LETTER TO THE EDITOR

Comment on: "the FDG PET/CT score" for the diagnosis of malignant pleural effusion

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Dear Sir,

Pleural effusion, caused by a number of malignant and benign diseases, is a common and challenging medical problem. Malignant pleural effusion (MPE) is frequently observed in multiple malignancies, with lung cancer being the most frequent underlying malignancy [1, 2]. The diagnosis of malignant pleural effusion adversely affects a patient's staging and prognosis and may alter the therapeutic approach [3]. Computed tomography (CT) and positron emission tomography (PET) as non-invasive methods have been used to characterize pleural effusion as malignant or benign and can trigger the determination of etiology in some cases [4]. Meta-analysis by Porcel et al. had predicted the pooled sensitivity, specificity, and positive likelihood ratio of 81%, 74%, and 3.22 respectively with area under the curve of 0.838 for identifying malignant effusion using semiquantitative interpretation of integrated PET-CT imaging system [5]. However, none of the imaging measurements appear to predict the probability of MPE enough to be recommended in the routine work-up for effusion of undetermined cause.

The study by Yang et al. addresses an important question regarding the predictive value of ^{18}F-FDG uptake in assessing the nature of pleural effusion [6]. Arguably, this innovative study is of major interest as multiple issues hamper the standardization of ^{18}F-FDG parameters for diagnosing the nature of pleural effusion. These Chinese researchers have developed and validated a method to differentiate malignant pleural effusion (MPE) from benign pleural effusion using simple-to-use positron emission tomography/computed tomography (PET/CT) score that uses multiple PET-CT parameters that

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would enable clinicians to diagnose MPE from benign pleural effusion. The study included 273 consecutive patients (199 derivation cohort and 74 validation cohort) with pleural effusion who underwent ^{18}F-FDG PET/CT scan for various clinical indications. A total of 29 PET/CT parameters were assessed for discriminatory analysis of pleural effusion, 19 of them were found to be statistically significant with $p < 0.01$ on univariate analysis. When subjected to multivariate analysis, five of these parameters proved to be predictive of malignancy, which were used to establish "the PET/CT scores" [6].

None of the individual parameters reported in the study were predictive for diagnostic purpose but were meaningful as a combined group. The authors emphasized a score of 4 or greater on a 10-point scale to be predictive of malignant pleural effusion.

However, certain points in "the PET/CT score" needs better clarification before the final clinical application. First, the authors did not provide a more thorough analysis of the heterogeneity in the patients with ^{18}F-FDG avid multiple lung nodule/masses in the ipsilateral lung, whether to provide score of 3 as per point 1 or score of 1 as per point 4. Whether the patients with ipsilateral lung nodules would belong to either or both categories needs better clarification. Secondly, the authors did not detail the presence of extra-pulmonary malignancies. Extra-pulmonary malignancy may be present on the initial staging scan along with pleural effusion, which will amount to a score of 3, raising the likelihood of MPE, but pleural effusion might also develop in an old treated case of extra-pulmonary malignant disease during follow-up or might be a side-effect of chemo/radiotherapy. Whether these patients will also be evaluated for MPE, using the same scoring method or not, the study falls silent on this. Thirdly, the pleural effusion is observed to be bilateral in a significant number of cases. Whether bilateralism of the pleural effusion increases the likelihood of malignancy or not, we were not able to find an adequate explanation for this in the study. In reality, certain clinical scenario may be present in which patients may have

bilateral pleural effusion, out of which ipsilateral pleural effusion might be FDG avid while contralateral pleural effusion might be non-FDG avid, how to apply scoring in these patients is also a noteworthy query.

Min-Fu Yang and colleagues have done an excellent work and probably designed the best retrospective analysis to date, regarding the evaluation of malignant pleural effusion using ^{18}F-FDG PET/CT parameters. If this criterion is validated in large prospective trials, it would represent an amazing breakthrough, as ^{18}F-FDG PET/CT is a routinely used investigation for staging and response evaluation in oncology patients. It would be really impressive to predict the likelihood of malignancy of pleural effusion on ^{18}F-FDG PET/CT which will help the clinician in planning effective treatment and management of the patient to a great extent.

Compliance with ethical standards

Conflict of interest   No conflict of interest to declare.

Statement of informed consent   This article does not contain any studies with human participants or animals performed by any of the authors.

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