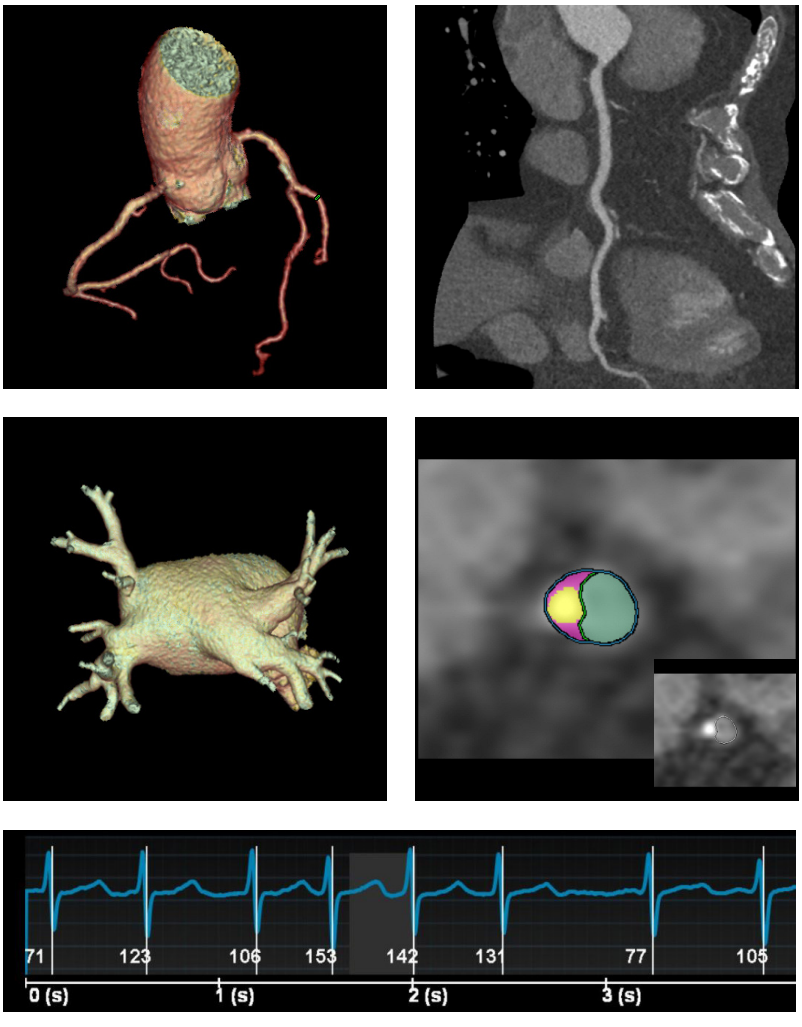
GE Healthcare

Case study

Cardiac CT on arrhythmic and high heart rate patients with Revolution™ CT



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Case 1

Low dose Cardiac CT exam in a patient with high BMI, high heart rate, highly calcified coronary arteries and paroxysmal atrial fibrillation

Heart rate 85-136 BPM

Patient history

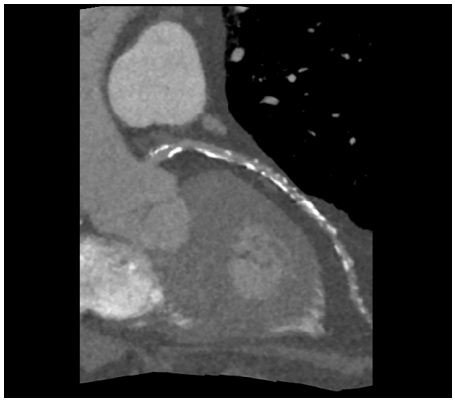
Patient in his 70s with paroxysmal atrial fibrillation was referred to CT for assessment of chronic coronary artery disease before pulmonary vein ablation.

Acquisition

One-beat cardiac acquisition:

- 160 mm axial scanning with ECG and Auto Gating
- 100 kV and 542 mA
- BMI: 34 (101 kg, 172 cm)
- ASiR™-V[1] to lower dose
- 0.28 sec rotation speed
- **Heart rate: 85 - 136 BPM**
- 70 cc of contrast media (400 mg I/ml, flow 4 cc/s) including SmartPrep phase triggering
- **DLP 92 mGy-cm**
- **1.2 mSv[2]**

Results



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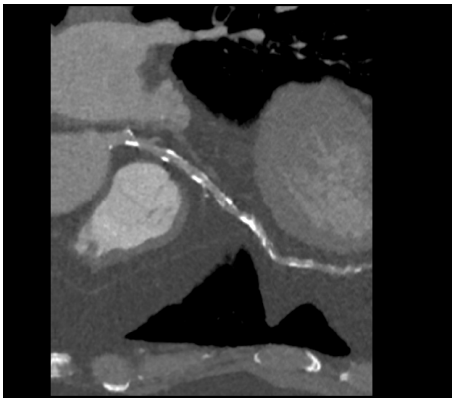

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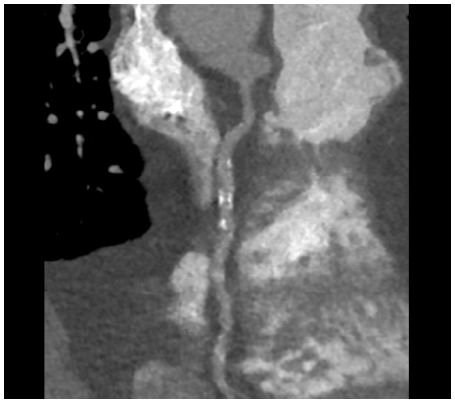

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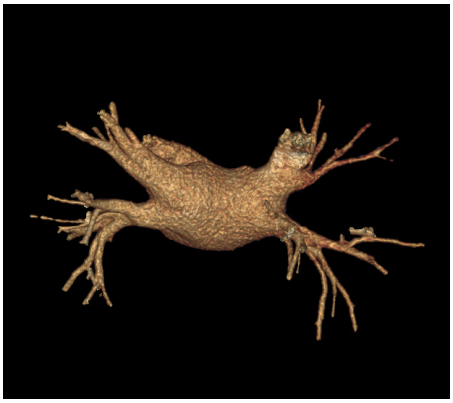
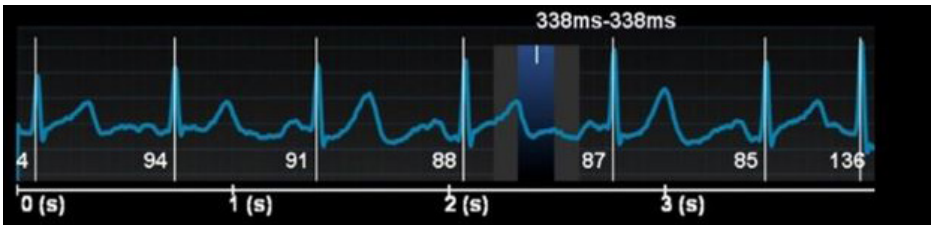


Volume rendering of the left atrium



Conclusion

This cardiac CT scan did not show any signs of disease in the pulmonary veins, the left atrium and the included parts of the lungs. The physician also reported a strong coronary atherosclerosis.

> Even on challenging patients for cardiac CT, a comprehensive analysis of the coronary arteries is possible with Revolution CT. Thanks to the combination of the one beat cardiac scanning mode, the high definition imaging and the arrhythmia managment, we can deliver confident diagnosis even of patient with arrhythmia or high heart rates, and still at low doses.
>
> Prof. Dr. Rainer Schmitt

Case 2

Low dose Cardiac CT on a patient with persistent atrial fibrillation

Heart rate 71 - 153 BPM

Patient history

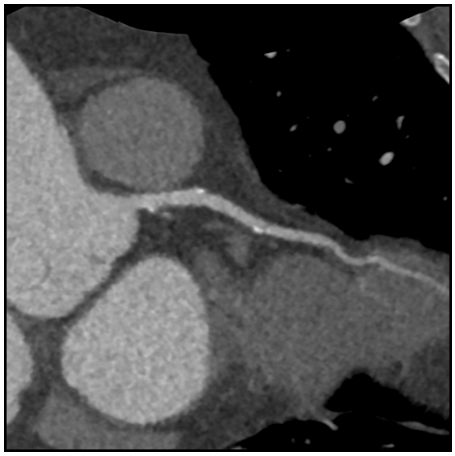
Male patient in his 60s with persistent atrial fibrilation and dispnea during exercise. The patient, with arterial hypertension and diabetes mellitus, was referred to CT for pulmonary vein assessment before ablation.

Acquisition

One-beat cardiac acquisition:

- 160 mm axial scanning with ECG and Auto Gating
- 100 kV and 544 mA
- BMI: 35
- ASiR™-V[1] to lower dose
- 0.28 sec rotation speed
- **Heart rate: 71 - 153 BPM**
- 60 cc of contrast media (400 mg I/ml, flow 4 cc/s) including SmartPrep phase triggering
- **DLP 124 mGy-cm**
- **1.7 mSv[2]**

Results



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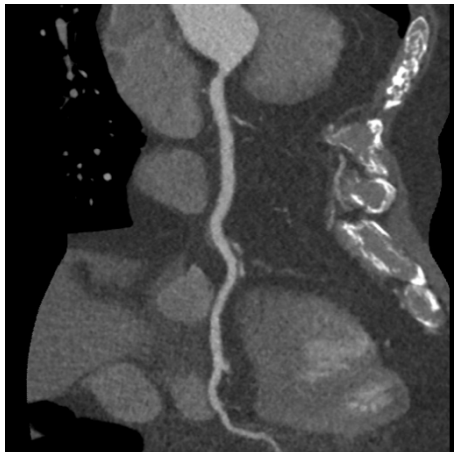

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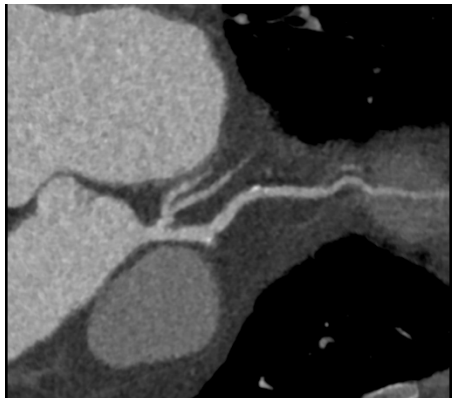
Volume rendering of the left atrium



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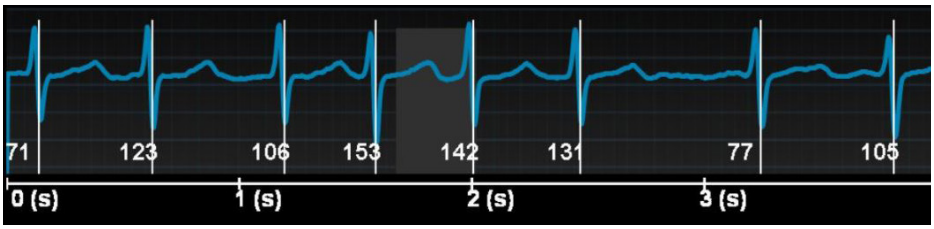

Conclusion

On this cardiac CT exam, an anatomical and morphometric analysis of the left atrium was performed. The results showed a dilatation of the left atrium as well as one accessory right pulmonary vein. The physician also reported a left ventricular hypertrophy and a minor coronary atherosclerosis.

> Thanks to the one-beat cardiac acquisition and the new iterative reconstruction technology, ASIR-V, Revolution CT delivers at low dose an excellent coronary vessel visualization even on patients such as this one with persistent atrial fibrillation and high heart rates during the scan acquisition.
>
> Prof. Dr. Rainer Schmitt

Case 3

CT of left atrium, pulmonary veins and coronary arteries in a single exam

Heart rate 63 - 123 BPM

Patient history

A woman in her 50s with persistent atrial fibrilllation was referred to CT for pulmonary vein assessment before ablation.

Acquisition

One-beat cardiac acquisition:

- 160 mm axial scanning with ECG and Auto Gating
- 100 kV and 520 mA
- BMI: 27
- ASiR™-V[1] to lower dose
- 0.28 sec rotation speed
- **Heart rate: 63 - 123 BPM**
- 60 cc of contrast media (400 mg I/ml, flow 4 cc/s) including SmartPrep phase triggering
- **DLP 140 mGy-cm**
- **1.9 mSv[2]**

Results

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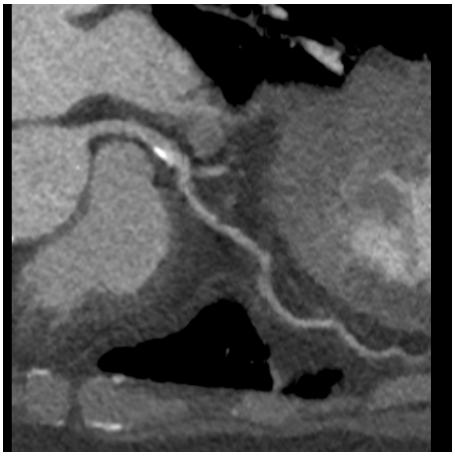

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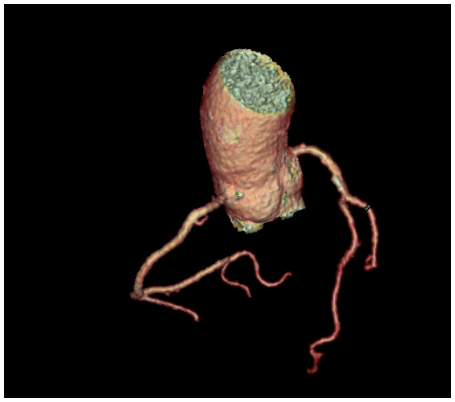
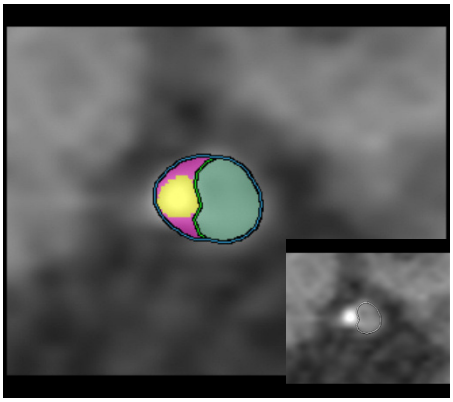
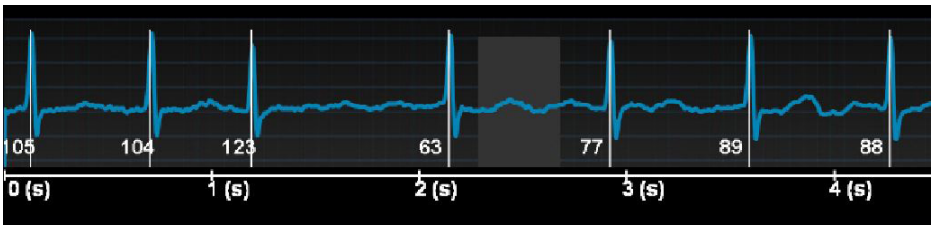
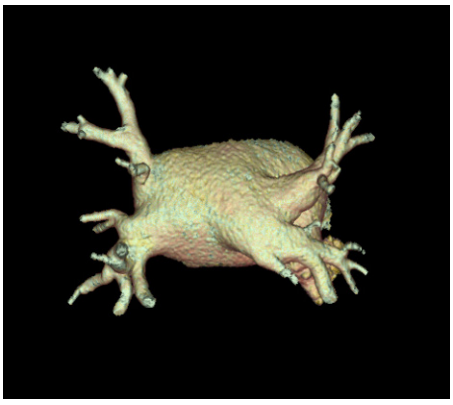


Volume Rendering of the coronary tree



Colour coded axial





Volume rendering of the left atrium

Conclusion

The CT scan of the pulmonary veins and coronary arteries displayed a late (common) confluence of the upper right and the lower pulmonary veins, as well as a dilatation of the right and left atria. The coronary analysis showed a nonstenotic calcified plaque in the proximal left anterior descending artery.

> Now with Revolution CT, on cardiac exams such as this one, where the primary indication is the detection of the pulmonary veins, a comprehensive analysis of the coronary arteries is also possible using the same acquistion, independently of heart rate or any arrhythmia conditions.
>
> Dr. med. Matthias Wagner

Case 4

Cardiac CT on a patient with absolute arrhythmia and atrial fibrillation

Heart rate 64 - 116 BPM

Patient history

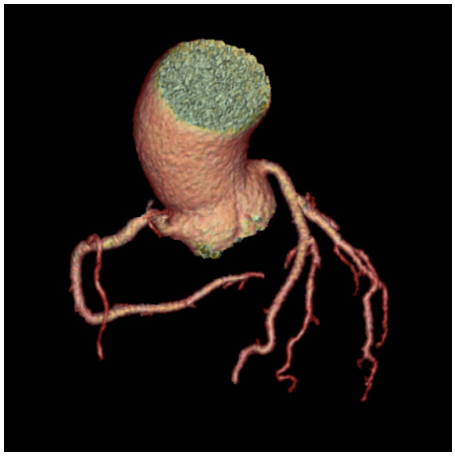
An obese patient in his 70s with cardiac risk factors, atrial fibrillation and suspected chronic coronary artery disease, was referred to CT for pulmonary vein and coronary artery assessment.

Acquisition

One-beat cardiac acquisition:

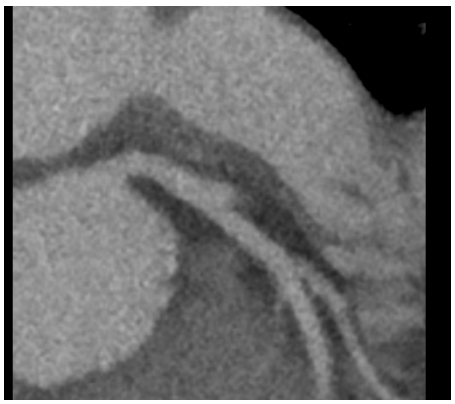
- 160 mm axial scanning with ECG and Auto Gating
- 120 kV and 445 mA
- BMI 33 (100 kg, 176 cm)
- ASiR™-V[1] to lower dose
- 0.28 sec rotation speed
- **Heart rate: 64 - 116 BPM**
- 60 cc of contrast media (400 mg I/ml, flow 4 cc/s) including SmartPrep phase triggering
- **DLP 256 mGy-cm**
- **3.5 mSv[2]**

Results



Volume Rendering of the coronary tree

Curved - RCA



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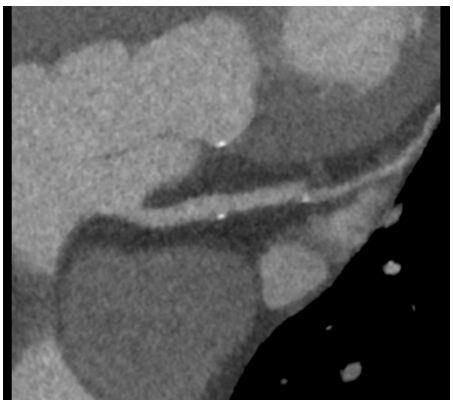
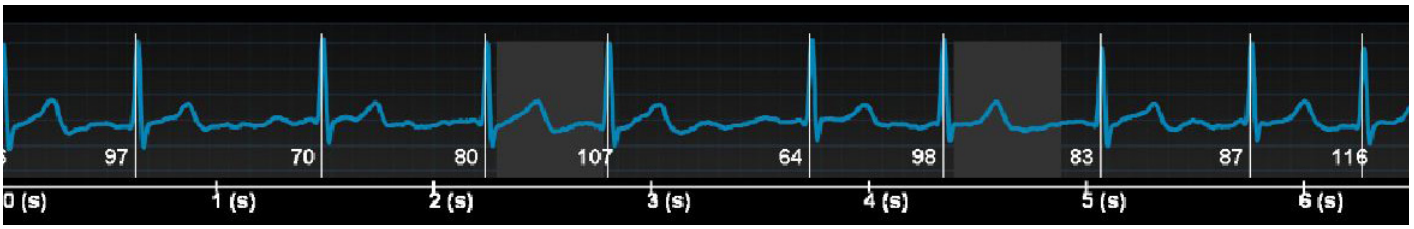


Curved -1st Diagonal



Conclusion

This Cardiac CT exam did not show any sign of relevant coronary vessel stenosis. On this patient with known arterial hypertension, a slight elongation of vessels and a dilatation of the left atrium were reported.

> With the help of the arrhythmia management system, an automatic retriggered scan can be performed on patients with severe arrhythmia. This helps to ensure a reliable reporting on coronary vessels, within one single injection, in this case even on a patient with adverse conditions for cardiac CT exam. This enables in a significant increase of consistent results in coronary CTA cases.
>
> Anna Matveeva, M.D.

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.

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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