

Clinical Image Gallery

Volume 1



TOSHIBA MEDICAL SYSTEMS CORPORATION

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WARNING: Any reference to x-ray exposure, intravenous contrast dosage, and other medication is intended as a reference guideline only. The guidelines in this document do not substitute for the judgment of a healthcare provider. Each scan requires medical judgment by the healthcare provider about exposing the patient to ionizing radiation. Use the As Low As Reasonably Achievable radiation dose principle to balance factors such as the patient's condition, size and age; region to be imaged; and diagnostic task.

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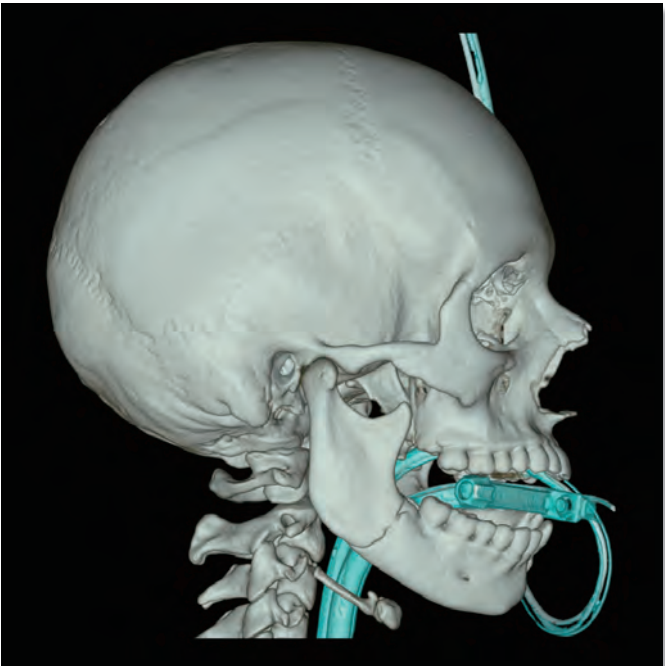
Prof Mathias Prokop
 Radboud University Nijmegen Medical Centre,
 Netherlands

The Aquilion ONE™ Vision CT is our radiology workhorse, our CT for advanced perfusion applications and also provides a source of excitement and endless possibilities for our researchers. The technology in this system is quite remarkable. Dose reduction is fully integrated with AIDR 3D, which takes all the guesswork out of using advanced iterative reconstruction algorithms. The new Quantum Vi detector is able to routinely scan at 0.275 second scan speeds and provides excellent motion-free images. We now employ this rotation speed for the majority of our examinations. In addition, the 16 cm wide coverage allows dynamic perfusion examinations to be performed in a routine clinical setting for a variety of clinical presentations, offering real clinical benefits in vascular as well as oncologic applications. The recently introduced motion-compensated subtraction techniques make it possible to create excellent-quality iodine maps at a competitive exposure dose. In between a busy work schedule which runs 24 hours per day, we have a team of researchers refining new applications of ultrafast dynamic volume CT which may further change the way we perform imaging in the future.

Mandible Fracture

Multiple fractures of the mandible are shown in this scan of a 30-year-old male following trauma.

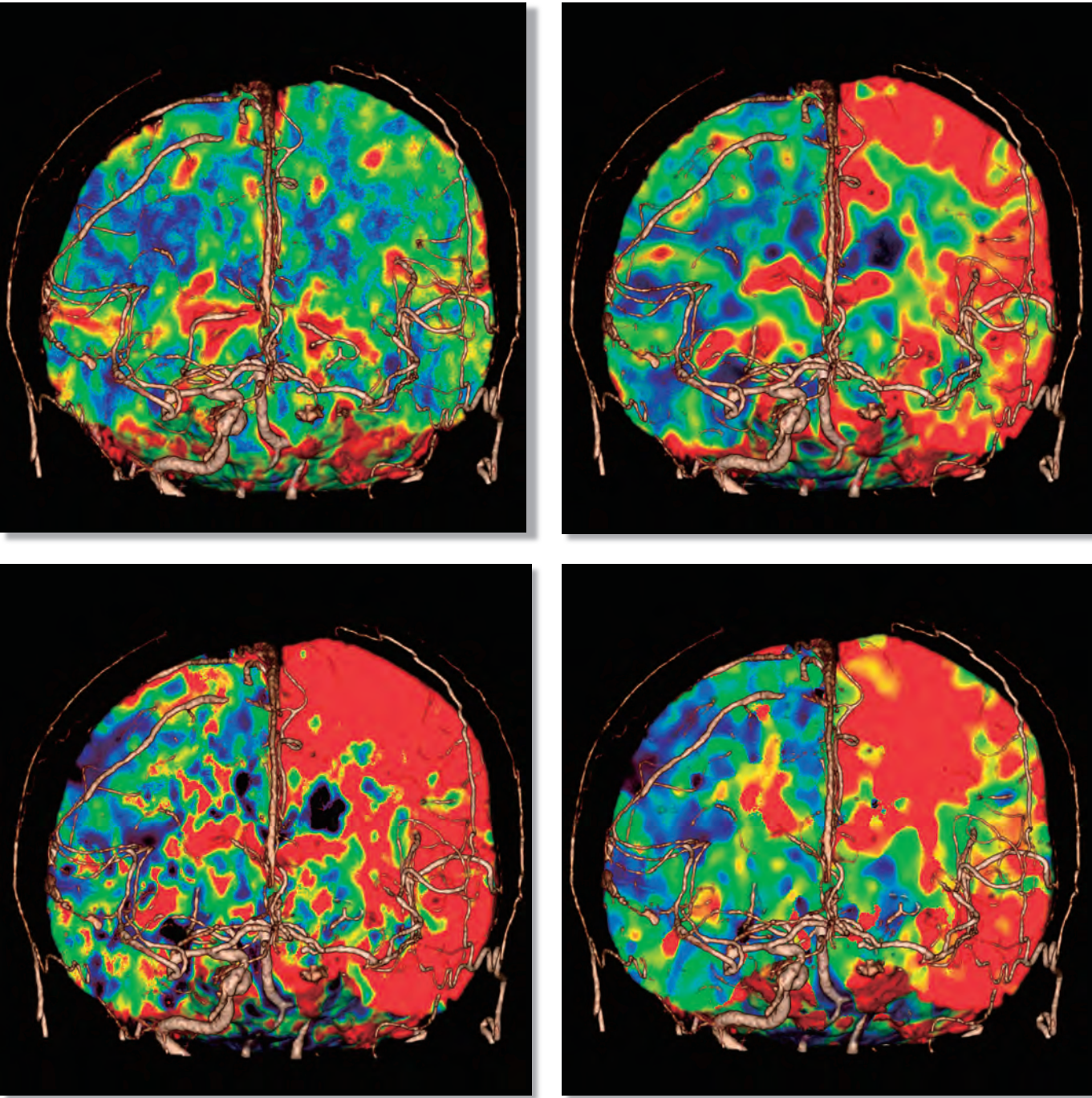
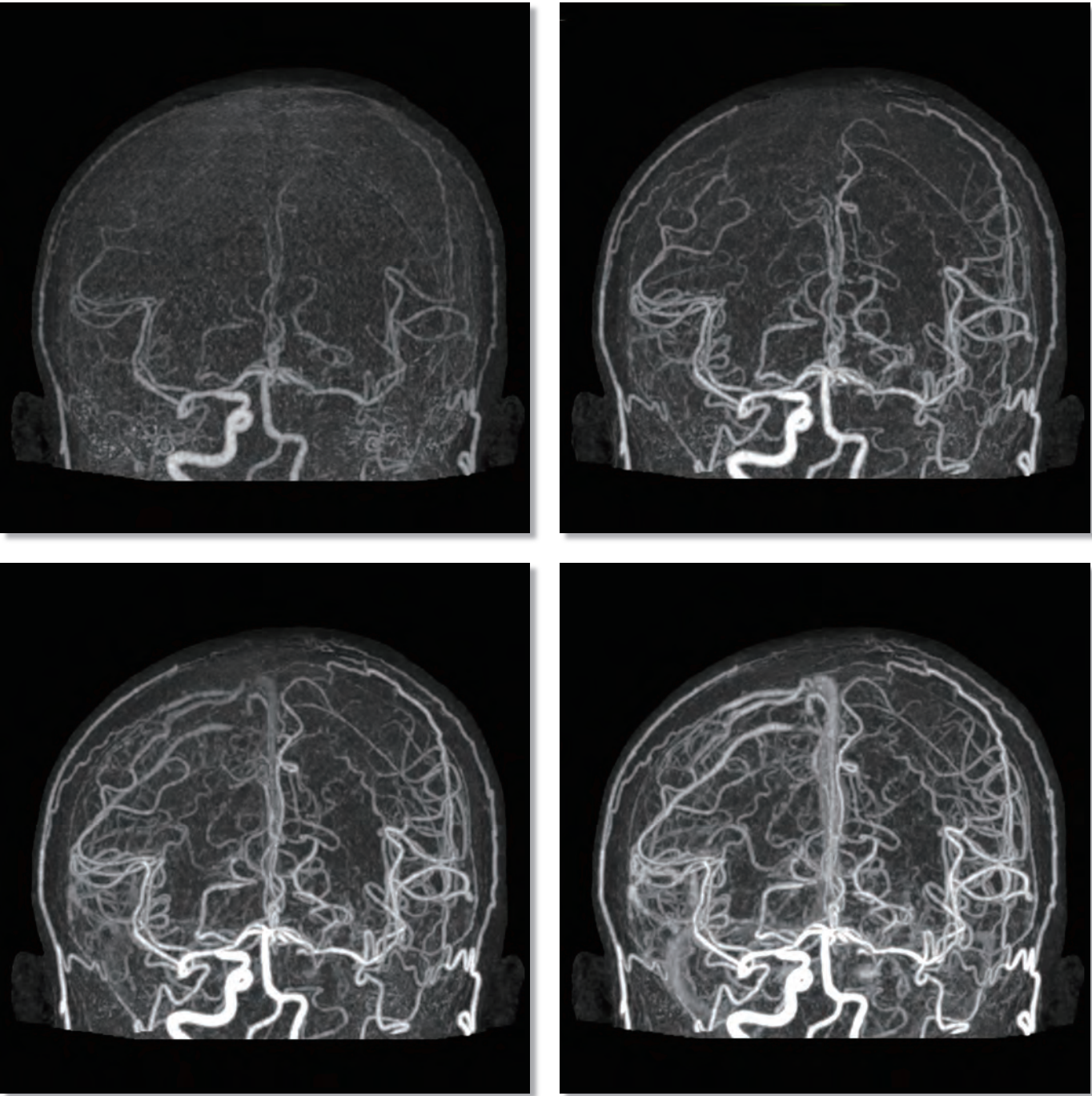
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Helical	0.5 mm x 80	0.812	120	165	0.275	247	AIDR 3D Standard	57.6	1506.9	3.16	0.0021



Left Carotid Artery Occlusion

The subtracted angiographic images demonstrate the occluded left carotid artery with filling of the MCA via the posterior communicating artery. Fusion of the arterial images with the perfusion maps shows the perfect marriage of morphology and function that is possible with dynamic volume imaging.

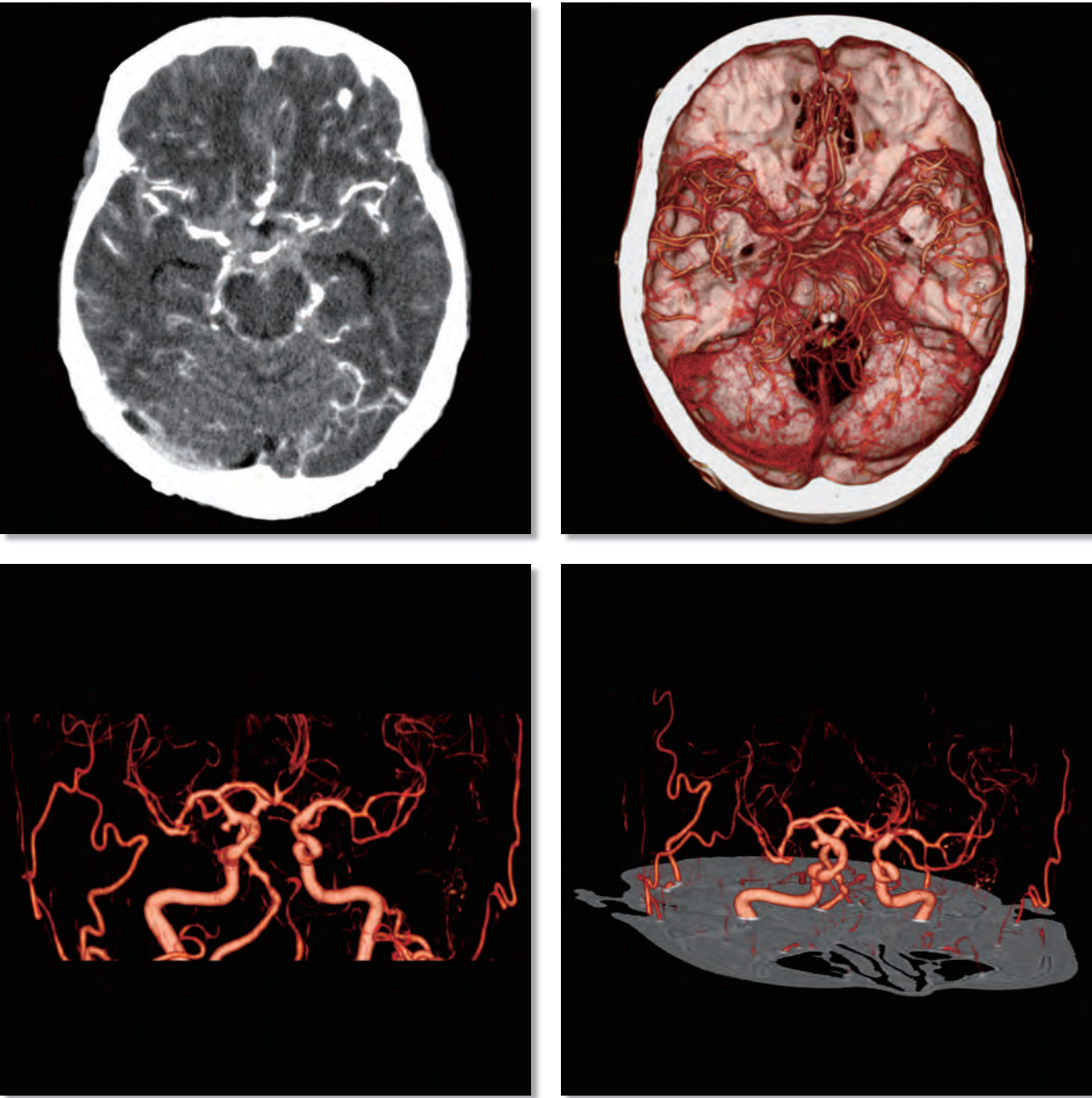
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Dynamic Volume	0.5 mm x 320	n/a	80	70/30	1.0	160	AIDR 3D Standard	99.58	1593.2	3.35	0.00021



Brain Aneurysm

An aneurysm is seen arising from the distal right internal carotid artery in this volumetric subtraction scan. A subarachnoid hemorrhage is seen in the axial soft tissue image. Pixel perfect subtraction removes the surrounding bones, ensuring that the aneurysm is clearly seen.

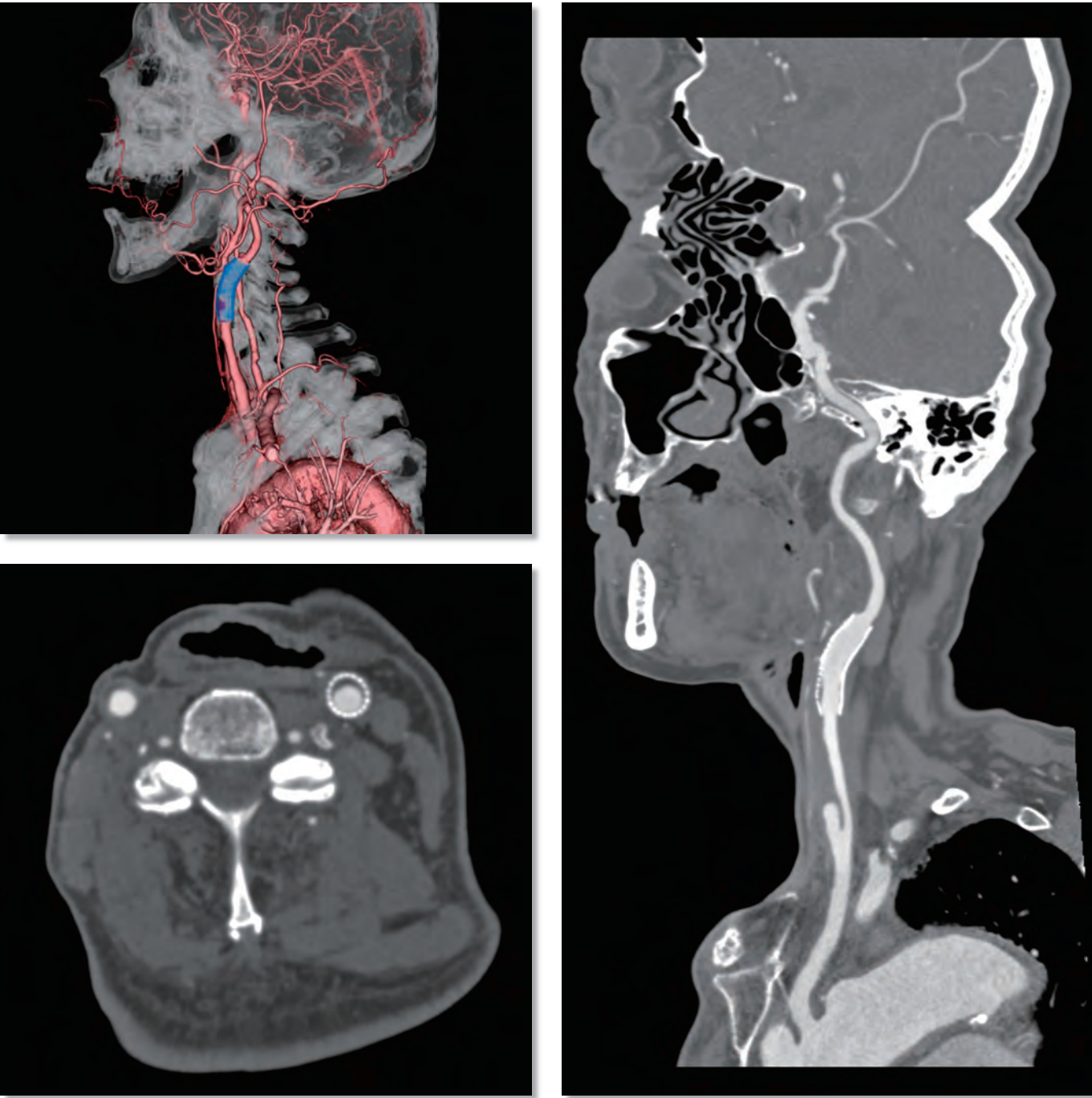
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Pre-Contrast Volume	0.5 mm x 160	n/a	120	110	1.0	80	AIDR 3D Mild	20.3	162.7	0.34	0.0021
Post-Contrast Volume	0.5 mm x 160	n/a	120	270	1.0	80	AIDR 3D Mild	49.9	399.4	0.84	0.0021



Carotid Stent

A stent has been placed at the level of the bifurcation of the carotid artery. Minor in-stent restenosis is seen in the proximal portion of the stent. Ultrahelical scanning allows the entire head and neck to be scanned in a true arterial phase, before contrast reaches the jugular veins.

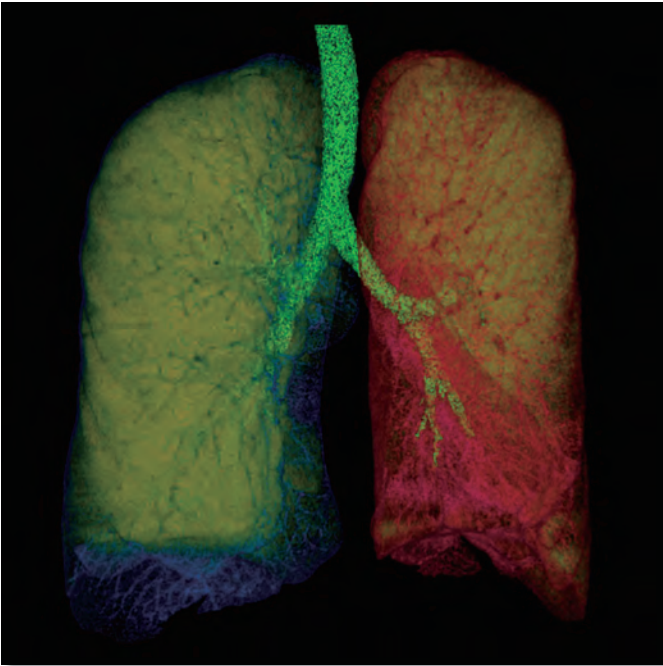
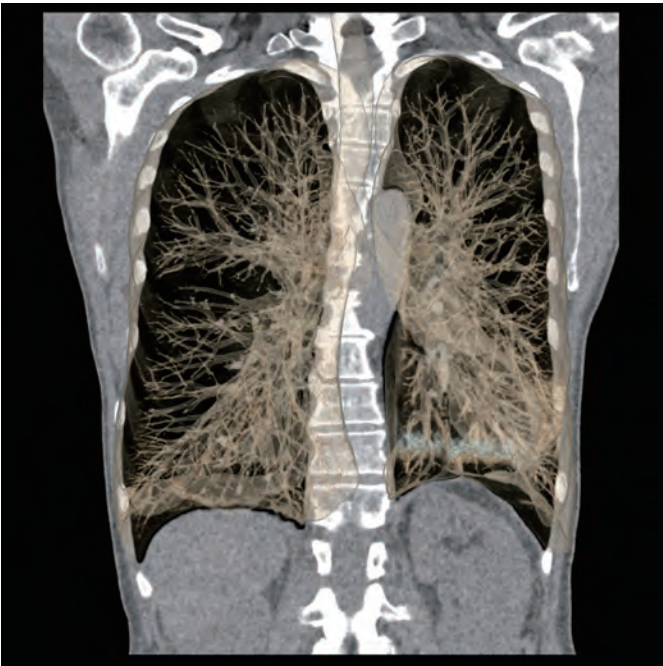
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Helical	0.5 mm x 160	0.812	120	SUREExposure™ 3D Standard	0.5	310	AIDR 3D Standard	21.3	760.4	2.36	0.0031



Lung Emphysema

A CT scan of the chest was requested for this 52-year-old woman to determine the extent of emphysema in the lungs. A small spiculated lesion is seen in the apex of the right lung. Extensive areas of low attenuation are seen in the right lung and in the superior left lung. Routine sub-millisievert chest scanning allows regular follow-up of emphysema at a low dose to the patient.

Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Helical	0.5 mm x 80	0.812	100	SUREExposure 3D Standard	0.275	360	AIDR 3D Standard	1.0	40.30	0.56	0.014



Dr. Marcus Chen
NHLBI, National Institutes of Health, USA

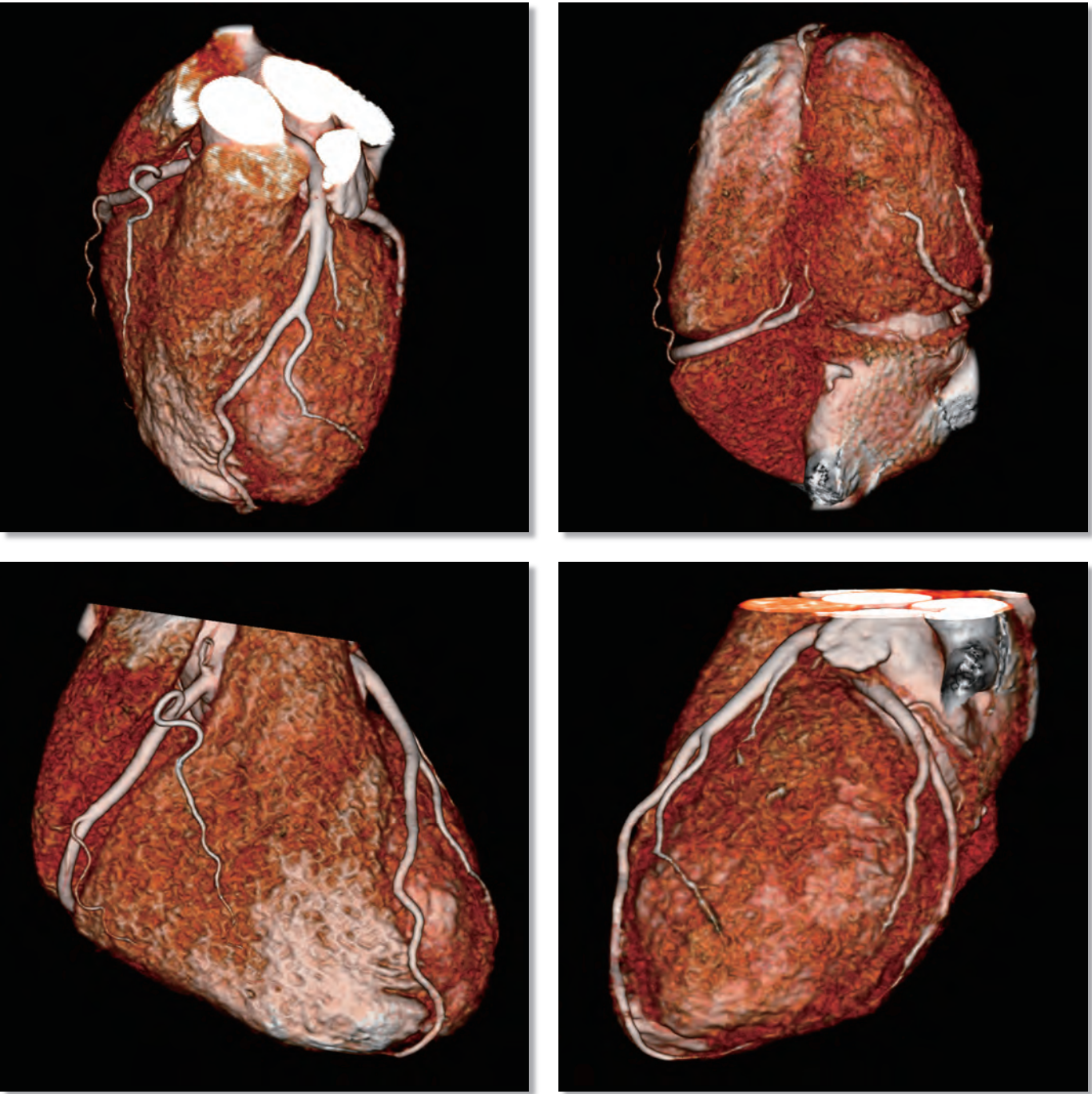
The initial US clinical experience with the Aquilion ONE Vision started in July 2012 at the National Institutes of Health.

“The Aquilion ONE Vision has five major features to optimize cardiac CTA examinations. The faster gantry rotation time of 0.275 s and the 16 cm volume coverage per rotation combine to allow single heartbeat CTA in patients with heart rates up to at least 75 bpm, which covers 95% of our patients. The addition of iterative reconstruction (AIDR 3D) integrated into the automated exposure control software ensures that examinations are routinely performed with minimal exposure requirements. Analysis of the first 99 patients scanned since installation shows the median radiation dose is <1 mSv for CTA. A more powerful X-ray generator supports scanning of larger patients (up to a BMI of 47 kg/m² in our experience) with diagnostic image quality.”

Low-Dose Cardiac

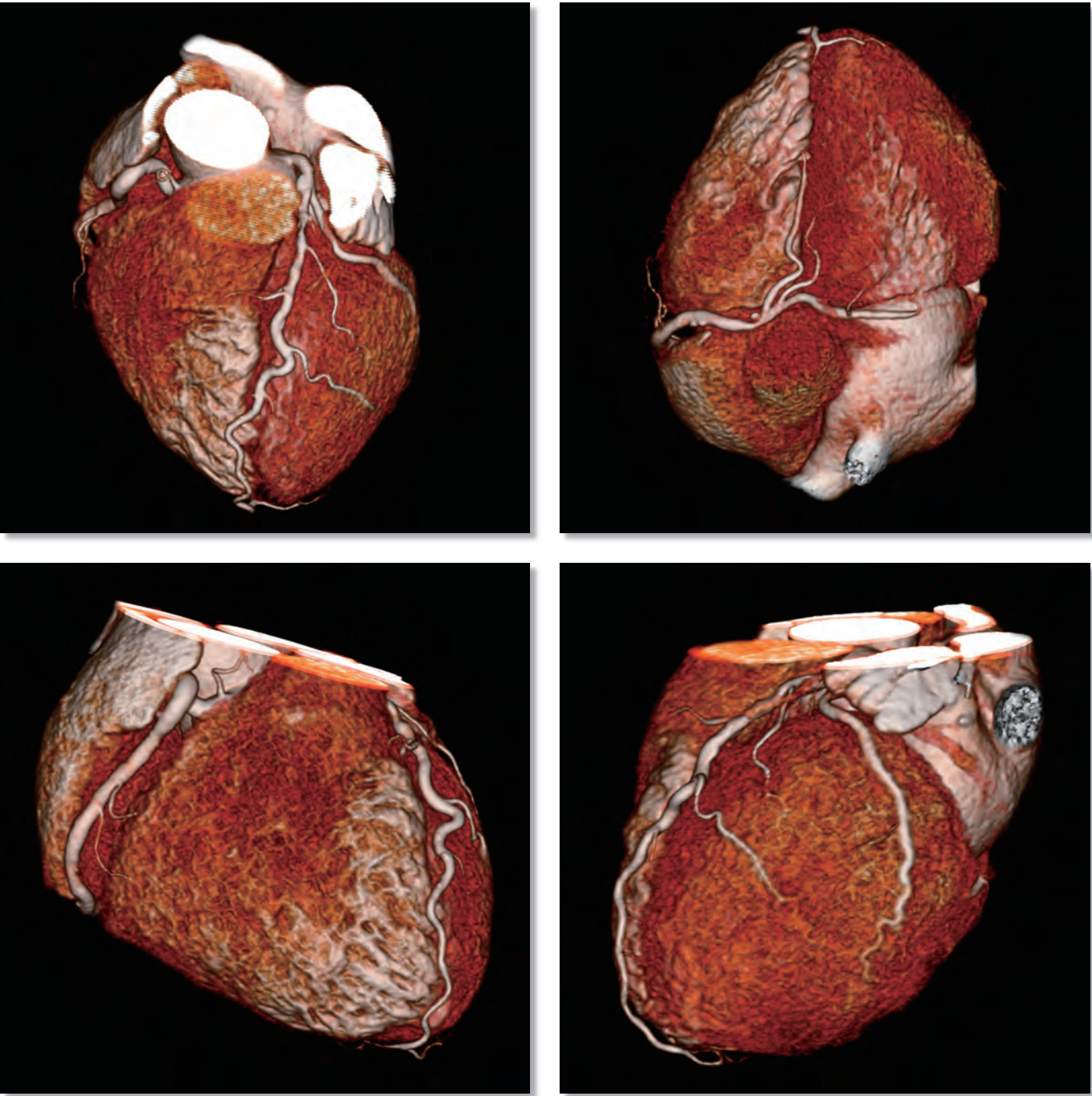
This 54-year-old woman with a BMI 19 presented with a family history of CAD. A one rotation scan was performed in the diastolic phase only to rule out CAD. The 0.275 s rotation speed and the integration of AIDR 3D into SUREExposure make low-dose, high quality cardiac imaging a routine examination.

Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Volume	0.5 mm x 240	n/a	100	SUREExposure 3D	0.275	120	AIDR 3D Standard	2.0	24.2	0.34	0.014

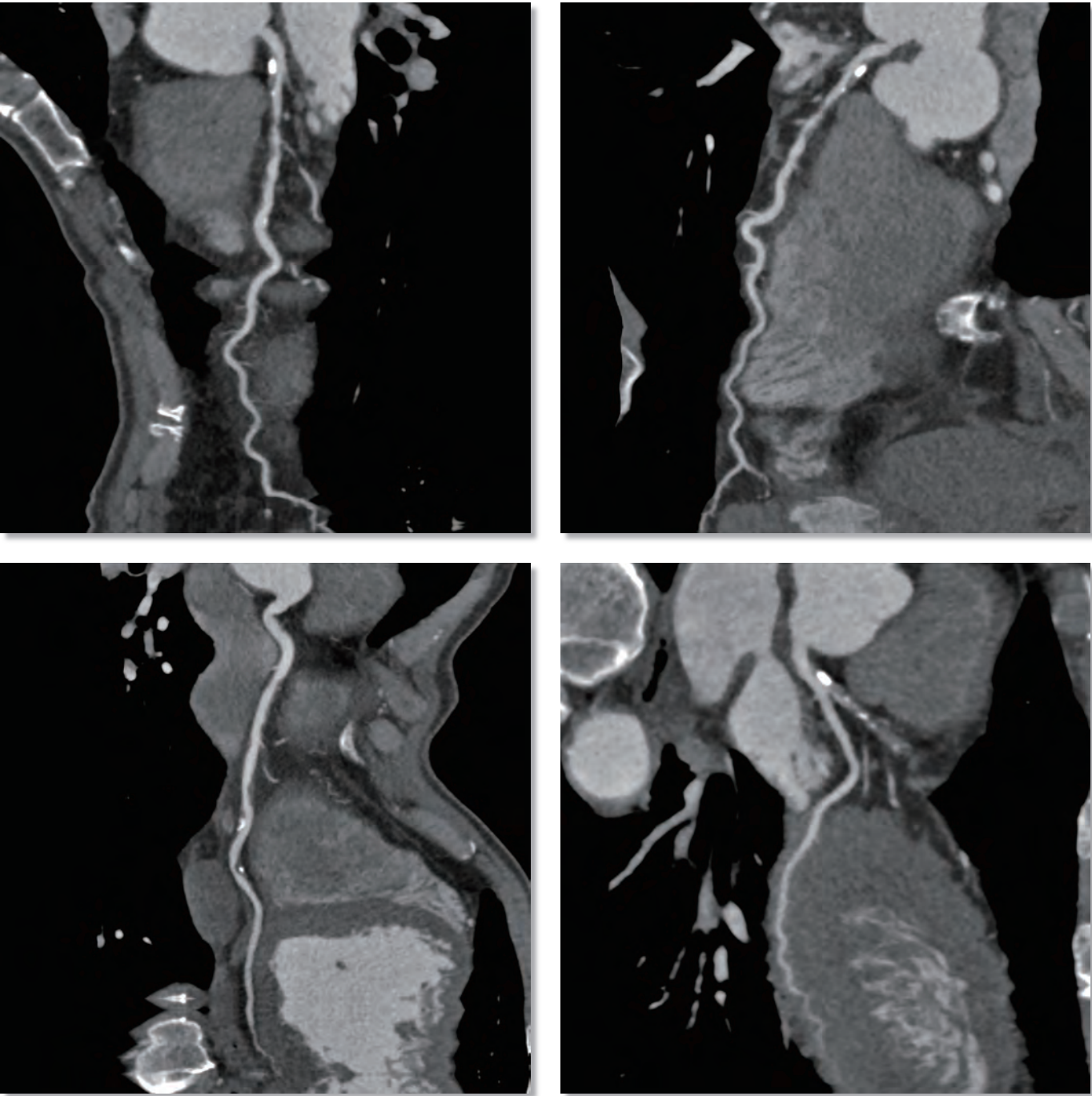


LAD and RCA Stenosis

A number of calcified and noncalcified lesions are seen in the proximal LAD in this one rotation scan of the heart in a patient with a heart rate of 55 bpm. The lesions are considered to be hemodynamically significant. Two calcified lesions are also seen in the distal RCA.



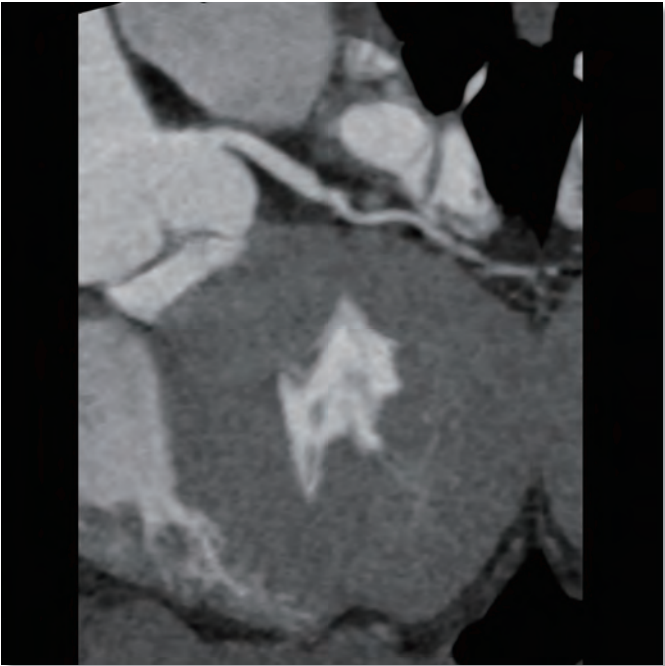
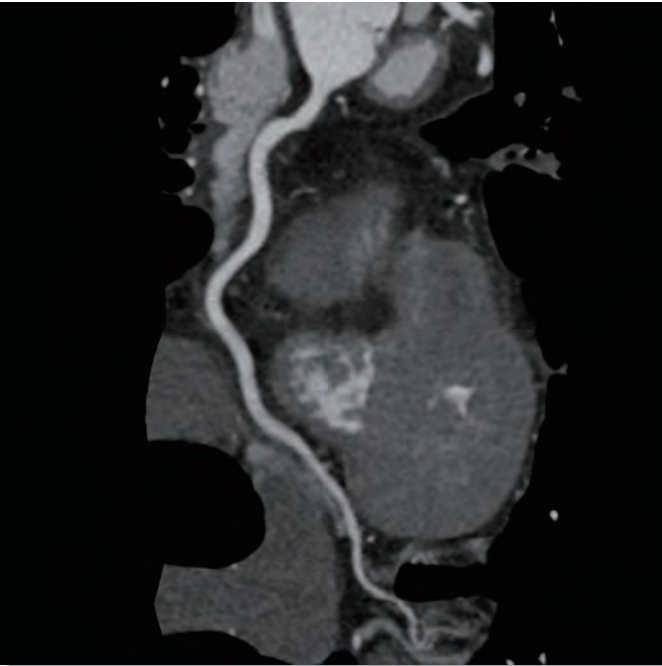
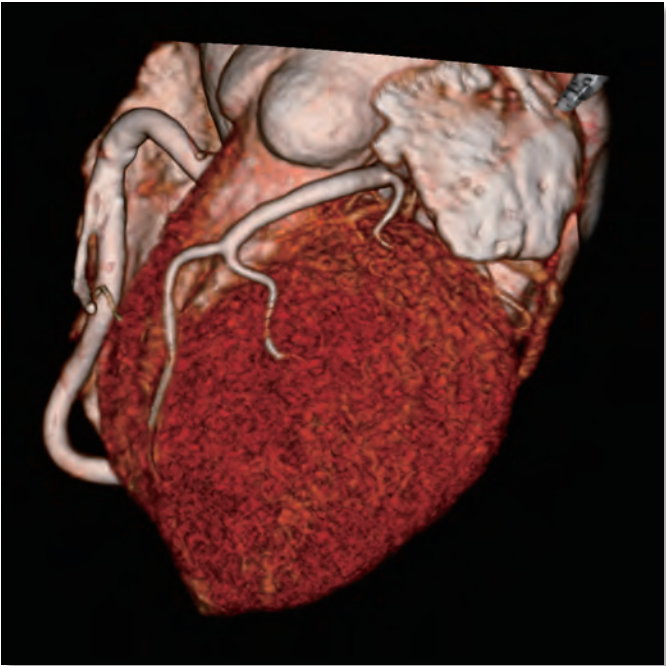
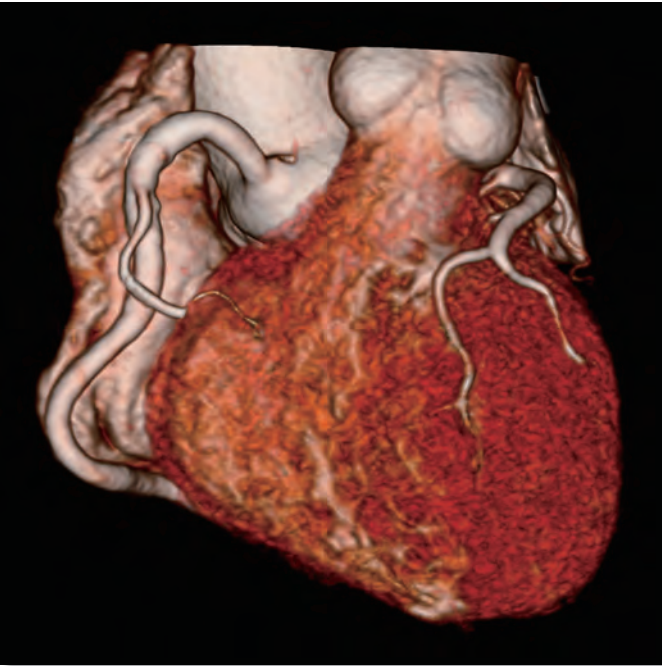
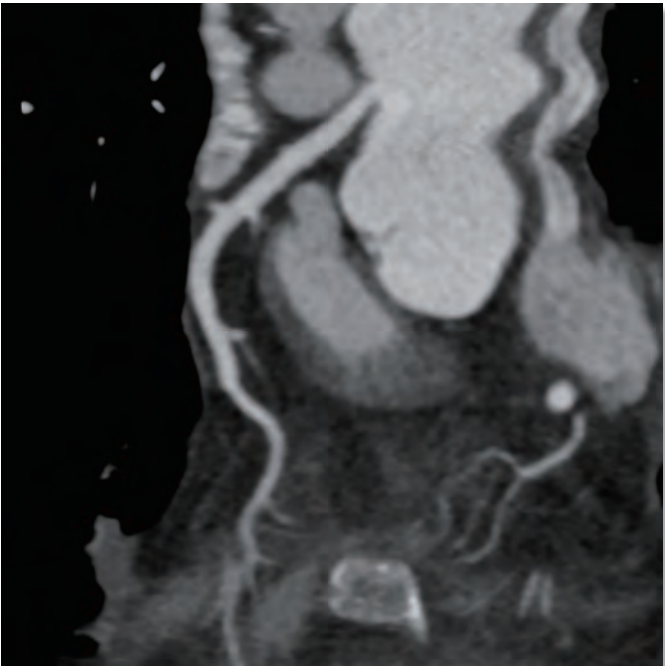
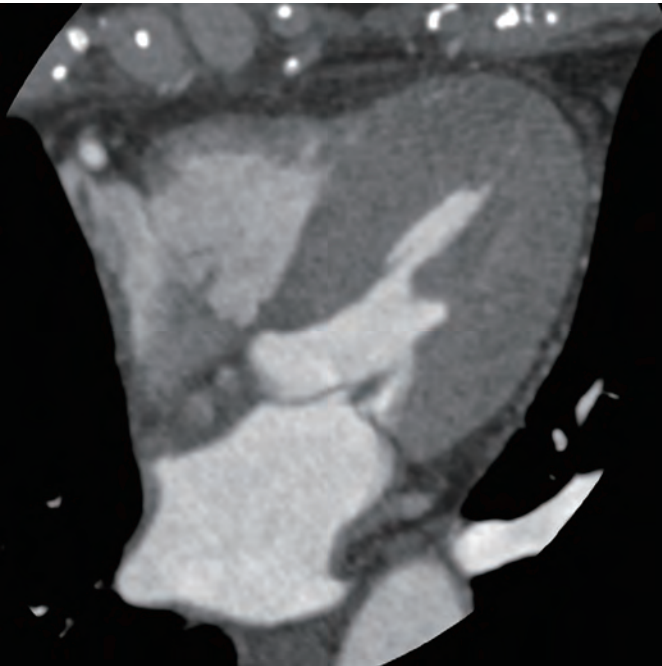
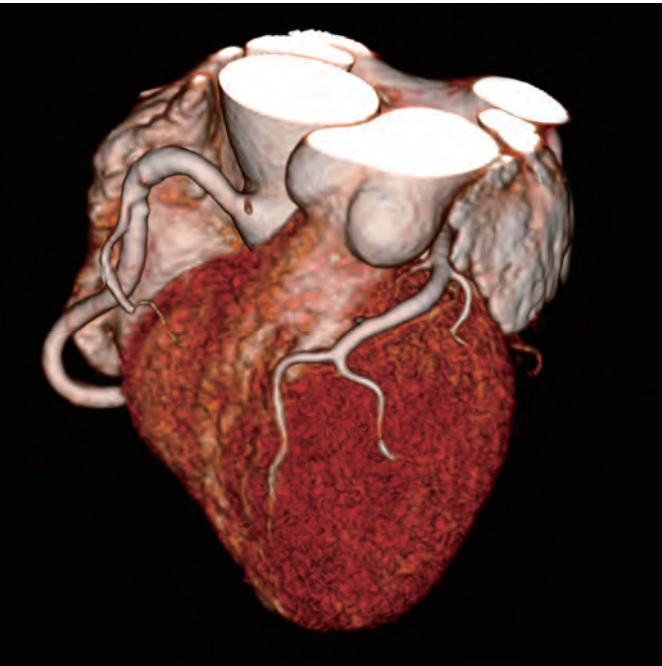
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Volume	0.5 mm x 256	n/a	135	SUREExposure 3D	0.275	128	AIDR 3D Standard	7.4	94.5	1.32	0.014



Heart Rate 86 bpm

This patient with a heart rate of 86 bpm presented with atypical chest pain. The wall of the left ventricle is thickened and the coronary vessels show no signs of disease. The 0.275 s rotation speed and multi-segment reconstruction allow patients with a high heart rate to be scanned with excellent image quality.

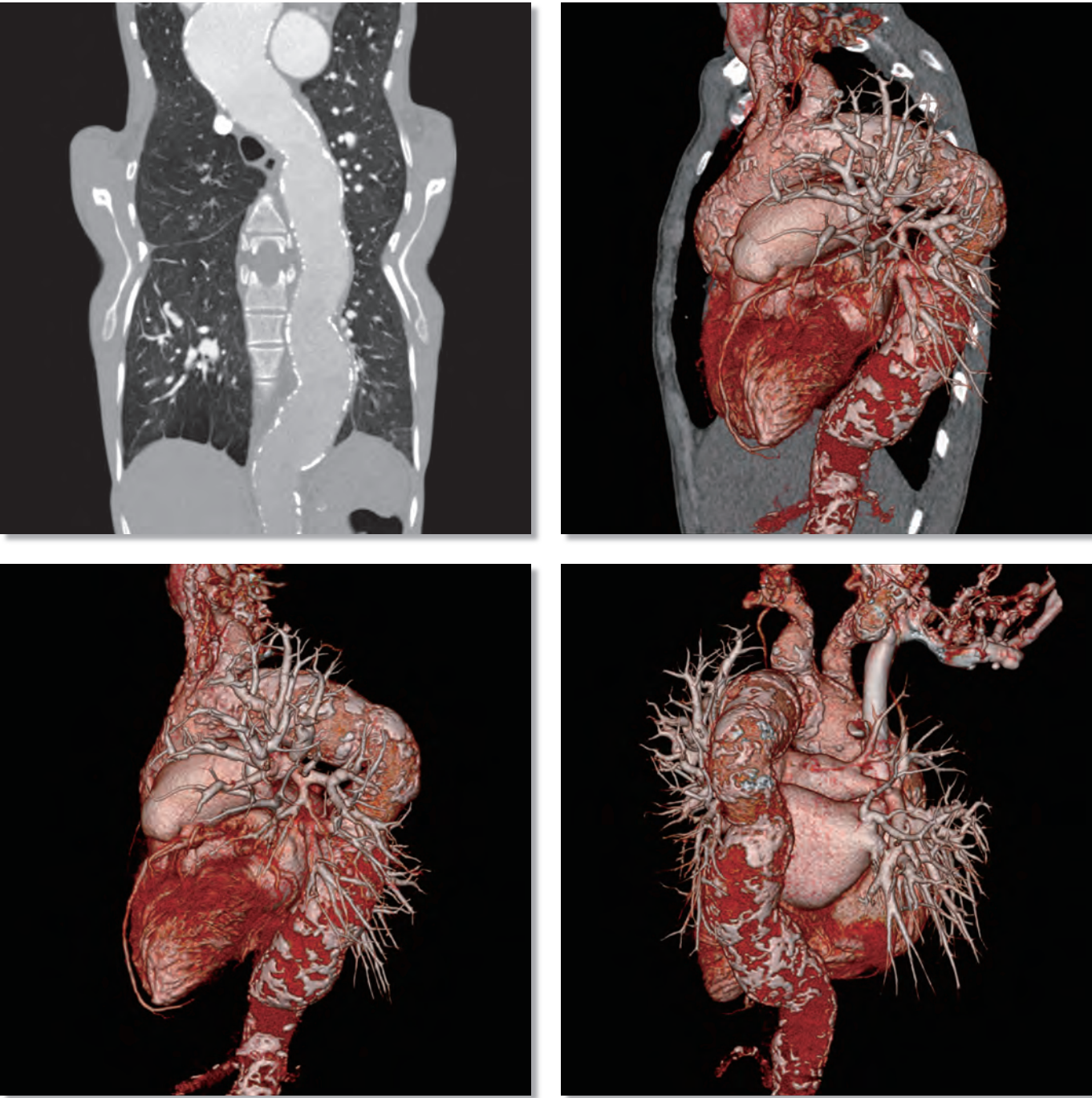
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Volume	0.5 mm x 256	n/a	120	^{SURE} Exposure 3D	0.275	128	AIDR 3D Standard	14.6	187.3	2.62	0.014



Thoracic Aortic Aneurysm

This 52-year-old man presented with a suspected aneurysm of the thoracic aorta. The entire thoracic aorta is dilated, with extensive calcified plaque. Routine 0.275 s scanning virtually eliminates pulsation artifacts.

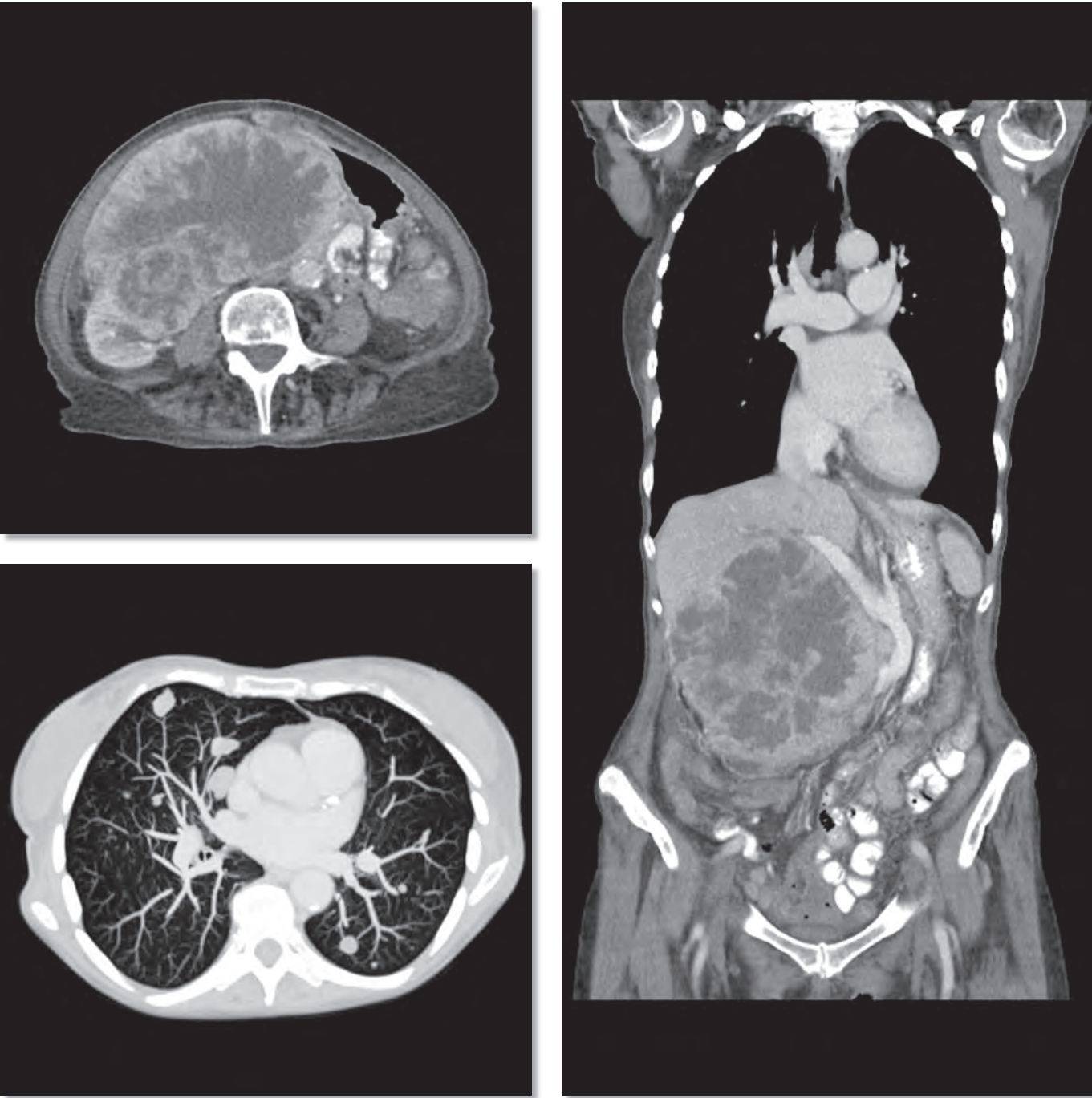
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Helical	0.5 mm x 80	0.812	80	SURE Exposure 3D Standard	0.275	319	AIDR 3D Standard	4.10	152.0	2.13	0.014



Right Renal Cell Carcinoma and Lung Metastases

A follow-up scan of the chest and abdomen was requested for this 73-year-old woman. A giant renal cell carcinoma in the right kidney is seen. Multiple metastases in the lungs are also demonstrated.

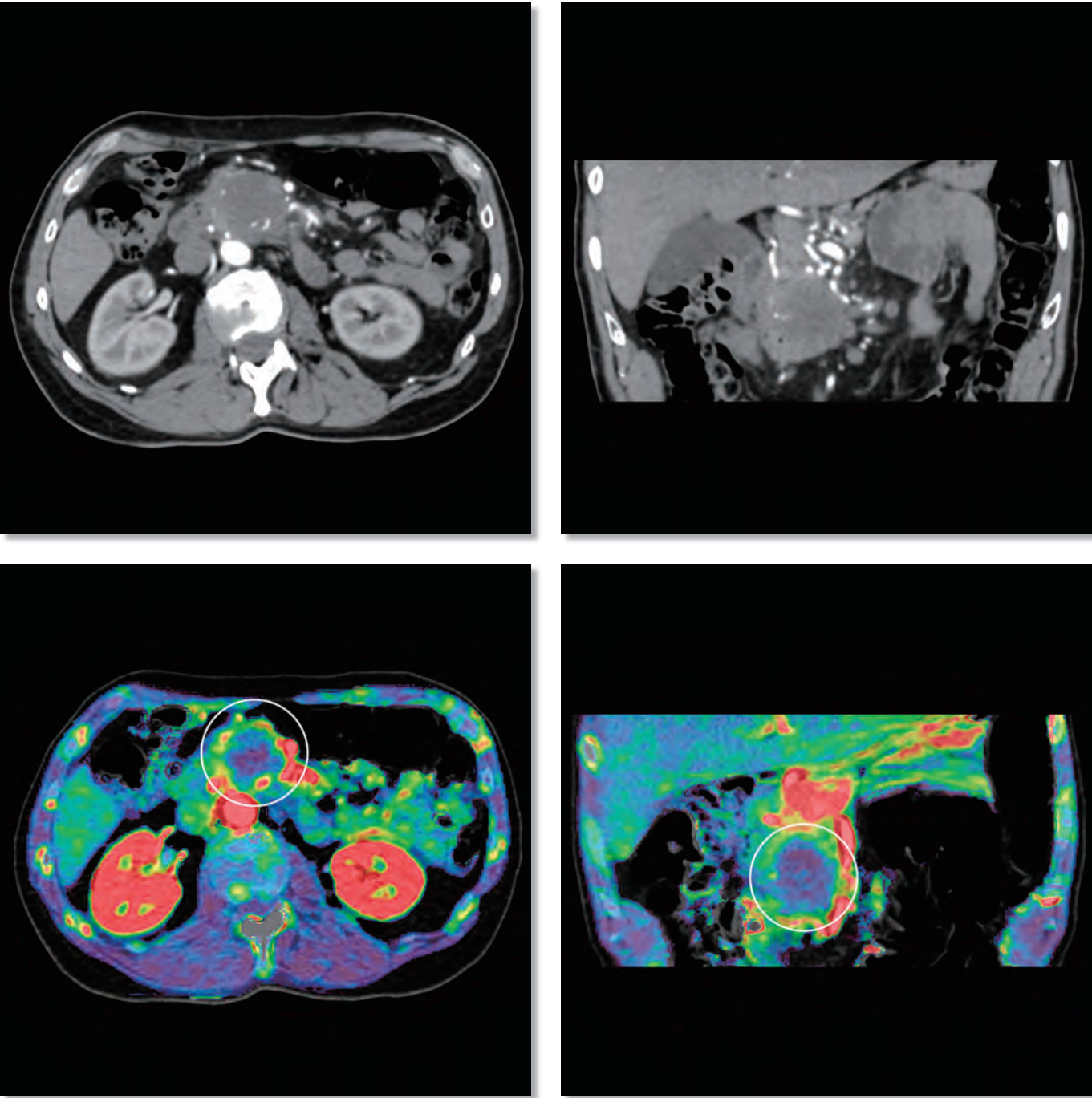
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Helical	0.5 mm x 80	0.812	100	SURE Exposure 3D Standard	0.275	620	AIDR 3D Standard	3.0	202.2	2.9	0.0145



Pancreatic Tumor Perfusion

A large mass is seen in the head of the pancreas in this perfusion scan. The perfusion maps demonstrate decreased blood flow to the tumor, typical of adenocarcinoma. Perfusion information aids in the differential diagnosis of tumors, which can be difficult with static or multiphase imaging.

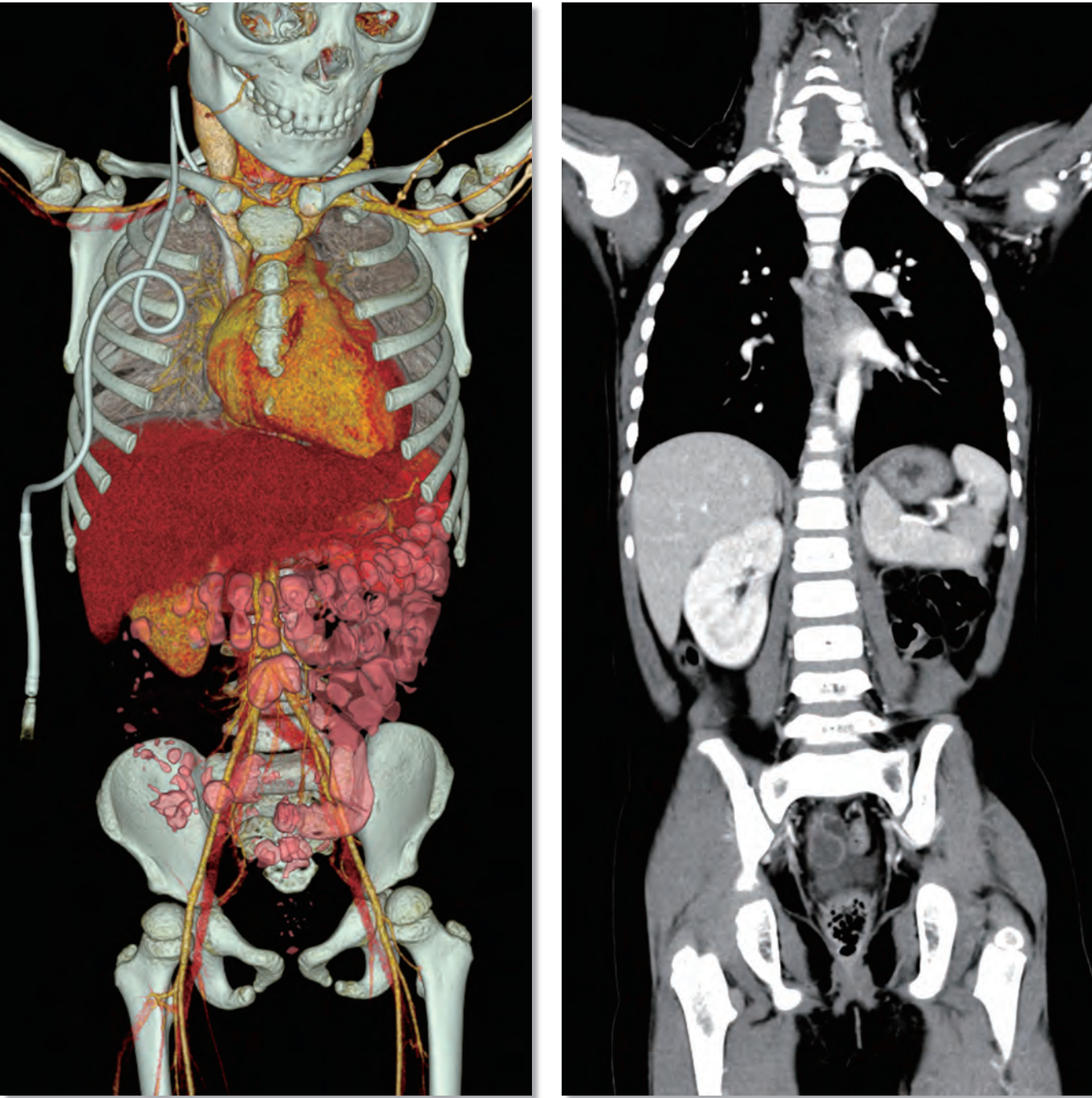
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Dynamic Volume (17)	0.5 mm x 160	n/a	100	50	0.5	80	AIDR 3D Standard	3.3	911.2	13.67	0.015



Whole-Body Tumor Staging

A scan of the chest and abdomen was performed on this 6-year-old child following treatment for a Wilms tumor. Ultrahelical scanning with 0.275 s rotation ensures that such scans are performed as fast as possible, minimizing the time the child needs to lie still.

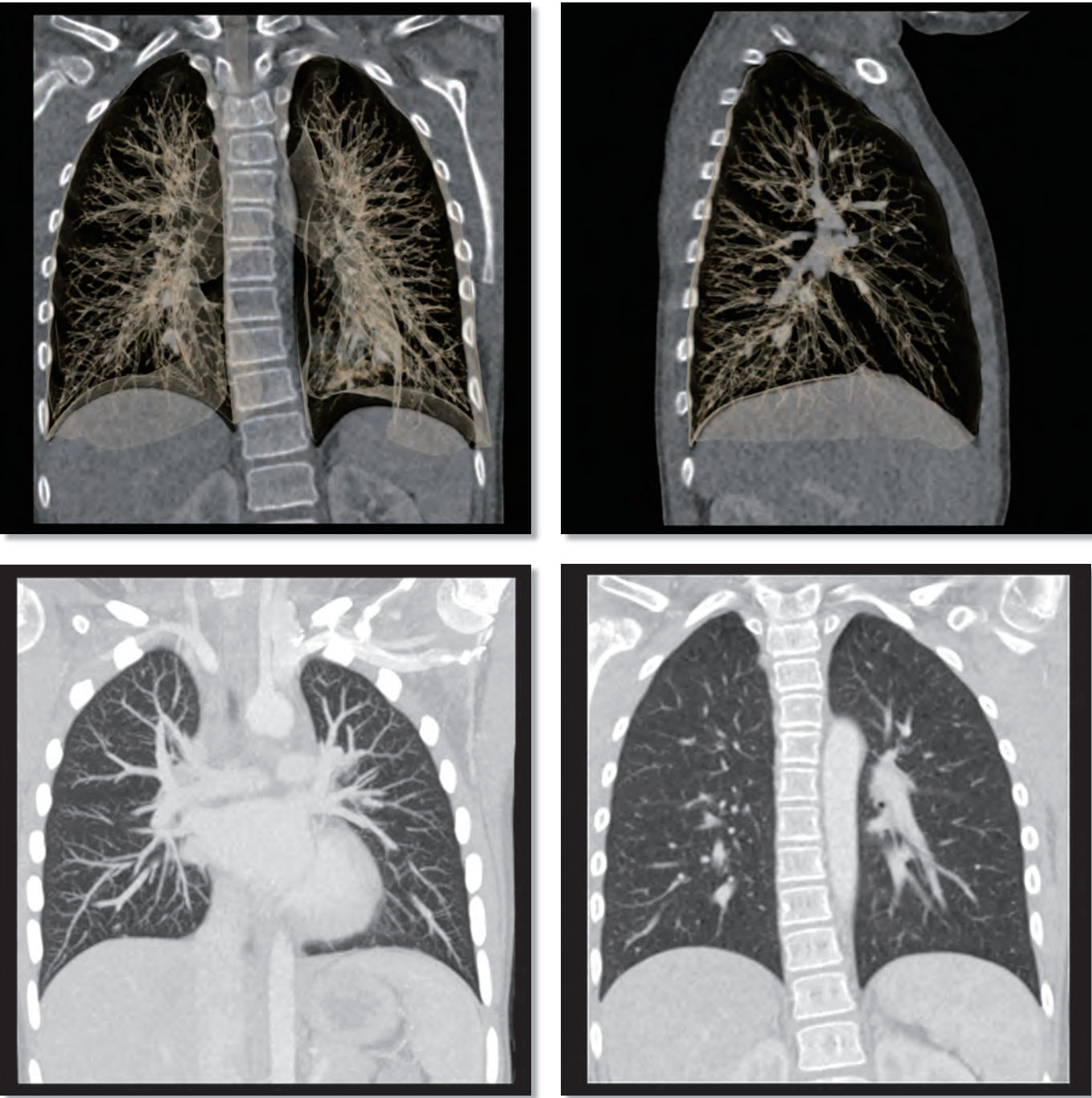
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Helical	0.5 mm x 64	0.641	120	SURE Exposure 3D	0.275	465	AIDR 3D Standard	4.0	18.56	0.35	0.019



Pediatric Chest

This 10-year-old girl presented with shortness of breath. The lungs appear normally aerated. Integration of AIDR 3D into automatic exposure control ensured the lowest possible dose for this child.

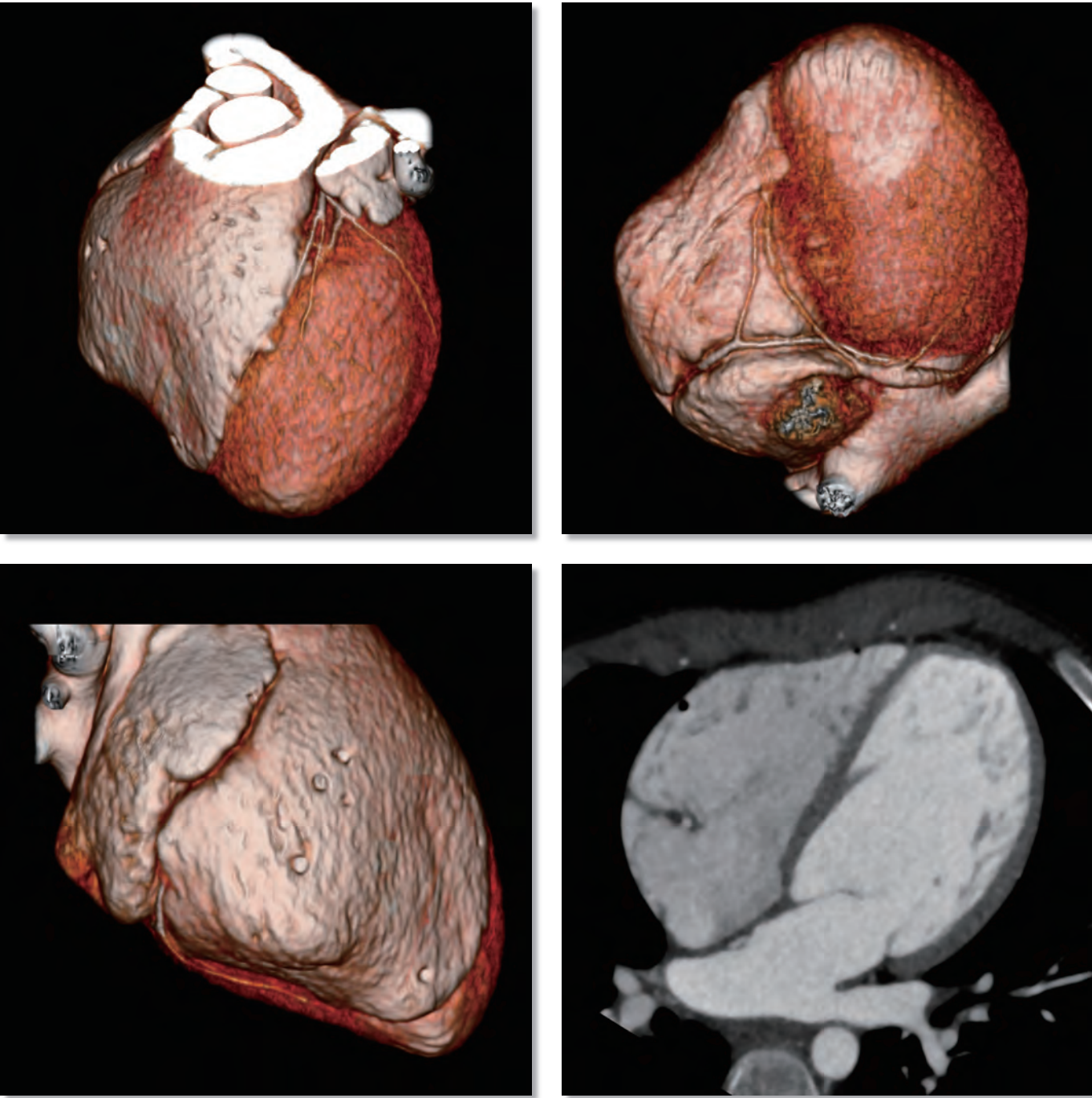
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Helical	0.5 mm x 80	0.812	100	SURE Exposure 3D Standard	0.275	240	AIDR 3D Standard	0.60	18.30	0.24	0.013



Pediatric Cardiac

A CT scan of the heart was performed in this 6-year-old child who presented with chest pain on exertion and a possible aberrant RCA, as seen on ultrasound. The RCA arises from the lateral portion of the right coronary cusp. The artery courses between the aorta and the right ventricular outflow tract, which is a normal anatomical variant.

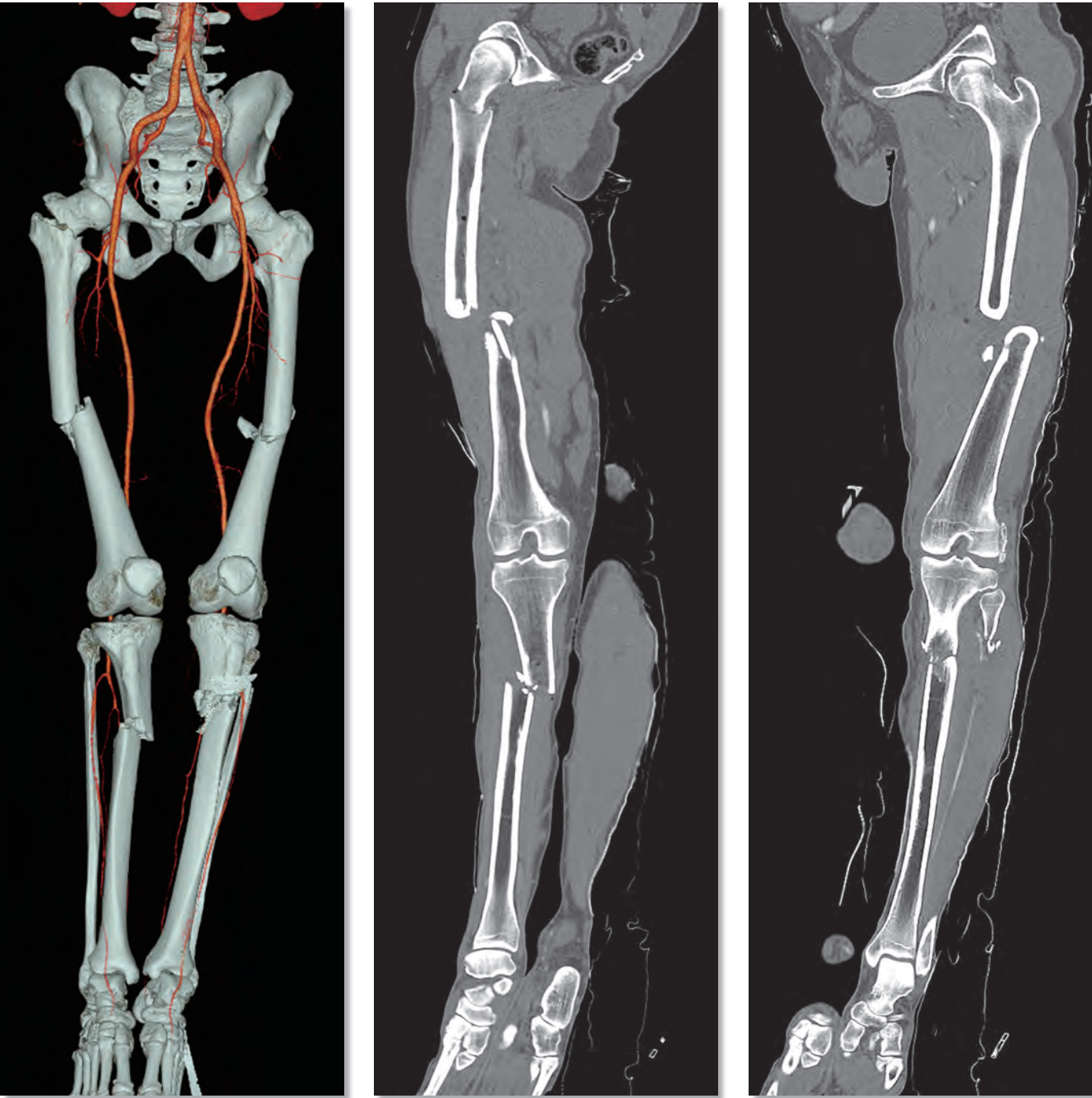
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Volume	0.5 mm x 200	n/a	100	SURE Exposure 3D	0.275	100	AIDR 3D Standard	5.1	51.1	0.92	0.018



Motorcycle Accident

This 48-year-old man was brought to the emergency department following a motorcycle accident. A CT scan was requested to determine the extent of his injuries. Multiple fractures of the lower limbs are seen in this whole-body scan. With a 0.275 s rotation speed, the entire scan was performed in just 10 s.

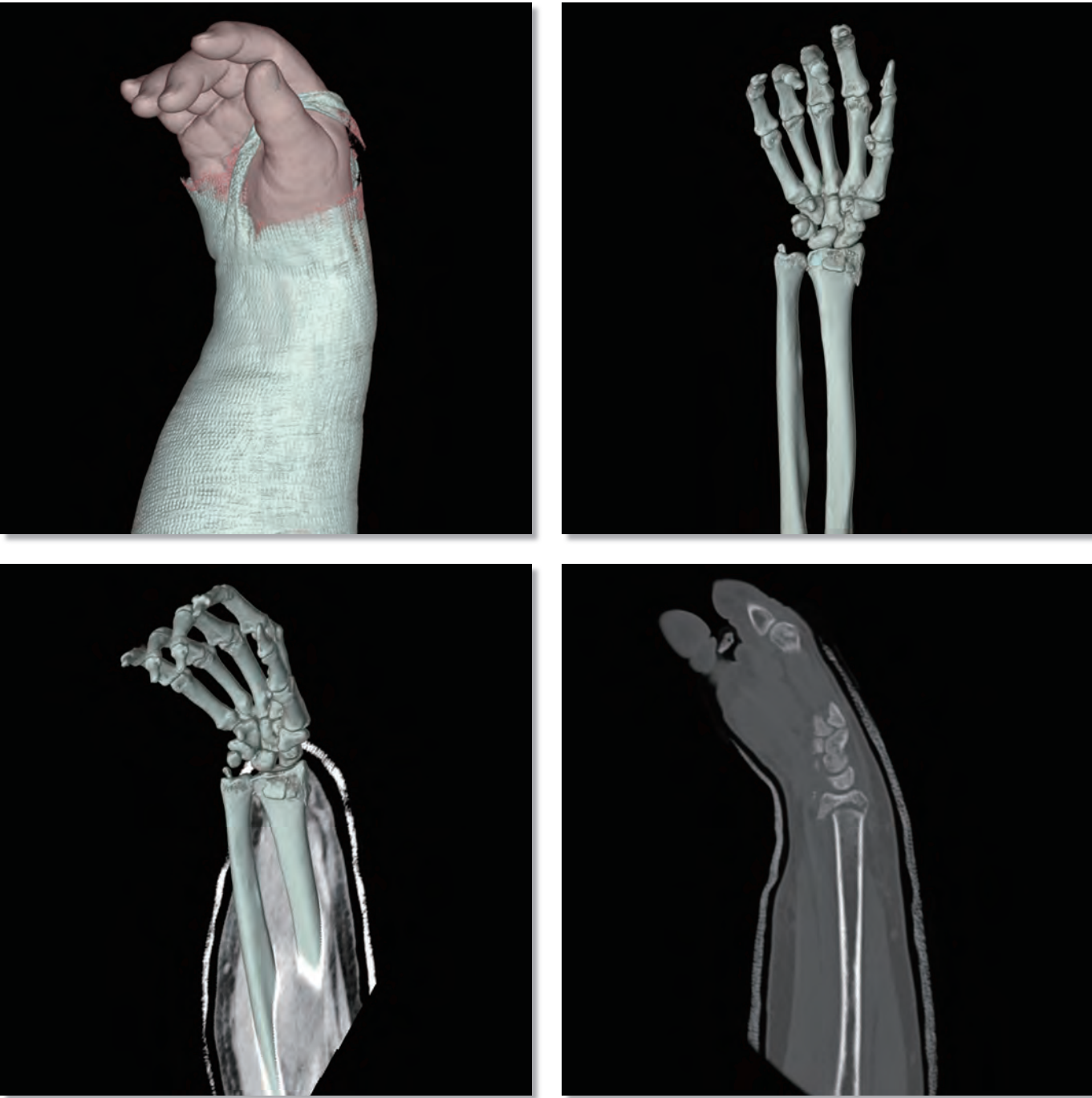
Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Helical	0.5 mm x 80	0.812	120	SURE Exposure 3D Standard	0.275	1215	AIDR 3D Standard	2.0	253.9	1.27	0.005



Wrist Fracture

Fractures of the distal radius and ulna are demonstrated in this volume scan of the wrist and hand.

Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Volume	0.5 mm x 320	n/a	120	42	0.5	160	AIDR 3D Standard	4.7	75.5	0.06	0.0008



Bilateral Knee Pseudoarthrosis

Pseudoarthrosis of the head of the fibula is seen in both knees in this scan of an 18-year-old woman. One rotation scanning of the extremities is fast and easy with a 0.275 s rotation speed, reducing the time the patient spends in the CT scanner.

Scan Mode	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Volume	0.5 mm x 320	n/a	80	137	0.275	160	AIDR 3D Standard	4.4	70.1	0.06	0.0008

Right Knee

Left Knee

