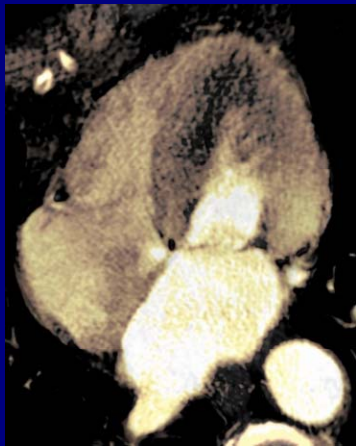


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MDCT Assessment of Myocardial Perfusion

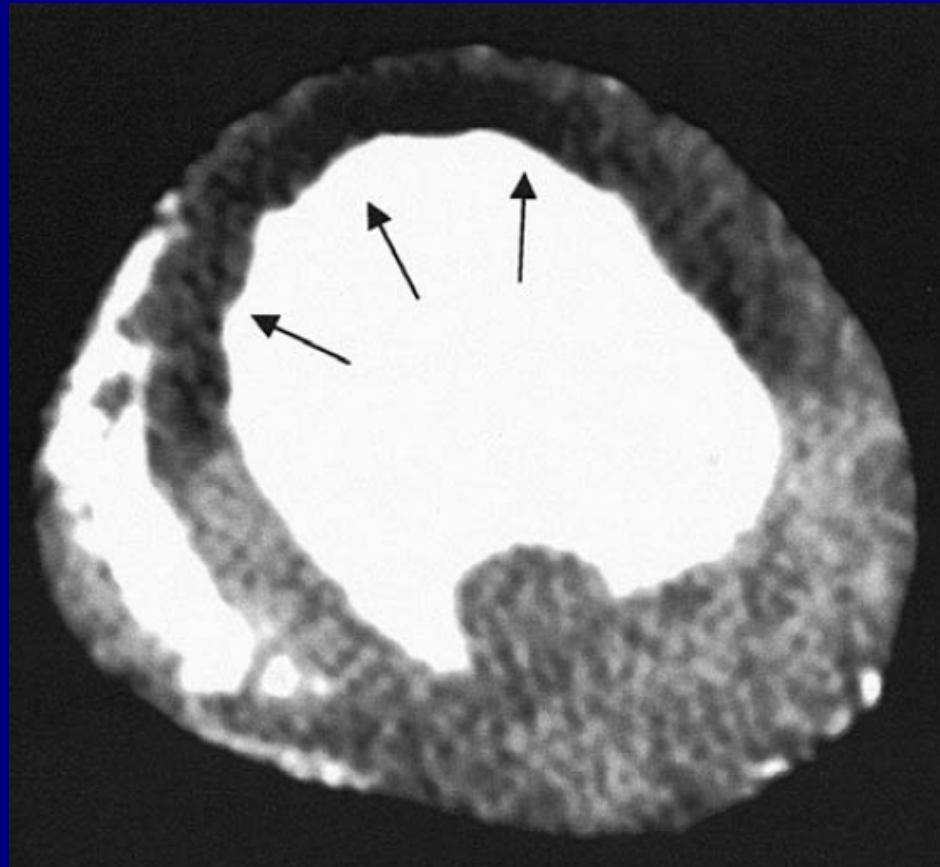


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Adenosine-stress CT in Animals

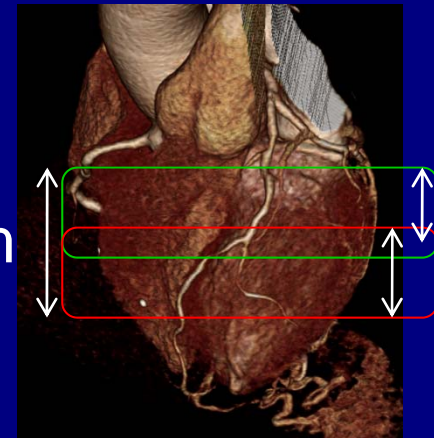


George RT. J Am Coll Cardiol 2006;48:153-60

Dynamic Scan (DS Flash) using Heart Shuttle

- Data are acquired at 2 table positions alternatingly covering 73 mm during systolic phases for 30 sec.
- 100 kVp, tube current 175 mAs/rot (0.285 s gantry rotation)
- Radiation dose: CTA 2.3 mSv, dynamic scan 9.6 mSv.
- Contrast: 50 ml (5 ml/s)
- Adenosine infusion at 140 $\mu\text{g}/\text{kg}/\text{min}$

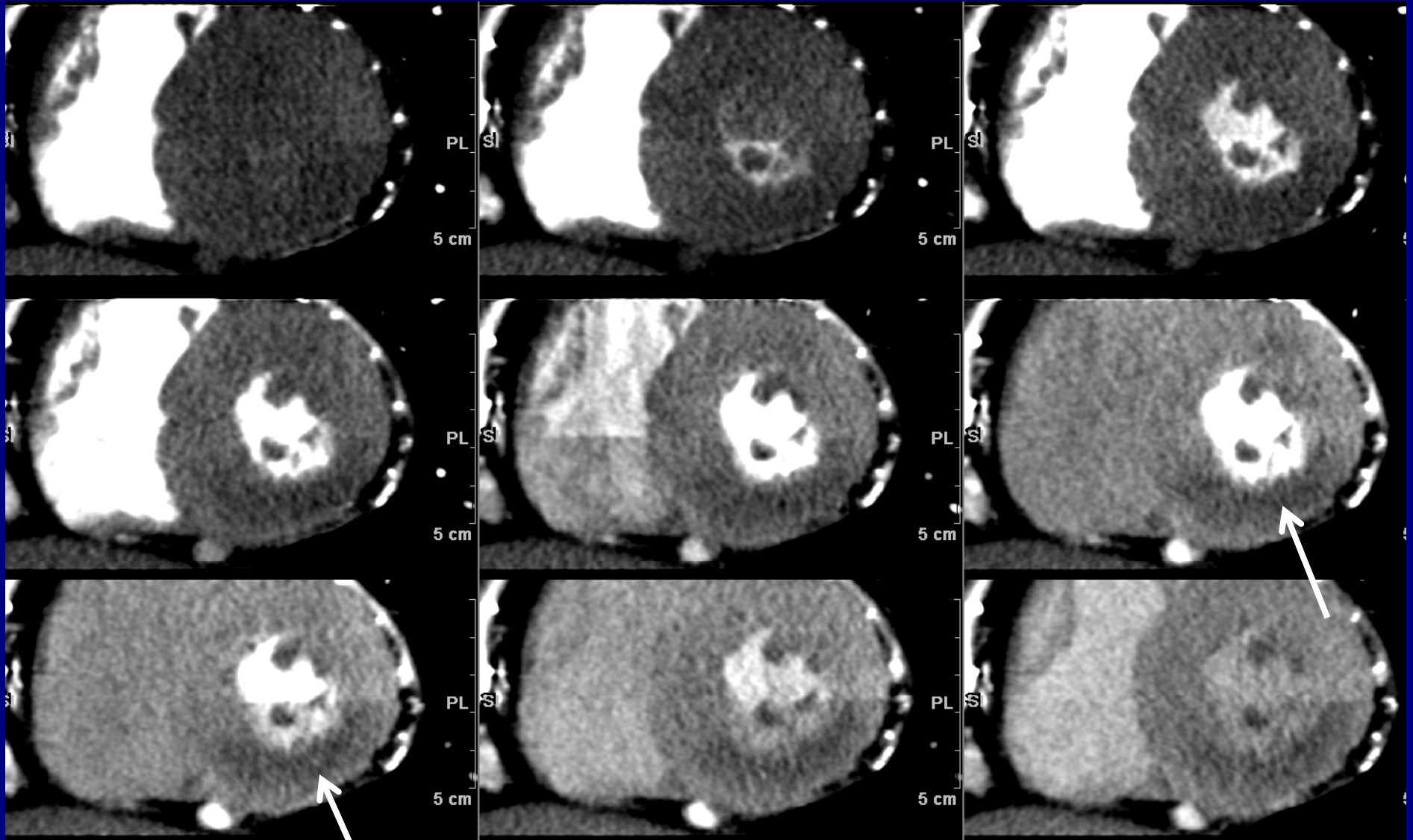
7 cm



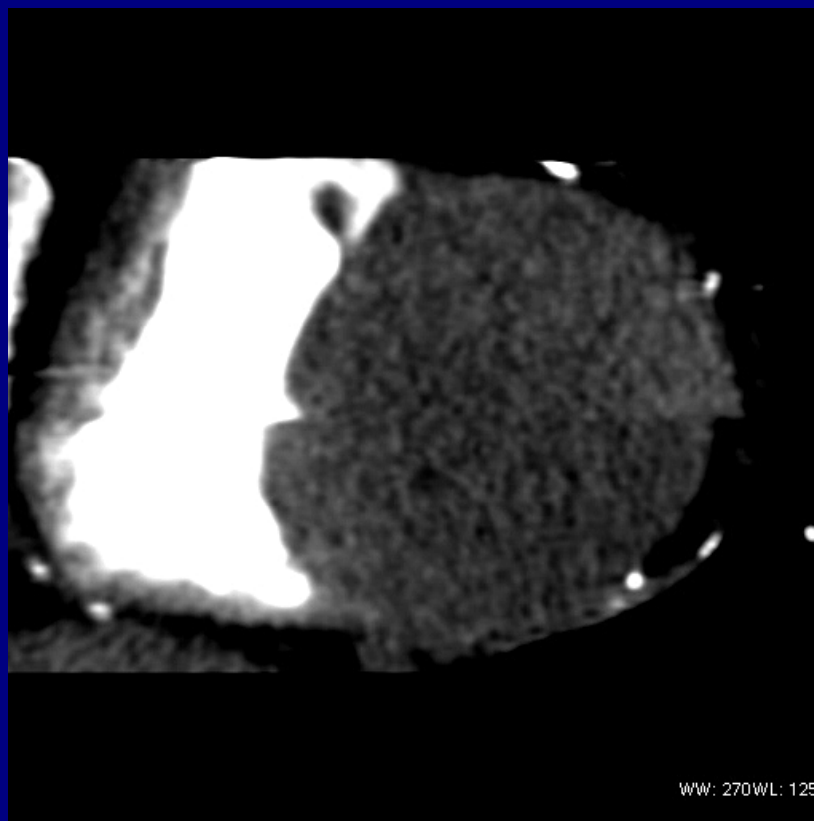
Bamberg F et al. Imaging Decisions 2009;13:49-51

67/M with CABG, 5 YA

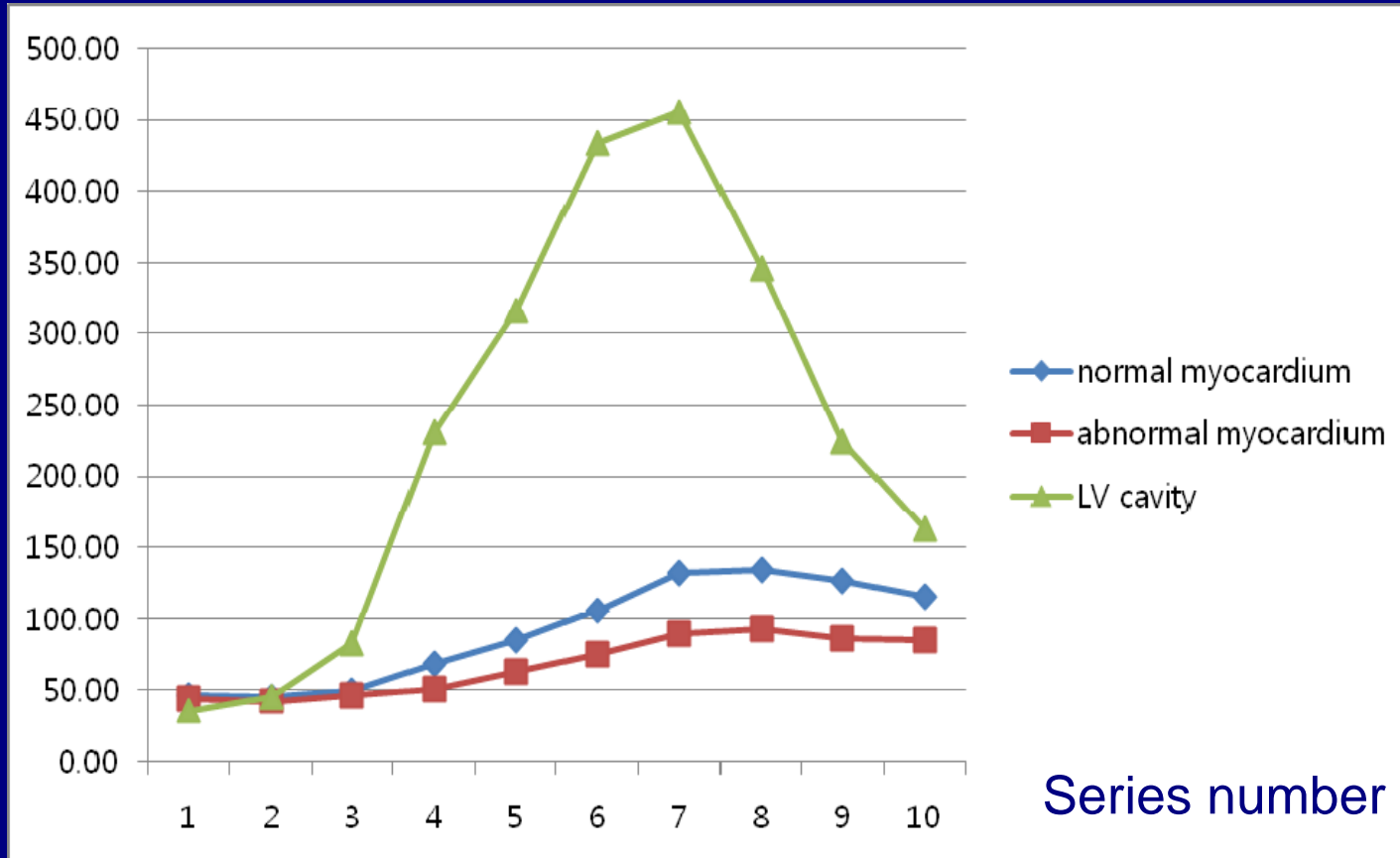




Dynamic CT Perfusion

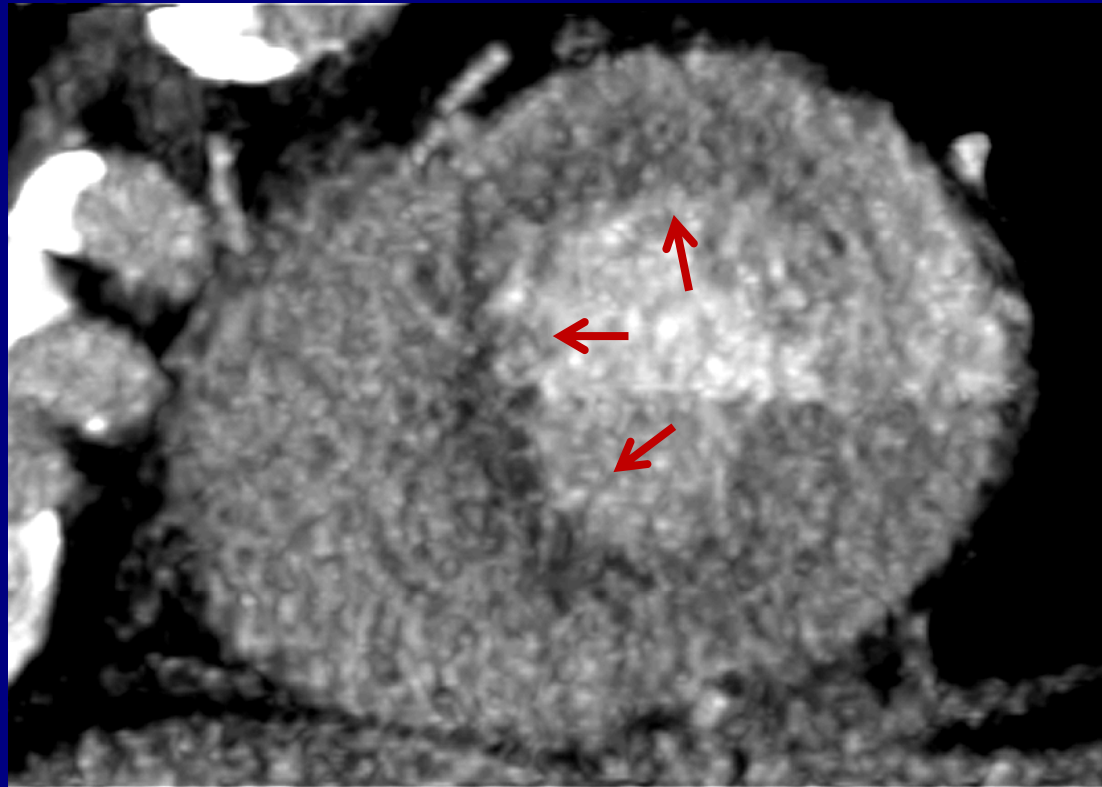


Time-attenuation Curve



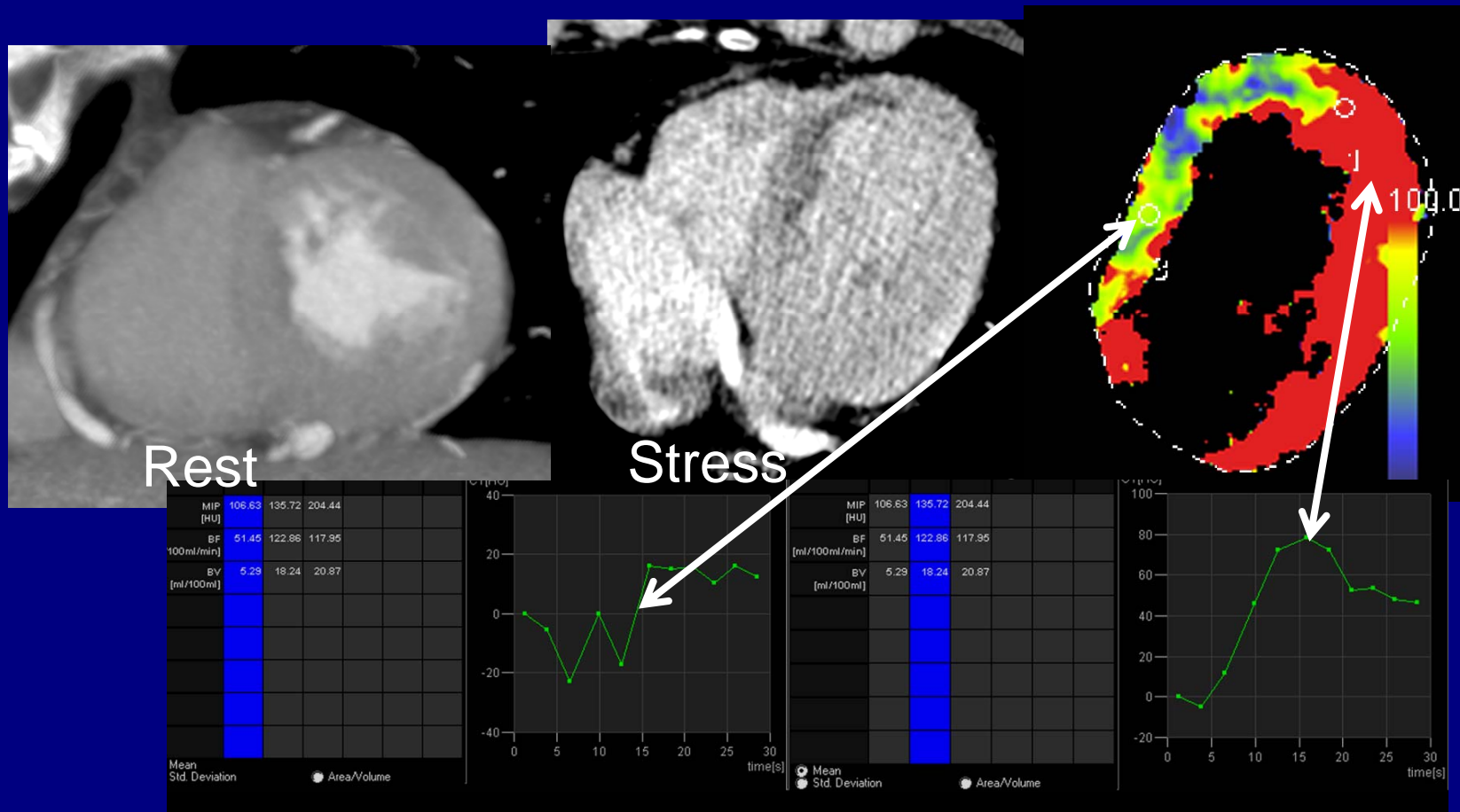
Maximum attenuation-difference between normal and abnormal myocardium of 26 patients: 18.0 - 30.3 sec after initiation of contrast injection

Tube current modulation with half-scan interval



49/M with diabetes. CT image showed subendocardial perfusion defect in anterior, anteroseptal and inferoseptal wall of mid-ventricular level.

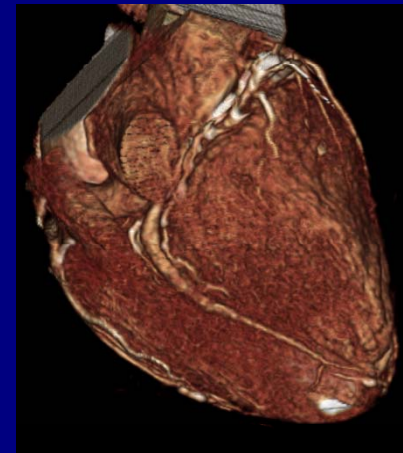
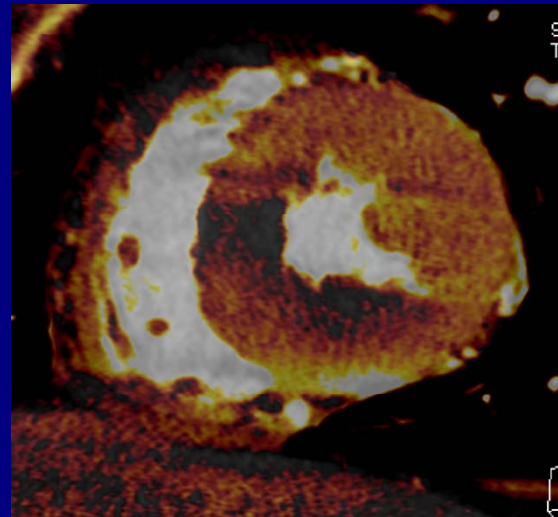
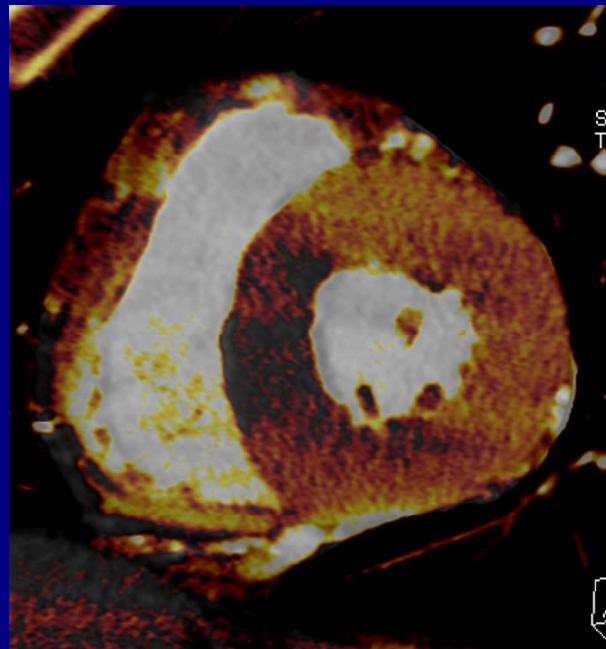
LAD Occlusion



MBF = 51 ml/100ml/min

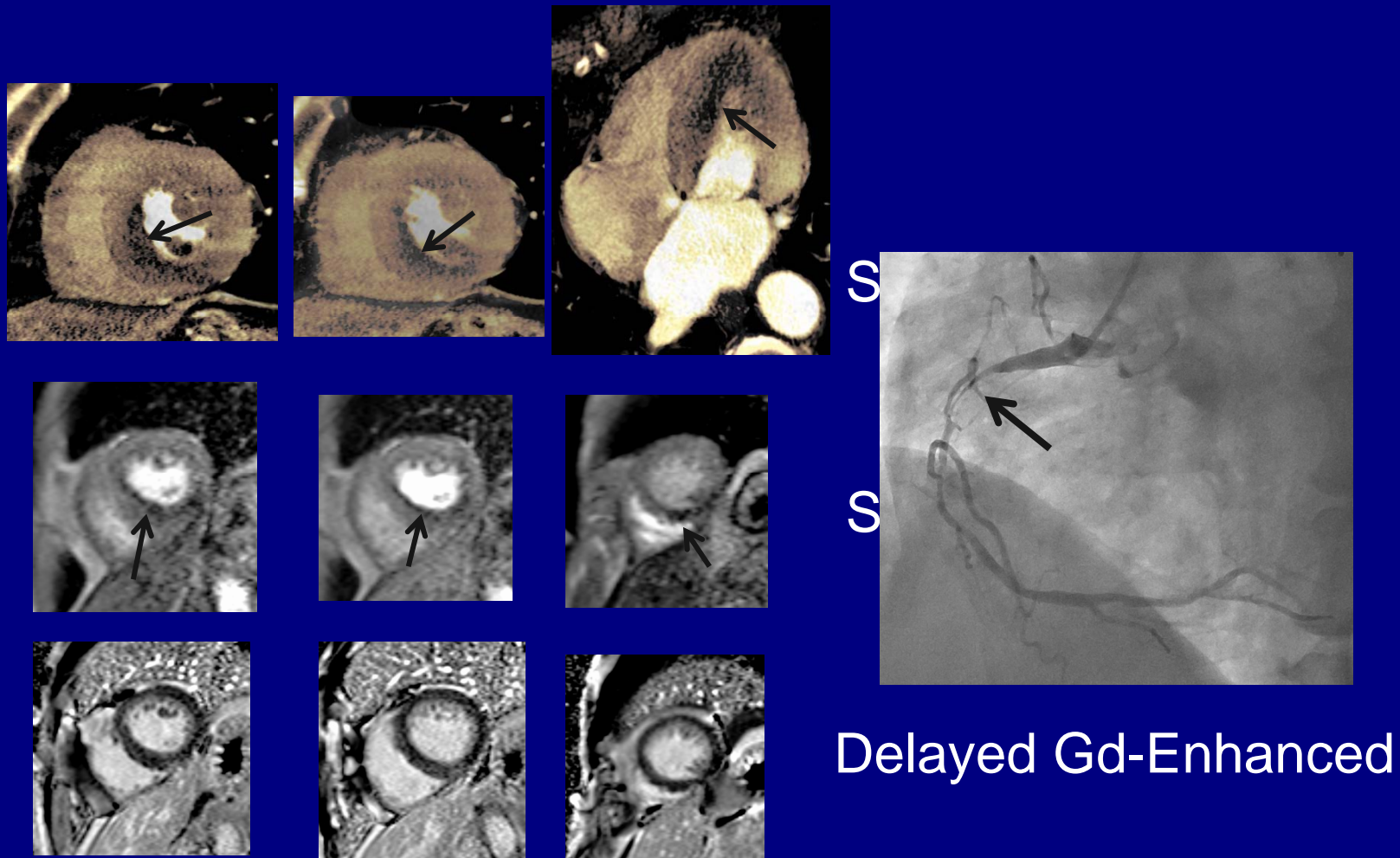
MBF = 122 ml/100ml/min

Adenosine-stress DECT



Coronary Artery	Score
Left Main (LM)	0.00
Left Anterior Descending (LAD)	873.57
Left Circumflex (LCX)	1902.10
Right Coronary Artery (RCA)	1780.03
Total Agatston Score	4555.70

Adenosine-stress CT and MRI, M/72 with DM



Detection of hemodynamically significant coronary artery stenosis: incremental diagnostic value of dynamic CT-based myocardial perfusion imaging

- Diagnostic accuracy of CT for the detection of anatomically significant coronary artery stenosis (>50%) was low for the detection of hemodynamically significant stenosis (PPV per coronary segment, 49%).
- With use of estimated MBF to reclassify lesions depicted with CT angiography, 30 of 70 (43%) coronary lesions were graded as not hemodynamically significant, which significantly increased PPV to 78% (95% CI: 61%, 89%; P = .02).
- The presence of a coronary artery stenosis with a corresponding MBF less than 75 mL/100 mL/min had a high risk for hemodynamic significance (odds ratio, 86.9; 95% CI:17.6, 430.4).

Bamberg et al. Radiology 2011, 260:689-698

Advantages/Strength of CT Perfusion

- Simultaneous evaluation of coronary artery anatomy and myocardial perfusion
- Quantification of myocardial blood flow
- No dark-rim artifacts as seen on adenosine-stress MRI (high spatial resolution)

Conclusions

- Adenosine-stress perfusion MDCT can provide information on coronary artery anatomy and myocardial perfusion simultaneously.
- Wide-coverage CT scanners with prospective scanning techniques enable dynamic imaging of myocardium after contrast injection with low radiation.
- Dual-energy technology may help detect myocardial ischemia during rest state.

Radiation dose according to protocols

	Protocol I (n=172)	Protocol II (n=108)	Protocol III (n=50)	P-value*
Radiation Dose, mSv				
Stress scan only	12.1 ± 1.6	7.7 ± 2.5	3.8 ± 1.3	<0.001
Total dose of exam	18.1 ± 2.4	14.1 ± 3.4	9.7 ± 2.3	<0.001

* one way ANOVA test and Bonferroni multiple comparisons tests