

Invited Perspective

^{18}F -FDG PET/CT: timing for evaluation of response to therapy remains a clinical challenge

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Abstract: Utilizing novel imaging modalities for defining response and predicting long-term outcome after treatment may have a significant impact on cancer patient management. ^{18}F -FDG PET/CT has great potential for use in early assessment of response to cancer therapy. However, the lack of a general consensus on a specific set of response criteria makes adoption of PET difficult for the oncology community. The optimal time after initiating therapy for assessing response to treatment also has yet to be clearly determined.

Keywords: ^{18}F -FDG, PET/CT, Therapeutic response, Cancer

Utilizing novel imaging modalities for defining response and predicting long term outcome after treatment may have a significant impact on cancer patient management. Conventional imaging with contrast enhanced computed tomography (CT) relies on changes in size to evaluate response to therapy. Response Evaluation Criteria in Solid Tumors (RECIST) were published in 2000 [1]. Key features of the original RECIST include definitions of minimum size of measurable lesions, instructions on how many lesions to follow (up to 10; a maximum five per organ site), and the use of uni-dimensional, rather than bi-dimensional measures for overall evaluation of tumor burden.

The recently revised RECIST concluded that, at present, there is not sufficient standardization or evidence to abandon anatomical assessment of tumor burden [2]. However, targeted therapies, especially early on, may not cause a significant change in the size of the lesions, despite efficacy at the molecular level. Thus, early assessment of response to such treatments may not be accurate using conventional imaging. The imaging of molecular targets and events may allow even earlier and more accurate assessment of response to new drug regimens. Molecular imaging has a significant impact on therapeutic decisions when favorable

response or failure can be determined early after the initiation of expensive targeted therapies [3, 4]. However, each of these exams may themselves add significantly to the cost and time of patient management. Therefore, it is important to characterize their additional value and to select the most appropriate test or combination of tests to assess response to targeted therapy.

^{18}F -FDG PET/CT has great potential for use in early assessment of response to cancer therapy [5]. However, the lack of a general consensus on a specific set of response criteria makes adoption of PET difficult for the oncology community. The optimal time after initiating therapy for assessing response to treatment also has yet to be clearly determined. The work by Vach and colleagues is very intriguing and definitely linked to this topic [6]. Specially, it explains the difference of important concepts that were not explored in detail until now. This article highlights limitations of previous research on assessment of treatment response by FDG PET that was not adjusted for treatment cycles or for time between baseline and interim PET/CT.

This article highlights the importance of distinguishing between assessing the goodness of a surrogate biomarker such as SUV for treatment

response evaluation (prognosis evaluation study) vs. the study of specific pre-determined gaps of time to perform the quantification (schedule optimizing study). This latter is a novel concept that should be further evaluated.

Although the number of included patients is small, the analytic portion contains good detail, without making it too difficult to understand. While this paper presents a very interesting and important topic, the validity of the results need to be confirmed in larger studies. Therefore, the authors are strongly encouraged to continue their work and present updated results that may change the way assessment of response to therapy by PET is incorporated in clinical trials, as well as eventually in routine clinical practice. Needless to say, it appears that schedule-optimizing studies need to be disease and stage specific, leading to the quest for more research before an adequate answer can be determined.

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