

# $^{99m}\text{Tc}$ -Leukocyte Scintigraphy Revealed Viral Pulmonary Infection in a COVID-19 Patient

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**Abstract:**  $^{99m}\text{Tc}$ -leukocyte scintigraphy was performed on a 40-year-old woman with spiking fevers. A focus of intense uptake in the right upper thorax was identified, concerning for infection along the central line in the superior vena cava. Additionally, heterogeneously increased uptake in both lungs was noted, which suggested pulmonary infection. CT images of the chest showed patchy ground-glass changes in both lungs and a large consolidation in the right lower lobe, which were consistent with changes for COVID-19 (coronavirus disease 2019). Severe acute respiratory syndrome coronavirus 2 RNA test was positive. This case demonstrates that leukocyte uptake in bilateral lungs could reveal viral pulmonary infection in COVID-19.

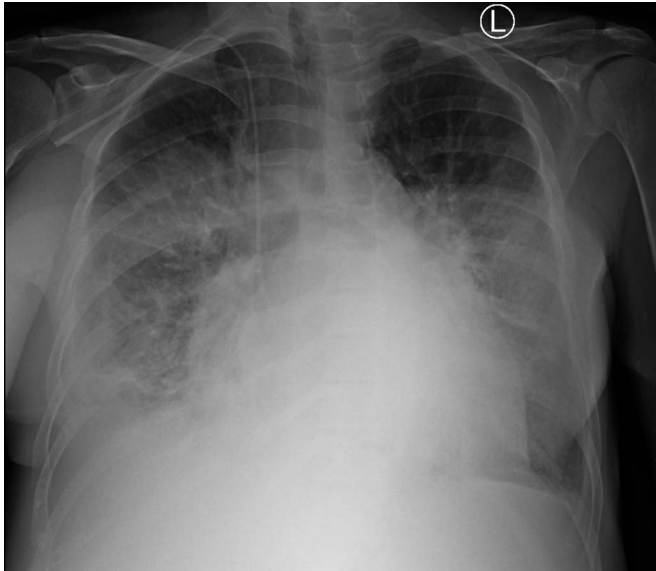
**Key Words:**  $^{99m}\text{Tc}$ -leukocyte scintigraphy, COVID-19, pneumonia, SARS-CoV-2 RNA

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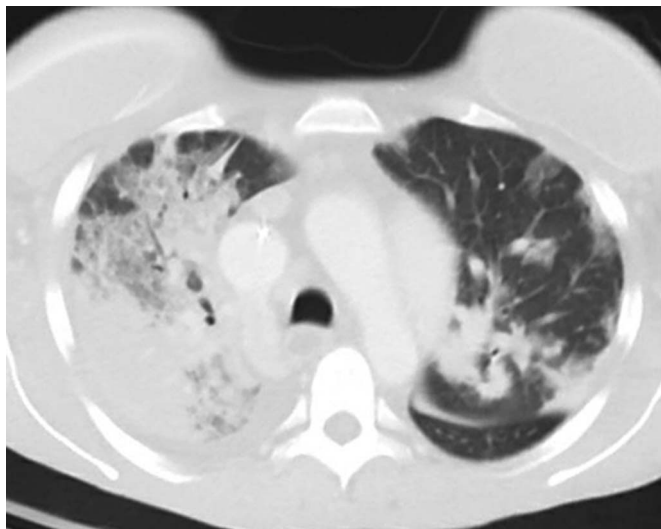
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**FIGURE 1.** A 40-year-old woman was referred for  $^{99m}\text{Tc}$ -leukocyte scintigraphy for recent spiking fevers. The patient had multiple ongoing medical issues including systemic lupus erythematosus, end-stage renal disease on hemodialysis, polysubstance abuse, hypertension, methicillin-resistant *Staphylococcus aureus* bacteremia, and spontaneous bacterial peritonitis. Approximately 1.5 months ago, the patient had an event of asystole secondary to hypoglycemia and was intubated for 6 days in medical intensive care unit and stabilized. A week after extubation, she developed fever of up to 103°F with cough. Sepsis workup was negative. Chest x-ray showed pulmonary vascular congestion and pulmonary edema. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA test was negative. Clinical suspicion was for aspiration pneumonia. Broad-spectrum antibiotics were given, and the fever subsided with remaining chronic cough. About 4 days ago, the patient developed spiking fevers of 103°F. The chest x-ray showed bilateral diffuse consolidations, which appeared more extensive in the right middle lung field. Considerations included pulmonary edema and viral pneumonia.



**FIGURE 2.** The  $^{99m}\text{Tc}$ -leukocyte scintigraphy was performed to investigate the potential focus of infection. Whole-body planar images of anterior (A) and posterior (B) views at 3 hours post-radiotracer injection demonstrated a focus of intense elongated uptake in the right upper thorax, which is suggestive of infection along the central line in the superior vena cava. Additionally, diffuse and heterogeneously increased uptake in both lungs was noted, with intense uptake in the right lower lobe. The pattern of increased uptake appeared grossly in accordance with the consolidations seen on the chest x-ray. Uptake in the liver, gallbladder, spleen, and skeleton is physiologic.<sup>1,2</sup> The focus of uptake in the right upper arm is the injection site. Radiotracer-labeled leukocyte scintigraphy is used to evaluate suspected sites of infection or inflammation and oftentimes for patients with fevers of unknown origin.<sup>1-4</sup> Although diffuse uptake in the lungs could be seen in pulmonary edema or renal failure, the heterogeneous pattern and more intense uptake in the lungs at 3 hours presented in this case were highly suggestive of pulmonary infection, especially viral pulmonary infection given the symptoms of high fever and cough in this COVID-19 (coronavirus disease 2019) pandemic.<sup>1-8</sup> Therefore, further workup for COVID-19 including chest CT and a second SARS-CoV-2 RNA test was warranted.



**FIGURE 3.** The chest CT imaging performed the next day showed multifocal ground-glass opacities and consolidations throughout bilateral lungs, with a large consolidation in the right lower lobe. The CT findings of the lungs demonstrated typical features seen in COVID-19 and confirmed the findings in <sup>99m</sup>Tc-leukocyte scintigraphy.<sup>8–10</sup> The SARS-CoV-2 RNA test completed on the same day turned out positive, which confirmed the diagnosis of COVID-19. Although <sup>99m</sup>Tc-leukocyte uptake is nonspecific for pathogens of infection,<sup>2–4</sup> heterogeneously increased bilateral pulmonary uptake could represent viral pulmonary infection secondary to COVID-19, as shown by this case. <sup>99m</sup>Tc-leukocyte scintigraphy thus may play a role in the diagnosis of COVID-19 in the properly selected cases, in addition to other nuclear medicine modalities such as PET/CT imaging.<sup>11–17</sup>