metabolite profiles using nuclear magnetic resonance (NMR), shows promise in identifying biomarkers for diagnosis and treatment, providing crucial insights into tumours and metabolic changes, allowing for an enhanced understanding of the mechanisms related to the cancer-cachexia process. **Objectives:** In the present study, we analysed the most impacted metabolic pathways affected after a glycaemic clamp in the serum of patients with rectal cancer diagnosed with sarcopenia (S) or not (NS). **Materials and Methods:** In this preliminary study, serum samples collected from rectal cancer patients were prepared through filtration to remove proteins and lipids, followed by the addition of deuterium buffer for magnetic field calibration. The spectra were obtained using NMR (500 MHz), allowing precise identification and quantification of metabolites in biological samples. The obtained spectra were processed by CHENOMX software for phase adjustment, baseline correction, and spectral alignment, and then analysed for metabolic pathways using MetaboAnalyst software. Finally, metabolic profiles were correlated with clinical data from patients ((S) or (NS)) and the time course of the glycaemic clamp (initial time (T0) and final time (after 120 minutes, T1)). Institutional Review Board approval (CAAE: 91217418.2.0000.5404). **Results:** A total of 7 patients were analysed, 3 S and 4 NS. All S were female, and NS group had 3 males and 1 female. The median age was 64 (43-66) years for S and 69 (58-74) years for the NS group. The M-value-TBW and M-value-FFM median (P25-P75) were 4,2 (3,40-5,55) and 4,4 (3,75-5,25), for the S group, and 7,20 (5,65-8,95) and 6,10 (5,63-6,63) for the NS group, respectively. Sarcopenic patients – S –, compared to NS patients, at T0, exhibited increased levels of glycerol (indicating mobilisation of body fat), glycine and threonine (suggesting lean body mass depletion), as well as methylhistidine (corresponding to skeletal muscle degradation), with maintained levels of alanine and urea. After 120 minutes (T1), S patients showed an increase in serum alanine, glycine, and urea, still with a high serum concentration of glycerol, though similar to NS patients, and a reduction in threonine and methylhistidine levels compared to NS patients. These metabolite alterations directly impacted metabolic pathway vias related to lipoic acid metabolism, glutathione metabolism, tryptophan metabolism, branched-chain amino acid degradation (leucine, isoleucine, and valine), glycolytic and gluconeogenic pathways, and pyruvate and pyrimidine metabolism in S patients compared to NS patients. **Conclusion:** The study reveals that S patients present a distinct metabolic profile, impacting metabolic pathways, mainly related to cachexia syndrome effects, compared to NS individuals, thereby enhancing our understanding of the metabolic disturbances in this condition. Mendes, MCS and Madeira, BSM are sharing the first authorship. Gomes-Marcondes, MCC and Carvalheira, JBC were co-advisors in these studies.

Keywords: Cachexia, Metabolism, Metabolomic analysis, Rectal cancer, Sarcopenia.

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PREPARATION OF 1-[18F]FLUORO-2-IODOETHANE AS A PROSTHETIC GROUP FOR [18F]FLUOROETILATION

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A B S T R A C T

Introduction/Justification: [18F]Fluorine is of considerable importance in radiochemistry for positron emission tomography (PET) due to its decay characteristics (18F; beta+ 96.7%, T1 = 2. 109:8 min). Numerous methods for introducing 18F into organic molecules have been developed, with alkylation being one of the methods. Thus, developing the radiochemistry process for the fluorination of dihaloalkyl compounds is a crucial step for the development of new radiotracers. **Objectives:** This work aims to prepare the 1-[18F]fluoro-2-iodo-ethane as a prosthetic group for radiolabeling amine or alcohol functionalized molecules, focusing on developing the radiotracers for molecular imaging. **Materials and Methods:** [18F] Fluoride was produced by the 18O(p,n)18F reaction on [18O] water using cyclotron (GE 16.5 MeV). Radiolabeling method 1: [18F]Fluoride was trapped in a QMA cartridge and released by eluting tetraethylammonium bicarbonate (TEAHCO3 (7.5 mg, 2.47 μmol) in methanol into a vial. The methanol solution was heated at 100oC with a gentle stream of N2 until methanol was evaporated. Acetonitrile (AcN) was added (0.5 mL $\times$ 2) and evaporated to complete drying the system. A solution containing 9 mg (3.19 μmol) of 1,2-diiodoethane in 0.5 mL AcN was added and heated at 100oC for 10 or 15 min. Radiolabeling method 2: Water solution containing [18F]fluoride was added to a vial and dried by azeotropic evaporation with acetonitrile (0.5 mL $\times$ 2) at 100 oC with a gentle stream of N2 over 10 min. An acetonitrile solution containing TEAHCO3 (7.5 mg, 2.47 μmol) or TBAHSO4 (8.3 mg, 2.47 μmol) was added and evaporated; finally, 9 mg (3.19 μmol) of 1,2-diiodoethane in 0.5 mL of AcN was added and heated at 100oC for 10 min. At the end of the reactions, vials were allowed to reach room temperature; a sample was removed and analyzed in TLC-SG and TLC-RPc18 using ethyl acetate or ethanol as the mobile phase. [18F]fluoride ion and [18F]fluoride/ammonium quaternary ion pair were also analyzed by TLC chromatography. Stripes were cut in segments of 1 cm and read in a well

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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