

ABSTRACTS OF CURRENT LITERATURE

Positron CT Imaging Using a High Resolution PCT Device (Positologica-I), ^{11}CO , $^{13}\text{NH}_3$, and ^{18}FDG in Clinical Evaluation of Cerebrovascular Diseases. F. Shishido, Y. Tateno, T. Takashima, S. Tamachi, A. Yamaura, T. Yamasaki; Research Institute for Brain and Blood Vessels, Akita, Japan. *Eur J Nucl Med* 9:265-271, 1984

Positron computed tomography (PCT) with a high-resolution system using ^{11}CO , $^{13}\text{NH}_3$, and F-18-labeled deoxyglucose (FDG) was performed in 21 patients suffering from cerebrovascular diseases and in three healthy volunteers. The data acquisition was initiated 3-5 min after ^{11}CO or $^{13}\text{NH}_3$ administration, whereas imaging was started 40 min after FDG injection. The authors classified the perfusion into three different patterns: the misery perfusion was characterized by normal ^{11}CO images, decreased $^{13}\text{NH}_3$ concentrations, and normal or slightly decreased FDG utilization. The luxury perfusion corresponded to slightly increased ^{11}CO concentrations, increased $^{13}\text{NH}_3$ uptake, and decreased FDG metabolism. Normal ^{11}CO , decreased $^{13}\text{NH}_3$ and FDG uptake was associated with old infarction. Early infarctions within a month after onset of symptoms appeared more extensive in PCT than in transmission computed tomography (TCT). Old infarctions (>2 mo) were of similar size for both PCT and TCT. The authors conclude that PCT examinations should find preferential use for the assessment of brain function in patients with cerebrovascular disease.

Relation of Myocardial Blood Flow and Initial Cardiac Uptake of 15-(p- ^{123}I -Phenyl)-Pentadecanoic Acid in the Canine Heart. S. N. Reske, S. Schön, E. J. Knust, H. J. Machulla, W. Eichelkraut, N. Hahn, C. Winkler; University Bonn, Bonn, West Germany. *Nucl Med* 2:83-85, 1984

The regional myocardial uptake of 15-(p- ^{123}I -phenyl)-pentadecanoic acid (IPPA) was compared with the regional myocardial blood flow (RMBF) in eight mongrel dogs. Five min. after the intravenous injection of Ru-103-labeled microspheres (diam 15 $\mu\text{m} \pm 1 \mu\text{m}$) 500 μCi of I-123 IPPA were intravenously injected. Five minutes later the heart was removed and sectioned into multiple slices. The RMBF was 90-120 ml/min per 100 g in normal dogs, whereas the myocardial blood flow was reduced to 20-50 ml/min per 100 g in three dogs with acute ischemia following ligation of the left anterior descending artery. A high correlation coefficient ($r = 0.924$) was found between the IPPA uptake and the corresponding myocardial blood flow in normal and ischemic hearts. The subepicardial radiotracer uptake was higher than the subendocardial radionuclide accumulation. After cardiac pacing, the myocardial blood flow was substantially increased (150-170 ml/min per 100 g), whereas IPPA uptake was only moderately increased.

Diffuse Slow Washout of Myocardial Thallium-201: A New Scintigraphic Indicator of Extensive Coronary Artery Disease. T. M. Bateman, J. Maddahi, R. J. Gray, F. L. Murphy, E. V. Garcia, C. M. Conklin, M. J. Raymond, M. E. Stewart, H. J. C. Swan, D. S. Berman; Cedars Sinai Medical Center, Los Angeles, CA. *J Am Coll Cardiol* 4:55-65, 1984

A limitation of stress-redistribution myocardial thallium-201 perfusion scintigraphy is the inability to distinguish relatively uniform global myocardial hypoperfusion from a normal perfusion

in a patient with extensive coronary artery disease. Diffuse slow washout of myocardial Tl-201 is a distinctive scintigraphic pattern that frequently suggests widespread coronary artery disease. This study was designed to investigate the correlation between angiographic findings and those of a diffuse slow washout of Tl-201 in presence of either no perfusion defect or a defect localized to the distribution of a single coronary artery. In 1,265 consecutive patients having quantitatively analyzed stress-redistribution studies, 46 had a diffuse, slow washout pattern with none or only one regional perfusion defect. Thirty-two (Group A) of 46 had undergone clinically indicated coronary angiography, and 23 (72%) of these were found to have 3-vessel or left main coronary artery disease. The mean time between imaging and angiography was 3 wk. Of the control group (Group B), patients without a diffuse, slow washout pattern and none or only one perfusion defect, five (17%) had extensive coronary disease. In Group A 13 patients had no perfusion defect, and nine of the 13 were found to have extensive disease. Of the 17 patients in Group B who had no perfusion defect, two had extensive disease. A diffuse washout abnormality carries a high predictive value for 3-vessel or left main coronary artery disease. The authors concluded that a diffuse, slow washout pattern without other scintigraphic indications of extensive coronary disease should lead to further diagnostic testing.

Combined Contrast Echocardiographic and Radionuclide Diagnosis of Atrial Septal Defect: Accuracy of the Technique and Analysis of Erroneous Diagnoses. L. E. Ginzton, W. French, I. Mena; Harbor Med. Ctr., Torrance, CA. *Am J Cardiol* 53:1639-1643, 1984

Atrial septal defect (ASD) is one of the most common congenital heart diseases of adults and may be asymptomatic into the 4th or 5th decade of life. Definite assessment of the location and magnitude of shunt is usually obtained by cardiac catheterization, and noninvasive methods using the first-pass radionuclide angiography (RA) or contrast echocardiography (contrast 2-D) study have also been utilized. To determine the accuracy of combined RA and contrast 2-D detection for the exclusion of ASD, the magnitude of the intracardiac shunt was compared with cardiac catheterization. Twenty-five patients with suspected ASD underwent RA and contrast 2-D studies. By catheterization 14 of the patients had ASD and 11 had no shunt. For the RA study a 15 mCi (Tc-99m) pertechnetate bolus was administered i.v., data were recorded in list mode, and region-of-interest (ROI) cursors were placed over the superior vena cava, and right and left lungs. A left-to-right shunt was detected by early recirculation in the right ROI of the lung field. The RA studies correctly identified all 14 patients with an ASD, but yielded five false-positive results among the 11 without an ASD. The mean pulmonary-to-systemic blood flow ratio for 14 ASD patients was 2.3 ± 0.9 (range 1.4 to 4.6). There were five false-positive patients: severe tricuspid regurgitation, one; severe aortic regurgitation, one; mitral stenosis associated with very dilated left atrium, one; severe thyroidotoxicosis, one; and no heart disease, one. When these five studies were reprocessed with gamma fitting and with the pulmonary ROI placed only in the upper lung fields to exclude superimposition of the left atrium, only two of the studies yielded false-positive results. Contrast 2-D correctly diagnosed 13 of 14 patients with ASD, but there were two false-positive diagnoses in the 11 patients with ASD. The combination

of contrast 2-D and RA shunt detection led to a proper diagnostic and therapeutic decision in 24 of 25 patients. These combined diagnostic modalities are clinically useful in the evaluation of patients with suspected ASD.

Krypton-81m Ventilation Studies as a Parameter for Lung Capacity after Lobectomy. M. C. Bins, A. M. J. Wever, E. K. J. Pauwels, E.A. van der Velde; University of Leiden, Leiden, The Netherlands. *Eur J Nucl Med* 9:312-315, 1984

Krypton-81m ventilation studies were performed in 17 patients with bronchiogenic carcinoma in order to assess the preoperative lung function and to predict the postoperative ventilation parameters from the preoperative krypton-81m study. Six krypton-81m images in different positions were used to calculate the lobar number of counts, which was estimated as the regional lung function. Then the percentage nuclide activity of the involved lobe was subtracted from the total lung activity. This value was multiplied with the preoperative inspiratory vital capacity (VC), forced expiratory volume in 1 sec (FEV₁), and the total lung activity (TLC) in order to obtain estimates for the preoperative lung function. Spirometric examinations were performed before surgery and 3, 6, and 12 mo after lobectomy. The postoperative spirometric data were correlated with the predicted values. High correlation coefficients were calculated for VC ($r = 0.82, 0.80, 0.80$) and FEV₁ ($r = 0.88, 0.88, 0.93$), when the predicted values were compared with the postoperative data 3, 6, and 12 mo later. The correlation between the estimated TLC-values and the TLC-data 3 mo after lobectomy was 0.86, whereas the correlation coefficient decreased to 0.51 and 0.43 when the preoperative estimates were correlated with the postoperative data 6 and 12 mo later.

Gastric Air Contrast—Useful Adjunct to Hepatic Artery Scintigraphy. R. L. Wahl, H. A. Ziesman, J. Juni, D. Lahti; Univ. Michigan Med. Ctr., Ann Arbor, Mi. *Am J Roentgenol* 143:321-326, 1984

Hepatic arterial infusion chemotherapy is used for the treatment of primary and secondary liver malignancies. Radionuclide infusion of Tc-99m MAA has been used to evaluate whether or not the intraarterial therapeutic catheter is in optimal placement, but Tc-99m MAA studies may be difficult to interpret. To better diagnose gastric extrahepatic perfusion, 20 Tc-99m MAA hepatic perfusion studies of 19 patients were evaluated by oral administration of powdered sodium bicarbonate-citric acid-simethicone crystal (E-Z-GAS). This product produces carbon dioxide gas, which distends the stomach and allows better delineation of gastric activity (extrahepatic perfusion to the stomach). A lack of change in activity in the left upper quadrant after the E-Z-GAS has been ingested suggests no gastric activity (no extrahepatic perfusion to the stomach). These "air contrast" views provided useful information in 16 of 20 studies. The authors concluded that the use of the air contrast technique can greatly aid in defining the presence or absence of gastric extrahepatic perfusion.

Diagnosis of Right Hemidiaphragmatic Rupture by Liver Scintigraphy. D. H. Blumenthal, G. Raghu, T. G. Rudd, C. M. Herman; Harborview Med. Ctr., Seattle, WA. *J Trauma* 24:536-538, 1984

This case report describes two male patients (ages 17 and 20 yr) who had received blunt abdominal injury in a motor vehicle accident. In each patient, the chest radiograph showed localized evaluation of a portion of the right hemidiaphragm suggesting diaphragmatic hernia. In Patient 1, a liver-spleen study showed corresponding evaluation of the central portion of the right hepatic lobe with a band-like, photon-deficient constriction adjacent to the diaphragmatic tear. The hernia involved the dome of the diaphragm in the area of the central tendon. Repeat surgical exploration 2 wk after injury (thoracotomy) revealed a right hemidiaphragmatic tear through which protruded a portion of the liver (Peck type II). Following repair, the patient recovered. In Patient

2, an emergency portable liver-spleen study showed a bulbous and elevated superior portion of the right lobe of the liver. Laparotomy revealed a 15-cm radial tear in the central tendon area of the right hemidiaphragm with liver protruding through it. Following repair, the patient recovered. These authors conclude (a) that right hemidiaphragmatic rupture may occur following blunt abdominal trauma, and (b) the liver-spleen study can be diagnostic early after such injury.

Opioid Drugs Cause Bile Duct Obstruction During Hepatobiliary Scans. R. J. Joehl, K. L. Koch, D. L. Nahrwald; Hershey Med Ctr., Hershey, PA. *Am J Surg* 147:134-139, 1984

Opioid narcotics are usually administered to relieve pain associated with acute cholecystitis, and these drugs cause biliary sphincter spasms. To determine whether opioid and/or sedative drugs have an adverse effect on hepatobiliary studies 13 healthy volunteers were studied. Each group had three studies as follows: (a) Baseline—without medications, morphine and meperidine (Group 1, four volunteers); (b) Baseline—hydroxyzine and hydroxyzine plus meperidine (Group 2, five volunteers); (c) Baseline—butorphanol and nalbuphine (Group 3, four volunteers). Three hepatobiliary studies of each volunteer were performed once each week. Elapsed time until Tc-99m IDA appeared in the bowel after administration of meperidine, morphine, hydroxyzine plus meperidine, butorphanol, and nalbuphine was significantly greater than the respective baseline values. The delayed visualization of the intestine caused by morphine (more than 3.5 hr in three of four volunteers) was significantly greater than the delayed visualization caused by meperidine. Hydroxyzine alone did not significantly affect clearance of tracer from the common bile duct into the intestine. The authors also presented a 32-yr-old female patient in whom meperidine and hydroxyzine injected i.m. caused functional common bile duct obstruction seen in the Tc-99m IDA image. Therefore, the authors concluded that opioid drugs should not be administered for several hours before performing a diagnostic Tc-99m IDA study.

The Use of Three-Phase Radionuclide Bone Scanning in the Diagnosis of Reflex Sympathetic Dystrophy. S. E. Mackinnon, L. E. Holder; Univ. Toronto Clin. Toronto, Ontario, Canada. *J Hand Surg-Am* 9A:556-563, 1984

These authors reviewed 145 consecutive three-phase radionuclide bone studies (TPBS) of the hands and forearms, 102 of which were performed for evaluation of pain in the hand. Confirmed reflex sympathetic dystrophy (RSD) was present in 23 patients, diffuse hand pain (not RSD) existed in 26 patients, focal hand pain in 41, and other pain-producing conditions in 45. For TPBS, rapid bolus injection of 20 mCi Tc-99m MDP yielded sequential 5-sec images by gamma camera over 40 sec (radionuclide angiogram, (RA) Phase I); followed immediately by blood pool (BP) or tissue phase images acquired using high sensitivity, low-energy, all-purpose collimator (Phase II); followed at 3-4 hr (after injection) by bone image acquired using high-resolution, parallel-hole collimator (delayed, Phase III). TPBS were evaluated by a nuclear radiologist not knowing patients' clinical histories. In the 23 patients with clinical RSD, positive images resulted from only ten RA studies (45% of total), from 12 BP studies (52%), but from 22 delayed studies (96%). Those RA and BP images were variably related: eight of ten patients with positive RA had positive BP, whereas four patients with positive BP had negative RA. When all 145 patients were considered, delayed images alone diagnosed RSD with a sensitivity of 96%, a specificity of 98%, a predictive value of a positive test of 88%, and a predictive value of a negative test of 99%. These authors concluded that: (a) delayed bone images reliably confirm clinical diagnosis of reflex sympathetic dystrophy facilitating early aggressive treatment; and that (b) such images permit monitoring a given patient's response to therapy.

The Clinical Value of Bone and Gallium Scintigraphy for Soft-Tissue Sarcomas of the Extremities. P. T. Kirchner, M. A. Simon; University of Chicago Hospital and Clinic, Chicago, IL. *J Bone Joint Surg* 66:319-328, 1984

The usefulness of gallium and bone scintigraphy in preoperative evaluation and in staging of soft-tissue masses of the extremities was studied prospectively in 48 patients. Three independent scintigraphic indicators of malignant disease were assessed: tumor uptake of Ga-67, increased blood pool activity in the tumor immediately after bone-tracer injection, and increased bone-tracer deposition in the scintigrams obtained 3 hr after injection. The scintigraphic findings were evaluated without knowledge of the tissue diagnosis and were then correlated with the operative findings, photographs of surgical specimens, and continued pathological and clinical staging of the patients. Gallium imaging was positive in 17 of 20 malignant lesions (sensitivity = 85%) and in 4 of 17 benign lesions (specificity = 72%). With the exclusion of acute inflammatory lesions, Ga-67 had a specificity of 92% and overall accuracy in the diagnosis of malignancy of 88%, and correctly identified the presence of soft tissue metastases in the three patients having metastases. Blood pool imaging with bone tracer was positive in 12/12 cases with sarcoma and in 4/11 benign lesions. Delayed bone images were positive in 15/21 sarcomas and 4/17 benign lesions. Focal bone tracer localization in the bone adjacent to the tumor correctly predicted tumor involvement of these areas in all four patients with corresponding radiographic changes and in three that were radiographically normal. The combined results of the three scintigraphic modalities have considerable predictive value in the diagnosis and management of soft tissue sarcomas of the extremities.

Technetium and Gallium Scintigraphic Evaluation of Patients with Long Bone Fracture Nonunion. J. L. Esterhai, C. T. Brighton, R. B. Heppenstall, A. Alavi, G. A. Mandell. University of Pennsylvania School of Medicine, Philadelphia, PA. *Orthop Clin N Am* 15:125-130, 1984

These authors reviewed the literature regarding application of technetium and gallium scintigraphy for preoperatively distinguishing long bone fracture nonunion from synovial pseudoarthrosis and/or occult osteomyelitis complicating nonunion. A study of 157 fracture nonunions evaluated with Tc-99m stressed the need for four-view scintigraphy (anterior or posterior, lateral, and both obliques) of the fracture site because of the possibility that the cleft, characteristic of synovial pseudoarthrosis, might be revealed only on an oblique projection. Three bone image patterns were identified: a photon-deficient cleft between two intense areas of radionuclide uptake; an intense uniformly increased uptake at the nonunion site; and an indeterminate pattern. Careful correlation of scintigraphic results with pertinent history, physical examination, and radiographic data increased accuracy of image interpretation. In 22 patients with fracture nonunion and possible subclinical osteomyelitis, the Ga-67 study could not define the infection because of the presence of new bone formation at the site of the fracture nonunion and past multiple surgical procedures. The authors conclude that Tc-99m scintigraphy when coupled with other diagnostic techniques is helpful in defining the presence of a synovial pseudoarthrosis complicating fracture nonunion. Obtaining a bone image projection corresponding to the plane of the nonunion is crucial. Neither Tc-99m nor Ga-67 scintigraphy, alone or in combination, however, can delineate between fracture nonunion and nonunion complicated by subclinical osteomyelitis because of the increased tracer activity associated with new bone formation at the nonunion site.

Meta-iodobenzylguanidine Adrenal Medulla Localization: Autoradiographic and Pharmacologic Studies. D. Guilloteau, J.-L. Baulieu, F. Huguet, C. Viel, C. Chambon, C. Valat, F. Baulieu, R. Itti,

L. Pourcelot, G. Narcisse, J.-C. Besnard; Laboratoire de Biophysique Médicale, Tours, France. *Eur J Nucl Med* 9:278-281, 1984

The uptake of meta-iodobenzylguanidine (MIBG) was examined in mice. Macro- and microautoradiographic studies were performed. MIBG was preferentially accumulated in the adrenal gland, lower radionuclide activity was seen in the stomach and bowel. The microautoradiographic examinations demonstrated a high radiotracer concentration in the medullary part of the adrenal gland. The application of phenoxybenzamine before the MIBG injection resulted in a 45% lower MIBG uptake. Similar results were obtained for cocaine (35% lower MIBG uptake), whereas desipramine failed to inhibit the MIBG uptake. The application of reserpine initiated a significant decrease of the radionuclide concentration in the adrenal gland. These results indicate that MIBG and catecholamines are comparable but do not have the same metabolic pathways.

Sonography of Brain Tumors in Infants. B. K. Han, D. S. Babcock, A. E. Oestreich. Children's Hospital Med. Ctr, Cincinnati, OH. *Am J Roentgenol* 143:31-36, 1984

Sonograms of six children with brain tumors are presented in which four demonstrated large tumor masses and displacement of adjacent structures. In two, however, the tumors appeared as areas of abnormally increased parenchymal echogenicity without obvious mass effect. Four astrocytomas, one teratoma, and one ependymoma were found. In five cases, examination was obtained through open sutures and fontanelles; in a 4-yr-old child, sonography was possible because of splitting of the sutures. All the solid tumors examined had higher intensity echoes than the adjacent normal brain. The sonographic finding of brain tumors in most instances are related to the mass-producing pressure effects on adjacent structures that may cause obstructive hydrocephalus. Although computed tomography is the modality of choice for investigating patients with suspected brain tumors, ultrasound examination is frequently the first avenue of approach for an infant with nonspecific findings of increased head size and intracranial pressure. Ultrasonograms and the correlative CT scans are provided.

Inversion for the Attenuated Radon Transform with Constant Attenuation. K. I. Kim, R. P. Tewarson, Y. Bizais, R. W. Rowe; Brookhaven National Laboratory and State University of NY at Stony Brook, N.Y. *IEEE Trans Nucl Sci NS-31:538-542*, 1984

The Radon transform and its inversion are the mathematical basis for TCT and ECT. In the case of SPECT, the mathematical problem is complicated by attenuation of the photons as they leave the object. This effect has been called the "Attenuated Radon Transform." An exact inversion of the "Attenuated Radon Transform" is presented. It involves boosting each projection ray for the total attenuation along that ray, filtering the projections with a modified convolution function, which in frequency space has a low frequency cutoff at $\mu/2\pi$, and backprojecting with an exponential distance weighting function. Computer simulations are presented. There is some discussion regarding the variable attenuation problem. A major limitation of the solution is that the detector response function, which depends on depth, is not included. Also, the stability of the solution in the presence of noise is not investigated.

Absolute Quantitation of Radioactivity Using the Build-up Factor. R. K. Wu, J. A. Siegel; Temple University Hospital, Philadelphia, PA. *Med Phys* 11: 189-192, 1984

A method of in vivo quantification of radioactivity based on an interactive solution to a set of simultaneous equations is reported. The equations are for the counts obtained from the anterior and posterior views and in each the buildup factor is included to account for scatter. Buildup factors for use with this technique were

previously measured for matching absorber thicknesses, radio-nuclide, camera window width, collimator, and source size. With an estimate of the phantom (patient) thickness, the transmission images of the arithmetic and geometric mean techniques are not required. In phantom studies, the technique was found to provide very accurate estimates of activity compared with standard techniques for a thin source and good results with an extended source.

A Simple Separator to Generate Half Micron Aqueous Particles for Lung Imaging. D. Royston, B. D. Minty, J. G. Jones, M. McLeod; Clinical Research Centre, Middlesex; and Royal Naval Hospital, Hants, UK. *Br J Radiol* 57:223-228, 1984

The authors report the design of an attachment to a conventional nebulizer that removes nearly all particles of diameters greater than 2 μm . It passes particles with a mass median aerodynamic diameter of 0.44 μm , compared with 3.8 μm from the nebulizer directly. Larger particles tend to be deposited in the major airways by inertial impaction as they resist sudden changes in direction at bifurcations. This effect produces irregular patterns in lung images, even in normal subjects. Lung images from Tc-99m albumin inhaled through the attachment show minimal deposition in the trachea and large air passages and good distribution in alveolar air space almost identical to the pattern seen with Kr-81m. The attachment consists of a 2 cm diameter plastic tube with two columns of stainless steel spheres 3 mm in diameter. The first is two layers deep and filters out the larger particles to reduce the wetting effect in the main column. The main column is 6 cm deep. The device is simple, inexpensive, and permits multiple projections of inhalation images.

Barium-Fluoride—Inorganic Scintillation for Subnanosecond Timing. M. Laval, M. Moszynsk, R. Allemant, E. Cormoreche, P. Guinet, R. Odrun. *Nucl Instrum Meth* 206:169-176, 1983

The first report on the scintillator barium fluoride (BaF_2) was in 1971. It has a pulse height of 10% relative to NaI(Tl) crystals, a decay time of 0.63 μsec , and a wavelength of 325 nm at the peak of the emission spectrum. It is nonhygroscopic and has a density of 4.88 g/cm^3 . This report expands on this information by refining the measurements of the decay time, which is found to consist of at least two components. The slow component has a decay time constant of 620 ns, whereas the fast component has a decay time constant of 760 ps and a pulse height 70 times that of the slow component. Energy resolution was found to be 10% for BaF_2 at 662 keV when this component is included. A time-resolution study resulted in a FWHM distribution of 78 ps for the scintillation using an XP2020 photomultiplier tube. These data indicate that BaF_2 is one of the fastest scintillators ever measured. This fact coupled with its good energy resolution and high density indicate that it may be advantageous in several different fields.

Preparation of Intense ^{68}Ga Positron Sources by Electrocodeposition of $^{68}\text{GeCu}_3$. T. A. Girad, U. Skalsey, E. Sweetman, D. E. Newman; University of Michigan, Ann Arbor, MI. *Nucl Instrum Meth* 205:567-572, 1983

The preparation of thin (<1 mg/cm^2) intense (> 10 mCi) sources of positron emitters have not been described in the literature. This report describes techniques developed for the production of intense sources of Ga-68 by electrocodeposition of the alloy $^{68}\text{GeCu}_3$. Yields are reported in excess of 90% for a thickness of a few mg/cm^2 . Activities in the micro- and millicurie range have been produced for multiple sources. The authors investigated the effects of specific activity, time and plating bath composition, and these are discussed at some length.

Diagnosis of Chagas' Disease in Humans Using a Biotin- ^3H -Avidin Radioimmunoassay. R. L. Tarleton, C. L. Shulz, M. Grogg, R. E. Kuhn; Wake Forest University, Winston Salem, NC. *Am J Trop Med Hyg* 33:34-40, 1984

A recently developed radioimmunoassay (RIA) capable of detecting *Trypanosoma cruzi* infections in mice was studied for use in humans by comparing the results of the RIA with indirect fluorescent antibody (IFA) and direct agglutination (DA). Human sera sample were obtained from 16 patients with a documented chronic cardiac form of Chagas' disease, 9 healthy control subjects, 1 patient with acute Chagas' disease, and 3 individuals with low-level antibody titers to *Leishmania* spp. The RIA utilizes microtiter plates with wells coated by glutaraldehyde—fixed trypomastigotes of *T. cruzi*. The plates may be stored at -70°C for up to 4 mo. Following preparation to prevent nonspecific adsorption of immunoglobulin (IgG), dilutions of test sera are added and incubated. After washing, the plates are then incubated with diluted biotinylated antihuman or antimouse IgM, IgG, or IgA. After again washing, tritium-labeled avidin is added and a second incubation performed. The plates are then dried, the wells removed, and counted. The IFA, DA, and RIA gave comparable results especially in regard to IgG levels specific for *T. cruzi*. IgA levels also proved indicative of *T. cruzi* infection. The limited number of sera with antibodies to *Leishmania* spp. showed no cross-reactivity with *T. cruzi* in the RIA, and there was no cross-reactivity from the *T. rangeli* infected mouse sera studied. The case of acute Chagas' disease showed higher IgM levels and lower IgG levels than seen in the patients with chronic disease. The RIA appears to be a promising diagnostic tool in Chagas' disease.

The Ergoloid Mesylate Dihydroergotoxine: Radioimmunoassay Measurements on Plasma and Blood-Pressure-Lowering Activity. B. G. Woodcock, W. D. Habedank, W. Loh, N. Rietbrock; University Clinic, Frankfurt, FRG. *J Cardiovasc Pharmacol* 6:543-545, 1984

These authors used an established radioimmunoassay (RIA) to quantify plasma levels of dihydroergotoxine (DHET), an antihypertensive drug. DHET mesylate was given as a single dose either orally as a solution (4.5 mg) to 12 or intravenously (0.6 mg) to 8 healthy, normotensive men, aged 21 to 38 yr (mean 26) and body weight 58 to 85 kg (mean 72). In patients these doses had been found to possess equal antihypertensive potency. For RIA, blood samples were collected in EDTA, and the plasma was stored at -20°C until testing. The RIA demonstrated a sensitivity of 10 pg/ml with an interassay CV not exceeding 13% for a range of 15-1000 pg/ml. Maximum blood pressure changes observed were similar by both routes of drug administration. After oral dosing, maximum decreases in systolic/diastolic pressure were $-14/-10$ mm Hg ($-11\%/-13\%$) with the patient supine and $-19/-9$ mm Hg ($-15\%/-12\%$) with the patient standing. After i.v. administration, maximum decreases were $-15/-6$ mm Hg ($-13\%/-8\%$) with the patient supine and $-17/-9$ mm Hg ($-15\%/-11\%$) with the patient standing. The observed changes in systolic as well as orthostatic (diastolic standing) blood pressure and the concentration of DHET after i.v. administration suggest that a correlation between those parameters may exist. The apparent longer antihypertensive effect after the oral dose must be interpreted with caution, since a placebo was not used in this study. Clinically significant reductions in blood pressure correspond to plasma DHET concentrations above about 200 pg/ml. Pulse-rate changes subsequent to drug treatment were small and not significant.

Radiochemistry and Biostability of Autologous Leucocytes Labeled with $^{99\text{m}}\text{Tc}$ -Stannous Colloid in Whole Blood. R. Hanna, T. Braun, A. Levendel, F. Lomas; Royal Canberra Hospital, Acton Act, Australia. *Eur J Nucl Med* 9:216-219, 1984

Autologous leukocytes were labeled with Tc-99m tin colloid (particle size 1–5 μm) and the leukocyte viability, phagocytosis, chemotaxis, and labeling efficiency were investigated. The distribution of labeled cells was assessed in animal studies. Furthermore, the uptake and clearance of the labeled leukocytes was evaluated in six patients. The total mean labeling efficiency of the leukocytes was 81%. Only 15% of the cell-bound activity could be removed by washing, thus no significant nonspecific surface adsorption of the Tc-99m tin colloid existed. Of the labeled leukocytes, 94% were classified as viable using a trypan blue test. The bactericidal capacity was equivalent for labeled and unlabeled leukocytes, whereas the chemotaxis was lower for labeled cells. Three hours after the administration of labeled leukocytes 6.66 %/g organ weight of the injected dose were found in the spleen and 1.29 %/g organ weight in the liver. In humans the mean percentage administered dose per organ was higher in the liver (24.4%) than in the spleen (18.6%). The mean abscess-to-blood ratio was 306:1 20 hr after the injection of labeled cells. Of the total nuclide dose, 1.3% was excreted in the urine within 20 hr.

In Vivo Labelling of RBC with $^{99\text{m}}\text{Tc}$ for Blood Pool Imaging Using Different Stannous Radiopharmaceuticals. H. I. Popescu, J. Lessem, M. Erjavec, G. F. Füger; Department of Nuclear Medicine, Karl-Franzens-Universität, Graz, Austria. *Eur J Nucl Med* 9:295–299, 1984

DTPA and pyrophosphate (PPI) were injected in 2 groups of 3 to 5 rats using a stannous concentration of 15 $\mu\text{g Sn}^{2+}$ /kg body weight, whereas a lower stannous concentration (1.9 $\mu\text{g Sn}^{2+}$ /kg body weight) was used in a third group. Pertechnetate, [250 mCi (7.4 MBQ)] was administered 30 min later. Then blood samples were subsequently taken up to 4 hr after radionuclide injection. Furthermore, the labeling efficiency of RBC was investigated with the high-stannous DTPA kit in three volunteers. Labeling with

high stannous concentrations yielded high blood pool activity 30 min after radionuclide application (94.5% for DTPA and 95.5% for PPI). Only 19.5% of the injected activity was found in the blood pool using the low stannous concentration. The percentage RBC-bound activity within 24 hr was greater than 97% when 15 $\mu\text{g Sn}^{2+}$ /kg body weight were administered for pretinning. The use of a low stannous concentration resulted in lower RBC-bound radionuclide activity (67.2%–92.2%). The radionuclide activity in the blood exceeded 80% of the injected dose in the three volunteers. The left ventricular ejection fraction was calculated in 25 patients using the high-stannous DTPA kit for pretinning. All patients underwent angiography within 7 days before or after the radionuclide examination. A high correlation coefficient ($r = 0.94$) was found between the LVEF values calculated from the radionuclide study and contrast angiography. The results emphasize the importance of high-stannous concentrations for RBC labeling.

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