

Negative gallium-67 citrate and positive positron emission tomography/computed tomography spleen scans, in Hodgkin's stage IV lymphoma

**Julia Malamitsi^{1,2},
Helen Kosmidis³,
Barbara Valotassiou¹,
Irene Bonou⁴,
John Andreou¹**

1. PET/CT Department, Diagnostic and Therapeutic Center of Athens Hygeia, Harvard Medical International, Athens, Greece
2. Department of Medical Physics, Medical School, University of Athens
3. Oncology Department and
4. Pathology Department of "Aglaia Kyriakou" Children's Hospital, Athens, Greece

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Correspondence address:

Julia Malamitsi, Associate Professor in Medical Physics, Department of Medical Physics, Medical School, University of Athens, 75 Mikras Asias Str, 11527 Athens, Greece
Tel: +30 210 74 62 375
E-mail: j.malamitsi@yahoo.gr

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Abstract

An 18-year-old male patient with Hodgkin's lymphoma stage IVB (HL-IVB), is presented. On a follow-up examination a splenic ultrasound scan showed the presence of multiple intense nodules. The gallium-67 citrate, single photon emission tomography scan was negative, while positron emission tomography/computerized tomography (PET/CT) scan with fluoro-18-fluorodeoxyglucose was strongly positive. Massive infiltration of the spleen by HL-IVB tissue was confirmed by pathology after splenectomy. Two successive PET/CT studies for follow-up purposes three and twelve months after completion of chemotherapy, were normal.

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Introduction

Malignant lymphomas comprise 8% of all malignancies. In the late stage of Hodgkin's lymphoma, megalosplenism with spleen lymphatic involvement is found. Individual splenic lesions, normally detected by a gallium-67 citrate (⁶⁷GaC) single photon emission tomography (SPET) scan, cannot be specifically visualized in Hodgkin's lymphoma stage IVB (HL-IVB) due to massive lymphatic involvement. On the other hand, positron emission tomography (PET) with fluoro-18-fluorodeoxyglucose (¹⁸F-FDG) has been shown to offer a more accurate staging, as well as a better detection of residual disease and recurrence in cases of HL-IVB. In addition ¹⁸F-FDG PET is superior in detecting splenic disease not detected by ⁶⁷GaC imaging [1-4].

We present a case with Hodgkin's lymphoma (HL) stage IVB, with splenic recurrence detectable only on the PET/CT scan and not on the ⁶⁷GaC SPET scan. Splenic infiltration by HL-IVB cells visible on PET/CT but not on ⁶⁷GaC scan, has been discussed in the literature, however this case is the first relevant case in the Greek literature.

Case presentation

An 18-year-old male patient was first presented at the age of 14 with lymph nodes in the neck, the supraclavicular and left iliac areas, as well as with hepatomegaly and an inhomogeneous spleen detected by abdominal ultrasound (US) and by computerized tomography (CT). He was then diagnosed as having HL-IVB. The patient was treated with combined chemotherapy according to the International Society of Paediatric Oncology (SIOP) protocol, i.e. 2 cycles of vincristine-oxycarbazine, procarbazine, prednisone and adriamycin (OPPA) and 4 cycles of endoxan-cyclophosphamide, vincristine-oxycarbazine, procarbazine and prednisone (COPP regimen). Chemotherapy was followed by radiotherapy of the neck and the mediastinum. The patient received 20 Gy of radiotherapy above the diaphragm (Mantle field) and 10 Gy below the diaphragm including the spleen; the full dose of 20 Gy below the diaphragm was not administered due to persistent thrombocytopenia. The patient had complete response to radio-chemotherapy.

One year post-treatment the patient developed thrombocytopenic purpura and was treated with steroids. Two years after treatment, on a regular follow-up, abdominal US scan showed multiple intense splenic nodules and thus recurrence of the disease was suspected. The patient was referred to our department for a ⁶⁷GaC scan which was negative for the presence of generalized recurrent disease both on whole body SPET and on planar views of the spleen (Fig. 1). Subsequently a ¹⁸F-FDG PET/CT scan was performed. Three large foci

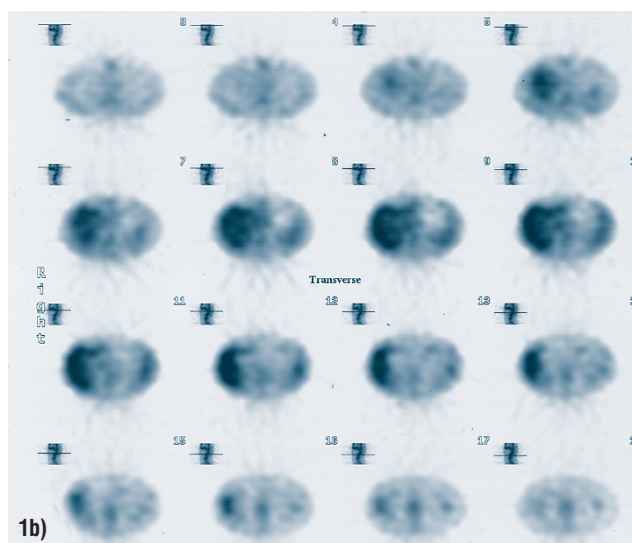
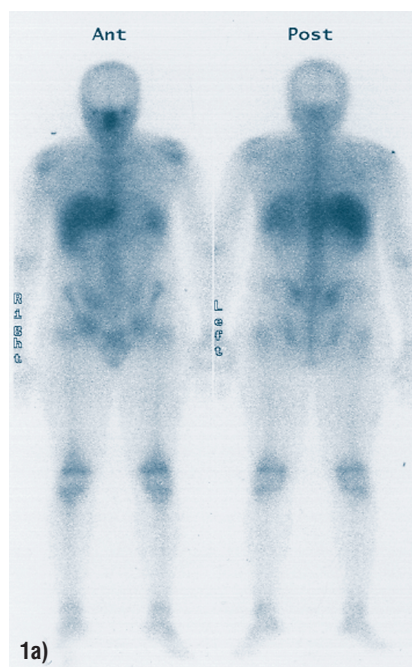


Figure 1. ^{67}Ga -C whole body scan (1a) and ^{67}Ga -C liver-spleen SPET (1b) scans appear normal.

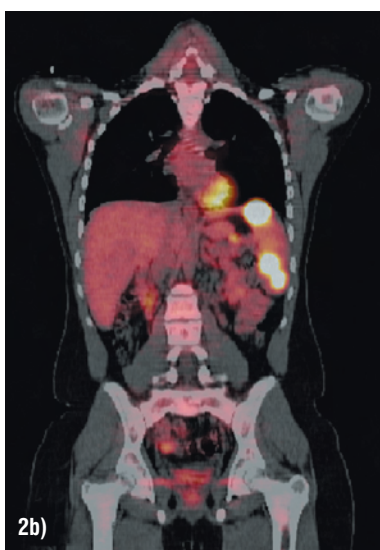
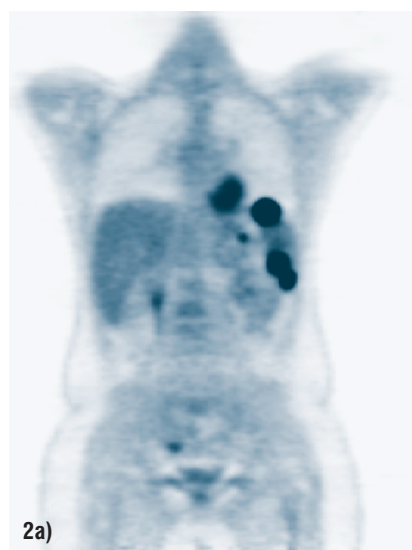


Figure 2. PET (2a) and PET/CT (2b) scans show three large foci of increased ^{18}F -FDG uptake in the spleen consistent with areas of infiltration of Hodgkin's disease.



Figure 3. Excised spleen (3a) shows three large and multiple small foci of lymphomatous infiltration confirmed by microscopic examination (3b).

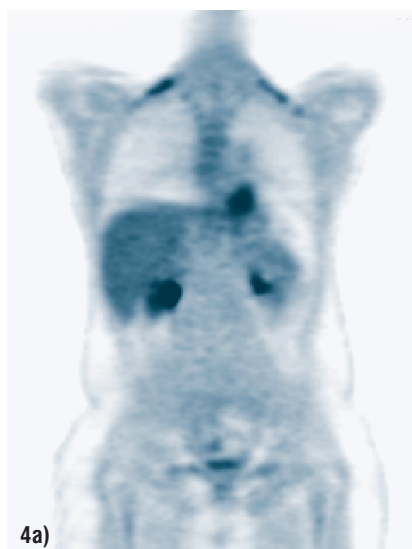


Figure 4. PET (4a) and PET/CT (4b) scans twelve months after splenectomy and chemotherapy, appear normal.

of increased ^{18}F -FDG uptake 3.3, 2 and 0.7 cm in diameter were seen in the spleen. The longitudinal diameter of the enlarged spleen was 13 cm (Fig. 2). No other lesions were detected in the rest of the body. After splenectomy, three large and multiple small foci were macroscopically seen in the spleen at the sites of the ^{18}F -FDG PET/CT scan lesions and on histology they were shown to be due to HL-IVB cells (Fig. 3). The patient was treated with two cycles of MINE regimen (mitoguazone, ifosfamide, vinorelbin and etoposide) and two cycles of COPP. In addition the patient received radiotherapy of 25 Gy below the diaphragm, at the region of the spleen and at the para-aortic lymph nodes. Subsequent ^{18}F -FDG PET/CT scans were normal at three and twelve months after the completion of treatment (Fig. 4). Seventeen months after the last course of treatment, the patient remained free of clinical, biochemical or CT imaging evidence of the disease.

Discussion

Accurate staging and monitoring response to treatment are of paramount importance for the management of patients with HL. For many years, the ^{67}Ga scan has been considered the imaging modality of choice [5]. However the sensitivity of the ^{67}Ga scan is strongly dependent on the histological type of lymphoma, the size of the lymphomatous foci and their location [5,6]. The ^{67}Ga scan is sensitive in detecting HL and intermediate and high malignancy non HL lesions, greater than 2 cm especially if localized in the mediastinum or superficially as in the neck [6, 7]. The sensitivity of the ^{67}Ga scan is considerably decreased in abdominal lymphoma disease, due to the normal uptake of the radiopharmaceutical by the liver and spleen and its secretion in the bowel [7]. Furthermore, despite technical progress in performing the ^{67}Ga SPET scan, low spatial resolution and the difficulty in quantifying the uptake of the radiopharmaceutical, make this study hard to interpret [8].

The ^{18}F -FDG PET scan is now established as an imaging method for the assessment of lymphomas [3, 7]. This scan is more sensitive than the ^{67}Ga SPET scan in detecting extra-nodal disease, can identify patients who need more intensive treatment and may have a prognostic value by predicting the final outcome of the disease during or after treatment [9, 10]. There are a substantial number of studies demonstrating greater sensitivity, specificity and accuracy of the ^{18}F -FDG PET scan in detecting splenic involvement, in patients with lymphoma, compared to the ^{67}Ga SPET scan (92%, 100% and 97% versus 50%, 95% and 78% respectively) [11,12]. ^{18}F -FDG PET whole body scan alone in patients with lymphoma is cost-effective compared to the current conventional staging algorithms because, although it is more expensive than the older imaging modalities, it may reduce the total cost of staging work-up by focusing the lymphoma lesions [13]. Fusion of metabolic PET and anatomic CT images in the PET/CT scan improves the diagnostic accuracy, decreases false positive rates and renders the method more accurate than CT or MRI alone or side-by-side visual interpretation of PET and CT images, in the detection of residual lymphoma

disease [14], in tumor diagnosis and in metastatic staging [15, 16]. Also PET/CT scan can detect infradiaphragmatic nodal lymphoma better than PET/CT or ^{67}Ga SPET scan alone [17-19]. *In conclusion*, our case has shown that ^{18}F -FDG PET/CT scan has identified splenic Hodgkin's lymphoma-IVB involvement in an 18 years -old man where ^{67}Ga SPET scan was negative.

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