Correlation of Segmented Metabolic Tumor Volume with Outcome - Letter


With great interest, we read the publication by Chung et al. (1). In 82 pharyngeal cancer patients undergoing (chemo)radiation, the authors studied the prognostic value of a “metabolic tumor volume” (MTV), defined as increased [18F]FDG-PET uptake in primary tumors and lymph node metastases. Although this concept seems appealing, we feel that comments about the methods are justified.

First, the authors chose a threshold of 2.5 for the standardized uptake value (SUV) for segmentation of the [18F]FDG-PET images, which is commonly applied in NSCLC. Not only is this threshold arbitrary and protocol dependent (2), but the most appropriate threshold for [18F]FDG-PET segmentation in head and neck tumors remains to be determined. As opposed to NSCLC, head and neck tumors are surrounded by closely packed tissue consisting of squamous cells, the cell type the tumor originated from, and peritumoral inflammation hampering PET segmentation. In two recent publications, we showed the effect of applying different thresholds, including SUV 2.5, on the segmentation of primary head and neck tumors and cervical lymph node metastases and advocated the validation of iterative methods (3, 4). Furthermore, as shown by Nagakawa et al. (5), a threshold of SUV 2.5 is ineffective for the segmentation of metastatic lymph nodes, as 30% of patients had reactive cervical lymph nodes with a maximum SUV of 2.5 or higher.

Second, the authors did not incorporate necrotic areas within the tumor or lymph nodes in the MTVs because they do not consume [18F]FDG. However, necrotic volumes are often the result of severe hypoxia, a tumor characteristic adversely affecting treatment outcome and prognosis. Thus, although this approach may be legitimate in terms of defining the MTV, these patients should be either excluded from the analysis or analyzed as separate cohort because this confounding characteristic may also influence the correlation of MTV with short-term outcome.

Third and most importantly, Chung et al. omitted to correlate the gross tumor volumes (GTV) on CT with the MTVs and short-term treatment outcomes in both univariate and multivariate analyses. There is solid evidence that the GTV of the primary tumor and metastatic cervical lymph nodes is one of the most powerful prognostic factors for treatment outcome among patients with advanced-stage disease (6). That is why the anatomic tumor size still forms the basis of the TNM staging system. Consequently, establishing any added value of MTV over anatomic GTV information should have been one of the main goals of the study.

Esther G.C. Troost
Dominic A.X. Schinagl
Johan Bussink
Johannes H.A.M. Kaanders

Department of Radiation Oncology,
Radboud University Nijmegen
Medical Centre, Institute of Oncology,
Nijmegen, the Netherlands

Wim J.G. Oyen
Otto C. Boerman

Department of Nuclear Medicine,
Radboud University Nijmegen
Medical Centre, Institute of Oncology,
Nijmegen, the Netherlands

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References

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