIS DES CONGRES BIARRITZ
8/9/10 JUIN 2016

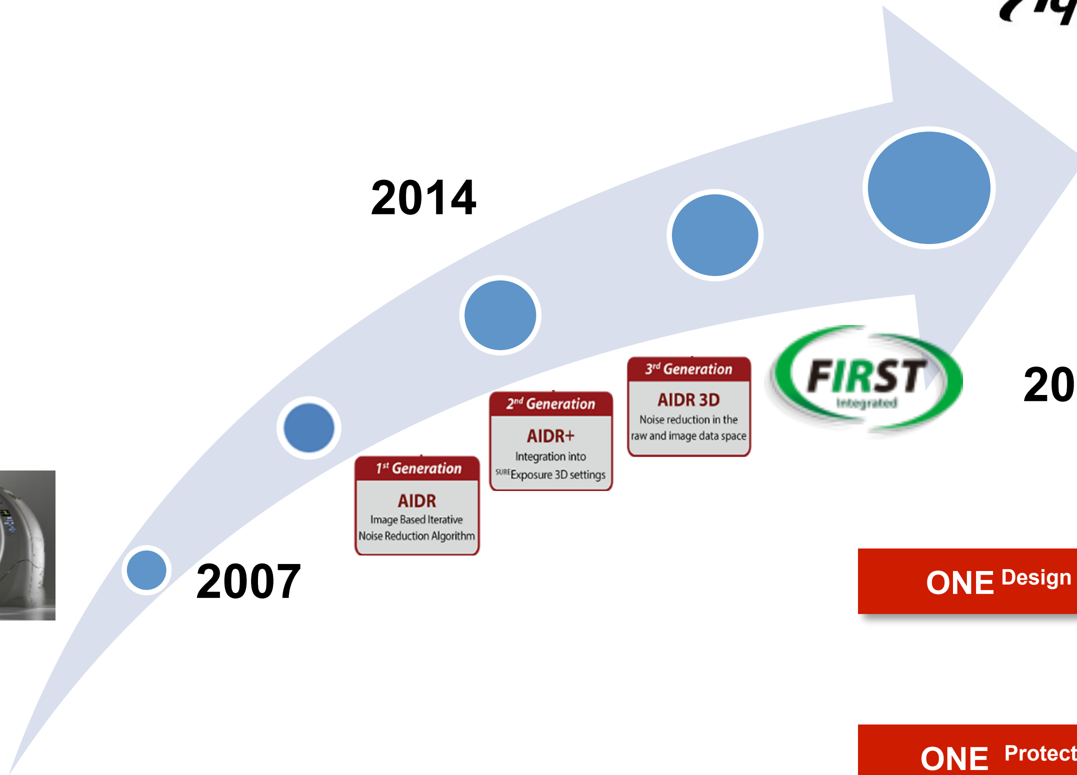
APPAC
ACTUALISATIONS ET PERSPECTIVES EN PATHOLOGIE CARDIOVASCULAIRE

Imagerie Hybride :Infinix 4D CT Aquilion ONE : voir et traiter ?

Scanners Volumiques Dynamiques de seconde génération

ONE Aquilion VISION EDITION

ONE Aquilion



1998 START DEVELOPMENT

ONE Design

- » 78 cm
- » Débattement latéral du lit

ONE Protect

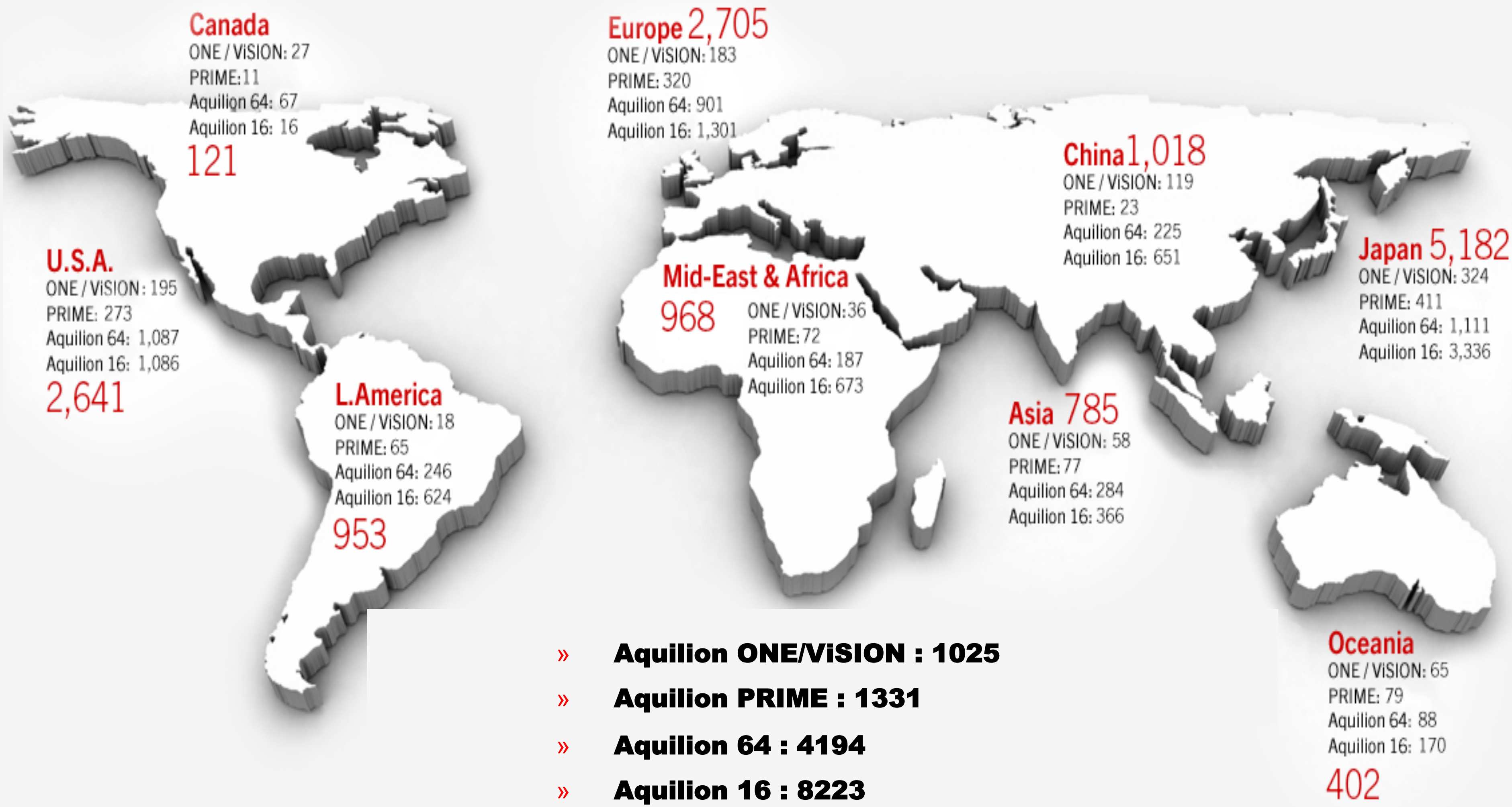
- » Détecteur pureVISION
- » AIDR 3D Enhanced

ONE Clinic

- » 0,27 seconde
- » Automatique Motion Correction

BASE INSTALLEE

Total: 14 697 systems (As of the end of Déc. '15)



- **Aquilion ONE/ViSION : 1025**
- **Aquilion PRIME : 1331**
- **Aquilion 64 : 4194**
- **Aquilion 16 : 8223**

Les Progrès attendus….

DOSE

ARYTHMIES

FONCTIONNEL

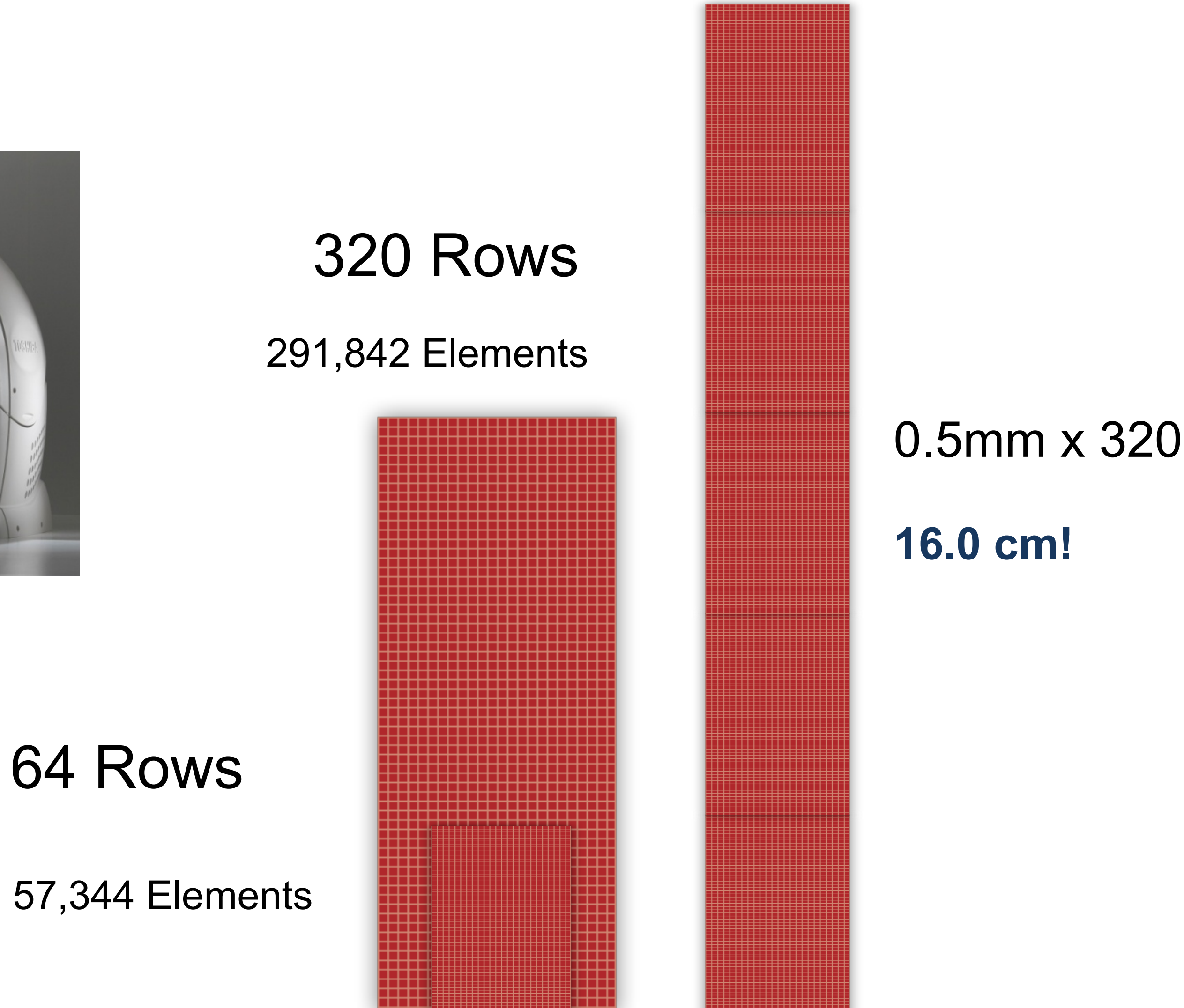
CALCIUM / STENT

Produit de Contraste

LE SCANNER VOLUMIQUE DYNAMIQUE

Aquilion ONE

Aquilion ONE VISION EDITION



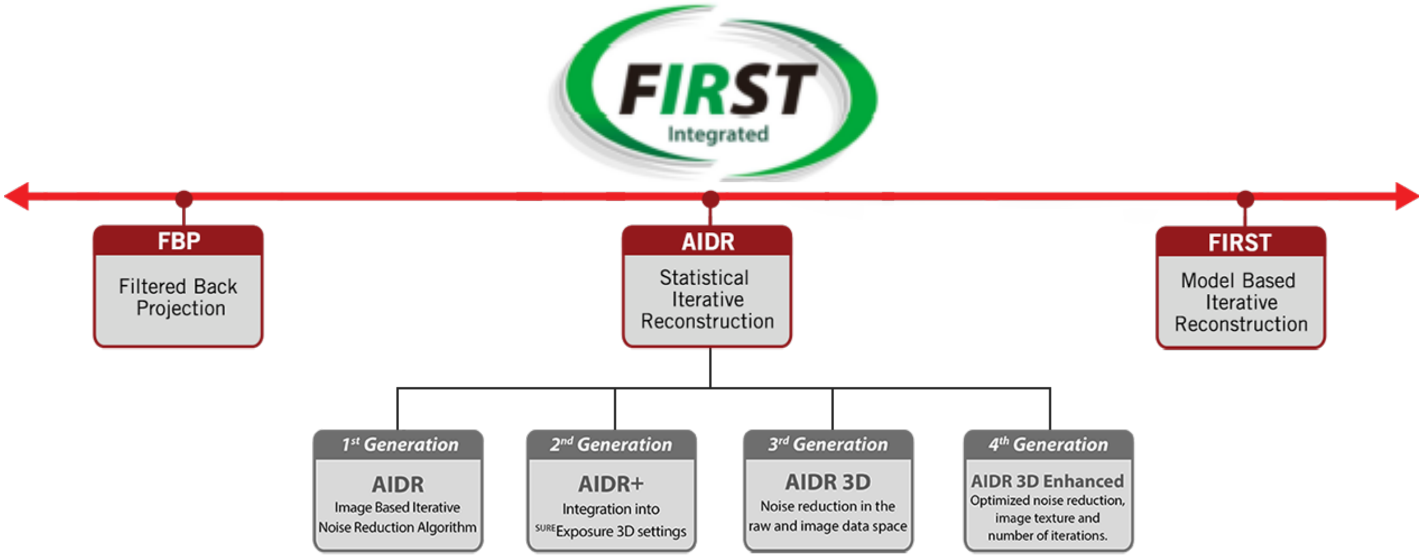
FIRST

Ultra low dose sans compromis
Résolution spatiale améliorée

Une nouvelle innovation Toshiba

***F**orward projected model-based **I**terative **R**econstruction **S**olu**T**ion*

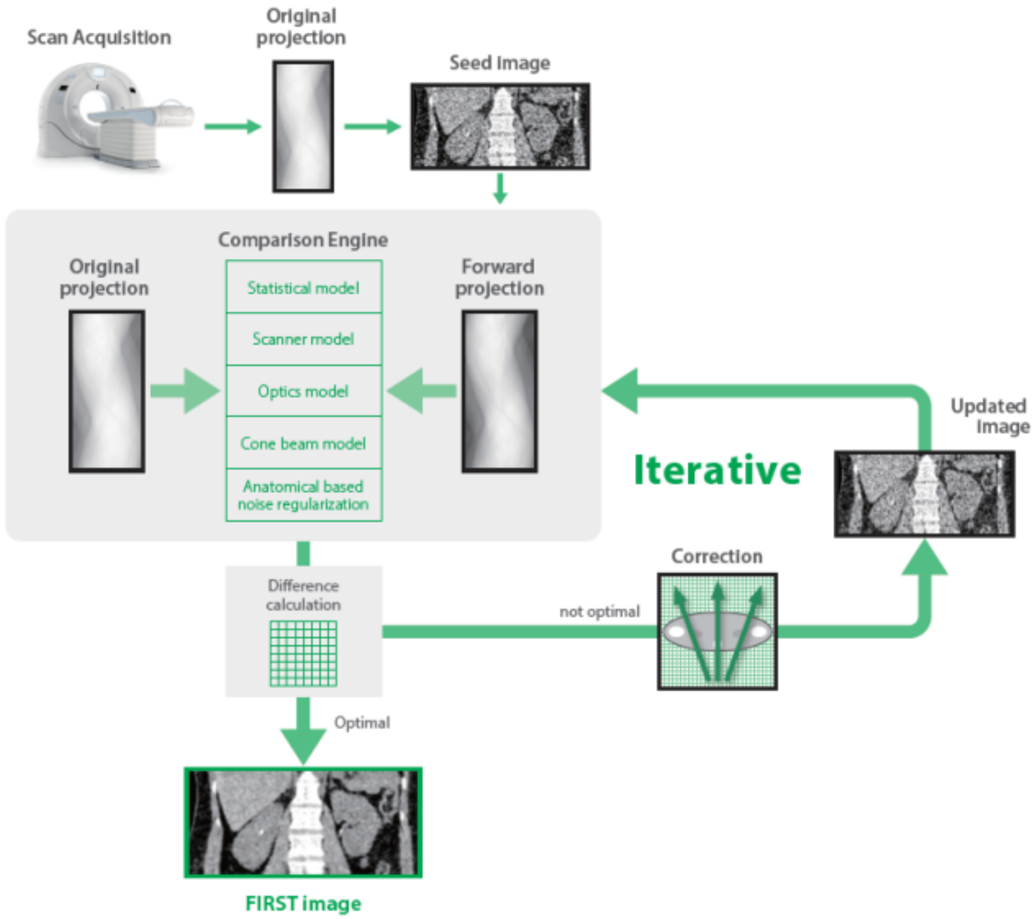
FIRST

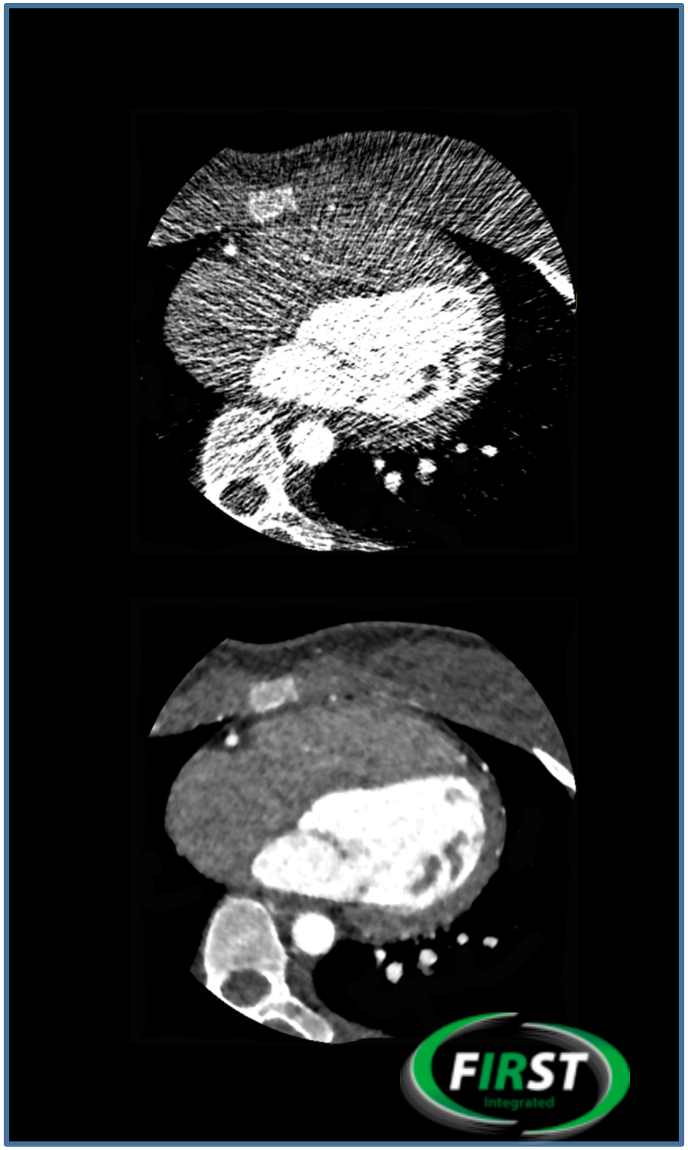


- FIRST est une technique de reconstruction de type MBIR (Model Based Iterative Reconstruction) ou Full Itérative
- Totalement intégré au Sure Exposure 3D – jusqu'à 82,2% de réduction de dose
- Améliore la résolution spatiale – pas d'effet plastique
- Intégrable dans une activité clinique de routine – Temps de reconstruction 3mn
- Reconstruction en parallèle avec Insta View et AIDR 3D

FIRST

Courtesy of Dr. Chen, NIH, US

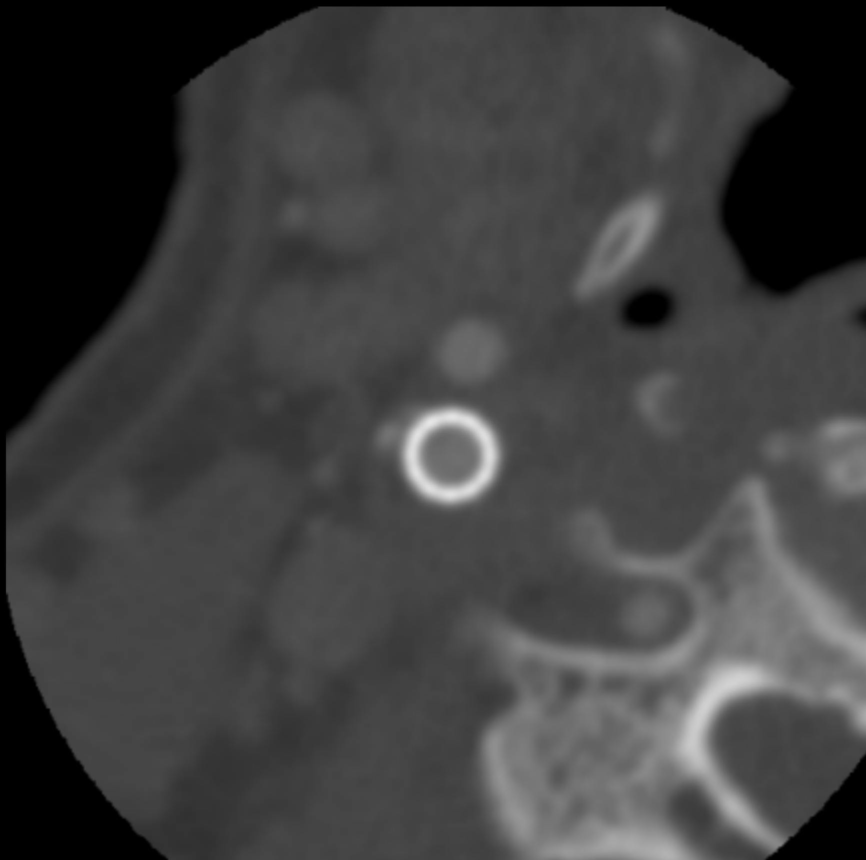




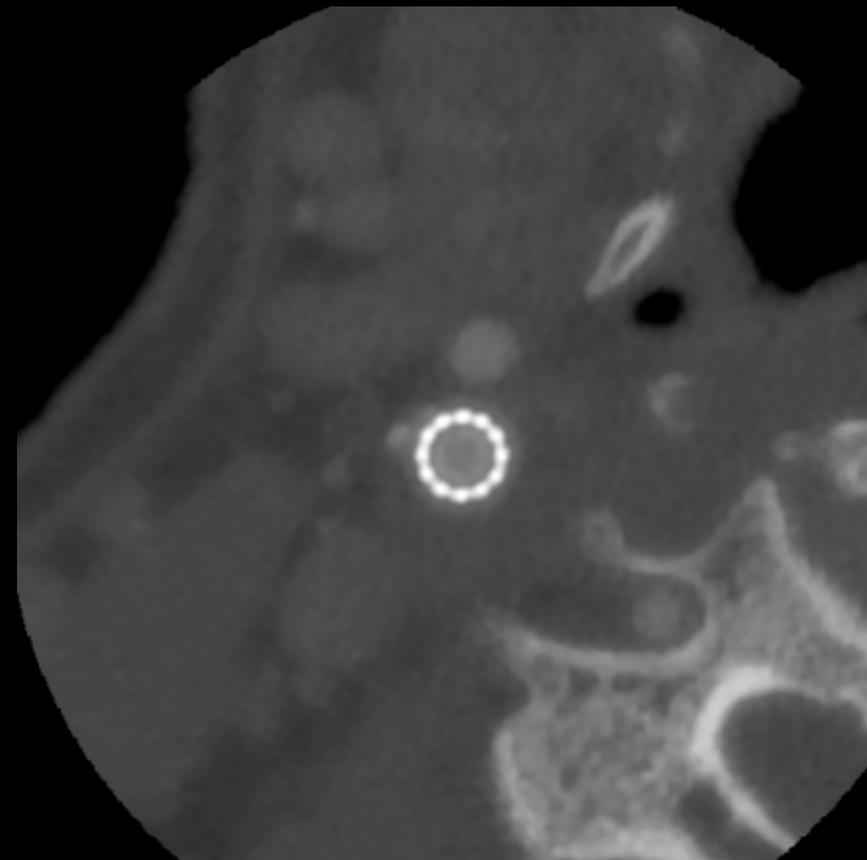
Carotid Artery Stent

Courtesy of Prof. Awai, Hiroshima University, Japan

FBP



FIRST Integrated



Carotid Artery Stent

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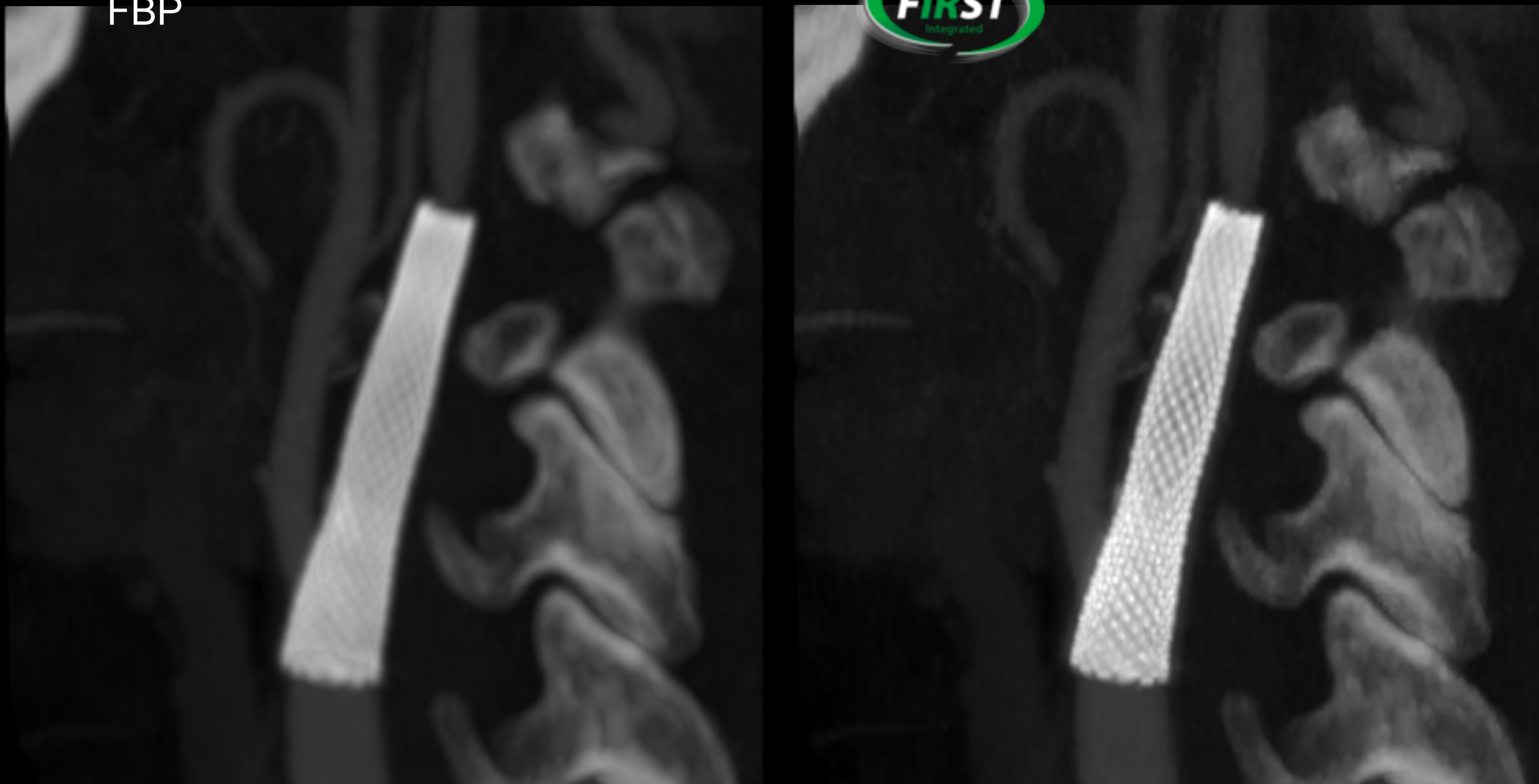
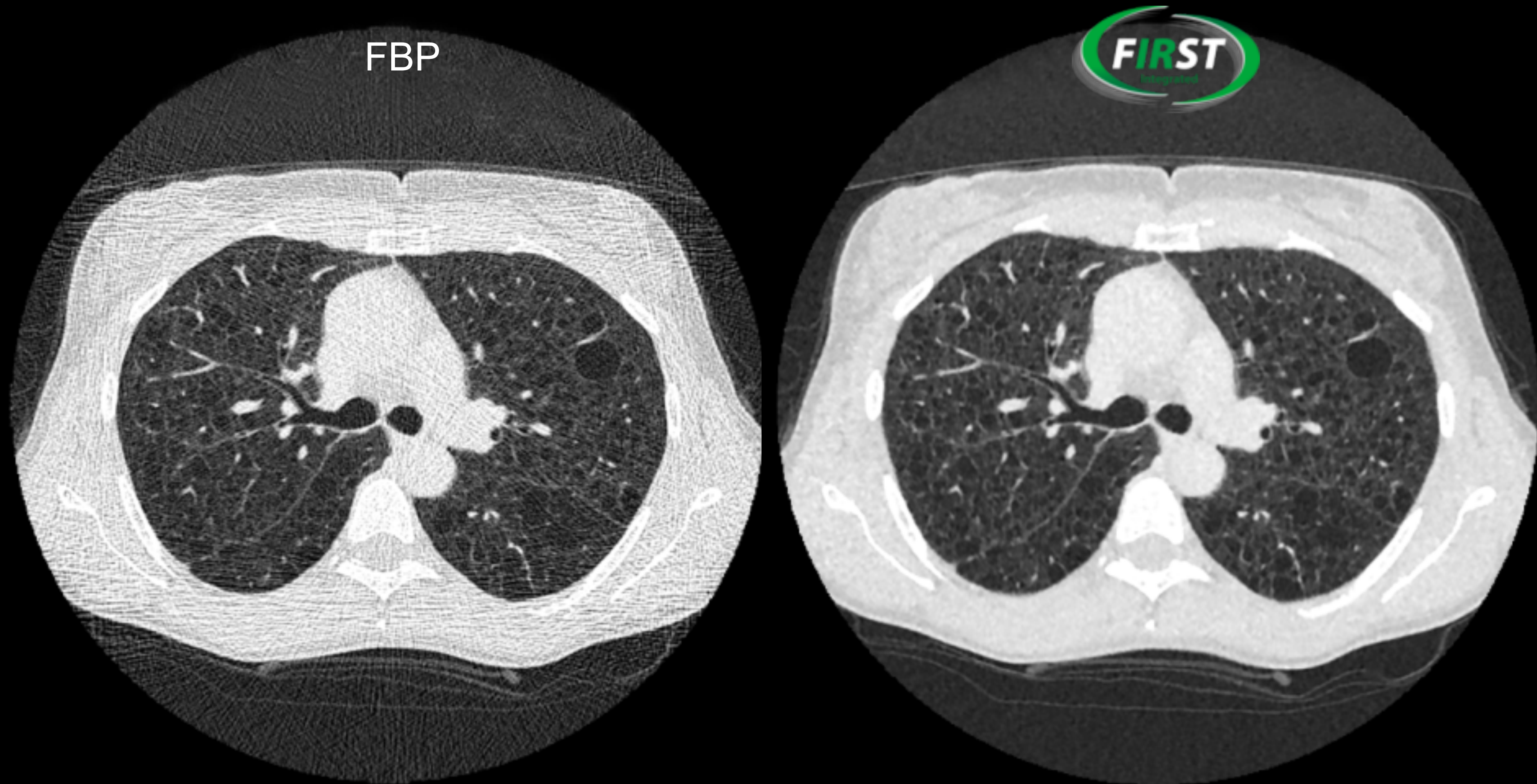
FBP



Scan mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy.cm)	Effective Dose (mSv)	k
Ultra Helical	CE	0.5 mm x 80	Standard	120	SUREExposure	0.5	295	FIRST	16.3	527.1	3.1	0.0059

Pulmonary Disease

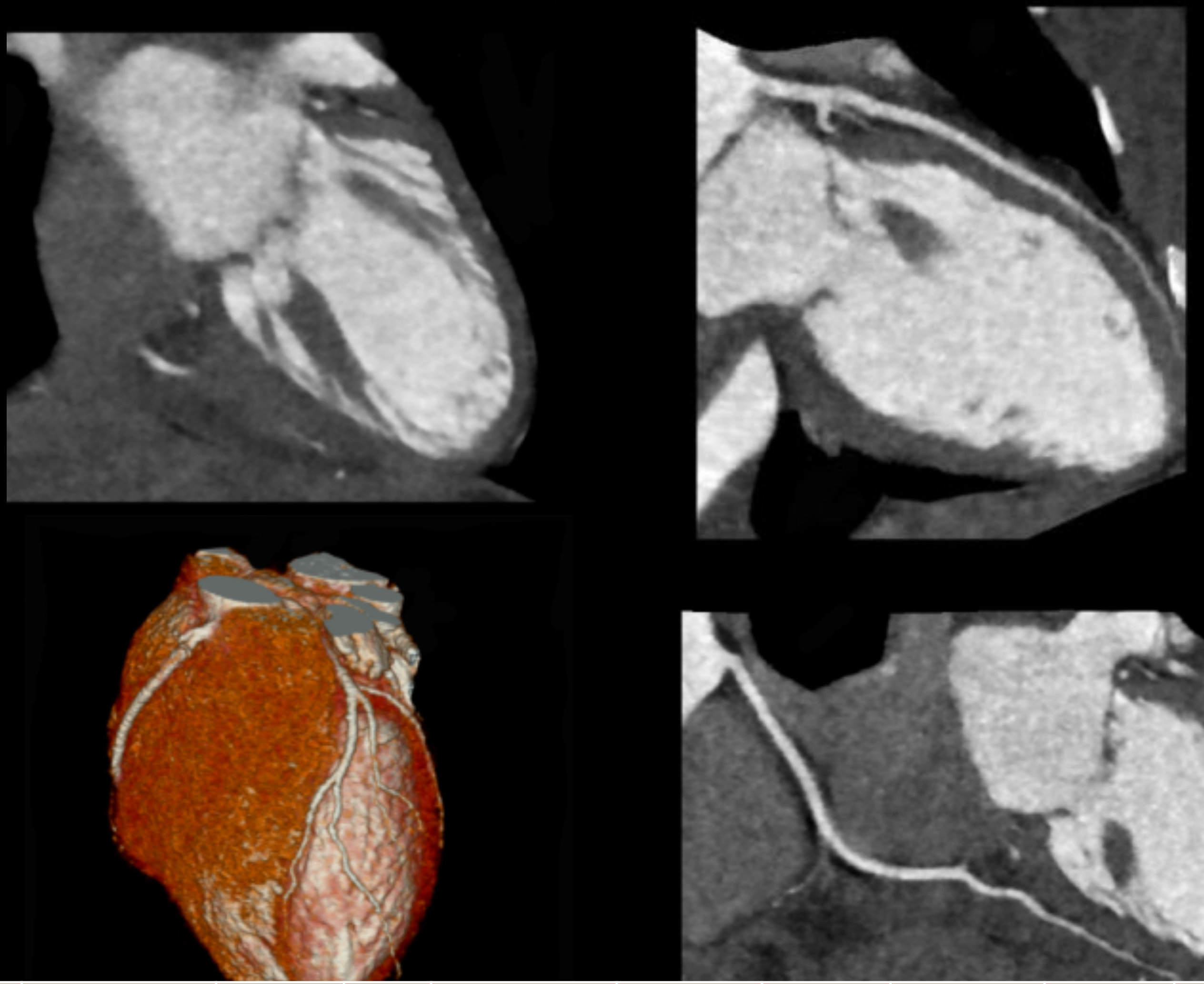
Courtesy of Dr. Chen, NIH, US



Scan mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy.cm)	Effective Dose (mSv)	k
Ultra Helical	-	0.5 mm x 80	Standard	120	SUREExposure 3D	0.5	330	FIRST	1.2	44.2	0.62	0.014

Ultra Low dose Cardiac

Courtesy of Dr. Chen, NIH, US



0.1mSv

Scan mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy.cm)	Effective Dose (mSv)	k
Volume	CE	0.5 mm x 240	-	80	^{SURE}Exposure	0.275	120	FIRST	0.6	6.90	0.1	0.014

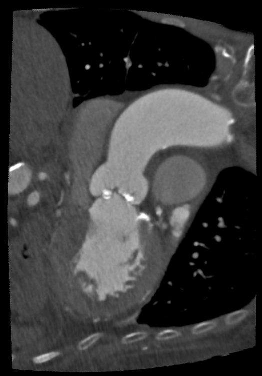
FIRST

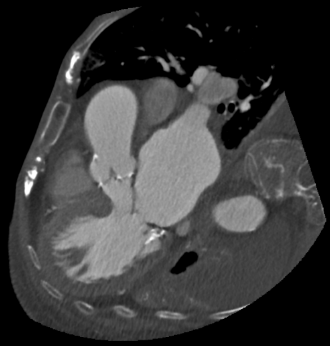
FIRST allows for low radiation dose of just 0.36 mSv

68 year old man
BMI of 32

CTDIvol	2.0 mGy
DLP	25.6 mGy•cm
Eff Dose	0.36 mSv

TAVI - Arms Down

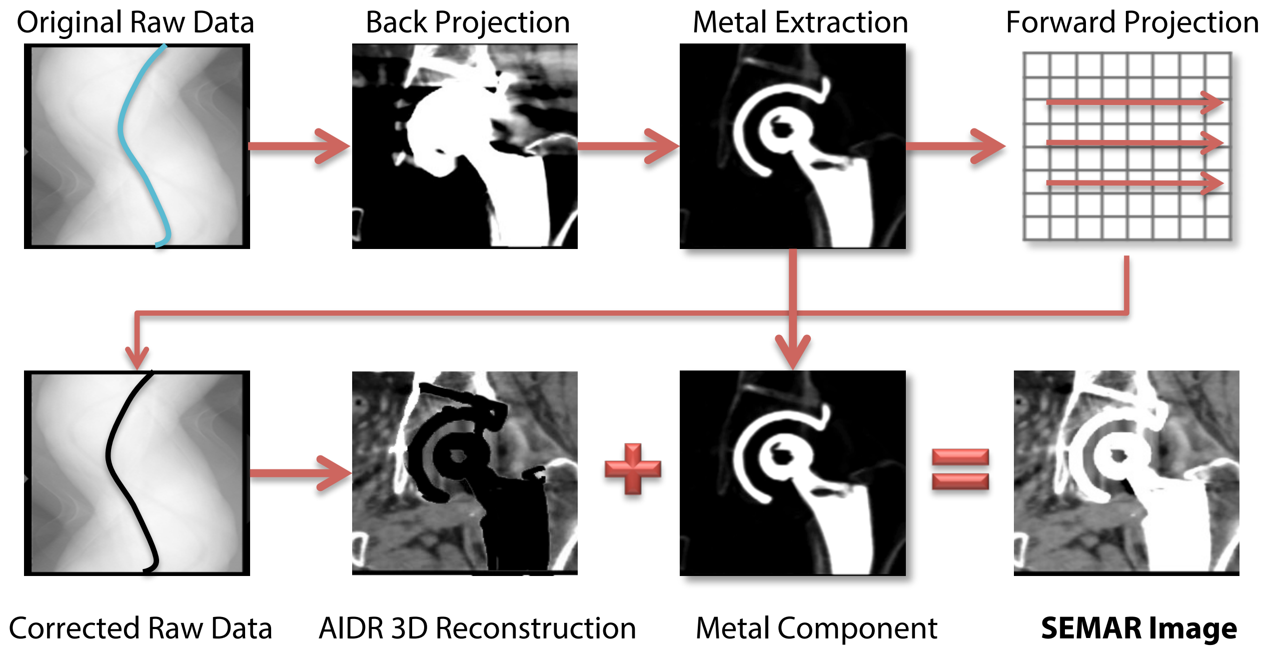


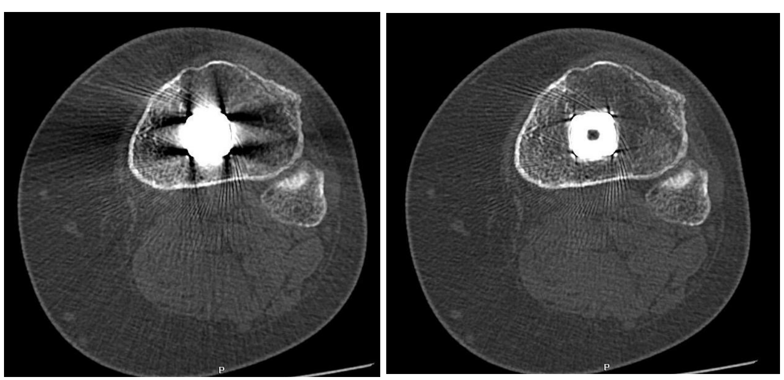


PUREVision Optics ensures excellent image detail, even with the patient's arms in the scan field

CTDIvol	37.2 mGy	4.8 mGy
DLP	483.6 mGy•cm	255.7 mGy•cm

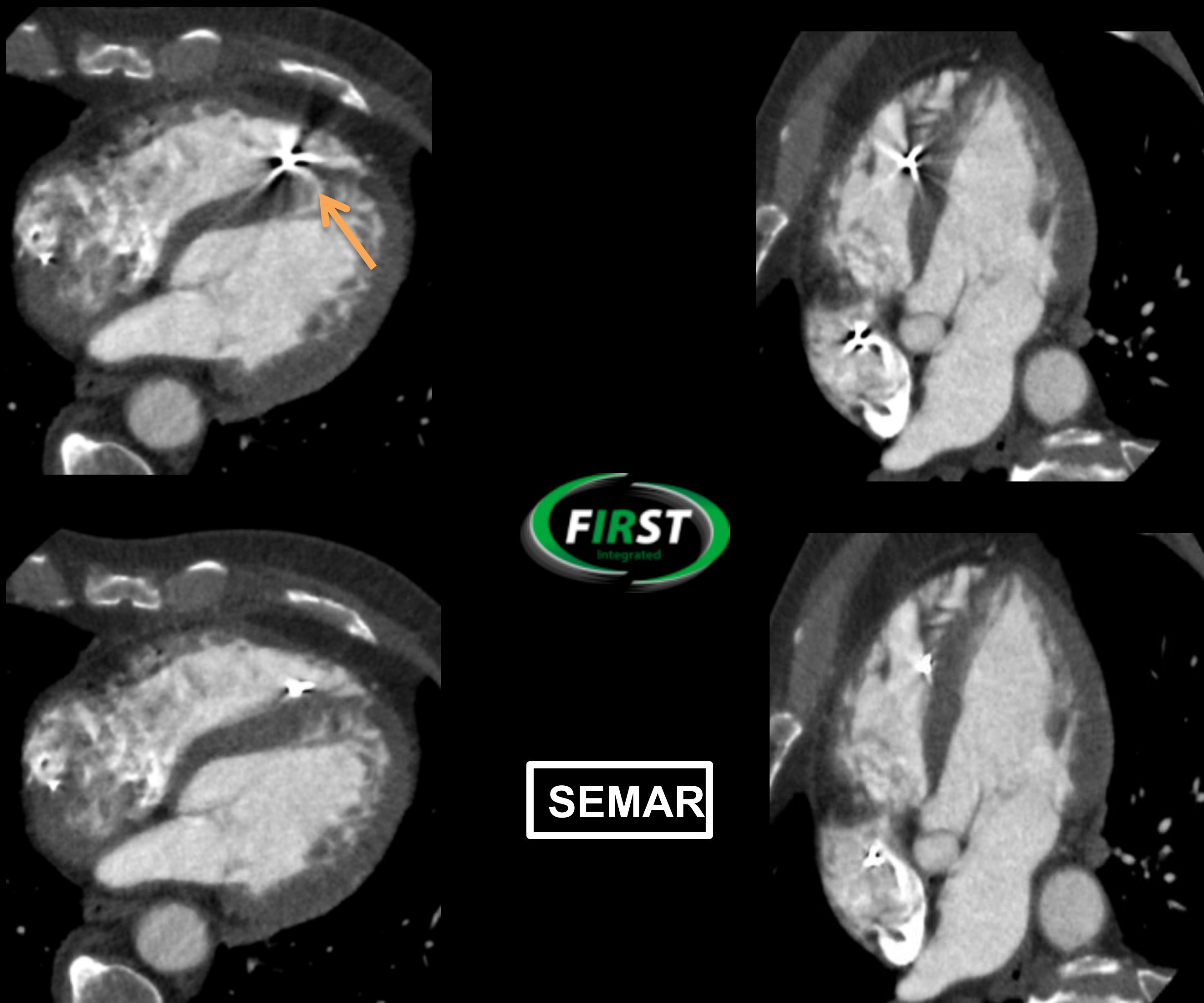
Single Energie Metal Artefact – SEMAR





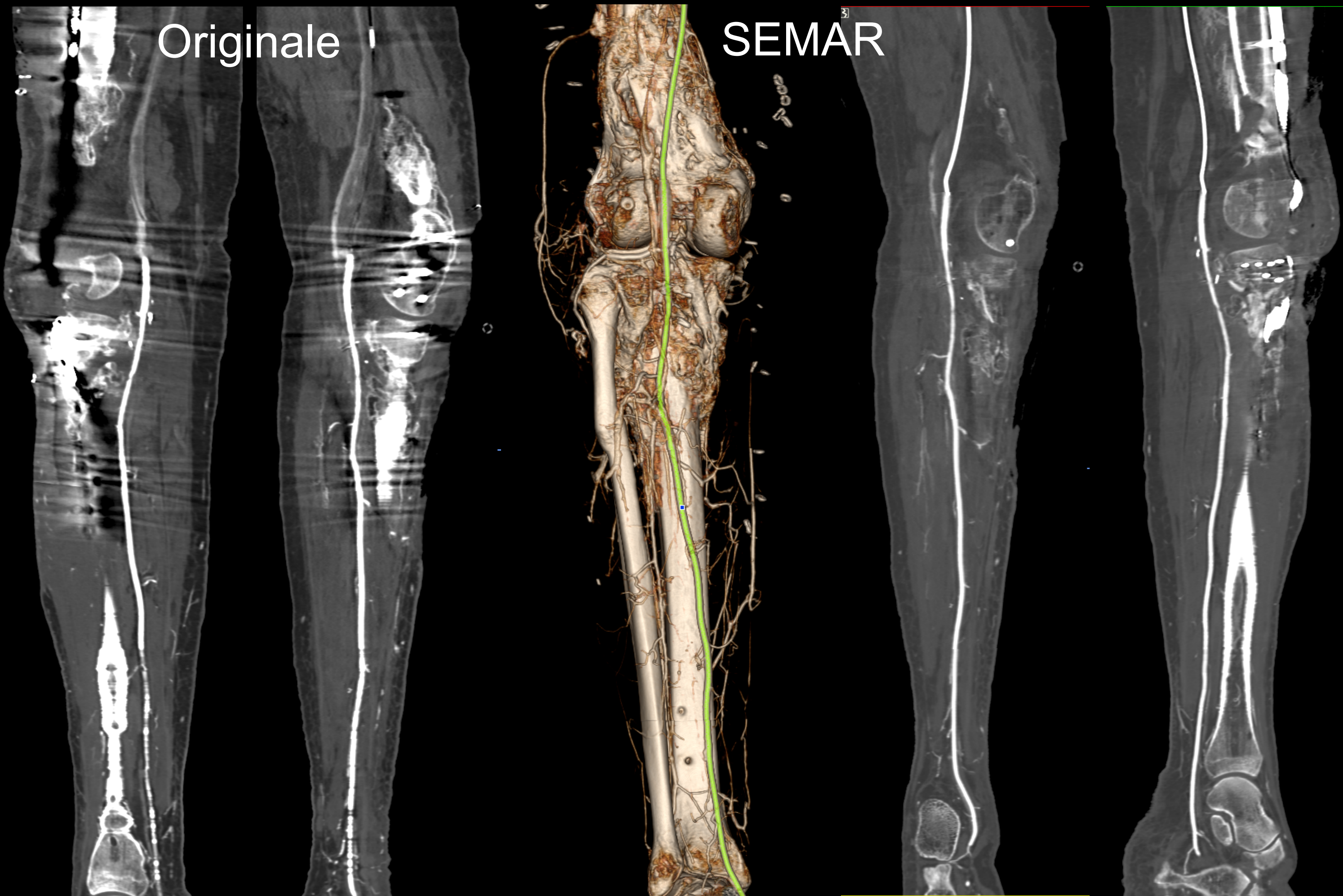
- Nouveaux algorithmes qui ne nécessitent qu'une seule acquisition
- Pas de majoration de la dose
- Suppression du matériel orthopédique
- Peut être utilisé rétrospectif
- Fluoroscopie

Single Energie Metal Artefact Reduction



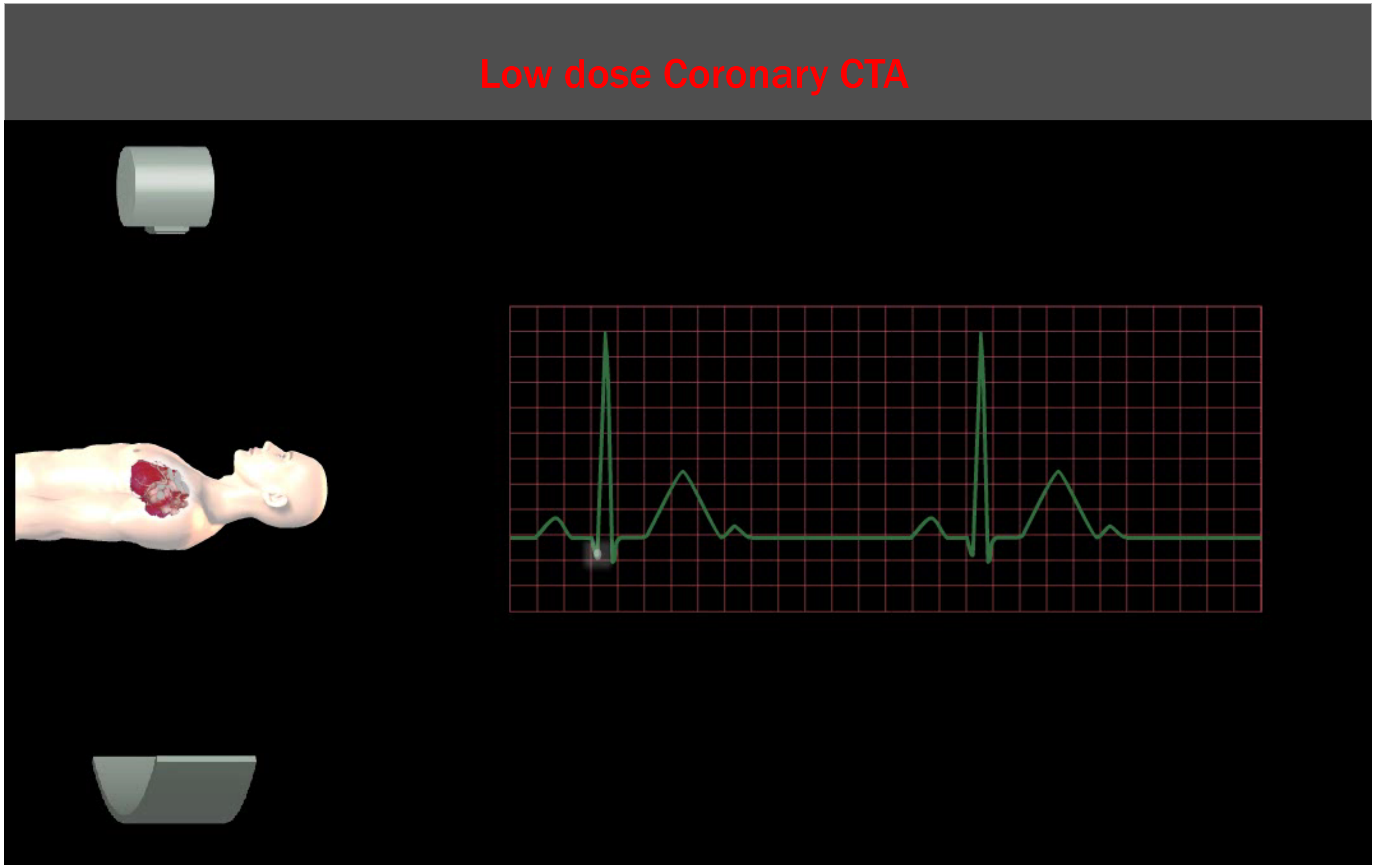
CTDIvol	5.4 mGy
DLP	74.9 mGy•cm
Eff Dose	1.05 mSv

Single Energie Metal Artefact – SEMAR




TOSHIBA
Leading Innovation
Aquilion ONE™
Cardiac
Made for Life

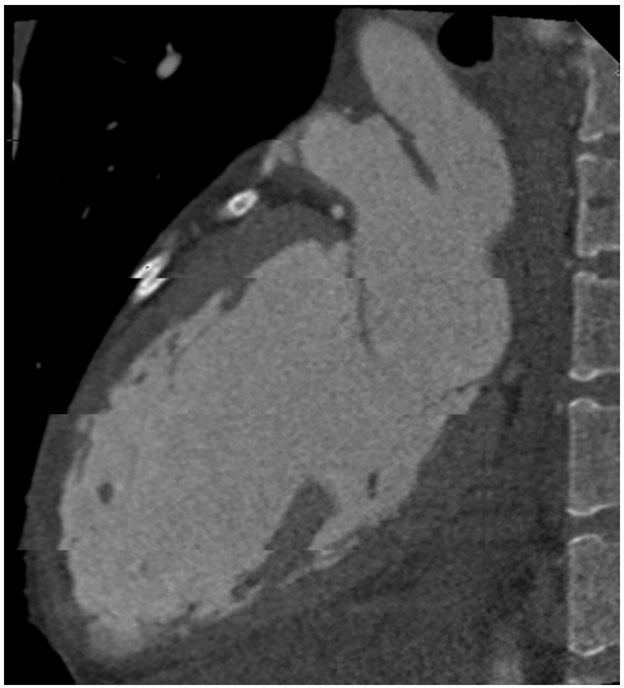
Le scanner Volumique dynamique



ONE Aquilion VISION EDITION

RT: 137 ms

Le scanner Volumique Isophasique



- Résolution temporelle Volumique divisée par 5
- Respiration libre sans artéfacts si nécessaire
- Scanner Isophasique

Le scanner Volumique dynamique

Sub mSv in 107 consecutive patients (Chen et al)

- No patient cohort selection
- All heart rates
- Robust CTA scanning
  97,2% success rate

Unselected patients

Radiology

Submillisievert Median Radiation Dose for Coronary Angiography with a Second-Generation 320–Detector Row CT Scanner in 107 Consecutive Patients[1]

Marcus Y. Chen, MD
Sujata M. Shanbhag, MD
Andrew E. Arai, MD

Purpose: To (a) use a new second-generation wide-volume 320–detector row computed tomographic (CT) scanner to explore optimization of radiation exposure in coronary CT angiography in an unselected and consecutive cohort of patients referred for clinical purposes and (b) compare estimated radiation exposure and image quality with that from a cohort of similar patients who underwent imaging with a previous first-generation CT system.

Materials and Methods: The study was approved by the institutional review board, and all subjects provided written consent. Coronary CT angiography was performed in 107 consecutive patients with a new second-generation 320–detector row unit. Estimated radiation exposure and image quality were compared with those from 100 consecutive patients who underwent imaging with a previous first-generation scanner. Effective radiation dose was estimated by multiplying the dose-length product by an effective dose conversion factor of 0.014 mSv/mGy · cm and reported with size-specific dose estimates (SSDEs). Image quality was evaluated by two independent readers.

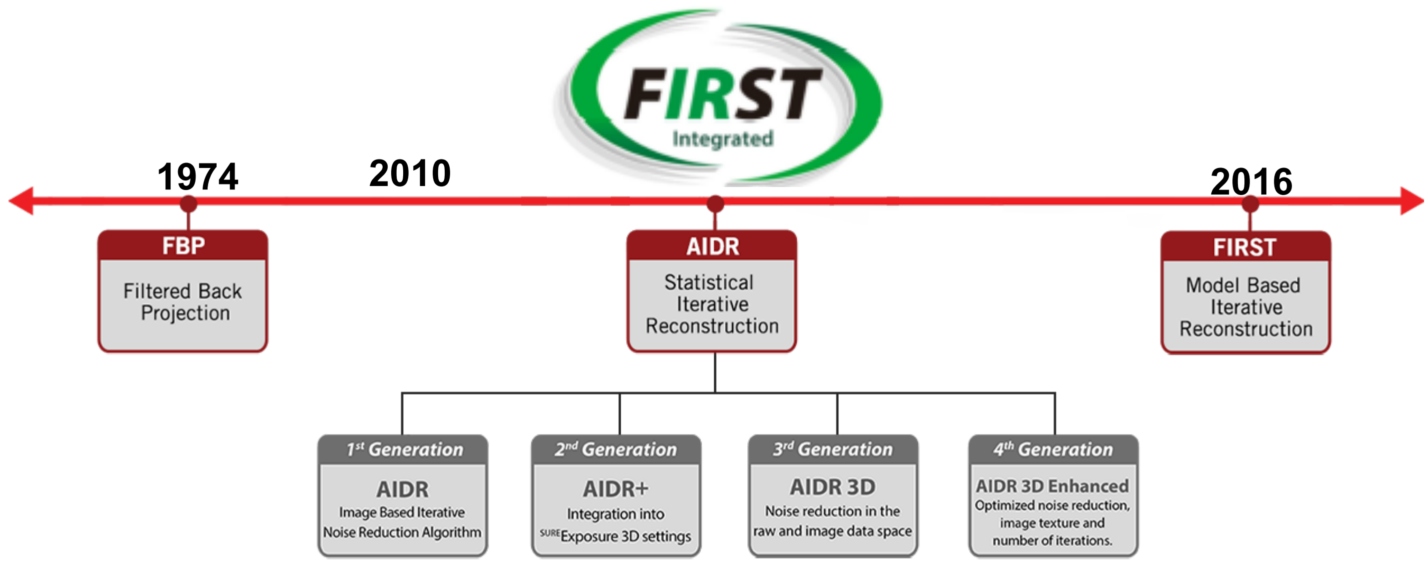
Results: The mean age of the 107 patients was 55.4 years ± 12.0 (standard deviation); 57 patients (53.3%) were men. The median body mass index was 27.3 kg/m^2 (range, 18.1–47.2 kg/m^2); however, 71 patients (66.4%) were overweight, obese, or morbidly obese. A tube potential of 100 kV was used in 97 patients (90.6%), single-volume acquisition was used in 104 (97.2%), and prospective electrocardiographic gating was used in 106 (99.1%). The mean heart rate was 57.1 beats per minute ± 11.2 (range, 34–96 beats per minute), which enabled single-heartbeat scans in 100 patients (93.4%). The median radiation dose was 0.93 mSv (interquartile range [IQR], 0.58–1.74 mSv) with the second-generation unit and 2.67 mSv (IQR, 1.68–4.00 mSv) with the first-generation unit ($P < .0001$). The median SSDE was 6.0 mGy (IQR, 4.1–10.0 mGy) with the second-generation unit and 13.2 mGy (IQR, 10.2–18.6 mGy) with the first-generation unit ($P < .0001$). Overall, the radiation dose was less than 0.5 mSv for 23 of the 107 CT angiography examinations (21.5%), less than 1 mSv for 58 (54.2%), and less than 4 mSv for 103 (96.3%). All studies were of diagnostic quality, with most having excellent image quality. Three of four image quality indexes were significantly better with the second-generation unit compared with the first-generation unit.

Conclusion: The combination of a gantry rotation time of 275 msec, wide volume coverage, iterative reconstruction, automated exposure control, and larger x-ray power generator of the second-generation CT scanner provides excellent image quality over a wide range of body sizes and heart rates at low radiation doses.

Supplemental material: *http://radiology.rsna.org/lookup/suppl/doi:10.1148/radiol.13122621/-/DC1*

[1]From the Advanced Cardiovascular Imaging Laboratory, Cardiovascular and Pulmonary Branch, National Heart Lung ... ment of Health and Human Services, 10 Center Dr, Building 10, Room B1D416, Bethesda, MD 20892-1061. Received November 25, 2012; revision requested December 5; revision received December 21; accepted December 27; final version accepted December 28. **Address correspondence to** M.Y.C. (e-mail: *marcus.chen@nih.gov*).

FIRST



Forward projected model-based **I**terative **R**econstruction **S**olu**T**ion

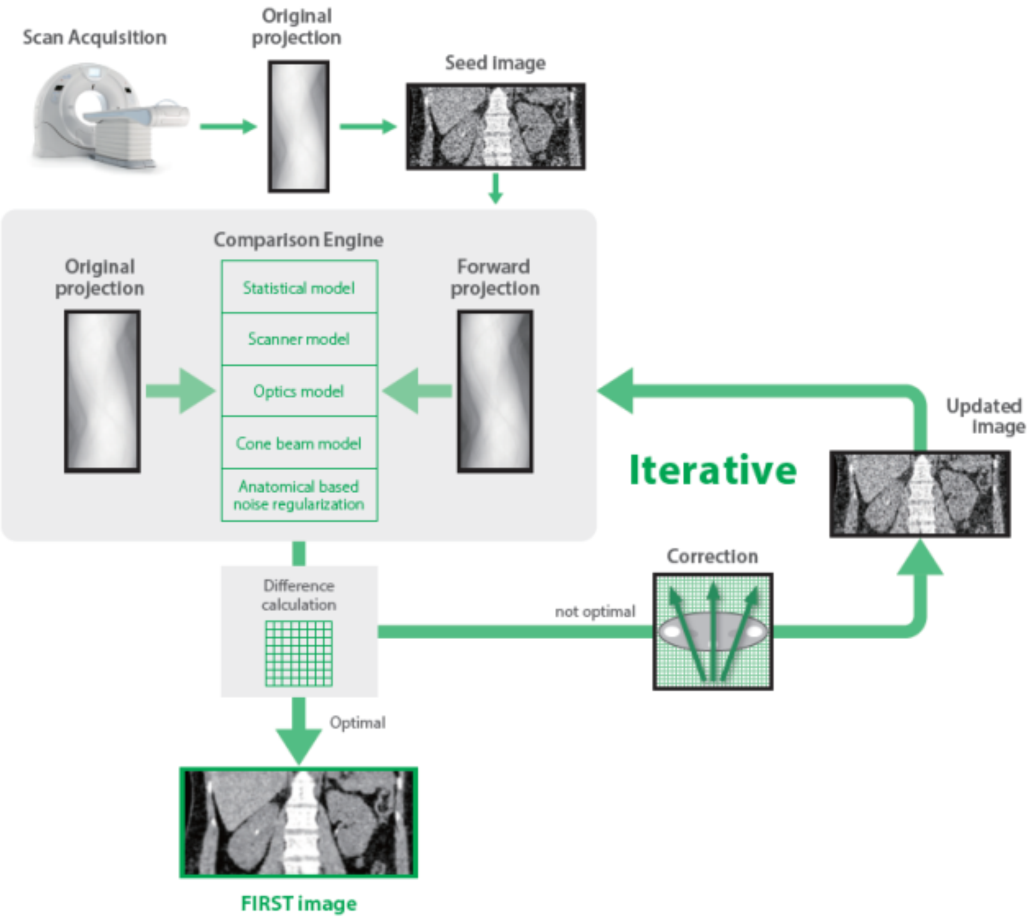
» FIRST est une technique de reconstruction de type **MBIR** (Model Based Iterative Reconstruction) ou Full Itérative

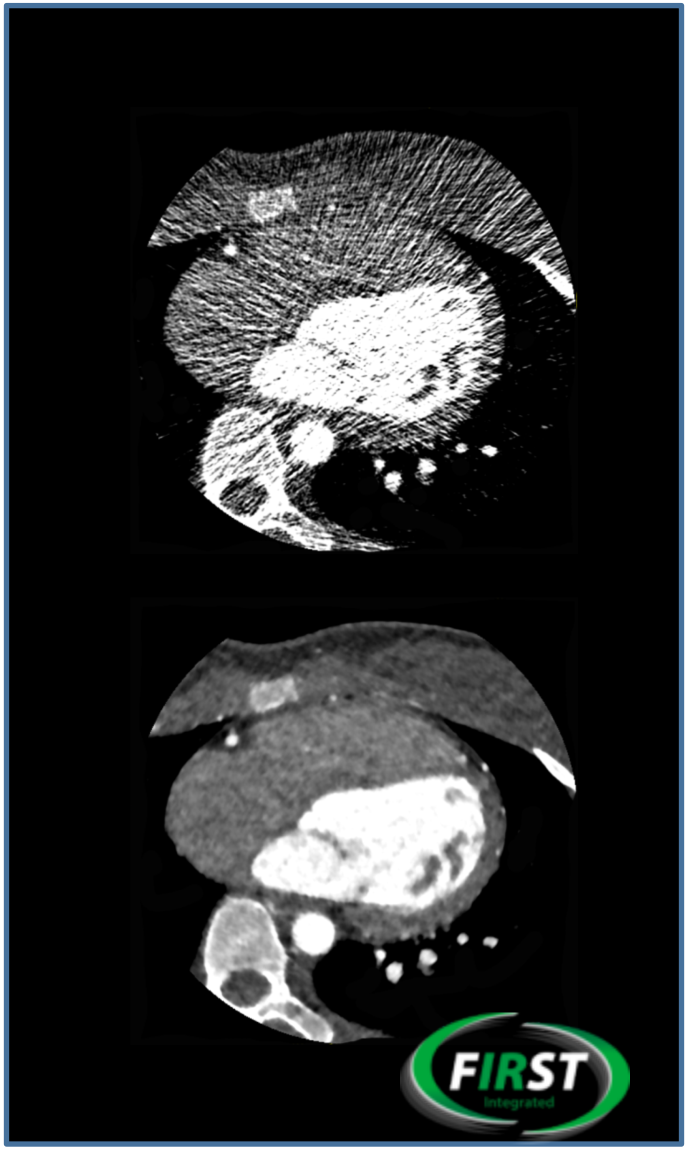
» Intégrable dans une activité clinique de routine – Temps de reconstruction 3mn

» Reconstruction en parallèle avec **AIDR 3D**

FIRST

Courtesy of Dr. Chen, NIH, US





FIRST

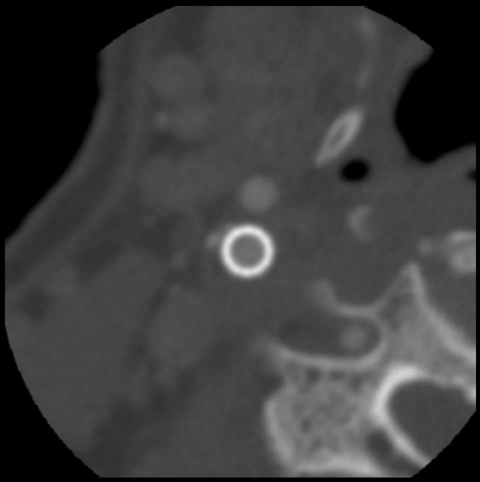
FIRST allows for low radiation dose of just 0.36 mSv

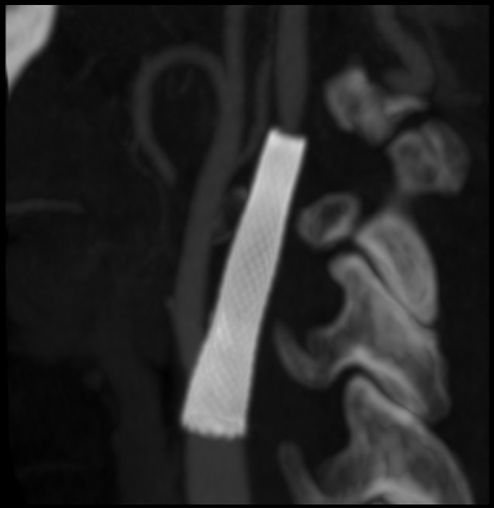
68 year old man
BMI of 32

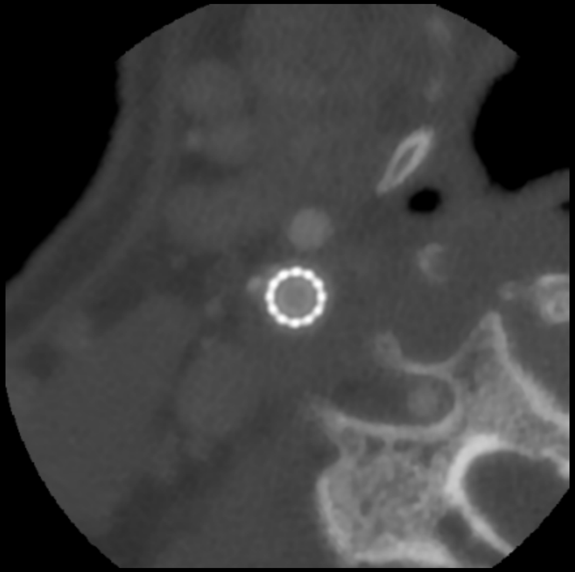
CTDIvol	2.0 mGy
DLP	25.6 mGy•cm
Eff Dose	0.36 mSv

FIRST : Résolution spaciale

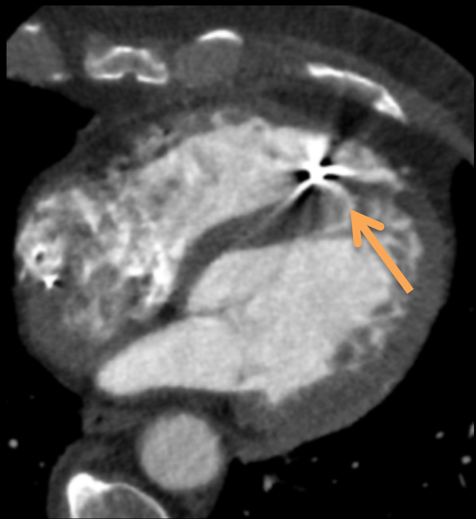
Courtesy of Prof. Awai, Hiroshima University, Japan



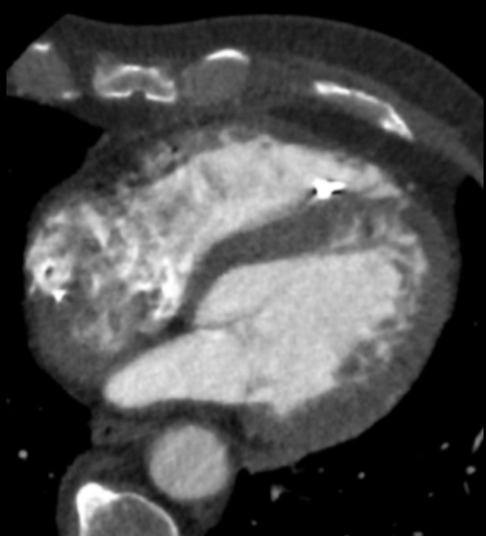


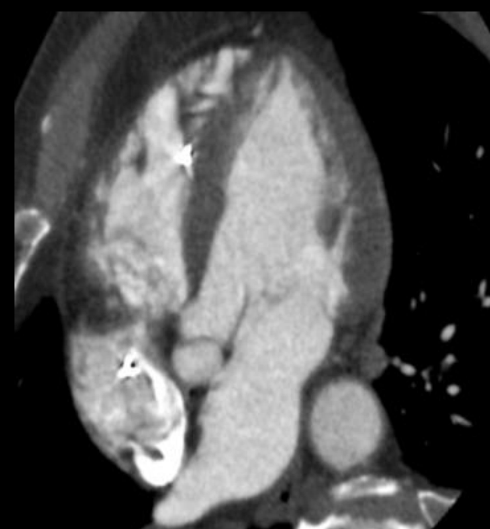


Single Energie Metal Artefact Reduction



FIRST



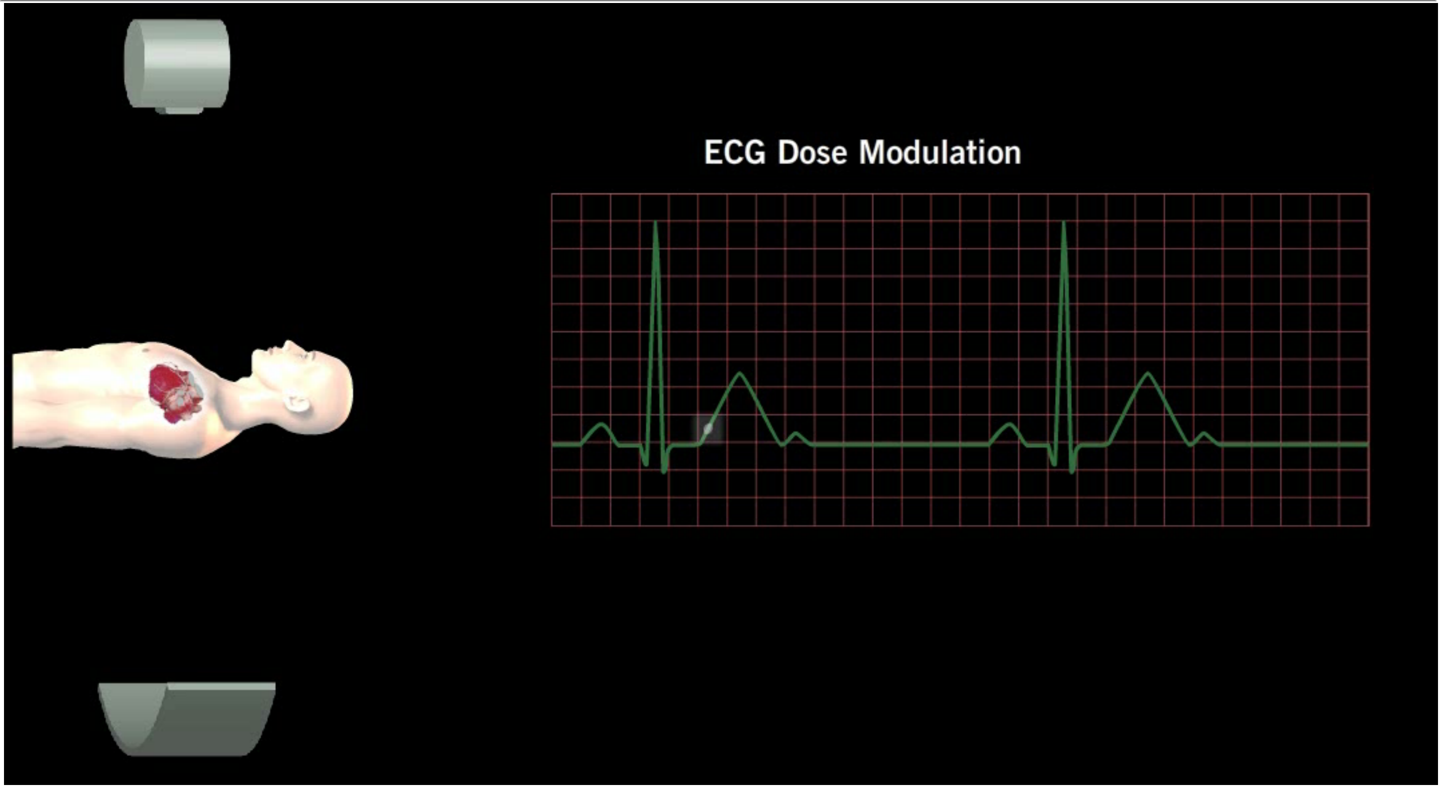


SEMAR

CTDIvol	5.4 mGy
DLP	74.9 mGy•cm
Eff Dose	1.05 mSv

Le scanner Volumique dynamique

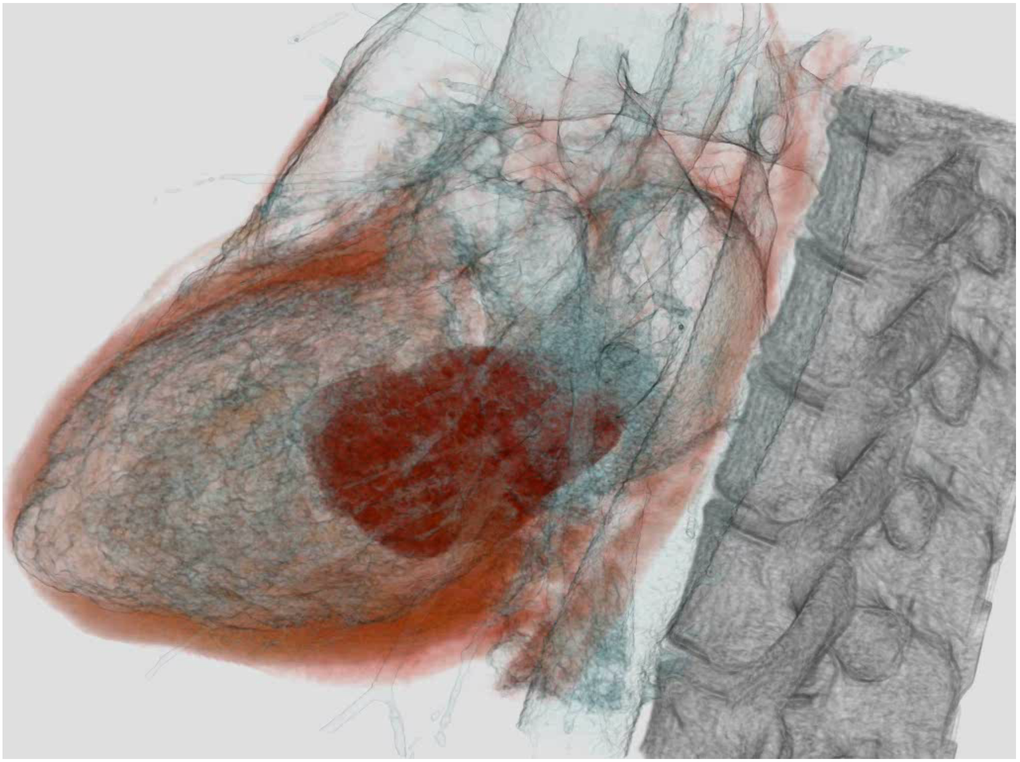
Coronaires, dynamique des parois, fraction d'éjection et fonction cardiaque sur un seul battement en propectif.



Le scanner Volumique dynamique

One Beat CTA/CFA

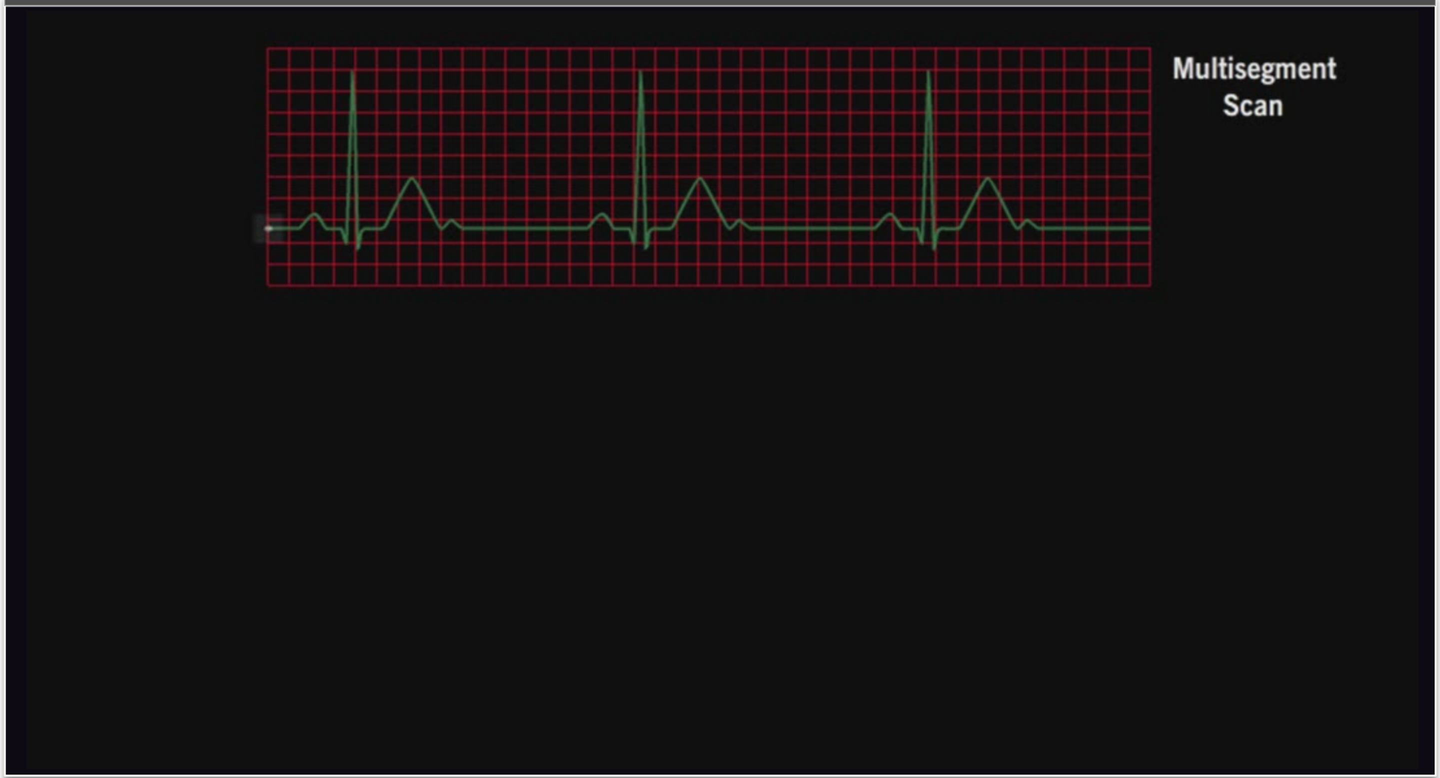
Atrial Myxoma, 4.0mSv



Le scanner Volumique dynamique

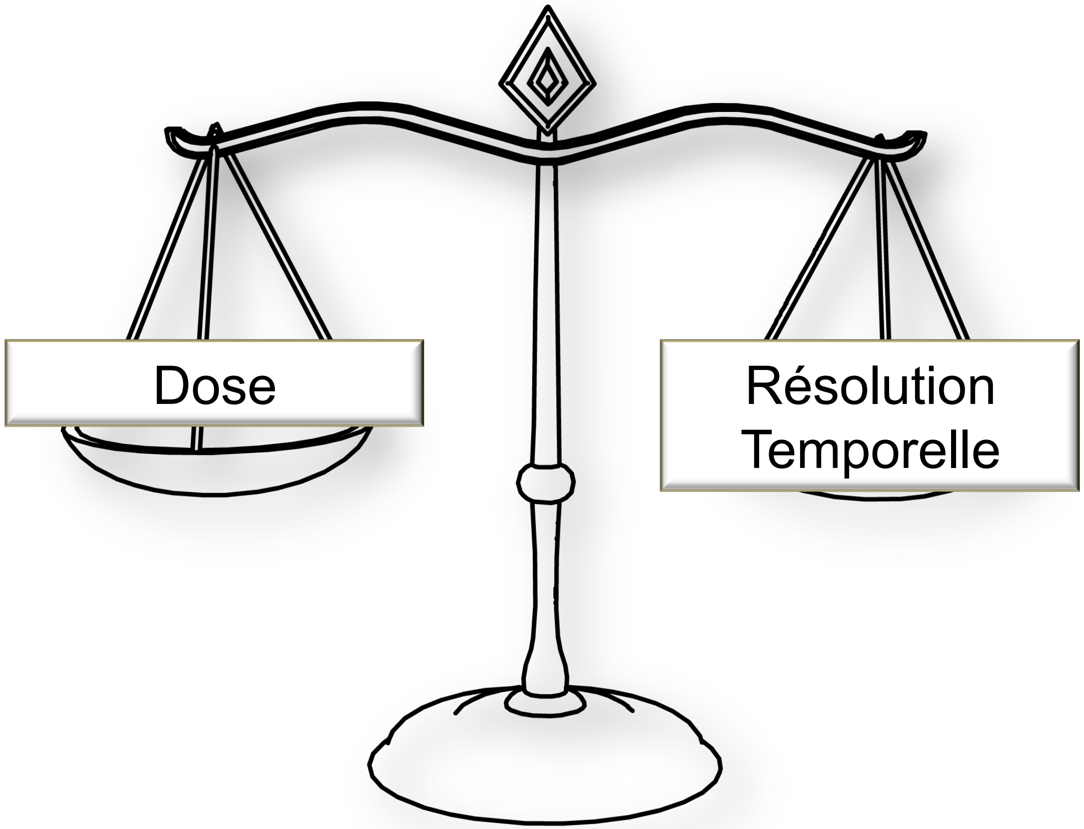
Multi Segment Cardiac

Prospective, automated for higher heart rates.



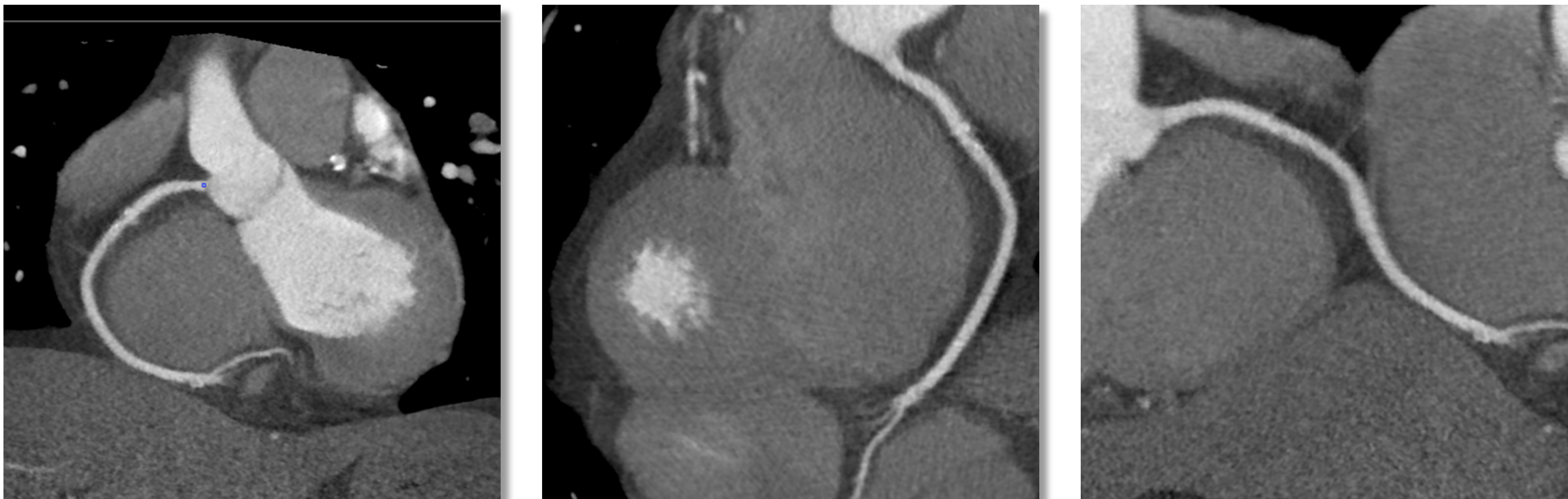
RT: 68 ms/2B   jusqu'a 27ms/5B

Le scanner Volumique dynamique



Le scanner Volumique dynamique

Multiple beat, multi-segment reconstruction



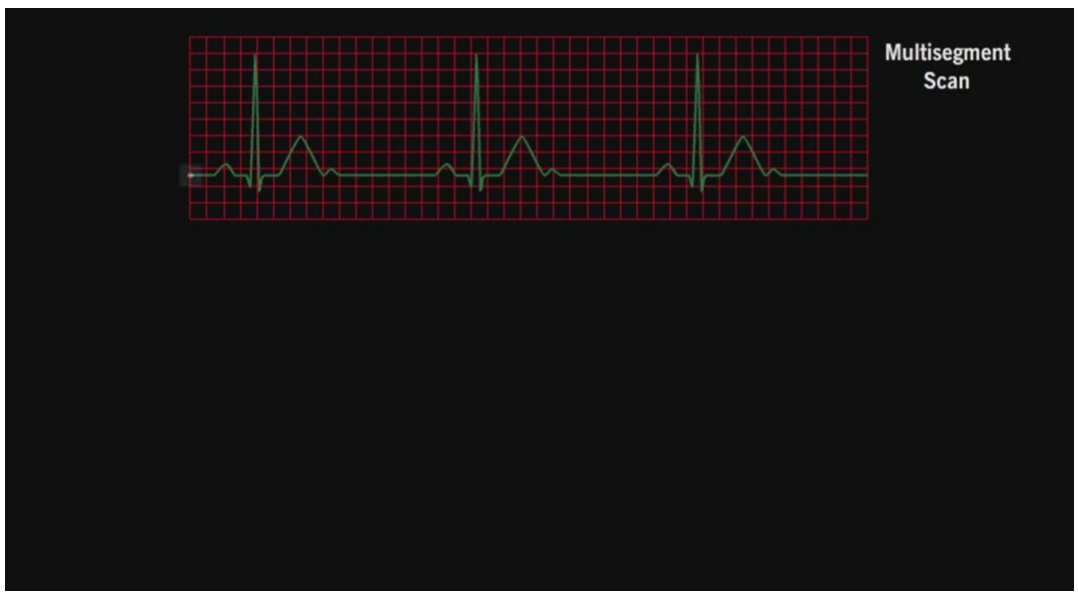
145 bpm, RCA

Conradia, Hamburg, Germany

Adaptive Motion Correction

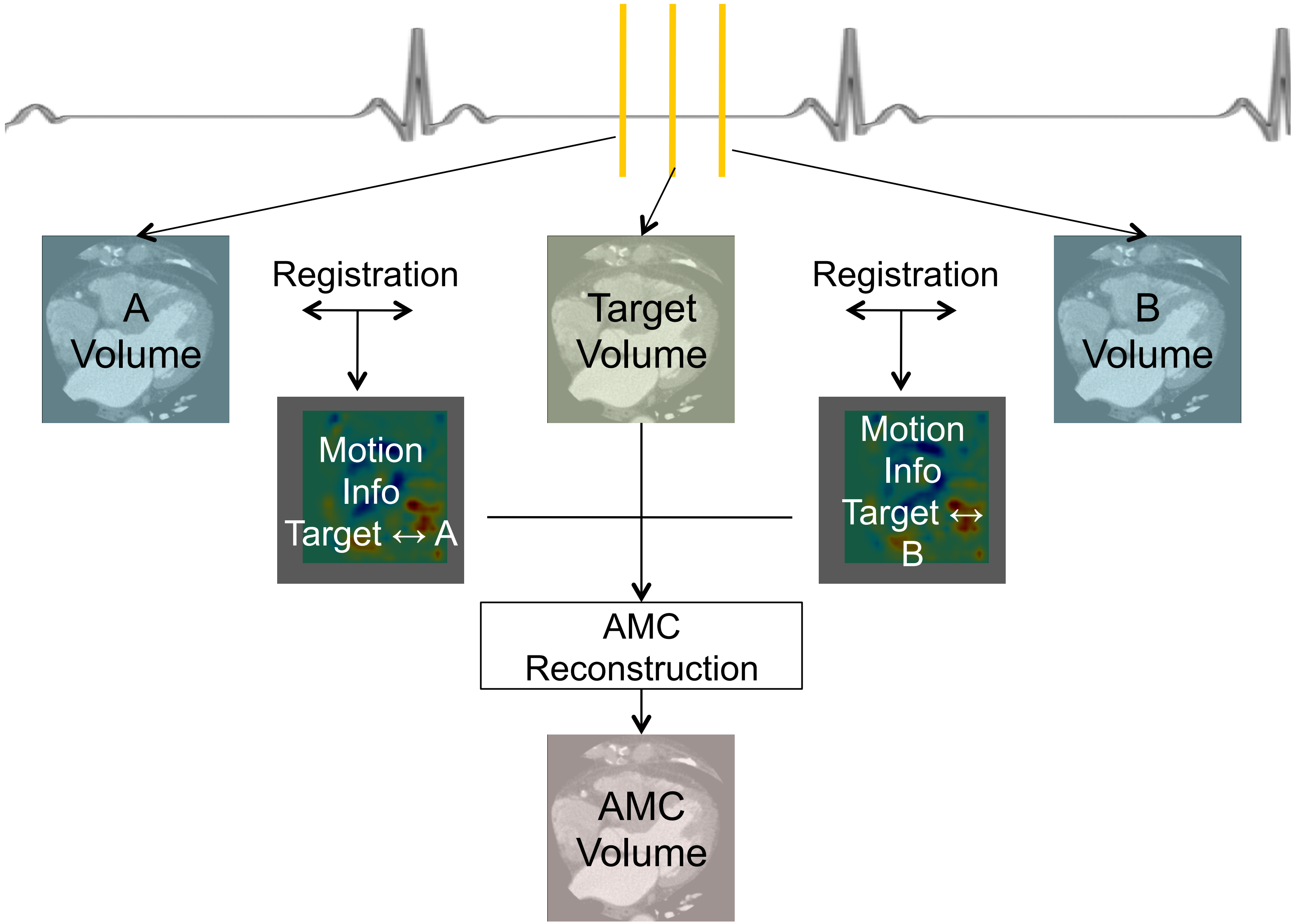
- 46 year old woman
- 90 bpm
- 2 beat scan

Scan Mode	Collimation	kV	mA	Rotation Speed (s)	Range (mm)	Dose Reduction	CTDI (mGy)	DLP (mGy.cm)	Effective Dose (mSv)
Volume	0.5mm x 200	100	SUREExposure	0.275	100	AIDR 3D	6.9	69.5	0.97 (k=0.014)

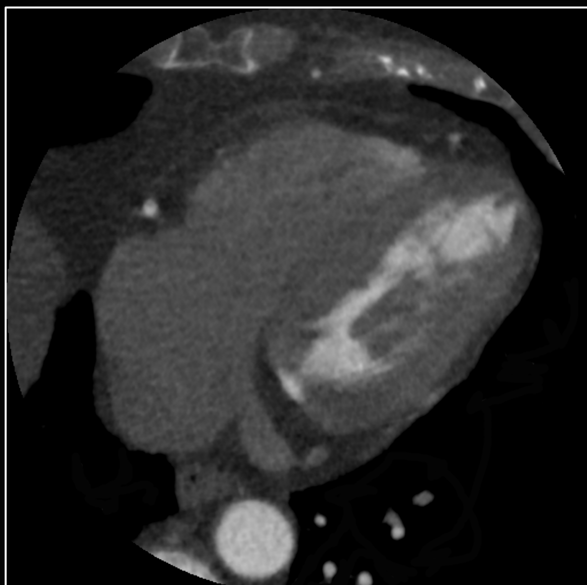


Courtesy Dr Chen, NHLBI, National Institutes of Health, USA

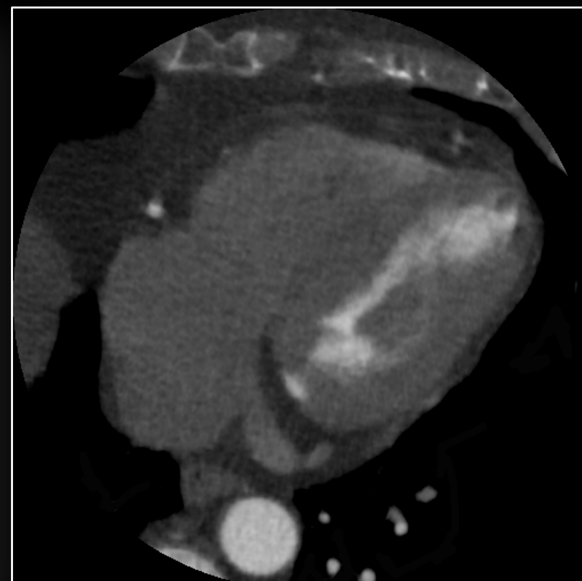
Adaptive Motion Correction



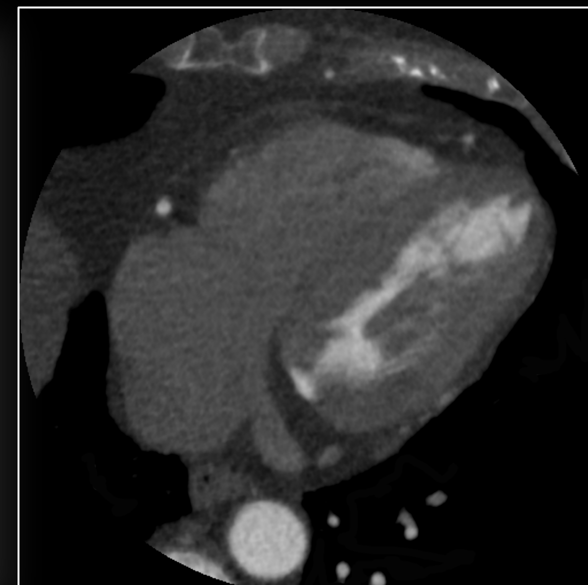
Adaptive Motion Correction



Half Reconstruction
135 ms



Segment Reconstruction
68 ms



AMC Reconstruction

Courtesy Dr Chen, NHLBI, National Institutes of Health, USA

34

Adaptive Motion Correction

Half Reconstruction 135 ms

Segment Reconstruction 68 ms

AMC Reconstruction

Courtesy Dr Chen, NHLBI, National Institutes of Health, USA

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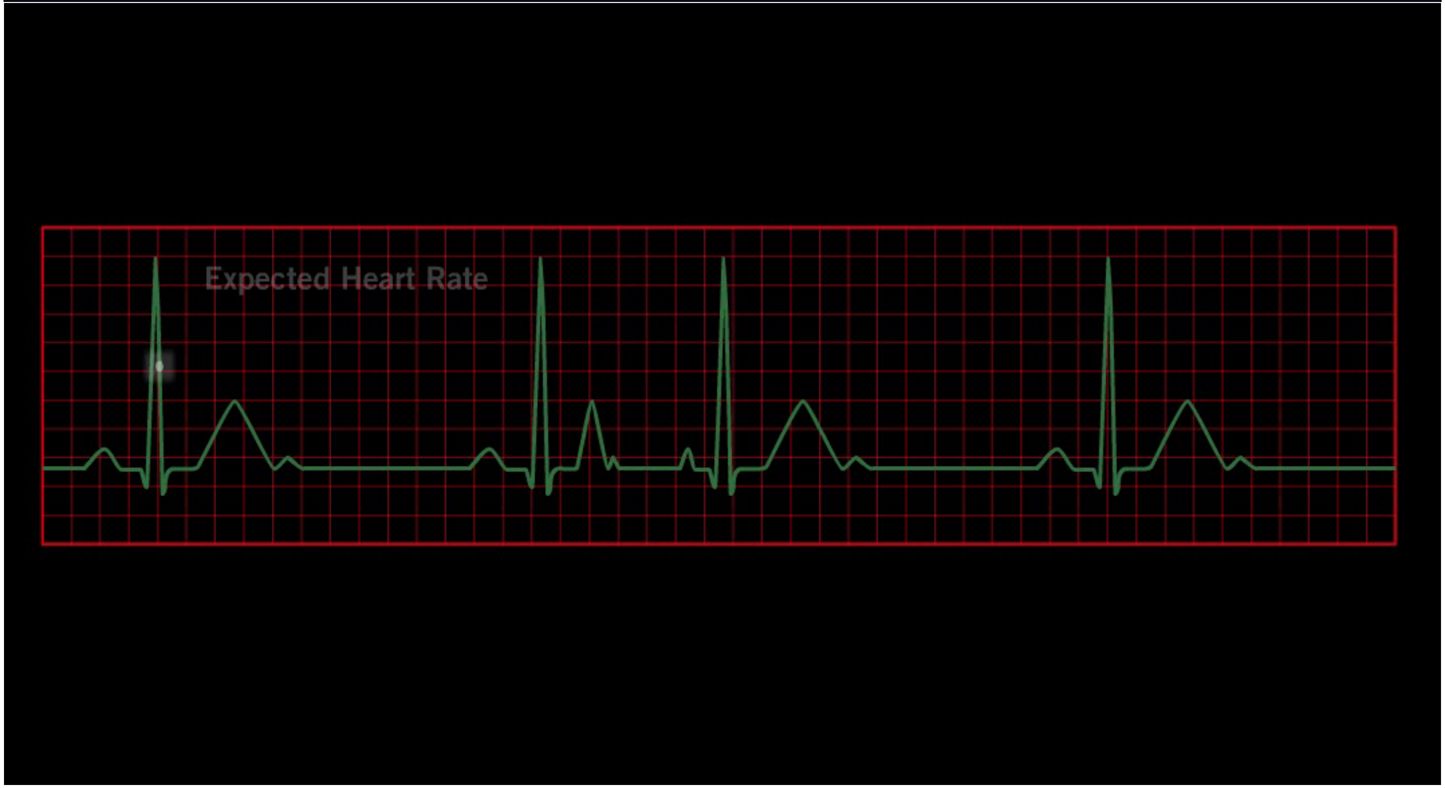
Le scanner Volumique dynamique

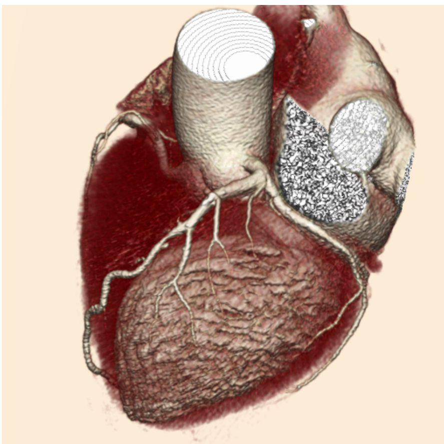
Détection des arythmies en temps réel

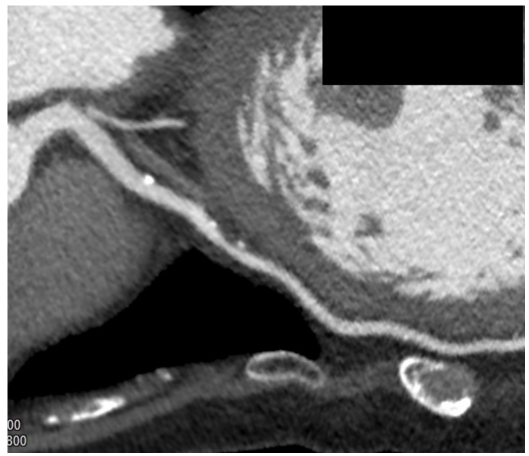
Automated for unstable or higher heart rates ensuring diagnostic image quality.

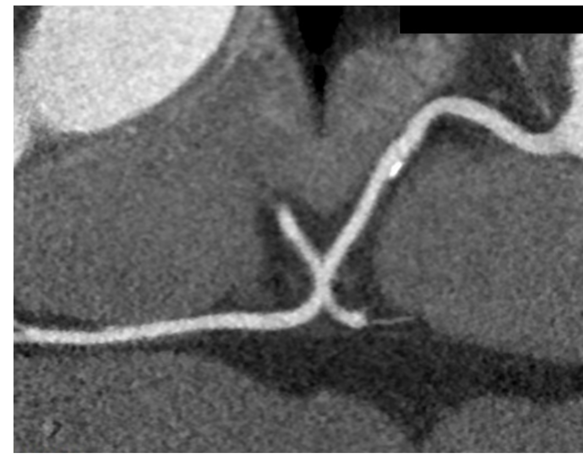


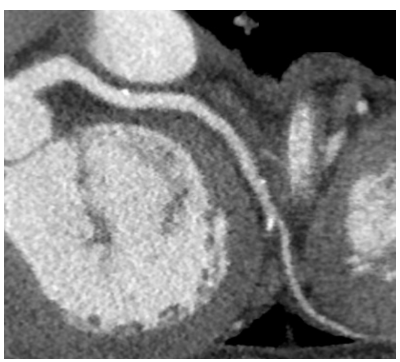
Le scanner Volumique dynamique

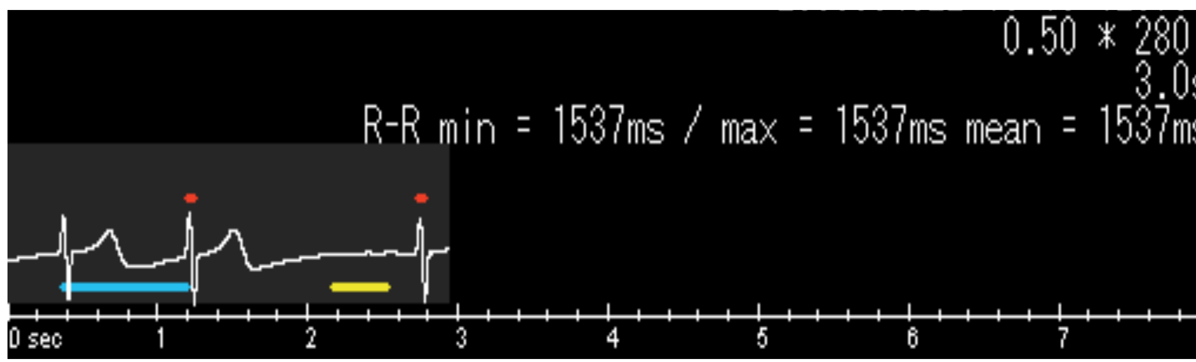
Atrium fibrilation











Journal of Cardiovascular Computed Tomography

Prospective ECG-gated 320 row detector computed tomography: implications for CT angiography and perfusion imaging

Kakuya Kitagawa · Albert C. Lardo · Joao A. C. Lima · Richard T. George

- Prospective gated acquisition
- Full cardiac coverage in 1-rotation
- Lowers radiation and contrast dose
- Improves Image Quality
- For the first time, patients with cardiac arrhythmia's are candidates for cardiac CTA
- Dose 1.7 – 2 mSv (using 100 kV)
- Potential for cardiac perfusion at 5 mSv dose

International Journal of Cardiology

A-fib compared to NSR (Uehara et al)

No patient cohort selection

- » 46 patients with Atrium fibrillation
- » 46 patients with Normal Sinus Rhythm
- » High quality: 90.2% vs 95.6%
- » Average quality: 97.9% vs 98.4%

ARTICLE IN PRESS
IJCA-12514; No of Pages 6
International Journal of Cardiology xxx (2010) xxx–xxx
Contents lists available at ScienceDirect
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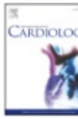
International Journal of Cardiology
journal homepage: www.elsevier.com/locate/ijcard



Quality of coronary arterial 320-slice computed tomography images in subjects with chronic atrial fibrillation compared with normal sinus rhythm

Masae Uehara [a], Nobusada Funabashi [a,*], Marehiko Ueda [a], Taichi Murayama [a], Hiroyuki Takaoka [a], Koichi Sawada [b], Tetsuharu Kasahara [b], Noriyuki Yanagawa [b], Issei Komuro [a]

[a] Department of Cardiovascular Science and Medicine, Chiba University Graduate School of Medicine, 1-8-1 Inohana, Chuo-ku, Chiba City, Chiba 260-8670, Japan
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Quality of coronary arterial 320 slice computed tomography images
Chronic atrial fibrillation
Normal sinus rhythm

ABSTRACT

Purpose: To evaluate coronary arterial image quality on 320-slice CT in subjects with chronic atrial fibrillation (CAf) vs. normal sinus rhythm (NSR).
Materials and methods: In 92 consecutive subjects, 46 each with CAf (male:female ratio 2.54:1.00, age 69.7 ± 9.9 years) and NSR (male:female ratio 1.88:1.00, age 63.7 ± 13.7 years), 320-slice CT (Aquilion-one) was performed with enhanced images reconstructed at 80% of ECG R-to-R intervals. Visualized coronary vessels > 1.5 mm diameter in the right coronary artery, left anterior descending (LAD), and circumflex (LCx) distribution were evaluated for length, percentage of length free from motion artifacts, and image quality on a scale ranging from 1 (highest quality) to 5 (lowest quality).
Results: LCx length measurements were significantly greater in subjects with NSR (108.8 ± 27.0 mm) than CAf (96.6 ± 31.4 mm) ($P = 0.049$), whereas percentages of length free from motion artifacts did not differ between the three vascular beds. Image quality, was significantly but marginally better overall in NSR than in CAF, as well as for LAD and LCx vascular beds. Mean scores in subjects with CAf and NSR were 1.4 ± 0.7 and 1.3 ± 0.6 in all arteries, 1.4 ± 0.7 and 1.2 ± 0.5 in LAD, and 1.5 ± 0.7 and 1.2 ± 0.5 in LCx, respectively (all $P < 0.001$). Despite this difference in image quality, mean scores for both CAf and NSR were weighted toward the high quality end of the scale.
Conclusion: By 320-slice CT, the overall length of visualized coronary arteries, motion artifact-free length, and image quality using a 5-point scale showed values equal to or slightly lower in CAf than in NSR, but the absolute values were quite acceptable in both groups.

1. Introduction

Recently, multislice computed tomography (MSCT) has been developed extensively. The technique has high spatial and temporal resolution, enabling accurate detection of coronary arteries and evaluation of lumens and plaques. Many previous studies have shown that the technique has high sensitivity, specificity, and negative and positive predictive values for detecting significant stenosis in coronary arteries [1–3]. The negative predictive value of greater than 95% is especially useful in excluding significant coronary artery disease in subjects with a low or intermediate pretest probability.

MSCT can also be useful in detecting myocardial damage [4–8] and abnormalities in other cardiac structures [9–13], information which may be clinically quite important. However MSCT does have some technical limitations. There may be difficulty evaluating coronary arteries in subjects who have severe calcification or implanted stents which causes blooming artifacts. Another problem is that 4 to 64-slice CT is unable to obtain high quality images of coronary arteries in subjects who have arrhythmias such as premature beats and atrial fibrillation. Because such subjects have irregular R-to-R intervals on their electrocardiogram (ECG), during scanning there may be discontinuous coronary artery images on the through plane, referred to as banding artifacts.

Subjects who have premature ventricular beats or CAf by ECG frequently have organic heart disease such as ischemic heart disease and cardiomyopathy. If the MSCT image quality of coronary arteries in subjects with arrhythmias were equivalent to that in subjects with NSR, MSCT would be useful for evaluating organic heart disease as well as or better than magnetic resonance imaging (MRI) and echocardiography. Previous studies of MSCT have shown improvement of coronary artery image quality in subjects with CAf, but it is still difficult to obtain images equivalent to those seen in subjects with NSR [14–17]. However recently new scanners have been developed which improve upon these limitations. Dual-source CT, with two-X-ray tubes and detectors mounted in a 90-degree geometry, has improved temporal resolution. This high temporal resolution may enable detection of significant coronary arterial stenoses even in subjects without stable NSR [18,19].

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E-mail address: nobusada@w8.dion.ne.jp (N. Funabashi).

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doi:10.1016/j.ijcard.2010.02.032

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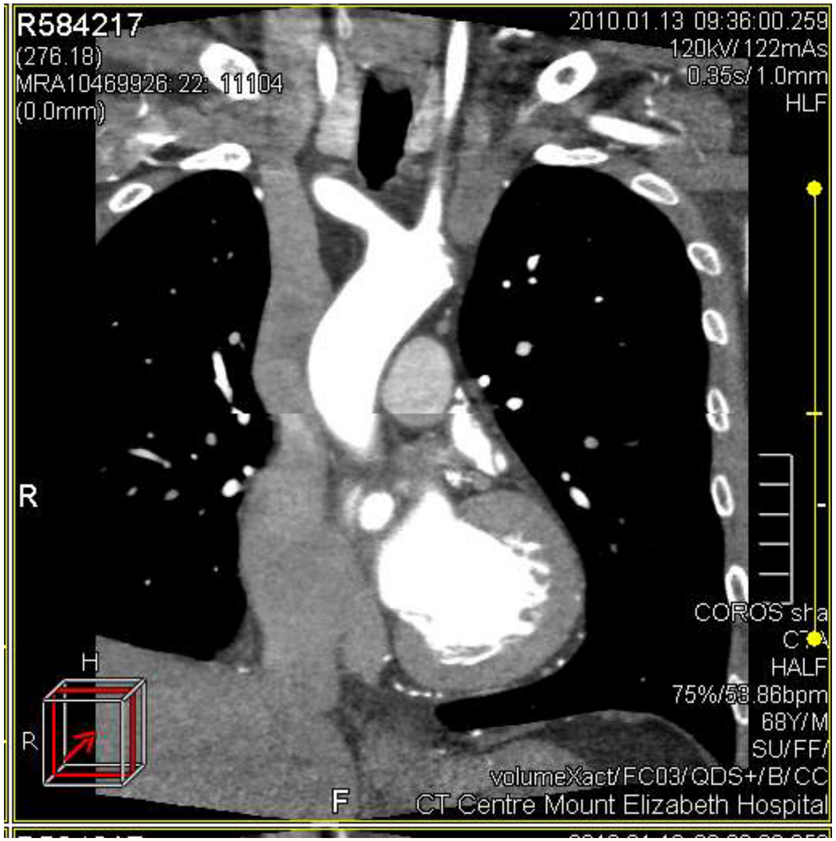
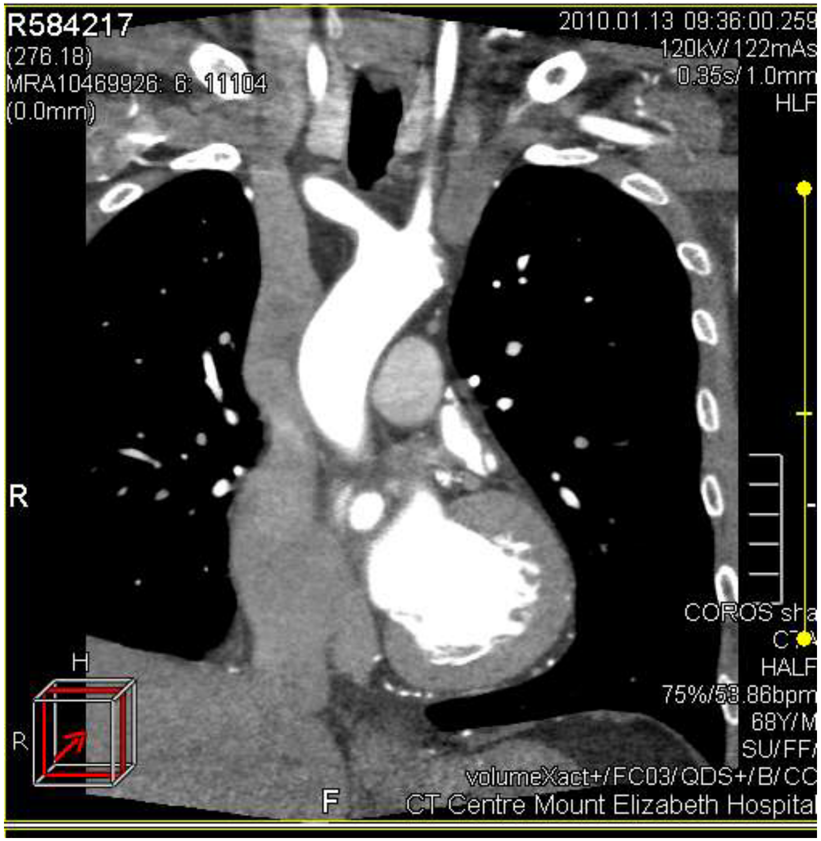
Le scanner Volumique dynamique

Wide volume allows large anatomical areas
(greater than 16 cm) to be covered very quickly

Le scanner Volumique dynamique





STITCHING ON

Variable Helical Pitch - vHP

Adaptive Diagnostics
Clinical Solutions

⬇ Radiation Dose

Contrast Volume

Workflow amélioré

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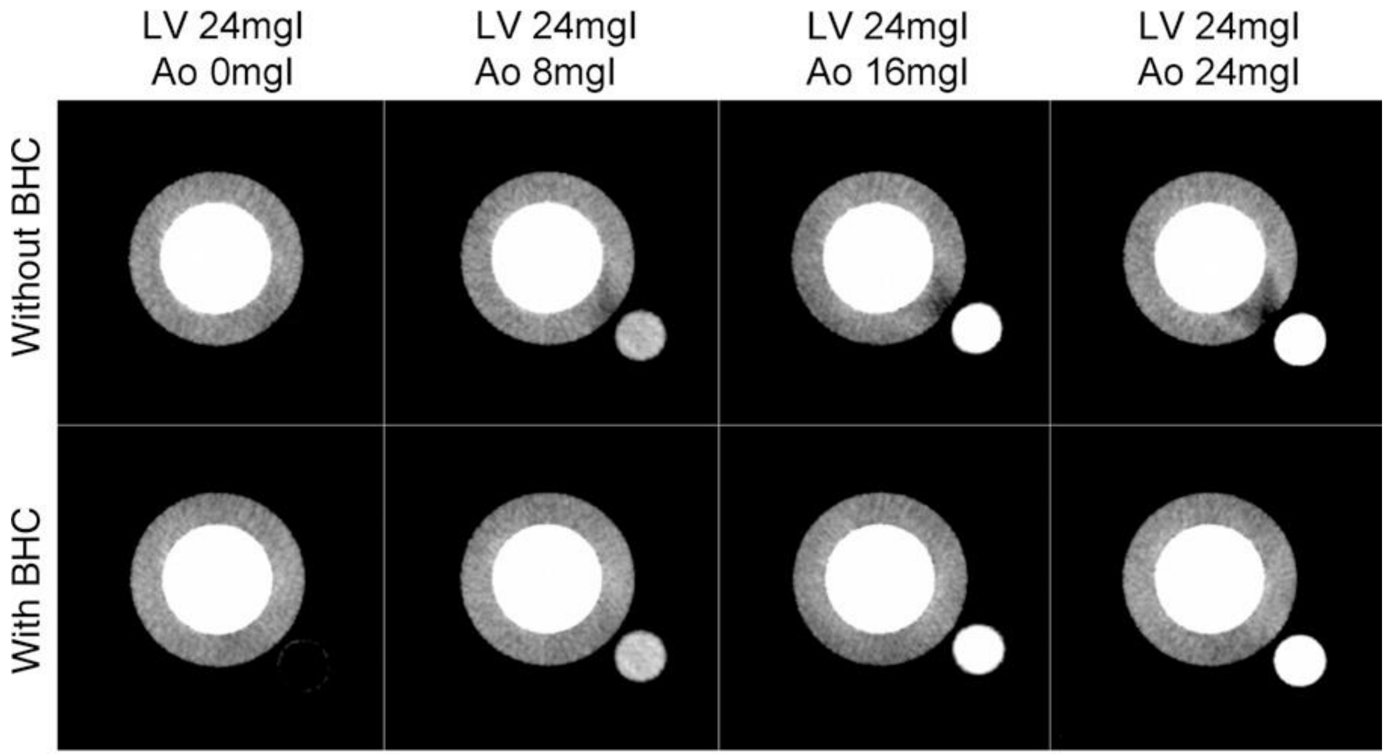
Myocardial Perfusion

Made for Life

Artéfacts durcissement faisceau X



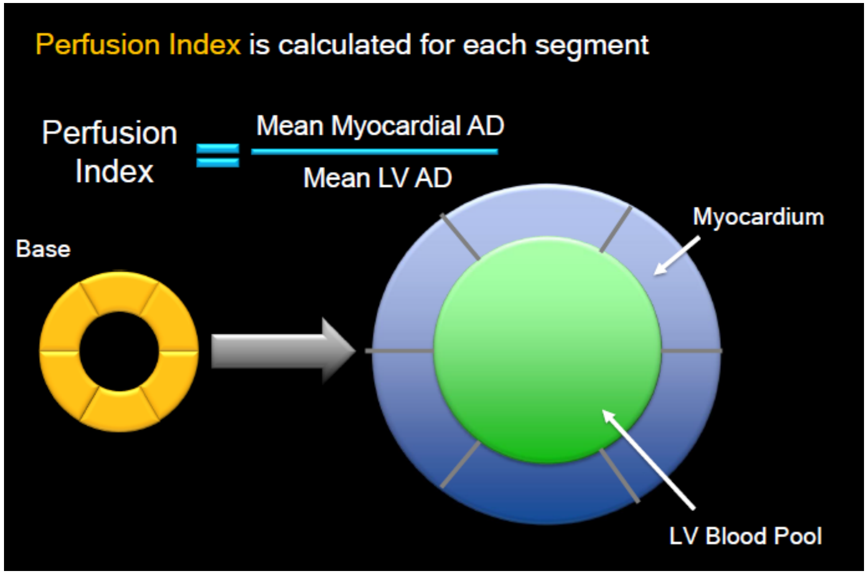
Radiology

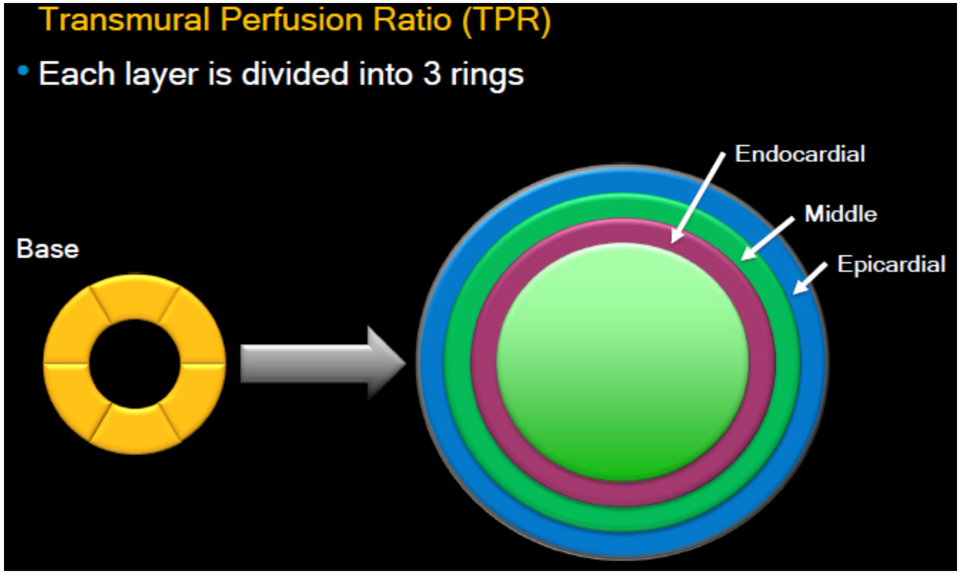
Characterization and Correction of Beam-hardening Artifacts during Dynamic Volume CT Assessment of Myocardial Perfusion[1]

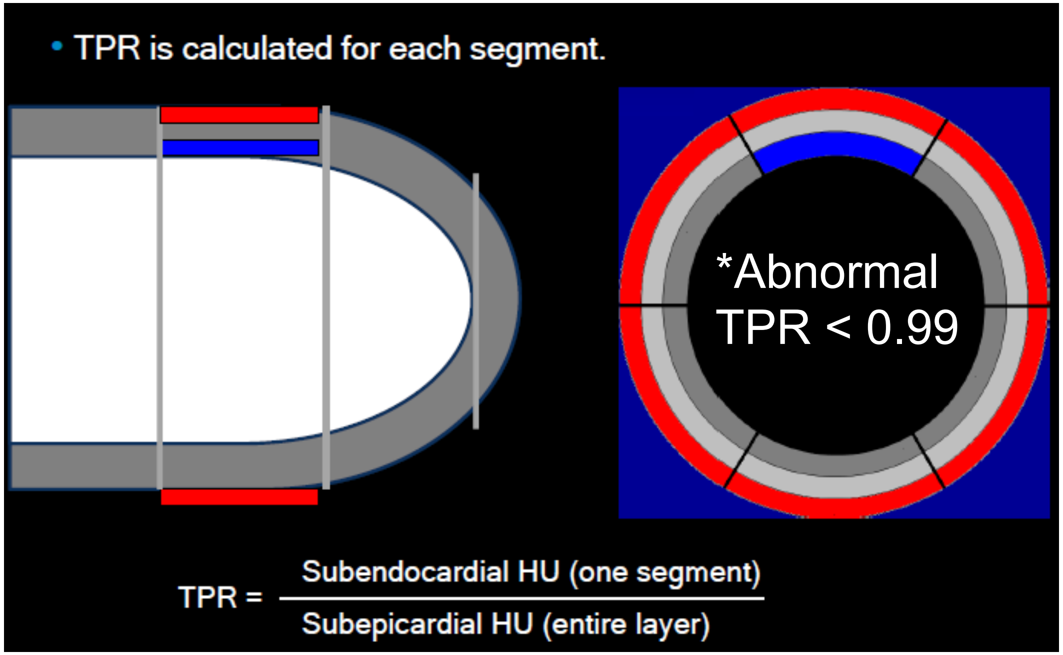
Kakuya Kitagawa , Richard T. George Armin Arbab-Zadeh , João A. C. Lima , MD Albert C. Lardo , PhD

From the Department of Medicine, Division of Cardiology (K.K., R.T.G., A.A., J.A.C.L., A.C.L.), and Department of Biomedical Engineering (A.C.L.), Johns Hopkins University School of Medicine,

LES MESURES



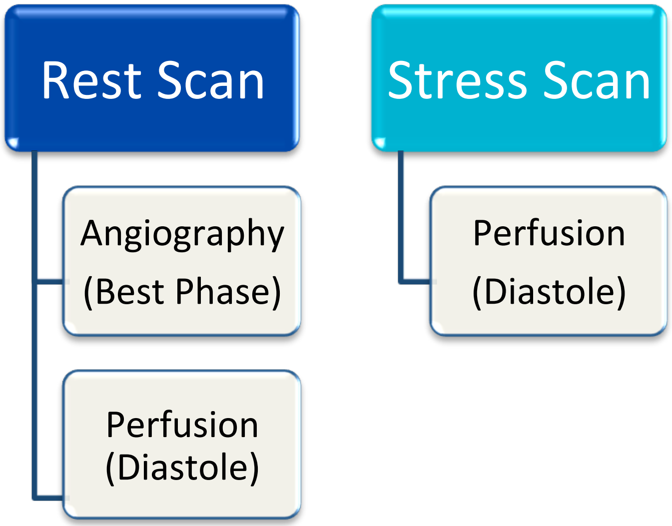




*George RT, et al.
Circ Cardiovasc Imaging. 2009

Workflow


Patient Arrives
Beta Blockade
Rest Scan
Stress Injection
Stress Scan


Rest Scan
Angiography (Best Phase)
Perfusion (Diastole)
Stress Scan
Perfusion (Diastole)

Le scanner Volumique Dynamique

- 71 year old male
- Atypical angina

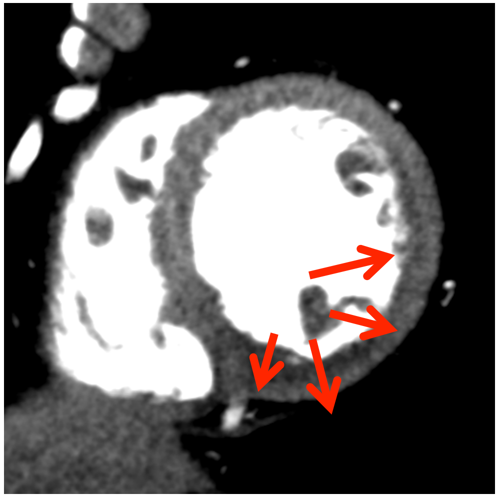
LAD

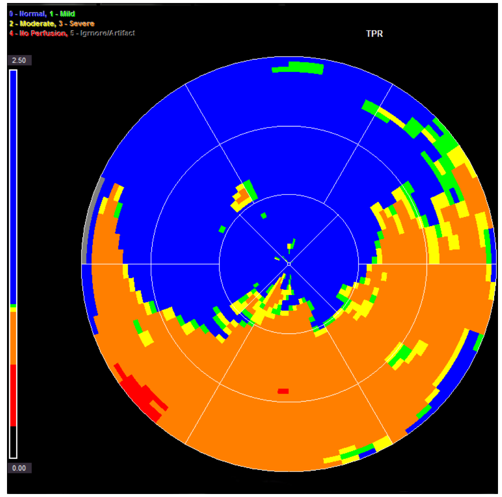
LCx

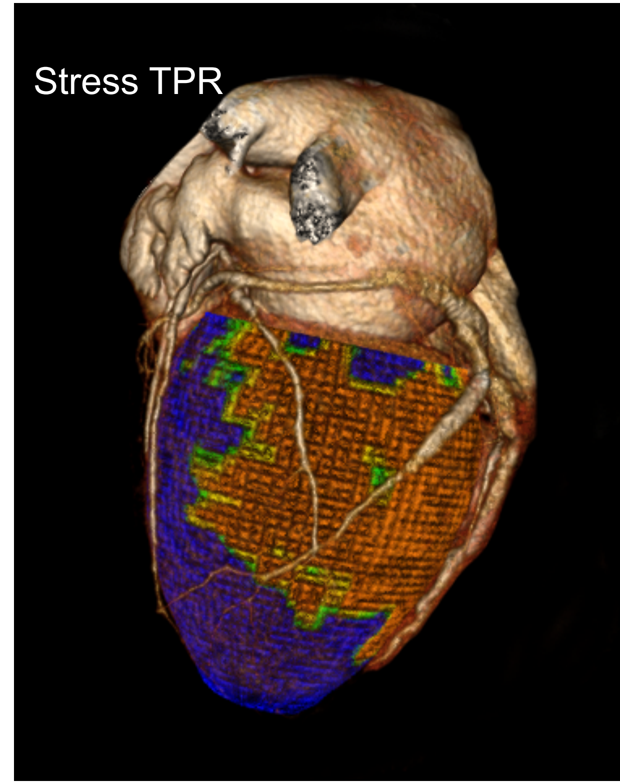
RCA

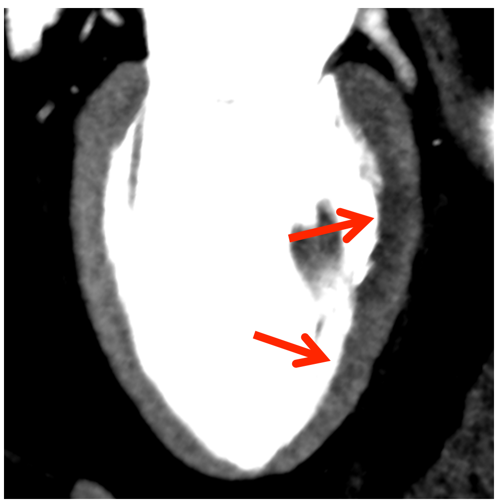
Stenosis in the mid LCx, severe stenosis in the mid RCA

Le scanner Volumique Dynamique









Rotation Speed	0.275s
Dose Reduction	AIDR 3D integrated
Dose	1.93mSv (k=0.014)

An area of hypo-attenuation is seen in the infero-lateral wall. The Transmural Perfusion Ratio (TPR) map confirms this.

CORE 320

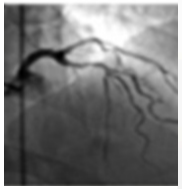
Representing Toshiba's environmental commitment

TOSHIBA eco style

ANALYSE MORPHOLOGIE

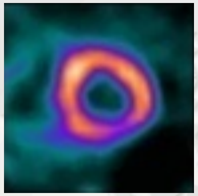
ANALYSE FONCTIONNELLE

TGH
NHLBI
BWH
LUMC
JHU
Rigshospitalet
Charité
Keio
Iwate
St. Luke's
Mie
NHC
InCor

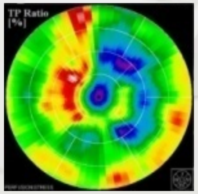


Coronarographie

CT angiographie



Scintigraphie SPECT

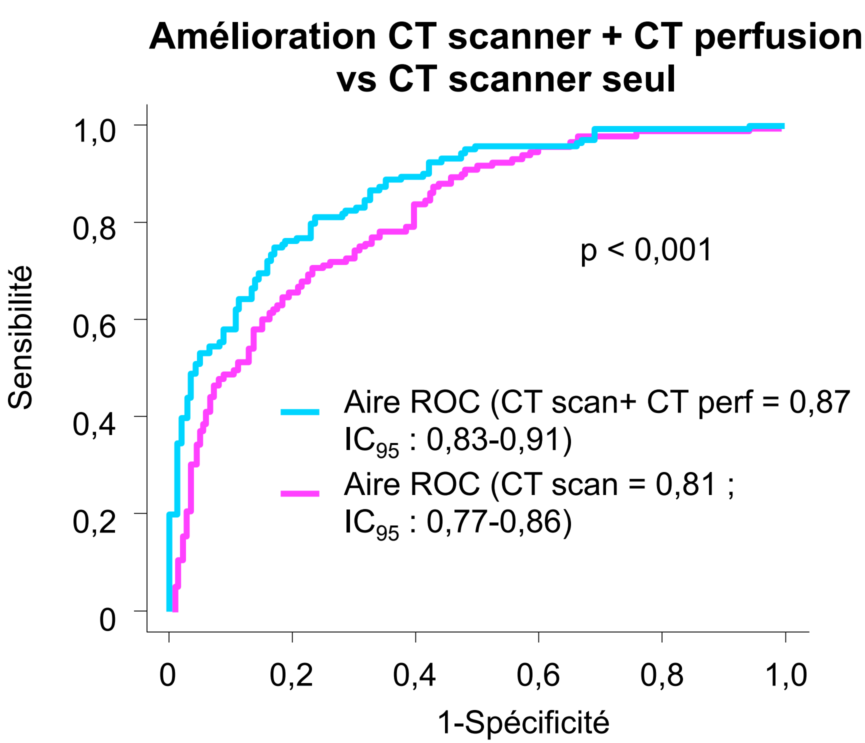


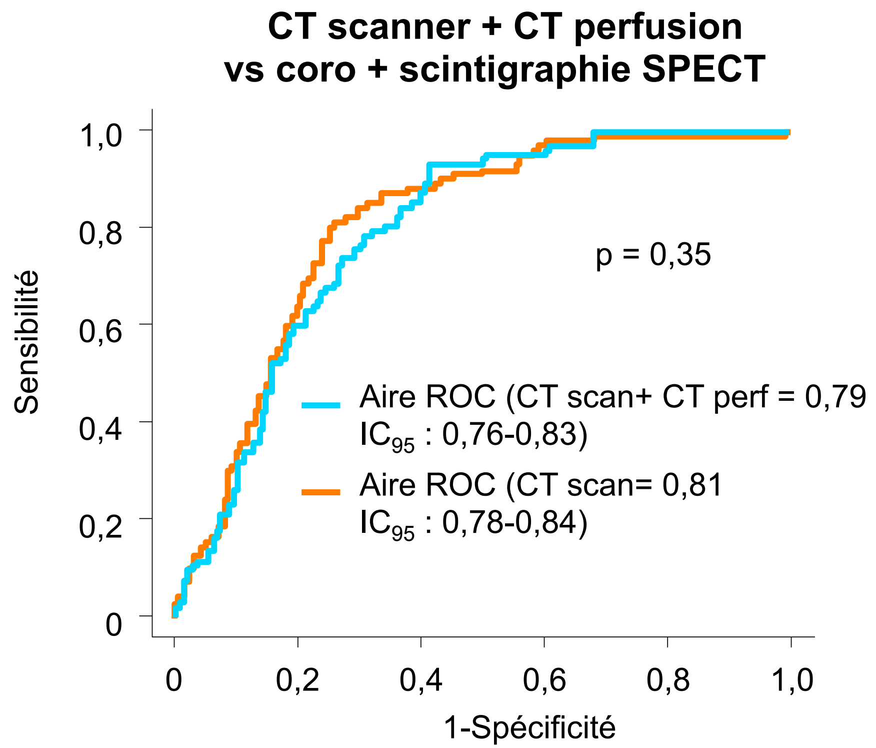
CT perfusion

Etude multicentrique 8 pays 16 Hopitaux 381 patients

- » **Evaluation du scanner / coronarographie associée à la scintigraphie**
- » **Performance diagnostique du scanner 320 barrettes**

CORE 320





- Le scanner de perfusion améliore la capacité diagnostique par comparaison avec le scanner seul
- La combinaison scanner / scanner de perfusion identifie les patients nécessitant une revascularisation
- Etude anatomique et viabilité lors d'un même examen avec une dose totale modérée (< 5 mSv)

ESC 2012 - D'après Lima J et al., abstract 3936,

Le scanner Volumique dynamique

European Heart Journal (2012) **33**, 67–77
doi:10.1093/eurheartj/ehr268

CLINICAL RESEARCH
Interventional cardiology

Computed tomography stress myocardial perfusion imaging in patients considered for revascularisation a comparason with fractionnal flow reserve

Brian S. Ko[1,2], James D. Cameron[1,2], Ian T. Meredith[1,2], Michael Leung[1,2], Paul R. Antonis[1,2], Arthur Nasis[1,2], Marcus Crossett[1,3], Sarah A. Hope[1], Sam J. Lehman[1], John Troupis[1,3], Tony DeFrance[4,5], and Sujith K. Seneviratne[1,2]*

[1]Monash Cardiovascular Research Centre Australia [2]Departement of Medicine Monash Medical Centre
[3]Departement of Diagnostic Imaging MMC [4]Stanford University USA and [5]CVCTA Education San Francisco

FFR < 0,8 en référence
Identification de 76% des territoires ischémiques
Identification de 84% des territoires non ischémiques

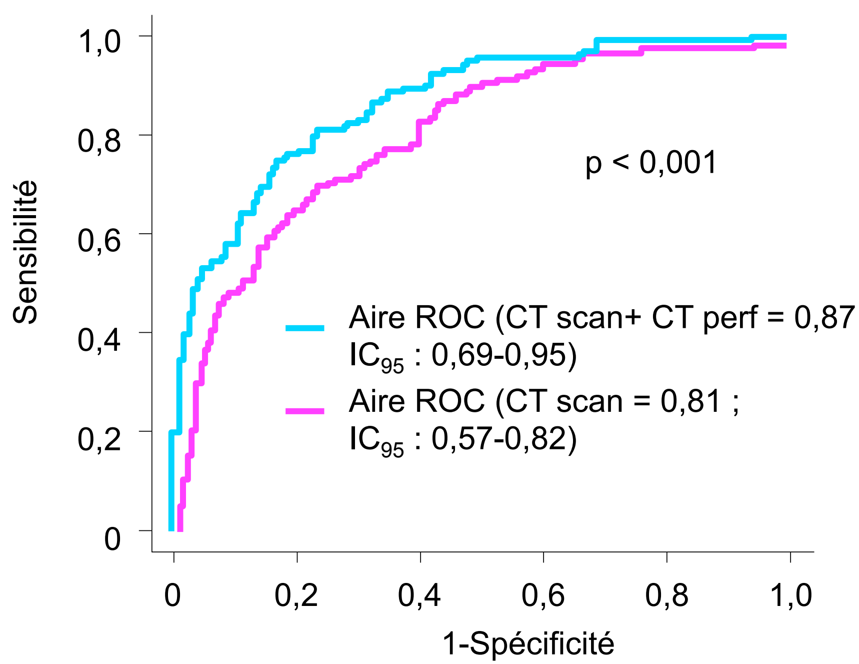
- **Défect de perfusion + sténose > 50% spécifique à 98%**
- **Perfusion normale + lésion < 50% permet d'éliminer une ischémie dans 100% des cas**
- **Concordance entre les résultats de la FFR et le scanner 320**
- **Efficacité très élevée quand il y a une concordance entre CTA et CTP pour la mise en évidence ou exclure l'ischémie**

CT perfusion salvages non diagnostic CTA for stent assessment

Computed tomography angiography and myocardial computed tomography perfus in patients with coronary stents: prospective intraindividual comparison with conventional coronary angiography.

Rief M,Zimmermann E,Stenzel F,Martus Pstandl k,Greupner J,Kranz
Department of Radiology, Charité, Berlin, Germany.

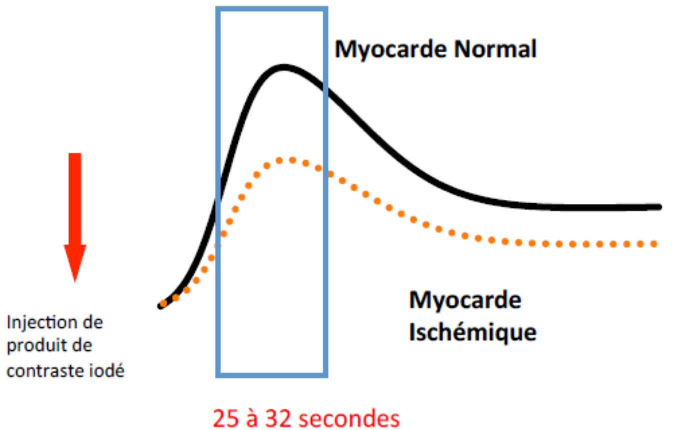
Amélioration CT scanner + CT perfusion vs CT scanner seul



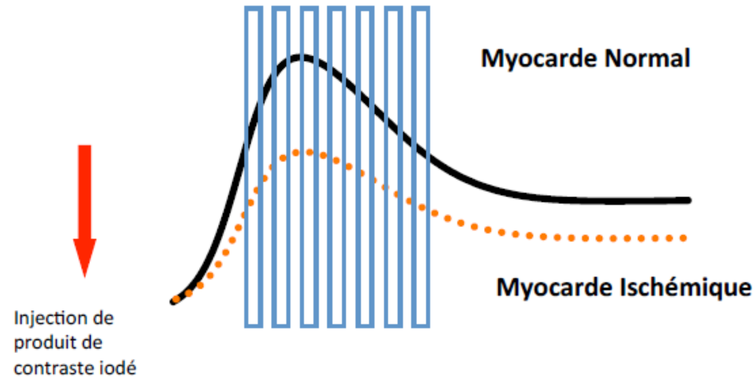
JACC
Journal of the American College of Cardiology

TECHNIQUES DE PERFUSION

Imagerie classique au pic d'atténuation attendu



Imagerie de perfusion dynamique: échantillonnage du volume à différents instants post injection



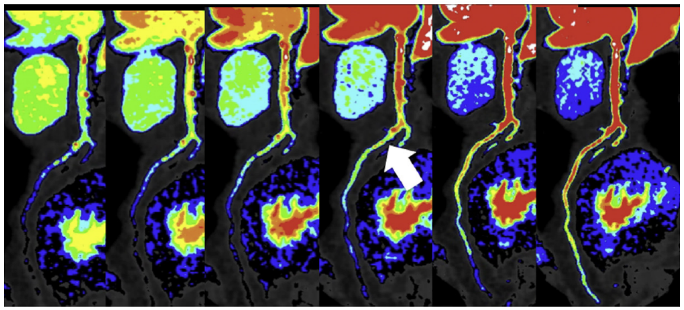
Méthode quantitative : flux sanguin myocardique, volume sanguin myocardique ,....

Quantification of coronary flow using dynamic angiography with 320-detector row CT and motion coherence image processing: Detection of ischemia for intermediate coronary stenosis

Michinobu Nagao[a,*], Yuzo Yamasaki[b], Takeshi Kamitani[b], Satoshi Kawanami[a], Koji Sagiyama[b], Torahiko Yamanouchi[b], Yamato Shimomiya[c], Tetsuya Matoba[d], Yasushi Mukai[d], Keita Odashiro[e], Shingo Baba[b], Yasuhiro Maruoka[b], Yoshiyuki Kitamura[b], Akihiro Nishie[b], Hiroshi Honda[b]

[a] *Departments of Molecular Imaging & Diagnosis, Graduate School of Medical Sciences, Kyushu University, Japan*
[b] *Departments of Clinical Radiology, Graduate School of Medical Sciences, Kyushu University, Japan*
[c] *Departments of Medical Technology, Graduate School of Medical Sciences, Kyushu University, Japan*
[d] *Departments of Cardiovascular Medicine, Graduate School of Medical Sciences, Kyushu University, Japan*
[e] *Departments of Medicine and Biosystemic Science, Graduate School of Medical Sciences, Kyushu University, Japan*

4,1 mSv



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Soustraction Coronaires

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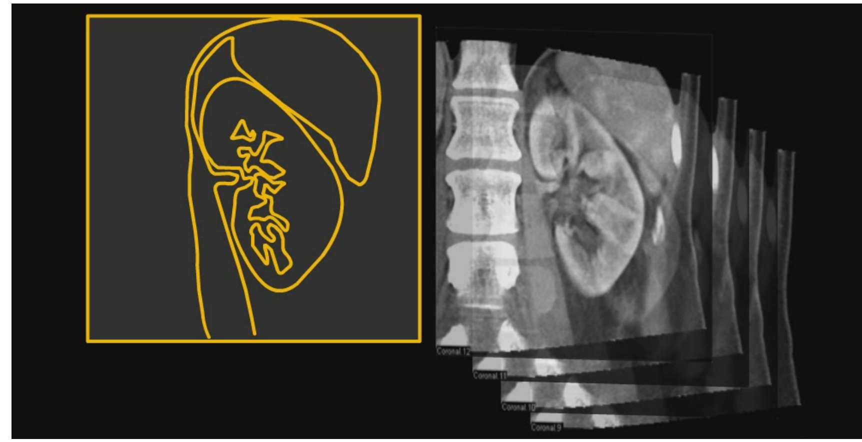
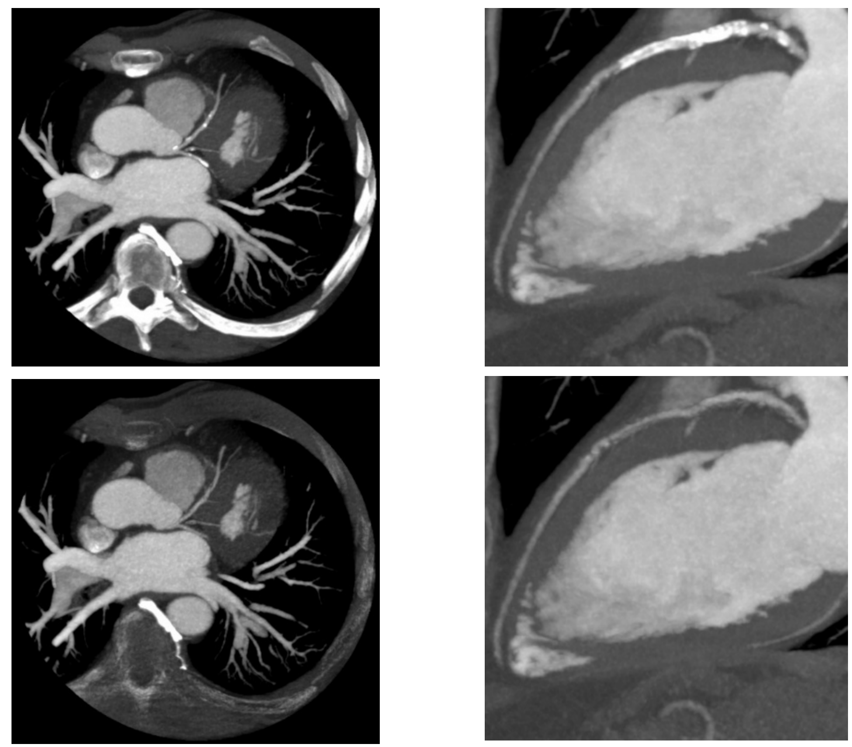
ONE Clinic Sure Subtraction





» ZERO CLICK

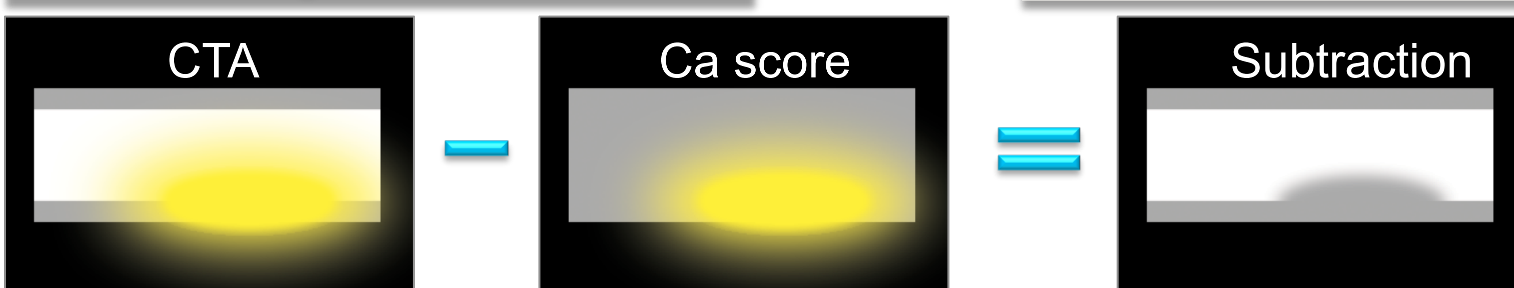
» ZERO ARTEFACTS DE SEGMENTATION

» RECALAGE ELASTIQUE

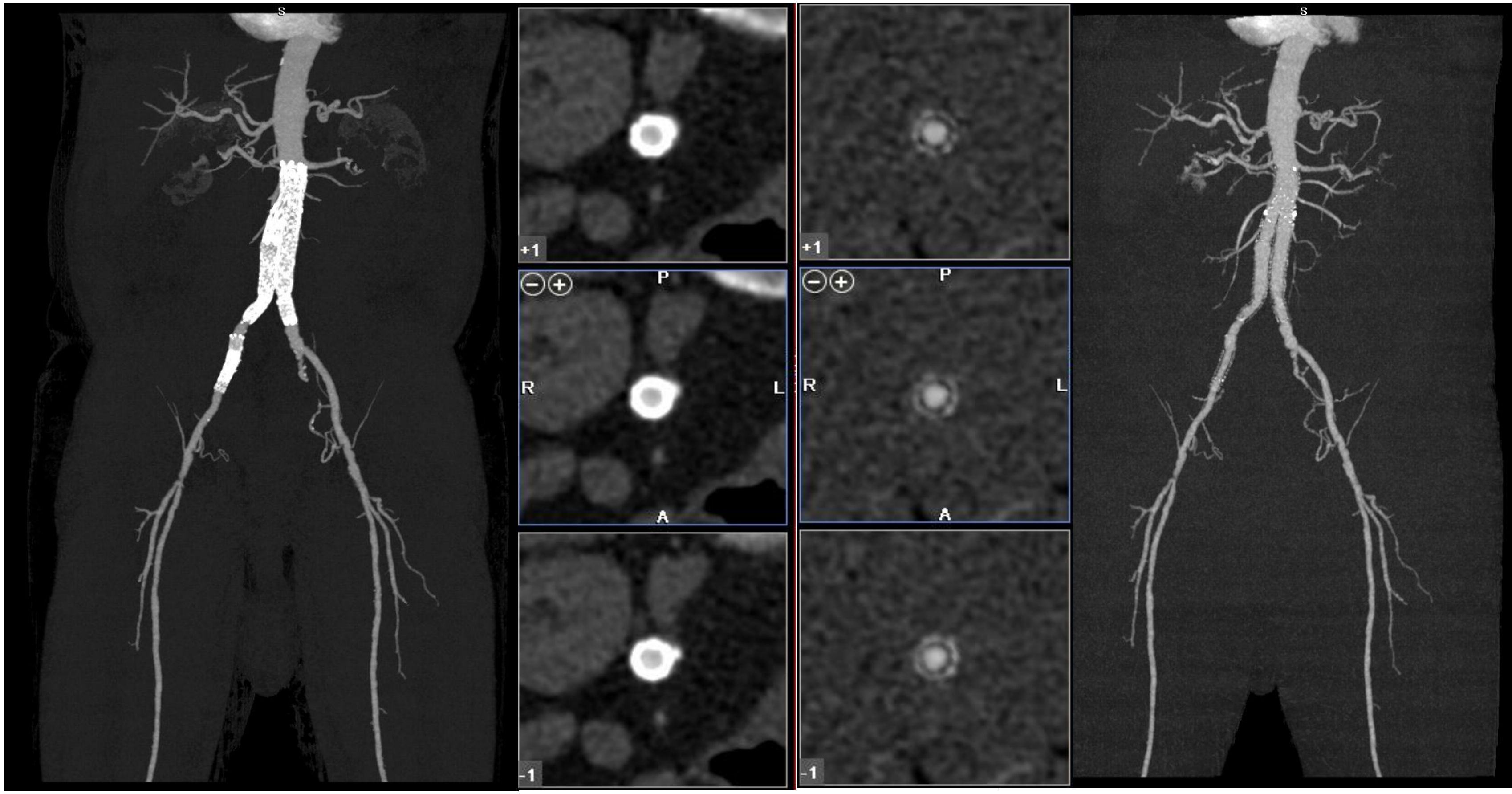
ONE Clinic Sure Subtraction

Images Natives

Bone Soustraction

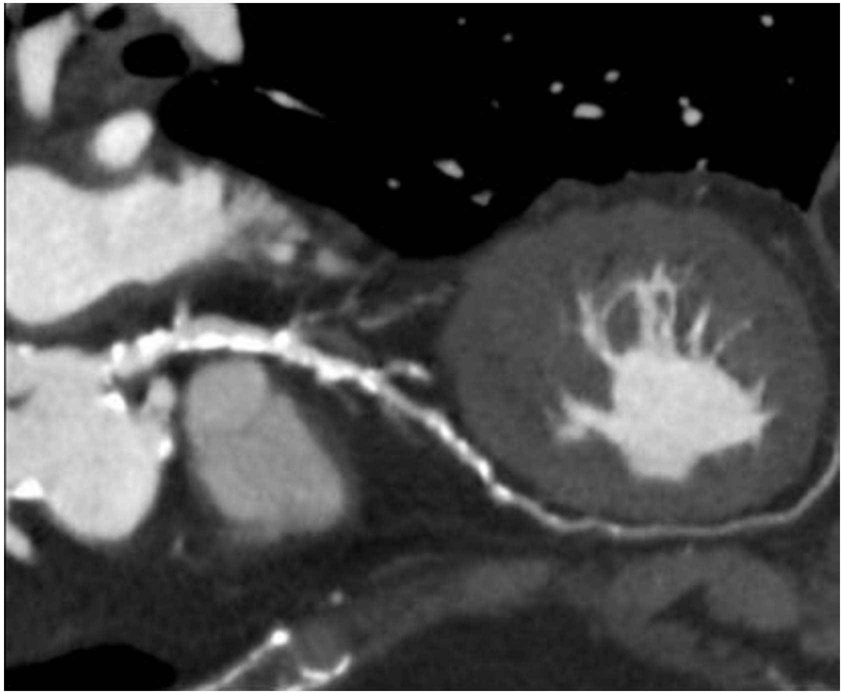


ONE Clinic Sure Subtraction

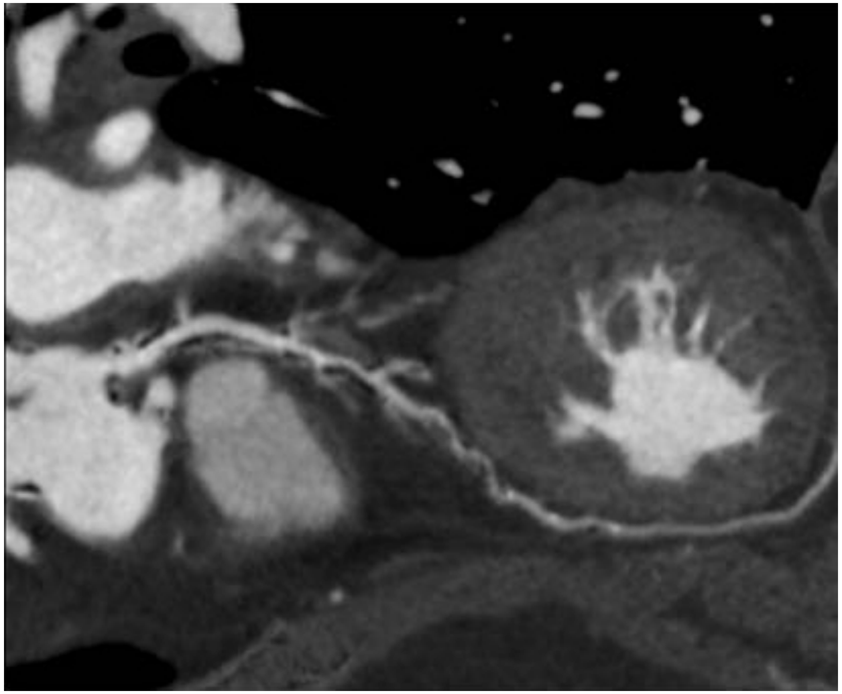


- Suppression de l’os , du stent et du calcium
- Suppression des artéfact en blooming
- Meilleure visualisation de la lumière

SureSubtraction - Coronaires



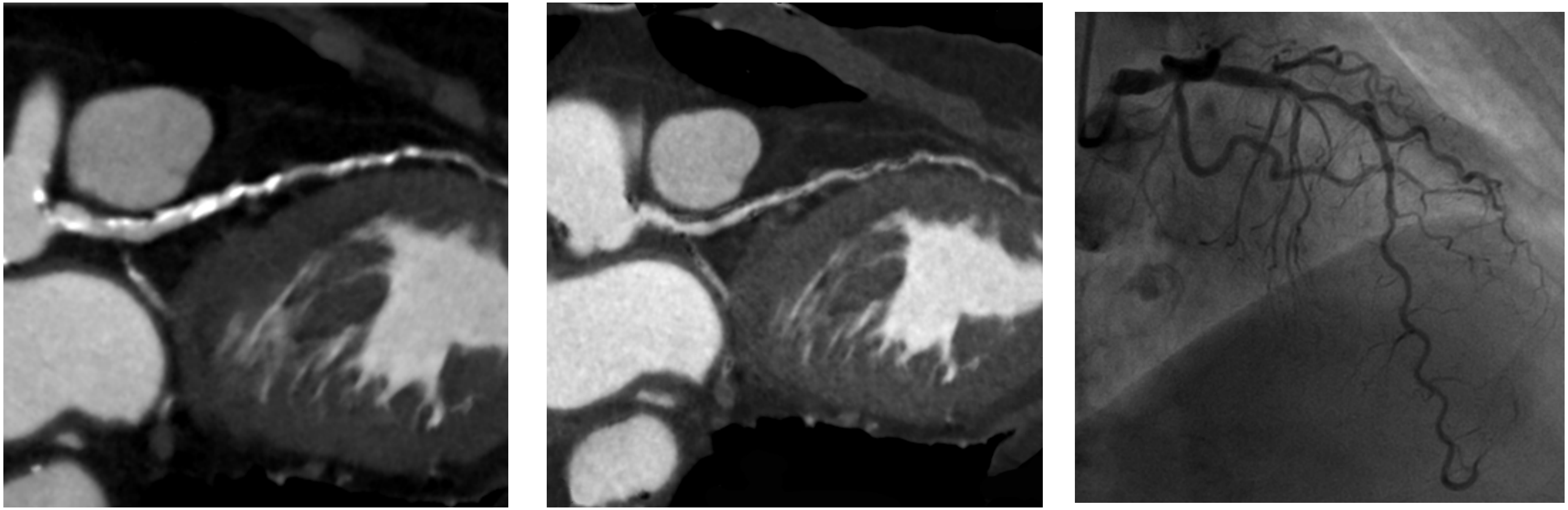
Post Contrast CTA



Subtracted

SureSubtraction - Coronaires

Adaptive Diagnostics
Clinical Solutions

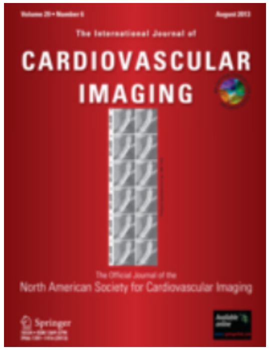


Post Contrast CTA — Subtracted

» Visualisation de la lumière améliorée grâce au recalage elastique

Courtesy Dr Kofoed, Rigshospitalet, Denmark

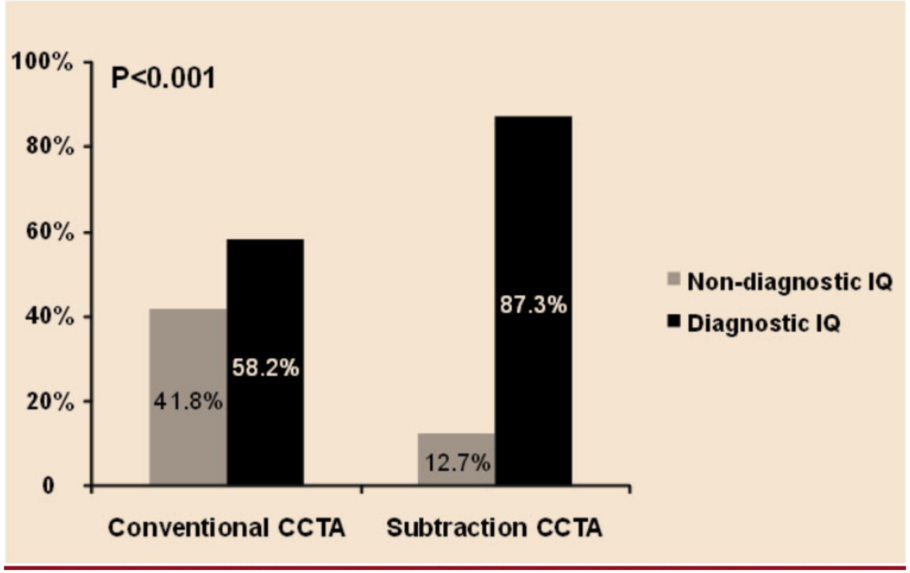
SureSubtraction - Coronaires



Improved evaluation of calcified segments on coronary CT angiography: a feasibility study of coronary calcium subtraction.

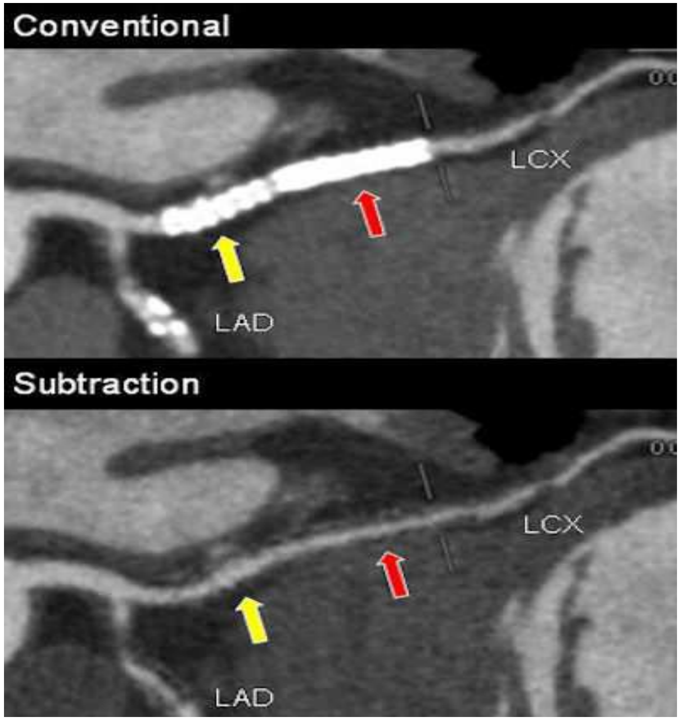
Tanaka R ,Yoshioka K , Muranaka K / Klaus Kofoed MD, Andreas Fuchs

Department of Radiology, Iwate Medical University/ Rigshospitalet, Copenhagen, Denmark

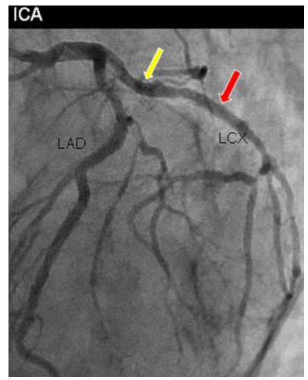


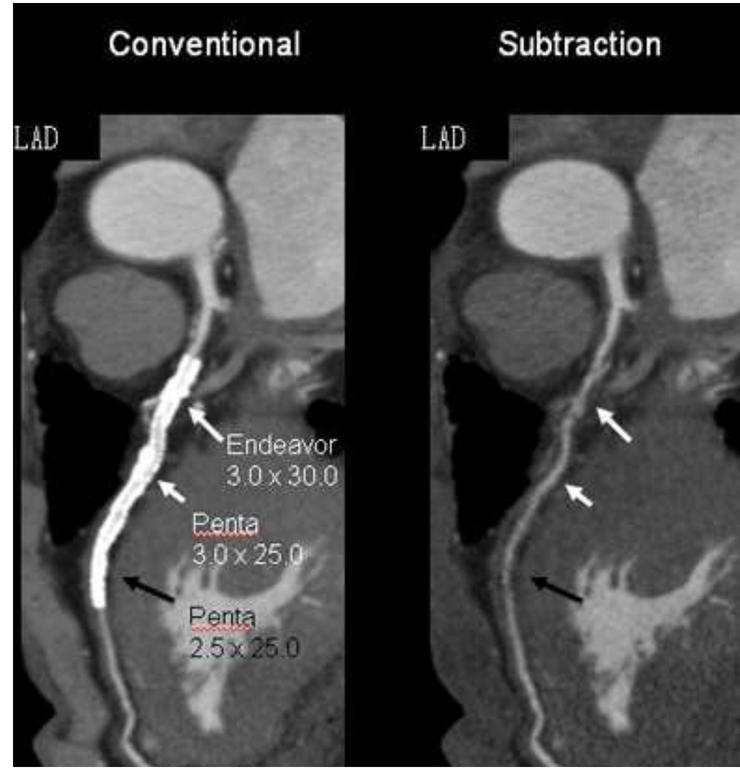
- **Réduction de 41,8 % à 12,7% de segment non diagnostique**
- **Augmentation de la précision de 15% de la spécificité de 25%**
- **Réduction de 20% des faux positifs**

SureSubtraction – Coronaires



- RSNA 2014
- 99 Patients
- Coronarographie





Précision/Taille	CTA	DSCTA
3,5 mm	78 %	92 %
3 mm	61 %	90 %
2,5 mm	37 %	88,2 % P=0,0001

Dr Makoto Takase Clinic TAKASAKI JAPAN

DSCTA vs. CTA for stent imaging

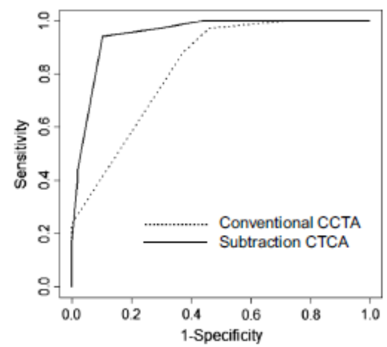
Exam	Sensitivity	Specificity	PPV	NPV	Accuracy
Conventional CTA	48.6%	58.5%	13.9%	81.9%	57.3%
DSCTA	62.9%	91.7%	66.6%	94.7%	88.2%

SureSubtraction - Coronaires

Int J Cardiovasc Imaging
DOI 10.1007/s10554-015-0630-1

Subtraction coronary CT angiography using second-generation 320-detector row CT

Kunihiro Yoshioka · Ryoichi Tanaka · Kenta Muranaka · Tadashi Sasaki · Takanori Ueda · Takuya Chiba · Kouta Takeda · Tsuyoshi Sugawara



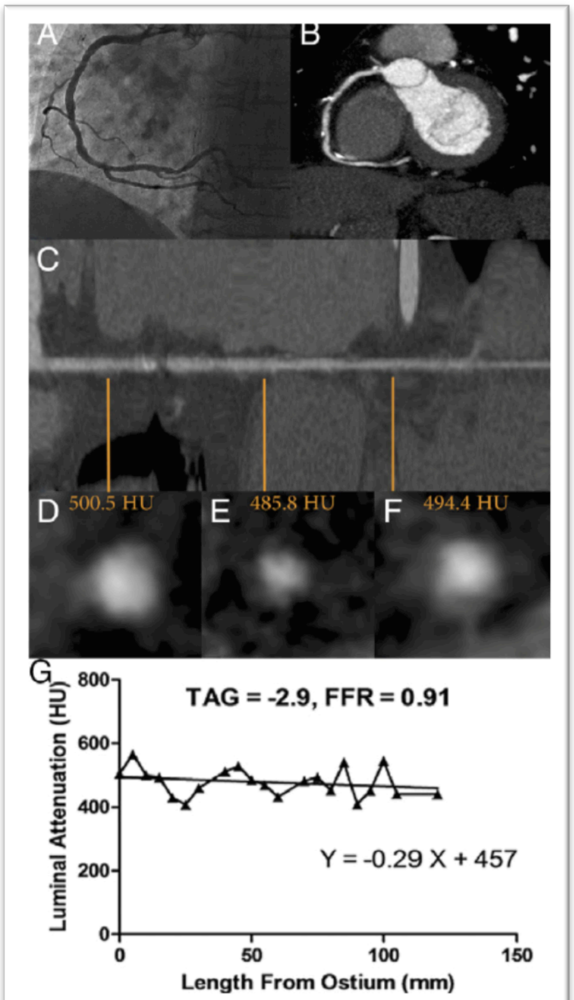
	AUC	95% conf
Conventional CCTA	0.824	0.750-0.899
Subtraction CTCA	0.936	0.889-0.983

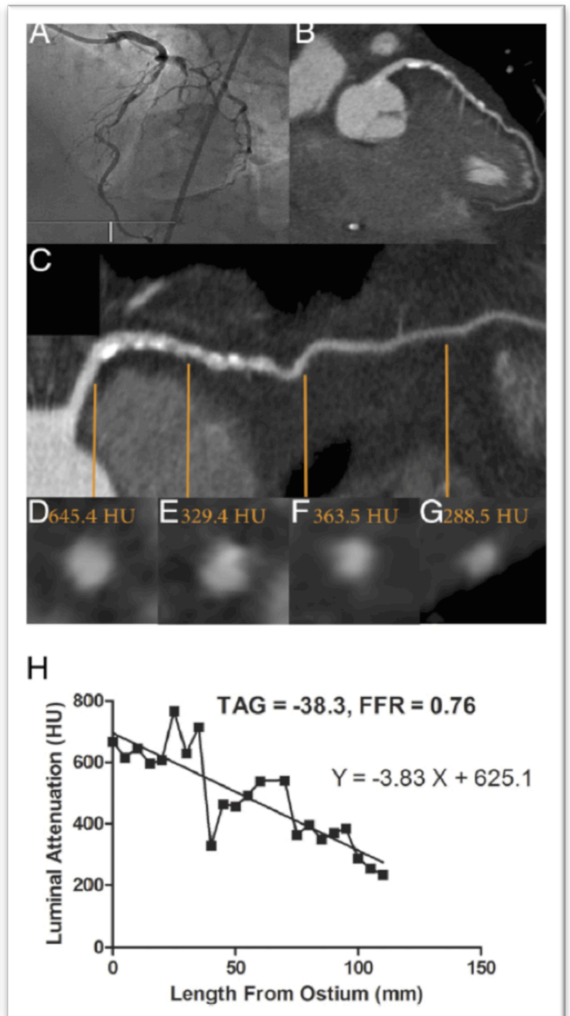
Measure	Conventional CCTA	Subtraction CCTA
True positive	30	32
False positive	18	7
True negative	30	41
False negative	4	2
Sensitivity	88.2 %	94.1 %
Specificity	62.5 %	85.4 %
Positive predictive value	62.5 %	82.1 %
Negative predictive value	88.2 %	95.3 %
Accuracy	73.2 %	89.0 %
AUC (95 % CI)	0.824 (0.750–0.899)	0.936 (0.889–0.936)
Inter-observer kappa coefficient	0.932	0.878

Measure	Conventional CCTA	Subtraction CCTA	*P* value
Image quality			
Score (mean ± SD)	2.3 ± 0.8	3.2 ± 0.6	<0.001
Inter-observer kappa coefficient	0.917	0.850	
Segment percentages			
Diagnostic image quality	56.1 %	91.5 %	0.004
Non-diagnostic image quality	43.9 %	8.5 %	

TAG320 : Transluminal Contrast Attenuation Gradient

Coronaire normale Variation des densités / cm		
LAD	LCX	RCA
11 UH	12 UH	5 UH





- Constant et reproductible grâce aux acquisitions Iso phasiques
- Mesure tout les 5 mm jusqu'a 2mm diam
- Mesure des variations de densités/ostiur et de part et d'autre de la sténose
- Dés 20% de sténose diminution de 50 U

TAG320 : Transluminal Contrast Attenuation Gradient

Transluminal Attenuation Gradient in Coronary Computed Tomography Angiography Is a Novel Noninvasive Approach to the Identification of Functionally Significant Coronary Artery Stenosis
A Comparison With Fractional Flow Reserve JACC Vol 61 2013

- 57 patients 78 coronaires
- FFR < 0,8
- Diminution > 15 UH sur 10 mm mesure tout les 5 mm ⊖ < 2mm

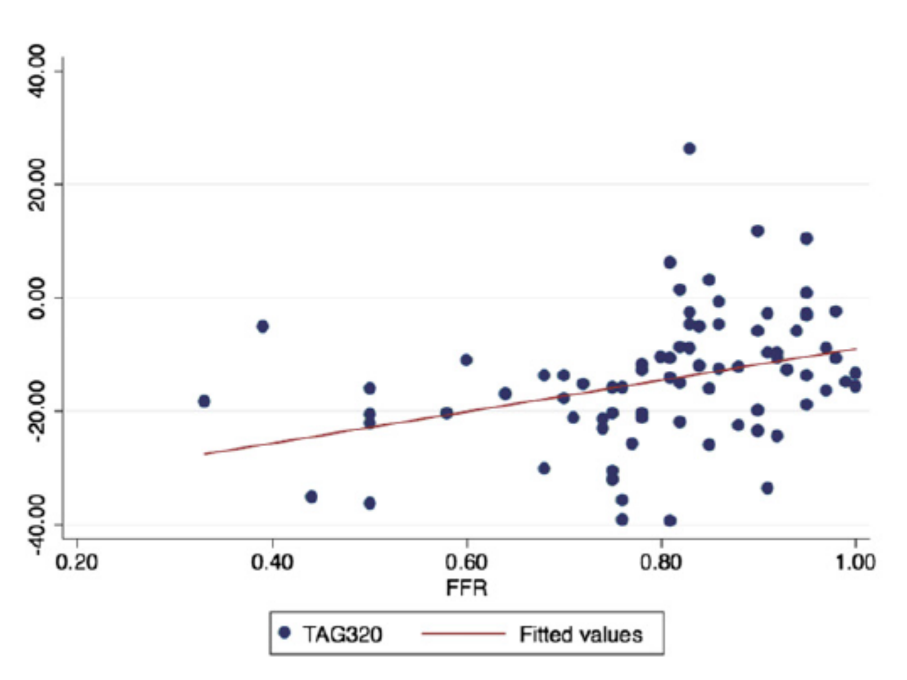


Figure 3 Scatter Plot Showing the Relationship Between TAG320 and FFR

The correlation coefficient between TAG320 and FFR was 0.43 (p < 0.001). FFR = fractional flow reserve; TAG = transluminal attenuation gradient.

Sensitivity	Specificity	PPV	NPV
77%	74%	67%	86%

TAG320 : Transluminal Contrast Attenuation Gradient

Comparison of Diagnostic Accuracy of Combined Assessment Using Adenosine Stress Computed Tomography Perfusion + Computed Tomography Angiography With Transluminal Attenuation Gradient + Computed Tomography Angiography Against Invasive Fractional Flow Reserve

J Am Coll Cardiol. 2014;63(18):1904-1912. doi:10.1016/j.jacc.2014.02.557

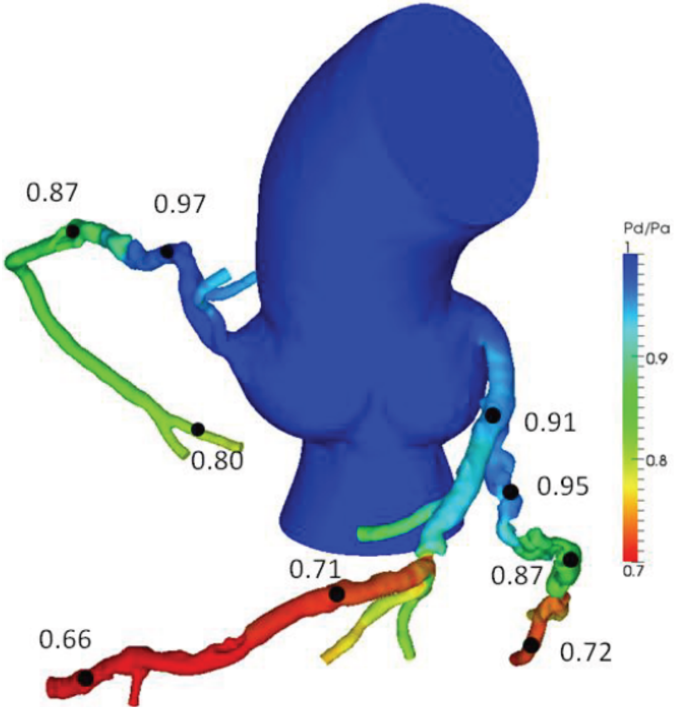
- 75 patients 127 coronaires
- FFR < 0,8
- Diminution > 15 UH sur 10 mm mesure tout les 5 mm ø < 2mm

Tableau 2	Estimations des précisions diagnostiques par vaisseau de la CC, du scanner coronaire (SC), des combinaisons SC+SPM, SC+GAT et SC+SPM+GAT, comparées à la RDF					
	CC>50% n=127	**CC>70%** n=127	**SC** n=127	**SC+GAT** n=97	**SC+SPM** n=123	**SC+SPM+GAT** n=117
Sensibilité, %	61	25	89	73	76	88
Spécificité, %	88	99	65	97	89	83
VPP, %	73	92	57	92	78	74
VPN, %	81	71	92	87	88	93

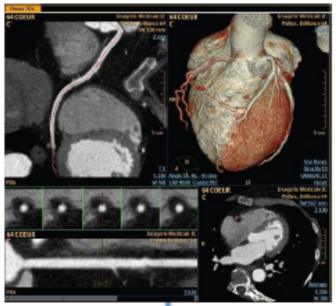
	CTA + TAG320	CTA + TCP	CTA+CTP +TAG320
Area Under Curve	0,844	0,845	0,91

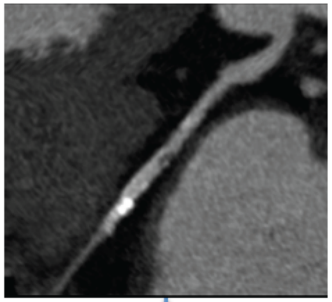
FFRct

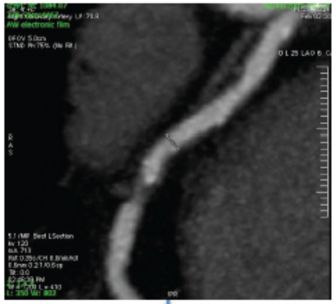
» **FFR ct basée sur la mécanique des fluides/diamètre/TAG 320 : WIP**



Prise en charge







Maladie coronarienne exclue → **Renvoi à domicile**

Indéterminée → Scanner de Perfusion Myocardique avec ADENOSINE → Négatif **Renvoi** / Positif **Coronarographie**

Maladie coronarienne significative → **Coronarographie**

Caractérisation de la plaque
WIP

» Amélioration de la résolution en contraste (bi – energie..)
» Meilleure résolution spaciale

Infinix ^{4D}CT

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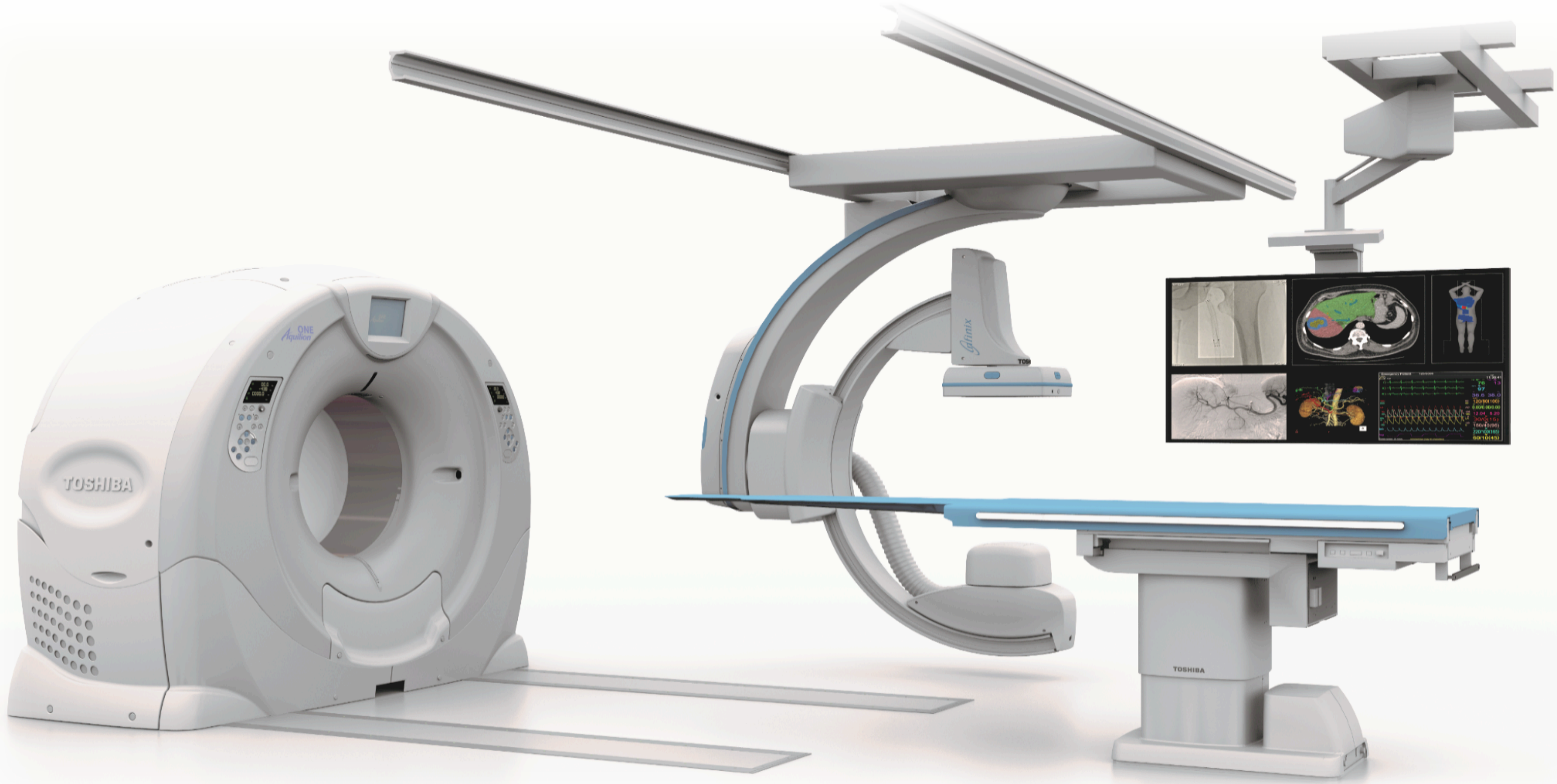

Interface commune et synchronisation des volumes

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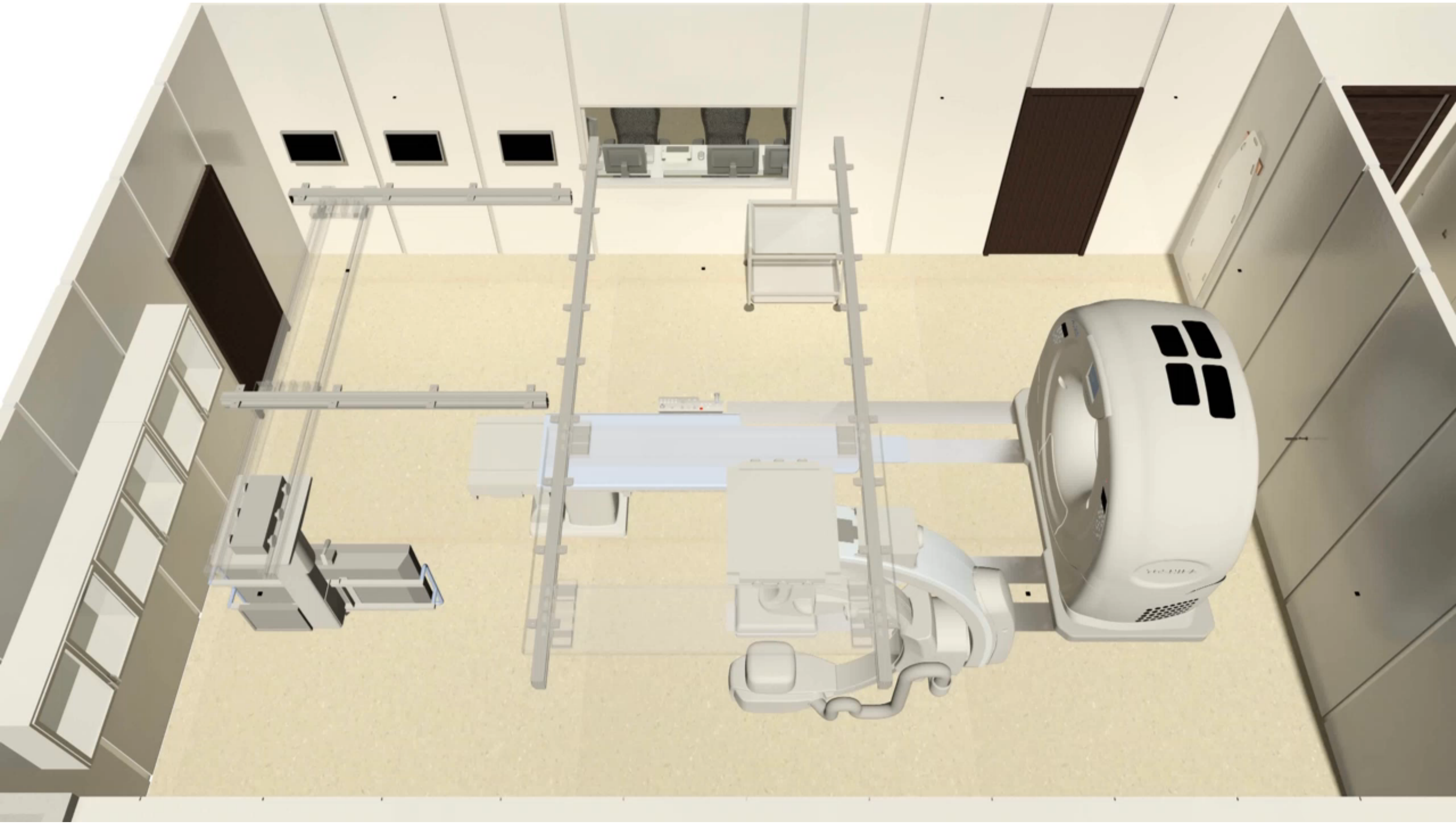

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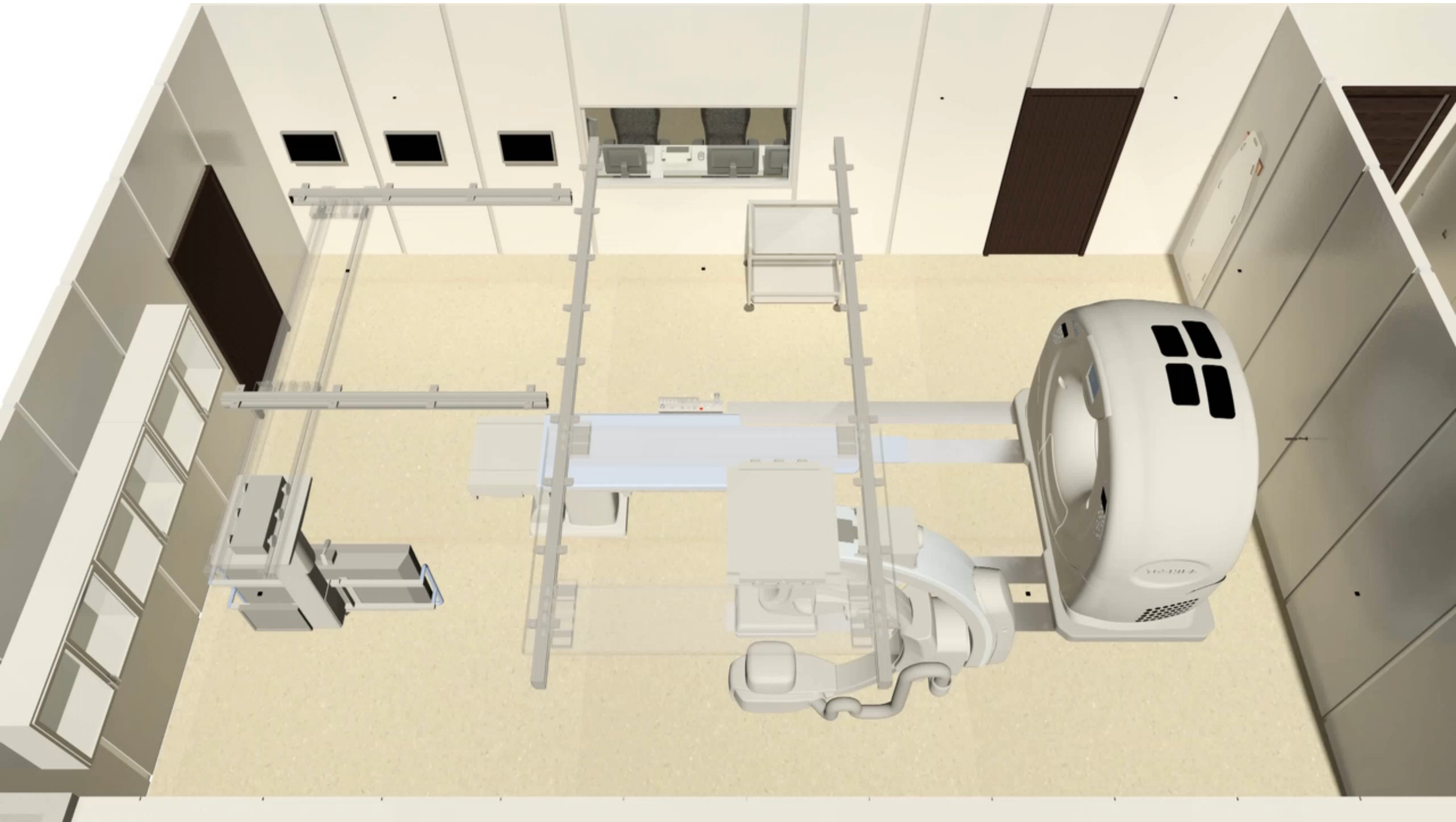
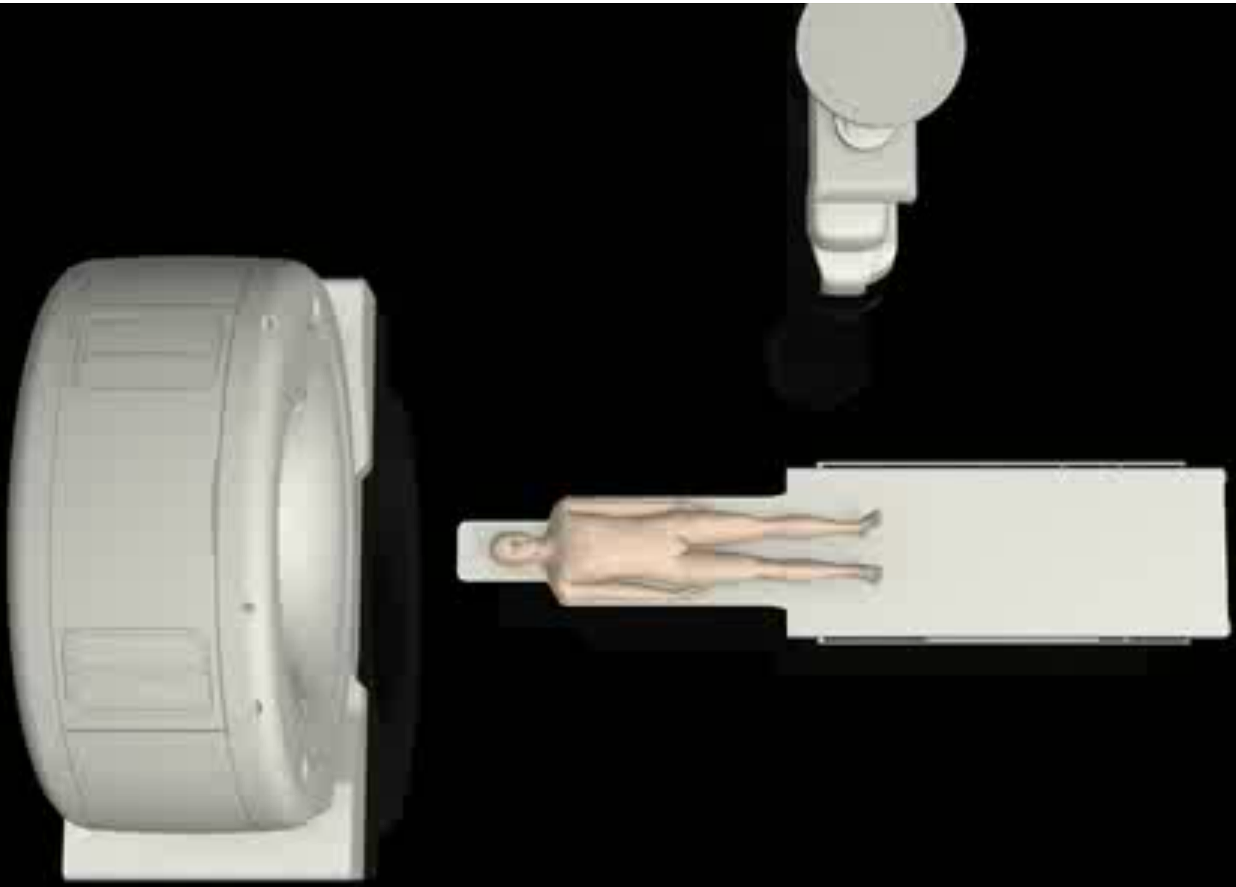


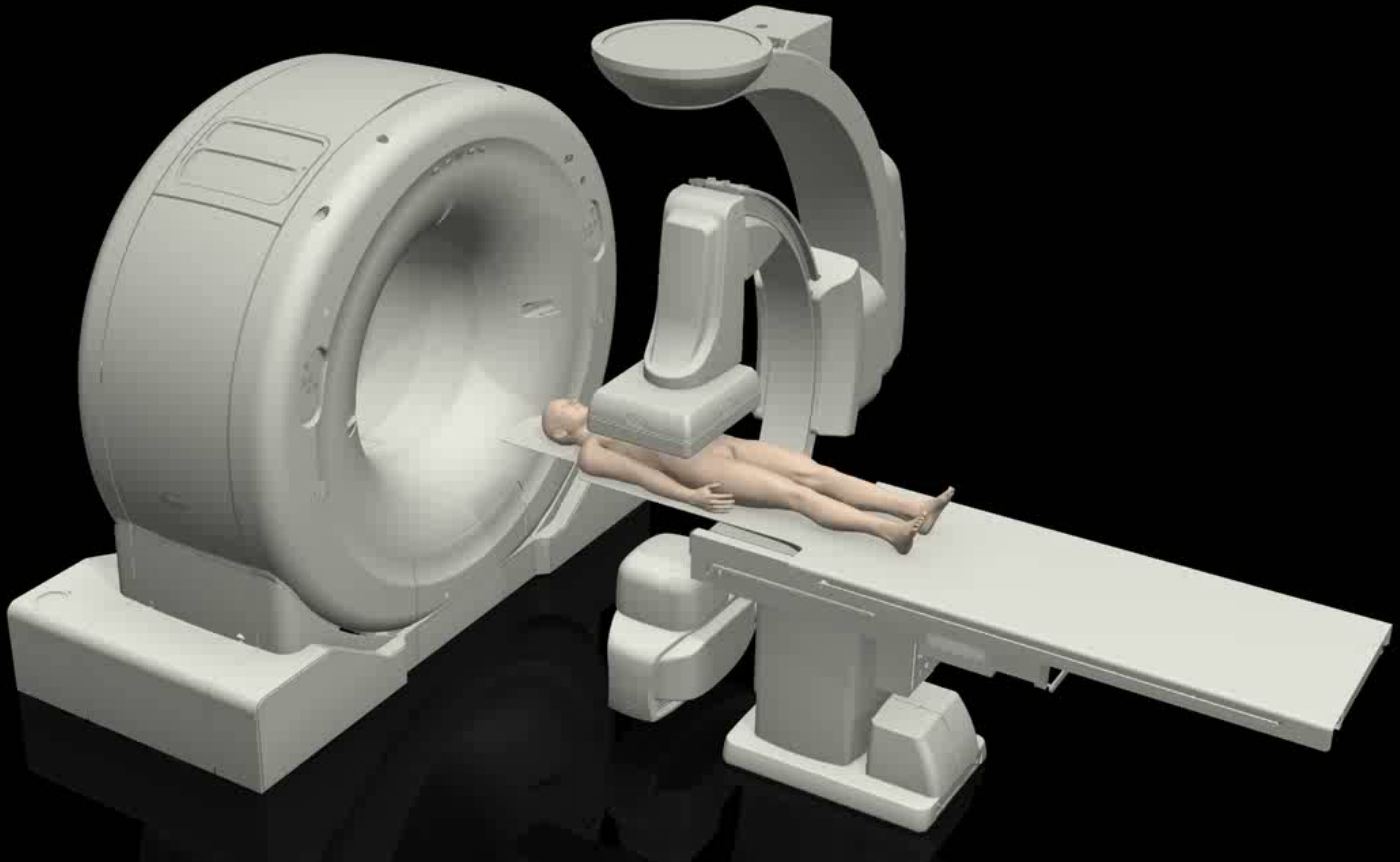
Infinix ^{4D}CT

SURE GUIDANCE



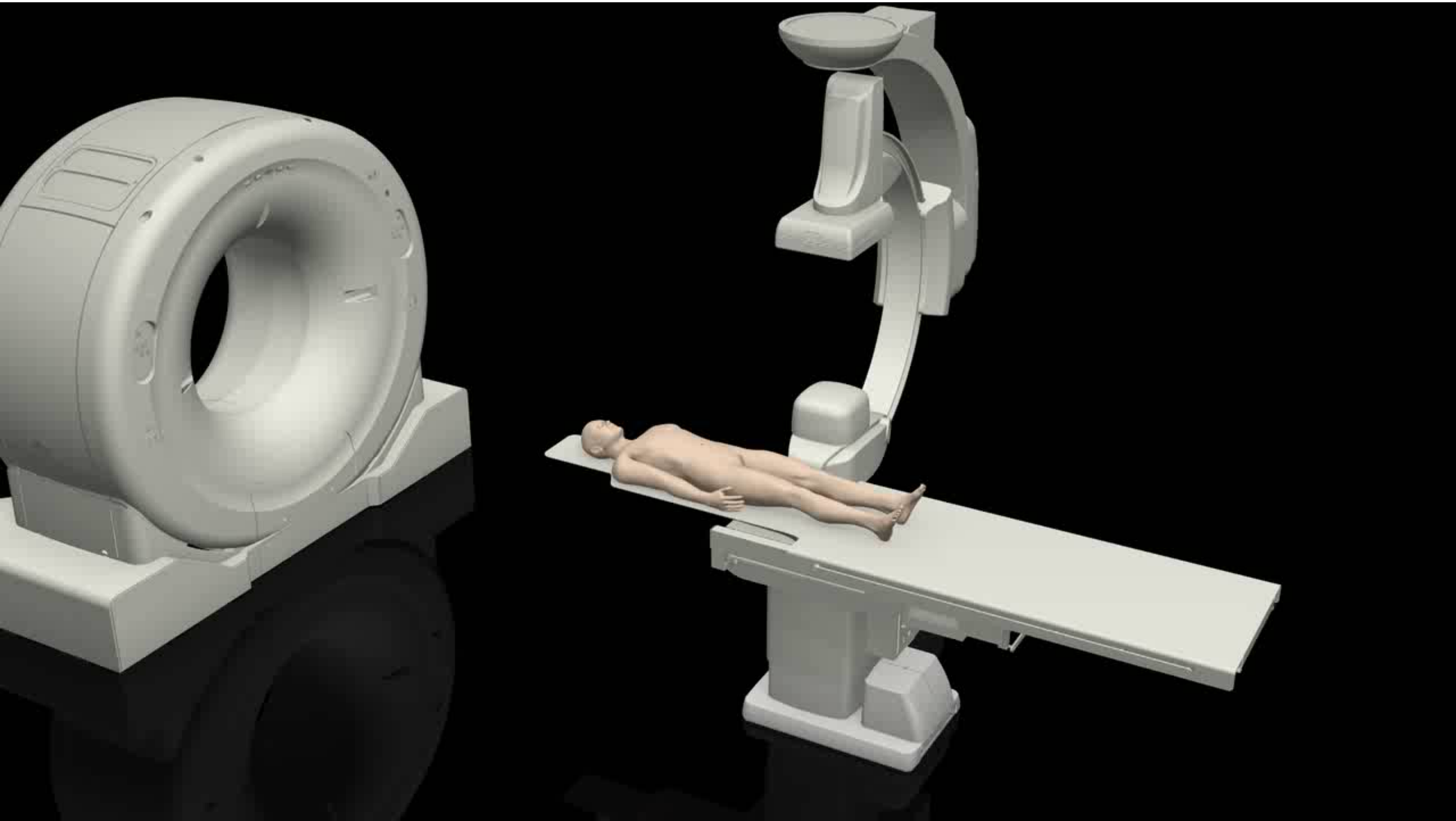
Infinix ^{4D}CT

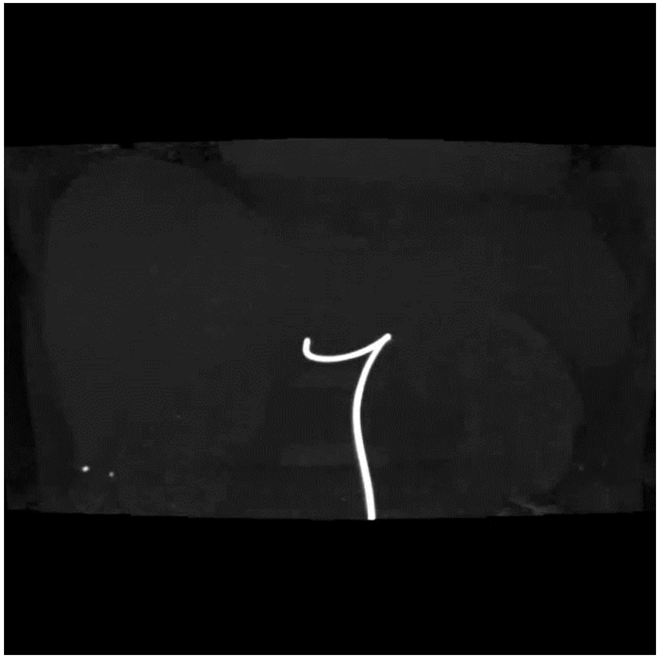
SURE GUIDANCE

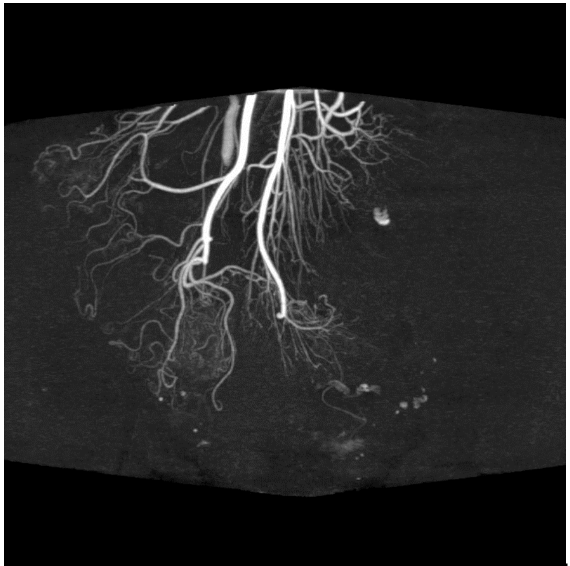


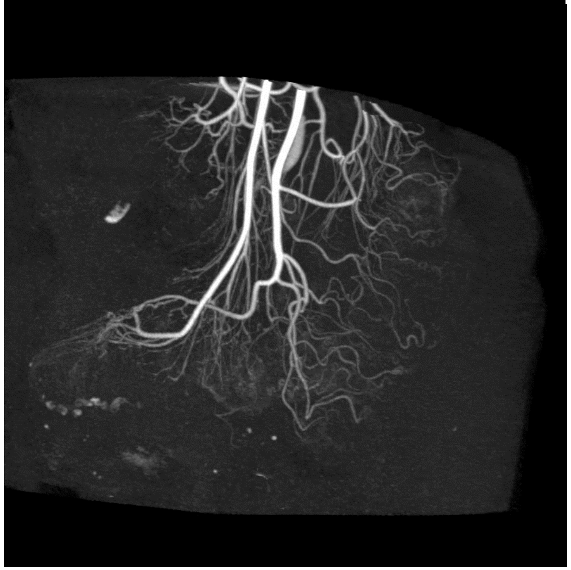
Infinix ^{4D}CT

SURE GUIDANCE





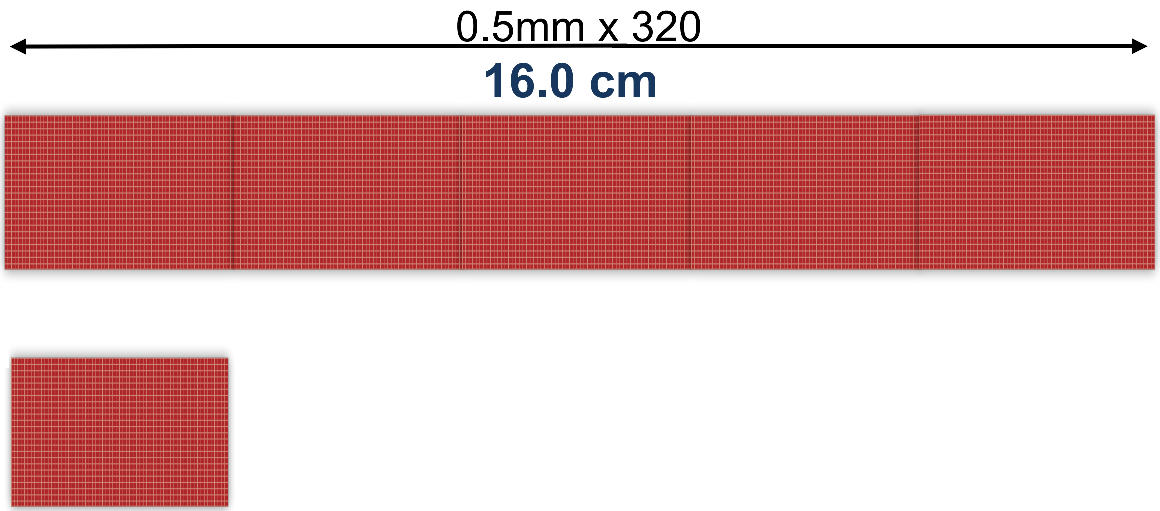


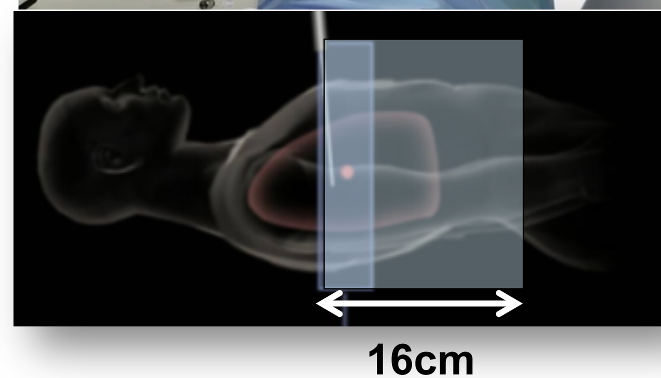


CT avec injection intra- artérielle

3D CT Fluoroscopie

3D CT Fluoroscopie





- » **Aquilion ONE**
- » **Aquilion PRIME**

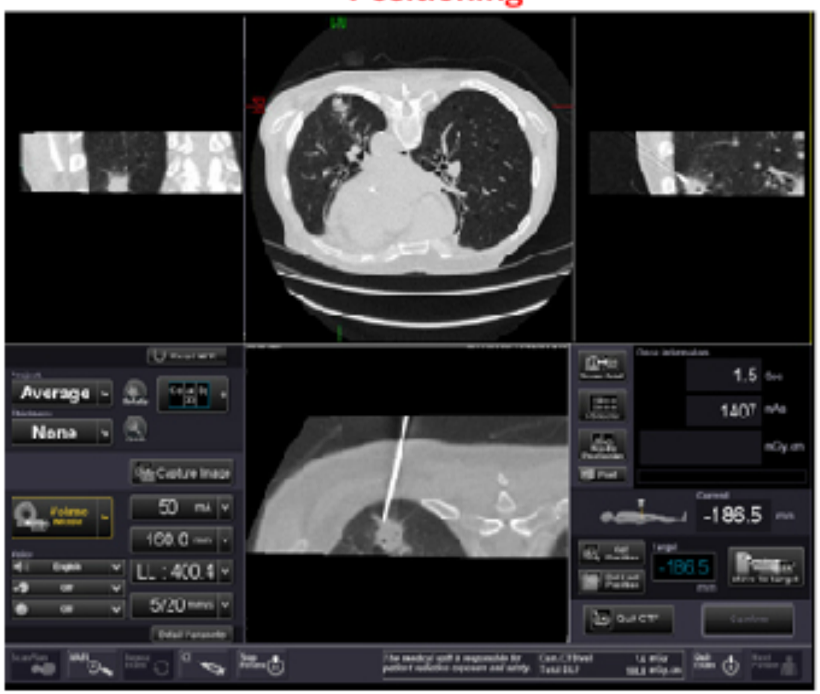
3D CT Fluoroscopie

AIDR 3D
integrated

» **Scopie Pulsée**

» **NEEDLE POSITIONING** : Meilleure précision dans le positionnement de l'aiguille grâce à la visualisation temps réel des 3 plans MPR en simultanés + plan oblique

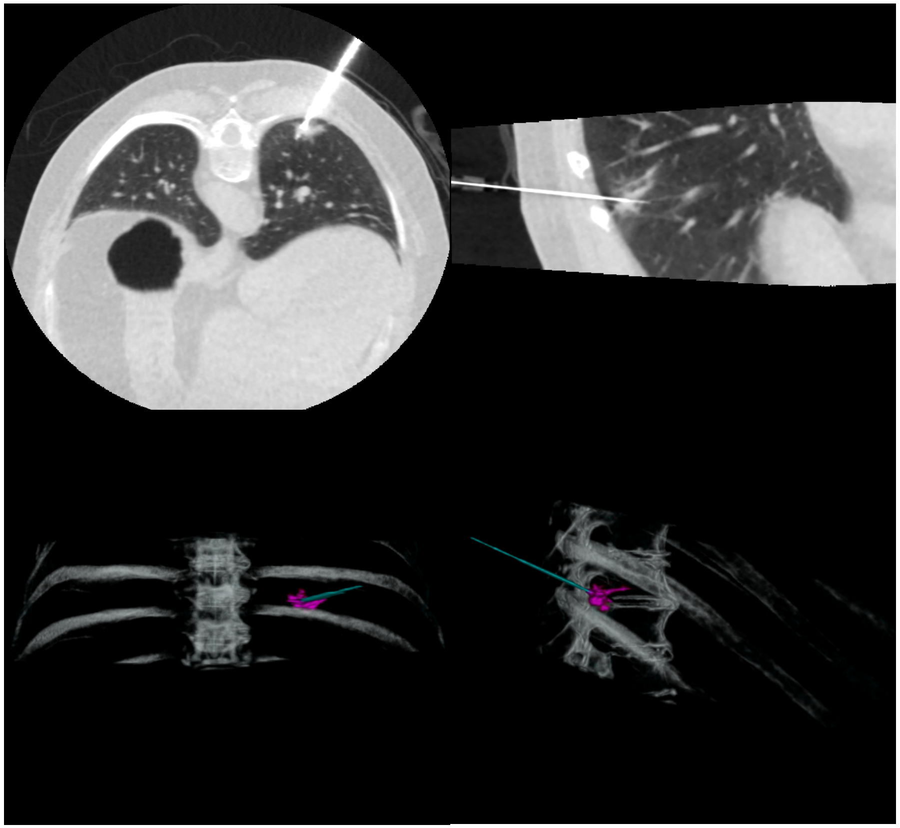
Positioning



MPR and oblique image guidance to confirm needle position

3D CT Fluoroscopie

» **Scopie Pulsée**



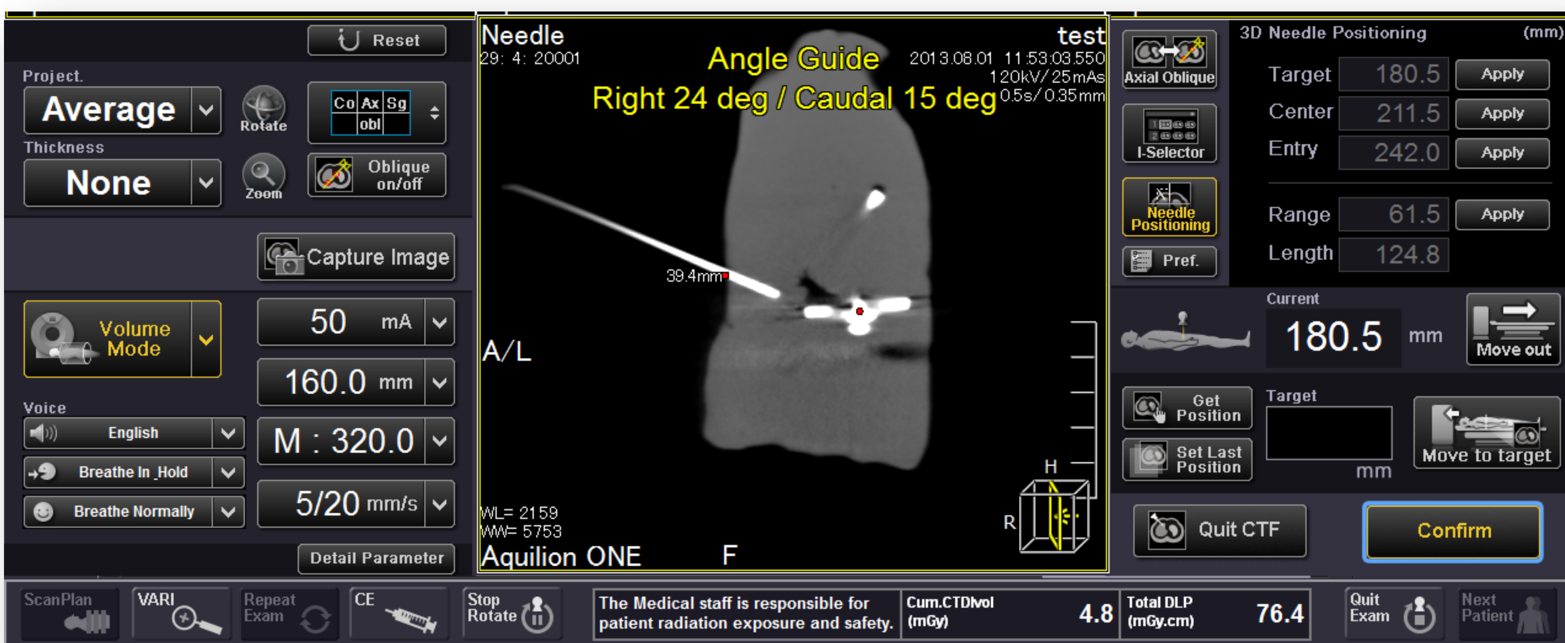
Dose Reduction	AIDR 3D integrated
Dose	0.34mSv (k=0.014)


Reset MPR
Project.
Average
Rotate
Co Ax Sg
2D
Thickness
None
Zoom
Capture Image
Volume Mode
50 mA
160.0 mm
LL : 400.4
5/20 mm/s
Voice
English
OFF
OFF
Detail Parameter
Scano Axial
I-Selector
Needle Positioning
Pref.
Dose information
1.5 Sec
1407 mAs
mGy.cm
Current
-186.5 mm
Get Position
Set Last Position
Target
-186.5
mm
Move to target
Quit CTF
Confirm
ScanPlan
VARI
Repeat Exam
CE
Stop Rotate
The medical staff is responsible for patient radiation exposure and safety.
Cum.CTDIvol 7.6 mGy
Total DLP 181.8 mGy.cm
Quit Exam
Next Patient

3D CT Fluoroscopie

» **NEEDLE TRACKING** : Outil de guidage

- » Affichage du plan de la trajectoire
- » Affichage du guide d'angle



Urgences |Polytraumatisés

Recommandations SFR et G4: Accès simplifié au scanner et à la salle d'angiographie

Infinix* ^{4D}*CT

VOIR. DIAGNOSTIQUER. TRAITER.

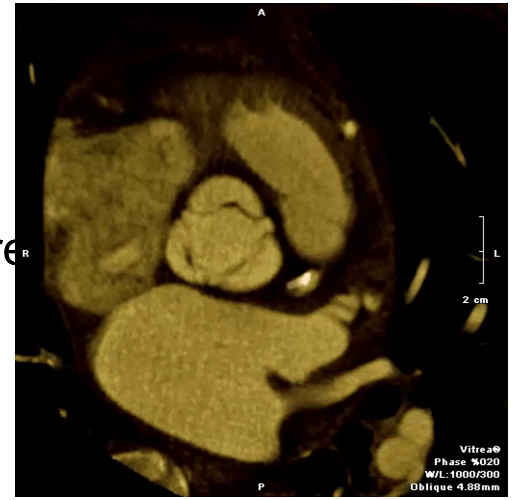
Prise en charge complète dans un même lieux

INTERETS ET AVANTAGES EN CARDIOLOGIE ?

- Augmenter la précision pour les poses de TAVI , TMVR?
- Ablations cardiaques - Planification

  - Contrôle pendant procédure

- Prise en charge des douleurs thoraciques atypiques
- Contrôle per/post angioplastie sous scanner?



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