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Introduction/Justification: There have been no head-to-head prospective studies comparing the ability of 18F-Fluoride PET/CT and 18F-PSMA-1007 PET/CT to detect bone metastases due to prostate cancer. So, this study aims to investigate the capacity of 18F-PSMA-1007 to detect bone metastases compared to the reference standard (18F-Fluoride PET/CT) in PCa patients, considering mainly the presence or absence, number and biodistribution of lesions. **Objectives:** This prospective study aimed to compare the ability of 18F-PSMA-1007 PET/CT and 18F-Fluoride PET/CT to detect bone metastases. **Materials and Methods:** Twenty-eight patients with prostate cancer biochemical recurrence were submitted to both 18F-PSMA-1007 PET/CT and 18F-fluoride PET/CT studies. These two radiotracers evaluated the presence or absence, number of lesions, body and bone localization, lesion pattern, and probability of malignancy. **Results:** Twenty-eight patients with prostate cancer biochemical recurrence, mean age of 70.8 ± 8.7 years; Gleason score = 7.72 ± 1.23 and the mean total PSA = 50.2 ± 183.9 ng/mL were included. On a per-patient basis, considering that 18F-Fluoride PET/CT is the gold standard, the 18F-PSMA-1007 PET/CT presented a concordance rate of 96.43%, sensitivity (S) of 92.3%, specificity (E) of 100%, predictive positive value (PPV) of 100% and predictive negative value (PNV) of 93.80% on lesion detection. Evaluating the number of lesions, 18F-PSMA-1007 PET/CT determined a PPV of 91.8% and sensitivity of 86.5%. Bone localization in 18F-Fluoride and 18F-PSMA-1007 were predominant in the dorsal spine (34.62%/62.65%), ribs (32.69%/32.65%)and pelvis (9.62%/12.24%), respectively. Both studies had a concordant rate of 80.76% on rib evaluation, the most conflicting site of uptake between the methods in actual literature. **Conclusion:** 18F-PSMA-1007 has the same ability as 18F-Fluoride to detect PCa bone metastasis in biochemical recurrence, with concordance of 96,43% and 80,00% on a per-patient and per-lesion evaluation, respectively. Both studies demonstrated predominancy of sclerotic and medullar lesions, located preferentially on dorsal spine and ribs, being the last one concordant in 80,76% of studies.

Keywords: Bone metastasis, Fluoride PET/CT, Prostate cancer, PSMA PET/CT, 18F-PSMA-1007.

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COMPARISON OF PET/CT IMAGES WITH 18F-FDG AND 18F-PSMA-1007 IN MUSCULOSKELETAL TUMORS TO EVALUATE THE POTENTIAL OF THERANOSTICS APPROACH

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Introduction/Justification: Sarcomas are malignant tumors in the bone, cartilage, fat, muscles, and vessels. Sar- comas are highly heterogeneous due to the wide variety of histological subtypes and various ana- tomical locations, and thus, the diagnosis and management of these tumors are challenging. Beyond sarcomas, the musculoskeletal system is a frequent site of metastatic tumors and multiple myeloma with lesions that present difficult local control. Imaging exams such as MRI and 18F-FDG (FDG PET/CT) to assess the extent of these tumors play a crucial role in managing these patients. However, PET/CT imaging with 18F-PSMA-1007 (PSMA PET/CT) may be a more interesting diagnostic marker due to the potential Theranostics implications. **Objectives:** This study aimed to compare the performance of FDG PET/CT and PSMA PET/CT images in patients with advanced-stage unresectable recurrent and metastatic musculoskeletal tumors. **Materials and Methods:** Patients underwent FDG PET/CT and PSMA PET/CT imaging with a 24-hour interval be- tween studies. Two nuclear medicine physicians compared imaging findings. **Results:** Eight patients underwent FDG PET/CT and PSMA PET/CT images. In five patients, PSMA uptake was higher than FDG uptake. The highest PSMA uptake occurred in a giant cell recurrent sacral tumor of a 27-year-old male patient; the SUVs for PSMA and FDG were 100 and 16, respectively. A 58-year-old male patient with osteolytic metastasis from renal cell carcinoma in the right scapula presented PSMA uptake higher than FDG (SUVs = 40 and 11, respectively). A recurrent spin- dle cell neural tumor in the upper limb of a 69-year-old male presented PSMA uptake also higher than FDG (SUVs = 27 and 8, respectively). A myxofibrosarcoma mass in the distal right leg of a 61- year-old female presented higher PSMA uptake slightly higher than FDG uptake (SUVs = 18 and 10, respectively). Interestingly, two patients with chordomas had heterogeneous PSMA and FDG up- take. The PSMA PET/CT of a 65-year-old male patient presenting multiple metastases from chor- doma with soft tissue invasion showed uptake higher than FDG in all lesions; the highest SUV was a lesion in the right acetabulum: PSMA SUV = 32 and FDG SUV = 19. This patient presented PSMA-avid additional sites of metastases in mediastinal lymph nodes and the right hepatic lobe, while FDG uptake was minimal in these metastases. In contrast, an FDG PET/CT of a 54-year-old male with a large recurrent chordoma (30x24 cm mass) extending from the level of L4 to the proximal left thigh presented FDG uptake higher than PSMA uptake (SUVs = 31 and 9, respectively). Also, FDG uptake of two patients (52-year-old males) with desmoid tumors in the upper limb was higher than PSMA uptake, although uptake of both radiotracers was low: PSMA SUVs of 3 and 5, and FDG SUVs of 4 and 7. **Conclusion:** The study results show the potential advantage of using PSMA PET/CT and FDG PET/CT to provide additional

information for monitoring patients and combining therapies, especially as PSMA PET/CT demonstrated more extensive disease. PSMA PET/CT has the advantage of the possibility of a Theranostic approach.

Keywords: Musculoskeletal tumors, PET FDG, PET PSMA, Theranostic.

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EVALUATION OF METABOLIC QUANTITATIVE VARIABLES AND QUALITATIVE/VISUAL PET/CT IN PATIENTS WITH RECTAL CANCER WHO ACHIEVED COMPLETE AND INCOMPLETE RESPONSE AFTER NEOADJUVANT RADIOCHEMOTHERAPY

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Introduction/Justification: Patients diagnosed with advanced rectal cancer (RC) are often submitted to neoadjuvant chemoradiotherapy (NACRT) treatment. There is no ideal imaging tool to measure the response of tumor after treatment. **Objectives:** The aim of this study was to evaluate the metabolic parameters obtained by FDG PET/CT, before and after NACRT. **Materials and Methods:** This retrospective study analyzed 518 patients with advanced RC. We divided patients in 2 groups: the ones who achieved a complete clinical response after treatment (good responder group) and the ones who did not achieved complete response (poor responder group). All patients underwent pre-treatment and post-treatment FDG PET/CT, with the post-treatment scan performed on average 19 weeks after treatment completion. Among the exclusion criteria were patients who began therapy before pre-treatment PET/CT and patients who did not have both studies, pre and post treatment. We included 37 patients in the good responder group who met all inclusion criteria and were selected for analysis, and 36 patients in the poor responder group. FDG PET/CT was analyzed by two nuclear medicine physician, and qualitative and quantitative analysis were performed. We used a visual response score (VRS) in qualitative analysis: grade 0 – (not reduce/progress) grade 1 (≤ 33% reduction), grade 2 (> 33% to 66% reduction), grade 3 (> 66% reduction), and grade 4 (no uptake after treatment). The following quantitative parameters were analyzed: SUV, MTV, and TLG, with ROIs drawn with a fixed threshold of 41% and a variable threshold which determined the best delimitation of the tumoral area (best fit value). **Results:** In visual analysis of good responders group the majority of patients had a VRS of grade 4 (62%) and grade 3 (33%). For poor responders group, 45.9% patients had a VRS grade 3 , 32.4% grade 2, 16.2%grades 0 and 1 and only 5.4% in grade 4. The average reductions in the analyzed variables were calculated: For good responders there was a reduction of 83% (SUV-mean with 41%); 68% (SUV-mean - BVF); 84% (TLG -41%); 94% (TLG- BVF); 7.29% (MTV-41%); 78% (MTV- BVF). For poor responders had a lower response rate: 51% (SUV-mean with 41%); 41% (SUV-mean - BVF); 63% (TLG -41%); 75% (TLG- BVF); 37 (MTV-41%); 6,5 (MTV- BVF.) **Conclusion:** FDG PET/CT can provide qualitative and quantitative variables in monitoring neoadjuvant radiochemotherapy response and possibly identify patients who will benefit from earlier monitoring and low-risk patients. Further analyses/studies are still needed to establish a cutoff/value for quantitative measures to aid clinicians.

Keywords: 18F-FDG PET/CT, Neoadjuvant response, Rectal cancer.

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THE NECESSITY OF 24-HOUR DELAYED IMAGING IN PATIENTS WITH PYELOCALICEAL DILATION FOR RELATIVE RENAL FUNCTION CALCULATION: A RETROSPECTIVE ANALYSIS

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Introduction/Justification: Static renal scintigraphy using 99mTc-DMSA is an accurate method for diagnosing and monitoring renal scars and allows for semi-quantification of relative tubular function (RTF). However, in cases of hydronephrosis, radiopharmaceutical accumulation in the pyelocaliceal system may interfere with RTF quantification. Although 24-hour images are typically requested to address this issue, they can inconvenience patients and disrupt the nuclear medicine service routine. **Objectives:** This study aimed to assess the impact of additional 24-hour imaging on RTF quantification in patients with hydronephrosis compared to standard 3-hour images. **Materials and Methods:** A retrospective analysis was conducted on patients who underwent renal scintigraphy with 99mTc-DMSA, focusing on those who received additional 24-hour imaging. Patients were divided into two groups: those aged up to 12 years (Group 1) and those over 12 years old (Group 2). Planar images were acquired 3 hours post-injection of 175 mBq of 99mTc-DMSA for adults and 1.5 MBq/kg for patients weighing up to 40 kg. Additional