Midtreatment PET Useful in Guiding Tx for NHL

Phase II Study of Risk-Adapted Therapy of Newly Diagnosed, Aggressive Non-Hodgkin Lymphoma Based on Midtreatment FDG-PET Scanning.
Kasamon YL, Wahl RL, et al:
Biol Blood Marrow Transplant; (February): 242-248

FDG-PET shows promise for adjusting chemotherapy protocols based upon early imaging results in patients with newly diagnosed aggressive NHL.

**Background:** FDG-PET/CT imaging after completion of chemotherapy can predict outcome in patients with aggressive non-Hodgkin lymphoma (NHL). Individuals with persistently positive FDG in a tumor site have very poor disease-specific survival. Perhaps of even more clinical importance is the finding that FDG-PET/CT performed after only a few cycles of chemotherapy can identify those patients who will respond favorably to treatment.

**Objective:** To assess the value of mid-treatment FDG-PET/CT results for altering the chemotherapy regimen.

**Design:** Patients with newly diagnosed aggressive B cell NHL were enrolled in this study. All subjects began standard frontline chemotherapy (R-CHOP). FDG-PET/CT was performed following completion of 2 to 3 cycles of therapy. Individuals with a negative FDG-PET/CT result continued the same chemotherapy regimen, whereas those with positive FDG levels in tumor sites were switched to a more aggressive platinum-based regimen including the use of autologous stem cell transplantation (ASCT).

**Results:** 59 subjects were enrolled. Mid-treatment PET images from 33 of these patients revealed positive FDG uptake at 1 tumor sites. Twenty-eight were then switched to a more aggressive regimen with ASCT. With median follow-up of 36 months, the 2-year estimated event-free survival (EFS) was determined to be 75%. In the group of individuals with a negative PET/CT exam at mid-therapy, the 2 year EFS was 89%. International Prognostic Index scores were similar for mid-treatment PET-positive compared to PET-negative subjects. The authors cited their findings in comparison to historical controls who showed mid-treatment FDG positive disease as evidence that PET results after several cycles of chemotherapy may be used to determine the desirability of a more aggressive treatment regimen.

**Conclusions:** The authors conclude: "Further investigations of individualized, risk-adapted strategies based on early metabolic imaging are warranted."

**Reviewer's Comments:** So as the authors correctly state, we cannot draw any definitive conclusions from this study, yet the results reveal the notable promise of adjusting chemotherapy protocols based upon early FDG-PET imaging in patients with newly diagnosed aggressive NHL. There is a related review by Dr Thomas in this issue of an article from J Nucl Med that reinforces the value of PET for determining prognosis based upon response to chemotherapy in NHL.

**Additional Keywords:** FDG-PET

**(print tag: () Refer to original journal article.)**
In Utero Exposure to I-131 Increases Long-Term Risk for Thyroid Carcinoma

A Screening Study of Thyroid Cancer and Other Thyroid Diseases among Individuals Exposed In Utero to Iodine-131 from Chernobyl Fallout.

Hatch M, Brenner A, et al:

*J Clin Endocrinol Metab;* 94 (March): 899-906

In utero exposure to I-131 increases long-term risk for thyroid carcinoma. The findings support a conservative approach to medical use of I-131 during pregnancy.

**Background:** Studies conducted after the accident at the Chernobyl nuclear power plant in 1986 found that the greatest increased risk of thyroid cancer occurred among those exposed at younger ages. This is assumed to be due to contaminated milk, small gland size, which increases the absorbed dose, and rapid cell proliferation. No studies focused on those exposed in utero. The Utah Fallout Study on 400 subjects living near a nuclear test site and exposed in utero to I-131 reported no cases of benign or malignant thyroid neoplasia for 30 years, but the sample is small and doses were low. The fetal thyroid initiates development by week 3 of gestation and functions by 3 months, accumulating iodine from the maternal circulation. In fact, fetal radioiodine concentrations can be much higher than the maternal thyroid.

**Objective:** To assess effect on risks of thyroid malignancy and benign disease for those exposed in utero following the Chernobyl accident.

**Methods:** Neck palpation, sonography, serum thyroid hormone level, and fine needle aspiration when necessary were performed on >2500 subjects aged 17 to 20 years and their mothers who had been pregnant in the vicinity of the Chernobyl nuclear accident, during which I-131 fallout was still present. Approximately 60% were from contaminated areas, and 40% were from noncontaminated areas. In utero thyroid dose estimates were calculated based on estimated I-131 activity in the mother's thyroid.

**Results:** Of 2528 screen subjects, there were a total of 8 thyroid cancers: 6 papillary, 1 follicular, and 1 Hurthle cell neoplasm. All but 1 occurred in the exposed group. There was an increased odds ratio for thyroid carcinoma with increased exposure (excess odds ratio per gray, 11.66), but it was not statistically significant ($P = 0.12$). No other thyroid disease showed increased prevalence.

**Conclusions:** The data in this study suggest that in utero exposure to I-131 increases long-term risk for thyroid carcinoma. The findings support a conservative approach to medical use of I-131 during pregnancy.

**Reviewer's Comments:** That 7 of the 8 cancers occurred in those in contaminated areas is convincing evidence that I-131 exposure was the culprit. And the odds ratio went up with increasing dose although the small number of actual cancers made it difficult to achieve statistical significance. In reality though, the barely 0.5% overall incidence of carcinoma in the exposed group is not especially alarming. As for practical implications, we already avoid I-131 exposure to pregnant patients. For those inadvertently exposed (usually in the first trimester before pregnancy is recognized), these results should be reassuring.

**Additional Keywords:** I-131

**print tag:** () Refer to original journal article.
Role of Nuclear Medicine in PHPT

The Diagnosis and Management of Asymptomatic Primary Hyperparathyroidism Revisited.
Khan AA, Bilezikian JP, et al:
J Clin Endocrinol Metab; 94 (February): 333-334

The main goal of preoperative imaging in primary hyperparathyroidism is to assist anatomic localization of abnormal functioning or enlarged parathyroid glands, not to establish a diagnosis.

Discussion: Before the automated serum screening chemistry panel that began in the early 1970s, the disorder had been symptomatic with kidney stones, skeletal disease, and/or neuromuscular dysfunction. Currently, primary hyperparathyroidism (PHPT) frequently has fewer signs or symptoms. Without symptoms it became doubtful whether parathyroid surgery was appropriate. A conference held at the National Institutes of Health in 1990 issued guidelines to surgical and nonsurgical management. Prospective studies yielding greater insight into pathogenesis and natural disease course led to a second international workshop on the management of asymptomatic primary hyperparathyroidism at the NIH in 2002. This conference revised the guidelines for diagnosis as well as for surgical versus nonoperative medical management. At both conferences, parathyroid surgery was cited as the only definitive therapy, even for those not meeting guidelines for surgery. These guidelines were intended exclusively for asymptomatic PHPT; those with complications of PHPT--kidney stones, fractures, overt neuromuscular disease, or symptoms of hypercalcemia, warrant parathyroid surgery. The Third International Workshop on Primary Hyperparathyroidism was held in May 2008. At that conference, preoperative diagnostic imaging was a major topic. The main goal of preoperative imaging in PHPT is to assist anatomic localization of abnormal functioning or enlarged parathyroid glands. Its purpose is not to establish a diagnosis of PHPT, nor do negative imaging studies rule out the diagnosis. Since all imaging studies have at best moderately good predictive values, preoperative parathyroid imaging studies should be done only in those with an established biochemical diagnosis of PHPT. The appropriate choice of imaging studies depends on the surgical plan: unilateral versus bilateral, and whether the procedure will be a second exploration in a consequently scarred operative field. The most frequently ordered imaging studies are sestamibi scintigraphy and cervical ultrasound. The reported sensitivity of scintigraphy varies widely between institutions, and sonography is operator dependent. CT and MRI are occasionally used, notably in cases of persistent or recurrent hyperparathyroidism. For those undergoing a repeat neck exploration, PTH assay of the aspirate from an FNA of a suspected adenoma can clinch the diagnosis preoperatively. In particularly difficult cases, angiography and selective venous sampling for PTH can be used when noninvasive studies are equivocal or conflicting.

Reviewer’s Comments: The group of symposium articles on primary hyperparathyroidism in the February 2009 issue of J Clin Endocrinol Metab should be of interest to our subscribers. Nuclear Medicine plays a primary role in the diagnosis and management of hyperparathyroidism, and not just because sestamibi scintigraphy is recognized as the primary preoperative imaging method. Because many of us work closely with our endocrinology colleagues on thyroid problems, they feel comfortable discussing and referring their parathyroid cases. Because many nuclear physicians perform bone densitometry, we are involved in monitoring as well.

Additional Keywords: Diagnosis & Management

print tag: () Refer to original journal article.
Heart Rate Response to Adenosine, Regadenoson Stress Blunted in Diabetics

Differences in Heart Rate Response to Adenosine and Regadenoson in Patients With and Without Diabetes Mellitus.

Hage FG, Heo J, et al:  
Am Heart J; 157 (April): 771-776

The heart rate response to both adenosine and regadenoson stress is blunted in patients with diabetes mellitus.

**Background:** The vasodilatory agents adenosine and regadenoson are frequently used in combination with myocardial perfusion imaging. A good heart rate response to the infusion of these agents suggests that the patient was properly prepared (eg, no recent caffeine) and that adequate vasodilation was achieved. However, it has been previously shown that the heart rate response in diabetics is blunted compared to those without diabetes.

**Objective:** To determine whether heart rate response will be lower in patients with than in those without diabetes mellitus.

**Methods:** 2000 patients were evaluated who underwent pharmacologic vasodilatory stress testing in combination with myocardial perfusion imaging. The heart rate response was compared between diabetics and non-diabetics.

**Results:** There were 643 patients with diabetes compared to 1357 without. The percent increase in the heart rate over baseline, defined here as the heart rate response, was 29% in diabetics versus 36% in non-diabetics. This was found to be due to the higher baseline heart rate in diabetics (68) as compared to non-diabetics (65; P <0.001). The average peak heart rate was 88 in both diabetics and non-diabetics.

**Conclusions:** The heart rate response to adenosine and regadenoson stress testing is blunted in patients with diabetes. This finding is due to the fact that the average baseline heart rate in diabetics (68) was higher than in non-diabetics (65), although the peak heart rate was the same.

**Reviewer's Comments:** This study is misleading in that it gives variation in terms of the standard error of the mean instead of the preferred standard deviation. Only by having such a high number of patients could they possibly have found a statistically significant difference. The standard deviation equals the standard error times the square root of the sample size. Using standard deviations, the authors' results show that the average baseline heart rate was 68 +/- 12 in diabetics compared to 65 +/- 11 in non-diabetics. This large degree of overlap means that the statistically significant findings (which use the standard error for computation) cannot be applied to individual patients (where the standard deviation is used).

**Additional Keywords:** Diabetics vs Non-Diabetics

**print tag:** () Refer to original journal article.
Neck Dissection for Small Tumors Modifies Use of Radioiodine in 30% of Patients

Prophylactic Lymph Node Dissection for Papillary Thyroid Cancer Less Than 2 cm: Implications for Radioiodine Treatment.

Bonnet S, Hartl D, et al:
J Clin Endocrinol Metab; 94 (April): 1162-1167

Prophylactic neck lymph node dissection for small tumors initially staged node negative modifies the use of radioiodine ablation in 30% of patients.

**Background:** In lower risk papillary thyroid cancer (PTC) patients, the role of I-131 remnant ablation is controversial. Even though the prognostic value of lymph node (LN) status in papillary thyroid cancer has not been clearly demonstrated, current practice regards the existence of locoregional LN metastasis as meriting more aggressive treatment and active monitoring. Specifically, a recent consensus statement published by the American Thyroid Association recommends the use of I-131 ablation following removal of PTC primaries <1 cm in size only in those with locoregional lymph node metastases. No definite position was taken on node-negative patients with primaries between 1 and 2 cm in size. The authors of this paper thought the uncertainty might be reduced by more precise determination of lymph node status.

**Objective:** To assess the value of prophylactic neck dissection of lymph node compartments in patients with small (<2 cm) primary papillary thyroid cancers.

**Methods:** The study group included 115 patients with PTC <2 cm in size and without LN metastases demonstrated at neck ultrasound. All patients underwent total thyroidectomy, and central and ipsilateral LN dissection.

**Results:** LN metastases were found in 42.0% of patients (n=48) with both central and lateral LN dissection; only 36.7% of patients (n=42) would have been discovered if prophylactic LN dissection had been limited to the central neck. In multivariate analysis, age <50 years \(P=0.0007\) and existence of a tumor extension beyond the thyroid capsule \(P=0.048\) were predictive of LN involvement. LN status modified the decision for postsurgical radioiodine ablation for 25 of 115 patients (21.7%). Among the 67 patients treated with I-131 on total body scan, 8 patients had foci in the neck outside the thyroid bed. One patient had diffuse uptake in the lungs. A second radioiodine treatment was administered 6 months later to these 8 patients. One patient (0.9%) presented with a postoperative laryngeal palsy, and another patient (0.9%) presented with hyperparathyroidism requiring calcium and vitamin D supplementation. At 1 year, no patient showed suspicious cervical LN on ultrasound. Tg levels were undetectable in 1 patient.

**Conclusions:** Prophylactic neck dissection for small tumors initially staged node negative modifies the use of radioiodine ablation in 30% of patients.

**Reviewer's Comments:** These results certainly make a cogent case for more extensive lymph node dissection so as to tailor I-131 treatment. In fact, there may be the value added curative removal of metastatic lymph nodes. The practical question is whether patients in this very low-risk category will be eager, or even willing, to undergo more extensive surgery for a very low-risk tumor.

**Additional Keywords:** Small PTC

**print tag:** () Refer to original journal article.
Should Patients Have I-131 Remnant Ablation for Low-Risk Tumors?

A Vision for the Surgical Management of Papillary Thyroid Carcinoma: Extensive Lymph Node Compartmental Dissections and Selective Use of Radioiodine.

Mazzaferri EL:
J Clin Endocrinol Metab; 94 (4): 1086-1088

The American Thyroid Association recommends I-131 remnant ablation in all cases with cervical lymph node metastases.

Discussion: The vast majority of papillary thyroid cancer (PTC) patients achieve a normal lifespan following total thyroidectomy and I-131 ablation. But many patients experience cervical lymph node recurrence, and >5% die of disease. A major question in reducing locoregional recurrence is whether surgery or radioiodine-- or neither or both--in patients with microcarcinomas is the optimal approach. Close to 90% of PTCs are small, ie, <2 cm and half are 1 cm. The smaller the primary, the better the prognosis, but recurrence rates need to be lowered because 10-year cancer-specific mortality rates are significant even for tumors <1 cm in size. Recent studies have found increased risk for death in follicular thyroid cancer if there are lymph node metastases, and that lymph node metastases remaining after initial therapy are the most common cause of subsequent recurrence. Postoperative I-131 ablation therapy of normal residual thyroid tissue can eliminate occult residual lymph node metastases and facilitate follow-up with serum Tg measurements. A 2008 report found a 2% lower risk of distant metastatic recurrences with remnant ablation. The American Thyroid Association recommends I-131 remnant ablation in all cases with cervical lymph node metastases. The problem with routine remnant ablation is the immediate risk for radiation injury to salivary glands, oral tissues, lacrimal ducts, and long-term risk of radioiodine-induced non-thyroidal second cancers. Cumulative I-131 doses >500 mCi increase the risk of leukemia, but it is not known whether a single 100 mCi increases cancer risk. It has been documented that I-131 residence times were significantly shorter in the prepared thyrogen compared with patients who underwent withdrawal, thus reducing radiation to normal tissues. Some reports have found that 30 mCi achieves successful ablation as effectively as much larger doses. A main issue in the initial treatment of small PTCs is the difficulty in accurately identifying lymph node metastases preoperatively by ultrasonography. Even at surgery, direct visualization cannot reliably detect lymph node metastases. Prophylactic dissection of the central and ipsilateral lymph node compartments is the most reliable method of detecting lymph node metastases. Prophylactic dissection to determine tumor involvement would result in an appropriate radioiodine therapy for those with lymph node metastases while avoiding this treatment for those free of residual locoregional tumor.

Reviewer's Comments: The use of I-131 ablation in lower risk thyroid cancer is, if you will excuse the expression, a "hot" topic. I found this editorial informative, clinically valuable, and reader friendly. Although it focuses on surgical issues, the editorial provides the latest suggestions on I-131 remnant ablation. What I learned from this paper is that we would be wise to consider the details of the preablation work-up--surgical, sonographic, and histologic--in order to tailor the I-131 ablative dose.

Additional Keywords: Use of Radioiodine

print tag: () Refer to original journal article.
ST Segment Response to Adenosine Can Be Related to Non-Ischemic Mechanisms

Adenosine-Induced ST Segment Depression With Normal Perfusion.
Hage FG, Heo J, Iskandrian AE:
Cardiol J; 16 (2): 121-126

A positive ECG response to adenosine stress is most likely a false-positive in patients with normal myocardial perfusion on SPECT imaging and no history of previous myocardial infarction or revascularization.

**Background:** Adenosine stress testing performed in conjunction with myocardial perfusion imaging is frequently used in the detection of coronary artery disease and risk stratification. While most patients with ST segment depression on electrocardiography have reversible perfusion defects, it is not well-known what the prognosis is for patients with a positive adenosine stress ECG and a negative myocardial perfusion scan.

**Objective:** To show on long-term follow-up that these patients continue to be at low risk.

**Methods:** A positive ECG response to adenosine stress was defined as 1 mm ST segment depression. Patients with a positive adenosine stress ECG test, a normal myocardial perfusion scan, and a past medical history negative for myocardial infarction or previous coronary revascularization were evaluated. Outcome measures tracked were total mortality, cardiac mortality, nonfatal myocardial infarction, and coronary revascularization.

**Results:** 73 patients were followed-up for 5 years for mortality. Four of 5 patients were female. During the follow-up period, there were 10 deaths, of which 5 were determined to be noncardiac. For the other end points, follow-up was complete for 21 months. During this time period, no patient had a myocardial infarction and 7 underwent coronary revascularization. The annual rate of myocardial infarction during the follow-up period was 0% in the study sample and the rate of revascularization was 5.5%.

**Conclusions:** In patients with a past medical history negative for previous myocardial infarction or coronary revascularization, an abnormal adenosine stress ECG response most likely represents a false-positive for inducible ischemia when the myocardial perfusion scan is normal.

**Reviewer’s Comments:** Note that the results of this study only apply to those with a past medical history negative for prior myocardial infarction or revascularization. The authors did not state the risk factors (eg, diabetes) that were present at the time of myocardial perfusion imaging in the patients that died during the follow-up period.

**Additional Keywords:** Coronary Artery Disease

**print tag:** () Refer to original journal article.
Myocardial Perfusion SPECT Imaging in <6 Minutes on Conventional SPECT Systems!

Half-Time SPECT Myocardial Perfusion Imaging with Attenuation Correction.

Ali I, Ruddy TD, et al:
J Nucl Med; (April): 554-562

Improvements from the resolution recovery software may be used to reduce acquisition times or administered activity.

**Background:** New reconstruction techniques have been introduced that compensate for spatial resolution in SPECT imaging, potentially allowing the reduction of acquisition time while maintaining imaging quality.

**Objective:** To evaluate gated myocardial perfusion SPECT acquired with a 50% reduction in imaging time and processed with the GE Evolution for Cardiac software.

**Methods:** The Evolution software compensates for collimator scatter and penetration along with the distance dependent system resolution. This software requires a look-up table of the point spread data for the collimators with which it is used. A total of 212 subjects participated in this investigation. Overall, 112 patients had rest and stress gated MPS studies acquired for the normal acquisition time (approximately 12 minutes) with repeated MPS studies acquired for 6 minutes; 56 of those had the short study first while the other 56 had the full-time study first. The remaining 100 had repeat full-time acquisitions. Studies were performed on the Infinia Hawkeye SPECT/CT system with CT transmission imaging for attenuation correction. All studies were reconstructed both with and without attenuation correction. Studies were read by 2 nuclear medicine physicians. Comparisons were made of final diagnosis, transient ischemic dilation (TID), ventricular volumes and ejection fraction, and summed stress (SSS), rest (SRS), and difference (SDS) scores. Diagnostic agreement between the different groups was assessed with the intra-class correlation coefficient and the kappa -coefficient, while linear regressions and Bland-Altman analysis was performed on the quantitative parameters.

**Results:** The full-time acquisition test-retest had excellent concordance with an intraclass correlation coefficient (ICCr) of 0.98 for the quantitative parameters (LVEF, SSS, SRS, SDS, TID). The concordance of the half-time with the full-time acquisitions was only slightly worse with an ICCr of 0.95 for the studies corrected for attenuation correction and an ICCr = 0.94 for the uncorrected studies. The image quality of the half- and full-time studies was essentially the same and the clinical diagnosis determined from the half-time images agreed with the full-time diagnosis in 95% of cases.

**Conclusions:** The results from the half-time studies were largely in agreement with the full-time study results. The authors note that agreement was only slightly lower than the full-time test-retest results.

**Reviewer's Comments:** This investigation included the crucial step of performing test-retest studies with the full-time acquisition so that the repeatability of the procedure was monitored. The authors provide convincing evidence that similar results can be obtained when the Evolution software is applied to the half-time acquisitions. Reducing the acquisition time may reduce motion artifacts and be better tolerated by patients.

**Additional Keywords:** Half-Time vs Full-Time

print tag: () Refer to original journal article.
MPI Plays Pivotal Role in Risk Stratification in CAD Patients

*Current Advances in Vasodilator Pharmacological Stress Perfusion Imaging.*

Druz RS:

*Semin Nucl Med;* 39 (May): 204-209

Regadenoson may be used instead of adenosine or dipyridamole for stress MPI.

**Background:** Myocardial perfusion imaging (MPI) using pharmacologic coronary vasodilators is a long established component of care for managing many patients with known or suspected coronary artery disease (CAD). Adenosine and dipyridamole both are potent simulators of epicardial artery dilatation. Recently a newer agent, regadenoson, which is a more selective coronary vasodilator, has moved into clinical practice.

**Objective:** To provide the reader with a review and update of these drugs and their application in stress MPI.

**Discussion:** Adenosine and dipyridamole are generally regarded as nonspecific cardiac adenosine receptor agonists. The authors note that regadenoson is highly specific to the cardiac receptor for adenosine. Consequently, there is likely to be less pulmonary bronchospasm associated with using regadenoson. Interestingly, less flushing is reported with the use of regadenoson, yet more patients report headaches as a side effect with adenosine. The incidence of AV block appears to be reduced with regadenoson compared to adenosine. In contrast to adenosine and dipyridamole, regadenoson is given as a single IV bolus with peak action at 2 to 4 minutes. Studies directly comparing adenosine and regadenoson demonstrate essentially the same degree of accuracy for detecting CAD for each agent. The authors also review results from the INSPIRE and the COURAGE Imaging sub-study. Findings from these large trials emphasized the importance of MPI with vasodilator stress for risk stratification of patients with CAD.

**Conclusions:** The authors conclude: "Vasodilator stress perfusion imaging is safe and effective in identifying significant coronary artery disease. Newer agents allow better tolerance, ease of administration, and improved side-effect profile. Recent trials have firmly established a pivotal role of vasodilator stress perfusion imaging in risk stratification and therapeutic guidance of patients with stable coronary artery disease."

**Reviewer's Comments:** The authors failed to mention the specific literature pertaining to successful use of regadenoson in patients with asthma. However, I am not aware of specific studies yet using regadenoson in patients with COPD, although we have done so at our facility without problems. I would be remiss if I did not inform the readership that, in our experience with this agent, there is a small but not insignificant fraction of patients who defecate following administration of regadenoson. We have reduced this to almost zero by performing "slow" IV injection. Overall, we've found that patients generally tolerate this drug better than adenosine. Finally, the use of regadenoson with Rb-82 may be limited by the relatively short duration of action of this drug.

**print tag:** () Refer to original journal article.
New Approach to Cardiac SPECT Substantially Improves Resolution and Count Sensitivity

A Novel High-Sensitivity Rapid-Acquisition Single-Photon Cardiac Imaging Camera.
Gambhir SS, Berman DS, et al:
J Nucl Med; 50 (April): 635-643

SPECT systems that are optimized for a specific imaging task can provide substantial improvements over conventional gamma-camera based approaches.

Background: Myocardial perfusion imaging typically requires an acquisition time of >12 minutes for each SPECT study. New SPECT instrumentation has become commercially available that substantially reduces the acquisition time.

Objective: To evaluate the Spectrum Dynamics D-SPECT system for myocardial SPECT imaging.

Methods: The D-SPECT represents a new approach to SPECT imaging. It consists of 9 independently rotating collimated cadmium zinc telluride (CZT) cameras arranged in an L-shape mounted inside a stationary gantry. Each individual camera can rotate independently to collect projection data. High-efficiency tungsten collimators are used along with a resolution recovery algorithm to maintain spatial resolution with high count sensitivity. Measurements of spatial resolution and sensitivity in the D-SPECT were made with line sources and were compared with those obtained from a conventional SPECT system. Energy resolution was also evaluated and multi-energy anthropomorphic heart phantom studies were acquired for both systems. Comparisons were also made on 18 Tc-99m sestamibi stress and rest studies between the D-SPECT and conventional SPECT systems. The D-SPECT studies were acquired 30 minutes after the conventional studies and were acquired for 2 minutes versus the 11-minute acquisition for the conventional study.

Results: The spatial resolution (FWHM) was 3.9 mm for the D-SPECT and 10 mm for the conventional system, but no resolution recovery was performed for the conventional measurement. The count sensitivity for the D-SPECT was more than a factor of 10 higher than the conventional system. The energy resolution was 5.7% facilitating the dual isotope studies. Clinical image quality was ranked slightly higher for the D-SPECT. The diagnostic results were similar and the summed stress scores and summed rest scores for the groups had a correlation near 0.8.

Conclusions: The improved imaging characteristics of the D-SPECT will make it appealing for myocardial perfusion imaging. The authors also note that this design is likely to have additional molecular imaging applications.

Reviewer’s Comments: The D-SPECT shows how new approaches designed for a specific task can provide significant improvement over conventional approaches. The use of CZT enables this development because its compactness allows sampling modes that are not possible with scintillators. Other new SPECT imaging systems using clever sampling schemes are also being introduced at this time.

Additional Keywords: Myocardial Perfusion SPECT

print tag: () Refer to original journal article.
Annexin V Uptake in Suspected Infected Hip and Knee Prostheses

The Use of 99mTc-Recombinant Human Annexin V Imaging for Differential Diagnosis of Aseptic Loosening and Low-Grade Infection in Hip and Knee Prostheses.

Lorberboym M, Feldbrin Z, et al:
J Nucl Med; 50 (April): 534-537

Annexin V may show promise in discriminating hip and knee prosthesis infection from aseptic loosening.

**Objective:** To evaluate annexin V uptake in suspected infected hip and knee prostheses.

**Background:** Aseptic loosening and prosthetic infection are 2 of the causes of peri-prosthetic pain. However, their management strategies differ tremendously, with the former requiring only 1 surgery for replacement, and the latter requiring at least a 2-stage procedure for debridement, antibiotic therapy, and replacement. As such, it is important that they be differentiated for optimal patient management. There is currently no imaging modality that confidently rules out the presence of an infected prosthesis. Plain film will show changes regardless of the presence of infection, and MRI/CT often is not useful due to metallic artifact. Bone scintigraphy still does not definitively discern infection from just loosening. Annexin V is a marker of cell apoptosis and cell stress and has shown uptake in subacute infection and chronic inflammation. This study looks at annexin V uptake patterns in infected hip and knee prostheses.

**Methods:** 7 patients (5 hip and 2 knee prostheses) were included. To confirm infection, pathological results were available for 4 cases; the others were confirmed with WBC, C-reactive protein, sedimentation rate, and clinical follow-up. All patients underwent MDP bone scintigraphy as well as planar and SPECT annexin V imaging. Annexin V scans were deemed positive if uptake was greater than adjacent soft tissue or the contralateral, unaffected joint. Scans were considered negative if uptake was equal to adjacent soft tissue or the contralateral, unaffected joint.

**Results:** Of the 7 patients, 4 had confirmed infection and 3 did not. Annexin V demonstrated 4 true positives, 1 false positive, and 2 true negatives. The authors mention that annexin V uptake was usually incongruent with MDP uptake.

**Conclusions:** Annexin V imaging has a high negative predictive value in hip and knee prosthetic infection. Annexin V uptake was also higher in infection than in aseptic loosening.

**Reviewer's Comments:** The study includes only 7 patients, so it's difficult to get too enthused about the 100% negative predictive value. Also, the authors point out that their results are in contrast to others in which annexin V uptake was higher in aseptic loosening versus infection. Although postulations were made as to why this may be (increased uptake at sites of cellular stress and not just apoptosis, and the role of infection-related leukocyte cell death in which caspase-1 is released), it seems that other, larger studies are needed to further clarify the pattern of annexin V uptake in these pathological entities. Moreover, no mention was made of the sensitivity/specificity of the more commonly used Tc MDP-In leukocyte combination imaging or how it compares to annexin V.

**Additional Keywords:** Annexin V

**print tag:** () Refer to original journal article.
**Visual vs Semi-Quantitative Analyses of FDG PET After Induction Chemotherapy**

*Prognostic Value of Interim 18F-FDG PET in Patients With Diffuse Large B-Cell Lymphoma: SUV-Based Assessment at 4 Cycles of Chemotherapy.*

Itti E, Lin C, et al:

*J Nucl Med; 50 (April): 527-533*

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Visual and SUV-based analyses perform equally well in assessing FDG PET in lymphoma patients status post-induction chemotherapy.

**Objective:** To compare the prognostic value of visual and semi-quantitative analyses of FDG PET after induction chemotherapy in patients with lymphoma.

**Background:** The use of FDG PET in the diagnosis and therapeutic response in lymphoma is well known. There has been great interest in determining how the more subjective, visual-based analysis compares to the more objective, semi-quantitative use of SUV-based assessment in providing prognostic information.

**Methods:** The baseline and post-induction (ie, after 4 cycles of chemotherapy) FDG PET studies of 80 patients were examined by 2 experienced readers using visual and SUV-based assessment. The visual criteria used were derived from Mikhaeel and Juweid, respectively, 2 well-known visual-based scoring systems. The semi-quantitative method used regions of interest around sites of disease to determine SUVmax. Event-free and overall survival were used as end points in evaluating the prognostic value of each assessment criteria. ROC curves were performed to determine the optimal SUVmax cut-off and the optimal SUVmax reduction in predicting the end points. Survival curves for the visual and SUV-based analyses were made using Kaplan-Meier plots.

**Results:** The overall accuracies for the visual and SUV-based analyses criteria were approximately 80% and 78%, respectively. The ROC curves also showed an optimal SUVmax cutoff of 3.0 and an SUVmax reduction of about 80% from baseline to post-induction scans. The authors also found that this reduction in SUVmax was independent of risk stratification and treatment regimen used (different chemotherapeutic agents, including rituximab, or whether stem cell transplant was performed).

**Conclusions:** Visual and SUV-based analyses of post-induction lymphoma FDG PET studies perform equally well. The authors also showed that an SUVmax of 3.0 and an SUVmax reduction of 73% from baseline to post-induction are optimal for predicting survival.

**Reviewer’s Comments:** The authors compare results from this study to their prior work, which examined the same comparison but in patients after only 2 cycles of treatment. In the latter, they found that SUV-based assessment criteria were more accurate in providing prognostic information. These findings are highly clinically relevant as they can be used as rough guidelines for nuclear medicine specialists when evaluating lymphoma patients during different early stages (status post-2 cycles vs 4 cycles) of therapy.

**Additional Keywords:** Lymphoma

**print tag:** () Refer to original journal article.
Proposition for Use of Radioiodine in Managing WDTC

A Proposition for the Use of Radioiodine in WDTC Management.
Bourgeois P:

J Nucl Med; 50 (February): 328-329

Scintigraphic imaging as part of postsurgical management can determine for the need for ablation in WDTC.

In a recent issue of the Journal of Nuclear Medicine, Drs. Hay, McDougall, and Sisson said they would eliminate diagnostic whole-body radioiodine scintigraphy prior to ablation. They also question the use of routine I-131 remnant ablation in all patients with well-differentiated thyroid carcinoma (WDTC) because the majority of patients must endure the effect of radiation while only a small minority will benefit. Rather than ablate remnant tissue, they would prefer I-123 SPECT/CT or I-124 PET/CT to differentiate remnants from lymph nodes for better specificity and I-124 to increase sensitivity. Dr. Bourgeois does not agree that therapeutic I-131 should be given without preceding imaging. Pretherapeutic scintigraphy identifies locoregional or distant iodine-avid metastases. Also, pretherapeutic imaging allows calculation of the lowest dose for ablation—considerably less in most cases than the 100 mci usually given. In Europe, higher doses still require hospitalization. Furthermore, scintigraphic imaging as part of postsurgical management is useful both to determine the necessity for ablation and to exclude unexpected metastases. Regarding the value of I-131 ablation, it needs to be considered if antibodies are present; if so, ablation is needed to destroy the normal thyroid tissue to eliminate a source of antigenic stimulation. There is an additional goal of ablation: namely, elimination of microfoci of carcinoma, which is an important prognostic factor. Kuffner et al recently found regional lymph node metastases in 10% of papillary primaries 1 cm, so that 10% of those aged >45 years but with small lesions will be undertreated in the Hay et al recommendation. Furthermore, Hay et al do not consider histologic criteria in determining candidates for ablation. It is appropriate to distinguish follicular from papillary carcinoma. Follicular has a worse prognosis than papillary carcinoma, and it is inappropriate to lump them together. Dr. Bourgeois believes that patients with stage 1 disease be imaged before determining the necessity for ablation.

Reviewer's Comments: I am pleased to see such a well-presented response to the editorial of Drs. Hay, McDougall, and Sisson that seriously challenges the current widespread practice standard (including ours) of routinely ablating most patients with differentiated thyroid carcinoma. I believe that pretreatment scanning is valuable to exclude those with no functioning remnant from ablation. As for side effects of ablation, I am considering a lower dose than the 100 mci we have been using—in the range of 50 to 75 mci—based on some recent reports of the effectiveness of ablative doses at that level.

Additional Keywords: Thyroid Cancer

print tag: () Refer to original journal article.
Amine Precursor DOPA Sensitive for Detecting Pheochromocytoma

18F-FDOPA PET and PET/CT Accurately Localize Pheochromocytomas.
Imani F, Agopian VG, et al:
J Nucl Med; 50 (April): 513-519

Benign and malignant pheochromocytomas have the ability to accumulate DOPA. DOPA-PET/CT is highly sensitive and specific in delineating the primary and potential metastases.

**Objective:** To evaluate the accuracy of DOPA PET or DOPA PET/CT as a marker for detecting benign and malignant pheochromocytomas (PC).

**Methods:** In 25 patients who were suspicious for PC, DOPA PET or DOPA PET/CT was performed; 17 of these patients received surgery. In 11 patients, the diagnosis of PC was established, and 2 more patients had confirmed PC during follow-up. None of the other patients had a false-positive DOPA study, whereas 2 patients had false-negative results, one probably due to the size of the tumor. No details were given on the other patient. There was no significant difference in the detection rate with PET alone or with the hybrid system. There was also no correlation between SUV and any tumor marker or differentiation (only 1 malignant PC) of the lesion.

**Conclusions:** In this study population, DOPA PET had a positive predictive value of 100%. Based on their results, the authors conclude that, in addition to the improvement of detectability, DOPA PET can be used for precisely localizing the tumor.

**Reviewer's Comments:** Amine precursors such as DOPA are very specific PET tracers for neuroendocrine tumors and for PC, which has almost no physiologic uptake in other tissue. The current study supports this further. The statement that there is no different uptake in benign or malignant PC is not really supported by the data, since the authors could include only 1 malignant PC. Furthermore, there is no comparison to the standard nuclear medicine approach using MIBG. Theoretically, one would expect that PET/CT is more sensitive given the better resolution, as was also discussed in the paper. The data suggest that DOPA PET or DOPA PET/CT could be a very valuable tool for differentiation of adrenal masses, since no false-positive lesions were detected.

**Additional Keywords:** Pheochromocytoma

**print tag:** () Refer to original journal article.
Can FDG PET Predict Response to Chemoradiation in Esophageal Cancer?

Mean and Maximum Standardized Uptake Values in [18F] FDG-PET for Assessment of Histopathological Response in Oesophageal Squamous Cell Carcinoma or Adenocarcinoma After Radiochemotherapy.


In this study, there was large overlap between the SUVavg/max between responders and nonresponders to chemoradiation in patients with esophageal cancer. Thus, FDG PET was not an adequate predictor of neoadjuvant treatment response.

**Objective:** To evaluate FDG PET in predicting the response to neoadjuvant chemoradiation in esophageal cancer.

**Background:** Esophageal cancer has one of the poorest 5-year survival rates, estimated at 15% to 40% despite recent advances in staging and surgical techniques. The development of neoadjuvant chemotherapy and radiation therapy has been developed in an attempt to further bolster the treatment armamentarium. Although FDG PET has been shown to be a valuable tool in the staging and detection of the recurrence of esophageal cancer, its use as a predictor of response to neoadjuvant chemoradiation is not yet clear. Further evaluation of this potential use of FDG PET is important because patients who are poor responders can be spared a multi-modality regimen that may not offer any change in overall survival.

**Methods:** 55 patients (34 with adenocarcinoma, 21 with squamous cell) with a biopsy-proven esophageal cancer were evaluated. Each patient had baseline FDG PET imaging as well as PET scans 3 months following a standardized neoadjuvant chemoradiation of cisplatin, 5 FU, and 36 Gy of radiation. Regions of interest to measure SUVavg and SUVmax were drawn on both baseline and post-therapy scans, with statistical analyses performed to determine if there were differences in SUVs between responders and nonresponders. All surgical specimens were histologically assessed for treatment response.

**Results:** Histopathologically, 21 patients were responders and 34 were nonresponders, with those with squamous cell cancer demonstrating a 50% response rate compared to only 29% among patients with adenocarcinoma. There was large overlap in the SUV values (both avg and max) in responders and nonresponders among both the squamous cell and adenocarcinoma subgroups. Also noted was that baseline SUVs in adenocarcinoma patients were higher in nonresponders than in responders, in contrast to the squamous cell patients.

**Conclusions:** FDG PET could not adequately separate neoadjuvant responders from nonresponders as others studies have shown.

**Reviewer's Comments:** This study is of clinical interest as the authors point out that their results are in discordance with others that have shown that FDG PET is valuable in distinguishing neoadjuvant responders from nonresponders among patients with esophageal cancer. These discrepant findings could be explained by differences in study methods such as timing of the post-therapy scan, use of the more objective semi-quantitative versus subjective SUV measurements of response, and the treatment regimen used. The authors also propose the hypothesis of "cellular stunning." Defined as the down-regulation of glucose transporters, this stunning phenomenon could lead to under-detection of viable tumor tissue on post-therapy scans.

**Additional Keywords:** FDG PET

**print tag:** () Refer to original journal article.
SCCT Guidelines for Interpreting Coronary CT Angiography

SCCT Guidelines for the Interpretation and Reporting of Coronary Computed Tomographic Angiography.
Raff GL, Abidov A, et al:
J Cardiovasc Comput Tomogr; 3 (March-April): 122-136

Guidelines for the interpretation and reporting of cardiac CT have been published by the Society for Cardiac Computed Tomography, setting the groundwork for national guidelines.

Background: As the use of cardiac CT angiography increases, so does the need to establish standards in order to ensure reliable practice methods and quality outcomes. Physician Qualifications: Recommended training criteria established by the American College of Cardiology (ACC) set forth guidelines that allow nuclear medicine physicians, radiologists, and cardiologists to meet their training standards. These guidelines are published on acc.org. Equipment: Interpretation should be done using 3D datasets and workstations. The guidelines do not include recommendations for the type of multidetector CT camera, acquisition protocols, or quality control. Interpretation: Pixels that exceed 130 Hounsfield units are typically considered to represent calcium for the purposes of establishing a coronary calcium score. It is recommended that a calcium score for each vessel (left main, left anterior descending, circumflex, and right coronary artery) be reported along with the total coronary calcium score. Interpretation of the angiographic data starts with mentioning the scan quality and mentioning any artifacts. An 18-segment model is proposed, with the alternative of a 28-segment model that was used in the Coronary Artery Surgery Study. Recommended grading of maximal diameter stenoses is done on a 6-point scale: 0=normal, no stenosis; 1=minimal, <25%; 2=mild, 25% to 49%; 3=moderate, 50% to 69%; 4=severe, 70% to 99%; and 5=occluded. Recommended descriptors of plaque are calcific, non-calcific, and mixed. "Non-calcific" is preferred over "soft" or "lipid-rich." Reporting: A structured reporting format is recommended and described in detail.

Reviewer's Comments: This is an important document for all physicians responsible for the interpretation and reporting of cardiac CT angiography scans. Nuclear medicine physicians are specifically included in the training criteria established by the ACC and the American Society of Nuclear Cardiology, and are eligible to apply for certification offered by the Certification Board of Cardiovascular Computed Tomography.

Additional Keywords: Coronary Artery Disease

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Liquid vs Solid Gastric Emptying Studies

The Added Diagnostic Value of Liquid Gastric Emptying Compared With Solid Emptying Alone.


Performing a liquid gastric emptying study prior to a solid one provides added value in diagnosing gastroparesis.

Objective: To establish normal values for liquid gastric emptying, and to determine whether liquid gastric emptying studies have added value to solid studies in the diagnosis of gastroparesis.

Participants/Methods: This study included 101 patients (77 female, 24 male; age range, 17 to 77 years) with symptoms of gastroparesis. Seven of these patients had diabetes. Thirty patients were healthy volunteers. All patients underwent both solid and liquid gastric emptying studies that were performed on the same day in the morning. Medications that might interfere with the studies were discontinued, and the patients could ingest nothing by mouth from the night before the studies. Each patient was administered 0.2 mCi (7.4 MBq) of In-111-DTPA in 300 mL of water orally with imaging for 30 minutes (1 minute per frame). This was followed by a standardized solid meal consisting of an egg-substitute sandwich with 2 mCi (74 MBq) of Tc-99m-sulfur colloid. Images for the solid study were acquired immediately (0 hours), and then at 1, 2, 3, and 4 hours after ingestion. Regions of interest were placed around the stomach with generation of time-activity curves. For liquids, a best-fit exponential emptying rate (T1/2) was determined. For solids, percentage emptying at 4 hours was calculated. In addition, the downscatter from the In-111 liquid into the Tc-99m solid meal was determined.

Results: In the healthy patients, an exponential gastric emptying pattern was noted. The normal upper range of T1/2 for liquids in these patients was 19 to 22 minutes. Delayed solid gastric emptying was seen in 16% of patients. Delayed liquid emptying was noted in 36%. Thirty-two percent of patients with normal solid emptying had delayed liquid emptying. There was no significant In-111 downscatter into the Tc-99m window.

Conclusions: The authors found added value of performing a liquid gastric emptying study in addition to a solid one for the detection of gastroparesis.

Reviewer's Comments: Based on the findings from this study, one would assume that performing a liquid gastric emptying first would be preferable. If that study were abnormal (which is quicker and easier to perform), then a subsequent solid gastric emptying study would not be necessary.

Additional Keywords: Gastric Emptying

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New Trends in Camera and Software Technology in Nuclear Cardiology.

Garcia EV, Faber TL:
Cardiol Clin; 27 (May): 227-236

Significant gains in hardware design and software processing have enabled fast cardiac perfusion protocols that dramatically reduce imaging acquisition times.

**Background:** The basic SPECT camera design is >50 years old, and the basic filtered back-projection reconstruction algorithm dates back >90 years.

**Objective:** This article discusses the recent advances in nuclear cardiology hardware and software. *Ultrafast Cameras:* (a) D-SPECT: this camera utilizes 9 solid-state cadmium zinc telluride (CZT) detectors that are placed in a 90 degrees geometry surrounding the patient. There are no moving external parts. Recently published research with this camera has found that the total patient imaging time for a standard stress-rest myocardial perfusion study can be reduced from 28 minutes to 6 minutes without loss of diagnostic performance. This camera has the potential to perform simultaneous Tl-201 rest and Tc-99m agent stress imaging in a single acquisition. (b) CardiArc System: this camera uses 3 curved detectors covering 180-degree geometry. It uses NaI crystals. Collimation is achieved using vertical slits that fan back and forth during acquisition. (c) GE Ultrafast AT: this uses CZT solid-state technology with no moving parts during acquisition. Iterative reconstruction is utilized. A standard 14-minute rest acquisition was able to be obtained in 4 minutes without loss of diagnostic quality. *Rotating Cameras:* (a) Cardius 3 XPO (Digirad): this solid state camera uses 3 rotating heads, and standard acquisition time is 7.5 minutes. (b) IQ SPECT collimation: this uses existing Siemens dual-headed SPECT cameras. Collimators are modified to allow an acquisition time of 4 to 5 minutes. (c) Multi-Pinhole SPECT: this creates diagnostic quality images without the need to rotate the gantry.

**Software:** Primary advances are in resolution recovery (decreases rejection of counts as noise and glean meaningful data) and iterative reconstruction. Current commercial applications include: (a) Wide Beam Reconstruction (UltraSPECT), (b) Astonish (Philips), (c) Evolution (GE), (d) Flash3D (Siemens), and (e) nSpeed (DIGIRAD). Acquisition times can be halved. These may result in a lower left ventricular ejection fraction compared to filtered back-projection reconstruction.

**Conclusions:** New hardware and software techniques can cut in half the acquisition time for stress-rest myocardial perfusion studies, without loss of diagnostic accuracy. These techniques may enable the use of lower radiation doses.

**Reviewer's Comments:** The newer cameras can reduce scan times, but improved clinical outcomes have not been shown. The cost-effectiveness of these newer technologies is not known.

**Additional Keywords:** Myocardial Perfusion

**print tag:** () Refer to original journal article.
Femoral Neck Stress Fracture--Planar Scintigraphy With or Without SPECT

Comparison of Planar Scintigraphy Alone and With SPECT for the Initial Evaluation of Femoral Neck Stress Fracture.
Bryant LR, Song WS, et al:
AJR; 191 (October): 1010-1015

SPECT imaging should be part of the procedure for assessment of stress injury to the femoral neck when performing a bone scan.

**Background:** Femoral neck stress fractures may occur in long distance runners, military personnel, or others involved in intense exercise routines. Bone scanning is known to have very good sensitivity and specificity for detecting stress fractures in general. The early detection of femoral neck stress fracture can prevent progression to a full-thickness fracture that may have devastating consequences.

**Objective:** To assess the utility of SPECT imaging compared to standard planar bone imaging for detecting stress fractures involving the femoral neck.

**Design/Methods:** This was a retrospective study of physically active patients who underwent bone imaging with Tc-99m MDP for suspected stress fracture. A total of 38 patients underwent planar bone imaging followed by MRI of the hips; another group of 33 patients underwent planar imaging plus SPECT imaging prior to MRI of the hips. All patients were military trainees. Stress fracture grade was determined based on the degree of edema seen on MRI as either low or high grade.

**Results:** In the first group, planar imaging had a sensitivity of 50% (6 of 12). In the second group, SPECT imaging had a sensitivity of 92% (12 of 13). Specificity was similar for the 2 methods. SPECT imaging was reported to be better for determining high-grade fractures as defined by MRI.

**Conclusions:** "The addition of SPECT to planar imaging should be considered in a young active population with hip pain."

**Reviewer's Comments:** I was a bit puzzled by the way the authors chose to do their data analysis. In addition, the authors did not say what their guidelines were for SPECT, or planar, imaging in distinguishing high- versus low-grade fractures. Nevertheless, I think the message is reasonably clear. SPECT imaging should be part of the procedure for assessment of stress injury to the femoral neck when a bone scan is performed.

**Additional Keywords:** Stress Fractures

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How Often Are Unexpected Abnormalities on PET/CT Seen in Thyroid Gland?

Evaluation of Thyroid FDG Uptake Incidentally Identified on FDG-PET/CT Imaging.
Chen W, Parsons M, et al:
Nucl Med Commun; 30 (March): 240-244

Incidental diffuse thyroid FDG uptake is commonly due to chronic thyroiditis.

Background: A variety of incidental findings may be observed on FDG-PET/CT exams. Understanding the possible etiologies for these results is, therefore, important for optimal PET interpretation.

Objective: To determine how often unexpected abnormalities on PET/CT are seen in the thyroid gland, and to demonstrate the clinical significance of these incidental findings.

Design: The authors retrospectively reviewed 2594 PET/CT exams (from an 18-month period) for either diffuse or focal incidental thyroid uptake. Patients with known prior thyroid disease were excluded.

Results/Conclusions: Incidental thyroid uptake was seen on 99 of 2594 (3.8%) PET/CT exams. Forty-six cases were diffuse and 53 were focal findings in the thyroid. Eleven of the focal lesions were confirmed pathologically. Seven of these 11 were found to be malignant, with 2 of the 7 representing metastases. There was no significant difference in the SUV of the 4 benign and 7 malignant focal thyroid lesions (mean, 2.9 vs 4.0, respectively). Twenty-one of the 46 cases with incidental diffuse uptake were evaluated further. All 21 patients were eventually diagnosed as having chronic thyroiditis.

Reviewer's Comments: These findings are consistent with other studies indicating that about half of unexpected focal thyroid lesions on PET are due to malignancy. It was interesting that all of the patients in this study with incidental diffuse thyroid FDG uptake who were further evaluated for this finding were found to have chronic thyroiditis. I might have expected there would be a small fraction of patients with subclinical Graves' disease as well. Also consistent with what others have observed, these authors found that FDG uptake cannot reliably distinguish benign from malignant focal lesions in the thyroid. That makes the important point that, in rare instances, focal thyroid uptake may represent metastatic disease. The authors cite one case from the literature in which thyroid uptake appeared to be diffuse, and yet a diagnosis of lung cancer metastases was eventually established as the cause.

Additional Keywords: Thyroid

print tag: () Refer to original journal article.