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# **BOOK OF ABSTRACTS**

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**Canadian Association of Nuclear Medicine**  
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**Eastern Great Lakes Chapter - Society of Nuclear Medicine**

**May 2-5, 2012 / du 2 au 5 mai 2012**  
**Ottawa, Ontario**



001

**<sup>18</sup>FDG PET(CT) AND MERKEL CELL CARCINOMA: A SYSTEMATIC REVIEW OF THE LITERATURE DATA AND META-ANALYSIS IN 463 PATIENTS / 672 PET(CT) STUDIES**

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**Objectives:** Diagnostic performance and impact on management of <sup>18</sup>FDG PET(CT) in Merkel cell carcinoma (MCC).

**Methods:** A systematic review of the literature data and a meta-analysis were performed on “Merkel cell carcinoma” AND “PET” AND/OR “<sup>18</sup>FDG” keywords from *PubMed, Google, BioMedLib, BioMedSearch, Refdoc, Scopus, ScienceDirect, SearchMedica, Ovid, Scirus, EMBASE, HighWire, OncologySTAT, Wiley-Blackwell, MD Consult, J-STAGE, Quertle, and SciVerse HUB databases.* Abstracts (posters and oral communications) from *the SNM, ASCO, ALROS, SSO, ASTRO, ACMS, AAD, MMIG, and ECE societies* were also systematically reviewed.

**Results:** In 80 papers (articles and abstracts), 463 MCC patients had 672 <sup>18</sup>FDG PET(CT) studies from 1998 to 2012. In 210 MCC patients (2 multicenter studies, 7 unicenter studies) <sup>18</sup>FDG PET(CT) had a mean sensitivity of 87.7%, a mean specificity of 95.7%, a mean PPV of 93.7%, a mean NPV of 89.2%, and a mean diagnostic accuracy of 86.3%. In 28 MCC patients (1 unicenter study), <sup>18</sup>FDG PET(CT) had a sensitivity, specificity, PPV and NPV for nodal/distant staging of 70.5%/100%, 100%/76%, 100%/66%, 68.75%/100%, respectively. Metabolic imaging had an impact on imaging work-up, diagnosis, staging, re-staging, treatment, and prognosis.

**Conclusion:** In this systematic review of the literature data and meta-analysis, <sup>18</sup>FDG PET(CT) had a high diagnostic performance in MCC. Metabolic imaging was found useful in the management of MCC.

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002

**NECROSIS ON <sup>18</sup>F-FDG PET/CT CORRELATES WITH PROGNOSIS AND MORTALITY IN SARCOMAS**

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This manuscript or any containing figures or tables have not been submitted to any publication previously. None of the authors have any financial or other relationships that might lead to a conflict of interest. The manuscript has been read and approved by all the authors, and the requirements for authorship have been met. Each author believes that the manuscript represents honest work.

Word Count:

Keywords: Sarcoma, fluorodeoxyglucose, FDG-PET/CT, necrosis, prognosis. Work was performed at: McGill University Health Center

**Purpose:** To determine if there is an association between necrosis as identified on staging <sup>18</sup>F-FDG PET/CT and overall survival (OS), and progression-free survival (PFS) in patients with sarcoma.



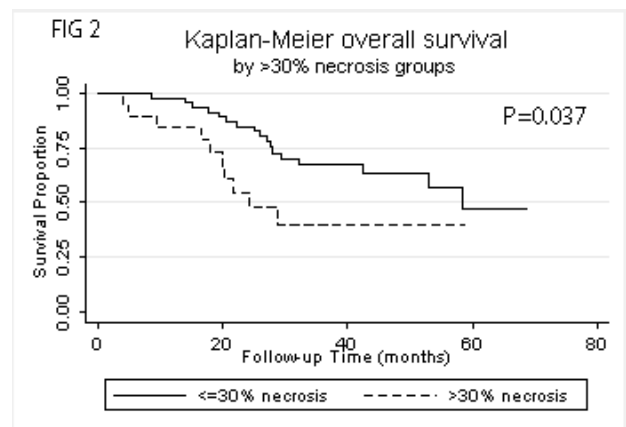
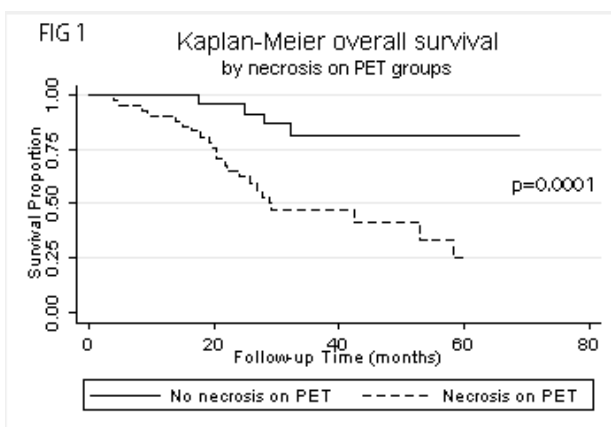
**Methods:** Sixty-six patients with newly diagnosed limb and girdle sarcoma had a positron emission tomography/computed tomography (PET/CT) at our institution between June 2004 and July 2009, for sarcoma staging prior to curative intent treatment. The tumor maximal standardized uptake values ( $SUV_{max}$ ), the presence of necrosis, and the volume of necrosis were measured for each primary tumor and correlated with follow-up data. PFS and OS were analyzed using the Kaplan-Meier method. Proportional hazards models were used to estimate hazard ratios.

**Results:** Median patient age was 49 years. 51.6% of the patients were men. Sarcomas were categorized as soft tissue (69.2%), bone (23.5%) and other (7.3%). Mean follow-up time was 33.3 months. 53% of patients progressed during the follow-up interval and 40.9% died. There was a statistically significant relationship between the presence of necrosis and OS (logrank  $p=0.001$ ), as well as PFS (logrank  $p=0.0001$ ). 24-month OS was 96%, 65% and 38% in patients with tumors with absent necrosis, with presence of necrosis, and with necrosis volume > 50% respectively. 48-month OS was 81% in patients with absent necrosis, and 41% in patients with presence of necrosis. 12-month PFS was 96%, 60% and 42% in patients with tumors with absent necrosis, with presence of necrosis, and with necrosis volume > 50%, respectively. 24-month PFS was 83%, 38% and 22% in these groups.

**Conclusion:** The presence of necrosis, as well as the volume of necrosis, as identified on the staging  $^{18}F$ -FDG PET/CT, and after adjusting for  $SUV_{max}$ , are strong independent adverse prognostic factors for disease recurrence and death in patients with limb and girdle sarcomas.

**Conclusion**

Our results suggest that in sarcoma patients, metabolically diagnosed necrosis on  $^{18}F$ -FDG PET/CT can serve as a more reliable surrogate marker for pathologically diagnosed necrosis and that this metabolically derived data has predictive value on patient outcomes. Further quantifying the amount of necrosis on PET/CT appears to enhance the prognostic potential. These metabolic markers can aid in clinical decision making, prior to surgery, and can help in risk stratification to optimize treatment of this very heterogeneous group of tumors. The presence of metabolically diagnosed necrosis, and significant necrosis volume indicate a higher grade tumor and correlate with poorer progression-free survival as well as overall survival. Nuclear medicine physicians should report on the presence of necrosis in sarcomas and should consider a further quantification of the necrosis, when evaluating staging PET/CT in sarcoma patients.



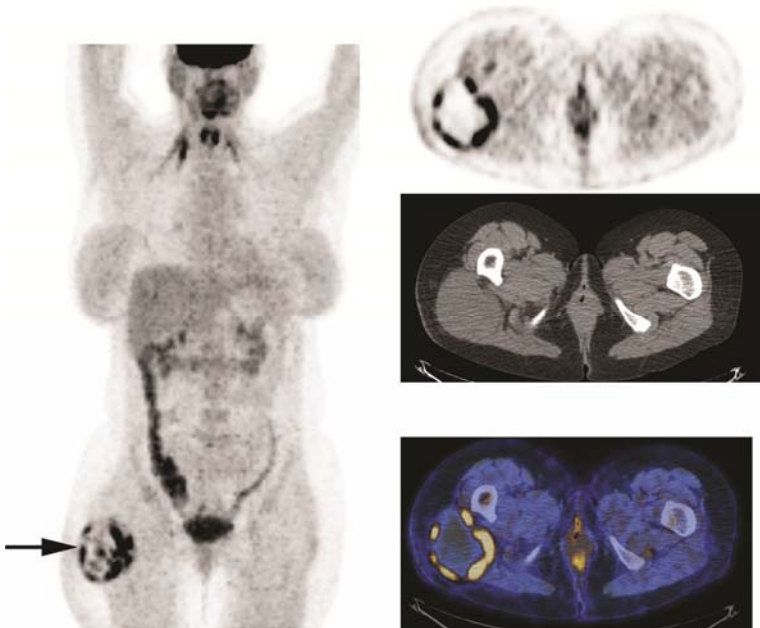
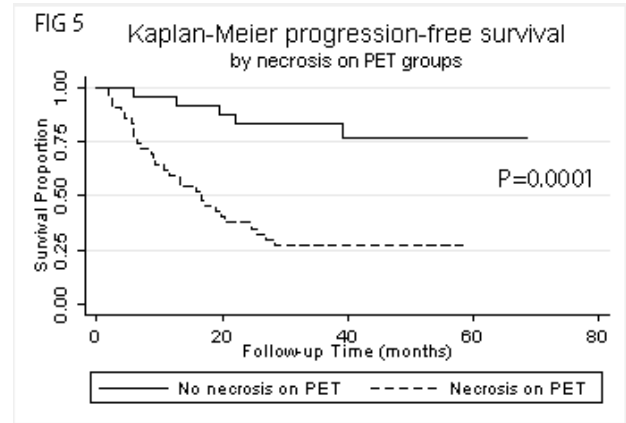
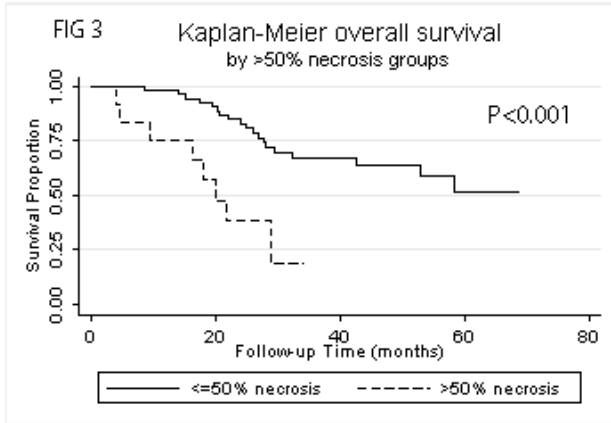


Fig 9 – 57F presented with a large poorly differentiated angiosarcoma of the right buttock that was highly necrotic. The patient’s initial CT chest was normal and the patient underwent preoperative radiation therapy to which she responded satisfactorily. Just 2.4 months later, she returned with metastatic disease to her chest and survived only 4.7 months after initial diagnosis.



003

**<sup>99m</sup>Tc LYMPHOSCINTIGRAPHY WITH SPECT/CT FOR THE IDENTIFICATION OF THE SENTINEL LYMPH NODE IN LUNG CANCER: A PILOT STUDY (PRELIMINARY RESULTS).**

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**Objective:** To develop an imaging protocol for the identification of the sentinel lymph node in early stage lung cancer patients using SPECT/CT.

**Methods:** 23 patients with clinically suspected stage I or II lung cancer (age > 50, no previous lung surgery or radiotherapy) referred for CT-guided lung biopsy were enrolled in the study. At the end of the biopsy before removal of the guiding needle 37 MBq (in 0.5 cc of saline) of antimony sulfide colloid (ASC) or filtered sulfur colloid (FSC) was injected into the biopsy site. SPECT/CT imaging of the chest was performed at 1 hour, 2 hours, or 3 hours after injection. The images were reviewed to assess whether focal nodal uptake of tracer could be identified.

**Findings:** Lymph node activity was identifiable in 11/23 (48%) patients. Three patients demonstrated activity in 2 lymph nodes resulting in 14 identifiable lymph nodes in total. Lymph node stations visualized included hilar (5/14), tracheobronchial angle (2/14), subcarinal (2/14), AP window (1/14), retrocrural (1/14), gastrohepatic (1/14) and internal mammary (2/14). There was a trend toward improved lymph node visualization with use of ASC and longer wait times. Most patients (17/23; 74%) also demonstrated substantial pleural activity, possibly related to lymphatic flow to the pleura. Some patients also demonstrated substantial tracheobronchial activity (5/23; 22%) related to at least partial airway injection as well as substantial liver/spleen activity (4/23; 17%) related to at least partial venous injection.

**Conclusion:** Lymph node activity is identifiable in 48% of patients with this lymphoscintigraphy SPECT/CT protocol. There was a trend to improved visualization with use of antimony sulfide colloid as well as longer post-injection wait times. Lymph node visualization is complicated by substantial background pleural, tracheobronchial, and systemic blood activity in many cases. This data is a useful starting point for the development of more refined imaging techniques to define the sentinel lymph node for patients with early stage lung cancer.

004

**MODIFIED METHOD FOR METHOTREXATE-TC-99M LABELED RADIOPHARMACEUTICAL, SYNTHESIS AND EVALUATION.**

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**Objective:** Synthesis, formulation & labeling of low cost Tc-99m labeled tumor imaging agent.

Currently Methotrexate (MTX) is used as an antagonist of Folic acid which is used in tumor cells. Methotrexate easily accumulates in these cells and produce antineoplastic effect. When Methotrexate was labeled with Tc-99m it gives image of neoplastic cell. A lab scale easy formulation was made using MAG-3 as a conjugating agent.

**Method:** Synthetic reaction was done with measured quantity of methotrexate and MAG-3 at pH 10 using Reflux condenser for 5-Hours. Basic pH produces ionization in both chemicals, and form a complex of MTX-MAG-3 which



was confirmed by chemical analysis using HPLC. MTX-MAG-3 complex was dissolved in stannous-phosphate buffer (pH 10) than  $TcO_4^-$  activity was added and pH was adjusted to 8.

**Results:** Radiochemical purity was analyzed using BIOSCAN (TLC-PMT Detector). Biodistribution study was done using Newzeland strain of Rabbit. Planer and SPECT imaging study were done using dual head gamma camera.

**Conclusion:** Analytical study by HPLC confirmed the complex formation of MTX-MAG-3 (Congugate conc. was 72.3%). Labeling efficiency was 92.7%. Biodistribution study of MTX-MAG-3-Tc-99m shows that maximum labeled compound is distributed in gut and excretes through feces.

Tc-99m labeling of MTX and images of cancer has been studied.

005

### SPECT/CT IN CERVICAL NODE IMAGING

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**Objectives:** To show the benefits of SPECT/CT for sentinel node imaging in cervical cancer.

**Methods:** Using 2 doses of 20mBq Filtered Sulfur Colloid in 0.5mL, four injections are made into the cervix using a 22 g spinal needle. After waiting approximately 20 minutes post injection, imaging is started. Two planar images of the anterior and lateral including transmission views followed by a SPECT/CT are acquired. Imaging takes about 45 minutes. Surgery is performed 2-4 hours post injection.

**Results:** Currently at HHS, 12 women have had cervical sentinel node injections. Imaging using SPECT/CT was performed on 5 of them. SPECT/CT imaging was useful in delineating external, internal and lower iliac nodes as well as any para-aortic lymph node uptake.

**Discussion:** SPECT/CT is the best method for localizing lymph nodes. It is superior to planar imaging in helping determine a more specific pathway for drainage. Any area undergoing sentinel node injection can benefit from a SPECT/CT; however its use in pelvic imaging has proved to be of most value. This is due to the complex drainage pathways of the pelvis, since there are more lymph node chains that the area of concern can drain into. Prior to surgery, the review of images aids in locating lymph nodes intraoperatively.

**Conclusion:** SPECT/CT has shown to be beneficial in localizing lymph nodes. It helps determine which specific pathways the area is draining into, and can give accurate anatomical landmarks for removing node intraoperatively. More imaging needs to be done here at HHS to determine the full extent of these benefits.

006

### MULTICENTRE TRIAL STANDARDS AND QUALITY ASSURANCE FOR THE LOW-DOSE 3D PET TRIAL: RUBIDIUM ARMI (ALTERNATIVE RADIOPHARMACEUTICAL FOR MYOCARDIAL IMAGING)

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**Objectives:** To standardize low-dose 3D Rb-82 PET myocardial perfusion imaging (MPI), as an alternative to Tc-99m SPECT, with highly repeatable interpretation in Canadian centers using 3D PET-CT technology.

**Methods:** Standardization of imaging protocols and quantitative polar map scoring was performed via rest and stress phantom scans at the 7 participating sites. Patients subsequently underwent low-dose (10 MBq/kg) rest and dipyridamole stress Rb-82 MPI. Sum stress, rest (SSS, SRS) and difference scores (SDS=SSS-SRS) were visually assessed using a 17-segment model and 4DM-PET. N = 25 quality assurance cases from all sites were co-read to assess variability of scoring, interpretation and image quality. Cases with SDS differences  $\geq 3$  underwent a third review to reach consensus.

**Results:** Qualifying phantom scans resulted in the expected scores of SSS, SDS = 2 at all sites on 8 different PET-CT scanners. Scoring of patient scans between core and recruiting sites showed very good agreement using the intraclass correlation coefficient (ICC):  $r = 0.91$  for SSS and  $0.86$  for SDS. 81% of SSS scores and 87% of SDS scores had differences (site-core)  $\leq 3$ . Following consensus review, agreement improved to:  $r = 0.98$  for SSS and  $0.96$  for SDS ( $p < 0.05$  for both). Interpretation was found to be in excellent agreement with  $\kappa = 0.93$ . Image quality was perceived differently by the site vs. core reviewers (88% vs. 73% rated as good;  $p < 0.05$ ).

**Conclusion:** With effective standardization and training, good agreement in scoring of Rb-82 MPI scans at the core and recruiting sites was achieved, demonstrating that standardized and repeatable interpretation is achievable across imaging centers using different 3D PET-CT scanners.

Financial support from CIHR grant: MIS100935.

007

### 18F-FLUORODEOXYGLUCOSE POSITRON EMISSION TOMOGRAPHY/COMPUTED TOMOGRAPHY IN CARCINOMA OF UNKNOWN PRIMARY: 6-YEAR SINGLE INSTITUTION EXPERIENCE

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**Objective:** Carcinoma of unknown primary (CUP) is a heterogeneous group of tumors with various clinical features causing diagnostic and therapeutic challenges. F-18 fluorodeoxyglucose positron emission tomography/computed tomography (F-18 FDG PET/CT) has the advantage of disclosing hypermetabolic foci including malignant disease throughout the body. The aim of this study was to evaluate the ability of F-18 FDG PET/CT for localizing the primary tumor, disclosing additional metastases, and changing the treatment in patients with CUP.

**Materials & Methods:** Between January 2006 and December 2011, 122 metastatic patients (female: 46, male:76, median age: 60.5 yrs, age range: 24-90 yrs) whom conventional diagnostic workup failed to disclose the primary tumor were included in the study. F-18 FDG PET/CT imaging was performed in a standard protocol (patient supine, arms lateral, vertex to thigh, 358 MBq, range: 296-444 MBq F-18 FDG, Siemens Biograph 2, a 60-minute uptake period, 6-7 bed position). Histopathology was taken as the only reference standard.

**Results:** F-18 FDG PET/CT correctly detected primary tumor in 42 of 122 (34.4%) patients. Lung was the most common site of primary tumor (n: 20). F-18 FDG PET/CT imaging disclosed additional previously undetected



metastases in 36 of 122 (29.5 %) of patients. F18-FDG PET/CT results changed the treatment in 37 of 122 (30.2%) patients.

**Conclusions** F-18 FDG PET/CT is able to disclose the primary tumor, disclose new metastases and change the treatment in about one third of patients with CUP.

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008

### **ASSESSMENT OF HEALTH-RELATED QUALITY OF LIFE, DEPRESSION AND ANXIETY IN HYPOTHYROID PATIENTS WITH THYROID CARCINOMA DURING THYROXIN WITHDRAWAL**

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**Objectives:** Thyroid hormones have significant effects on psychological status. Anxiety, depression and mood disturbances are generic predictors of health-related quality of life (HRQL). We attempted to study the HRQL in patients with differentiated thyroid carcinoma (DTC) during hypothyroidism, which is induced routinely for iodine-131 (I-131) whole body scan and ablative treatment.

**Materials & Methods:** Hundred and forty three hypothyroid patients with DTC (F:101, M: 42, age: 58.7 yrs) who were on low-iodine diet were included in this study. Hypothyroidism was indicated for I-131 scan (n: 30) or I-131 therapy (n: 113). HRQL was studied using the Short Form (SF-36), Hospital Anxiety and Depression Scale (HADS), Profile of Mood States (POMS), Beck Depression Inventory (BDI).

**Results:** The median for serum thyroid stimulating hormone level was 66 mU/L and period of withdrawal 18 days. Histopathology included papillary thyroid carcinoma (n:109) and thyroid follicular carcinoma (n: 34). The results of SF-36 showed that the HRQL was significantly impaired in hypothyroid patients during withdrawal of thyroxin (physical component scale: 44.3±9.5, mental component scale: 40.8±10.2,  $p \leq 0.001$ ). No correlation was detected between TSH level and HRQL components ( $p \leq 0.32$  and  $p \leq 0.72$ ). In multivariate analysis, depression, mood disturbance and anxiety were associated with mental health score on the SF-36 ( $R^2$ : 0.22).

**Conclusion:** HRQL is impaired in hypothyroid patients with DTC during thyroxin withdrawal suggesting that the withdrawal period before I-131 whole body scan and radioiodine therapy should be kept to minimum and when feasible, recombinant TSH administration be preferred.

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009

**IODINE NEGATIVE DISSEMINATED METASTASES OF THYROID PAPILLARY CARCINOMA AT THE TIME OF PATIENT'S INITIAL PRESENTATION: ROLE OF F-18 FDG PET/CT AS THE PRIMARY DIAGNOSTIC TOOL**

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**Objective:** Papillary thyroid carcinoma, particularly recurrent papillary carcinoma metastasizes frequently to regional lymph nodes, and rarely to lung, brain, pancreas, bone and liver, usually as a solitary lesion. Here we report a case of disseminated metastases of multicentric papillary thyroid carcinoma at the time of patient's initial presentation.

**Patient Findings:** Metastasis of papillary carcinoma in the 7th left rib was histopathologically diagnosed in a 50-year old man presented with thoracic back pain. F-18 fluorodeoxyglucose positron emission tomography/computed tomography showed multiple distant metastases throughout the body. The patient underwent T6 and T7 posterior vertebrectomy due to a mass lesion involving these vertebra, and total thyroidectomy and cervical lymph node dissection. Repeated histopathological examinations of specimens obtained from T6-7 vertebrae, thyroid gland and cervical lymph nodes confirmed the diagnosis of papillary thyroid carcinoma. Iodine-131 whole body scan showed no uptake in any metastatic foci. This case report demonstrates the most extensive metastases of radioiodine-negative F-18 fluorodeoxyglucose positive well-differentiated thyroid carcinoma at the time of the patient's initial presentation.

**Conclusion:** When interpreting findings on F-18 fluorodeoxyglucose positron emission tomography/computed tomography that are highly suggestive of widespread metastases, one should consider differentiated thyroid carcinoma in the differential diagnosis.

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010

**Ga-68 DOTATATE AND F-18 FDG/PET CT IN THE DIAGNOSTIC WORK-UP OF A COLLISION TUMOR OF THE THYROID GLAND (MEDULLARY CARCINOMA IN THE LEFT LOBE, PAPILLARY CARCINOMA IN THE RIGHT LOBE)**

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**Objective:** Medullary thyroid carcinoma (MTC) and papillary thyroid carcinoma (PTC) are two separate clinical entities. The coexistence of two contiguous but histologically different tumors within the same organ is called collision tumor. We present Ga-68 **DOTATATE** PET/CT and F-18 FDG PET/CT findings of a patient who has PTC in the right lobe of the thyroid and MTC in the left lobe (collision tumor of the thyroid).

**Patient Findings:** Cytologic examination of fine needle aspiration suggested the possibility of medullary thyroid carcinoma in a 46-year old man presented with a cervical lump. Calcitonin was high (171 pg/ml; normal range 1.9-9.6 pg/ml) at the patient's initial presentation. Histopathological examination of the specimen obtained from total thyroidectomy and cervical lymph node dissection revealed papillary carcinoma (3 mm in diameter) in the right lobe and medullary carcinoma (20 mm in diameter) in the left lobe of thyroid, and metastasis of medullary thyroid carcinoma in 6 cervical lymph nodes. The patient had gradually increasing serum calcitonin after thyroidectomy suggesting the presence of a metastatic focus producing calcitonin. Tc-99m (V) DMSA whole body scan showed no abnormality. F-18 fluorodeoxyglucose positron emission tomography/computed tomography revealed moderately increased uptake in a right cervical lymph node suggesting reactive hypermetabolism. Ga-68 **DOTATATE** PET/CT showed a focus of increased uptake (SUVmax 8.2) in the body of T8 vertebra suggesting metastasis. Histopathology of the vertebrectomy material confirmed the diagnosis of metastatic medullary thyroid carcinoma. Serum calcitonin dropped to normal within 3 weeks.

**Conclusion:** Ga-68 **DOTATATE** PET/CT is an emerging diagnostic tool for neuroendocrine tumors, but there is little experience in its use in patients with medullary thyroid carcinoma. This unique case report suggests its possible use in this difficult clinical entity, and shows the discrepancy between F-18 FDG PET/CT and Ga-68 **DOTATATE** PET/CT.

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011

## TEST-RETEST REPEATABILITY OF MYOCARDIAL BLOOD FLOW MEASUREMENTS USING RUBIDIUM-82 PET IMAGING

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**Objectives.** The goal of this study was to determine the test-retest repeatability of rubidium-82 (<sup>82</sup>Rb) myocardial blood flow (MBF) imaging using positron emission tomography (PET) and a highly automated analysis program using image-derived input functions and dual spillover corrections.

**Methods.** Test-retest repeatability of rest, dipyridamole induced stress (0.72 mg/kg), and stress/rest flow reserve (MFR) left-ventricle MBF was measured in patients (n = 29) with suspected coronary artery disease and in healthy volunteers (n = 3). The effects of the rate-pressure product (RPP) at rest and stress were assessed with correlation and Bland-Altman repeatability coefficients (RPC). The effect of tracer infusion profile repeatability was also assessed.

**Results.** Subjects with a change in rate-pressure product (> 2500 bpm × mmHg) between test and retest scans at rest, stress, or delta stress – rest had significantly higher RPCs (rest MBF: 0.56 vs 0.31 mL/min/g, stress MBF: 2.1 vs



1.2 mL/min/g, MFR: 1.9 to 1.2;  $p < 0.05$ ). MBF values derived from heterogeneous tracer infusion profiles had a significantly higher RPC at stress (3.2 vs 0.8 mL/min/g;  $p < 0.001$ ), with a similar trend shown at rest (0.57 vs 0.33 mL/min/g;  $p = 0.06$ ).

**Conclusion.** Differences in the rate-pressure product and tracer infusion profiles can have a negative effect on the repeatability of rubidium-82 PET MBF measurements at rest and stress. Standardized rubidium tracer infusion profiles and consistent hemodynamic conditions may help improve the test-retest repeatability of these measurements.

012

### THE PROGNOSTIC VALUE OF CHANGE IN RV FUNCTION AS MEASURED ON RADIONUCLIDE VENTRICULOGRAPHY IN PATIENTS WITH HEART FAILURE

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**Objective:** To evaluate the prognostic value of change in RV function as measured by gated-equilibrium Radionuclide Ventriculography (RNV) in patients with known cardiomyopathy.

**Methods:** We retrospectively analyzed the clinical records of patients with new-onset heart failure that attended our heart Function Clinic since January 2007 and included all patients who had undergone at least two RNV scans during the follow-up period. Information on subsequent clinical events was obtained from patient records over the follow-up period.

RV and LV EF were measured semi-quantitatively on planar gated equilibrium RNV on an LAO projection to achieve optimal separation of heart chambers and change in both RV ( $\Delta$ RVEF) and LV ( $\Delta$ LVEF) function was measured as a percentage of the baseline EF with a  $>10\%$  increase or decrease relative to baseline being significant.

Using a Pearson's test we correlated  $\Delta$ RVEF with  $\Delta$ LVEF and also evaluated the prognostic value of  $\Delta$ RVEF using a multivariate logistic regression model including Age, creatinine, and  $\Delta$ LVEF for the composite outcome of; all cause mortality, heart transplant, and heart failure hospitalization.

**Results:** We included 118 patients for analysis (75% male, mean age 59  $\pm$  27 years, 56% ischemic cardiomyopathy, mean follow-up 3.37  $\pm$  2.1 years, mean LVEF 31%  $\pm$  20, mean RVEF 30%  $\pm$  22). During the follow-up period there were 23 events (6 deaths, 3 transplants and 14 heart failure admissions).

There was a statistically significant correlation between  $\Delta$ RVEF and  $\Delta$ LVEF ( $r = 0.43$   $p < 0.0001$ ). Univariate analysis of  $\Delta$ RVEF showed a trend towards event prediction, with a positive  $\Delta$ RVEF having an OR of; 0.297, 95% CI 0.076-1.159,  $p = 0.08$ .

Both RVEF on follow-up RNV and  $\Delta$ LVEF were significantly associated with events ( $p = 0.001$  and  $0.006$  respectively) on univariate analysis.

In those with severe RV dysfunction at baseline  $\Delta$ RVEF was strongly predictive of events ( $p = 0.04$ ) and was superior to  $\Delta$ LVEF on multivariate analysis.

**Conclusion:** In this study  $\Delta$ RVEF in those with severe RV dysfunction at baseline and persistent RV dysfunction in the overall population were markers of poor prognosis independent of LV function. There was a trend for  $\Delta$ RVEF to also be related to outcomes, but this was not statistically significant.



## Eric Lepp Clinical Vignettes

L-001

### THE DIAGNOSTIC VALUE OF FDG-PET/CT FOR ACUTE INFECTION IN THE HYPERGLYCEMIC PATIENT WITH TYPE I DIABETES

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A 4 year old girl presented to the emergency department with a one week history of persistent low grade fever and cough. Her parents noted mild weight loss dating back six months without any significant gastrointestinal symptoms. Otherwise, there was no significant past medical history, surgical history, or family history. Physical exam revealed a patient in mild respiratory distress with decreased air entry at the right base and some stridor. Leukocyte count was elevated and serum glucose was 8.9 mM. The chest x-ray revealed a right middle lobe consolidation compatible with pneumonia and enlargement of the cardio-pericardial silhouette. The presence of a pericardial effusion was confirmed by ultrasound. Cultures from the pericardiocentesis were positive for several strains of atypical bacteria. The immunologic investigations were non-contributory and the underlying cause of the infection remained elusive to the treating team.

A follow up CT chest performed 4 days post-pericardiocentesis additionally revealed a subphrenic fluid collection for which the differential included abscess versus post-procedural hematoma. A PET/CT scan was requested to assess whether this collection was infected. Prior to injecting FDG, the serum glucose measured by glucometer was greater than 25 mM which led to the diagnosis of type I diabetes. The patient was scanned despite the marked hyperglycemia for the purpose of guiding management. Moderate-to-intense FDG uptake was noted in the subdiaphragmatic fluid collection confirming active infection. An important point to note is that the diagnosis was made in spite of markedly altered FDG biodistribution best evidenced by dramatically diminished brain activity which was barely distinguishable from that of blood pool.

In conclusion, FDG-PET/CT proved effective at demonstrating active infection under extreme glycemic conditions. In contrast to oncologic imaging, this case corroborates the role of FDG-PET/CT as a modality for imaging infection in the setting of hyperglycemia, particularly in the diabetic population.