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LETTER TO THE EDITOR

CT perfusion in characterizing anterior mediastinal solid tumors

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Dear Editor,

In the January-February 2017 issue of *Diagnostic and Interventional Radiology*, Bakan et al. (1) reported on the usefulness of quantitative parameters derived from computed tomography (CT) perfusion in characterizing anterior mediastinal solid tumors. Notably, on a cohort of 25 patients, they found significantly lower blood volume and blood flow in "nonthymoma malignancies" compared with thymomas (1). Their results add valuable information to optimize diagnosis and clinical decision-making. However, some considerations should be pointed out.

First, in the introduction, the authors reported that thymectomy is not therapeutic for thymic hyperplasia. This information is inaccurate because, although myasthenia gravis is an exclusion criterion, Wolfe et al. (2) recently proved the benefit of thymectomy in patients with nonthymomatous myasthenia gravis, including lymphoid thymic hyperplasia, for improving clinical outcomes and reducing the need for immunosuppressive therapy.

Second, the cohort included eight cases of thymic hyperplasia with diagnosis obtained through histology in four cases and chemical-shift magnetic resonance imaging (MRI) in the remaining cases. However, the authors should provide the type of hyperplasia (lymphoid or rebound) at histology and should declare clinical condition inducing rebound hyperplasia if histology demonstrated normal thymic tissue (3). Similarly, they should provide clinical information on the remaining four patients of this group to suppose lymphoid or rebound type. Moreover, it should be stressed that an alternative diagnosis of normal thymus cannot be excluded in the latter cases because normal thymus with soft tissue attenuation at CT is also seen in adulthood. This differentiation may be important since, based on the different histologic composition of lymphoid hyperplasia compared with normal thymus, we found different apparent diffusion coefficient values at diffusion-weighted imaging between these entities in patients with myasthenia gravis (4). Hence, similar differences cannot be excluded by using quantitative data from CT perfusion.

Third, the authors did not provide WHO and Masaoka-Koga classifications of thymomas with relative quantitative metrics at CT perfusion. Despite the small thymoma group, this information would help reader in the interpretation of results because the wide range of histologic types and different clinical behavior of thymomas could be the basis for different values at CT perfusion. Moreover, the term "benign" used by Bakan et al. for thymic epithelial tumors should be avoided because of unfavorable prognosis in advanced thymoma, with 10-year overall survival rates from 84% in stage I to 42% in stage IVA.

Lastly, among limitations of the study, the authors declared a relatively high standard deviation in thymoma group because of different stages of thymoma in their cohort. However, standard deviation of groups or diseases was not reported in Table or in Results and, anyhow, it should not be used if sample data are not normally distributed. Indeed, the non-normal distribution of data in the study can be supposed by the use of median values and nonparametric Mann-Whitney U test to compare medians between groups. Rather than standard deviation, the authors should provide, together with the absolute range in the Table, a percentiles range (e.g., the interquartile range) to accurately describe distribution and spread of data.

Conflict of interest disclosure

The author declared no conflicts of interest.

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Author Reply

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Dear Editor,

I would like to thank Priola et al. for their interest and comments on our manuscript. As a reply to their specific considerations we would like to mention a few points.

First, as a response to the sentence "Wolfe et al. (1) recently proved the benefit of thymectomy in patients with nonthymomatous myasthenia gravis, including lymphoid thymic hyperplasia, for improving clinical outcomes and reducing the need for immunosuppressive therapy," we would like to underline that our manuscript reads "while thymectomy is often performed for thymoma, it is not therapeutic for thymic hyperplasia." This information was based on Kent et al. (2), which is published before Wolfe's study. Wolfe et al. (1) was not published at the time that our manuscript

Table. Interquartile ranges of perfusion parameters for subtypes of anterior mediastinum lesions

	BF	BV	PS
Thymic hyperplasia	33.67–69.57	5.32–12.57	11.66–27.94
Thymoma	48.47–111.7	8.47–19.41	11.33–27.53
Lymphoma	24.91–56.16	3.08–6.82	3.83–14.41
All malignant tumors	25.75–59.43	4.67–8.77	11.43–16.99

This Table is intended to be an addendum to data presented in Bakan et al. (1). Please refer to the abovementioned article for all perfusion parameters data.
BF, blood flow; BV, blood volume; PS, permeability surface.

was submitted, nor accepted for publication (it was published on August 2016). These two important studies present contradicting results on therapeutic thymectomy. Thus, we believe that both studies should be taken into consideration in further research on this topic.

Second, Priola et al. (3) reported that diffusion-weighted imaging (DWI) is a valuable imaging method for defining the normal thymus, by determining unrestricted diffusion with high apparent diffusion coefficient values. Also, it has been shown that, DWI has an important role in differentiation of lymphoid hyperplasia from rebound hyperplasia (3). Since normal thymus and thymic hyperplasia may show similar attenuation, CT is an insufficient imaging method for differentiating these entities. We could not measure CT perfusion parameters of different types of thymic hyperplasia because of the small sample size. All of our four cases with histologic diagnosis were rebound hyperplasia. In our study, the thymic hyperplasia group comprised three patients receiving corticosteroid therapy, two patients undergoing major surgery, two patients with malignancies, and one patient with sepsis.

Third, thymomas exhibit morphologic heterogeneity, with several WHO subtypes often present in the same tumor. The WHO classification system cannot be used to anticipate clinical outcome (4). According to 2004 WHO classification system, the thymomas have five separate histologic subtypes: A, AB, B1, B2, and B3. In our study, the term "benign" was used for defining thymomas of type A to type B3 subtype. We did not compare CT perfusion parameters between the types of thymoma according to the WHO or Masaoka-Koga classification due to the small sample size (n=7). Our cases comprised two patients with type A, one patient with type AB, two patients with type B1+B2, one patient with type B2, and one patient with type B2+B3 thymoma.

Lastly, Mann-Whitney U test was preferred because of the small sample size. Moreover, the groups were not normally distributed. Interquartile range for all groups are given in the Table.

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