

A Quick and Accurate Technique for Surveying Bone Scan Patients

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With the recent advances in bone scanning agents, patients can now be dosed and examined during a normal working day. Because this facet of bone scanning appeals to our referring physicians, the demand on our division has increased substantially. We have occasionally been requested to scan as many as three patients a day.

Currently our division has two dual-probe Ohio-Nuclear Scanners and one camera or stationary imaging device. With our present workload of approximately 18-20 scans per day we cannot afford to "block out" several hours a day for a bone scan without creating a backlog of studies and overloading our already full schedule. Therefore we needed a quick method of surveying bone scans without sacrificing the quality of work or the patient care that our division demands.

The technique we developed is outlined here. The method is not represented as necessarily being unique since I feel certain many institutions employ such a modified technique.

We observe the following protocol for 5:1 total body scans.

1. The patient receives 15 mC ^{99m}Tc -polyphosphate between 8 and 10 am on the day to be scanned.
2. The patient voids immediately before scanning.
3. The patient is scanned in the supine position approximately 6 ± 1 hr postinjection.
4. The 24L collimators are used for both probes (low energy, medium focus).
5. A baseline of 130 keV with a window of 50 keV is used on the analyzing system (0-1 MeV range).
6. The "set-up" area is over the sternum anteriorly and the dorsal spine posteriorly.
7. The maximum counting rate is then balanced to the lower counting rate of the two probes (counting rate balanced).
8. This counting rate is then multiplied by a factor of five.

9. The new counting rate is then used to determine the technique to be used. We use the 400 counts/linear centimeter column as a minimum.
10. The intensity is determined by the usual setting for the information density to be used (counts/linear centimeter) on the regular 1:1 scan.
11. Line spacing is at 1/2 in.
12. The scan ratio is 5:1.
13. The light mask aperture is the standard 1/8 in., 1:1 mask. NOTE: The standard 1/8-in. mask produces a slight overlap on the scan image when a 1/2-in., 5:1 technique is used. This is due to a reduction factor of five and a spacing increase of only four (1/8 to 1/2 in.). We have a custom-made set of masks which are approximately 0.27 cm long and approximately 0.07 cm wide which omits this overlapping. Because of the smaller aperture of this mask, our intensity has to be increased to compensate. A new 5:1, 1/2-in line spacing mask is now commercially available at a reasonable cost.
14. No background erase or contrast enhancement is used.
15. Scan speed is determined by the counting rate and the information density desired.
16. Full width of the patient is scanned from head to toe.

This technique is used as a screening device to rule out any possible abnormal or suspicious area. If any area is suspicious, a 1:1 scan is usually requested by our medical staff. By using this technique, scans (5:1) are accomplished in 20-25 min scanning time (see Figs. 1 and 2). If 1:1 scans are needed, an additional 30-45 min scanning time is used. This of course depends on the areas and their location. On patients requiring 5:1 total-body

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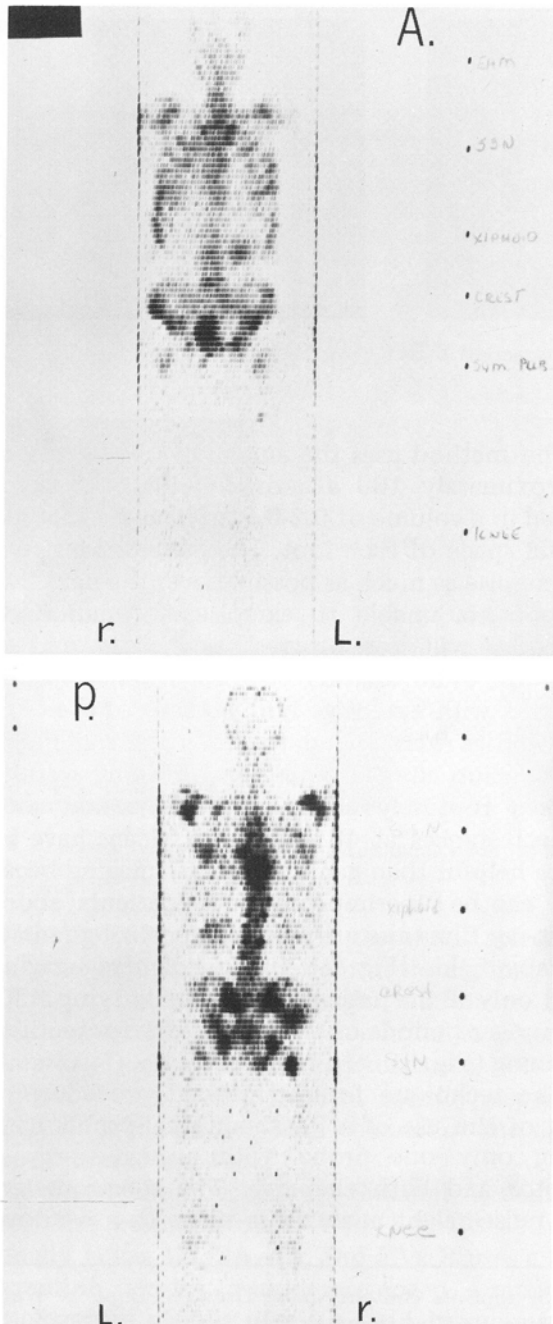


Fig. 1. Bone scans (5:1) of patient with multiple metastatic tumors in bone structure. A is anterior view, P is posterior view. Views accomplished by using 5:1 reduction and 1/2-in. line spacing.

scans as well as 1:1 areas of interest, scanning time, usually runs 1 hr to 1 hr 15 min. As you can realize, one can scan a 5:1 total-body survey in less than half an hour and a complete study composed of 5:1 total-body scan and 1:1 areas in approxi-

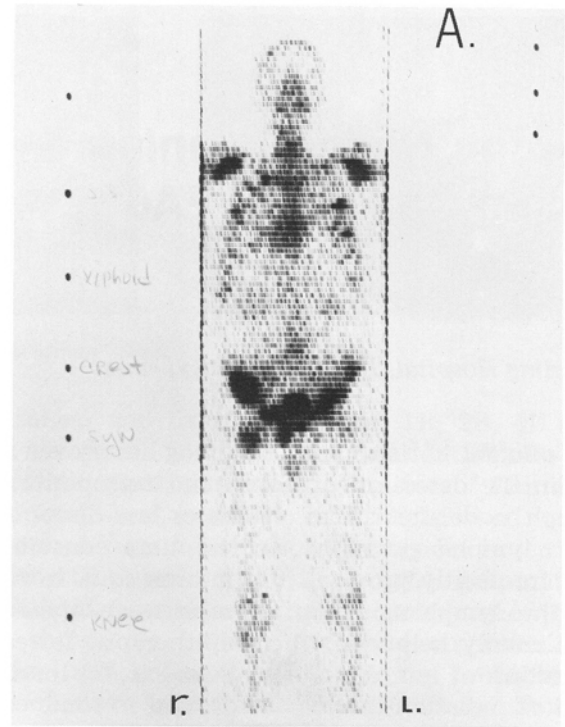


FIG. 2. Bone scan (5:1) of patient with multiple osseous lesions (metastases) in anterior view. Scan was accomplished using 5:1 reduction and 1/2 in. line spacing.

mately 1 hr 15 min. In many cases no 1:1 scans are requested; therefore a total exam runs less than 1/2 hr scanning time.

Many institutions use the 1/8-in. line spacing and a reduction of light aperture size to accomplish the 5:1 total-body scans. Even at high counting rates produced by ^{99m}Tc -polyphosphate, the scanning time is usually well over 1 hr. Quite often additional 1:1 areas are needed. This adds another 30-45 min scanning period. The total time can easily run over 2 hr.

As you can see, this technique can save much time for a busy department with no loss of diagnostic information. The method is used as a general total-body survey and can be used for other 5:1 total-body scans, such as those using ^{67}Ga or ^{131}I . We have found it to be quite helpful to our service in substantially reducing the scan time per patient.

Acknowledgment

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