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Letter to the Editor

In Regard to Trotter et al.

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One of the first steps in the radiation therapy process is delineating targets to treat. However, this task may lack precision and be hardly reproducible. That is why Trotter et al wrote a review that suggested to include positron emission tomography (PET) imaging for treatment planning in radiotherapy.[1] Delineated volumes could then be modified compared with those based on the scanner alone. However, several issues persist and must be stressed: larger volumes may mean a better coverage of microscopic spreading, but also a wider margin overflowing healthy tissues; interobserver variations may decrease but not lead to changes in outcomes; different PET segmentation algorithms may lead to different volumes; PET benefits may vary according to treated locations. But this review has the merit to highlight the role of PET that could go beyond cancer diagnosis and staging. Image-based phenotypic precision medicine intends to offer therapeutic options for the majority of patients and diseases.[2] In prostate cancer, Prostate specific membrane antigen (PSMA)-PET was shown to easily identify the dominant lesion,[3] enabling an accurate focal boost for a potentially better disease control.[4] Another example would be mapping hypoxic areas in prostate cancer with [^{18}F]Fluoromisonidazole (18F-FMISO) PET-CT to deliver dose-painting radiotherapy.[5] RTEP5 is phase 2 trial that found improved overall survival due to a radiation therapy boost in hypoxic tumoral lung lesions identified by 18F-FMISO PET-CT.[6] Based on a prospective study on phenotypic imaging in breast cancer with a theranostic approach,[7] a pilot study evaluated immuno-PET using antibodies against carcinoembryonic antigen for a precise mapping and delineation of bone metastasis and showed its feasibility,[8] paving the way for developing the PET-LINAC, a linear accelerator coupled with a PET-CT. Performing PET imaging could also be time-sparing for radiation oncologists. Indeed, 68Ga-DOTATE PET-CT for meningioma contributed to more precise volumes than magnetic resonance imaging[9] and could then help semiautomatic delineation by using standard uptake value (SUV) thresholds.[10] Because of the rich (and complex) data from PET imaging, more advanced models for automation can be developed, with for examples the GloD-LoATUNet and the mask-Net, which are deep-learning algorithms trained for automatic delineation of esophageal gross tumor volume and segmentation of non-small cell lung cancer in one second, respectively.[11,12]

In a near future, PET imaging could become essential for treatment planning for all patients undergoing radiation therapy, and this review represents an inducement to design clinical trials evaluating the role of PET imaging for radiation oncologists, and to better define its place in the practice guidelines.

Disclosures

None to be declared regarding the present paper.

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