

A Unique Finding on Gallium-67 Scintigraphy

Widespread Fatal Skin Manifestations of Pseudomonas Sepsis

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Abstract: We report a case of a 25-year-old woman presented with neutropenic fever after chemotherapy for the relapse of acute biphenotypic leukemia. Gallium-67 scintigraphy for the detection of infectious foci demonstrated a unique pattern of numerous foci with intense and varying-sized radioactivity spreading throughout the body. The subsequent skin biopsy and culture proved *Pseudomonas* infection. Therefore, this unique image, in combination with clinical information, was compatible with cutaneous manifestations of *Pseudomonas* sepsis. Eventually, the patient died of uncontrolled systemic infection despite the aggressive antibiotic treatment. This case reminded clinicians and nuclear medicine physicians to notice the potentially fatal finding on gallium-67 scan.

Key Words: gallium scan, septic embolism, neutropenic fever, leukemia, *Pseudomonas*

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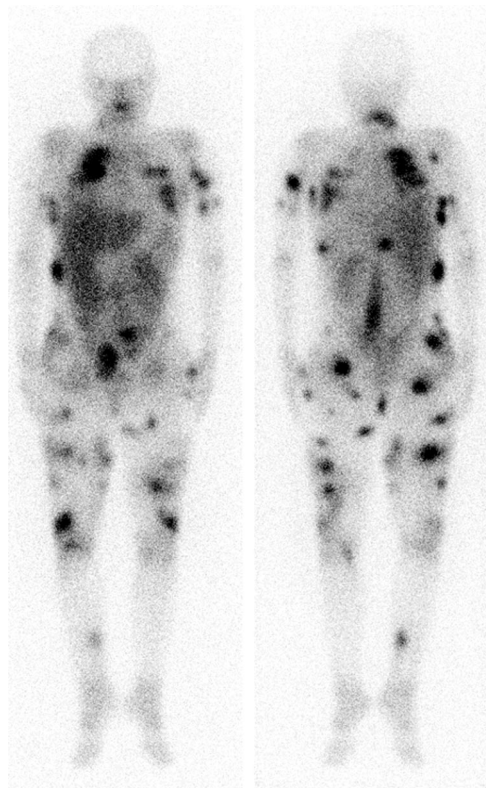


FIGURE 1. Whole-body gallium-67 scintigraphy. A 25-year-old woman presented with neutropenic fever after chemotherapy for the relapse of acute biphenotypic leukemia. She was treated empirically, but still had fever up to 39.5°C. Physical examination was unremarkable except her paleness and elevated body temperature. Laboratory investigation revealed pancytopenia (hemoglobin, 72 g/L [normal range, 120–160]; white blood cell count, 40/mL [normal range, 399–10,390]; platelet count, 14,000/mL [normal range, 130,000–400,000]). Blood culture result was positive for *Pseudomonas aeruginosa*. Chest x-ray showed marked infiltration within bilateral lower lung fields. Urinalysis was negative for any infection. Because the patient had no localizing signs or symptoms, she underwent Gallium-67 scintigraphy for the identification of infectious foci.^{1–5} Gallium-67 scan demonstrated a unique pattern of numerous foci with intense and varying-sized radioactivity spreading throughout the body.



FIGURE 2. Left distal thigh/knee region of this patient. Varying-sized erythematous skin lesions developed in the trunk and extremities. Pathology of the skin lesion demonstrated subcutaneous fresh and hemorrhagic granulation tissue distributed in lobular pattern with evident erythrocyte extravasation, but no evidence of subcutaneous/dermal leukemic infiltration identified by myeloperoxidase, CD33, CD3, CD20, and TdT stains. Six days later, cultures taken from lesions over her left thigh showed growth of *P. aeruginosa*. Therefore, the diagnosis of cutaneous manifestations of *Pseudomonas sepsis* was made. Two weeks after her presences of cutaneous septic emboli, the patient died of uncontrolled systemic infection despite aggressive antibiotic treatment. *P. aeruginosa* is one of the most common opportunistic nosocomial pathogens, which mainly affects immunocompromised patients in hospitals and results in high morbidity/mortality.^{6,7} Furthermore, *P. aeruginosa* infection is increasing because of antimicrobial selection pressures, the wide use of immunosuppressive treatments, the higher survival rate of immunocompromised patients, endemic hospital reservoirs, invasive procedures that allow the organism to penetrate the host, and changes in lifestyle (saunas, jacuzzis, contact lenses, etc).^{6,8} The presence of multiple cutaneous lesions, a delay in diagnosis and treatment, and the existence of severe neutropenia imply an unfavorable course.⁸ Gallium-67 scintigraphy permits whole-body imaging and provides information on pathophysiological and pathobiochemical processes.⁹ The precise mechanism in normal and pathologic tissues is not completely understood.¹⁰ Generally, it is widely accepted that the iron analog gallium binds to circulating transferrin receptors (CD71), and the gallium-transferrin complex extravasates at the inflamed/infected site. Then, gallium is transferred to lactoferrin (excreted by leukocytes) and siderophores (produced by microorganisms growing in a low-iron environment).^{9,11,12} Because of the multifactorial mechanism of gallium-67 uptake, gallium-67 scintigraphy may be useful in a neutropenic/pancytopenic patient. This case with cutaneous manifestations of *Pseudomonas sepsis* reminded clinician and nuclear medicine physician to notice the potentially fatal finding on gallium-67 scintigraphy.