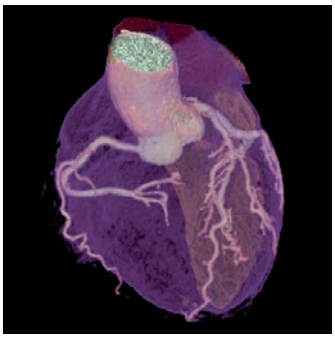
GE Healthcare

Case study

Low-dose and High-resolution Cardiovascular Imaging with Revolution* CT



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Case 1

Rapid and Precise Coronary CT Angiography

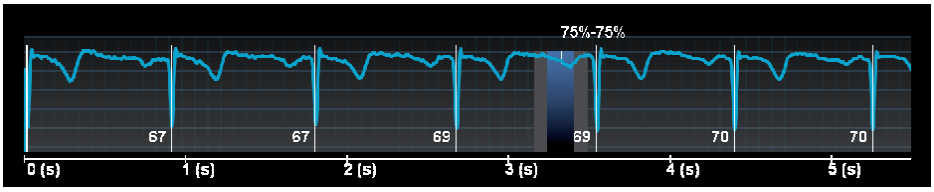
Patient history

A woman in her 60s with multiple risk factors and complaining about atypical chest pain was referred to CT for coronary assessment.

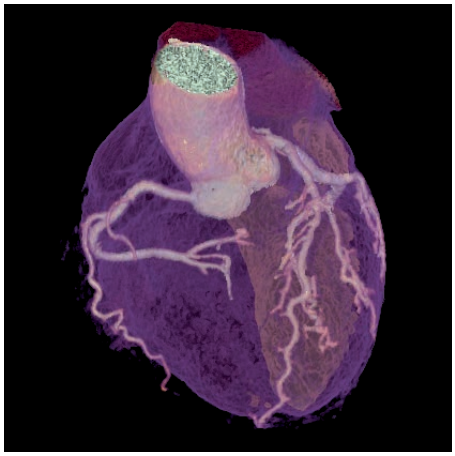
Acquisition

One-beat cardiac acquisition:

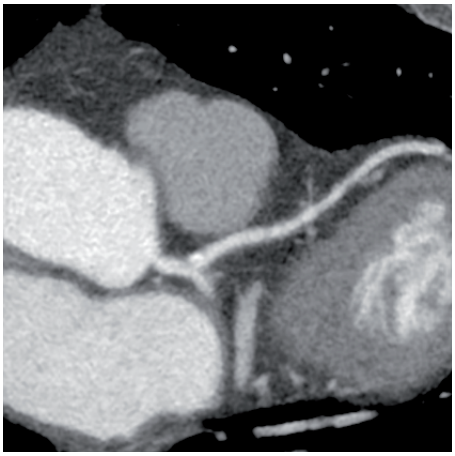
- **120 mm axial scanning** with ECG gating
- **kV Assist & SmartmA** to tailor dose to patient's morphology: 80 kV, 370 mA, Noise Index 30
- BMI: 23
- ASiR*-V[1] to lower dose
- 0.28 sec rotation speed
- Heart rate: 69 BPM
- 60 cc of contrast media (350 mg I/ml) – including SmartPrep phase (automated threshold-based triggering)
- **DLP 18 mGy-cm**
- **0.25 mSv[2]**
- **Exposure time: 0.28 sec**



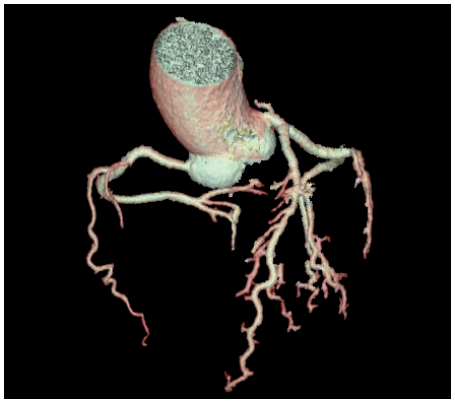
Results

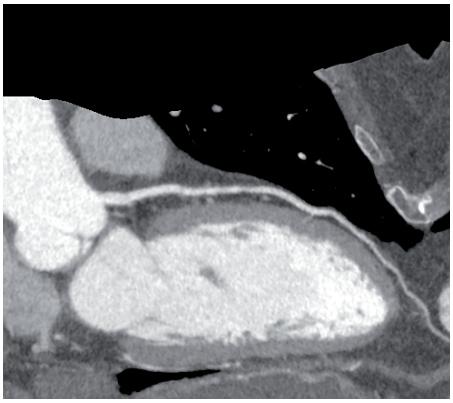


3D – Coronary Tree



Curved - LAD





Curved - RCA

Conclusion

On this patient with a relatively high heart rate (77 BPM before apnea, 69 BPM during acquisition), the exam was performed within a single diastolic phase, at 80 kV, enabling diagnostic quality images to be acquired at a quarter of a milliSievert.

> Thanks to the one-beat axial acquisition, the new iterative reconstruction technology ASiR-V and the high image quality at low kV, Revolution CT delivers cardiac CT with excellent image quality at very low dose routinely.
>
> Jacques Feignoux

Case 2

Conclusive Triple-Rule-Out Study Without Compromise

Patient history

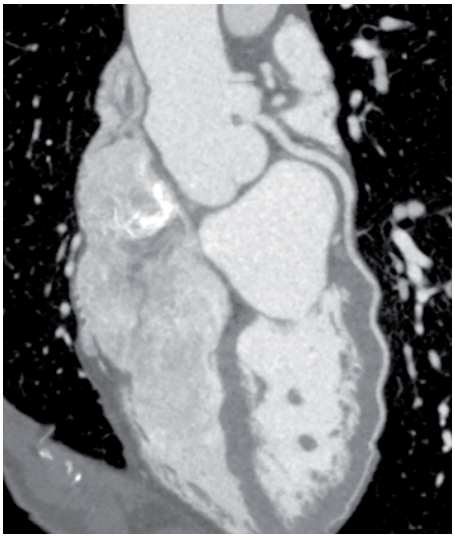
A woman in her 50s, complaining of paroxysmal chest pain for one month and presenting with left ventricular hypertrophy, was referred to CT for triple-rule-out after a vasovagal episode related to stress.

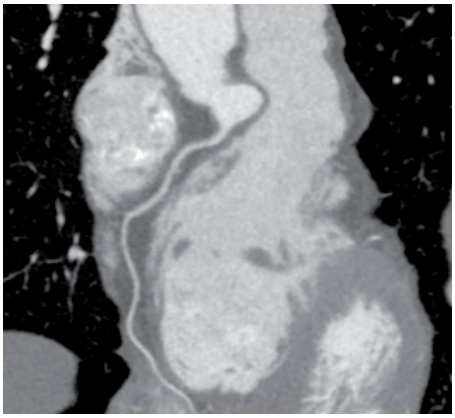
Acquisition

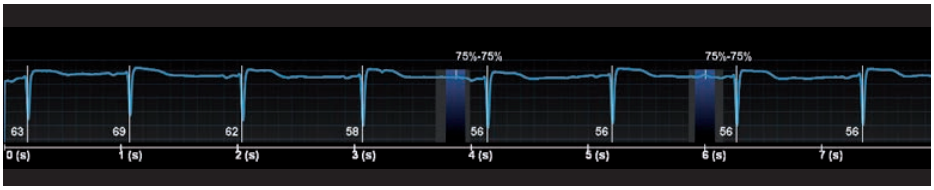
Axial scanning with ECG gating:

- **Smart coverage** to automatically select anatomy specific collimations required to scan the prescribed area
- **kV Assist & SmartmA** to tailor dose to patient's morphology: 80 kV, 295-320 mA, Noise Index 30
- BMI: 17
- ASiR-V[1] to lower dose
- 0.28 sec rotation speed
- Heart rate 56-69 BPM
- **DLP 36 mGy-cm**
- **0.5 mSv[2]**
- Coverage: 240 mm
- **Exposure time: 0.56 sec**

Results







Conclusion

Thanks to the 160 mm coverage, this exam was performed with two axial volumes for optimal visualization of pulmonary arteries, thoracic aorta and motion free coronaries. The new generation of iterative reconstruction ASiR-V delivers diagnostic image quality at half a milliSievert.

> With Revolution CT, triple-rule-out studies are now robust and reproducible with easy synchronization with contrast injection and lower dose, with uncompromised image quality.
>
> Jean-Louis Sablayrolles

Case 3

Detailed Head & Neck CT Angiography at Low Dose

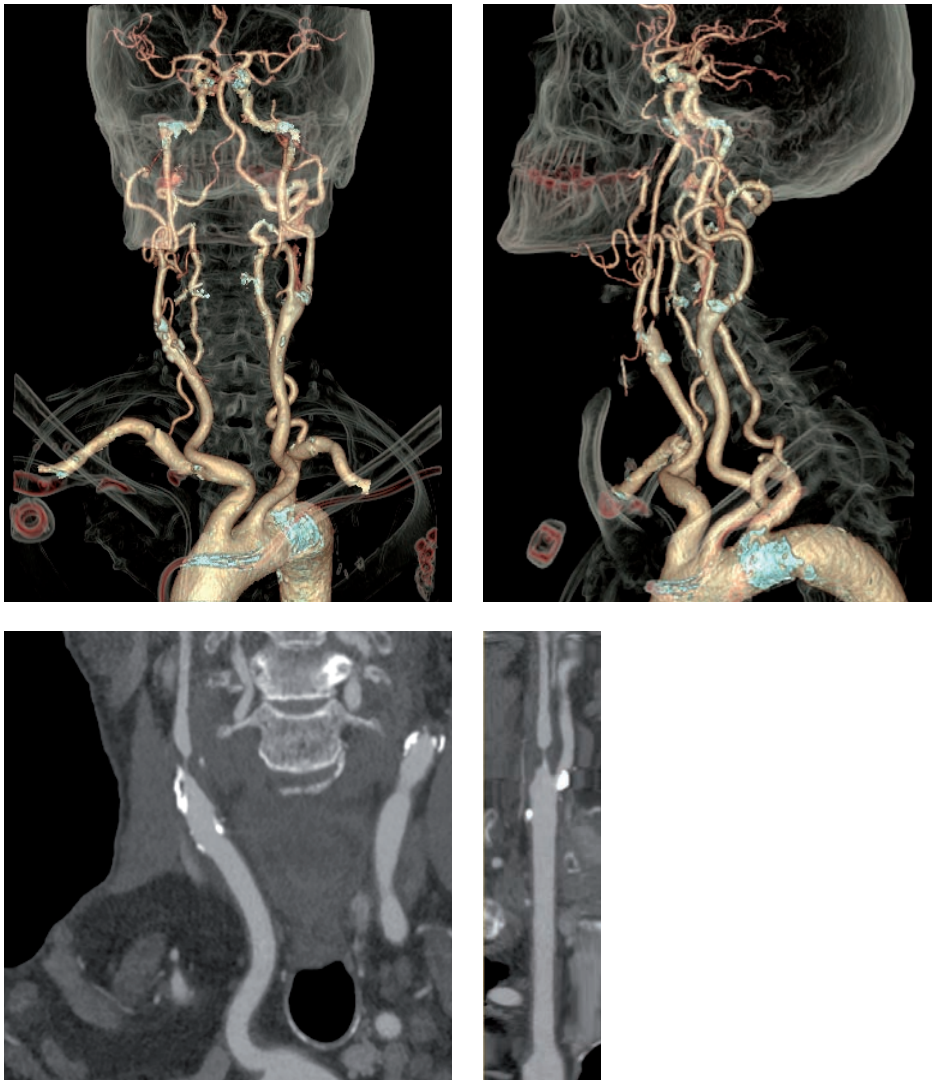
Patient history

A man in his 70s was referred to CT for follow-up of a stenosis of the right internal carotid.

Acquisition

- Helical mode
- Pitch 0.992:1
- **kV Assist & SmartmA** to tailor dose to patient's morphology: 120 kV, 35-320 mA, Noise Index 25
- BMI: 26
- ASiR-V[1] to lower dose
- 0.5 sec rotation speed
- 50 cc of contrast media (350 mg I/mL) – including SmartPrep phase (automated threshold-based triggering)
- **DLP 175 mGy-cm**
- **0.9 mSv[3]**
- Coverage: 300 mm
- **Acquisition time: 1.9 sec**

Results



Conclusion

This head and neck angiography was performed in less than two seconds with high-resolution images at less than one milliSievert.

> With Revolution CT, faster head and neck angiography allows for uniform contrast in pure arterial phase, with no venous contamination. Therefore, it gives us the imaging accuracy that we need to provide a confident diagnosis to referring clinicians.
>
> Laurent Macron

Case 4

Low-dose and High-resolution Runoff CT Angiography

Patient history

A man in his 60s was referred to CT for follow-up of lower limb arteriopathy.

Acquisition

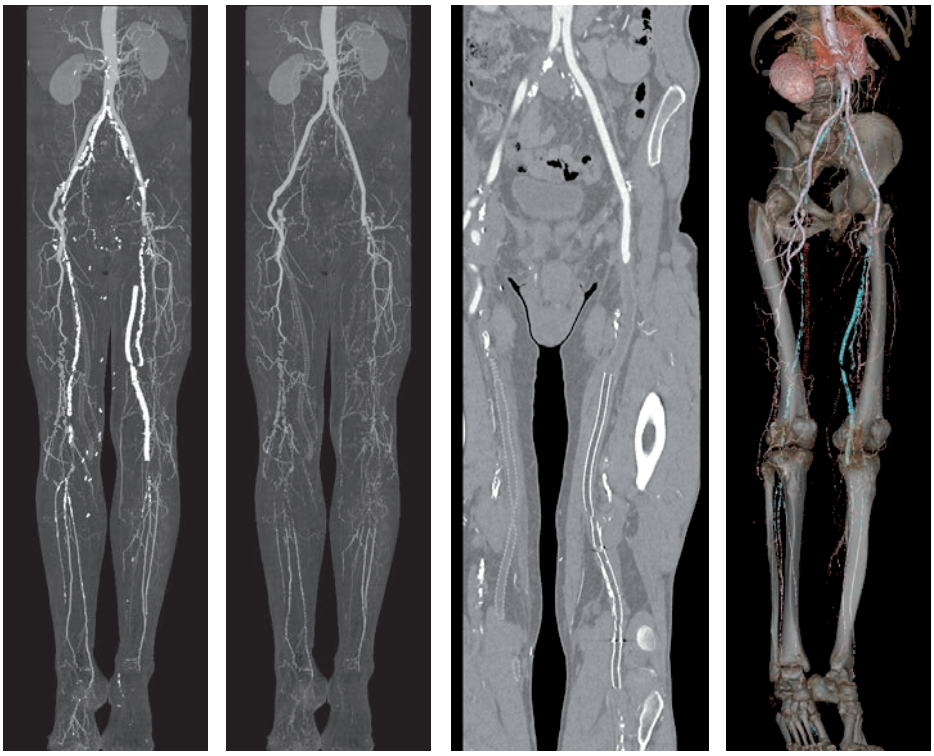
- Helical mode
- Pitch 0.984:1
- **kV Assist & SmartmA** to tailor dose to patient's morphology: 100 kV, Noise Index 26
- BMI: 22
- ASiR-V1 to lower dose
- 1 sec rotation speed
- **DLP 226 mGy-cm**
- **2 mSv[4]**
- Coverage: 1210 mm
- **Acquisition time: 35 sec**

Conclusion

This exam demonstrates the need of high spatial resolution for a confident diagnosis in severe arteriopathy cases. The significant dose reduction capabilities of ASiR-V allowed us to get this high image quality at only 226 mGy-cm.

> Revolution CT provides the flexibility to perform vascular examination using multi-volume axial imaging or helical mode with up to 80 mm collimation to optimize the results while delivering low dose thanks to ASiR-V.
>
> Jean-Louis Sablayrolles

Results



Enabling Technologies

- Revolution CT puts the next generation of iterative reconstruction, ASiR-V, up to **160 mm of multivolume axial scanning** and **up to 80 mm collimation for helical scanning in your hands, helping you acquire** high-definition images at lower doses.
- **ASiR-V[1]** was designed to deliver **reduced noise levels and improve low-contrast detectability so you can** routinely **reduce dose up to 82%** relative to FBP at the same image quality[5] for patients of all ages.
- Revolution CT introduces the groundbreaking Gemstone Clarity Detector that gives you **160 mm whole organ coverage with best-in-class spatial resolution.** The focally-aligned, miniaturized detector modules and 3D collimator are designed to reduce electronic noise by 25% which may improve image quality and reduce artifacts in low signal conditions, for example in large patients or when scanning at low kV and mA.
- Revolution CT features also the latest **Smart Dose technologies** designed to help you acquire high quality images using lower doses of radiation. Smart Dose technologies may help you make a more accurate diagnosis and lower exposure for patients across routine and advanced exams, including dynamic acquisitions for perfusion and 4D studies. Smart Dose technologies include **kV Assist** that helps you select the right settings for the patient being scanned. It recommends tube voltage and current to achieve the lowest dose while meeting your image quality goals.
- Finally, Revolution CT allows **70 kV scanning** so you can develop low-dose protocols, which are especially suitable for pediatric imaging.

About GE Healthcare

GE Healthcare provides transformational medical technologies and services to meet the demand for increased access, enhanced quality and more affordable healthcare around the world.
GE (NYSE: GE) works on things that matter - great people and technologies taking on tough challenges. From medical imaging, software & IT, patient monitoring and diagnostics to drug discovery, biopharmaceutical manufacturing technologies and performance improvement solutions, GE Healthcare helps medical professionals deliver great healthcare to their patients.

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GE imagination at work

The clinical cases are displayed for educational purposes only and for the benefit of healthcare students and professionals

[1] In clinical practice, the use of ASiR-V may reduce CT patient dose depending on the clinical task, patient size, anatomical location and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.
[2] Obtained using a chest factor of 0.014*DLP
[3] Obtained by EUR-16262 EN, using a head and neck CTA conversion factor of 0.0049*DLP
[4] Obtained by EUR-16262 EN, using an adult Runoff factor of 0.009*DLP
[5] Image quality as defined by low contrast detectability.

Legal Mentions : The system is intended to produce cross-sectional images of the body by computer reconstruction of x-ray transmission projection data from the same axial plane taken at different angles. The system has the capability to image whole organs in a single rotation. Whole organs include but are not limited to brain, heart, liver, kidney, pancreas, etc..
The system may acquire data using Axial, Cine, Helical, Cardiac, and Gated CT scan techniques from patients of all ages. These images may be obtained either with or without contrast. This device may include signal analysis and display equipment, patient and equipment supports, components and accessories.
Class: IIb – Manufacturer: GE Medical Systems LLC, USA – LNE/G-MED – NB 0459 – GMDN 37618.

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