

## Positive gallium-67 and thallium-201 scans in thymic rebound after chemotherapy for lymphoma

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It is a diagnostic problem to distinguish thymic rebound or rebound thymic hyperplasia from thymic malignancy, but it is frequently made more difficult because most patients have had previous malignancies. Recently we evaluated a six-year-old girl with thymic rebound after chemotherapy for lymphoma, by both gallium-67 and thallium-201 scans. On gallium-67 scan, intensive uptake was seen in the anterior mediastinum. CT revealed a triangular-shaped, homogeneous mass in the anterior mediastinum. On early scan of thallium-201 study, slight accumulation was seen in the anterior mediastinum and was enhanced in delayed scans. Considering the clinical state and imaging results, thymic rebound after chemotherapy was the most likely diagnosis, and follow-up observation was done without therapy. During the course, there were no signs of relapse. Some reports have described both positive and negative thallium-201 accumulation in thymic rebound. Although more experience with similar cases is necessary, it is likely that thallium-201 also tends to accumulate in thymic rebound as well as gallium-67.

**Key words:** gallium-67, thallium-201, thymic rebound

### INTRODUCTION

THYMIC REBOUND<sup>1–5</sup> or rebound thymic hyperplasia<sup>6–10</sup> is a relatively rare condition, in which temporal thymic hyperplasia occurs. While undergoing chemotherapy, especially in young patients, the thymus tends to involute. During recovery, the thymus regrows or occasionally overgrows or “rebounds.”<sup>3</sup> It is occasionally difficult to distinguish this hyperplasia from thymic malignancy, because most patients with these phenomena have previously suffered from various malignancies. Recently we evaluated a patient with thymic rebound after chemotherapy for lymphoma by both gallium-67 and thallium-201 scans.

### CASE REPORT

A six-year-old girl with a previous history of lymphoma was admitted to our hospital for postchemotherapy evalu-

ation. She had suffered from lymphoma originating in the right femur. Systemic chemotherapy had been performed for about 2 years, and the mass in the right distal femur had become much smaller and the symptoms had disappeared. Laboratory tests after admission showed only a slight elevation of lymphocyte percentage and lactic dehydrogenase. MR imaging revealed a well-reduced mass in the right femur, which suggested good control of the disease. To detect relapsed or further lesions, gallium-67 scan was performed. Intensive gallium-67 uptake was seen in the anterior thoracic region on both whole body and chest anterior planar scans (Fig. 1), which was confirmed in the anterior mediastinum by SPECT performed at the same time. CT was recommended and it revealed a triangular-shaped, homogeneous mass in the anterior mediastinum (Fig. 2). Thallium-201 scan was also performed for evaluation of the “mass.” On early scans, slight accumulation of thallium-201 was seen in the anterior mediastinum, and it was further enhanced in delayed scans (Fig. 3). In the same way as the gallium-67 scan, thallium-201 accumulation in the anterior mediastinum was well demonstrated by SPECT (Fig. 4). Considering the clinical state and imaging results, thymic rebound after chemotherapy was the most likely diagnosis, and follow-up observation was done without therapy. During the course, there were no

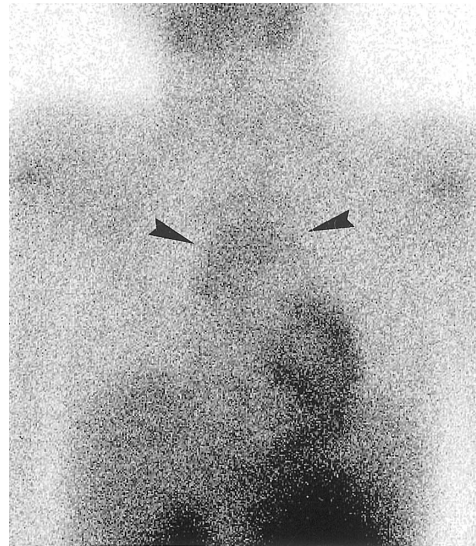
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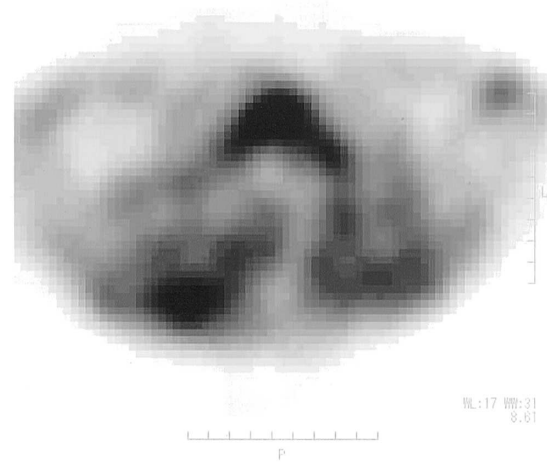
**Fig. 1** Gallium-67 scan after admission shows intense radioactivity in the anterior mediastinum, representing accumulation in the thymus (*arrowheads*).



**Fig. 3** Delayed phase images of thallium-201 scan shows mild, but definite radioactivity in the same region as that seen in gallium scan (*arrowheads*).



**Fig. 2** Symmetric, homogeneous thymic enlargement is seen on contrast-enhanced CT.



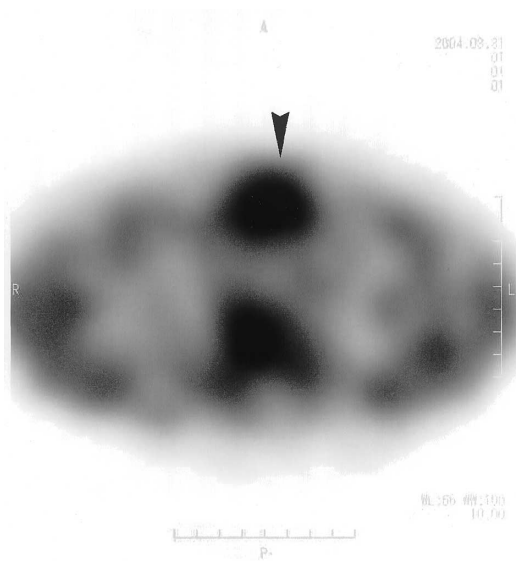
**Fig. 4** Obvious thallium-201 accumulation in the thymus was seen on delayed phase SPECT.

signs of relapse, and radioactivity in the anterior mediastinum had disappeared on repeated gallium-67 scan about 7 months later. On gallium-67 SPECT after about one year, no radioactivity was seen in the anterior mediastinum either (Fig. 5).

### DISCUSSION

It is a diagnostic problem to distinguish rebound thymic hyperplasia from thymic malignancy, but it is frequently made more difficult because most patients have had

previous malignancies. Kissin et al. reported that it was impossible to distinguish benign thymic hyperplasia from tumor infiltration on the basis of CT information alone. They suggested as provable diagnostic points for thymic rebound that the patient had been treated with chemotherapy, the thymus was previously uninvolved, or there was no other evidence of disease relapse.<sup>6</sup> Gallium-67 accumulation in thymic rebound has also been reported.<sup>2,4,8</sup> Increased thymic localization of gallium-67 is thought to reflect regenerative activity of the thymus.<sup>2,8</sup> Harris et al. reported a case of thymic rebound which was avid for



**Fig. 5** Gallium-67 SPECT performed about one year after shows no obvious radioactivity in the anterior mediastinum. Care is needed not to misinterpret sternal manubrium activity as that in the thymus (arrowhead).

gallium-67, but not for thallium-201. They suggest that the negative thallium-201 scan of their case would indicate the benignancy or reactive nature of the lesion.<sup>4</sup> Fletcher et al. reported that in pediatric patients with Hodgkin disease, thallium-201 scans might provide an alternative to gallium-67 scans in monitoring the response to treatment, because thallium-201 did not accumulate in thymic rebound or in bones such as the sternum.<sup>9</sup> On the other hand, Israel et al. editorialized on the case of Harris et al. in the same issue of the journal, and claimed that there might exist slight uptake of thallium-201 in the anterior mediastinum.<sup>11</sup> Recently, positive uptake in normal thymus and thymic rebound on F-18 fluorodeoxyglucose positron emission tomography have also been reported, and to differentiate them from various malignancies has become a new diagnostic problem.<sup>12,13</sup>

In the present case, conscious of the report of Harris, et al., we performed thallium-201 scan as well as gallium-67 scan. There was significant radioactivity in the enlarged thymus on both gallium-67 and thallium-201 scans. Given the clinical state and CT findings,<sup>5</sup> the enlarged thymus was thought to be thymic rebound. The course was observed, and there was no evidence of relapse of lymphoma. During the course, gallium-67 accumulation in

the thymus disappeared. Although further experience with similar cases is necessary, it is likely that thallium-201 also tends to accumulate in thymic rebound as well as gallium-67.

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