

Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION

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Circulation 2001;103:62-

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 72514
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1524-4539

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Four-Dimensional Cardiac Imaging With Multislice Computed Tomography

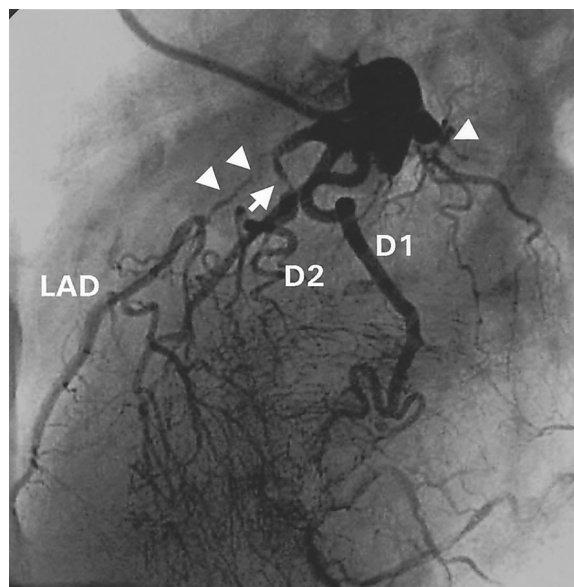
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A 58-year-old man was referred to our center for angiographic evaluation of unstable anginal complaints. Selective coronary angiography revealed 3-vessel disease.

Multislice CT angiography (Somatom plus 4 Volume Zoom, Siemens AG), a new noninvasive technique to image the heart and coronary arteries, was also performed (Figure). The entire heart was scanned within 1 single breath-hold after injection of a contrast medium (iomeprol, 350 mg/mL, 144 mL at 4 mL/s). By use of retrograde ECG gating, a 3D volume consisting of thin slices can be reconstructed from the CT data during a preselected period (250 ms) within the RR interval of each cardiac cycle. 3D data sets were acquired

during 20 different reconstruction intervals equally distributed throughout the cardiac cycle.

These 20 3D data sets, each representing a different cardiac phase, were further processed on a graphic workstation (Indigo 2, SGI) with 3D volume-rendering software (Voxel View, Vital Images). By manual segmentation, the thoracic wall was removed from each volume. From these volumes, a large series of movie frames was recorded, like photographs, and ordered according to their phase. By running these frames at a speed corresponding to the original heart rate, we could create a 4D representation of the beating heart (Movie).



Selective coronary angiogram of left coronary artery (90° left anterior oblique view). Midsegment of left anterior descending coronary artery (LAD, arrowheads) and proximal circumflex artery are occluded and distal parts are filled by collateral vessels. Significant lesions can be observed in second diagonal branch (D2, arrow) as well.

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Movie can be found Online at www.circulationaha.org

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Circulation encourages readers to submit cardiovascular images to the Circulation Editorial Office, St Luke's Episcopal Hospital/Texas Heart Institute, 6720 Bertner Ave, MC1-267, Houston, TX 77030.

(Circulation. 2001;103:e62.)

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