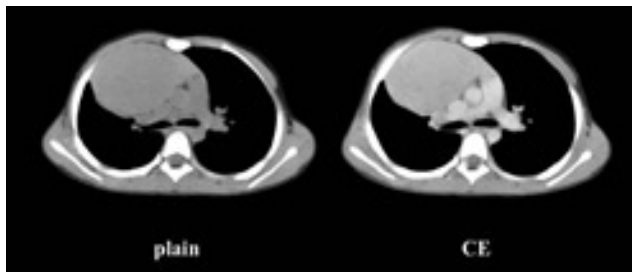


## First description of the role of $^{18}\text{F}$ -FDG-PET/CT as compared to CT, MRI to suspect a case of thymoma in a pediatric patient

**To the Editor:** In childhood, thymoma is a rare tumor of the anterior mediastinum [1-4] and no positron emission tomography with fluorine-18 fluorodeoxyglucose/computed tomography ( $^{18}\text{F}$ -FDG-PET/CT) findings have been reported to date. We report a case of pediatric thymoma in a patient who underwent  $^{18}\text{F}$ -FDG-PET/CT. This imaging modality appears to offer useful information for differential diagnosis.

A 5 years old boy was admitted to our hospital for further examination of a mediastinal mass that had been identified incidentally on chest radiography. A huge anterior mediastinal mass was recognized on CT, with density comparable to muscle and mild homogeneous enhancement after intravenous administration of contrast media (Fig. 1). No calcification or fat component was recognized. On MRI, the mass showed low signal intensity on T1-weighted imaging and homogeneous enhancement after administration of Gd-DTPA (Fig. 2).

Signal hyperintensity on diffusion-weighted imaging was also observed. Given these findings on conventional imaging and the incidence of anterior mediastinal tumors in childhood, lymphoma was suspected despite an absence of any significant elevation of soluble interleukin-2 receptor (sIL-2R).

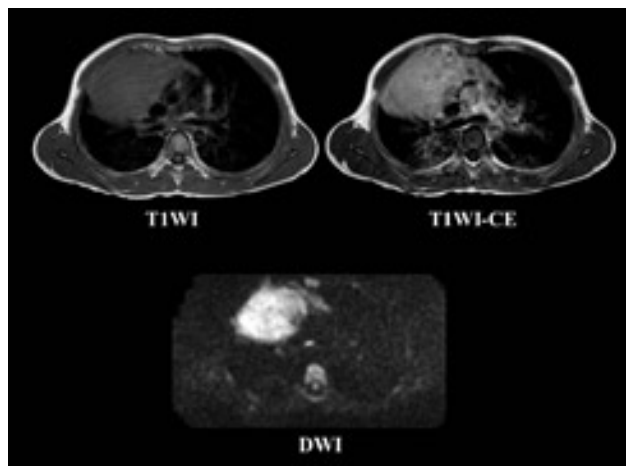


**Figure 1.** Results of CT. On plain imaging, the tumor shows homogeneous enhancement with iso-density to muscle (left). After intravenous administration of contrast media, mild homogeneous enhancement is observed (right)

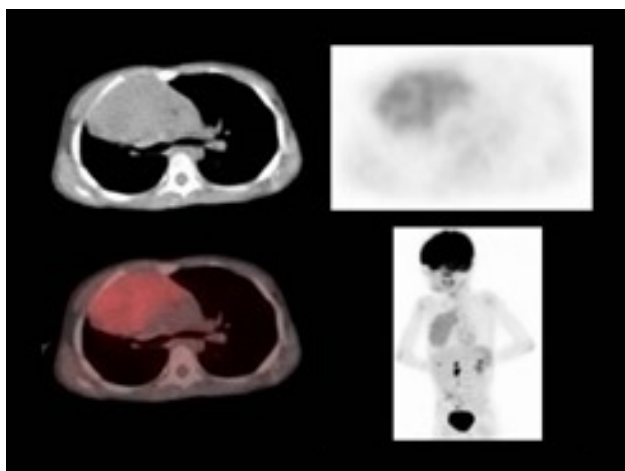
Fluorine-18 FDG-PET/CT showed only mild  $^{18}\text{F}$ -FDG uptake (SUVmax, 2.6) in the anterior mediastinal tumor, contrasting with the expected result for lymphoma (Fig. 3). Given this finding, the possibility of low-risk thymoma was suggested despite the uncommon nature finding of this anterior mediastinal tumor in childhood.

The patient underwent open chest biopsy and lymphoma was ruled out on rapid diagnosis. Total extirpation of the tumor was subsequently performed. The final diagnosis was type B1 (low-risk) thymoma (Fig. 4).

Thymoma is known as a common anterior mediastinal tumor in adults. Some authors have reported thymoma as the most common mediastinal tumor (36%) in adults and describe thymoma as rare in the pediatric population (4%) [1]. Others reported that thymoma comprises about 1.5% (3 of



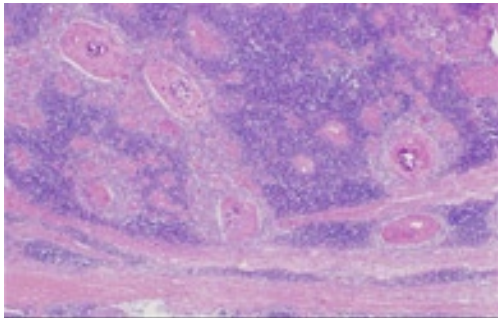
**Figure 2.** Results of MRI. The tumor shows low signal intensity on T1-weighted imaging (T1WI, upper left) and homogeneous enhancement after administration of Gd-DTPA (T1WI-CE, upper right). On diffusion-weighted imaging (DWI), signal hyperintensity is apparent (lower).



**Figure 3.** Results of  $^{18}\text{F}$ -FDG-PET/CT (CT (upper left),  $^{18}\text{F}$ -FDG-PET (upper right), fused image (lower left), whole-body MIP image (lower right)). Only mild  $^{18}\text{F}$ -FDG uptake is apparent in the anterior mediastinal tumor.

196 cases) [2] or, 1% [3, 4] of mediastinal tumors in the pediatric population, while as the most common pediatric mediastinal tumor they consider lymphoma, representing 43% of all tumors [2].

Lymphoma usually appears as a mass with homogeneous enhancement after intravenous administration of contrast media on CT. On MRI, homogeneous enhancement with Gd-DTPA on T1-weighted imaging is also observed and signal hyperintensity on diffusion-weighted imaging is thought to be a characteristic finding reflecting higher cellular density. In the present case, these findings were observed on both CT and MRI and considered consistent with lymphoma, particularly



**Figure 4.** Histological specimens. The tumor consists of both a thymic cortical area (lymphocyte-rich) and a medullary area (formation of Hassall bodies) without lobulation. These findings are consistent with type B1 thymoma.

given the incidence of this pathology. However, the mild uptake of  $^{18}\text{F}$ -FDG on  $^{18}\text{F}$ -FDG-PET/CT was not like lymphoma. Others reported on the role of  $^{18}\text{F}$ -FDG-PET in the assessment of anterior mediastinal masses [5], with SUVmax significantly lower in low-risk thymic tumors than in high-risk thymic tumors or lymphomas, they described SUVmax  $<5$  as associated with a high probability of a low-risk thymic tumors. Based on that report, we considered the possibility of low-risk thymoma in our case. In another report [6], an increasing tendency of SUVmax was observed according to tumor type, in the order low-risk to high-risk thymoma to thymic carcinoma. This report also suggested that mild  $^{18}\text{F}$ -FDG uptake may indicate low-risk thymoma.

The clinical significance of  $^{18}\text{F}$ -FDG-PET/CT in this case was the contribution to treatment planning. The standard treatment for low-risk thymoma is surgery, whereas chemo- or radiotherapy is typically applied for lymphoma. When lymphoma was strongly suspected, only open biopsy without preparation for surgery would be performed. Once low-risk thymoma became suspected based on  $^{18}\text{F}$ -FDG-PET/CT findings, preparation for operation was undertaken and total extirpation of the mass was performed after open chest biopsy. As described above, thymoma and lymphoma show similar findings on CT and MRI and differentiation using conventional imaging is thus difficult. However,  $^{18}\text{F}$ -FDG uptake differs substantially between these pathologies, giving  $^{18}\text{F}$ -FDG-PET/CT a useful role to play in treatment planning. In this respect, the possibility of low-risk thymoma should be considered when mild  $^{18}\text{F}$ -FDG uptake is observed for an anterior mediastinal mass even in a pediatric patient.

*In conclusion*, mild  $^{18}\text{F}$ -FDG uptake indicated low-risk thymoma better than CT or MRI in a pediatric patient and thus supported appropriate treatment planning.

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*The authors declare that they have no conflicts of interest.*

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