

## Delayed imaging and additional methods to reduce subdiaphragmatic activity in myocardial perfusion SPECT imaging

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Compton scatter from radiotracer in structures close to the heart may partially or completely mask myocardial perfusion defects on SPECT imaging. Previous reports have discussed benefits of additional delayed imaging. We present a case in which additional delayed stress imaging reduced Compton scatter and unveiled clinically significant, stress-induced ischemia.

### Case report

A 65-year-old diabetic female with documented CAD who underwent PCI to the RCA 9 years ago presented with exertional dyspnea (1). A single-day rest/stress (10.5/30.9 mCi Tc-99m sestamibi) protocol with pharmacologic stress was performed. The patient experienced no chest pain or ST segment changes during stress. However, she developed shortness of breath, which was relieved with aminophylline.

In the resting tomograms, there is considerable radiotracer in the stomach, which is distant from the inferior wall of the LV, resulting in minimal Compton scatter. However, in the post-stress tomograms acquired 40 minutes following radiotracer injection, there is marked persistence of tracer in the left lobe of the liver and fundus of the stomach, resulting in considerable Compton scatter into the inferior wall (Figs. 1 and 2). There appears to be an inferolateral defect, somewhat worse at rest. Gated tomographic images demonstrate inferolateral hypokinesis and decreased inferolateral wall thickening, consistent with scar. LVEF was 65%, and LV volume was normal.

Repeated post-stress tomograms were acquired 105 min after the radiotracer injection. Before them, the patient drank 16 oz. water (in addition to that which she drank 10 minutes after the stress tracer injection) and ambulated for 15 minutes. The repeated post-stress images demonstrate near-complete clearance of subdiaphragmatic tracer concentration, revealing a much more severe and extensive inferolateral perfusion defect. The moderate, partial reversibility of this inferolateral perfusion defect in the resting tomograms is consistent with inferolateral scar with significant distal peri-infarct ischemia (Figs. 3 and 4).

In conclusion, we emphasize that acquiring additional delayed tomographic images allows more time for clearance of tracer from the liver. In addition, encouraging patients to drink water and ambulate before delayed imaging promotes clearance of tracer from the stomach and bowel. Such measures will likely minimize or eliminate Compton scatter into the heart and expose the true extent of myocardial scar or ischemia—which may otherwise be underestimated or overlooked (1).

### References

1. Galt JR, Cullom J, Garcia EV. Attenuation and scatter compensation in myocardial perfusion SPECT. *Semin Nucl Med.* 1999 Jul;29(3):204-20. [PubMed]

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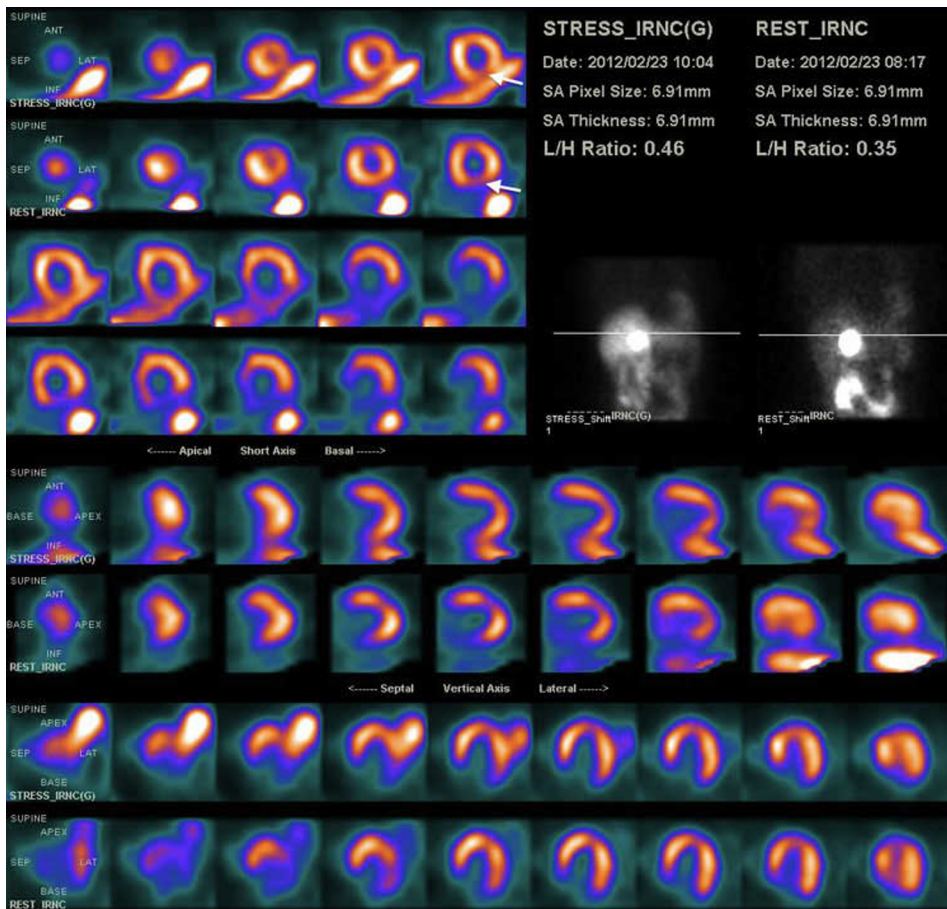


Figure 1. Stress tomograms obtained 40 minutes after stress injection demonstrate marked persistence of tracer concentration in the left lobe of the liver and the fundus of the stomach, resulting in considerable Compton scatter into the inferior wall. Resting tomograms obtained 40 minutes after rest injection demonstrate considerable radiotracer in the stomach, which is distant from the inferior wall of the LV, resulting in minimal Compton scatter. There appears to be an inferolateral defect, somewhat worse at rest (white arrows). Gated tomographic images demonstrated inferolateral hypokinesis and decreased inferolateral wall thickening, consistent with scar.

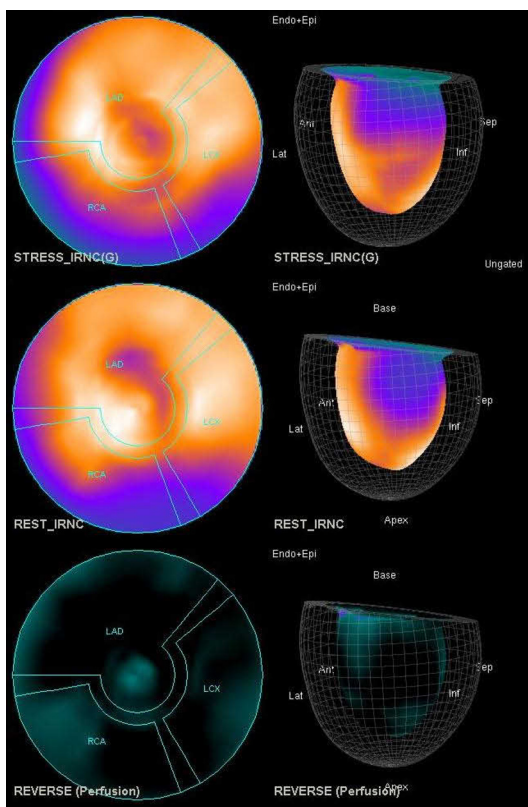


Figure 2. Initial stress and rest polar plots demonstrate an inferolateral defect, somewhat worse at rest, consistent with scar.

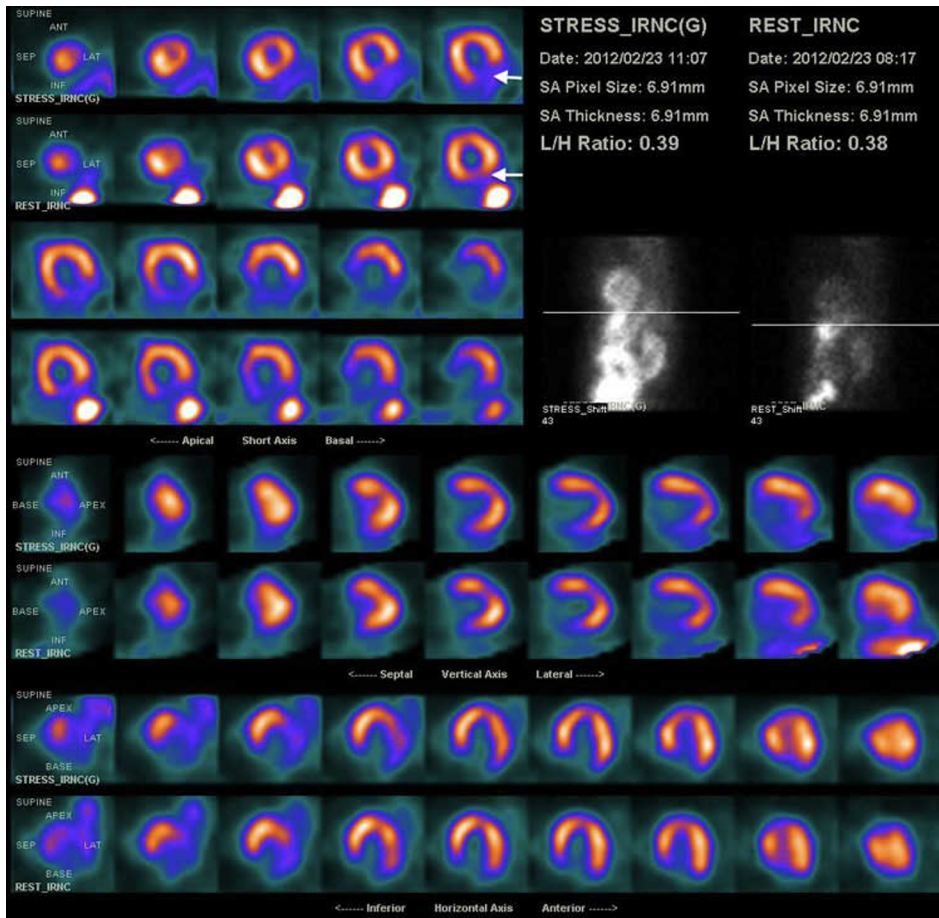


Figure 3. Additional delayed stress tomograms were obtained 105 minutes after stress injection. Before the repeated tomograms, the patient drank 16 oz. water (in addition to that which she drank 10 minutes after the stress tracer injection) and ambulated for 15 minutes. Delayed stress tomograms demonstrate nearly complete clearance of subdiaphragmatic tracer concentration, revealing a much more severe and extensive inferolateral perfusion defect (white arrows). The moderate, partial reversibility of this inferolateral perfusion defect in the resting tomograms is consistent with inferolateral scar with significant distal peri-infarct ischemia.

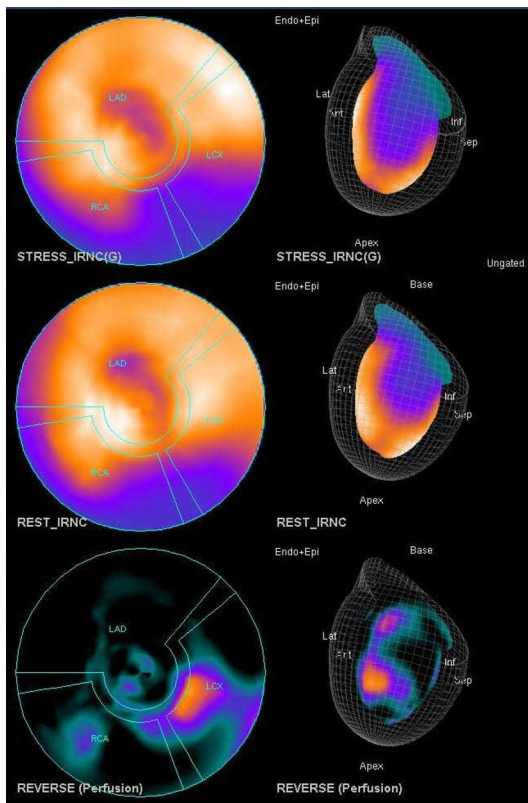


Figure 4. Delayed stress and initial rest polar plots demonstrate a much more severe and extensive inferolateral stress perfusion defect. Scan findings are consistent with inferolateral scar with significant distal peri-infarct ischemia.