

## Positivity of extrapulmonary Ga-67 uptake in sarcoidosis: Thyroid uptake due to chronic thyroiditis and bone uptake due to fibrous dysplasia

Shin MATSUOKA, Katsuhiro UCHIYAMA, Hideki SHIMA, Sonomi OISHI,  
Youko NOJIRI and Naoyuki UENO

*Department of Radiology, Teikyo University School of Medicine, Ichihara Hospital*

Ga-67 citrate scintigraphy was performed on a 29-year-old man who had been diagnosed as having pulmonary sarcoidosis by a transbronchial lung biopsy. A Ga-67 citrate scintigram showed increased uptake not only in the pulmonary hilum and mediastinum, but also in the thyroid gland and the right ilium. Chronic thyroiditis was confirmed by aspiration biopsy of the thyroid gland, and fibrous dysplasia was confirmed by CT guided biopsy of the right ilium. Extrapulmonary Ga-67 uptake in patients with sarcoidosis does not necessarily indicate the involvement of other tissues and organs.

**Key words:** sarcoidosis, Ga-67, chronic thyroiditis, fibrous dysplasia

### INTRODUCTION

SARCOIDOSIS, a disease of unknown etiology, is characterized by the presence of non-caseating granulomas that most often are found in the intrathoracic lymph nodes and lung, and other organs may also be involved. Ga-67 citrate scintigraphy has been useful for identifying extrapulmonary lesions because Ga-67 accumulates well in sarcoid lesions.<sup>1</sup> In the present patient, Ga-67 citrate scintigraphy was performed to identify extrapulmonary involvement of sarcoidosis. Although abnormal Ga-67 accumulation was recognized in the thyroid gland and the right iliac bone, chronic thyroiditis and fibrous dysplasia were confirmed by pathological analyses, respectively.

### CASE REPORT

A 29-year-old man was admitted after finding of bilateral hilar enlargement in a chest radiograph taken at a routine health screening. Aside from mild coughing, the patient

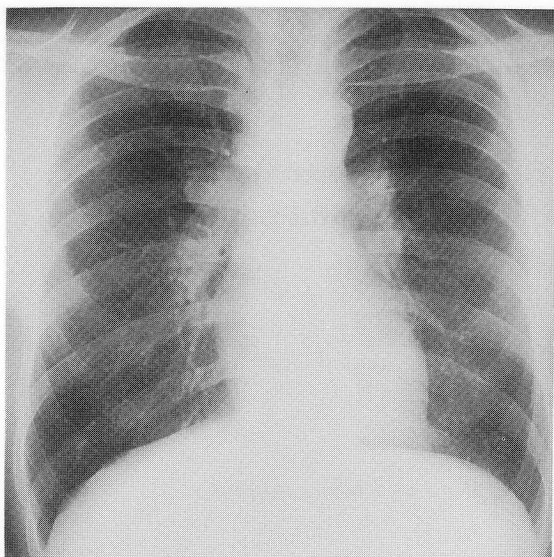
was asymptomatic. A blood biochemical test was normal. A chest radiograph revealed bilateral hilar and paratracheal fullness suggestive of lymphadenopathy (Fig. 1). Since a transbronchial lung biopsy revealed non-caseating granulomatous lesions consisting of epithelioid cells, the patient was diagnosed as having sarcoidosis. To identify extrapulmonary involvement of sarcoidosis, Ga-67 citrate scintigraphy was performed. A Ga-67 citrate scintigram showed increased uptake in the pulmonary hilum and mediastinum, diffused uptake in both lobes of the thyroid gland, and increased uptake in the right ilium (Fig. 2). Faint visualization of Ga-67 citrate in the parotid and submandibular glands was also observed.

The thyroid gland did not show signs of swelling, tenderness or nodularity. Thyroid function tests were normal and thyroid antibodies were negative. Aspiration biopsy of the thyroid gland was carried out and the results confirmed chronic thyroiditis. Concerning Ga-67 uptake in the right ilium, MR imaging was performed. A T1-weighted image showed low signal intensity (Fig. 3A) and a T2-weighted image showed slightly lower signal intensity than that in normal bone marrow (Fig. 3B). Fibrous dysplasia was confirmed by CT guided biopsy of this lesion. Since the uptake of Ga-67 citrate in the salivary glands was not so striking, and there was no symptom either, no pathological examination was done.

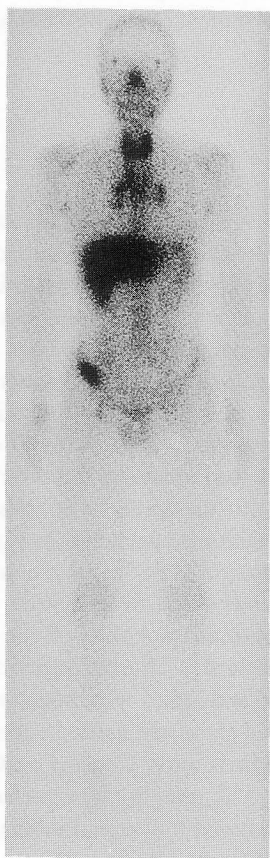
Received August 20, 2001, revision accepted September 19, 2001.

For reprint contact: Shin Matsuoka, M.D., Department of Radiology, Teikyo University School of Medicine, Ichihara Hospital, 3426-3, Anesaki, Ichihara, Chiba 299-0111, JAPAN.

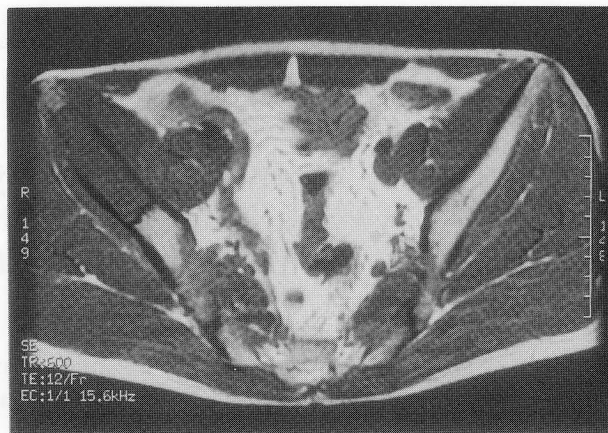
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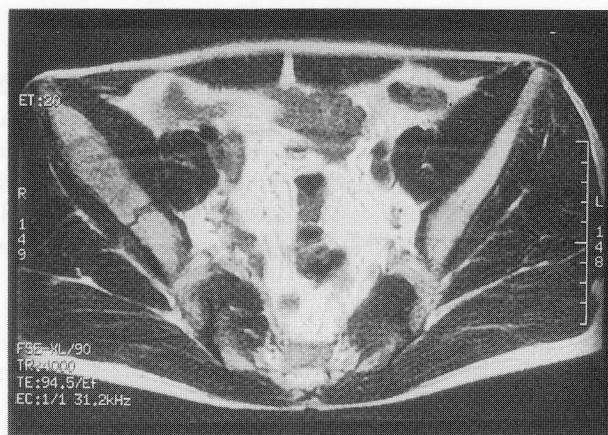
**Fig. 1** Chest radiograph shows symmetrical bilateral hilar and right paratracheal lymphadenopathy without pulmonary parenchymal abnormality.



**Fig. 2** Ga-67 citrate scintigram shows intense uptake in bilateral hilar and mediastinum. Furthermore, diffuse uptake of Ga-67 citrate in thyroid gland and increased uptake in the right ilium are noted.



**A**



**B**

**Fig. 3** Magnetic resonance imaging results. The lesion in the right ilium shows low signal intensity on T1- (A, TR 500/TE 12) and T2- (B, TR 4000/TE 94) weighted images.

## DISCUSSION

Sarcoidosis is a disease of unknown origin, characterized by systemic formation of noncaseating granulomas. These lesions mainly appear in the pulmonary hilum, mediastinum and lung, and generally show signs of increased Ga-67 accumulation. The characteristic uptake of Ga-67 in intrathoracic lymph nodes is commonly referred to as a Lambda sign.<sup>2</sup> Extrapulmonary lesions of sarcoidosis often affect the eyes (40–50%), peripheral lymph nodes (10–50%), skin (15%), spleen (6%), and central nervous system (4%). Since increased uptake of Ga-67 citrate is seen in these extrapulmonary lesions, it is useful for assessment of the extrapulmonary sarcoid lesions.<sup>1</sup>

Clinically recognizable thyroid involvement with sarcoidosis will occur in less than 1.0% in patients with sarcoidosis. Autopsy reports indicate that the thyroid may be affected in 4.2%,<sup>3</sup> and autoimmune diseases and sarcoidosis may be related.<sup>4</sup> In particular, an association with Hashimoto's thyroiditis has been recognized.<sup>5</sup> Recently a

relatively high incidence (16.7–37.8%) of thyroid autoantibodies in patients with sarcoidosis was also reported.<sup>6,7</sup> Since Ga-67 citrate accumulates in chronic autoimmune thyroiditis, it is necessary to perform immunological, endocrinological and histological analyses, as in this present case.

In a review of reports of sarcoidosis, the frequency of radiographic evidence of osseous involvement has varied from 1 to 13%, averaging 5%.<sup>8</sup> It has been estimated that 80 to 90% of patients with sarcoidosis involving bone have radiographic evidence of pulmonary sarcoidosis. The small bones of the hands and feet are predominantly involved, but other bone are rarely affected. The most characteristic osseous manifestation is a reticulated “lace-like” trabecular patterns in the proximal and middle phalanges, but radiographic findings show relative variation.<sup>9</sup> As a result, diagnostic imaging is sometimes difficult. Although increased uptake of Ga-67 in osseous involvement of sarcoidosis has been reported,<sup>10</sup> this uptake does not necessarily indicate the involvement of sarcoidosis, so that histological confirmation is required as this patient.

Fibrous dysplasia is a skeletal developmental anomaly of bone forming mesenchyme in which osteoblasts fail to undergo normal morphologic differentiation and maturation. It is of unknown cause and not hereditary.<sup>11</sup> Uptake of Tc-99m HMDP and Tc-99m MDP in a fibrous dysplasia of bone has been well documented,<sup>12</sup> but uptake of Ga-67 has hardly been reported at all.<sup>13,14</sup> One of the mechanisms of Ga-67 citrate uptake in fibrous dysplasia is presumably due to the increased vascularity of the lesion.<sup>13</sup> In this present case, though fibrous dysplasia was also considered on the basis of the imaging results, the pathological diagnosis was made in order to completely eliminate sarcoidosis.

Ga-67 citrate scintigraphy is useful for identifying extrapulmonary lesions in sarcoidosis patients, but as with the present patient, extrapulmonary accumulation of Ga-67 could be unrelated to sarcoidosis.

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