recent. Thus, a growing need exists to validate software performance in different tasks in different diseases. **Objectives:** To evaluate the performance of artificial intelligence software to determine metabolic tumor burden in the primary staging of rectal cancer. **Materials and Methods:** A cross-sectional retrospective analysis was conducted on 51 histology-proven rectal cancer patients (35% females; mean age = 61 years) who underwent a staging 18F-FDG PET/CT. Whole-body metabolic tumor burden parameters (wbMTV and wbTLG) were quantified semi-automatically and through AI algorithm (Syngovia VB60; Siemens Healthineers Medical Solutions). The AI software's ability to correctly identify and classify the primary lesion, regional lymph nodes, and distant metastases was evaluated. In addition, the intraclass correlation coefficient (ICC) was applied to evaluate concordance between the AI-based software and the semiautomatic software in determining wbMTV and wbTLG. Values above 0.7 were considered to indicate substantial agreement. Resultados: The AI and semiautomatic tumor burden metrics correlated strongly for both wbMTV (ICC = 1.00; 95% CI = 0.94 - 0.99; P < 0.0000) and wbTLG (ICC = 1.00; 95% CI = 0.80 – 0.90; P < 0.0000). Additionally, the AI software's ability to correctly identify lesions compared to the documented staging was better for the identification of distant metastasis (78,57% of patients), mildly adequate to identify regional lymph nodes (50,00%) and had poor performance for identification of the primary lesion (5,76%). On the other hand, the time spent calculating these metrics was less by AI than by the semiautomatic method, especially in patients with advanced disease. **Conclusion:** The determination of whole-body metabolic tumor burden on 18F-FDG PET/CT with artificial intelligence software is challenging because of the physiologic bowel activity. However, deep learning may have the ability to overcome these challenges and may therefore improve the primary staging of rectal cancer.

Keywords: 18F-FDG PET/CT, Artificial intelligence., Rectal cancer.

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SYNTHESIS, CHARACTERIZATION, AND RADIOLABELING OF MODIFIED PEPTIDE FRAGMENTS TARGETING AVB3 INTEGRIN ADHESION MOLECULE OVEREXPRESSED IN TUMORS

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Introduction/Justification: Peptides are biomolecules that have been associated with various physiological responses and have great potential for the diagnosis or treatment of diseases, including various types of tumors. Several studies have shown that biologically active peptides containing the RGD domain have a high affinity with the $\alpha v\beta 3$ integrin adhesion molecule overexpressed in tumor cells, assisting in molecular imaging or targeted radionuclide therapy (TRT) as an anti-tumor agent. **Objectives:** To obtain an anti-integrin peptide fragment modified by incorporating two spacers — hexa-aminocaproic acid (C6) or dodeca-aminocaproic acid (C12) — and by adding the chelating agent DOTA for subsequent radiolabeling with yttrium-86 (86Y). **Materials and Methods:** The modified peptides were synthesized by the solid-phase peptide synthesis method using the Fmoc/tBut strategy. In this strategy, the Fmoc group removal step was carried out with 20% 4-methylpiperidine / 80% DMF, and the amino acid coupling step is usually performed with the diisopropylcarbodiimide/1-hydroxybenzotriazole (DIC/HOBt) acylation mixture. In this step, an excess of Fmoc-amino acids and acylating agents of 2.5 times were used relative to the synthesis scale utilized in mmol/g. Peptide cleavage from the resin and removal of side chain protecting groups were carried out using a mixture containing a high concentration of TFA (reagent K). After synthesis and cleavage, the peptides underwent characterization and purification process through high-performance liquid chromatography (HPLC) and mass spectrometry. The radiolabeling process was conducted utilizing cyclotron-produced 86Y, employing a NaOAc buffer (pH = 5.5). The radiochemical reaction was performed at 95°C for 30 min, followed by filtration through a Sep-Pak C18 cartridge for purification and determination of the radiolabeling yield. **Results:** The DOTA-C6-anti-integrin and DOTA-C12-anti-integrin peptides were efficiently synthesized, and the yields obtained were approximately 12.7% and 26.4%, respectively. Chromatographic analyses obtained by HPLC, as well as mass spectrometry, showed that the entire synthesis, cleavage, and characterization process were carried out properly with visualization of profiles and molecular masses of 1165.3 g/mol and 1249.1 g/mol for the DOTA-C6-anti-integrin and DOTA-C12-anti-integrin peptides, respectively. After the purification process, 14.6 mg and 66.2 mg of pure peptides were obtained. The preliminary 86Y-labeling data indicated a radiochemical yield of approximately 97% for both peptides. **Conclusion:** The proposed modified anti-integrin peptides were efficiently synthesized, characterized, and purified. Preliminary radiolabeling studies with 86Y demonstrated a high radiochemical yield, paving the way for further exploration in radiochemical studies and assays of affinity to tumor cells.

Keywords: Anti-integrin peptides, Tumor cells, Yttrium-86, $\alpha v\beta 3$ integrin.

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AVALIAÇÃO DA BIODISTRIBUIÇÃO DO RADIOFÁRMACO 177LU-PSMA I&T EM ANIMAIS COM MODELO TUMORAL.

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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