Other tracer like Fluoro-Deossi-Thymidine (18F-FLT) is used for PET oncological studies, in particular because it does not accumulate into inflammation [7].

Although FDG is widely used in oncological PET covering about 90% of clinical study, there are several situations in which it is not sufficiently sensitive. For this reason, other tracers labeled either with 11C or 18F, were synthesized and tested for the types of malignant tumors that can be FDG negative.

Great effort is made for developing wide range of injectable news radiotracers with high sensitivity and specificity for each histopathologic kind of tumors.

References


2

FDG PET-CT for evaluating response to therapy of advanced cancer

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Over the last years, chemotherapy and radiotherapy have been increasingly used to treat locally advanced cancers. The approach of concomitant chemoradiation followed by surgery has become frequent in several tumors, including colorectal and esophageal cancer. These tumors are well known to show intense uptake of 18F-FDG, and thus pretreatment and posttreatment FDG PET was found useful for predicting response to chemoradiation. In fact in this sheeting conventional imaging techniques, including computed tomography (CT), ultrasound (US), endoscopic ultrasound (EUS) and magnetic resonance (MR) have been shown to be poor predictor of response to therapy, with low accuracy in the post-treatment evaluation. Several studies demonstrated strong association of FDG-PET based response to histological response and overall survival. The rationale of PET accuracy is high metabolic rate of malignant cell and early correlation of metabolism to therapy response. Furthermore the possibility of quantitation of FDG uptake by the tumor mass by means of the Standardized Uptake Value (SUV) allows to study tumor metabolism over time. Therefore FDG PET offers two main parameters which can be evaluated: pretreatment SUV and percentage reduction of SUV after treatment. Available data indicate that FDG PET is useful for evaluating response to chemoradiation, and in particular a significant response is frequently observed (70–90%) in patients with relevant decrease of FDG uptake after therapy.

A field of growing interest for PET use is evaluation of response to therapy in non-operable advanced cancer, as gastric and ovarian tumors. For this purpose PET should be employed for early identification of responders, as early identifications of response to chemotherapy regimens is crucial to identify non-responder cases in order to avoid further cycles of unnecessary chemotherapy which strongly affect the patient’s quality of life. Moreover, early response to chemotherapy allows to plan a more tailored systemic treatment.

Finally new PET–CT tomographs represent a great advance for imaging tumor sites as they acquire both anatomic and metabolic data in the same exam session providing a precise localization for high uptake areas. This feature is particularly important for pretreatment evaluation of advanced cancer.

3

Thermal ablation of lung tumors

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Percutaneous radiofrequency (RF) ablation is a minimally invasive technique used to treat solid tumors. Because of its ability to produce large volumes of coagulation necrosis in a controlled fashion, this technique has gained acceptance as a viable therapeutic option for unresectable liver malignancies. Recently, investigation has been focused on the clinical application of RF ablation in the treatment of lung malignancies. In theory, lung tumors are well suited to RF ablation because the surrounding air in adjacent normal parenchyma provides an insulating effect, thus facilitating energy concentration within the tumor tissue. Experimental studies in rabbits have confirmed that lung RF ablation can be safely and effectively performed via a percutaneous, transthoracic approach, and have prompted the start of clinical investigation. Pilot clinical studies have shown that RF ablation enables successful treatment of relatively small lung malignancies with a high rate of complete response and acceptable morbidity, and have suggested that the technique could represent a viable alternate or complementary treatment method for patients with non-small cell lung cancer or lung metastases of favorable histotypes who are not candidates for surgical resection.