

ABSTRACTS OF CURRENT LITERATURE

An Evaluation of ^{99m}Tc -Labeled Red Blood Cell Scintigraphy for the Detection and Localization of Gastrointestinal Bleeding Sites. J. A. Markisz, D. Front, H. D. Royal, B. Sacks, J. A. Parker, G. M. Kolodny; Beth Israel Hosp., Boston, MA. *Gastroenterology* 83: 394-398, 1982

In 39 consecutive adults (24 men) suspected of having gastrointestinal hemorrhage from unknown site(s) 15 mCi of Tc-99m-labeled autologous red blood cells was administered intravenously. An anterior abdominal flow study was obtained immediately comprising 32 images of 1.5 sec each by gamma camera. Static anterior views were made at 10-min intervals for 90 min, with lateral or oblique images taken to aid in localization once a bleeding site was evident. Delayed images up to 24 hr were performed if no bleeding site was observed. In some of the cases angiography was performed shortly after scintigraphy. Of 17 patients with positive scans, four had sites of active bleeding demonstrated also by angiography. In one of those four, scintigraphy indicated bleeding in the transverse colon, whereas arteriography established it as duodenal. Seven of the patients with positive scans had negative arteriograms. In five of those seven, the site of bleeding was identified by direct visualization at surgery of active bleeding or fresh blood clots. Six of the patients with positive scan had no arteriographic studies performed. One of those six patients had the bleeding site identified intraoperatively, and one had active bleeding seen on colonoscopy. Of the 22 patients with negative scintigraphic studies, eight had negative arteriograms. When surgery was performed for angiodysplasia of the ascending colon in one of those eight patients, no active bleeding or blood loss was found. Of 22 patients with negative radionuclide studies, 21 required only medical management, and 20 of those were symptom-free 5-19 mo later. These authors concluded that scintigraphy is reliable for screening patients in whom arteriography is being considered to localize active bleeding sites.

Relative Diagnostic Accuracy of Laparoscopy and Liver Scanning Techniques. W. P. Boyd, Jr. Veterans Administration Hospital, Tampa, FL. *Gastrointest Endosc* 28:104-106, 1982

This author reviews the literature from 1973 to 1981 on a comparison of results obtained by laparoscopy and by liver imaging. Of cases numbered 29 through 123 in individually diagnosed groups, liver scintigraphy with Tc-99m-sulfur colloid was reported to detect 79-80% of confirmed liver neoplasms (true positives indicating sensitivity). True-negative results (specificity) ranged from 50-82% of cases. False-negative and false-positive results from liver scintigraphy were achieved in 20-21% and 18-50% of cases, respectively. In contrast, laparoscopy showed sensitivity of 80-92% and specificity of 100%. False-negative and false-positive results by operation were from 8-20% and 0%, respectively. In chronic hepatitis (21 cases) and cirrhosis (73 cases), radionuclide liver studies showed a sensitivity of 67% and 86%, respectively, with false-negative rates of 33% and 14%. In those disease states, laparoscopy was 98-100% sensitive. In the detection of mass lesions, liver scintigraphy and computed tomography (CT) had sensitivities of 83% and 77%, and specificities of 94% and 97%, respectively. Radionuclide liver studies and CT indicated false-positive results in 8% and 3.5% of cases and false-negative results in 17% and 23% cases, respectively. According to this author, the standard liver scintigram is the screening test of choice recognizing its advantage in diffuse disease states and dependable record in

focal disease. Ultrasonography and CT are best used as selected tests for individual patient situations and are complementary to laparoscopy which gives the most specific information in focal and diffuse liver disease.

Radionuclide Hepatobiliary Imaging in the Detection of Traumatic Biliary Tract Disease in Children. J. R. Sty, R. J. Starshak, A. M. Hubbard; Children's Hospital, Milwaukee, WI. *Pediatr Radiol* 12: 115-118, 1982

The detection of bile-leaks can be very difficult and computed tomography, conventional radionuclide images, and ultrasonography are used extensively for the investigation of hepatic parenchymal injury. The authors report the results of Tc-99m IDA hepatobiliary imaging in eight children (eleven examinations) following abdominal trauma. Parenchymal and biliary-tract abnormalities were identified. Results were compared with standard radiographs, radionuclide liver images, ultrasonography, and the clinical course. Hepatobiliary scintigraphy was performed following the iv injection of 4 mCi per 1.7 m². The camera was equipped with a high-resolution parallel-hole collimator. Multiple projections of 400,000 cts each were obtained a 1, 5, 10, 30, and 60 min. Standard five view liver images were obtained following injection of 3 mCi of Tc-99m sulfur-colloid. The authors identified focal regions of decreased activity during the parenchymal phase in 6 patients. Bile leaks were identified in all during the excretory phase. In three patients the bile leak was confined by the hepatic capsule, and in two children the leak resolved during conservative therapy. The authors conclude that Tc-99m IDA scintigraphy is a useful diagnostic procedure in selected pediatric patients following abdominal trauma.

Radionuclide Hepatobiliary Imaging in Congenital Biliary Tract Ectasia (Caroli Disease). J. R. Sty, A. M. Hubbard, R. J. Starshak; Milwaukee Children's Hosp., Milwaukee, WI. *Pediatr Radiol* 12: 111-114, 1982

Caroli disease (congenital biliary tract ectasia) is characterized by: (a) segmental saccular dilatation of the intrahepatic ducts, (b) a predisposition to calculous disease, cholangitis, and liver abscess, (c) absence of cirrhosis and portal hypertension, (d) association with renal tubular ectasia or other cystic renal abnormalities. In the past diagnosis of this disease has been difficult without surgical exploration or percutaneous transhepatic cholangiography. The author presented five cases of the disease (ages 16 mo to 13 yr) with symptoms that included failure to thrive, crampy abdominal pain, fever, or palpable hard livers. These five patients received Tc-99m-IDA scans, and the results were compared with those of Tc-99m sulfur colloid (Tc-99mSC) images, ultrasonography (US), and computed tomography (CT). All five patients with the disease, in whom the diagnosis had been established by Tc-99m-IDA studies, were characterized by the photopenic areas during the hepatic parenchymal phase becoming filled in with radionuclide tracer or showing areas of increased radioactivity in the excretory phase. While Tc-SC studies detected liver abnormality in 4/4 cases, the findings were nonspecific, characterized by numerous hepatic focal lesions or nonhomogeneous uptake of tracer by the liver with or without splenomegaly. US (3/3) and CT (2/2) readily showed dilated bile ducts but lacked the functional information

of Tc-99m IDA imaging. The author concluded Tc-99m IDA imaging; which provides both functional and morphologic information, is sensitive and specific for identifying congenital dilatation of the intrahepatic bile ducts in children.

Treatment of Asymptomatic Metastatic Cancer to the Liver from Primary Colon and Rectal Cancer by the Intra-Arterial Administration of Chemotherapy and Radioactive Isotopes. I. M. Ariel, G. Padula; Cabrini Medical Center, New York, NY. *J Surg Oncol* 20: 151-156, 1982

The authors report a series of 40 patients with colorectal cancer with metastases to the liver, observed at the time of operation, and treated by a combined course of cancer chemotherapeutic agents and Yttrium-90 microspheres through intrahepatic artery by direct administration. Two different techniques and drug schedules were used. One group of 25 patients was treated by a catheter inserted at the time of operation, and they received 100 mCi of Y-90 microspheres and 5-fluorouracil (5-FU) on a continuing basis. In the second group, the 15 patients referred after surgery were treated by the percutaneous insertion of the catheter into common hepatic artery, and they received a bolus of combined chemotherapy with Platinol, methotrexate and 5-FU and 100 mCi of Y-90 microspheres. The radioactive Y-90 is 100% pure beta emitter with a half-life of 64.2 hr, and the size of particles is $15 \pm 5 \mu\text{m}$ in diameter. The average survival time in group one and group two are 26 mo (varying from 9 to 60 mo) and 31 mo (varying from 12 to 60 mo), respectively. The authors' prospective studies are in progress limiting the treatment to the internal irradiation to determine the precise role in overall treatment of metastatic cancer to the liver.

Radioisotope Spleen Scan in Patients with Splenic Injury. H. G. Mishalany, J. H. Miller, M. M. Woolley; Children's Hosp. of Los Angeles and Univ. So. Calif. *Arch Surg* 117:1147-1150, 1982

The role of the radioisotopic spleen scan in the management of patients with splenic trauma was evaluated in 30 patients (21 boys, 9 girls) on admission to the hospital, before discharge from the hospital, and at subsequent examinations 3 mo and 12 mo after injury. During the first minute following injection of Tc-99m sulfur colloid (50 $\mu\text{Ci}/\text{kg}$, minimum dose 200 μCi) rapid sequential images of the spleen were obtained at 10 sec intervals along with static scintiphotos. The majority of patients demonstrated reduced or delayed splenic perfusion in the dynamic study, and all but one had abnormal static images. The one exception had an abnormal scintigram on later examination and was considered to have had an evolving splenic hematoma. Nonoperative supportive therapy was given 23 patients, and five had splenorrhaphy with preservation of splenic function. The spleen scintigram has largely replaced abdominal paracentesis in the diagnosis of splenic injury and is a more precise test for bleeding from the spleen. The indications and contraindications for spleen scintigraphy were discussed, and the authors concluded that the radionuclide study is useful not only for the initial diagnosis but also for monitoring the healing process.

The Value Of Scintimetry Compared with Histomorphology, Parathormone Assay, Densitometry, and Radiology in Renal Osteopathy. G. Lingg, G. Nebel, S. Dorr; Hamburg, Germany. *Fortschr Röntgenstr* 136:9-13, 1982

The authors compared the results of scintimetric skeletal scintigraphy with histomorphometry, radiograms, densitometry, and parathormone levels in 21 patients on dialysis. Sixty persons without evidence of metabolic bone disease received scintigraphic studies, and served as controls. Gamma camera scintigraphy was

performed 3 hr after the iv injection of 555 MBq Tc-99m MDP. Regions of interest were placed over both the middle third of the femur, over the femur epiphysis, as well as over soft tissue of the thigh, and the bone: soft-tissue ratio was calculated. Parathormone was assayed with radioimmunoassay procedures in all patients, but was found to be of little value for the identification of metabolic bone disease. The hormone levels also failed to show an acceptable correlation with the scintimetric data. All patients had densitometric measurements of the radius, which also had low sensitivity; abnormal measurements were found in only 50% of the patients. Densitometric evidence of demineralization was, however, associated with highly abnormal radionuclide imaging results. Fourteen patients had iliac-crest biopsy for histomorphometric evaluation. Radiograms of the hands were made with mammography technique in all patients, plus standard radiograms were made of the skull, lumbar vertebra, and the pelvis. Radiograms identified only half of the patients with metabolic bone disease. Scintimetric evaluation of images identified an age-dependent bone: soft-tissue index in controls. All dialysis patients had an abnormal bone: soft-tissue ratio. All patients with morphometric or radiographic evidence of renal osteopathy had highly irregular scintimetric index values. The authors conclude that scintimetric bone scans offer a sensitive, noninvasive screening procedure for the identification of renal osteopathy.

Thallium-201-Chloride Thyroid Scintigraphy to Evaluate Benign and/or Malignant Nodules: Usefulness of the Delayed Scan. H. Ochi, H. Sawa, T. Fukuda, Y. Inoue, H. Nakajima, Y. Masuda, T. Okamura, Y. Onayama, S. Sugano, H. Ohkita, Y. Tei, K. Kamino, Y. Kobayashi; Osaka School of Med., Osaka, Japan. *Cancer* 50: 236-240, 1982

The authors administered 1.5-2.0 mCi of Tl-201 intravenously to 76 patients (59 female) age 10-83 yr (mean 46.5) who had single or multiple thyroid nodules with decreased radioactivity by I-123 thyroid imaging. The Tl-201 thyroid studies were performed with a gamma camera at 5-15 min following injection (early study) and at 3-5 hr (delayed study when the activity of the normal thyroid approached background radioactivity, facilitating interpretation). In 35 of 37 histologically confirmed malignant tumors (94.6%), both early and delayed Tl-201 scintigrams were positive. The tumors encountered were: anaplastic carcinoma (6 patients), papillary carcinoma (23), follicular carcinoma (5), epidermoid carcinoma (1), and malignant lymphoma (1). In one patient with follicular carcinoma, the early image was positive and the delayed was negative. In one patient with medullary carcinoma who had negative early and delayed images, the serum carcinoembryonic antigen (CEA) and calcitonin levels were elevated. In 35 of 39 patients with benign tumors (89.7%) that included 34 adenomas and 5 adenomatous goiters, the delayed images were negative. In three adenomas and in one adenomatous goiter, however, the images were positive, both early and delayed. When the early Tl-201 study is negative, a delayed study is not necessary. Serum CEA should be measured routinely to detect any false-negative imaging results. From their results, these authors hypothesize that visualization of the thyroid gland on early gallium-67 images is related to blood flow, while visualization of malignant nodules is probably due to affinity of Tl-201 for malignant tumor (shown experimentally by an investigator cited).

Radionuclide Evaluation of Postextrasystolic Potentiation of Left Ventricular Function Induced by Atrial and Ventricular Stimulation. V. Kalff, W. Chan, M. Rabinovitch, J. Stewart, J. H. Thrall, B. Pitt, W. O'Neill, J. Walton; Univ. Mich, Ann Arbor, MI. *Amer J Cardiol* 50:106-111, 1982

Radionuclide ventriculography was used to compare postex-

trasystolic potentiation following ventricular premature beats with that following premature atrial beats in ten patients (five men, five women, age 36–68 yr) undergoing diagnostic cardiac catheterization. Pacing wires were placed in the right atrium and right ventricle, and patients were injected with stannous pyrophosphate followed by 25 mCi sodium pertechnetate. Imaging data were acquired in the LAO projection using gamma camera and computer. Atrial or ventricular trigeminy was induced in randomized order by a programmable pacemaker with the R-R coupling intervals of the premature atrial and ventricular beats held constant for each individual. Reformatted data were analyzed for volume changes within and between the preliminary and the two stimulation studies. No significant difference was found between the coupling intervals of ventricular and atrial premature beats. A significantly longer compensatory pause occurred after the ventricular premature beat (1120 ± 220 compared with 1050 ± 190 ms, $p < 0.01$), but no significant difference was found between the ventricular and atrial stimulation studies for a change in left ventricular ejection fraction (7 ± 3 compared with $7 \pm 5\%$), relative end-diastolic volume (5 ± 10 against $4 \pm 7\%$) and relative end-systolic volume (-12 ± 12 against $-12 \pm 8\%$). It was concluded that atrial stimulation may be used to assess impaired left ventricular function by postextrasystolic potentiation, with the possibility of development of a noninvasive procedure using esophageal pacing techniques.

Radionuclide Angiographic Exercise Left Ventricular Performance in Chronic Aortic Regurgitation-Relationship to Resting Echocardiographic Ventric. Dimensions and Systolic Wall Stress Index. S. M. Lewis, A. L. Riba, H. J. Berger, R. A. Davis, F. J. T. Wackers, J. Alexander, M. J. Sands, L. S. Cohen, B. L. Zaret; Yale Univ. School of Med., New Haven, CT. *Amer Heart J* 103:498–504, 1982

Echocardiographic parameters of left ventricular (LV) function at rest have proved valuable in predicting the postvalvular replacement course of patients with aortic regurgitation (AR), as have radionuclide angiographic (RNA) studies of LV response to exercise. The interaction of these evaluations of LV reserve and resting function with symptomatic status was assessed in 45 patients (42 males, 3 females), ages 16–85 yr (mean, 46 yr). Seven of the 45 were symptomatic while 12 had relatively mild AR by clinical and angiographic evaluation. Percent fractional shortening ($\% \Delta D$) and LV radius/wall-thickness (Th) ratio corrected for systolic blood pressure (LV radius/Th \times SBP) were derived from standardized M-mode echocardiograms obtained at rest. Left ventricular ejection fraction (LVEF) and regional wall motion (RWM) were obtained at rest and with upright bicycle ergometer exercise using quantitative first-pass RNA. LV end-diastolic dimensions ranged from 4.3–8.6 cm. (6.1 ± 0.1 cm); LV end-systolic dimension ranged from 2.7–6.7 cm (4.0 ± 0.1 cm) and $\% \Delta D$ ranged from 161–633 (344 ± 15). Only $\% \Delta D$ failed to be significantly greater than normal controls ($p < 0.001$). Resting LVEF determined by RNA ranged from 34–75% ($55 \pm 2\%$). Normal LVEF and normal LV exercise reserve was found in 29 patients, with an increase from $56\% \pm 2\%$ at rest to $69\% \pm 2\%$ with exercise. Normal LVEF and abnormal LV exercise reserve, with a fall from $55\% \pm 2\%$ at rest to $50\% \pm 3\%$ with exercise, was found in six. In the ten patients with abnormal resting LVEF, normal LV exercise reserve (from $42\% \pm 2\%$ at rest to $55\% \pm 3\%$ with exercise) was seen in seven, while three had abnormal LV exercise reserve ($43\% \pm 1\%$ at rest to $33\% \pm 2\%$ with exercise). No significant difference was found in resting LVEF in symptomatic and asymptomatic patients, and some patients with abnormal resting LVEF had normal exercise reserve. Additionally, resting systolic and diastolic blood pressures, frequently of LV hypertrophy, exercise peak heart rate, rate-pressure product, and external work load did not differ in patients with normal or abnormal exercise reserve. Pulse pres-

sure was greater (85 ± 7 compared with 65 ± 4 mm Hg) in patients with abnormal exercise reserve compared with those with normal exercise reserve ($p < 0.025$). The only echocardiographic parameter that differed significantly in patients with abnormal exercise reserve compared with those with normal exercise reserve was the LVED radius/wall thickness \times SBP ratio (395 ± 25 vs. 315 ± 16 , $p < 0.01$). Since the resting echocardiographic indices and RNA determination of LV response to exercise provide complementary physiologic information in patients with AR, both should be used for preoperative categorization of AR patients.

Gold-195m, A New Generator-Produced Short-Lived Radionuclide for Sequential Assessment of Ventricular Performance by FIRST Pass Radionuclide Angiocardigraphy. F. J. Wackers, R. W. Giles, P. B. Hoffer, R. C. Lange, H. J. Berger, B. L. Zaret. Univ. of Vermont Med. Ctr. Coll., Burlington, VT. *Amer J Cardiol* 50:89–94, 1982

These authors evaluated a new generator that produces Au-195m ($T_{1/2}$ 30.5 sec) from bound parent Hg-195m ($T_{1/2}$ 41.6 hr). The predominant emission of Au-195m is a 262 keV gamma ray with 68% abundance. Au-195m is eluted from the column of inorganic material using an eluent of aqueous sodium thiosulfate/sodium nitrate solution with a yield of 40–68%. Assuming a 20 mCi dose of Au-195m (containing 20 μ Ci Hg-195m breakthrough), the radiation dose to the kidneys, liver, and spleen in man are calculated to be 0.340, 0.070, and 0.086 rad, respectively, during first pass radionuclide angiocardigraphy. By gamma camera scintigraphy an equilibrium blood pool study was performed in a dog by constant infusion of generator eluate, and a stable cardiac blood pool image of the right and left ventricles was obtained. In the 30-degree left anterior oblique view, the left ventricular ejection fraction (LVEF) was 34%; using 15 mCi Tc-99m for blood pool labeling, the LVEF was 38% in the same position. Serial first-pass radionuclide angiocardigraphy was performed by multicrystal gamma camera using Au-195m in dogs. During the left ventricular phase, the count rate in the whole field of view was 160,000 to 190,000 counts/sec (uncorrected for decay). In the end-diastolic left ventricular region of interest, counts ranged from 3,000 to 6,000/sec (background- and decay-corrected). (In contrast, counts in end-diastole using 15 mCi Tc-99m-DTPA ranged from 3,000 to 5,000/sec.) Infusion of isoproterenol in the dogs led to a mean 28% increase in LVEF. These authors conclude that this short-lived radiotracer permits rapid sequential measurements of ventricular function at greatly reduced exposure of the patient to radiation.

¹¹¹Indium-Chloride Bone Marrow Scintigraphy in Aplastic Anemia. E. K. J. Pauwels, J. teVelde, J. Hermans, H. L. Haak, Ph. J. Jurgens; Univ. Hosp., Leiden, Netherlands. *Scand J Haematol* 26: 81–90, 1981

Correlation of bone marrow scintigraphic findings with peripheral blood cell values and with bone marrow histology was investigated in 24 patients diagnosed as having acquired aplastic anemia due either to a primary stem cell defect or to an autoimmune reaction. Scintiphotos of all body areas were performed 48 hr after the administration of 3mCi In-111 chloride. Images were divided into 11 or 12 regions for visual grading of bone marrow activity contrasted to soft tissue activity and assigned a "total scintigraphic score" of 0 to 1. The scintigraphic score of the pelvis was analyzed separately in each patient and compared to the histology of a bone marrow sample obtained from the iliac crest. Patients were classified into four groups based on the histology and on the clinical follow-up studies. A significant distinction was found between the scintigraphic findings in patients designated T III (rapid response to immunosuppressive therapy) and those designated III/II (limited and delayed response to immunosuppressive

therapy). Scintigraphic evidence of marrow extension into the extremities was found in the five patients designated III/II but not in the four patients designated T III. Abnormal pelvic scintiphotos correctly indicated hypoplastic or absent hematopoietic tissue but the converse was not true. Total scintigraphic score did not discriminate between the various clinical-histologic patient groups.

Radioimmunoassay of Tuberculous Antigen. G. V. Kadival, A. M. Samuel, B. S. Virdi, R. N. Kale, R. D. Ganatra; Barc and Maharastra Anti-TB. Assoc., Bombay. *Ind J Res* 75:765-770, (1982)

The investigators have developed a radioimmunoassay for tuberculo-protein using cell sonicate antigen derived from the culture of H 37 R V strain of *M. tuberculosis*, labeled with I-125. Anti-BCG sera produced in rabbits was used as a source of antibodies in this assay where separation between bound and free fractions was by a double antibody system. The assay was sufficiently sensitive to detect 10^3 organisms/ml or the equivalent of 1 ng/ml of sonicated antigen. It was highly specific for *M. tuberculosis* and *M. bovis* and demonstrated poor cross-reactivity with seven other mycobacterial species. One hundred-one sputum samples were analyzed for the presence of this antigen. Sixty-two samples that were negative for tubercle bacilli by smear and culture examination demonstrated levels of 1.4 ± 1.8 ng/ml. Nineteen samples that were positive by smear and culture had levels of 58.5 ± 30.5 ng/ml, and 20 sputa; negative by smear but positive by culture, showed levels of 26.6 ± 19.7 ng/ml. This radioimmunoassay offers appreciable promise for the detection of tuberculo-protein in clinical samples from CSF, urine, pleural, and ascitic fluids where direct demonstration of the organisms is difficult.

Analysis of Recorded Image Noise in Nuclear Medicine. B. M. W. Tsui, R. N. Beck, K. Doi, C. E. Metz; Dept of Radiology, University of Chicago, Chicago, IL. *Phys Med Biol* 26(5), 883-902, 1981

The authors derived expressions for the autocovariance function and Wiener spectrum of the detected and recorded image noise in terms of the detected count density and the transfer characteristics of the recorder system. They then designed and built a phantom to demonstrate the effects of object size and contrast, which was imaged with a device chosen to clearly separate the detector and recorder systems. By analyzing the images with a microdensitometer and applying fast-Fourier transforms to the data, they were able to estimate the projected autocovariance function and Wiener spectrum of the recorded image noise. The results of their measurements were in good agreement with the theoretical predictions at high detected count densities. The authors concluded that the noise magnitude in the recorded image is affected by the detected count density as well as by the transfer characteristics of the exposure system whereas the noise texture is affected by the latter alone.

Monte Carlo Calculations of a Bismuth Germanate Scintillation Detector. S. M. Alkhafaji; University of Michigan, Ann Arbor, MI. *Nucl Instrum Meth* 187:547-551, 1981

Positron ring detectors are becoming very common in nuclear medicine research laboratories around the world. Many of the latest ring detectors utilize the scintillator bismuth germanate or BGO, as it is more commonly called. This paper presents calculated sensitivities for the small slabs of BGO ranging in thickness from $1/8''$ to $2''$ over the energy range 140-999 keV. Graphs are presented showing total intrinsic efficiency plotted against energy, single interaction efficiency against energy, and radial energy distribution for various energies. The author concludes that BGO

could be used to 660 keV without serious deterioration in image resolution due to multiple interactions.

Application of In Vivo Activation Analysis to the Compartmental Study of Sodium in the Hand. F. Cohen-Boulakia, B. Maziere, D. Corner; Service Hospitalier Frederic Jolot, Orsay, France. *Phys Biol Med* 26(5) 857-865, 1981

A compartmental analysis of the data depicting the disappearance of Na-24 from the hand after in vivo activation by neutron irradiation from two Cf-252 sources was performed. The dose to the hand, assuming a relative biological effectiveness for the neutron of five, was 8 rad equivalent (8 cGy equivalent). The time-activity curves were assumed to correspond to an open two-compartmental model, with one pool representing quickly exchangeable sodium (E) and the second pool, slowly exchangeable sodium (SE). For subjects with normal hand calcium concentrations the fast turnover half-time T_E , averaged 1 hr and the slow turnover half-time T_{SE} , 79 hr. For the subnormal calcium content groups the respective half-times were 0.8 hr and 34.5 hr, with only the latter being sufficiently different from the normal group. This suggests a link between severe demineralization and acceleration of bone sodium turnover.

Wilm's Tumor versus Neuroblastoma: Usefulness of Ultrasound in Differentiation. D. S. Hartman, R. C. Sanders; Uniformed Services University of the Health Sciences, Bethesda, MD & Johns Hopkins Medical Institutes, Baltimore, MD. *J Ultrasound Med* 1:117-122, 1982

The authors succeeded in establishing a correct differentiation between neuroblastoma and Wilm's tumor in 23 of 26 sonograms reviewed as "unknown" cases. Wilm's tumor was found to be either evenly echogenic throughout or evenly echogenic with discrete areas of sonolucency representing foci of cystic necrosis. Neuroblastoma, on the other hand, was found to be quite heterogeneous with irregular areas of hyperechogenicity intermixed with less echogenic regions. Uninvolved renal parenchyma surrounding a Wilm's tumor may be compressed and seen as a hyperechoic rim representing a pseudocapsule. Neuroblastoma is often locally invasive and its borders blend imperceptibly into the adjacent tissue. Sonograms, urograms, and corresponding gross pathologic pictures are presented.

Sonographic Localization of Neonatal Umbilical Catheters. D. A. Oppenheimer, B. A. Carroll, K. E. Garth, B. R. Parker; Stanford University School of Medicine, Stanford, CA. *Amer J Roentgenol* 138:1025-1032, 1982

By means of a portable small-parts, real-time scanner, with either a 6.0 or 7.5 MHz transducer, the authors examined neonates with umbilical artery and vein catheters for a total of 115 catheter localizations. Aorta catheters were identified in a coronal plane using a left flank approach and the umbilical vein catheters identified on scans through the anterior abdominal wall. The aortic bifurcation and renal arteries were identified allowing determination of proper positioning of the umbilical artery catheter and tip between these landmarks. Confirmation of passage of an umbilical vein catheter through the ductus venosus and into the inferior vena cava was possible with ultrasound. The catheter was identified as either a single or double wall echogenic structure, frequently producing shadowing and occasionally seen only in a portion of its course. The method proved highly reliable, non-invasive and generally supplanted the need for radiographic assessment except in instances of improper positioning. Sonograms, radiographs, and diagrammatic representation are provided.

Sonography of Nabothian Cysts. S. R. Fogel, B. S. Slasky; University Health Center of Pittsburgh, Pittsburgh PA. *Amer J Roentgenol* 138:927-930, 1982

Small cystic structures varying in size from 6 to 20 mms were encountered about the uterine cervix in 25 cases. With respect to the cervical canal most were multiple and eccentric, in the range of 9 to 11 mm in diameter. The authors classify the cysts as "low" if they appeared within one centimeter of the external os and were likely to be visualized by speculum examination; and "high" if above this level and unlikely to be seen. Nabothian cysts were visualized in both the pregnant and nonpregnant patients. The etiology of these cysts is thought to be related to the growth of squamous epithelium over descended columnar epithelium past the level of the external cervical os. Representative sonograms are provided.

Fetal Weight Estimation by Real-Time Ultrasound Measurement of Biparietal and Transverse Trunk Diameter. K. J. Dornan, M. Hansmann, D. H. A. Redford, B. K. Wittman; University of British Columbia, Vancouver, British Columbia, Canada. *Amer J Obstet Gynecol* 142:852-857, 1982

Using a nomogram previously established by Hansmann, the authors examined 100 fetuses within 72 hr of delivery, measuring both the fetal biparietal diameter and the transverse trunk diam-

eter at the level of the ductus venosus. Under optimal conditions 82% of the predicted birth weights are within 10% of actual birth weight. The overall clinical experience yielded 74% of predicted weights within 10% of the actual weight; the measurements were unobtainable in 15%. The accuracy of the prediction depended upon the size of the fetus, being most accurate in the less than 1500 and from 2000 to 4000 grams. Measurements were the least accurate in fetuses weighing greater than 4000 grams. Representative measurements and the nomogram employed are provided.

JOHN . J. COUPAL
PEGGY A. DOMSDAD
ANDREW FRIED
WEI-JEN SHIH

University of Kentucky
Medical Center and VA Hospital
Lexington, Kentucky

ROBERT E. ZIMMERMAN
Sidney Farber Cancer Institute
Boston, Massachusetts

JOHN H. CLORIUS
Deutscherkrebsforschungszentrum
Heidelberg, West Germany

AUDREY WEGST
University of Kansas Medical Center
Kansas City, Kansas

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