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## Case Report

# Indium-111 labeled leukocyte accumulation in extremity soft tissue sarcoma

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### ABSTRACT

Nuclear medicine labeled leukocyte whole-body scintigraphy is commonly used to identify a source of infection in a patient with fever of unknown origin. White blood cells can also localize to other sites of inflammation, including sometimes tumors. A patient with a large myxofibrosarcoma in his left forearm was scanned due to chronic low-grade fever and persistent leukocytosis. This case demonstrates focal white blood cell activity in an extremity soft tissue sarcoma.

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## Case report

A 70-year-old male with end-stage renal disease, recently started on hemodialysis, was hospitalized for anemia, intermittent weakness, and confusion. He also reported painful swelling of his left forearm. Radiographs (not shown) hinted at prominence of the volar soft tissues. Subsequent MRI of the left forearm (Fig. 1) revealed a large 12.6 × 5.5 × 5.0 cm mass in the anterior compartment. The mass exhibited central heterogeneous T2 and high T1 signal. Peripherally, it displayed intermediate T1 and high T2 signal. Surrounding edema was also present. The biopsy results returned high-grade myxofibrosarcoma.

He also had 2–3 months of low-grade fever and leukocytosis up to 28,000/uL with no identified source of infection. Autologous Indium-111 labeled white blood cells were injected IV into the right forearm, and 24 hour delayed images were acquired. The labeled leukocyte scan (Fig. 2) demonstrated focal uptake in the soft tissues of the proximal to mid-left forearm corresponding to the mass on MRI. The study would

have been interpreted as positive for infection in the left forearm except for being recognized that this was the site of the patient's known malignant mass.

No distant metastatic disease was evident on whole-body bone scan or CT chest/abdomen/pelvis. Due to the risk of local recurrence, above the elbow amputation was done. Gross pathology showed a necrotic soft tissue mass without osseous extension (Fig. 3). In the postoperative course, his leukocytosis resolved.

## Discussion

Soft tissue sarcomas are uncommon tumors arising from the mesenchymal cells. The median age of diagnosis is 60 years [1]. These tumors are found more often in the body than extremity. Myxofibrosarcoma is a sarcoma type that develops mostly in the extremities [2]. Nuclear medicine imaging studies for sarcomas (soft tissue or bone derived) have included technetium-99m methylene diphosphonate (MDP)

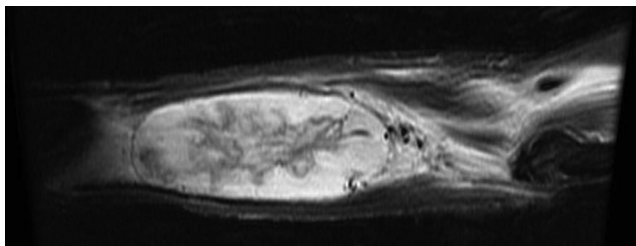
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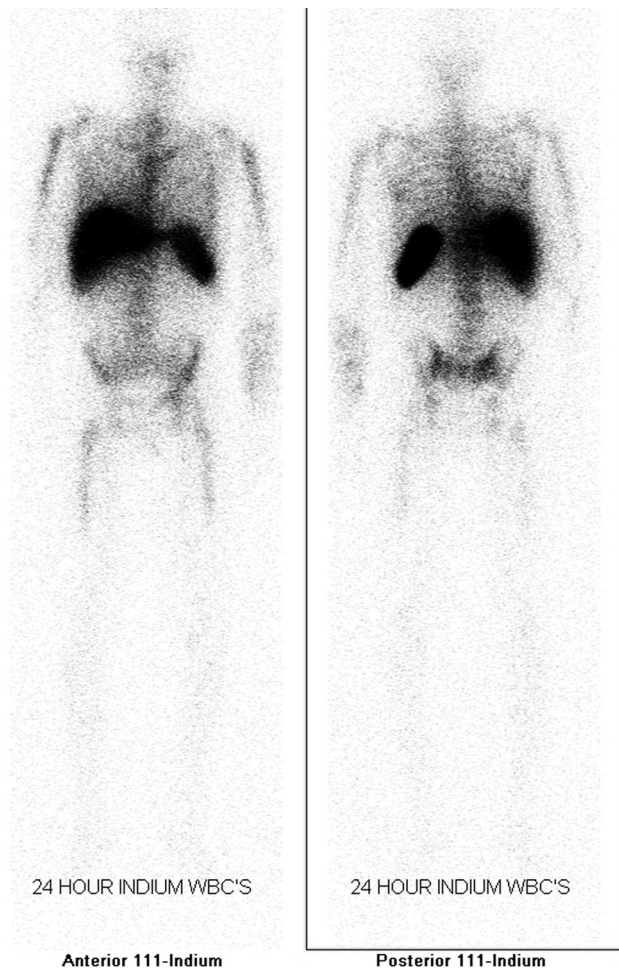
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**Fig. 1 – Coronal T2-weighted short-tau inversion recovery (STIR) image of the left forearm mass.**

bone scan and fluorine-18 fluorodeoxyglucose positron emission tomography (FDG-PET) [3]. We are aware of no published reports describing Indium-111 white blood cell localization to a soft tissue sarcoma in an extremity.

The underlying principle behind a white blood cell nuclear scan is that leukocytes will accumulate at sites of infection. The normal distribution includes the spleen, liver, and marrow. Combined leukocyte and Tc-99m sulfur colloid bone marrow nuclear medicine imaging evaluates for discordant



**Fig. 2 – Anterior and posterior whole-body projections after administration of Indium-111 labeled autologous white blood cells. Note asymmetric focal WBC uptake to the left forearm.**



**Fig. 3 – Above the elbow amputation specimen demonstrating a large partially necrotic mass in the left anterior forearm soft tissues. No osseous extension.**

activity due to osteomyelitis [4]. Since Gallium-67 citrate is taken up by many neoplasms as well as infection, labeled leukocyte scintigraphy is more specific than Gallium-67 for infection and is more commonly used for several advantages including this higher specificity. However, labeled leukocytes can sometimes also be taken up by tumors. Although the test retains its high sensitivity for acute or chronic infections in cancer patients, specificity is somewhat reduced by cancer [5].

There have been published reports that identified variable intensity granulocyte accumulation in malignant primary or metastatic tumors. One retrospective study on patients with malignant tumors found increased leukocyte activity in 40% (10/25) of examinations [6]. A few of those cases demonstrated rather intense uptake that would typically be considered more characteristic of abscesses. In another retrospective study on cancer patients with fever of unknown origin, 34% (21/61) had focal uptake to noninfected neoplasms [7]. The one included case of myxofibrosarcoma was located in the pelvis.

## Conclusion

In the search for sources of infection in patients with malignancies, differential considerations for “positive” focal radioactivity on an Indium-111 leukocyte scan, without correlative anatomic imaging, should also include tumor uptake. The intensity can range from subtle to rather intense based on prior studies. Since tumors can harbor inflammatory cells, it is valuable to use correlative anatomic imaging in conjunction with the labeled leukocyte imaging to help distinguish activity in a tumor versus an abscess. As shown by this case, labeled leukocyte uptake can occur in an extremity soft tissue sarcoma.

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