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Introduction/Justification: Head and neck squamous cell carcinoma (HNSCC) is the seventh leading cause of cancer in the world, and substantial morbidity and mortality have been attributed to the tumor effects. Radiotherapy (RT) alone or with chemotherapy (CHEMO) and/or surgery is a commonly used treatment but, despite its beneficial effects on tumor control, it can cause early and late adverse effects. RT can cause thyroid dysfunction (TD) in patients with HNSCC, but not all patients treated similarly develop TD. **Objectives:** The study aimed to identify TD among HNSCC patients submitted to external RT, and to identify risk factors for TD in these patients. **Materials and Methods:** This is a retrospective study focusing on early and long-term thyroid function in 285 HNSCC patients treated with RT alone or alone or combined with CHEMO and/or surgery. The patients were seen at diagnosis and follow up at the Clinical Oncology Service of the University Hospital between July 2001 and March 2016. The analysis of the thyroid function data of each patient included in study was done serially after the end of treatment, using free thyroxine (FT4) and thyroid-stimulating hormone (TSH) levels. The study was approved by the Institutional Human Research Ethics Committee (number: 2312237). **Results:** One-hundred fifty-six (54.7%) patients presented TD during follow-up, 153 (53.7%) in long-term. Subclinical hypothyroidism (SCH, 43.5%) was most common, of which 68.5% persisted SCH, 21% overt hypothyroidism, 0.8% central hypothyroidism, and 9.7% returned to euthyroidism at the study end. Mean time after RT for first TD detection was 7.2 months; 3.85 for subclinical thyrotoxicosis; 17.77 for SCH, 42.0 for long-term follow-up TD. Type 2 diabetes mellitus, tumor infiltration of lymph nodes, and no tumor resection were TD risk factors. About: One-hundred fifty-six (54.7%) patients presented TD during follow-up, 153 (53.7%) in long-term. Subclinical hypothyroidism (SCH, 43.5%) was most common, of which 68.5% persisted SCH, 21% overt hypothyroidism, 0.8% central hypothyroidism, and 9.7% returned to euthyroidism at the study end. Mean time after RT for first TD detection was 7.2 months; 3.85 for subclinical thyrotoxicosis; 17.77 for SCH, 42.0 for long-term follow-up TD. Type 2 diabetes mellitus, tumor infiltration of lymph nodes, and no tumor resection were TD risk factors. About SCH progression risk, a direct association with TSH was observed, all patients with TSH $\geq$ 7.5mIU/mL had primary hypothyroidism/SCH, whereas 19.5% with TSH $<$ 7.5mIU/mL persisted euthyroid in long-term follow-up. Oral cavity tumors were associated with euthyroidism/SCH; pharynx/larynx with overt hypothyroidism. **Conclusion:** The data indicate the need for frequent monitoring of thyroid function in HNSCC patients treated with RT, particularly in those with type 2 diabetes mellitus, lymph nodes infiltrated by the tumor, and not submitted to surgical tumor resection. Acknowledgements: This study was supported by grants from the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).

Keywords: Head and neck squamous cell carcinoma, Radiotherapy, Thyroid dysfunction.

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DOES PET/CT WITH 18F-FLUOROESTRADIOL (18F-FES) CONTRIBUTE TO THE ASSESSMENT OF BREAST CANCER COMPARED TO FLUORINE-2-D-DEOXYGLUCOSE (18F-FDG)?

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Introduction/Justification: While fluorine-2-D-deoxyglucose (18F-FDG) PET/CT is commonly used in the assessment of breast cancer, it has limitations, such as its inability to distinguish it from inflammatory and infectious conditions. In this context, another molecular imaging tool, PET/CT with 18F-fluoroestradiol (18F-FES), is emerging as a promising alternative. Preliminary data from the literature already shows comparable sensitivity between these exams in breast cancer with estrogen receptors. In addition, the latter seems relevant because it correlates with the concentration of these receptors, shows their expression non-invasively and suggests a theoretical gain in specificity. **Objectives:** To evaluate whether 18F-FES PET/CT provides supplementary information to clinical reasoning when compared to 18F-FDG PET/CT in the assessment of breast cancer. **Materials and Methods:** A retrospective, observational, and comparative analysis was performed using information stored in the databases of a private institution regarding 18F-FES PET/CT scans performed in the context of breast cancer. The selection criteria required a complementary scan using 18F-FDG, which was met by thirteen out of the 14 tests found, however, one study was excluded from the analysis because its indication could not be precisely classified with the available data. **Results:** The twelve selected tests were carried out between August 2022 and March 2024, on females with a mean age of 62.16 years. The time interval between studies using positron-emitting radioisotopes (18F-FES and 18F-FDG) ranged from 1 to 29 days. The administered activity of 18F-FES varied from 4.0 to 10.0 mCi, and the interval between administration and image acquisition ranged from 45 to 130 minutes. Among the findings showing 18F-fluoroestradiol uptake, breast lesions and thoracic lymph nodes were the most common, present in six and five reports, respectively. The indications for the scans varied, with ten intended for staging/restaging and two

to address clinical uncertainty about the presence of estrogen receptors. In 40% of the staging/restaging subgroup, 18F-fluoroestradiol contributed to the clinical reasoning. 18F-FES showed uptake in lymph nodes without hypermetabolism and was able to provide diagnostic specificity, either by raising suspicion in a finding initially taken as benign or by predicting false-positive metabolic findings due to the absence of estrogen receptors. Regarding the evaluation of hormone receptor expression status, 18F-fluoroestradiol has supported a proposed change in the tumoral immunohistochemistry of a lesion non-invasively. **Conclusion:** 18F-FES PET/CT appears to provide additional relevant information in breast cancer, but future studies should evaluate the method's impact on clinical management.

Keywords: 18F-FDG PET/CT, breast cancer, FES.

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COMPARISON OF 18F-FDG AND 18F-PSMA PET/CT IN PATIENTS WITH NON-SMALL CELL LUNG CANCER

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Introduction/Justification: Lung cancer remains a major global cause of mortality. While 18F-FDG PET/CT is widely utilized for detection, staging, and monitoring, detecting increased glucose metabolism in tumor cells, it lacks theranostic potential. The prostate-specific membrane antigen (PSMA) tracer, initially linked to prostate cancer, is also recognized as a marker of neoangiogenesis, accumulating in various neoplasms and showing promising theranostic capabilities. **Objectives:** This study aims to compare the uptake patterns of 18F-FDG and 18F-PSMA in primary and metastatic lesions of non-small cell lung cancer. **Materials and Methods:** Four male patients diagnosed with non-small cell lung cancer (including two adenocarcinomas, one squamous cell carcinoma, and one unspecified type), aged between 58 and 71 years, underwent PET/CT imaging. 18F-FDG PET/CT scans were performed 60 minutes after intravenous administration of 0.1 mCi/kg of 18F-FDG, while 18F-PSMA PET/CT scans were obtained 90 minutes after intravenous injection of 0.1 mCi/kg of 18F-PSMA. Imaging data were analyzed by two nuclear medicine physicians and one radiologist. The maximum standardized uptake value (SUVmax) of each lesion was measured for both radiotracers in the primary tumor, lymph nodes, and metastatic sites identified through visual analysis, considering values obtained above the cardiac blood pool measured in the left atrium. **Results:** A total of 100 lesions were detected, with 82 identified using 18F-FDG and 92 using 18F-PSMA. Eight lesions were exclusively detected by 18F-FDG, while 14 were only identified by 18F-PSMA. The median SUVmax of lesions in 18F-FDG and 18F-PSMA images was 5.3 (1.7 – 25.0) and 3.7 (0.7 - 12.4), respectively. Brain lesions were more readily identified on 18F-PSMA images, whereas liver lesions were more notable on 18F-FDG images due to the intense physiological uptake of 18F-FDG and 18F-PSMA in the brain and liver, respectively. **Conclusion:** Both 18F-FDG-PET/CT and 18F-PSMA-PET/CT have the ability to identify most lesions of non-small cell lung cancer. Although 18F-PSMA images detected a greater number of lesions, the uptake intensity is generally higher with 18F-FDG. These findings suggest that the two radiopharmaceuticals may have complementary roles in lung cancer by independently detecting lesions with higher glycolytic activity or greater neoangiogenesis, or both simultaneously, which could contribute to a more personalized approach in managing these patients. The results also suggest a possible theranostic approach in selected patients with high uptake of PSMA. Further investigations involving a larger patient cohort are essential to validate these findings.

Keywords: Lung cancer, PET/CT, PSMA-18F, PSMA-68Ga, Theranostic.

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COMPARISON OF 68GA-PSMA AND 18F-FDG-PET/CT IN THE ASSESSMENT OF DESMOID TUMORS

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Introduction/Justification: Recently, the tracer Prostate Specific Membrane Antigen (PSMA), which can be labeled with the radioisotopes 68Ga or 18F, has been commercially