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Introduction: Advances in the identification of molecular targets in tumor cells have enabled the development of more precise diagnostic and therapeutic approaches in oncology, through the use of radiopharmaceuticals. In this context, theranostics has gained relevance by integrating diagnosis and therapy within a single molecular platform. Among these agents, 68Ga-PSMA is widely used for prostate cancer imaging and has also demonstrated potential in other PSMA-expressing neoplasms, supporting diagnosis, treatment planning, and therapy response assessment. **Objectives:** This study aims to optimize and standardize the in-house synthesis of 68Ga-PSMA radiopharmaceutical, ensuring reproducibility, safety, and technical feasibility, with a focus on its application in the theranostic model for non-prostatic neoplasms. **Material and Methods:** This prospective study is being conducted at the Nuclear Medicine Service of the Hospital de Clínicas (NMS/HC) - Unicamp and was approved by the Research Ethics Committee (approval number 6,698,585/2024; CAAE 30476720.9.0000.5404). In an automated synthesis module, 68GaCl3 is eluted from a commercial 68Ge/68Ga generator and used for radiolabeling the PSMA-11 peptide. The reaction is performed in acetate buffer at 85°C for 5 minutes, followed by purification, sterilization, and dilution for clinical use. Quality control procedures are being implemented and optimized. To date, radiochemical purity of 68Ga-PSMA has been assessed by thin-layer chromatography (TLC) using TLC-SG and iTLC-SG as stationary phases, with 0.1M sodium citrate and ammonium acetate/methanol (1:1) as mobile phases, respectively. The pH of the final product has been determined. Current analyses include radiochemical yield and purity and chromatographic peak behavior expressed as retention factors (Rf), while stability studies are planned. In parallel, safety procedures and clinical protocols are being developed in collaboration with radiopharmacy and nuclear medicine specialists. Following optimization and standardization of the in-house synthesis methodology, 68Ga-PSMA will be implemented for clinical imaging in patients selected at NMS/Unicamp, supporting theranostic applications in accordance with ethical standards. **Results:** Initial in-house 68Ga-PSMA syntheses were successfully performed, demonstrating consistent radiochemical performance across independent productions (n = 7). Radiochemical purity assessed by TLC showed a mean value of 92.5 ± 3.3% and was further confirmed by direct activity measurement of segmented TLC strips using a dose calibrator, with a mean of 99.2 ± 0.7%. The final radiolabeled product presented an appropriate pH of 5.2 ± 0.3. Chromatographic analysis demonstrated the expected migration profiles. Using ammonium acetate/methanol (1:1) as the mobile phase, 68Ga-PSMA migrated with the solvent front (Rf = 0.9–1.0), whereas with 0.1M sodium citrate, free 68Ga remained near the origin (Rf = 0.3–0.4). **Conclusion:** The optimization and standardization of in-house 68Ga-PSMA production represents an important step toward institutional autonomy, improving access to molecular imaging in oncology. This approach may extend PSMA-based theranostic applications beyond prostate cancer and contribute to the establishment of Unicamp's radiopharmacy as a national reference center.

Keywords: Radiopharmacy, 68Ga-PSMA, Quality control, Theranostics, Non-prostatic neoplasms.

Conflicts of interest: Not declared.

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58

ASSOCIATION OF CACHEXIA AND BODY COMPOSITION WITH CIRCULATING GROWTH DIFFERENTIATION FACTOR-15 (GDF-15) SERUM LEVELS IN PATIENTS WITH GASTRIC AND COLORECTAL CANCER

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Introduction: Cancer-associated cachexia remains a primary focus of clinical research, with increasing attention on molecular targets such as Growth Differentiation Factor 15 (GDF-15). A recent Phase 2 trial showed that GDF-15 inhibition via ponsegromab improved body weight and physical activity, reinforcing its role as a key driver. While other targets are in development, evidence linking GDF-15 to muscle mass remains inconclusive, and gastric and colorectal cancers are underrepresented in these clinical studies. This landscape underscores the need to investigate the clinical implications of elevated GDF-15 levels across specific oncological populations. **Objective:** To investigate associations between body composition, radiodensity, and adipose tissue glucose uptake (via PET/CT) with plasma GDF-15 levels in gastric and colorectal cancer patients. **Methods:** This prospective study included patients with gastric/gastroesophageal junction (GEJ) adenocarcinoma (n=67; 42 analyzed for GDF-15) and colorectal cancer (n=46; 38 analyzed for GDF-15). Data were managed via REDCap. Preoperative serum was analyzed for GDF-15 using Luminex®. Body composition was assessed by CT; cachexia followed GLIM (gastric) or Fearon (colorectal) criteria. Statistical analysis in Jamovi 2.3 included Shapiro-Wilk, × 2, Student's t/ Mann-Whitney U, and Spearman's rank correlation ($p<0.05$). **Results:** In the Gastric/GEJ cohort the median age was 63; 56.7% were male. Mean BMI was 24.5 (±5.05) kg/m^2; however, cachexia (35.9%), sarcopenia (40.9%), and myosteatosis (39.4%) were

prevalent. Cachectic patients had significantly higher GDF-15 (1028 ± 663 vs. 655 ± 293 pg/mL; p = 0.034). GDF-15 correlated with sarcopenia (rho=0.270, p=0.009), myosteatosis (rho=0.293, p=0.030), and negatively with skeletal muscle attenuation (rho=-0.451, p=0.003). No significant association was found with PET/CT glucose uptake (mean SUV) in visceral adipose tissue (VAT) (p=0.441), subcutaneous adipose tissue (SAT) (p=0.911), or muscle (p=0.072). In the Colorectal cohort the mean age was 62.5; 54.3% male. Mean BMI was 28.6 (± 5.1) kg/m^2; cachexia (67.4%), myosteatosis (78.9%), and low muscularity (39.5%) were identified. GDF-15 levels did not differ by cachexia status (p=0.554) but were significantly higher in patients with weight loss (795 ± 400 vs. 404 ± 281pg/mL; p = 0.012). VAT area was significantly larger in patients with GDF-15 >1000 pg/mL (230 ± 35 vs. 136 ± 72, p = 0.017). No association was found with PET/CT uptake in VAT (p=0.774) or SAT (p=0.518). **Conclusion:** GDF-15 was associated with cachexia and musculoskeletal impairment in gastric cancer, and with weight loss and visceral adiposity in colorectal cancer. The lack of correlation with PET/CT glucose uptake suggests GDF-15 influences tissue wasting independent of glucose metabolic alterations in these settings. These results highlight GDF-15 as a potential target for personalized therapeutic interventions in gastrointestinal oncology.

Keywords: GDF-15, Cancer cachexia, Gastric cancer, Colorrectal cancer, PET/CT.

Conflicts of interest: Not declared.

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59

METABOLIC ASSESSMENT OF VISCERAL ADIPOSE TISSUE IN PATIENTS WITH GASTRIC CANCER: AN EXPLORATORY ANALYSIS

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Introduction: Visceral adipose tissue (VAT) plays a key role in metabolic and inflammatory regulation and has increasingly been associated with cancer prognosis. Reduced VAT index, along with higher VAT radiodensity and glucose uptake, has been linked to poor outcomes in cancer patients. However, it remains unclear if these alterations result from lipolysis, systemic or tissue inflammation, or adipose tissue beiging/browning. This cross-sectional study aimed to characterize the metabolic profile of VAT in patients with gastric cancer (GC) by integrating imaging-based metabolic assessment with gene expression analysis. **Methodology:** This study analyzed a subgroup of 36 patients with histologically confirmed gastric adenocarcinoma treated at the Clinics Hospital of the University of Campinas (HC-UNICAMP). All patients underwent 18F-fluorodeoxyglucose positron emission tomography/computed tomography (18F-FDG PET/CT). PET-derived metabolic activity of VAT was quantified using the mean standardized uptake value (SUVmean). VAT gene expression was evaluated using the nCounter system (Elements panel), targeting genes associated with adipocyte browning and differentiation, including UCP1, PPARGC1A, PRDM16, CIDEA, DIO2, TMEM26, CD137, TBX1, ZIC1, and LHX8. Clinical, nutritional, and inflammatory data were collected, stored and managed using REDCap. Statistical analyses were performed with Jamovi software (v.2.3.28). The study was approved by the Institutional Review Board (CAAE: 76237023.0.0000.5404). Results: Patients were stratified according to VAT radiodensity into low- and high-radiodensity groups based on the median value (16 and 20 patients, respectively). No significant differences were observed between groups regarding demographic or tumor-related characteristics. The high-radiodensity group exhibited a distinct anthropometric and body composition profile, characterized by lower body mass index, smaller waist circumference, and a lower visceral obesity. This group also presented significantly lower visceral and subcutaneous adipose tissue areas and indices, along with higher attenuation of both VAT (p < 0.001) and SAT (p = 0.003). SUVmean increased in the high-radiodensity group (p < 0.001). Gene expression analysis revealed no major differences between groups with low and high VAT 18F-FDG uptake, except for reduced DIO2 expression in the high-uptake group, suggesting attenuated local thyroid hormone–mediated thermogenic signalling. A trend toward higher PPARGC1A expression was observed in the high-uptake group, possibly reflecting early beige adipocyte differentiation, although canonical thermogenic and beige adipocyte markers remained unchanged. No significant differences were observed in systemic inflammatory markers between groups. Patients with lower VAT radiodensity demonstrated greater insulin sensitivity. **Conclusion:** In GC patients, high VAT radiodensity and glucose uptake were associated with reduced adipose tissue mass and a distinct metabolic profile, without evidence of systemic inflammation or established adipose tissue browning. These findings suggest that elevated VAT glucose uptake may reflect an early or heterogeneous metabolic response related to cancer-associated alterations rather than active thermogenic remodeling. Further studies with larger cohorts are warranted to better elucidate the underlying mechanisms and clinical relevance of VAT metabolic changes in gastric cancer.

Keywords: Gastric cancer, Visceral adipose tissue, 18F-FDG PET/CT, gene expression, Radiodensity.

Conflicts of interest: Not declared.

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