ABSTRACTS OF CURRENT LITERATURE

Preoperative Scintigraphy with Correlation to Cytology and Histopathology in Carcinoma of the Thyroid. J. Tennvall, E. Cederquist, T. Möller, Y. Naversten, M. Åkerman; University Hospital, Lund, Sweden. *Acta Radiologica Oncol* 22:183–191, 1983

The results of I-131 or pertechnetate scintigraphy and aspiration cytology were compared with the histopathological evaluation in 83 patients. In 50 patients a circumscribed photopenic area or lesion within one lobe was present, and eight patients had similar abnormalities in both lobes. The radionuclide accumulation was irregular in 18 patients, and seven scintigrams were classified as normal. Fifty-four of the 83 patients suffered from well-differentiated thyroid carcinoma (six follicular, 28 papillary, and 20 mixed-cell type carcinomas). The scintigrams were abnormal in 50 of the 54 patients with well-differentiated carcinoma, and four scintigrams were false negative. Thirteen of 16 patients with medullary carcinoma were correctly classified, and all 13 patients with undifferentiated carcinoma had true-positive images. Eleven of the patients with undifferentiated carcinoma had a unilateral photopenic nodule. The diameter of the tumor was less than 1 cm in all seven false-negative scintigrams. In 48 patients (66%) the preoperative cytologic diagnosis was carcinoma or suspected carcinoma. A false-negative diagnosis based on aspiration cytology was obtained in 22 patients (30%). The tumor was missed by needle aspiration cytology in 11 of the 22 cases (50%).

Myocardial Perfusion Imaging with ^{99m}Tc-DMPE in Man. M. C. Gerson, E. A. Deutsch, H. Nishiyama, K. F. Libson, R. J. Adolph, L. W. Grossman, V. J. Sodd, D. L. Fortman, J. L. E. Vanderheyden, C. C. Williams, E. L. Saenger; University of Cincinnati, Cincinnati, OH. *Eur J Nucl Med* 8:371–374, 1983

A new radiopharmaceutical, technetium-99m bis(1,2-dimethylphosphino)ethane (Tc-99m DMPE) was studied as a myocardial perfusion imaging agent in four patients, two normal volunteers and two patients with severe coronary artery disease. The volunteers underwent exercise imaging with 2 mCi Tl-201 before the Tc-99m DMPE study. The myocardial scintigrams using the technetium compound were of inferior quality compared with the corresponding Tl-201 images. Hepatic uptake overlapped with the cardiac apex in the DMPE studies and lessened diagnostic accuracy. High quality myocardial images were obtained after the injection of Tc-99m DMPE in a dog. Otherwise, the heart was not visualized and high hepatic accumulation was present when 5 mCi Tc-99m DMPE were injected in a pig. Absorption radiation dose estimations showed that Tc-99m DMPE is preferable to Tl-201. The highest doses consisted of 200 mrad/mCi to the gallbladder and 160 mrad/mCi to the liver. The authors conclude that further work is justified to develop Tc-99m-pharmaceuticals for myocardial imaging.

Prediction of Postoperative Pulmonary Function following Thoracic Operations–Value of Ventilation Perfusion Scanning. W. F. Bria, D. J. Kanarek, H. Kazemi; Massachusetts Gen. Hosp., Boston, MA. *J Thorac Cardiovasc Surg* 86:186–192, 1983

Since patients with bronchogenic carcinoma often have coexisting chronic obstructive pulmonary disease, the decision to operate may depend on accurate prediction of postoperative pulmonary functional status. Regional alterations of pulmonary ventilation and perfusion as determined by radionuclide lung imaging coupled with standard overall pulmonary function tests, such as the FEV_1 and FVC, have been used for these evaluations, and this study sought to determine the accuracy and usefulness of such predictions. A retrospective study was made of 20 patients who had radionuclide ventilation-perfusion studies, lung resection, preoperative and postoperative FEV_1 and FVC determinations by standard spirometric methods. Perfusion images were obtained following i.v. injection of a 10 ml bolus of saline containing 1–2 mCi of dissolved N-13. Ventilation images were obtained using 2 mCi of gaseous N-13 contained in a spirometer. Each lung was divided into four sections from base to apex, and regional function during the single-breath, perfusion, volume, and washout phases determined. The estimated postoperative FEV_1 or FVC was calculated using the regional distribution of either ventilation or perfusion in the following formula: estimated postoperative FEV_1 = preoperative FEV_1 × percentage of function of lung regions not to be resected. The postoperative FEV_1 was well estimated by the ventilation or perfusion derived data, correlation coefficient of 0.88 for either method. Postoperative FVC had a correlation coefficient of 0.95 when derived by ventilation image data and 0.93 if perfusion image data were used. The qualitative data obtained from the regional N-13 washout studies added useful information in selected patients.

Dynamic Radionuclide Imaging as a Means of Evaluating Vascular Perfusion of the Upper Extremity—A Preliminary Report. L. A. Kolman, J. A. Nunley, R. H. Wilkinson, J. R. Urbaniak, R. E. Coleman; Wake Forrest Univ. Bowman Gray Med. Ctr., Winston Salem, NC. *J Hand Surg* 8:424–434, 1983

Dynamic radionuclide imaging (DRI) was used to evaluate the vascular supply of the upper extremities in 44 patients (35 men, nine women; aged 19–59 yr). The patients were seated with the dorsal aspects of the forearms, hands, and wrists placed against the detector surface of a large field-of-view gamma camera. Following an i.v. bolus injection of 20–25 mCi of Tc-99m labeled medronate in the least symptomatic extremity, nine sequential images at 5 sec per frame were obtained for each hand with simultaneous computer acquisition of data. Immediate blood pool images were also obtained as were delayed studies to assess the bones and joints. The images were assessed visually and time-activity curves generated over anatomical regions of interest. The DRI studies were correlated with the arterial patterns determined by operative intervention or contrast arteriography in 50 limbs. Hemodynamically significant alterations of vascular anatomy were correctly identified by DRI in 24 posttraumatic forearms, providing quantitative documentation of perfusion patterns and arterial graft integrity. Details of perfusion in the wrists and hands were in most cases only implied. In the nontraumatic cases of vascular insufficiency, differentiation of severe vasospastic disease and arterial insufficiency was difficult, but information was obtained that proved to be of value when used in conjunction with the clinical history and results of physical examination.

Radionuclide Quantification of Mitral and Aortic Regurgitation. S. C. C. Reinders Folmer, R. W. Koster, A. V. La Riviere, A. J. Dunning; Departments of Nuclear Medicine and Cardiology, Academic Medical Centre, 1105 AZ Amsterdam, The Netherlands. *Eur J Clin Invest* 13:325–330, 1983

Gated equilibrium blood pool scintigraphy was used to quantify

the regurgitant blood flow in 97 patients. Cardiac catheterization, including a ventriculogram and an aortic root angiogram, served as the reference methods. The assessment of mitral or aortic regurgitation was based on the cineangiograms. Mitral backflow was graded on a scale from 1 to 4, and aortic regurgitation was quantified using a scale from 1 to 3. Gated equilibrium blood pool studies were performed after i.v. injection of 10 to 15 mCi Tc-99m HSA. The ejection fraction (EF), the stroke count index (SCI), and the regurgitant fraction (RF) were calculated from the scintigraphic examination using a region-of-interest technique. Thirty-seven patients had mitral regurgitation, 24 patients suffered from aortic regurgitation, and 36 were classified as normal. On the basis of the 36 normals, a SCI of 1.50 was selected as the upper limit of the normal range. No statistically significant different SCI values were found when patients with angiographic mitral regurgitation grades 1 and 2 were compared with normals. The same result was obtained for aortic regurgitation Grade 1. Patients with hemodynamic moderate or severe (Grades 3 or 4) mitral or (Grade 3) aortic regurgitation were correctly classified in 92% using the SCI values. The specificity was 95%, and the positive and negative predictive values exceeded 90% in these patients. The authors conclude that the SCI value is a reliable parameter for the classification of patients with hemodynamic significant valvular disease.

Scintigraphic Quantification of Myocardial Ischemia—A New Approach. B. M. Massie, M. Hollenberg, J. A. Wiisneski, M. Go, E. W. Gertz, S. Henderson; Vet. Admn. Med. Ctr., San Francisco, CA. *Circulation* 68:747–755, 1983

The sensitivity of Tl-201 scintigraphy in coronary disease has generally been high, but its ability to estimate the extent of anatomic involvement has been limited. This study was undertaken to develop a quantitative scintigraphic measurement of ischemia. Using the seven pinhole tomographic technique, 15 normal subjects and 55 patients with chest pain were imaged immediately after exercise and 3 hr later. Circumferential profiles of the initial and 3-hr redistribution and of 3-hr clearance rate were generated for each of three left ventricular sections. A scintigraphic ischemia score (SIS) was derived by summing the three sections of the area between exercise and 3-hr profiles and the area by which the clearance profile fell below the lower limits of normal clearance derived from the normal subjects. The redistribution area becomes progressively large for patients with zero, one, two, or three vessel diseases (SIS 438 ± 428, 846 ± 370, 1150 ± 903, and 1307 ± 927, respectively). The normal subjects had a low likelihood of coronary disease (95% confidence). The intergroup differences were statistically significant, but there was considerable overlap among individual patients. The SIS correlated significantly with a coronary arteriography score designed to reflect the potential ischemia based on the coronary anatomy, and exercise ECG suggest that the SIS is an effective measure of myocardial ischemia. This measurement might then provide an objective method for choosing and evaluating therapy.

Use of Dual Intracoronary Scintigraphy with Thallium-201 and Technetium-99m Pyrophosphate to Predict Improvement in Left Ventricular Wall Motion Immediately after Intracoronary Thrombolysis in Acute Myocardial Infarction. J. Schofer, D. G. Mathey, R. Montz, W. Blenfeld, P. Stritzke; Univ. Hamburg, Krankenhaus, Eppendorf, D2000 Hamberg, Germany. *J Am College Cardiol* 2: 737–746, 1983

To document the benefit of reopening the occluded coronary artery by an intracoronary infusion of streptokinase, 31 patients with acute myocardial infarction (MI) (angiographically proven total occlusion of left anterior descending artery in 19, of the right coronary artery in eight, and of the circumflex coronary artery in four), underwent intracoronary thallium-201 scintigraphy before and after intracoronary thrombolysis. Intracoronary Tc-99m pyrophosphate (PPi) scintigraphy was performed simultaneously after thrombolysis in 16 of the 31 patients. The scintigraphic results were compared with the changes in regional ejection fraction (EF) in the area of infarction. Two patients with inferior MI had normal LV contrast cineangiogram with no initial significant LV thallium defect. In eight patients, regional EF normalized (from 18% to 63%), and all eight patients showed substantial new thallium uptake after thrombolysis. In five patients regional EF improved (from 20% to 40%); three of these patients had additional thallium uptake but large residual defects persisted, and two had substantially increased thallium uptake with Tc-99m PPi accumulation remaining in the area of new thallium uptake. Of nine patients with no significant change in the regional EF, the initial thallium defect was unchanged in seven. Two patients showed significant new thallium uptake with Tc-99m PPi uptake in the same area. No changes in thallium defect size or regional EF were observed in seven patients in whom thrombolysis failed. Intracoronary injection of Tc-99m PPi after thrombolysis revealed a localized accumulation in the area of thallium defect with or without significant thallium/Tc-99m PPi overlap, whereas in the cases of permanent coronary occlusion no Tc-99m PPi localization was seen. Authors concluded that dual intracoronary scintigraphy with thallium and Tc-99m PPi is helpful to predict myocardial salvage and to determine areas of irreversible damage immediately after intracoronary thrombolysis.

Analysis of the Degree of Pulmonary Thallium Washout after Exercise in Patients with Coronary Artery Disease. Ronald Levy, Alan Rozanski, Daniel S. Berman, Ernest Garcia, Ken Van Train, Jamshid Maddahi, H. J. C. Swan; Cedars-Sinai Med. Ctr., Los Angeles, CA. *J Am College Cardiol* 2:719–728, 1983

Abnormal pulmonary thallium uptake during stress Tl-201 study is suggestive of and directly related to the LV dysfunction, but the abnormal thallium uptake is visible in less than 30% of patients with coronary artery disease. The pulmonary thallium activity, expressed by the degree of pulmonary activity as a quantitative fraction of the myocardial value, has the advantage of being more objective, but the abnormal pulmonary to myocardial ratios are present in less than 40% of patients with coronary artery disease. It has been observed also that pulmonary thallium activity occurred at stress and usually disappeared by the time of the resting examination. The relative degree of pulmonary thallium washout may vary among normal subjects. To improve the detection of increased pulmonary thallium activity in patients with coronary artery disease, an independent analysis of pulmonary thallium activity between stress and redistribution was studied on 92 patients with coronary artery disease. For quantitative analysis of pulmonary thallium washout, pulmonary thallium activity (PTA) was determined from a 10-× 10-pixel region of interest placed over the medial aspect of the left upper lung field on the anterior view at stress and redistribution imagings. The degree of pulmonary thallium washout was expressed as Stress PTA—Redistribution PTA/Stress PTA. For diagnostic purposes the level of pulmonary thallium washout was considered abnormal if 41% or more (>2 s.d. above the mean value in patients with less than 1% coronary artery disease). Abnormal pulmonary thallium washout was present in 59 of the 92 patients with coronary artery disease, and in only two of eight with angiographically normal arteries. Abnormal pulmonary thallium washout was related to both the anatomic extent and functional severity of disease, and it occurred with greatest frequency in patients with multivessel disease and in those with exercise-induced left ventricular dysfunction. When added to the quantitative analysis of myocardial study, the analysis of pulmonary thallium washout increased the

detection of coronary artery disease from 84%–93%. The authors concluded that the pulmonary thallium washout analysis (1) provides a more reliable objective measurement of pulmonary thallium activity, (2) correlates with both the extent of coronary artery disease and the degree of exercise-induced left ventricular dysfunction, and (3) improves the sensitivity of quantitative thallium scintigraphy to detect the presence of coronary artery disease.

Computed Tomographic Scanning versus Radioisotope Imaging in Adrenocortical Diagnosis. C. K. Guerin, H. W. Wahner, C. A. Gorman, P. C. Carpenter, P. F. Sheedy II; Mayo Clinic, Rochester, MN. *Am J Med* 75:653–657, 1983

One hundred patients with tissue diagnosis who had adrenal scintigraphy using I-131-19 iodocholesterol (19-IC) and I-131-6B-iodomethyl-19-norcholesterol (NP-59) between 1973 and 1981 were included in the study. Forty-eight of the patients studied after 1976 also had computed tomography (TCT) of the adrenal region. All patients had biochemical evaluation before scintigraphy: 28 with Cushings syndrome (including five adrenal carcinoma, one adenoma, 15 hyperplasia); 58 with primary aldosteronism; 13 had nonfunctional tumors. Study interpretations were formulated with knowledge of the clinical data. An adrenal adenoma was suspected when unilateral or asymmetric uptake was present. Adrenal hyperplasia was suspected when bilateral symmetrical uptake occurred in the presence of biochemical evidence of adrenal hyperfunction. Patients with functional adrenocortical carcinomas usually showed either bilateral nonvisualization or only contralateral visualization, often in the presence of radiographic evidence of a large mass. The overall diagnostic accuracy of both NP-59 scintigraphy and TCT in adrenocortical lesion is approximately 90%. TCT is fast and less expensive and involves lower radiation doses to the patient than scintigraphy. The main disadvantages of scintigraphy is that it requires at least 7 days to complete the study. Thus, scintigraphy as a routine procedure in establishing adrenocortical disease has been superseded by TCT at our institution. TCT may be unsuccessful, however, if a tumor is in an extopic location or in the postoperative patient, where artifacts from metallic clips or adhesions may create problems.

^{111}Indium Leukocyte Scanning in Small-Bowel Crohn's Disease. S. H. Saverymuttu, A. M. Peters, H. J. Hodgson, V. S. Chadwick, J. P. Lavender; Departments of Medicine and Diagnostic Radiology, Royal Postgraduate Medical School, London, England. *Gastrointest Radiol* 8:157–161, 1983

Twelve patients with Crohn's disease were evaluated by In-111-leukocyte scintigraphy. The disease was limited to the small bowel. Large bowel involvement was excluded by double-contrast barium enema or colonoscopy. Ten patients had evidence of active disease based on the Crohn's disease activity index (CDAI above 150). Two patients had a CDAI below 150, but the C-reactive protein and the erythrocyte sedimentation rate were elevated, suggesting active disease. In five patients a mixed leukocyte preparation labeled with In-111-acetylacetone was injected; seven patients received pure granulocytes labeled with In-111-tropolonate. Twenty-five patients with irritable bowel syndrome were used as the control group. In 11 patients acetylacetone-labeled leukocytes were injected, and in 14 patients tropolone-labeled leukocytes were preferred for scintigraphy. All 25 patients with the irritable bowel syndrome had negative images. The early images (40 min to 4 hr after injection) showed abnormal abdominal nuclide accumulation in all patients with Crohn's disease. The late images (16 to 24 hr) showed distal transit of labeled leukocytes corresponding to fecal excretion. The patients with active disease (n = 10) had high levels of fecal In-111 excretion (mean value 15.2%), whereas the patients with irritable bowel syndrome excreted less than 1.6% of the injected In-111 dose. In patients with Crohn's disease the abnormal radionuclide accumulation was concordant with the radiographic extent of the disease. In one patient the initial barium examination was normal, but the repeated barium study revealed evidence of active disease. These results indicate that scintigraphy with In-111-labeled leukocytes is useful for the assessment of patients with suspected Crohn's disease. The measurements of fecal In-111 excretion might be used for therapy monitoring.

Diuretic Radionuclide Urography in Diagnosis of Suspected Ureteral Obstruction following Renal Transplantation. R. J. MacGregor, J. W. Konnak, J. H. Thrall, D. A. Campbell, Jr., S. A. Koff; Univ. Michigan Medical Center, Ann Arbor, MI. *J Urol* 129:708–711, 1983

In a patient with renal transplantation, partial ureteral obstruction is a difficult diagnostic situation, whether obstruction and/or rejection. The diuretic radionuclide urogram has been an effective method to discriminate obstructive from nonobstructive hydronephrosis in nontransplanted kidney. Nine patients with suspected partial ureteral obstruction underwent the diuretic urogram. The bladder was catheterized before the study in each patient. The washout kinetics of Tc-99m DTPA from renal pelvis and ureter were monitored before and after i.v. lasix, using a gamma camera/computer system. Separate renal and ureteral regions of interest were used to generate renal and ureteral histograms. Lasix (0.3 mg/kg) was administered after pelviocalyceal visualization was observed, usually 15 min following Tc-99m DTPA injection. All histograms fell into one of the following patterns: 1) normal, 2) dilated nonobstructive, 3) obstructive pelvis and distal ureter. Two patients showed the obstructive pattern, confirmed and relieved by surgery. Seven patients had nonobstructive patterns, verified by long-term clinical follow-up and subsequent ancillary testing including ultrasound, renal biopsy, and renal function measurement. It was concluded that diuretic radionuclide urography is a safe, noninvasive, and accurate method to diagnose suspected posttransplantation ureteral obstruction.

^{99m}Technetium Phosphate Compound Joint Scintigraphy in the Management of Juvenile Osteochondritis Dissecans of the Femoral Condyles. B. R. Cahill, B. C. Berg; St. Francis Hospital Center, Peoria, IL. *Am J Sports Med* 11:329–336, 1983

The management of osteochondritis dissecans (OCD) varies from conservative to surgical intervention, since its course may progress toward detachment or healing. Standard radiographs give a very crude estimate of the activity of the lesion. Radionuclide bone scintigraphy has known sensitivity to assess osseous healing. Accordingly, to evaluate its diagnostic value, joint scintigraphy was used on 18 patients (average age, 13.5 yr) with OCD of the knee. Two hours after i.v. administration of Tc-99m diphosphonate, both knees were imaged with the low energy, all-purpose collimator. Then the pinhole collimator was used to image the involved knee in the anterior, posterior, medial, and lateral projections. Scintigraphic activity profiles were divided into stages—0 to IV. The scintigraphy in Stage 0 and I is normal. In Stage II the osseous defect is outlined by focal activity. In Stage III the osseous defect is outlined with higher uptake, and the involved femoral condyle shows more activity than the adjacent, uninvolved femoral condyle. In Stage IV there is higher uptake in the femoral condyle in comparison with adjacent condyle, and tibial plateau also shows abnormally high uptake. The scintigrams were repeated at 6 wk intervals until healing occurred. When the diagnosis of OCD was established by radiograms and scintigrams, the patients were placed on an activity restriction program, in an attempt to reach a symptom-free level. The patients were followed for an average of 18 mo. Ninety-five images were categorized according to their level of scintigraphic activity. The scintigram indicated extent of

healing or progression and preceded changes seen on radiogram by months. Scintigraphy also showed anomalies of ossification not detected by radiography. The authors concluded that scintigraphy is valuable in the management of OCD because of its sensitivity to detect changes in the activity of the disease process.

Control of the Carcinogenic Potential of ^{99m}Technetium by the Immunologic Hormone Lymphotoxin. J. H. Ransom, C. H. Evans, A. E. Jones, R. A. Zoon, J. A. DiPaolo. National Cancer Institute, National Institutes of Health, Bethesda, MD. *Cancer Immunol Immunother* 15:126–130, 1983

These authors injected i.v. a single dose of from 125 to 2300 μCi [^{99m}Tc] sodium pertechnetate/kg body weight in pregnant Syrian golden hamsters. After 24 hr, the hamsters were sacrificed, and the fetuses were excised and dissociated into a single cell suspension, which was then cultured. An average of five transformed colonies—10,000 cells plated in culture—was noted following the injection of 250 μCi Tc-99m/kg maternal body weight. As the Tc-99m radioactivity dose increased, the number of morphologically transformed hamster fetus cells (capable of causing tumors in athymic nude mice) increased in a curvilinear manner. If a single i.v. dose of from 0 to 8000 Units of the anticarcinogenic immunologic hormone, lymphotoxin, (derived separately from hamster peritoneal leukocytes) was administered to the pregnant hamsters immediately after a dose of 250 μCi Tc-99m/kg, however, there ensued a lymphotoxin-dose-dependent reduction that appeared to be curvilinear in the number of morphologically transformed fetal cells formed. A 50% reduction in transformation frequency resulted from a dose of 1000 Units of lymphotoxin. Nearly total (97%) inhibition of transformation occurred after injection of 8000 Units of lymphotoxin. To assure that these transformations resulted from Tc-99m radiation, the authors allowed Tc-99m to decay through 120 half-lives (leaving essentially only Tc-99) and then injected the Tc-99 into a separate group of hamsters—no transformed cells evolved. The mechanism by which lymphotoxin exerts an anticarcinogenic behavior is unknown. These authors conclude that deficient endogenous levels of lymphotoxin in the patient receiving diagnostic radioactivity may indicate both an altered capacity to respond to carcinogenic stimuli and the need for more intensive follow-up examinations in such patients.

Electronic Autoradiography of Living Human Cells with a MWPC. R. Bellazzini, G. Betti, A. Del Guena, et al; Instituto Fisica dell Universita, Pisa, Italy. *Nucl Instrum Methodol* 204:517–523, 1983

The authors have constructed a multiwire proportional chamber (MWPC) for performing autoradiography of carbon-14 labeled cells. A 9 μm mylar window on the MWPC spaced very close to the cathode-anode-cathode structure results in 10 mm spatial resolution with 70% transmissive efficiency and ultimate detection sensitivity of about 20%. Intrinsic resolution for low energy 5.9 keV photons is 0.4 mm.

Quantitative images of cells containing carbon-14 are shown. It is concluded that resolving power, linearity, and sensitivity are good enough to permit the construction of biological maps of C-14-labeled living cells that have typical activity density of 100 mBq/mm^2 and 1 cm separation.

Electronics System for Positron Computerized Tomography "Positologica" Dedicated to Head Studies. T. Tomitami; National Institute of Radiological Sciences 9-1, Anagawa-4-chome, Chibashi, Japan. *Nucl Instrum Methodol* 197:507–516, 1982

The electronics system used with the "Positologica" system is described in some detail. Its major features are elimination of false events using delayed coincidence circuits that record chance coincidences circuits. In addition, multiinteraction events and multiple coincidence events are rejected. Performance measurements indicate 7–10 nsec coincidence time is optimum for the BGO detectors used. Performance measurements indicate that the singles counting rate peaked with 10 μCi/ml of ^{13}NH in a 20-cm diameter, 2-cm-thick disk at a rate of 2×10^6 cps. True coincidence rate including scatter, peaked at 5×10^4 cps at 10 μCi/ml.

Recent Progress in Fast Timing with CsF Scintillators in Application to Time-Of-Flight Positron Tomography in Medicine. M. Moszynski, R. Allemand, M. Laval, et al, Center d'Etudes Nucleaires de Grenoble. LETI/MCTE, 85X, 38041 Grenoble, Cedex, France. *Nucl Instrum Methodol* 205:239–249, 1983

Cesium fluoride (CsF) is the detector material of choice for use in time-of-flight positron imaging instruments. The progress in CsF technology that has taken place in the past 2 yr is described. Light yield and consequently timing and pulse-height resolution have improved considerably. This study reports the results of timing experiments with various CsF crystals and photomultiplier tubes for purposes of optimizing the design of a positron time-of-flight tomograph. The pulses produced had FWHM of 1.5 to 3.8 nsec. This variation was due mainly to variation in decay time constants of 2 to 3 nsec indicating to the authors that CsF scintillation production technology still needs perfecting. Light output is almost 10% that of NaI(Tl) crystals. It is concluded that 400 psec is the best time resolution obtainable with present detectors and photomultipliers, and 450 psec is typical for a two-detector system. Furthermore, dynode pulse timing is superior to classical anode signal timing for all small photomultipliers tested.

Correlation of the Real-Time Ultrasonographic Appearance of Hepatic Hemangiomas with Angiography. H. Onodera, K. Ohta, M. Oikawa, et al; Tohoku University School of Medicine, Seiryomachi, Sendai, Miyagi, Japan. *J Clin Ultrasound* 11:421–425, 1983

Thirty-one hepatic hemangiomas were studied by real-time ultrasonography with a detection rate of 77%. Seventeen lesions were hyperechoic, six hypoechoic, and one isodense. The vast majority showed sharp demarcations of the margins. The internal echo texture was homogeneous in 15 and heterogeneous in nine. Angiographically the hemangiomas showed rapid filling with prolonged opacification of the vascular spaces. Seven of the 31 lesions were not detected by real-time ultrasonography; inaccessibility of location (e.g., immediately under the diaphragm) and the sonographic texture of lesion itself are offered as possible explanations. Representative sonograms and correlating diagrams are provided.

The Ultrasonic Appearance of Intravascular Gas in Fetal Death. B. J. Weinstein, L. D. Platt; St. Francis General Hospital, Pittsburgh, PA. *J Ultrasound Med* 2:451–454, 1983

Six patients are presented in whom intravascular gas was identified within the fetus by real-time ultrasonography. High-amplitude linear echoes were identified, frequently demonstrating a "comet-tail artifact" similar to that seen with gas in the biliary tree. This phenomenon was identified as early as 6 to 12 hr and as late as 10 days following death of the fetus. Acoustic shadowing is a variable finding with the echoes from intravascular gas. Recognition of gas in the fetal circulatory system is considered important because this represents a pathognomonic sign of fetal death. Representative sonograms and radiographs are provided.

Hematosalpinx in Tubal Pregnancy: Sonographic-Pathologic Correlation. B. R. Subramanyam, B. N. Raghavendra, E. J. Balthazar, et al; New York University Medical Center, New York, NY. *Am J Roentgenol* 141:361–365, 1983

The authors reviewed sonograms of 84 patients with documented tubal pregnancies, finding 18% with a discretely highly echogenic adnexal mass. The source of the echogenicity was de-

termined at surgery to be clotted blood in each case. Lesions were either round or oval and occasionally associated with mild uterine enlargement. Blood in the cul de sac identified in five cases was also diffusely echogenic. Sonographic "masking" of the uterine outline by the hematosalpinx of similar echogenicity was a commonly encountered phenomenon in the present series. Differential diagnosis includes teratoma and ovarian cyst with clotted blood. The authors suggest that absence of intrauterine gestation, diffusely echogenic adnexal mass, and diffusely echogenic hematoma in the cul de sac are strongly suggestive of a ectopic gestation in the proper clinical setting. Representative sonograms and gross pathologic specimen photographs are provided.

Sonography of Neuroblastoma. S. J. White, K. J. Stuck, C. E. Blane, T. M. Silver; University of Michigan Medical Center, Ann Arbor, MI. *Am J Roentgenol* 141:465–468, 1983

In a study of 21 children with neuroblastoma, the authors evaluated 14 primary tumors before therapy. All were noted to be heterogeneously echogenic with poorly defined margins and ten of 14 contained discrete anechoic areas, varying in size from 0.5 cm to 4 cm in diameter. Eleven of the 14 patients had tumors of adrenal origin, the other three were in the neck, the lumbar paravertebral space, and the pelvis, respectively. Recurrent and residual tumors were indistinguishable from primary tumors with respect to their echogenicity. Bright echoes with acoustic shadowing indicated tumor calcifications in three cases. Sonography can be used to detect and monitor liver metastases. No characteristic appearance was noted for these deposits. Sonography provides an advantage over TCT in the presence of surgical clips for evaluating residual or recurrent tumor. Representative sonograms are provided.

JOHN J. COUPAL
PEGGY A. DOMSTAD
ANDREW FRIED
WEI-JEN SHIH
University of Kentucky Med. Ctr. and VA Hospital
Lexington, Kentucky

R. E. ZIMMERMAN
Harvard Medical School
Boston, Massachusetts

LUDWIG STRAUSS
Klinikum Mannheim
Mannheim, West Germany

BOOKS RECEIVED

American Equilibration Society Compendium (Volume 16 1981–1982). Richard E. Coy, Richard Blustein, Eds. Morton Grove, IL, American Equilibration Society, 1983, 591 pp

Computer Tomography of Neck, Chest, Spine, and Limbs (Atlas of Pathological Computer Tomography Volume 3). L. Jeanmart, A.L. Baert, A. Wackenheim, M. Osteaux. New York/Heidelberg/Berlin/Tokyo, Springer-Verlag, 1983, 194 pp, $98.50

Exercises in Diagnostic Ultrasonography of the Abdomen. F.S. Weill, A. Le Mouel. New York/Heidelberg/Berlin/Tokyo, Springer-Verlag, 1983, 125 pp, $15.50

Manual of Nuclear Medicine Procedures (4th Edition). James E. Carey, Jr., Robert C. Kline, John W. Keyes, Jr. Boca Raton, FL, CRC Press, 1983, 231 pp, $39.50 US; $45.00 Foreign

Radionuclides Production Volume I (CRC Series in Radiotracers in Biology and Medicine). Frank Helus. Boca Raton, FL, CRC Press, 1983, 147 pp, $56.00 US; $65.00 Foreign

Radionuclides Production Volume II (CRC Series in Radiotracers in Biology and Medicine). Frank Helus. Boca Raton, FL, CRC Press, 1983, 176 pp, $63.00 US; $73.00 Foreign