

# Lumbar Osteomyelitis: Indium-111 White Blood Cell Scintigraphy: Case Report

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Indium-111 ( $^{111}\text{In}$ ) leukocyte scintigraphy is a currently used nuclear medicine imaging procedure to diagnose sites of focal infection (1-3). Normal distribution of  $^{111}\text{In}$  leukocyte images shows activity in the liver, spleen, and bone marrow (4,5). Occasionally, cold defects have been seen due to various reasons, including osteomyelitis, on  $^{111}\text{In}$  leukocyte scintigraphy (1,4,5). We present a case of  $^{111}\text{In}$  white blood cell (WBC) scintigraphy, which demonstrates cold defects in the lower lumbar spine (bodies of L4 and L5) due to osteomyelitis.

## CASE REPORT

A 37-yr-old white male was admitted with low back pain following L4-L5 and L5-S1 discectomies ~ 1 yr previously. The patient was not febrile; however, he complained of severe headache, increasing back pain, and inability to ambulate due to pain.

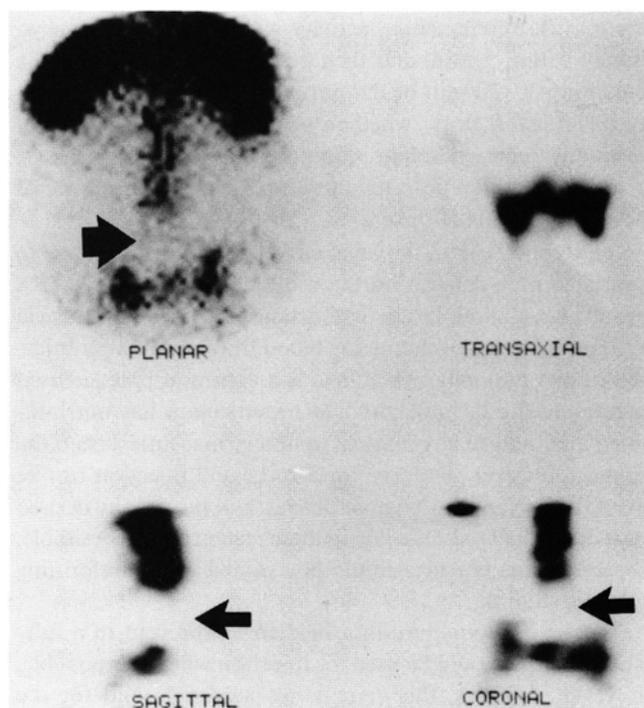
The patient underwent a magnetic resonance imaging (MRI) study that was interpreted as showing questionable L4-L5 abscess. Needle biopsy and aspiration was performed on the L4-L5 disc. The gram stain showed gram-positive cocci and few pleomorphic gram-positive rods. However, the cultures were negative. Postsurgical osteomyelitis is often polymicrobial (6).

An  $^{111}\text{In}$ -leukocyte study was ordered to rule out lumbar abscess. A bone scan alone in this case would have been nonspecific and would have to be followed by a gallium scan, which takes a few days before its diagnostic value can be determined. Bone scans can, however, demonstrate hot lesions due to postsurgical changes. On the other hand, gallium imaging also may show increased uptake in bone that would cause difficulty in diagnosis. We felt that  $^{111}\text{In}$  was the study of choice to diagnose infection in this case. SPECT images of the lumbosacral spine were obtained at 24 hr postinjection of 500  $\mu\text{Ci}$  of  $^{111}\text{In}$  autologous labeled leukocytes. Reconstructed tomographic images showed absence of normal marrow activity at the L4 and L5 levels (Fig. 1). Our findings were compared with MRI, radiographs, and a computed tomography (CT) scan of the lumbosacral spine, all suggestive of osteomyelitis at the L4-L5 level. MRI showed an abnormal decrease in signal on  $T_1$  weighted images involving the L4 and L5 vertebral bodies, and an increased signal in the same areas seen on the  $T_2$  weighted images (Fig. 2). Radiographs of the

lumbosacral spine showed osteomyelitis at the L4-L5 vertebral bodies (Fig. 3) and had shown rapid progression of osteomyelitis at the same level, compared with radiographs taken three days previously. A CT scan of the lumbosacral spine revealed an osteopenic area at the L4-L5 level. The patient was treated with intravenous antibiotics with slow, gradual improvement of low back pain.

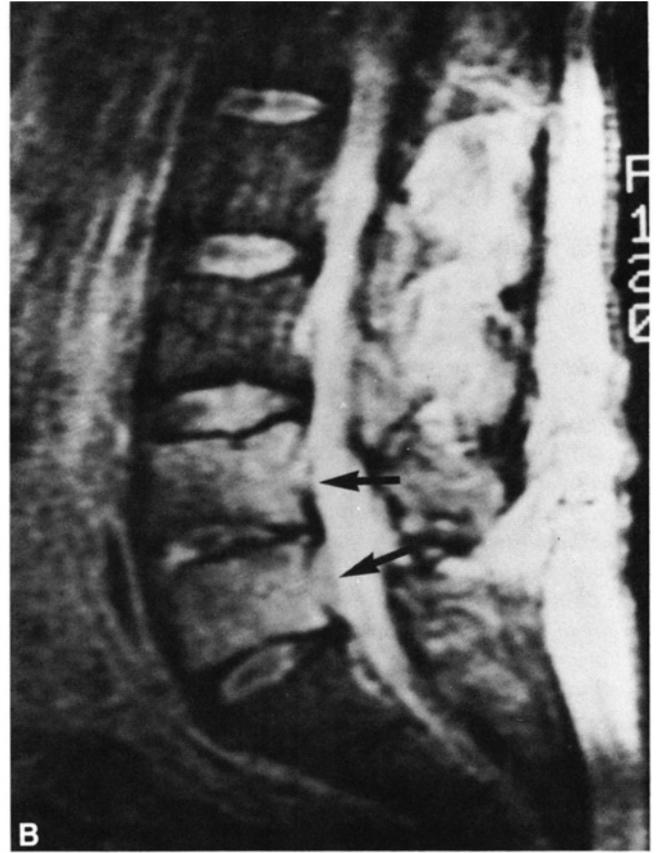
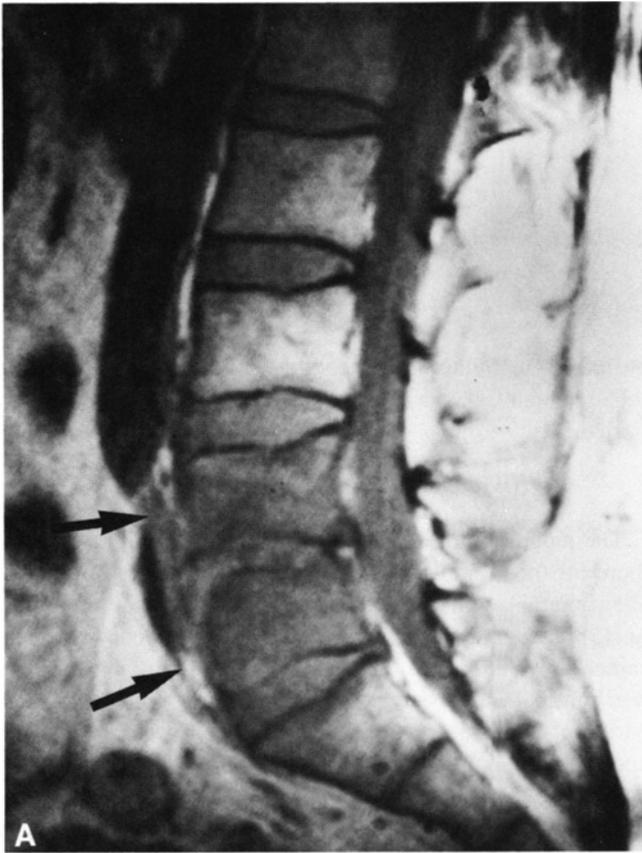
## DISCUSSION

Focal increased uptake of  $^{111}\text{In}$  leukocytes (hot lesions) other than liver, spleen, and bone marrow (4,5) are considered abnormal. There have been some cases reported of abnormal  $^{111}\text{In}$  leukocyte uptake due to various reasons, such as clumping of leukocytes, accessory spleen, and on occasional tumors and fractures (5,7,8). In this case, we found a cold defect on an  $^{111}\text{In}$  leukocyte study of the lower lumbar spine, highly suggestive of osteomyelitis. This may have occurred due to bone marrow packing, in which the subperiosteal and intraos-



**FIG. 1.** Reconstructed transaxial, sagittal, and coronal images of lumbosacral spine 24 hr following i.v. injection of 500  $\mu\text{Ci}$  of  $^{111}\text{In}$ -labeled leukocytes. Arrow shows cold defect on sagittal and coronal cuts as well as on planar image.

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**FIG. 2.** MRI images showing decrease in signal on T<sub>1</sub> weighted bodies (A) and increase in signal in the same area on T<sub>2</sub> weighted images (B) (arrows).



**FIG. 3.** Lateral x-ray lumbosacral spine suggestive of osteomyelitis at L4-L5 vertebral bodies (closed arrow)

seous pus may have stopped the microcirculation of the involved bone due to acute inflammation and necrosis thus resulting in a cold defect (9). This is a quite dramatic and somewhat unusual cause of a cold defect due to osteomyelitis of the lumbar spine.

### REFERENCES

1. Mole YP, Carney WH, Fernandez-Ulloa M. Skeletal photopenic lesions in In-111 WBC imaging. *J Nucl Med* 1984;25:1322-1326.
2. McDougall IR, Baumert JE, Lantieri RL. Evaluation of In-111 leukocyte whole body scanning. *Am J Roentgenol* 1979;133:849-854.
3. Coleman RE, Black RE, Welch DM, et al. Indium-111 labeled leukocytes in the evaluation of suspected abdominal abscesses. *Am J Surg* 1980;139:99-164.
4. Datz FL, Thorne DA. Cause and significance of cold bone defects on indium-111 labeled leukocyte imaging. *J Nucl Med* 1987;28:820-823.
5. Coleman RE, Welch D. Possible pitfalls with clinical imaging of indium-111 leukocytes: Concise communication. *J Nucl Med* 1980;21:122-125.
6. Hirschmann JV. Osteomyelitis. In: Petersdorf RG, Adams RD, Braunwald E, Isselbacher KJ, Martin JB, Wilson GD, eds. *Harrison's Principles of Internal Medicine*, 10th ed. New York: McGraw Hill Book Co.; 1983:1972-1974.
7. Nostrand DV, Abren SH, Callaghan JJ, Atkins FB, Stoops HC, Savory CG. In-111 labeled white blood cell uptake in noninfected closed fracture in humans: Prospective study. *Radiology* 1988;167:495-498.
8. Fortner A, Datz FL, Taylor A Jr, Alazraki N. Uptake of In-111-labeled leukocytes by tumor. *AJR* 1986;146:621-625.
9. Trackler RT, Miller KE, Sutherland DH, et al. Childhood pelvic osteomyelitis presenting as a "cold" lesion on bone scan: Case report. *J Nucl Med* 1976;17:620-622.