What can and what cannot be accomplished with PET: clarifying ongoing misconceptions

Abass Alavi

Department of Radiology, Perelman School of Medicine, Hospital of the University of Pennsylvania, Philadelphia, USA

Corresponding author: Abass.Alavi@uphs.upenn.edu

Background: The introduction of 2-deoxy-2-[18F]fluoro-D-glucose (FDG) in 1976 as a joint effort of the University of Pennsylvania and Brookhaven National Laboratory opened new perspectives in medical imaging. Although FDG PET/CT has become a unique cornerstone of molecular imaging and one of the most widely used imaging modalities, familiarity with its limitations is of paramount importance for avoiding unnecessary examinations.

Content: FDG PET and PET/CT are now widely used in many oncologic diseases for tumor staging/re-staging and monitoring of disease activity as well as for evaluating the response to administered therapy. However, FDG is a nonspecific tracer and can also accumulate at the sites of many benign processes. Even though dual time-point imaging of FDG PET may be helpful in differentiating malignant from benign processes, exceptions exist, and some authors have even demonstrated significant overlap of FDG uptake patterns in malignant and benign lesions. A variety of other PET radiopharmaceuticals such as FLT, ^{60}Cu-ATSM, ^{18}F-EF5, ^{18}F-FMISO, FIAU, FHBG, FHPG, ^{11}C-Acetate, ^{18}F-Fuoride, ^{94m}Tc-MIBI, ^{18}F or ^{11}C -labeled Choline are increasingly being used in various disorders and their area of clinical applications is expanding. In this context, the lecture is also approaching various controversial domains such as PET applications for imaging islets in pancreas, detecting plaques and tangles in Alzheimer's disease or bacteria at sites of infection. Last, but not least, the presentation provides a brief summary related to novel quantitative techniques such as partial volume correction and global disease assessment.

Conclusion: At the end of the lecture attendees would expand their knowledge about what can and what cannot be accomplished with FDG PET/CT imaging.

Key words: Positron emission tomography, fluorodeoxyglucose, FDG PET/CT limitations.