Introdução/Justificativa: O antígeno de membrana específico da próstata (PSMA) é uma glicoproteína de transmembrana do tipo II que se mostra baixa ou não é expressa na próstata normal, mas é altamente expressa no câncer e apresenta-se ainda mais aumentada em pacientes metastáticos resistentes à castração, existindo um consenso no qual seu nível de expressão está ligado à malignidade da doença (MALIK, N. et al., 2015.; RUANGMA et al., 2019). Com isso, novos radiofármacos para o diagnóstico e terapia do câncer de próstata estão sendo descritos com base na descoberta de inibidores de PSMA, que se ligam especificamente ao grupo farmacofórico Glutamato-Ureia-Lisina (Di lorio, 2022). O radiofármaco baseado em PSMA-I&T, radiomarcado com lutécio-177 tem sido bastante estudado no mundo para essa terapia. **Objetivos:** O objetivo foi avaliar a captação do 177Lu-PSMA-I&T em camundongos com modelo tumoral por meio de estudos de biodistribuição invasiva (aprovado pelo CEUA-IPEN). Os estudos pré-clínicos representam importante passo para desenvolvimento e registro do produto, contribuindo para avaliação de segurança e eficácia. **Materiais e Métodos:** O radiomarcado 177Lu-PSMA-I&T (7,4 MBq/0,1 mL) foi inoculado em 20 camundongos com desenvolvimento de modelo pré-clínico de câncer de próstata utilizando células LNCaP, inoculadas no flanco superior esquerdo dos camundongos SCID. O estudo contemplou os tempos de 30, 60 min com e sem bloqueio e 2h após a administração do 177Lu-PSMA-I&T. Os animais foram eutanasiados para retirada do coração, pulmão, pâncreas, baço, estômago, fígado, rins, intestinos, cérebro, músculo, osso (fêmur) e cauda. Os órgãos foram pesados e contados em contador gama tipo poço (Cobra, Packard) para determinar a porcentagem da atividade administrada por grama (%AI/g). Os resultados foram analisados estatisticamente utilizando o programa GraphPad Prism. **Resultados:** O estudo de biodistribuição em camundongos SCID com tumor mostrou um rápido clareamento sanguíneo e excreção renal do 177Lu-PSMA-I&T. A maior captação do 177Lu-PSMA-I&T no tumor foi em 30 minutos, assim como na maioria dos órgãos que expressam PSMA, como os pulmões. Verificou-se uma correlação crescente na razão tumor:sangue em função do tempo, demonstrando a afinidade de ligação do radiofármaco. Analisando-se os grupos de 60 min, o bloqueio apresentou uma boa resposta, com diminuição da captação do 177Lu-PSMA-I&T nos órgãos que expressam PSMA e no tumor, sendo de 2,18 ± 0,27 %AI/g após 60 min sem bloqueio e 0,62 ± 0,17 %AI/g após 60 min com bloqueio. A captação nos rins também diminuiu drasticamente nos animais com bloqueio. **Conclusão:** Este estudo preliminar demonstra a especificidade do radiofármaco 177Lu-PSMA-I&T em modelo animal e representa importante pré-requisito para avaliação clínica, produção e o registro do produto no Brasil para uso disseminado na terapia de pacientes com câncer de próstata resistentes à castração. 1 - Malik, N. et al., Radiofluorination of PSMA-HBED via AI(18)F(2+) Chelation and Biological Evaluations In Vitro. Molecular Imaging and Biology, (2015). 2 - Ruangma A., et al., PSMA for Pet imaging of prostate cancer. The Bangkok medical Journal, (2019) 3 - Di lorio et al., Production and Quality Control of [177Lu]Lu-PSMA-I&T: Development of an Investigational Medicinal Product Dossier for Clinical Trials. (2022)

Palavras-chave: Biodistribuição, LNCaP, Pré-clínico, PSMA I&T.

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BODY COMPOSITION AND INSULIN SENSITIVITY IN PATIENTS WITH RECTAL CANCER

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Introduction/Justification: Glucose intolerance is a metabolic abnormality recognized in patients with cancer cachexia and has been implicated in the development of low muscularity (LM). LM is an important feature associated with the poor prognosis of cancer patients, leading to a reduction in functional capacity, poor quality of life, increased treatment intolerance, and reduced overall survival. LM have been shown to correlate with insulin sensitivity. However, clinical studies evaluating the association between body composition features and insulin resistance are scarce, and the results are contradictory. **Objectives:** The purpose of this study was to evaluate the association between insulin sensitivity and the body composition features of patients recently diagnosed with rectal cancer. **Materials and Methods:** This is a cross-sectional study involving patients diagnosed with rectal cancer. Body composition was analyzed using computed tomography (CT) images processed with the SliceOmatic software based on the difference in tissue measurements by Hounsfield Units (HU). Muscularity was categorized according to Martin's criteria. Cachexia was categorized according to Fearon's criteria. Insulin sensitivity was evaluated using euglycemic hyperinsulinemic clamp. Personal information, tumor characteristics, and biochemical exams were collected from medical records. Statistical analyses were conducted using Stata Corp LP® version 17.0 software. This study was approved by the Institutional Review Board (CAAE: 91217418.2.0000.5404). **Results:** A total of 33 patients were included in the analysis. Low muscularity and cachexia diagnosis were identified in 27% of the sample (n = 9). The low muscularity (LM) group consisted mostly of females aged 55–70 years. There was no

difference in BMI, weight loss, tumor stage, or ECOG score between muscularity groups. The LM group had a lower skeletal muscle area ($p < 0.001$), lower visceral adipose tissue area ($p = 0.01$), and there is no difference in skeletal muscle radiodensity ($p = 0.85$), subcutaneous adipose tissue area ($p = 0.76$), and intramuscular adipose tissue area ($p = 0.46$) when compared to normal muscularity group. A lower handgrip strength was also observed in the LM group ($p < 0.01$). Regarding insulin sensitivity, the LM group had a higher M-value adjusted for Free Fat Mass (FFM) ($p = 0.01$) and M-value adjusted for Total Body Weight (TBW) ($p = 0.0347$). Additionally, a significant negative correlation was found between muscularity and M-value-FFM (rho = -0.5047, $p = 0.004$) and M-value-TBW (rho = -0.4742, $p = 0.0076$). There was no difference in M-value between cachexia and non-cachexia patients. No statistical difference was observed in inflammatory markers (C-reactive protein, Glasgow prognostic score (mGPS), and neutrophil-to-lymphocyte ratio (NLR)) according to muscularity groups. **Conclusion:** There is no insulin resistance associated with LM or cachexia. It is possible that the main determinant of insulin sensitivity is the amount of visceral adipose tissue and systemic inflammation. The LM group exhibits a lower area of visceral adipose tissue, with no discernible difference in inflammatory markers. This study highlights the importance of expanding investigations into the determinants of metabolic changes and body composition in cancer cachexia.

Keywords: Cachexia, Insulin resistance, Metabolism, Muscularity, Rectal neoplasia.

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DEEP LEARNING FOR CT IMAGES SEGMENTATION

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Introduction/Justification: Computed tomography (CT) scans are integral to cancer patient diagnosis, revealing changes in body composition linked to survival progression. The conventional approach to body composition analysis using CT scans is labor-intensive and expensive, demanding skilled professionals and licensed software for manual segmentation of Regions of Interest (ROIs). To address these challenges, we introduce a Deep Learning algorithm designed for automated CT image segmentation, presenting an efficient alternative that overcomes the limitations of the current methodology. Beyond the advantages of speed, automation enhances result uniformity and enables uncertainty estimation. In this presentation, we will show preliminary results from our algorithm, highlighting its potential contributions to survival analysis in cancer patients. **Objectives:** The primary goal of this study was to develop an automated segmentation algorithm for CT scans using Deep Learning models. **Materials and Methods:** In developing segmentation algorithms, a dataset of 453 CT slices at the L3 lumbar vertebral level from gastric cancer patients was utilized, with an 80% training and 20% testing partition. Employing the UNET+ResNet18 deep learning architecture, supervised training utilized manually generated segmentation masks as references. Four dedicated UNET+ResNet18 algorithms were trained for distinct ROIs: Skeletal Muscle (SM), Intramuscular Adipose Tissue (IMAT), Visceral Adipose Tissue (VAT), and Subcutaneous Adipose Tissue (SAT). Segmentation performance on the test set was evaluated using the Dice Coefficient, underestimation and overestimation percentages, Bland-Altman analyses, and qualitative visual inspection of segmented images. **Results:** The UNet+ResNet18 models demonstrated superior segmentation performance for SM, VAT, and SAT, achieving mean Dice scores exceeding 0.95. In comparison to manual segmentation, the Deep Learning algorithm exhibited minor average underestimations and overestimations, both below 5% for these tissues. However, IMAT segmentation exhibited relatively lower performance, with a mean Dice score of approximately 0.86 and underestimation and overestimation percentages around 15% and 13%, respectively. The Bland-Altman analysis revealed mean bias and limits of agreement for mean radiodensities of SM, VAT, SAT, and IMAT as follows: 0.14 [-0.82, 1.10] HU, -0.53 [-2.03, 0.98] HU, -0.18 [-1.70, 1.33] HU, and 0.48 [-3.86, 4.82] HU, respectively. **Conclusion:** The Deep Learning approach provides a standard and fast solution for CT image segmentation, demonstrating good results for SM, VAT and SAT. For these tissues, derived radiomics features could provide valuable insights into the analysis of cancer patient outcomes. Further studies are necessary for enhancing IMAT segmentation, given its challenging small area. Additionally, future investigations should focus on uncertainty estimation in CT images, exploring its impact on segmentation procedures and radiomic feature extraction.

Keywords: Automated body composition analysis, Computed tomography, Deep learning.

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AUTOMATED SYNTHESIS AND IN VITRO STUDIES OF [68GA]GA-FAPI-46 IN HOSPITAL RADIOPHARMACY

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