frontal lobes. In this case, the neurological manifestations include epilepsy, ataxia with aspects of stiff-person syndrome, behavior and sensitive alterations. Most of the clinical manifestations mentioned has also been observed in patients with NMDA antibodies, who expressed cingulate gyri, precuneus, parietal lobes and basal ganglia hypermetabolism, and cingulate hypermetabolism, with cerebellar hemispheres hypometabolism, characterizing an anteroposterior gradient of FDG uptake. LGI1 antibodies resulted in hypermetabolism in the basal ganglia and temporal mesial lobe, with frontal hypometabolism. For most of the groups of patients, epilepsy was a common manifestation, followed by behavior and sensitive alterations. The exception is the aquaporin-4 antibody for which muscular disorders are the main symptom, also highlighted in GAD patients. **Conclusion:** PET/CT FDG is able to detect metabolic alterations in brain images with a high sensitivity. Different anti-bodies can show different patterns of hypermetabolism and hypometabolism. More studies with higher casuistic are necessary to better identify each pattern. Moreover, PET/CT FDG with whole body studies is able to detect neoplasm or suspicious neoplasm lesions.

Keywords: Autoimmune encephalitis, FDG-PET/CT images, Paraneoplastic syndromes.

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DIRECT COMPARISON BETWEEN 18F-FDG PET/CT AND 18F-PSMA PET/CT IN RADIOIODINE-REFRACTORY DIFFERENTIATED THYROID CARCINOMA PATIENTS

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A B S T R A C T

Introduction/Justification: Differentiated thyroid carcinoma (DTC) is the most common endocrine malignancy and generally has a good prognosis when properly treated. However, approximately 5-15% of cases become refractory to radioiodine therapy (rRIT), limiting diagnostic and therapeutic options and significantly impacting patient survival. Recent studies have demonstrated prostate-specific membrane antigen (PSMA) uptake in positron emission tomography/computed tomography (PET/CT) scans of advanced DTC, suggesting its potential as a diagnostic imaging target and possibly opening new avenues for theranostic approaches. **Objectives:** To compare 18F-PSMA and 18F-fluorodeoxyglucose (18F-FDG) PET/CT scans of patients with rRIT DTC. **Materials and Methods:** This cross-sectional study included 21 patients with rRIT DTC and locoregional or distant metastases. All patients underwent both 18F-FDG PET/CT and 18F-PSMA PET/CT scans. Uptake intensity was assessed using the maximum standardized uptake value (SUVmax), and lesion location was categorized as thyroid bed, cervical, thoracic, and abdominal lymph nodes, lungs, liver, and bones. The median SUVmax (range) was calculated for both radiotracers. **Results:** Both radiotracers detected lesions in all patients. The number of patients with active disease identified by 18F-FDG PET/CT and 18F-PSMA PET/CT, respectively, in each region was: thyroid bed (6 vs. 5), cervical lymph nodes (15 vs. 15), thoracic lymph nodes (11 vs. 11), abdominal lymph nodes (3 vs. 0), lungs (16 vs. 15), bones (4 vs. 6), and liver (1 vs. 1). In five patients, 18F-FDG identified more affected regions than 18F-PSMA, while in three patients, the opposite was observed. The median SUVmax was 24.2 (5.6–80.9) for 18F-FDG and 17.3 (4.1–73.3) for 18F-PSMA. In 12 patients (57.14%), the SUVmax of 18F-PSMA was higher than that of 18F-FDG. **Conclusion:** Both radiotracers demonstrated uptake in at least some lesions in all rRIT DTC patients. Uptake intensity varied among lesions, with some showing higher 18F-FDG uptake and others higher 18F-PSMA uptake, suggesting a potential complementary role for these tracers in this disease. 18F-PSMA demonstrated a higher SUVmax than 18F-FDG in more than half of the patients, indicating that, in selected cases, PSMA-labeled theranostic approaches may be a viable option.

Keywords: 18F-FDG PET/CT, 18F-PSMA PET/CT, Differentiated thyroid carcinoma, Radioiodine-refractory.

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BRAIN-TO-LIVER RATIO FROM 18F-FDG-PET/CT AS A PROGNOSTIC MARKER IN MULTIPLE MYELOMA

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A B S T R A C T

Introduction/Justification: 18F-FDG PET/CT imaging is widely used in oncology for staging and monitoring treatment response in multiple myeloma (MM). Studies have shown reduced 18F-FDG uptake in the brains of patients with disseminated malignancies, such as malignant lymphoma and other aggressive cancers. This phenomenon is likely associated with the Warburg effect and hyperlactatemia. **Objectives:** This study aimed to evaluate whether the brain-to-liver ratio (BLR) of 18F-FDG uptake in MM patients serves as a prognostic marker. **Materials and Methods:** A total of 82 MM patients diagnosed between March 2011 and May 2019 were included, with a median follow-up of 25 months (range: 0.1 −113). All patients underwent whole-body 18F-FDG PET/CT at diagnosis after fasting for at least six hours and with peripheral blood glucose levels below 180 mg/dL. A dose of 0.1 mCi/kg of 18F-FDG was intravenously administered 60 minutes before image acquisition. Brain and liver standardized uptake values (SUVmean) were determined using automated whole-brain segmentation and a spherical volume of interest (VOI) in the liver. The BLR was calculated by dividing the brain SUVmean by the liver SUVmean for each patient. Descriptive and bivariate analyses were performed. Overall survival (OS) and progression-free survival (PFS) were estimated using the Kaplan-Meier method and compared with the log-rank test (IBM-SPSS v.24). The follow-up data were updated in January 2025. **Results:** The cohort included 55% male patients, with a median age of 64 years (range: 39−87). At diagnosis, 67% had ISS stage III disease, 16% had an ECOG performance status ≥ 2, and 88% presented with bone lesions. Chemotherapy was administered to 94% of patients, with 27% receiving bortezomib. A complete response (CR), very good partial response (VGPR), or partial response (PR) was achieved by 71% of patients. Disease progression occurred in 47% of cases, and the overall mortality rate was 69%. The 60-month OS and PFS rates were 35% and 10%, respectively. The BLR was significantly correlated with sex (R= 32%, P= 0.006), overweight status (R = 32%, P =0.007), ISS stage (R = 23%, P = 0.04), and beta-2 microglobulin levels (R = 42%, P < 0.0001). Patients with a median BLR >2.7 had significantly better OS (50% vs. 13%, P= 0.006) and PFS (3% vs. 0%, P = 0.006). **Conclusion:** BLR derived from 18F-FDG-PET/CT at diagnosis appears to be a strong prognostic indicator of OS and PFS in MM patients, with a cut-off value of 2.7. BLR also correlates with beta-2 microglobulin, a well-established serum marker of tumor burden, and ISS stage III disease. The lower 18F-FDG uptake in more aggressive MM cases may be associated with neoplastic lactate production. Given that brain cells can utilize lactate as an alternative energy source when blood lactate levels rise, this may result in reduced brain FDG uptake. Consequently, BLR may serve as a marker of high glycolytic MM burden and provide an estimate of disease severity.

Keywords: 18F-FDG PET/CT, Brain-to-Liver Ratio (BLR), Multiple Myeloma, Prognostic Marker, Tumor Glycolysis.

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SYNTHESIS, CHARACTERIZATION, AND RADIOLABELING OF MODIFIED EGFR-TARGETING PEPTIDES: POTENTIAL THERANOSTIC AGENTS?

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A B S T R A C T

Introduction/Justification: Cancer remains one of the leading causes of mortality worldwide. Consequently, efforts to overcome the limitations of conventional therapies have increasingly focused on molecularly targeted treatments, with particular emphasis on peptides due to their anti-tumorigenic properties and high affinity for receptors overexpressed in tumors. Peptides designed to inhibit intracellular signaling pathways play a key role in molecularly targeted therapies, often focusing on receptors such as the Epidermal Growth Factor receptor (EGFr), which is overexpressed in many solid tumors. As targeting biomolecules, these peptides can also serve as carriers for radionuclides, enabling both molecular imaging and targeted radionuclide therapy. **Objectives:** This study aimed to develop modified peptides with high affinity for EGFr, thereby enabling their potential application as theranostic molecules. **Materials and Methods:** Anti-EGFr peptides were modified by incorporating two different spacers—hexa-aminocaproic acid (C6) or dodeca-aminocaproic acid (C12)—and by adding the chelating agent DOTA. These peptides were synthesized using the Fmoc/tBu strategy for peptide synthesis. Cleavage from the resin was performed using a reagent mixture with a high concentration of trifluoroacetic acid (reagent K). Subsequently, the peptides underwent characterization and purification through high-performance liquid chromatography (HPLC) and mass spectrometry. A preliminary radiolabeling assay of DOTA-C6-anti-EGFR was conducted using cyclotron-produced yttrium-86 (^{86}Y) in a NaOAc buffer (pH 5.5). The radiochemical reaction was carried out at 95°C for 30 min, followed by purification through a Sep-Pak C18 cartridge to determine the radiolabeling yield. **Results:** The peptides DOTA-C6-anti-EGFr and DOTA-C12-anti-EGFr were successfully synthesized, with yields of 33.8% and 3.3%. HPLC and mass spectrometry analyses confirmed the efficiency of the synthesis, cleavage, and purification processes, as evidenced by the molecular masses corresponding to the expected peptides. Preliminary radiolabeling data for DOTA-C6-anti-EGFr with ^{86}Y demonstrated a radiochemical yield of approximately 96.5%. **Conclusion:** The modified peptides targeting EGFr were successfully synthesized, characterized, and purified. The significantly lower yield obtained for the C12 spacer suggests that peptides incorporating the C6 spacer are more viable for further development. Moreover, the high radiochemical yield of DOTA-C6-anti-EGFR highlights its potential for future radiochemical and theranostic applications, warranting further investigation.