counter. **Results:** All the chromatographic systems evaluated presented [18F]fluoride and [18F]fluoride/ammonium quaternary retained in the origin of the systems. Samples of the reaction showed a radioactive product moving to the front of the TLC-RPc18 using ethanol, and this TLC system was used to analyze the reaction efficiency. Radiochemical yield was calculated considering the Rf 0.5-1.0 radioactive counts in the TLC-RPc18/EtOH. Reaction under condition 1: heating time: 10 min = 24.5%, 15 min = 10.6%. Reaction under condition 2: TEAHCO3 - 10 min = 47.6%, TBAHSO4 - 10 min = 24.8%. **Conclusion:** The results demonstrated the feasibility to produce 1-[18F]fluoro-2-iodo-ethane by both techniques, and heating time and kind of ammonium salt can influence the reaction yield. Directly adding [18F]fluoride to the vial, without using a QMA cartridge, seems to be a good alternative to optimize multiple reaction parameters in the radiolabeling process. This route will be used to optimize parameters for the proposed reaction and for other dihaloalkyl molecules.

Keywords: 1-[18F]fluoro-2-iodo-ethane, Ammonium quaternary, Radiolabeling, [18]fluor.

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EVALUATION OF 18F-PSMA PET/CT UPTAKE IN PATIENTS WITH GASTRIC ADENOCARCINOMA: AN EXPLORATORY ANALYSIS

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A B S T R A C T

Introduction/Justification: Gastric cancer is the fifth most common cancer and the third leading cause of cancer-related death worldwide. The diagnosis of gastric tumors involves a multimodal approach, including upper gastrointestinal endoscopy with biopsy, computed tomography (CT), and endoscopic ultrasound. Positron emission tomography combined with computed tomography scanners (PET/CT) is widely used in cancer diagnosis and staging as it reflects the tumor's molecular activity. However, its indication in gastric cancer is limited, being reserved for specific clinical scenarios. In this context, evaluating new imaging methods for gastric tumors becomes crucial. In recent years, PET/CT targeting PSMA (Prostate-Specific Membrane Antigen) has been explored beyond prostate cancer. PSMA expression in the endothelium of newly formed vasculature (neoangiogenesis) has already been described in other cancer types, such as colorectal, gastric, and pancreatic; however, its role in gastric cancer evaluation remains poorly understood. **Objectives:** This study aims to investigate 18F-PSMA PET/CT uptake in different clinical scenarios of patients with gastric cancer and compare it with 18F-FDG PET/CT uptake (glucose metabolism). **Materials and Methods:** This study was approved by the Institutional Review Board (CAAE 76237023.0.0000.5404). It was conducted in patients diagnosed with gastric adenocarcinoma treated at the Clinic Hospital of Unicamp (HC-UNICAMP) who underwent both Fludeoxyglucose F-18 (FDG) and prostate-specific membrane antigen (PSMA) positron emission tomography/computed tomography (PET/CT) to evaluate radiotracer uptake in the primary lesion and metastases. **Results:** A total of 24 patients with a confirmed diagnosis of gastric adenocarcinoma through upper gastrointestinal endoscopy and biopsy underwent 18F-PSMA PET/CT and 18F-FDG PET/CT. Among them, 5 had metastatic disease, and 19 had localized tumors. Among the 5 metastatic patients, 3 demonstrated PSMA uptake, of whom 2 had undergone chemotherapy before imaging, while 1 had not received chemotherapy prior to imaging. Among the 19 patients with localized tumors, 5 showed PSMA uptake, all of whom had not received neoadjuvant therapy. The remaining 14 patients showed no PSMA uptake, with 2 having undergone neoadjuvant therapy before the scan. Among these 14 patients without PSMA uptake, 6 also showed no FDG uptake, and only 1 had previously undergone neoadjuvant therapy. **Conclusion:** Our results demonstrated that PSMA uptake in gastric cancer is heterogeneous. It is well known that gastric cancer has high molecular, histological, and phenotypic heterogeneity, making its classification and treatment challenging. Accordingly, the findings of this descriptive analysis suggest that PET-PSMA uptake in gastric cancer may be associated with tumor biology, as well as the molecular profile of the tumor and its metastases, supporting the hypothesis that tumor heterogeneity contributes to the uptake or lack thereof of the radiotracer. Differential gene expression analysis may provide valuable insights into tumor heterogeneity and help identify potential biomarkers for patient stratification and the development of novel therapeutic approaches.

Keywords: 18F-FDG PET/CT, 18F-PSMA PET/CT, Gastric Cancer, Tumor Heterogeneity.

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PET/CT WITH ^{18}F-FDG AND ^{18}F-PSMA IN LUNG CANCER: DIFFERENCES BETWEEN ADENOCARCINOMA AND SQUAMOUS CELL CARCINOMA

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A B S T R A C T

Introduction/Justification: Lung cancer remains a leading cause of mortality worldwide. PET/CT with ^{18}F-FDG is widely used for detecting, staging, and monitoring lung cancer by assessing increased glycolytic metabolism in tumor cells. Prostate-specific membrane antigen (PSMA), although primarily a marker for prostate cancer, is also associated with tumor neoangiogenesis and has shown uptake in various malignancies, including lung cancer, suggesting potential theranostic applications. **Objectives:** This study aims to compare the uptake of ^{18}F-FDG and ^{18}F-PSMA in primary and metastatic lung cancer lesions, analyzing differences between adenocarcinoma and squamous cell carcinoma (SCC) subtypes. **Materials and Methods:** Fourteen patients (9 men and 5 women), aged 55–82 years and diagnosed with lung cancer (10 adenocarcinoma, 4 SCC), underwent PET/CT scans on two separate days: 60 minutes after intravenous administration of 0.1 mCi/kg of ^{18}F-FDG and 90 minutes after intravenous administration of 0.1 mCi/kg of ^{18}F-PSMA. Images were assessed by two nuclear medicine physicians and one radiologist. The maximum standardized uptake value (SUVmax) was measured for both tracers in primary tumors, regional lymph nodes, and distant metastatic lesions. The lesions were defined in both tracers by an SUVmax uptake above the background and visual analysis. **Results:** A total of 288 lesions were analyzed (247 adenocarcinoma, 41 SCC). In adenocarcinoma, ^{18}F-PSMA identified 215 lesions, compared to 237 detected by ^{18}F-FDG. Nine lesions were exclusive to ^{18}F-PSMA, while 32 were detected only by ^{18}F-FDG. Forty-five lesions showed higher ^{18}F-PSMA uptake, while 174 exhibited predominant ^{18}F-FDG uptake. The median SUVmax for ^{18}F-FDG was 6.5 (range: 1.8–24.5), compared to 4.0 (range: 0.7–24.8) for ^{18}F-PSMA. In SCC, ^{18}F-PSMA identified 36 lesions, while ^{18}F-FDG detected 41. No lesions showed predominant ^{18}F-PSMA uptake, and SUVmax values were higher for ^{18}F-FDG (median: 8.8; range: 1.3–36.6) compared to ^{18}F-PSMA (median: 2.5; range: 0.9–10.4).We found that SUV values for ^{18}F-PSMA are statistically different between SCC and adenocarcinoma subtypes in the lesions that showed uptake of both radiotracers (Mann-Whitney U test, p-value < 0.0001). Also, a positive correlation was observed for ^{18}F-FDG and ^{18}F-PSMA SUVs in both histological subtypes, being strong for SCC (r = 0.0,8140, p-value < 0.0001) and moderate for adenocarcinoma (r = 0.4278, p-value < 0.0001). **Conclusion:** These findings highlight distinct uptake patterns between adenocarcinoma and SCC using ^{18}F-FDG and ^{18}F-PSMA PET/CT. SCC demonstrated markedly higher ^{18}F-FDG uptake with minimal ^{18}F-PSMA uptake, indicating limited utility of ^{18}F-PSMA in this subtype. In contrast, adenocarcinoma showed higher ^{18}F-FDG uptake in most lesions, but a subset exhibited significant ^{18}F-PSMA uptake, suggesting a potential link between neoangiogenesis and glycolytic metabolism. These results support a complementary role for ^{18}F-PSMA in adenocarcinoma evaluation, particularly in cases with high PSMA expression. Further studies are needed to determine its clinical impact on personalized treatment strategies and theranostic applications.

Keywords: Lung cancer, PET/CT, Tumor Metabolism, ^{18}F-FDG, ^{18}F-PSMA.

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ADIPOSE TISSUE METABOLISM IN RECTAL CANCER PATIENTS WITH CACHEXIA

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A B S T R A C T

Introduction/Justification: Adipose tissue (AT) glucose uptake, assessed by Fludeoxyglucose F-18 (FDG) positron emission tomography/computed tomography (PET/CT), reflects tissue metabolic activity and may be linked to both glucose metabolism by adipocytes and inflammatory cell activity. Additionally, adipose tissue radiodensity, measured by computed tomography (CT), has emerged as a promising metabolic biomarker. Increased AT radiodensity may indicate inflammation or the presence of brown adipose tissue (BAT), providing insights into pathophysiological processes underlying cancer cachexia. **Objectives:** The purpose of this study was to evaluate adipose tissue metabolism, assessed by the visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT) glucose uptake through ^{18}F-FDG PET/CT analysis and VAT and SAT radiodensity assessed by CT in cachexia (C) and non-cachexia (NC) rectal cancer patients. **Materials and Methods:** This is a cross-sectional study involving patients diagnosed with rectal cancer. Cachexia was categorized according to