

## Resolution of Ga-67 citrate uptake in the left neck mass of Hodgkin's disease and reversion of double scoliosis of cervical-thoracic and lower lumbar vertebrae

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A 6-yr-old boy underwent a total body Ga-67 citrate imaging study because of a large mass of Hodgkin's lymphoma in the left neck and the left anterior chest wall region. The images showed intense uptake in the left neck extending anteroinferiorly to the left upper chest wall corresponding to the left neck and chest region. In addition, there was mild cervical-upper thoracic scoliosis with convexity to the right and mild scoliosis of the lower lumbar scoliosis with concavity to the left. After three cycles of chemotherapy, in the follow-up Ga-67 citrate total body images seven months after his first Ga-67 citrate imaging, the intense uptake in the left neck and the left upper chest wall had been resolved and the scoliosis of the cervical-thoracic and lower lumbar spine had also been reversed to normal. This case shows that a Ga-67 citrate imaging study is useful for first diagnosis and subsequent monitoring of the therapeutic effects in a follow-up imaging. Also Ga-67 citrate imaging provided evidence that the scoliosis had been reversed.

**Key words:** Ga-67 citrate total body imaging, large neck mass, Hodgkin's disease, cervical-thoracic scoliosis, lumbar scoliosis

### INTRODUCTION

Ga-67 IMAGING STUDY has become well established in staging lymphomas<sup>1</sup> by confirming disease relapse,<sup>2</sup> and differentiating residual disease from scar.<sup>3,4</sup> This shows that a Ga-67 citrate image is useful for follow-up after appropriate therapy as well as for the first diagnosis of Hodgkin's disease. In addition, our patient's Ga-67 citrate scintigraphies demonstrated reversible scolioses of the cervical-thoracic and lower lumbar spine.

### A CASE REPORT

A 6-year-old boy presented with a three-month history of left neck swelling and tenderness, which was treated with antibiotics without any improvement. On physical exami-

nation, a large mass was found in the left neck and anterior left chest wall region (Fig. 1). A total body Ga-67 citrate imaging study 48 hr. after iv injection of 222 MBq (6 mCi) Ga-67 citrate in May 1999 showed an intense uptake in the left neck extending anteroinferiorly to the left upper chest wall corresponding to the mass in the left neck and chest region (Fig. 2). CT and US showed massive level 2 through level 5 adenopathy, the largest one being 5.2 × 4.0 cm. Multiple nodules in the spleen were noted in the CT as well. An US guided biopsy of the left neck mass detected in Hodgkin's lymphoma, sclerosing type, grade I (Fig. 3). The patient underwent three cycles of chemotherapy with cyclophosphamide, vincristine, prednisone, procarbazine, adriamycin, bleomycin, and vinblastine in June, July, and September 1999. After the completion of chemotherapy, in the follow up Ga-67 citrate imaging study in December 1999, seven months after his first Ga-67 citrate images, the intense uptake in the left neck and chest wall has resolved, and scoliosis of the cervical-thoracic and lower lumbar spine was no longer seen (Fig. 4). The patient was doing well.

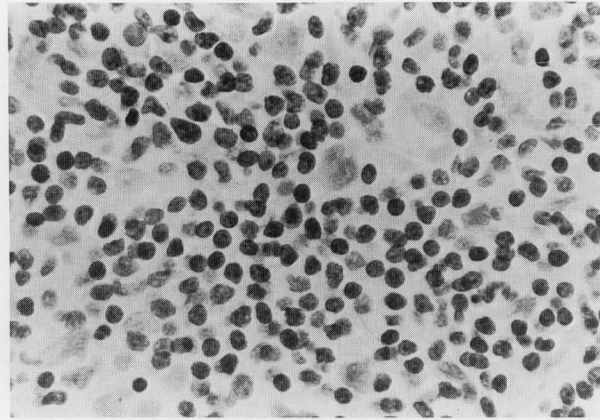
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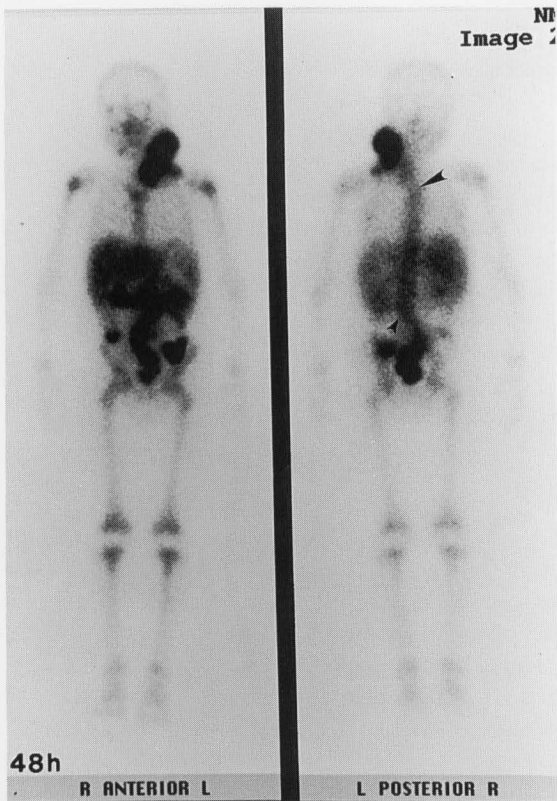
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**Fig. 1** Photos of the 6-year-old boy's head, neck, and chest: a large bulging mass, as indicated by arrows, in the left side of the neck extends to the left upper chest wall. Left, lateral view; right, anterior view.



**Fig. 3** A concurrent incisional biopsy from the left mass confirmed Hodgkin's disease, nodular sclerotic type grade I. Note that fibrous band and a Reed-Steinberg cell are consistent with sclerosing Hodgkin's disease.



**Fig. 2** Anterior and posterior total body images at 48 hours after 222 MBq (6 mCi) iv injection of Ga-67 citrate show intense uptake from the left upper neck extending anterior-inferiorly to the left upper chest wall. Cervical-upper thoracic vertebral scoliosis with convexity to the right (arrowhead) and lower lumbar scoliosis with convexity to the left (smaller arrowhead) are also noted in the posterior image.

### DISCUSSION

Ga-67 citrate is known to be localized in malignant masses and benign lesions. Thus Ga-67 citrate images are



**Fig. 4** In the follow-up anterior and posterior total body Ga-67 citrate images at 48 hours, the mass lesion with intensive uptake in the left neck and left upper chest wall is no longer seen; the cervical-upper thoracic vertebral scoliosis and the lower lumbar scoliosis are also no longer demonstrable.

useful for follow up imaging to determine therapeutic effectiveness after appropriate therapy as well as to make the first diagnosis of malignant lesions such as Hodgkin's disease or non-Hodgkin disease,<sup>4</sup> and non-malignant le-

sions such as aspergillosis<sup>5,6</sup> or sarcoidosis.<sup>7,8</sup> Ga-67 citrate imaging study has played a useful role in monitoring the therapeutic effect of treatment of aspergillosis.<sup>5,6</sup> In sarcoidosis, the typical symmetrical inguinal lymph node Ga-67 uptake may help in the diagnosis of sarcoidosis, especially in cases of atypical Lamda and panda patterns,<sup>7</sup> and after steroid therapy multiple extrapulmonary sites of accumulation of Ga-67 citrate have resolved.<sup>8</sup> In a follow up Ga-67 citrate imaging study of intrasplenic lymphoma, the area of previous avid splenic uptake was transformed to a cold defect.<sup>9</sup> This case shows clearly that a Ga-67 citrate image is useful for follow-up after appropriate therapy as well as for the first diagnosis of Hodgkin's disease.

In our case, in addition to demonstrating a negative scan after chemotherapy indicating complete remission, his scolioses of the cervical-thoracic spine and lower lumbar spine were shown (see Fig. 1), and reverted to a normal spine on a follow-up Ga-67 citrate study after chemotherapy. Because the mass in the boy's left neck was very big, it caused his head to tilt to the right, the side opposite the neck mass lesion. Consequently there had been cervical-thoracic scoliosis with convexity to the right and lower lumbar scoliosis with concavity to the left. To reach the balance posture, the scoliosis of the lumbar spine appeared to compensatory to the cervical-thoracic scoliosis as the convexities were in opposite directions. It is understandable that a big mass of lymphoma occupying the left neck caused the "flexible" scoliosis, as a similar flexible scoliosis can occur with limb length discrepancy that can be corrected with the use of a lift on the short side.<sup>10</sup> With the resolution of the lymphoma mass in the patient's left neck, his cervical-thoracic scoliosis reverted to normal; just as the use of a lift on a short limb (leg) corrects length discrepancy. Because of reversion of the cervical-thoracic scoliosis, the scoliosis of the lower lumbar spine, secondary to the cervical-lumbar scoliosis, disappeared. To our knowledge, double scoliosis secondary to a tumor mass in the neck and reversion to normal after completion of resolution of the tumor that were demonstrated on Ga-67 citrate scans has not been reported elsewhere.

Since Ga-67 citrate is normally localized principally in the bone and bone marrow in addition to the liver and spleen, the radiopharmaceutical was initially used for a bone-imaging agent. Thus our Ga-67 citrate scintigra-

phies allowed us to document curvature of the spine-scoliosis- and to demonstrate reversible scoliosis after chemotherapy. If this patient underwent scintigraphy with another tumor-imaging agent, such as Tl-201 chloride, the curvature abnormalities of the spine would not have been exhibited.

In summary, this case shows clearly that a Ga-67 citrate image is useful for follow-up after appropriate therapy, as well as for first diagnosis of Hodgkin's disease. Also, the lymphoma in the neck resulted in double scoliosis of the spine that reversed to normal after successful completion of chemotherapy for a left neck mass in Hodgkin's disease.

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