

# Post-<sup>90</sup>Y Radioembolization PET/CT Scan with Respiratory Gating Using Time-of-Flight Reconstruction

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We present an interesting case of a post-<sup>90</sup>Y radioembolization PET scan acquired with the aide of respiratory gating. We postulated that respiratory gating would allow accurate tracking of the tumor position, which may be altered by patient breathing. Time-of-flight image reconstruction was used to produce images with less noise in fewer iterations than is possible with conventional PET.

**Key Words:** respiratory gating; <sup>90</sup>Y; time-of-flight

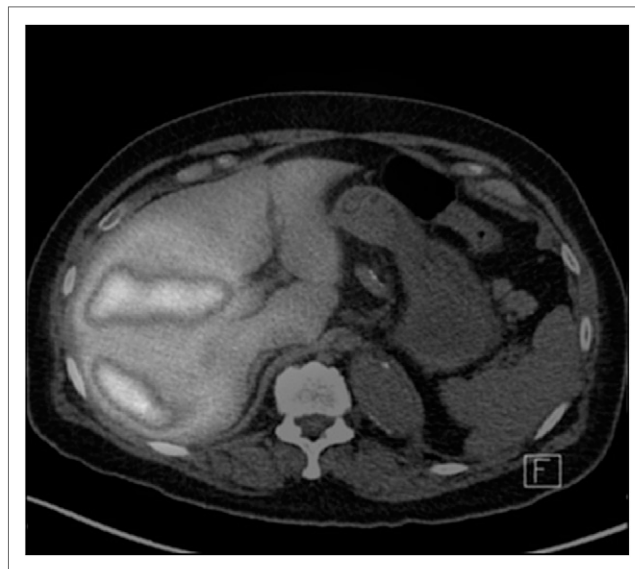
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**T**he internal pair production property of <sup>90</sup>Y makes possible its use for imaging by PET (1). Although imaging is impeded by the fact that <sup>90</sup>Y is a pure β-emitter, chemically identical surrogates can be used instead (2). In this case, <sup>86</sup>Y was the isotope of choice during the scan.

## CASE REPORT

A 66-y-old man with hepatocellular carcinoma was radioembolized in the left and right hepatic lobes with 0.4 and 1.4 GBq of <sup>90</sup>Y, respectively. Using a 40-slice mCT PET scanner (Biograph; Siemens Medical Solutions) and a respiratory gating hardware system (ANZAI Medical Co., Ltd.), we obtained the PET/CT scan approximately 14 h after <sup>90</sup>Y implantation. The CT scan for attenuation correction was obtained at an energy of 120 kV. In total, 86 images (3.0-mm slices) were generated. The CT scan was followed by the PET scan, using 2 bed positions at 10 min each (total scan time, 20 min), aided by respiratory gating with the liver in the field of view. Images were then reconstructed using the TrueX algorithm plus time-of-flight reconstruction (UltraHD PET; Siemens Medical Solutions) with 2 iterations, 21 subsets, and a filter of 2 mm. Post-<sup>90</sup>Y radioembolization PET/CT showed the microsphere biodistribution in both hepatic lobes (Fig. 1).



**FIGURE 1.** Right hepatic lobe showing <sup>90</sup>Y biodistribution. A color version of this figure is available as a supplemental file at <http://tech.snmjournals.org>.

## DISCUSSION

In this interesting case, a post-<sup>90</sup>Y radioembolization PET scan was acquired with the aide of respiratory gating. We postulated that respiratory gating would allow accurate tracking of the tumor position despite the movement caused by patient breathing. In addition, time-of-flight image reconstruction was used to produce images with less noise and in fewer iterations than is possible with conventional PET. The biodistribution of microspheres in both hepatic lobes could be visualized.

## CONCLUSION

Respiratory gating aided in the accurate tracking of tumor position, and time-of-flight reconstruction provided better images with less noise.

## DISCLOSURE

No potential conflict of interest relevant to this article was reported.

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