

Abstracts in this section pertain to papers presented at the meeting of SNM's Southeastern Chapter, "Expanding the Clinical Role of Nuclear Medicine," October 31–November 2, 1986, Nashville, TN. Program Chairman: Michael J. Gelfand, MD

Staging of Advanced Colorectal Carcinoma, Clinical Efficacy of Anti-CEA Monoclonal Antibody Imaging. R. G. Carroll, S. J. Harwood, E. Avlonitis, S. Overturf, D. Laven, and B. Sinni. *Bay Pines VA Medical Center and University of South Florida, School of Medicine, St. Petersburg, FL.*

We studied the localization of indium-111-^{(111)In} labeled Anti-CEA monoclonal antibody in ten cases of Stage IV colorectal carcinoma, all of whom exhibited an elevated serum CEA level. The imaging agent was 10–20 mg of ZCE-025 murine Anti-CEA hybridoma monoclonal antibody labeled with 5 mCi of [¹¹¹In]citrate. All patients received planar images at 3 and 7 days postinfusion, as well as single photon emission computed tomography (SPECT) at Day 7. X-ray computed tomographic scans of chest and abdomen were obtained on eight of the ten patients. X-ray polytomography and gallium SPECT scans were obtained in several patients.

No side effects were encountered, other than on one patient who exhibited a mild maculopapular rash during the infusion, which responded promptly to i. v. injection of 50 mg diphenhydramine (Benadryl-R).

Clinically and radiologically unsuspected spread of disease to the chest was detected in four cases. Lesions were confirmed by autopsy tissue in one case, and by gallium scan in the other three cases. Anti-CEA imaging appears to have excellent specificity in the detection of unsuspected pulmonary metastatic disease in colorectal cancer.

Use of Peak Filling Rate to Detect Early Anthracycline Cardiotoxicity. W. I. Ganz, A. Gentili, T. Miller, R. Chahine, J. Johnson, A. Serafini. *University of Miami School of Medicine, Miami, FL.*

To verify the hypothesis that patients (pts) undergoing anthracycline therapy develop diastolic dysfunction prior to systolic dysfunction, peak filling rate (PFR) and left ventricular ejection fraction (LVEF) were computed from serial gated radionuclide angiograms (RNA) in 46 pts. Normal values for LVEF (mean \pm s. d. = $67 \pm 6.5\%$) and PFR (mean \pm s. d. = 2.84 ± 0.27 EDV/sec) were computed from 31 RNA in 12 stable normal pts. Anthracycline cardiotoxicity was suspected when LVEF fell by $>10\%$ from a baseline value or when LVEF was observed to be below 41% when no baseline LVEF was available. A decline in PFR of over 2 s.d. (>0.54 EDV/sec) from a baseline PFR value suggested cardiotoxicity when heart rate (HR) was above 90% of the baseline HR. If HR was below 90% of the baseline HR or if no baseline PFR was obtained a PFR below 1.76 EDV/sec suggested early anthracycline toxicity.

In 7 of the 46 pts, LVEF fell significantly. In these seven pts, PFR fell significantly in the study prior to LVEF decline. One of these seven pts had an endomyocardial biopsy which

demonstrated grade I anthracycline toxicity coinciding with a decline in PFR and LVEF maintenance. On clinical follow-up (10 wk) another of the seven patients developed irreversible CHF when LVEF finally dropped significantly. These preliminary results suggest that (a) a fall in diastolic parameters may represent the first sign of anthracycline toxicity, and (b) diastolic as well as systolic parameters should be monitored in pts undergoing anthracycline therapy.

Advantages of Modified Oblique Cardiac MRI Projections. W. I. Ganz, A. Serafini, A. Gentili, *University of Medicine, Miami, FL.*

To optimize magnetic resonance imaging (MRI) imaging of cardiovascular anatomy, a modified oblique projection (MOP) is proposed. Twenty subjects were studied in this MOP using a Picker 0.35 Tesla MRI system with gated multislice spin echo sequences. In the MOP, the patient's right side is elevated 30° at the diaphragm, and the shoulders are depressed so that they are symmetrical on the imaging table. This position provides advantages in imaging the cardiovascular system in all orthogonal projections. In the transaxial projection, (1) the ventricular mass, (2) the four chamber view demonstrating the atrio-ventricular septum and valves; (3) aortopulmonary relation and (4) the aortic origin of both left and right coronary arteries can usually be visualized. In the coronal projection, the connection of (1) pulmonary vessels to cardiac chambers, (2) superior and inferior vena cavae to the right atrium, (3) left ventricle to aorta, (4) right atrium to right ventricle, and (5) left atrium to left ventricle can be appreciated. In the sagittal projection, (1) the course of the aorta and pulmonary as well as (2) atrial ventricular relationships can be demonstrated. The MOP may provide a better way to image the heart and vessels than the traditional long and short axis oblique methods. Further experience with MOP will be required to better define its clinical efficacy.

Active Valvular Vegetations Detected by Cardiac MRI. W. I. Ganz, A. Gentili, A. Serafini. *University of Miami School of Medicine, Miami, FL.*

To determine whether proton magnetic resonance imaging (MRI) can detect active vegetations on the tricuspid valve, five patients underwent MRI within 2 wk of the time that tricuspid valve vegetations were observed on echocardiography.

Using a 0.35 Tesla Picker MRI system gated spin echo (SE) multislice, images were adequate with 128 view acquisitions. The SE pulse sequence employed repetition time of the patients RR interval to allow gating, and echo times of 26 msec (for optimal structural detail) and 60 msec (for optimal contrast enhancement). To optimize visualization of the atrioventricular valve planes, patients were positioned in a modified oblique position, in which the right side of the patient's diaphragm is elevated 30°, and the shoulders are symmetrically positioned on the imaging tables. SE images best demonstrate the atrioventricular valves at the end systole, when the valvular motion is minimized.

In the ten control patients, the only normal area of increased SE signal was noted at the tricuspid valve cusp attachment to the ventricular wall. In the patients with endocarditis, the region of increased tricuspid SE signal intensity corresponded to the sites of vegetation seen on echocardiography. In two patients, the increased SE signal intensity extended to include additional portions of the valve and into the ventricular system. It is hypothesized that the regions of increased SE signal intensity correspond to the regions of active inflammation. Cardiac MRI studies are useful in endocarditis, since at least 15% of patients with active tricuspid vegetations do not have confirmed positive blood cultures, and since MRI may allow noninvasive diagnosis of endocarditis.

Quantitation of Thallium-201 SPECT in Normal Men: A Simplified Display Format. A. H. Hakki, R. G. Carroll, P. Goldner, C. A. Johnson, and S. J. Harwood. *VA Medical Center and University of South Florida, Bay Pines, FL.*

The "Bullseye" method of quantitation of thallium-201 (²⁰¹Tl) single photon emission computed tomography (SPECT) displays myocardial segments from apex to base disproportionate to their anatomic size, and does not take into account changes in left ventricular (LV) volume with exercise (EX), thus, limiting comparison of myocardial segments from exercise to redistribution.

An alternative approach was examined, based on dividing the LV into five equal segments in each of three projections (transaxial, coronal, and sagittal). In addition, the central 60% of the LV was displayed in three projections, subjected to radial circumferential profile analysis, and used to designate the three coronary vascular distributions (left anterior descending, left circumflex, and right coronary arteries).

To provide normal reference values, ten healthy men underwent treadmill exercise ²⁰¹Tl imaging, using a GE400 AT Camera and an ADAC 3300 Computer. The minimum 36° sector count density was 73 ± 7% in transaxial, 74 ± 11% in coronal and 78 ± 10% in the sagittal projection.

In conclusion, the proposed display format for ²⁰¹Tl SPECT allows for proportionate anatomical representation of myocardial segments from apex to base, and takes into account changes in LV volume with EX.

Radiopharmaceutical-Chemotherapy Drug Interactions in Nuclear Medicine. D. L. Laven, P. J. Goldner, W. B. Hladik, J. A. Ponto, B. C. Lentle. *Bay Pines VA Medical Center, College of Pharmacy, University of New Mexico, Albuquerque, NM, University of Iowa Hospitals & Clinics, Iowa City, IA, and Cross Cancer Institute, Edmonton, Alberta, Canada.*

Many different, routinely performed imaging procedures (including gallium-67 (⁶⁷Ga) citrate and numerous technetium-99m- (^{99m}Tc) agents) serve a useful role in monitoring the course of patient therapy. Interactions involving chemotherapeutic drugs and radiopharmaceuticals continue to be described in the literature. These interactions can be annoying (interfering) or beneficial in terms of their relationship to select nuclear medicine imaging procedures. Besides gallium-67 citrate, interactions with various chemotherapeutic drugs will be described involving: [^{99m}Tc]MDP, [^{99m}Tc]PYP, [^{99m}Tc] sulfur colloid, [^{99m}Tc]red blood cells, [^{99m}Tc]glucoheptonate, [^{99m}Tc]hepatolite, [^{99m}Tc]MAA, [^{99m}Tc]DTPA, as well as xe-

non-133 gas, iodine-131 hippuran, and thallium-201 chloride. Recognition of radiopharmaceutical chemotherapy drug interactions is important in interpreting information obtained from nuclear medicine imaging. Clinical examples will be presented highlighting the various patterns of altered radiopharmaceutical biodistribution noted in interactions between chemotherapy agents and the radiopharmaceuticals listed above.

Indium-111-Labeled Anti-CEA MOAB Localization of Colorectal Carcinoma. H. Abdel-Nabi, A. Schwartz, D. Matsuoka, D. Wechter, L. Langdale, M. Cerqueira, C. Higano, and M. W. Unger. *VA Medical Center and University of Washington, Seattle, WA and Hybritech, Inc., San Diego, CA.*

The effectiveness of indium-111- (¹¹¹In) labeled anti-carcinoembryonic antigen (CEA) monoclonal antibody (MoAb) was studied in 15 patients (pts) with colorectal carcinoma (Ca). Each patient received ~5.5 mCi of ¹¹¹In-ZCE 025 (murine anti-CEA MoAb of the IgG₁ class). Planar total-body scans were performed 3 and 6 days postinfusion, single photon emission computed tomography (SPECT) performed at Day 3 only. Twenty-nine tumor sites (lymph nodes (LN):15, lung:6, colorectal:6, local recurrences:2) were confirmed at laparotomy (11 pts), autopsy (2 pts), CT and x-ray (2 pts). Indium-111-MoAb localization was seen in 15/15 LN metastases (mets), 3/6 lung mets, 2/2 local recurrences and 1/6 colorectal tumors. SPECT did not affect the number of lesions detected by planar scanning, but provided better anatomical delineation of these lesions.

In conclusion, the detection rate of colorectal Ca and mets with ¹¹¹In-ZCE 025 in this study is 72%. The MoAb was found most valuable in detecting lymph node mets, and could play a major role in pre-operative staging of colorectal Ca.

Personal Computer Based Physician Display And Dictation Station. C. Eubig, J. H. Trueblood, M. J. Frank, L. O. Faulk, and C. V. Mijares Jr. *Medical College of Georgia, Augusta, GA.*

A digital storage, retrieval, and display station was developed for use in the nuclear medicine laboratory and evaluated with nuclear cardiac studies. It was found to allow the physician ready access to the results of completed studies without having to compete with busy main computer terminals. A video digitizer/display board, bus mounted in an IBM AT, captures images as processed on the main computer system and displays them with 512 × 512 resolution and 8-bit precision. Gray or color scale manipulation of the displayed images is possible on a high quality monitor. Other display features are inverse video, zoom, and four on one image formatting. A joystick controlled cursor makes selections from a graphics menu of various display functions and a list of the images available on disk. The 30 megabyte AT hard disk stores over 100 images with a 3-sec access time. High density floppy disks can be used for archiving. Total system cost was under \$7,000. A 20-megabyte, 3-sec access time, removeable disk system is an option. Since a dynamic display is not currently available with this system, a video cassette recorder is used for these studies. This system is especially good for viewing static images such as thallium studies for which display manipulation is desirable.

Increased Extremity Uptake on Three-Phase Bone Scans Caused by Peripherally Induced Ischemia Prior to Injection. M. L. Lecklitner and K. P. Douglas. *University of South Alabama, Mobile, AL.*

We studied 68 patients prospectively in order to determine the frequency and magnitude to which either a blood-pressure cuff (BPC) or simple rubber tourniquet (SRT) induces an increased flow artifact in the hand ipsilateral to BPC or SRT application.

In Groups I and II (12 patients each), we injected the contralateral upper extremity, after a BPC was inflated to a pressure 20 mmHg below systolic pressure for 30 sec and 60 sec, respectively. In Groups III (32 patients) and IV (12 patients) a SRT was applied for 30 sec prior to ipsilateral injection and 120 sec prior to contralateral injection, respectively. In Groups I-IV, technetium MDP, 20 mCi, was injected, and triple-phase images were acquired.

Virtually all patients in Groups I and II and few patients in Groups III and IV demonstrated the artifact. Blood-pool and skeletal-phase images showed no lateralization in those patients demonstrating the artifact. However, four patients demonstrated increased flow activity on the side opposite tourniquet application; three of these four patients had vascular disease.

A BPC should not be used as the occlusive device, and 3 min should elapse after application of a SRT, in order to minimize the ischemic artifact. In cases of asymmetry of flow accompanied by abnormalities in blood-pool and skeletal images, identification of an underlying disease should be pursued.

A Modified Limulus Lysate Technique for Routine Pyrogen Testing of Gallium-68 EDTA. L. C. Washburn, J. E. Carlton. *Medical and Health Sciences Division, Oak Ridge Associated Universities (ORAU), Oak Ridge, TN.*

Gallium-68 ethylenediaminetetraacetic acid [⁶⁸Ga]EDTA is a useful agent for evaluation of breakdown in the blood-brain barrier using positron emission tomography. Our institution's policy is to test each batch of research radiopharmaceuticals for pyrogens before administration to patients. However, the short half-life of ⁶⁸Ga (68 min) precludes U. S. P. pyrogen testing using preconditioned rabbits, and the 0.005 M EDTA present in [⁶⁸Ga]EDTA inhibits gel formation when the standard procedure for Limulus lysate pyrogen testing is used. We have found that the inhibitory effect of EDTA is concentration dependent. Dilutions of the 0.005M EDTA at levels of 1:10, 1:25, and 1:100 were used to reconstitute *E. coli* endotoxin positive controls at levels of 0.5 and 5.0 ng per 0.2-ml sample. Samples to be tested were added to single-test Limulus lysate vials and incubated at 37°C for 15, 30, or 60 min. Positive gel formation was obtained for the 1:25 dilution at both levels of endotoxin in 30 min. The minimum level of *E. coli* endotoxin required to produce a pyrogenic response in rabbits is ~5-10 ng/kg. The minimum total level that could be detected in a 10-ml [⁶⁸Ga]EDTA injection solution using the 30-min test at a 1:25 dilution was 0.6 µg or, assuming a body weight of 70 kg, 9 ng/kg. This modification of the Limulus lysate technique provides a useful means for routine pyrogen testing of [⁶⁸Ga]EDTA.

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The Effect of Camera-Left Ventricular Distance on Detectability of Lesions in a Thallium Myocardial Phantom: A Method for Testing Resolution Recovery Algorithms. R. G. Carroll, A. H. Hakki, L. M. Zangara, S. J. Harwood, *Bay Pines VA Medical Center, Bay Pines, FL.*

We obtained duplicate emission computed tomographic images of a thallium filled myocardial phantom at three distances: 13.7 cm, 15.7 cm, and 17.7 cm from the center of the left ventricle.

Each of the duplicate acquisitions was reconstructed three times; without a prefiltration step, with a Gaussian prefiltration step, and with a nine-point smooth prefilter. After the prefiltration, all data was reconstructed with a Hamming 1.2 filter with one iteration. Thus, there were nine reconstructions performed in duplicate. Quantitative circumferential profile analysis was obtained through the identical slice of a vertical long-axis projection in all reconstructions. The lesion, which contained no activity, was seen on the unfiltered data as 18% on the 13.7 cm, as 22% on the 15.0 cm, and as 24% on the 17.7-cm reconstruction. In the Gaussian prefiltered set, minimum lesion counts were 15% at 13.7 cm, 22% at the 15.7 cm distance, and 22% at the 17.7 cm distance. The nine-point smooth resulted in a lesion value of 23% at 13.7 cm, 28% at 15.7 cm, and 30% at 17.7 cm. We conclude that the Gaussian prefiltration improves lesion detectability, and that the nine-point smooth obscures lesion detectability at all distances, as compared with the nonprefiltered data.

A Knowledge-Based System for Interpreting Thallium-201 SPECT Images. H. L. Hise, E. V. Garcia, N. F. Ezquerria, E. G. DePuey. *Emory University Hospital, Georgia Institute of Technology, Atlanta, GA.*

To overcome the needed expertise and variability in identifying the presence and location of coronary artery disease (CAD) from stress thallium-201 myocardial distributions, we developed an expert system to provide consistently accurate interpretations. After reviewing 291 patient (pt) studies with coronary angiography, we developed heuristic rules which best correlated the presence and location of perfusion defects (PDs) on 180° single photon emission computed tomography studies with documented CAD (>50% stenosis). The PDs were identified from polar bullseye maps as pixels below gender-matched normal limits. We structured 40 rules as the knowledge base of this expert system. This "C" driven, expert system, tailored after MYCIN, acts as an inference engine where the location, size and shape of each of the PDs identified from bullseye maps, as well as pt-related information including pre-test likelihood, is used to "fire" the rules to produce new facts or draw inferences. For each parameter and for each rule, a certainty factor is assigned which is traced to infer the certainty of the identification and location of CAD in a pilot group of 42 CAD pts and eight normals. This analysis resulted in agreement in the identification of all 50 pts (100%) and 135/150 (89%) vascular territories when compared with the interpretation by human experts. This expert system which promises to provide consistently accurate interpretations can be easily downloaded to run on standard nuclear medicine systems.

SPECT Quantitation: Dependence of Radionuclide Concentration on Object Size. J. R. Galt, E. V. Garcia, W. L. Robbins. *Emory University, Atlanta, GA.*

The dependence of reconstructed counts on object size has been shown for positron emission tomography to limit the accuracy with which actual regional distributions are derived in objects smaller than two full widths at half maximum (FWHM), such as myocardial walls (~10 mm). Simulations and phantom studies were performed for single photon emission computed tomography (SPECT) to characterize how different system spatial resolutions and convolution filters affect the recovered counts of varying object sizes. The simulation consisted of convolving experimentally determined point spread functions with a three-dimensional model of a right triangular phantom. The actual 1,600-cc lucite phantom was filled with a technetium-99m concentration of 3.25 $\mu\text{Ci}/\text{cc}$. The phantom was reconstructed using a Ramp filter and two Hann filters with cutoff frequencies of 0.833 and 0.625 cycles/cm, respectively, and corrected for attenuation. Objects of two FWHM size yielded counts that were 93% (simulation) and 95% (phantom) of those of a large standard of equal concentration. Objects of 1 FWHM size yielded 70% (simulation) and 66% (phantom) of the standard. Smaller objects resulted in a more severe decline in counts exhibiting a near linear dependence on object thickness. Similarly, the lower the reconstructed system resolution, the more severe the reduction in counts. These findings confirm that object size should be considered in developing methods for absolute quantification of tracer concentration from SPECT and that it may be feasible to predict myocardial wall thickness by comparing extracted counts with a standard thickness.

An Alternative to the Use of Convolution Integrals of Internal Dosimetry. M. G. Stabin, E. E. Watson. *Oak Ridge Associated Universities, Oak Ridge, TN.*

The absorbed dose in a tissue or organ from a radionuclide in the body depends on the cumulated activity in each source organ. Although the most desirable method for determining cumulated activity is direct measurement of activity in the source organs, this is not always possible; however, measurements of activity in some organs or tissues and application of mathematical principles of tracer kinetics can often indirectly yield the required information. The convolution integral technique is a powerful tool for calculating cumulated activity in a compartment which has a time-varying input of activity but direct evaluation of convolution integrals can result in complex and cumbersome calculations. We describe a simple method which will yield the same value for cumulated activity as does the convolution integral method in such situations, if the integration extends from the time of administration to infinity and if the retention functions are constant over time. Theoretical solutions and examples show the equivalency for retention functions described by a sum of exponentials, but proof of applicability to any mathematic retention function is also demonstrated. This method offers significant advantage in the calculation of cumulated activities for use in radiation dose estimates, or for any situation involving linked compartments and time-varying input functions.

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agency Agreement No. FDA 224-75-3016 with the Food and Drug Administration.

Radiation Dose Estimates for Technetium-99m-Microlite Leukocytes. M. G. Stabin, E. E. Watson, C. S. Marcus, and J. A. Kuperus. *Oak Ridge Associated Universities, Oak Ridge, TN, Harbor-UCLA Medical Center, Torrance, CA.*

The usefulness of autologous granulocytes and monocytes labeled by phagocytosis with high specific activity technetium-99m albumin colloid (Microlite) for imaging infections in adults and children has been demonstrated in clinical trials. Acute infections were imaged in the first 2 hr; imaging at 4 hr provided bone marrow images and evaluation of aseptic necrosis of the femoral head. Radiation dose estimates were calculated using distribution and retention data in 11 patients ages 8 to 73 and excretion data from one patient. Intercepts and half-times for all patients were averaged; dose estimates were then extrapolated from the averages to adults and five pediatric age groups. Estimates for early pregnancy, 3 mo, 6 mo, and 9 mo were calculated using S-values for pertinent source organs irradiating the whole fetus, which were estimated using the buildup factor technique. Dose estimates for the spleen were 2.1, 0.81, 0.45, 0.30, 0.20, and 0.14 mGy/MBq for the newborn, age 1, 5, 10, 15, and adult, respectively. All fetal doses were ~0.004 mGy/MBq. Corresponding radiation doses for indium-111 (^{111}In) WBCs are a factor of 2-5 higher. The improved clinical utility over ^{111}In combined with the more favorable radiation doses makes this an attractive agent.

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Image Oriented Approach to Evaluating High Energy Collimator Performance. C. Eubig, J. A. DeGrazia, and S. P. Lance. *Medical College of Georgia and University Hospital, Augusta, GA.*

Gamma camera features, such as the counterbalanced head and a thinner crystal, limit high-energy collimator design and make it more important to know the expected high-energy performance of a system one is about to purchase. Specifications, though available for new equipment, may not be available for older equipment. The user does usually have an opinion based on past experience about the performance of older systems and would like to be able to rate a new system relative to that experience.

We developed a set of computer image oriented tests which use clinical applications appropriate phantoms and can be easily performed, especially by a vendor at a test site. The tests address resolution, septal breakthrough, and sensitivity. They give the user both quantitative and visual information of what to expect from the performance of the new system relative to ones with which he has experience. The tests were compared with techniques recommended by NEMA and were applied to a number of camera and iodine-131 collimator systems with a wide range of performance parameters. These tests were found especially useful when applied to gamma camera systems under consideration for purchase.

Clinical Value and Utility of Cardiac MRI. M. A. Lekich, A. N. Serafini, M. Sammons, and W. Ganz. *University of Miami School of Medicine, Miami, FL and University of Belgrade School of Medicine, Belgrade, Yugoslavia.*

Thirty-five normal controls and 40 patients underwent gated magnetic resonance imaging (MRI) using a superconducting 0.5 Tesla magnet.

The purpose of this research was to develop an appropriate protocol for evaluation of cardiovascular pathology. Prognostic clinical value and utility of MRI were assessed in acute and remote myocardial infarction, CHF due to various cardiomyopathies, aortic dissection, congenital heart diseases, pericardial diseases and aneurysms.

A large number of options that can critically affect image quality were systematically varied to optimize spatial resolution and imaging time. Variations in number of signal averages, data matrix size and TE for T1 and entropy weighted images were also carefully examined.

The optimal images were obtained with multislice 128 gradient steps with four signal averages. Adequate patient positioning, electrically sufficient ECG signals and maximizing the number of slices on each Spin Echo sequence with a TE 26 msec and 60 msec are also important and were used for the formulation of optimal protocol for cardiac MRI.

Use of Technetium-99m Albumin Colloid in Gastric (Emptying and Reflux) Scintigraphy. S. J. Harwood, D. L. Laven, R. G. Carroll, L. M. Zangara, S. T. Overturf, and P. J. Goldner. *Bay Pines VA Medical Center, Bay Pines, FL.*

Albumin colloid (AC) has been marketed as an alternative to sulfur colloid (SC) for hepatosplenic (and bone marrow) scintigraphy. Pitman, Cooper, and Riccardione (*Clin Nucl Med* 10S:41, 1985) described the instability of technetium-99m (^{99m}Tc) AC when incubated in simulated gastric juice, and state the unsuitability of this agent for gastric scintigraphy. We have performed seven studies, using [^{99m}Tc]AC for gastric emptying or reflux. For gastric emptying, the solid test meal consisted of 5 mCi [^{99m}Tc]AC (2–3 hr postkit preparation) in lukewarm water, to which 1–1.5 oz. Quaker Instant Oatmeal was slowly added with constant stirring. For gastric reflux, the liquid test meal consisted of 2–3 mCi [^{99m}Tc]AC (2–3 hr postkit preparation) in 6 oz. of orange juice or milk. Initial ingestion was followed by esophageal rinse with 6 oz. of the liquid. ITLC-SG testing using 85% methanol consistently yielded radiochemical purity results >99.0%. Gastric images were obtained for up to 1 hr. in emptying studies and up to 24 hr for tracheoesophageal fistula and reflux studies. Resultant images demonstrated activity in the stomach, intestinal tract and esophagus, with no significant activity noted in the thyroid, salivary gland or urinary bladder. We conclude that [^{99m}Tc]AC placed into a oatmeal, milk, or orange juice test meal, serves satisfactorily for gastric (emptying and reflux) scintigraphy.

Dobutamine Stress Testing in the Detection of Atherosclerotic Coronary Artery Disease. W. J. Hollins, G. H. Hendrix, L. Gordon, and K. M. Spicer. *Medical University of South Carolina, Charleston, SC.*

Dobutamine thallium stress testing has been proposed as a noninvasive, nonexercise dependent screening test for coronary artery disease (CAD). Fifty patients received dobutamine

infused at incremental doses of 5, 10, 15 mcg/kg/min to a maximal dose of 20 mcg/kg/min. Dobutamine infusion was terminated for angina, PVCs, severe hypertension, drop in systolic blood pressure greater than 20 mmHg, 2mm ST segment depression, or completion of the protocol. Thallium scintigraphy was obtained during the maximum dose of Dobutamine tolerated and repeated 4 hours later. There were no complications. Of 25 patients in whom coronary angiography was available for retrospective analysis, perfusion defects occurred in 15 of 20 patients with angiographically documented CAD (>50% lesion). There were no perfusion defects in five patients who had no CAD. This yielded a sensitivity of 0.75, specificity of 1.0, predictive value of 1.0, and diagnostic accuracy of 0.8. Of perfusion defects with redistribution, 89% were in regions of >50% stenosis. Of perfusion defects without redistribution, 100% were in regions of greater than 75% coronary stenosis.

We conclude that dobutamine thallium stress testing is a safe, specific test with acceptable sensitivity for the detection of CAD in patients who cannot exercise.

Iodine-131 MIBG Imaging in Neuroblastoma. M. J. Gelfand and R. E. Harris. *University of Cincinnati and Children's Hospital Medical Center, Cincinnati, OH.*

¹³¹I-MIBG imaging (MIBG) studies were performed in 17 children with neuroblastoma. Ten were studied once, four twice and three on three occasions. Each received 0.007–0.010 mCi/kg i. v. with imaging 48–96 hr later.

17/27 Scans were positive (+), 1/27 was equivocal (eq) and 9/27 negative (–). Of 17 (+) scans, 10/17 MIBG located more sites of tumor than all other imaging studies combined (usually bone scan, computed tomography and x-ray skeletal survey), 2/17 found the same number of sites and 5/17 found fewer sites. Of the five where MIBG found fewer sites, two had MIBG after apparently successful chemotherapy of gross tumor, but bone scan changes were still resolving and x-rays showed healing.

The child with an eq MIBG had eq magnetic resonance imaging findings at the same location.

Of 9 (–) scans, review of other clinical and imaging data indicated that eight MIBG were true negative and one false negative.

MIBG was particularly effective in demonstrating bone metastases at the ends of long bones and/or a pattern of diffuse marrow involvement of spine and pelvis not seen on other imaging modalities.

Abnormal catecholamine determination (cat) corresponded to + MIBG and normal cat to – MIBG in 22 of 25 in whom cat data was available. One each of the other three was cat–/MIBG eq, cat–/MIBG+ and cat+/MIBG–.

MIBG is (+) in almost all children with other evidence of neuroblastoma, and correlates well with cat. It is probably the single most sensitive imaging study for the detection of metastatic and infiltrative disease.

Correlation of Indium-111 Labeled Leukocyte Imaging and Technetium-99m Skeletal Scintigraphy in the Evaluation of Infected Total Hip Prostheses. J. A. Johnson, M. L. Routt, Jr., M. J. Christie, E. P. Nance, J. J. Kaye, and M. P. Sandler. *Department of Nuclear Medicine and Orthopedic Surgery Vanderbilt University Medical Center, Nashville, TN.*

Preoperative exclusion or confirmation of periprosthetic infection is essential for correct surgical management of patients with suspected infected joint prostheses. The sensitivity and specificity of indium-111 (¹¹¹In) labeled leukocyte imaging in the diagnosis of infected total joint prostheses was examined in 17 patients. Indium-111 labeled leukocyte imaging (24 hr) was compared with technetium-99m (^{99m}Tc) HDP skeletal scintigraphy and aspiration arthrography. A final diagnosis was obtained in all cases by intraoperative bone culture. Indium-111-labeled leukocyte images were interpreted by two methods. In Method 1 the images were read as positive if they demonstrated hyperactivity relative to the contralateral side. In Method 2 the images were positive if they demonstrated focal hyperactivity of either an incongruent distribution or intensity when compared to [^{99m}Tc]HDP images.

	Aspiration culture	Indium-111	
		Method 1	Method 2
Sensitivity	29%	100%	71%
Specificity	100%	40%	100%
Accuracy	71%	71%	88%

This study demonstrates that ¹¹¹In-labeled leukocyte imaging is an extremely sensitive and accurate imaging modality for the detection of infected joint prostheses. It also demonstrates the necessity of correlating In-111 labeled leukocyte images with [^{99m}Tc]HDP skeletal scintigraphy in the detection of periprosthetic infection.

Radionuclide Contaminants in Iodine-123. W. J. Maguire. *Methodist Hospital, Memphis, TN.*

Long half-life contaminants and resulting radiation doses are compared in commercially available iodine-123 (¹²³I) capsules produced from three different target materials. Patient thyroid dose can vary by more than a factor of three due to the variation in identity and activity of contaminants present. Iodine-123 produced from xenon-124, which has just become available this year, has the lowest contaminant levels and radiation dose of the three types studied.

Development of a Drug-Radiopharmaceutical Interaction Screening Program for Nuclear Medicine. D. L. Laven, D. F. Coakley, and P. J. Goldner, N. Gregorio, W. B. Hladik, and V. J. Stathis. *Bay Pines VA Medical Center, Bay Pines, FL,*

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Recognition of drug radiopharmaceutical interactions is important to both nuclear medicine practitioners and nuclear pharmacists. The potential for interactions is significant. Failure to recognize or appreciate their occurrence can lead to diagnostic interpretation errors. The literature contains a vast number of case reports noting interactions involving a wide range of pharmaceutical agents. Such reporting is typically retrospective in nature. Few attempt to quantify the frequency with which a particular interaction may occur. The current study describes: (a) a prospective screening method to identify potential cases of altered radiopharmaceutical biodistribution in inpatient and outpatient populations; (b) measurement of the frequency of altered biorouting of radiopharmaceuticals in 11 different, routinely performed imaging procedures involving 1081 patients; and (c) clinical relevance of noted altered radiopharmaceutical biodistributions in which one in ten patients yielded scan results showing signs of altered biorouting of the radiotracer.

Preclinical Evaluation of Monoclonal Antibody HMFG-1 Using Parenteral Administration. F. Shihab, H. Azar, I. Tyson, J. Hadden, L. Tenorio, and W. Pettit. *University of South Florida, Tampa, FL.*

Iodine-125-labeled monoclonal antibody (MoAb) HMFG-1 was evaluated for its potential use in the clinical radioimmunodetection of colonic mucinous adenocarcinoma. The antibody, an IgG₁, has been shown to react against a component of the human milk fat globule membrane, as well as with a range of adenocarcinomas and normal epithelial cells. The labeled antibody was administered intraperitoneally into athymic nu/nu mice bearing intraperitoneal xenografts of human colonic mucinous adenocarcinoma (×56). Percent dose per gram of tumor, tumor to blood ratio, and tumor to tissue ratios were derived from serial differential tissue counts of radioactivity in samples from tumor-bearing and nontumor-bearing mice. Preferential tumor maxima were noted at 5–7 days postintraperitoneal injection of high selectivity MoAb (HMFG-1). Selectivity of tumor localization was assessed by comparison with antihepatitis virus MoAb. Immunoperoxidase studies were used to assess the presence of the HMFG within various tissues. Distinct tumor images were obtained by gamma camera without the use of subtraction techniques. This study demonstrates the potential clinical usefulness of the labeled monoclonal antibody in future imaging and therapeutic modalities.