ABSTRACTS OF CURRENT LITERATURE

External Imaging of Cerebral Muscarinic Acetylcholine Receptors. W. C. Eckelman, R. C. Reba, W. J. Rzeszotarski, R. E. Gibson, T. Hill, B. L. Holman, T. Budinger, J. J. Conklin, R. Eng, M. P. Grissom; George Washington University Medical Center, Washington, DC. *Science* 223:291–293, 1984

These authors evaluated brain uptake of (R)-3-quinuclidinyl-4-iodobenzilate (also known as (R)-4-IQNB) labeled with either I-125 or I-123. Each product is a mixture of two diastereomers. Autoradiography of excised coronal section of brain from a normal cat and dog 15 min after femoral vein injection of (R)-4-(I-125)IQNB revealed radioactivity in the cerebrum but not in the cerebellum. (Autoradiography begun 2 hr after i.v. injection yielded similar results.) The localization of radionuclide appeared to reflect directly the amount of muscarinic acetylcholine receptor (m-AChR) in the respective tissues. After femoral vein injection of either (R)-4-(I-125)IQNB or its analogue (R)-(H-3)QNB in the normal rat, rapid blood clearance of radionuclide ensued, and localized in heart, pancreas, and corpus striatum with uptake qualitatively similar between agents. Radioactivity in cerebellum was usually less than that in the other tissues. After intravenous injection of 5 mCi (R)-4-(I-123)IQNB into a normal man, lateral images of the brain by gamma camera revealed radioactivity in the cortex, but not in the cerebellum. When that imaging procedure was repeated using the flow-mediated brain perfusion agent I-123-labeled N,N,N′-trimethyl-N′-(2-hydroxy-3-methyl-5-iodobenzyl)-1,3-propanediamine (also known as I-123-HIPDM), however, radioactivity uptake was seen in both the cortex and cerebellum. When the normal man having received 5 mCi (R)-4-(I-123)IQNB was then imaged by a single photon emission computerized tomography, good definition of the caudate putamen area and the cerebral cortex was obtained. Those observations suggest that uptake of (R)-4-(I-123)IQNB in the human is receptor-mediated, since muscarinic receptors are at relatively low concentration in the cerebellum. These authors conclude that receptor-binding radiotracers can be used in humans to visualize m-AChR by external imaging.

Malignant External Otitis: Early Scintigraphic Detection. A. M. Strashun, M. Nejatheim, S. J. Goldsmith; Mt. Sinai Medical Center, NY. *Radiology* 150:541–545, 1984

In elderly diabetic patients with *Pseudomonas* otitis externa it may extend into adjacent structures including bone, cranial nerves, meninges, and vessels. This phenomena may lead to the clinical diagnosis of "malignant" external otitis. For successful treatment, early diagnosis is essential. In this study the authors compare the diagnostic findings obtained from the initial radiographs, from thin-section tomographic studies of the temporal bone, transmission computerized tomographic (TCT) scans of the head and neck, Tc-99m methylene diphosphonate (MDP) bone imaging, gallium-67 citrate scintigraphy, and single photon emission computed tomography, for the diagnosis of temporal bone osteomyelitis in ten patients who fulfilled the clinical criteria for this disease. In the eight patients studied, routine radiographs of the skull were negative, thin-section tomography was positive in one of seven patients, and TCT suggested the presence of osteomyelitis in three of the nine patients. Both Tc-99m MDP and Ga-67 citrate scintigraphy, however, were positive in all ten. Interestingly, three patients considered to be in clinical remission still had positive findings on the Tc-99m MDP images but normal Ga-67 studies. For the early detection of malignant external otitis, the authors conclude that technetium bone and gallium scintigraphy are more sensitive than radiographs and computerized tomography. For the follow-up of the evaluation of these patients, however, gallium scintigraphy appears to be more specific than Tc-99m MDP.

Relation between Effective Radiation Dose and Outcome of Radioiodine Therapy for Thyroid Cancer. H. R. Maxon, S. R. Thomas, V. S. Hertzberg, J. G. Kerelakes, I-Wen Chen, M. I. Sperling, E. L. Saenger; Univ. Cincinnati Medical Center, Cincinnati, OH. *N Engl J Med* 809:937–941, 1983

Variable response to radioiodine therapy for ablation of thyroid remnants and functioning metastases from thyroid carcinoma appears to reflect individual differences in the radiation dose received by the target tissue. A pretreatment plan to ascertain the radiation dose that might be expected in the lesions was evaluated in 50 patients undergoing ablation of remnants and 26 patients treated for metastatic disease. Standard patient preparation was adhered to and diagnostic studies were performed using rectilinear scans, probe and scaler counting, and computerized analysis of regions of interest. These provided determinations of lesion uptake and the effective half-time of I-131 in the lesion. In 30 patients who had quantitative dosimetric studies before and several months after treatment, those patients successfully treated patients had a mean radiation dose to residual thyroid tissue that was about 4.4 × that of the unsuccessfully treated patients ($p < 0.05$). This was apparently due to the longer effective half-life of I-131 (ratio 1.8:1, $0.005 < p < 0.1$). There were no significant differences between the two groups in the amount of iodine administered, the I-131 uptake percentage, or the follow-up time ($p < 0.1$). Patients with metastatic disease treated successfully also had apparently longer effective target tissue half-times of I-131 ($0.05 < 0.1$) with a mean radiation dose per 100 mCi of administered iodine about six times higher than those who failed to respond ($p < 0.05$). It is recommended that patients receive not less than 30,000 rad as the initial dose for ablation of thyroid remnants, and patients with metastases of I-131 concentrating thyroid cancer receive not less than 8000 rad as initial therapy.

Exercise Testing in Aortic Regurgitation: Comparison pf Radionuclide Left Ventricular Ejection Fraction with Exercise Performance at the Anaerobic Threshold and Peak Exercise. C. A. Bousher, B. J. Kanarek, R. D. Okada, A. M. Hutter, H. W. Strauss, G. M. Pohost; Massachusetts Gen. Hosp., Boston, MA. *Am J Cardiol* 52:801–808, 1983

Irreversible myocardial degenerative changes may occur in patients with severe aortic regurgitation (AR) in the absence of severe symptoms. It has been suggested that exercise radionuclide angiography can be used to detect left ventricular (LV) dysfunction in such patients. The radionuclide rest and peak exercise ejection fraction (EF) can be simply derived but may not adequately assess LV function in AR because of multiple factors that

change to a variable extent during exercise. Serial LVEFs were measured during graded supine exercise in 35 patients with asymptomatic or minimally asymptomatic AR and 16 control patients. Simultaneous pulmonary gas exchange analysis permitted determination of anaerobic threshold, which is the point during exercise at which lactic acid began to accumulate in the blood. The EF and oxygen uptake were measured at rest, anaerobic threshold, and peak exercise. The control patient's EF increased from 0.65 ± 0.06 at rest to 0.73 ± 0.05 at anaerobic threshold. No further change in EF occurred between anaerobic threshold and peak exercise. Peak oxygen uptake in controls were 20 ± 4 ml/kg/min. Patients with AR were classified into two groups based on peak oxygen uptake 16 ml/kg/min (Gp I, n = 26) and 16 ml/kg/min (Gp II, n = 9). In Group II, the mean oxygen uptake at the anaerobic threshold and peak exercise was less than control, similar to or greater than control patients in Group I. In Group I, the mean rest EF was 0.62 ± 0.07, similar to that in controls, and there was no change at anaerobic threshold; however, it decreased at peak exercise (0.57 ± 0.12). In Group II, the mean rest EF was 0.44 ± 0.12, below that of the controls that decreased at the anaerobic threshold (0.35 ± 0.10), and decreased further at peak exercise (0.30 ± 0.09). The data suggest that in Ar, the anaerobic threshold reflects cardiac performance and during exercise may prove a more useful end point than at peak tolerance.

The Affect of Pulmonary Edema on Proton Nuclear Magnetic Resonance Relaxation Times. F. Skalina, H. L. Kundel, G. Wolf, and B. Marshall; University of Pennsylvania. *Invest Radiol* 19:7–9, 1984

The purpose of this study was to investigate what effect the permeability of pulmonary edema would have on nuclear magnetic resonance (NMR) relaxation time with respect to proton imaging. By means of intravenous injection of alloxan in saline permeability edema was produced in rats; the control animals received physiologic saline only. After anesthesia the rats were ventilated by means of a tracheostomy. When sufficient time had lapsed for the induced edema to become uniformly distributed, the rats were killed. On samples of pulmonary tissue the T_1, T_2, and extravascular lung water were measured by NMR. It was determined that the relaxation times and the extravascular lung water were represented by a linear relationship. Any alveolar process that is diffuse can increase proton density including pulmonary edema. When considering the different etiologies of increased proton density in the lung, T_1 and T_2 relaxation times may be used as a distinguishing measurement.

Tumor Markers In Bronchogenic Carcinoma. T. Rasmuson, G. R. Björk, L. Damber, S. E. Holm, L. Jacobsson, A. Jeppsson, T. Stigbrand, G. Westman; University Hospital, S-90185 Umea, Sweden. *Acta Radiologica Oncol* 22:209–214, 1983

Carcinoembryonic antigen (CEA), tissue polypeptide antigen (TPA), placental alkaline phosphatase (PAP), and pseudouridine (PU) concentrations were analysed in 80 healthy adults and 62 patients with pulmonary bronchiogenic carcinoma. The results of the healthy adults were used to determine the normal range of the markers. Thirty-six patients suffered from squamous cell carcinoma, 13 patients had an undifferentiated small-cell carcinoma, and eight had an adenocarcinoma. Four patients with large cell anaplastic carcinoma and one patient with a pulmonary blastoma were included in the study. Three clinical stages were differentiated: (a) no evidence of disease; (b) loco-regional disease; and (c) generalized disease with infiltration of the pleura, the contralateral lung or with distant metastases. CEA levels were abnormal in 36% (Stage 2) and 62% (Stage 3), whereas PV value was elevated in 14% (Stage 2) and 31% (Stage 3). PAP serum activity was elevated in only a few patients in Stage 2 and 3 (11% and 7%). TPA serum-marker concentrations were abnormal in Stages 2 and 3 (28% and 30%). Using a lower limit would give 73% abnormal TPA concentrations, but this would raise the number of false positives to 21%. Monitoring of the different marker levels in individual patients failed to demonstrate any significant decrease with therapy. Analyzing the survival data, patients with elevated CEA or PU marker concentrations had a significantly lower median survival time (5 and 3 mo) compared with patients with normal levels (9 and 8.5 mo). Of the patients with adenocarcinoma, 57% had elevated CEA levels, whereas only 28% of the patients with other types of carcinomas had elevated CEA concentrations. The authors conclude that all four tumor markers are of limited diagnostic value, since either the frequency of abnormal concentrations was low, or a high false-positive rate would be obtained. Only CEA and PU values increased with the clinical stage.

Complementary Roles of TCT and I-131 MIBG Scintigraphy in Diagnosing Pheochromocytoma. B. H. Gross, I. R. Francis, G. M. Glazer, B. Shapiro, J. C. Sisson. *Am J Roentgenol* 141:719–725, 1983

Thirty-two patients (M 16, F 16; age range from 10–67 yr) with pathologically proven primary, metastatic, or recurrent pheochromocytoma underwent comparative studies with I-131 MIBG scintigraphy and transmission computerized tomography (TCT). MIBG study generally preceded CT. Each patient was given iodide to block thyroid iodide uptake, and I-131 MIBG scintigrams were obtained at 24, 38, and 72 hr. These images were performed using a large-field-of-view gamma camera interfaced with microcomputer. The blood pool, kidneys, and bone were imaged using Tc-99m in vivo labeled red cells, Tc-99m DTPA, and TC-99m MDP, respectively. An abnormal focus of MIBG uptake was superimposed on blood pool, renal, and bone images, enabling more precise anatomic localization. Of the 32 patients, 12 had primary adrenal pheochromocytomas, four had recurrent pheochromocytomas, nine had extraadrenal lesions (five in the thorax, four in the abdomen), and seven had metastatic tumors. The TCT scan and I-131 MIBG study were equally accurate in the identification of primary and recurrent pheochromocytoma. As the initial examination in patients with extraadrenal tumors, I-131 MIBG study was more accurate. In patients with metastatic disease, scintigraphy was preferable to TCT because it permitted imaging of the entire body. There are some limitations to the tumor localization with MIBG study: availability of the radiopharmaceutical, excretion of most of the tracer by kidney resulting in renal and bladder visualization causing problem of interpretation, and wide range of avidity of normal adrenergic tissue and adrenergic tumors for MIBG. TCT of extraadrenal tumor has been very useful in planning appropriate surgical intervention. It was concluded that I-131 MIBG scintigraphy and TCT in the detection of pheochromocytoma are complementary.

Detection of Hepatic Metastases: Comparison of EOE-13 Computed Tomography and Scintigraphy. D. L. Miller, R. C. Rosenbaum, P. H. Sugarbaker, M. Vermoss, M. Willis, J. L. Doppman. *Am J Roentgenol* 141:931–935, 1983

Ethiodized oil emulsion (EOE) 13 is a liver and spleen specific transmission computerized tomographic (TCT) contrast agent used to diagnose hepatic metastases. To clarify the merits of EOE-CT, 19 patients with known malignant neoplasms were retrospectively evaluated. The malignancies were as follows: colorectal cancer 13, pancreatic carcinoma two, melanoma one, esophageal carcinoma one, retroperitoneal sarcoma one, acinar cell parotid tumor one. The patients had both Tc-99m sulfur colloid and EOE-CT studies followed by direct surgical examination of the liver at laparotomy within 3 wk after EOE-CT and within 4 wk after liver scintigraphy. No differences were seen when the patients were scored as positive or negative for metastases. In a

lesion-by-lesion analysis of 58 hepatic lesions, the sensitivity of EOE-CT was 69.0% and the sensitivity of scintigraphy was 32.8% ($p < 0.001$). All lesions detected by Tc-99m sulfur colloid scintigraphy were also detected by EOE-CT. EOE-CT had a size threshold of 1.0–1.5 cm, whereas Tc-99m sulfur colloid liver scintigraphy had a threshold of 2.5–3.0 cm. Based on these data it was concluded that EOE-CT is a more sensitive examination for detection of small hepatic metastases than Tc-99m sulfur colloid liver scintigraphy.

Single Photon Emission Computed Tomograms of the Liver: Normal Vascular Intrahepatic Structures. R. I. Pettigrew, K. F. Witztum, G. C. Perkins, M. L. Johnson, R. N. Burks, J. W. Berba, S. E. Halpern; V.A. Medical Center, San Diego, CA. *Radiology* 150:219–223, 1984

Since the target-to-nontarget ratio (differentiation of tissues) required for single photon emission computerized tomography is appreciably less than that of planar tomography, the normal intrahepatic vessels with a diameter of approximately 2 cm may appear as distinct focal defects in the tomographic sections of the liver. These normal vessels are rarely visualized on the two-dimensional scintigraphic images and therefore seldom interpreted as a possible defect. To evaluate the problem that the increased definition of intrahepatic structures by emission tomography may present, five subjects with no evidence of hepatic disease were studied by liver tomography with Tc-99m sulfur colloid (TSC). On a separate examination Tc-99m autologous red blood cells (RBC) were administered intravenously and tomographic studies of the intrahepatic blood pool were obtained. In each case studied, well-demarcated defects were evident in contiguous TSC liver tomograms in the successive planes. When the tomographic planes obtained with TSC were compared with those obtained with the labeled erythrocytes, all of the defects obtained with the colloid study corresponded to the intrahepatic vein. Typically the right portal vein, its posterior branch, and the left portal vein were thus visualized. To avoid interpreting the defects of intrahepatic vessels seen on tomographic studies that are obtained with Tc-99m sulfur colloid, it was recommended that such defects be examined carefully in multiple orthogonal planes.

Magnetic Resonance and CT of the Normal and Diseased Pancreas: A Comparative Study. D. D. Stark, A. A. Moss, H. I. Goldberg, P. L. Davis, M. P. Federle; Univ. of California, San Francisco, CA. *Radiology* 150:153–162, 1984

In this study, 19 patients, aged 8–72 yr, with proven pancreatic diseases (including four adenocarcinomas, two islet cell carcinomas, and two lymphomas in pancreatic regions) and 50 control subjects, 26–76 yr, were imaged by NMR. The results were then compared with transmission computerized tomographic studies (TCT). The normal pancreatic head, body and tail were identified by NMR in approximately 60% of patients. Pancreatic adenocarcinoma and retroperitoneal lymphoma were detected using morphologic criteria similar to those used in TCT. Differentiating bowel from pancreas is difficult by NMR. Tissue relaxation times are usually not helpful in differentiating adenocarcinoma or lymphoma from normal pancreatic tissue, but NMR intensities T_1 and T_2 were useful in differentiating pancreatic islet cell tumors from normal pancreatic tissue. NMR accurately identified retroperitoneal invasion, vascular involvement, and liver metastases. With pancreatitis tissue, T_1 and T_2 relaxation times were prolonged. Complications such as ductal dilatation, pseudocyst, and ascites were identified, but small pancreatic calcifications were not. Because motion in the upper abdomen limits spatial resolution there is difficulty in differentiating bowel from pancreas in patients with heavy retroperitoneal fat, the pancreas is a difficult organ to image by NMR. Nevertheless, NMR is a versatile and unique modality for the evaluation of pancreatic disease.

Demonstration of Functioning Heterotopic Splenic Autografts by Scintigraphy. G. L. Cullingford, I. Surveyor, A. J. Edis; University of Western Australia, Perth, Australia. *Aust. NZ J Surg* 53:343–347, 1983

Over an 8-mo period, 15 patients (11 males), median age 25 yr, underwent splenic autografting concurrently with splenectomy subsequent to severe splenic trauma (in 14 cases, blunt). The resected spleen was sliced into segments 5 mm thick with diameter between 3 and 8 cm. Four or five slices were laid on the omental apron spread out under the transverse colon. The lower margin of the apron was folded back over the grafts and tacked down with sutures creating individual pockets, each containing a separate slice of splenic tissue. An attempt was made to autotransplant approximately one-third by volume of the resected spleen with an estimated mass of 30–60 gm of splenic tissue being implanted. Autograft function was then determined by scintigraphy following i.v. injection of 0.5 mCi of either Tc-99m-labeled, heat-denatured autologous red blood cells (Tc-99m RBC) or Tc-99m sulfur colloid (Tc-99m SC). Anterior and left lateral scintigrams of the abdomen were obtained at 1, 4, 8, and 12 wk following surgery. By the fourth postsurgical week five patients showed uptake of either Tc-99m RBC or Tc-99m SC in the liver and the individual splenic autografts. An additional eight patients had positive scintigrams by the 8th week, and all patients had functioning splenic autografts demonstrated by scintigraphy by the 12th week. Positive scintigrams indicated that reticuloendothelial function was viable in the splenic autografts. In one patient, positive abdominal scintigrams obtained at 12 wk and at 6 mo after splenic autograft implantation revealed no growth of the grafts during that period. When Tc-99m-RBC were used for imaging, radioactivity was seen in the urinary bladder representing unbound radionuclide. These authors conclude that scintigraphy is clinically efficacious for revealing viability of splenic autotransplants.

Effects of Renal Failure and Metabolic Diseases upon Bone Scanning in Children. C. Schümichen; Department of Nuclear Medicine, Albert-Ludwigs-University, D-7800 Freiburg, West Germany. *Ann Radiol* 26:498–504, 1983

Bone clearance measurements of Tc-99m MDP were performed in 20 healthy persons and in 27 patients suffering from metabolic diseases of the bone, renal failure, and hyperparathyroidism. After the injection of 2 mCi Tc-99m MDP, blood samples were obtained up to 30 min later, and the total soft tissue clearance was calculated. Since approximately 16% of the Tc-99m MDP activity is bound to plasma proteins during the first 30 min, an appropriate correction factor was applied to the data. Then the glomerular filtration rate was determined using 2 mCi In-113 DTPA. The bone clearance of Tc-99m MDP corresponds to the difference between the total soft tissue clearance and the glomerular filtration rate. A mean bone clearance of 40 ml/min was calculated for the control group. Normal bone clearance values were obtained in three patients with acute renal failure. Four of eight patients with chronic renal failure had abnormal bone clearance levels. The radiologic examinations failed to demonstrate bone abnormalities in these patients. The bone clearance was significantly raised in 12 patients with proven renal osteodystrophy and in patients suffering from primary hyperparathyroidism.

Low Renal Uptake of ^{99m}Tc-DMSA in Patients with Proximal Tubular Dysfunction. W. H. J. van Luÿk, G. J. Ensing, D. A. Piers; University Hospital, NL-9713 EZ Gröningen, The Netherlands. Eur J Nucl 8:404–405, 1983

Nine patients with proximal tubular dysfunction underwent renal scintigraphy. Four patients suffered from idiopathic Fanconi

syndrome, three had tubular proteinuria. One child with cystinosis and a patient with Bartter syndrome were included in the study. The dosage of Tc-99m DMSA was calculated according to body weight. Scintigrams were obtained 2 hr after radionuclide administration. Kidney-to-background ratios were calculated for each kidney and compared with normals. In all patients low renal radionuclide uptake was obtained with kidney-to-background ratios from 1.2 to 2.5 compared with 5.0 to 10.0 in patients without renal disease. A high radionuclide accumulation was observed in the bladder, suggesting a renal loss of Tc-99m DMSA at the level of the proximal tubuli. The background activity was equivalent to that of normal patients. The authors suggest that Tc-99m DMSA might be used as a diagnostic tool in patients with proximal tubular dysfunction.

Quantitative Scanning of Soft-Tissue Sarcomas with Nitrogen-13-Labeled L-Glutamate. P. P. Sordillo, R. E. Reiman, R. S. Benua, A. S. Gelhard, G. B. Magill, G. Rosen, J. S. Laughlin; Sloane-Kettering Cancer Center, New York, NY. *Cancer Invest* 1:387–394, 1983

N-13 L-glutamate was evaluated as a tumor-imaging agent in 14 patients with soft tissue sarcomas. The patients, seven males and seven females, ranged in age from 16–66 yr (average 39 yr). Images were obtained approximately 5 min after the i.v. administration of 10 mCi N-13 L-glutamate. A dual-detector rectilinear scanner interfaced with computer was used for 12 patients; the other two studies were done with a gamma camera and a positron emission tomograph, respectively. Positive images were obtained in 11 of the 14 patients, with marked concentration of the radiopharmaceutical in seven cases. The N-13 L-glutamate scan results corresponded with the results of Ga-67 images in three patients and with Tc-99m MDP images in six cases. N-13 L-glutamate gave positive results in one case in which the Ga-67 study was negative and in two cases that had negative Tc-99m studies. The percent uptake of N-13 L-glutamate by the tumor was determined in eight patients and ranged from 0.8% to 5.0% (mean = 2.7%). The count rate ratio between the tumor and corresponding contralateral site ranged from 1.20 to 3.84 (mean = 2.12). In eight patients that were followed after chemotherapy, N-13 uptake decreased corresponding to the degree of clinical response. N-13 L-glutamate offers several advantages over Ga-67 for imaging soft tissue sarcomas, and may prove useful in following patients who receive chemotherapy and in the study of tumor metabolism, both in vivo and in vitro.

The Role of Radioactive Colloids in Malignant Peritoneal Mesotheliomas. J. Cain, D. Nori, A. Huvos, R. A. Erlandson, B. Hilaris, J. L. Lewis, Jr.; Sloane-Kettering Cancer Ctr., New York, NY. *Gynecol Oncol* 16:263–274, 1983

Because of the small number of patients seen at any one institution, malignant peritoneal mesothelioma remains a therapeutic problem. Three treatment modalities are available for this malignancy: surgery, chemotherapy, and radiotherapy. Intraperitoneal instillation of P-32 colloid for management of this problem was first used by Rogoff et al. Jackson-Pratt tubes are placed and a circlage stitch is inserted in the skin for use at the time of tube removal. Within 48 hr the P-32 colloid administration is performed. To assure patency the tubes are flushed with normal saline every 6 hr prior to P-32 instillation. A small amount of radiocolloid is then instilled, and scintillation imaging of the abdomen is performed to assure the presence of a uniform distribution. Then a total of 10 mCi diluted to 200 ml in 1:20 normal saline is instilled. The tubes are removed and the circlage sutures are tied. The patient is instructed to move from side to side for 6 hr after instillation. Six patients (three men, three women, aged from 29 to 63) treated with P-32 and combinations of external radiation, surgery, and chemotherapy are reviewed and the survival time, at last follow-up, varies from 5 mo to 18 yr. All patients treated had an initial response to the therapy that included P-32. Response is hard to evaluate or follow in these patients who present with vague symptomatology and rarely palpable disease. The use of P-32 is particularly appropriate for patients with large surface areas involved, but with no great bulk of disease, and for patients in whom no complete resection of the tumor is possible, but who still require some form of direct therapy for the serosal surface at risk. A dose of 10 to 15 mCi of P-32 was set as equivalent to 100 to 150 mCi Au-198 because the P-32 has a longer half-life and more energetic beta particles. The increase in the dose of P-32 did not seem to translate into an increase in local control; however, it did increase the complication rate. The author suggested that with combined therapy, intraperitoneal P-32 and chemotherapy, longer survival can be achieved.

Comparison of Radioimmunoassay and Fluorescent Polarization Immunoassay for Quantitative Determination of Vancomycin Concentrations in Serum. B. H. Ackerman, H. G. Berg, R. G. Strate, J. C. Rotsbchafer; St. Paul Ramsey Med. Ctr., St. Paul, MN. *J Clin Microb* 18:994–995, 1983

Vancomycin, an antibiotic used to treat methicillin-resistant staphylococcal sepsis, causes ototoxicity if serum levels of drug are elevated. These authors compared a new fluorescent polarization immunoassay (FPI) with a standard commercially available radioimmunoassay kit (RIA) for measuring serum vancomycin concentration in 34 patients, each of whom had received 500 mg vancomycin infused over one hour for presumed or confirmed staphyloccal sepsis. Vancomycin was measured in blood serum samples (123 in all) taken before infusion and at 15 min after termination of infusion. Daily and intraassay coefficients of variation (CV) from RIA measurements of control sera containing 10, 20, and 40 μg drug/ml serum ranged from 9.5–12.2%. Daily and intraassay CV from FPI measurements of control sera containing seven, 35, and 75 μg drug/ml of serum ranged from 1.5 to 4.1%. For the patients' serum samples, RIA measurements of vancomycin concentrations significantly exceeded the corresponding FPI measurements by 0.72 ± 2.1 μg/ml (mean $\pm$ s.d.) ($p < 0.01$). From an orthogonal regression plot of the 123 patient RIA values (on the X axis) plotted against corresponding FPI values (on the Y axis), a least squares regression line of $Y = 1.01 X - 0.81$ was derived. From that relationship of RIA and FPI values, a correlation coefficient of +0.99 was derived. There were no serum concentration outliers by either RIA or FPI. These authors conclude that fluorescent polarization immunoassay and radioimmunoassay are comparable for measuring serum vacomycin concentration.

Ultrasonography of Choledocholithiasis. S. G. Parulekar, M. P. McNamara, Jr.; The Mt. Sinai Med. Ctr., Cleveland, Ohio. *J Ultrasound Med* 2:395–400, 1983

Sixty-four of 81 common bile duct stones seen in a retrospective study produced acoustic shadowing. Stones were best demonstrated by sagittal sections with the patient in the right anterior oblique position. Sixteen percent of the stones were identified in the proximal common bile duct, 69% in the distal segment, and 12% at the genu of the duct. Stones at or near the ampulla were frequently best demonstrated on transverse scans. Of the 46 patients in whom stones were identified, 39 per cent showed no evidence of dilatation of the intrahepatic biliary ducts. Numerous conditions were found mimicking choledocholithiasis—these include air in adjacent bowel, impression from the right hepatic artery or cystic duct upon the common bile duct, surgical clips, tortuosity of the common bile duct, air, mucous plug, or blood clot within the biliary tree, and calcification within the head of the pancreas. The authors caution that proven stones were occasionally

identified by ultrasound and not by cholangiography. In two patients, stones were also found to coexist with carcinoma of the head of the pancreas, which was responsible for the primary obstruction.

Sonographic Features of Uterine Leiomyomas: Analysis of 41 Proven Cases. B. H. Gross, T. M. Silver, M. H. Jaffe; University of Michigan Medical School, Ann Arbor, MI. *J Ultrasound Med* 2: 401–406, 1983

In retrospective study of 41 surgically proven uterine leiomyomata, the authors found the most frequent abnormality to be irregularities of uterine contour (76%). Abnormalities of texture, either increase or decrease in the echogenicity were seen in 68% of cases and enlargement was varified in 66%. In 22% of the studies examined there was no demonstrable sonographic abnormality even in retrospect. The retrospective sensitivity of the method was 76%. The largest of the undetected leiomyomas was 1.5 cm in diameter. The authors feel that ultrasound was unreliable in diagnosing masses less than 2 cm in diameter. Diagnostically difficult situations include retrodisplaced or duplicated uterus, calcified or pedunculated myoma, and markedly enlarged myomatous uterus obscuring the borders of the pelvic organs.

Sonographic Findings in Myoglobinuric Renal Failure and Their Clinical Implications. J. G. Pardes, Y. H. Auh, E. Kazam; The New York Hospital-Cornell Medical Center, NY, NY. *J Ultrasound Med* 2:391–394, 1983

The authors present findings in three patients with acute tubular necrosis and renal failure on the basis of myoglobinuria. A spectrum of sonographic findings included enlargement of the kidney, prominence of the medullary pyramids, and increased echogenicity of the cortex as compared with adjacent liver parenchyma. All three presented with acute renal failure, but two of the three regained normal renal function within one to two weeks. Two of the three patients presented were drug abusers. Representative sonograms are provided.

A Date-Independent Predictor of Intrauterine Growth Retardation: Femur Length/Abdominal Circumference Ratio. Women's Hospital of Texas, Houston, TX. *Am J Roentgenol* 141:979–984, 1983

With a linear array, real-time system, the authors measured a femur length with electronic calipers and the abdominal circumference at the level of the umbilical portal venous complex by either direct perimeter measurement or formula for the circumference of a circle using average diameters. A calculation of femur length divided by abdominal circumference times 100 was studied in 361 normal pregnancies. This ratio was independent of menstrual age and demonstrated a normal range after 21 wk of 22 ± 2 wk. Using 23.5 wk (the 90th percentile) as the upper limit of normal, the authors identified growth retardation in 63% of the fetuses so affected, a specificity of 82.1%. Since this ratio is independent of fetal age, less error is expected as a result of dependence upon the biparietal diameter or menstrual history.

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