

# Thymic Metastasis in Breast Cancer: A Case Report

Sung Bin Park, MD<sup>1</sup>  
Hak Hee Kim, MD<sup>1</sup>  
Hee Jung Shin, MD<sup>1</sup>  
Moon Hee Paik, MD<sup>1</sup>  
Dae-Bong Kim, MD<sup>1</sup>  
Gyungyub Gong, MD<sup>2</sup>

A malignant tumor is generally believed to be very unlikely to metastasize to the thymus. Only three cases of thymic metastases have been reported so far in the medical literature. We report here a rare case of metastatic breast cancer to the thymus, which was detected by CT and PET scanning, and the metastasis was also confirmed by video-assisted thoracic surgery biopsy. Recognition of an unusual breast cancer metastasis, such as to the thymus, as well as the usual patterns of breast cancer metastasis will facilitate an accurate, prompt diagnosis and its appropriate treatment.

## Index terms:

Breast neoplasm, metastases  
Thymus, CT  
Thymus, PET

## Korean J Radiol 2007; 8: 360-363

Received April 8, 2006; accepted  
after revision July 31, 2006.

<sup>1</sup>Department of Radiology and the Research Institute of Radiology, University of Ulsan College of Medicine, Asan Medical Center, Seoul 138-736, Korea; <sup>2</sup>Department of Pathology, University of Ulsan College of Medicine, Asan Medical Center, Seoul 138-736, Korea

## Address reprint requests to:

Hak Hee Kim, MD, Department of Radiology and the Research Institute of Radiology, University of Ulsan College of Medicine, Asan Medical Center, 388-1 Poongnap-dong, Songpa-gu, Seoul 138-736, Korea.  
Tel. (822) 3010-4390, 4400  
Fax. (822) 476-4719  
e-mail: hhkim@amc.seoul.kr

**T**he thymus is an essential organ in the immune system that plays a particularly important role in the cellular immunity system as a source of T lymphocytes. Therefore, it has generally been thought that a tumor is very unlikely to metastasize to the thymus (1). We report here on a rare case of thymic metastasis in breast cancer.

## CASE REPORT

A 26-year-old woman presented with a palpable mass of two months' duration in the left breast. The physical examination revealed a hard, non-tender mass in the 12 o'clock position of the left breast.

Mammography (not shown) showed a diffuse, dense breast without visible abnormalities. Breast ultrasonography showed a 2.0 × 1.0 × 4.0 cm sized, irregularly shaped, poorly defined, hypoechoic mass in the 12 o'clock position of the left breast (Fig. 1A) and multiple metastatic lymph nodes in the left level I axilla (Fig. 1B) and in the left supraclavicular area. Fine needle aspiration biopsy that was guided by palpation was performed for the breast mass. The results were indicative of ductal carcinoma (Fig. 1C).

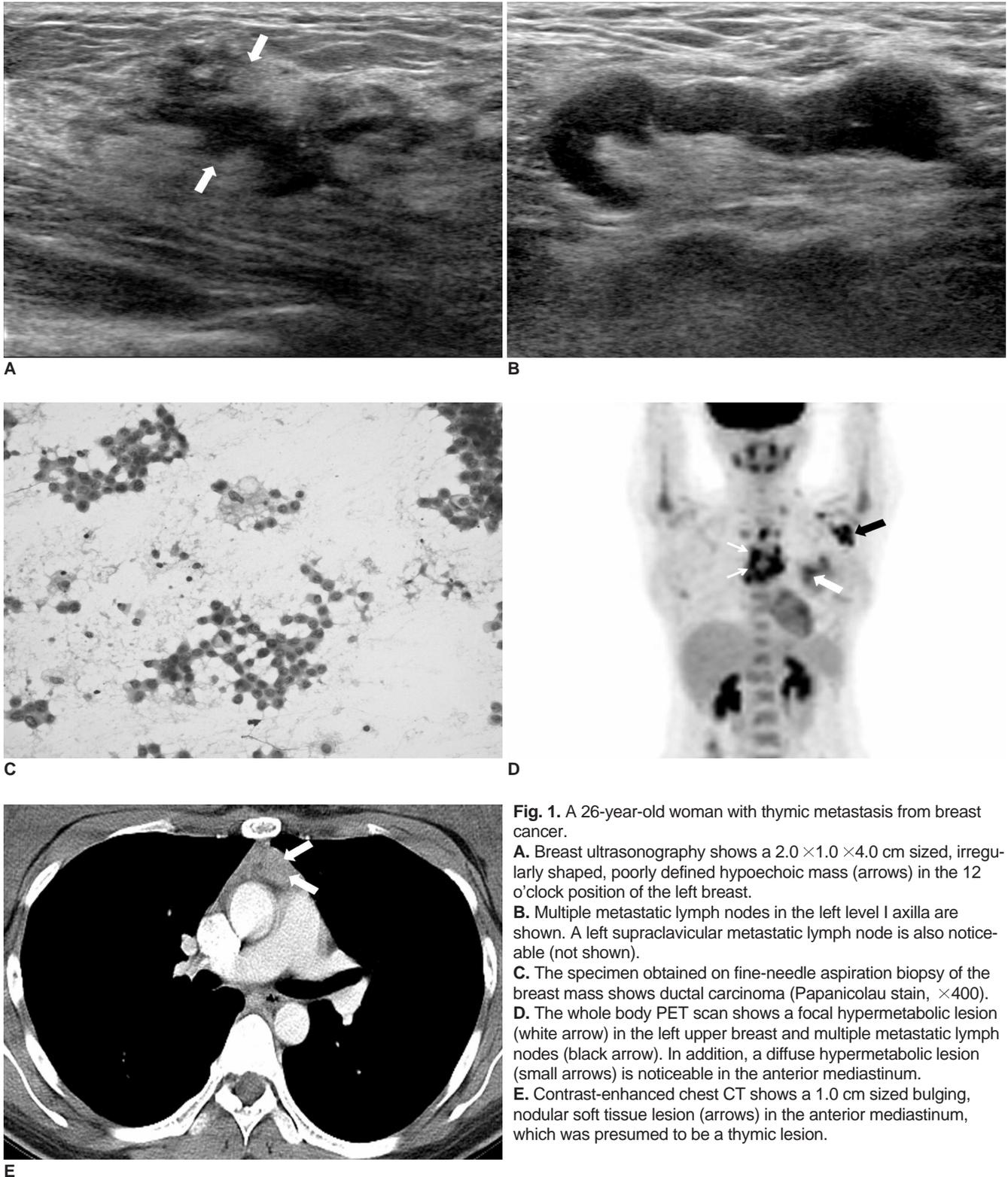
The whole-body PET scan showed a focal hypermetabolic lesion in the left upper breast and multiple metastatic lymph nodes in the ipsilateral axilla and the supraclavicular area. A diffuse hypermetabolic lesion in the anterior mediastinum was also noted (Fig. 1D). Contrast-enhanced chest CT showed a 1.0 cm sized bulging, nodular soft tissue lesion in the anterior mediastinum, which was presumed to be a thymic lesion (Fig. 1E). As the video-assisted thoracic surgery showed poorly defined, hard nodules confined to the thymus, thoracoscopic biopsy was considered and performed. The histopathologic results of the thymic biopsy revealed thymic tissue interwoven with malignant ductal cells, and this finding was basically the same as compared with the results of the breast pathology obtained by the fine needle aspiration (Figs. 1F, G). Thus, the metastatic breast carcinoma to the thymus was confirmed.

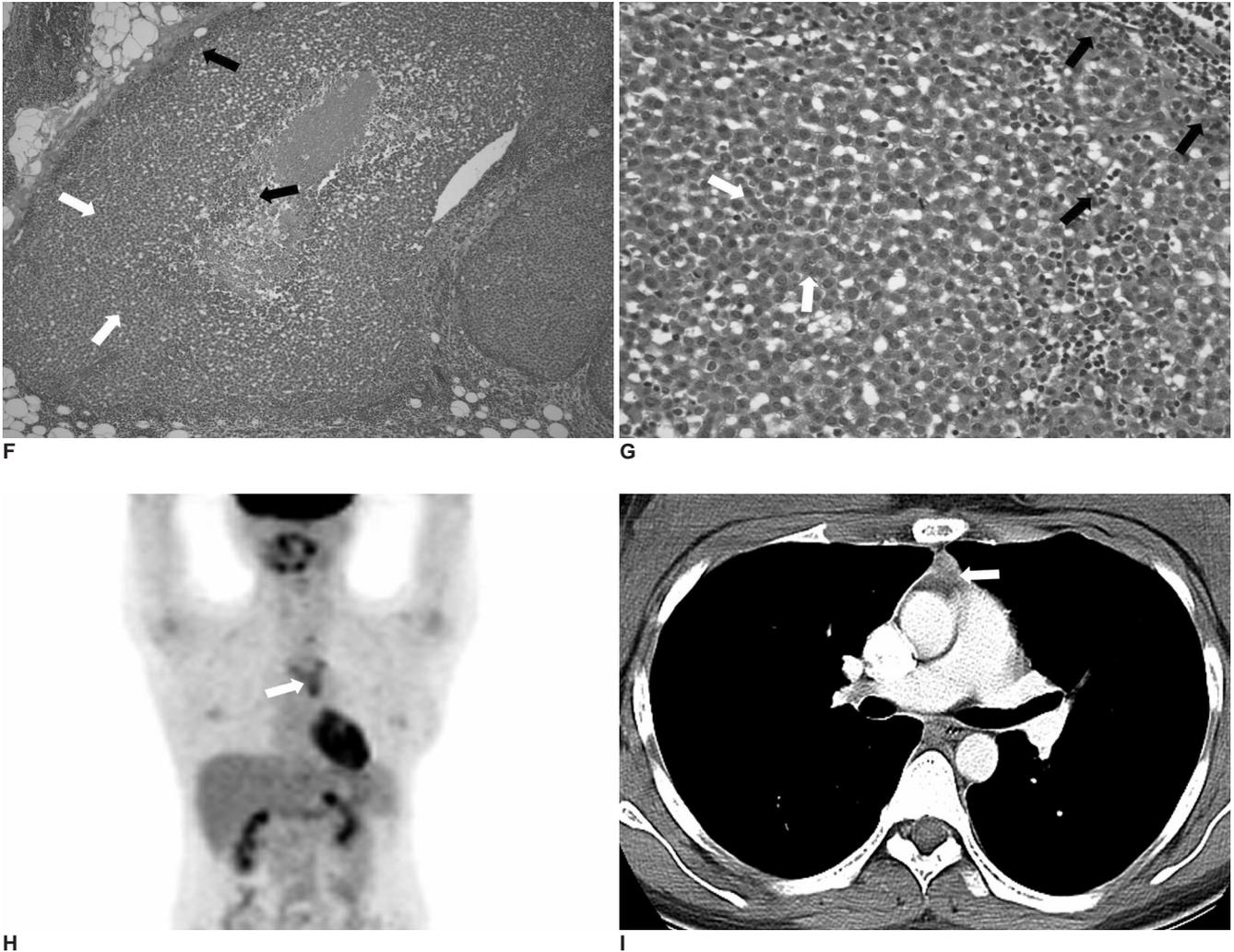
## Thymic Metastasis in Breast Cancer

Two-cycles of chemotherapy with using paclitaxel was administered, and the follow-up PET (Fig. 1H) and CT scans (Fig. 1I) showed that the primary breast mass, the metastatic thymic lesion and the metastatic lymphadenopathy had considerably regressed with a partial response.

## DISCUSSION

As the thymus is an essential organ that controls the cellular immunity function, it has been considered almost





**H**  
**Fig. 1. F, G.** The biopsy specimen, obtained by video-assisted thoracic surgery, shows ductal carcinoma cells (white arrows) and thymic cells (black arrows) in the same fields (Hematoxylin & Eosin staining,  $\times 100$ ). Compared with the specimen obtained by the fine-needle aspiration, the interwoven ductal carcinoma cells (white arrows) with the background thymic cells (black arrows) are basically the same pathology (Hematoxylin & Eosin staining,  $\times 400$ ). The thymic metastasis from primary breast cancer was confirmed.  
**H, I.** After two-cycles of chemotherapy, the PET (**H**) and the CT scans (**I**) showed that the primary breast mass, the metastatic thymic lesion (arrow) and the metastatic lymphadenopathies were considerably regressed with a partial response.

impossible that a tumor could metastasize to the thymus. Although tumors almost never metastasize to the thymus, precise observation of the thymic structure has revealed that the thymus is not absolutely safe from tumor metastasis (1). As it has been pointed out by Clark (2), the parenchyma of the thymus has a blood thymus barrier, which prevents the thymus from making direct contact with antigens or cancerous cells, thereby seemingly excluding the occurrence of cancer metastasis. However, the septum of the thymus is comprised of interlobular connective tissue with blood vessels, lymph ducts and nerves, which theoretically does not exclude the possibility of metastasis. Therefore, when the structure of the thymus is precisely analyzed, a remote possibility of the thymic metastasis from tumors is imaginable (1).

There are relatively few reports (1, 3, 4) of thymic metastases; however, cases of metastatic breast, stomach, larynx and lung carcinoma to the thymus have been reported at autopsy (5). As to the autopsy series by Middleton (5) with the author's seven cases of thymic metastasis in 102 cases of carcinoma, the incidence was approximately 7%. There were four cases of breast cancer among these seven cases. The high incidence of thymic metastasis in breast cancer as compared with the one case of the thymic metastasis in lung cancer is rather striking (5).

In a study of the metastatic patterns of 145 breast cancer patients, a systemic spread of the disease was found to involve bone in 51% of the patients, lung in 17%, brain in 16%, and liver in 6% (6). It is important to detect these

## Thymic Metastasis in Breast Cancer

secondary tumors because some patients can be successfully palliated with an appropriate treatment and can perhaps even achieve prolonged survival (7). Therefore, recognition of an unusual breast cancer metastasis, such as to the thymus, as well as the usual patterns of breast cancer metastasis will facilitate an accurate, prompt diagnosis and an appropriate treatment.

We report here on a rare case of a woman with the stage IV breast cancer that spread to the thymus; the neoplasm was detected by CT and PET scanning, and it was confirmed by video-assisted thoracic surgery biopsy.

### Acknowledgement

The authors express their gratitude to Bonnie Hami, MA, Department of Radiology, University Hospitals Health System, Cleveland, Ohio, for her editorial assistance in preparing the manuscript.

### References

1. Hayashi S, Hamanaka Y, Sueda T, Yonehara S, Matsuura Y. Thymic metastasis from prostatic carcinoma: report of a case. *Surg Today* 1993;23:632-634
2. Clark SL. The reticulum of lymph nodes in mice studied with the electron microscope. *Am J Anat* 1962;110:217-257
3. Phillips CJ. Case report: metastatic malignant testicular teratoma of the thymus. *Br J Radiol* 1994;67:203-204
4. Nam MS, Chu YC, Choe WS, Kim SJ, Hong SB, Kim YJ, et al. Metastatic follicular thyroid carcinoma to the thymus in a 35-year-old woman. *Yonsei Med J* 2002;43:665-669
5. Middleton G. Involvement of the thymus by metastatic neoplasms. *Br J Cancer* 1966;20:41-46
6. Patanaphan V, Salazar OM, Risco R. Breast cancer: metastatic patterns and their prognosis. *South Med J* 1988;81:1109-1112
7. Ampil FL, Jawahar A, Zamani R, Krishnamsetty RM. Breast cancer metastasis to the medulla oblongata: a case report. *Eur J Gynaecol Oncol* 2004;25:737-738