

ABSTRACTS OF CURRENT LITERATURE

A Simple Method for Correcting Left Ventricular Equilibrium Radionuclide Angiography for the Effects of Arrhythmias. D. N. Taylor, D. J. Hawkes, B. A. Goddard, N. Garvie, D. M. Ackery, and D. Harris; Southampton General Hospital, Southampton, England. *Phys Med Biol* 24: 1162-1167, 1979

Many computer systems used for equilibrium multiple-gated blood pool studies assume a uniform heart rate. Thus, variations in R-R intervals will cause fewer counts to be collected in the later images of the cycle. When this effect is severe, the left ventricular ejection fraction (LVEF) and apparent wall motion will be overestimated. Other authors have described correction methods based on rejecting data from undesirable heart beats. The method presented in this study uses the data from all cardiac cycles with the correction performed after the data acquisition is completed. A time-activity curve is obtained from a noncardiac area that should yield a constant curve if the heart rate is uniform. If there are R-R interval irregularities, each image is multiplied by a correction factor obtained from the noncardiac time-activity curve. Case studies are presented in which the LVEF and regional wall motion are significantly changed by this procedure. The authors state that this occurs in one out of forty patients, but in one out of ten patients the procedure produces added confidence in the results.

Gallium Scanning in Paget's Disease of Bone—Effect of Calcitonin. A. D. Waxman, D. McKee, J. K. Siemsen, and F. R. Singer; Cedars-Sinai Med. Ctr., Los Angeles, CA. *Am J Roentgenol* 134: 303-306, 1980

A comparative study of gallium and conventional bone scanning agents in five patients with Paget's disease was done to ascertain which type of scan would more closely reflect the improvement in biochemical changes resulting from calcitonin therapy. Each patient had classic radiographic features of the disease, and in each case the diagnosis was confirmed by bone biopsy. Serial total body scans were done with a dual-head rectilinear scanner using either 15 mCi of Tc-99m diphosphonate (TcDP) or 5-7 mCi gallium-67 citrate i.v. All patients had baseline and serial follow-up TcDP scans and serial serum alkaline phosphatase and 24-hr urinary hydroxyproline determinations. Four of five patients had baseline and serial Ga-67 scans, but one patient had no baseline study. The TcDP scan showed only slight improvement in four of five patients, and no improvement in one. The gallium-67 scans showed a moderate to marked improvement in all four cases studied serially, and biochemical values improved 50% or more in all patients. The one case who had no baseline gallium scan studied with gallium during calcitonin therapy showed TcDP abnormalities worse than those on the gallium scans. These results indicate that the gallium scan is a more sensitive index of calcitonin effects on bone and is potentially valuable to assess the response of a particular anatomic site to therapy.

The Mechanism of Adsorption of Ga-67 Citrate to Cultured Cells. H. Orii and K. Nakamura; Tokyo, Japan. *Eur J Nucl Med* 5: 155-158, 1980

The binding behavior of Ga-67 citrate to cultured cells and to glass surfaces was studied using mouse leukemic cell line L5178Y.

Five μCi Ga-67 citrate were added per milliliter of cell suspension (4×10^6 cells) after which cells were incubated at 37°C for 1 hr. Following incubation cells were washed six times, and radiotracer uptake was determined in a well-type scintillation counter. Cell viability was determined by trypan blue exclusion. The identical procedure was used to measure the extent of Ga-67 adsorption to a glass surface, and Ga-67 release from cells was also determined. Cells were incubated with Ga-67 citrate for 30 min at pH 5.5 or 6.8. Labeled cells were centrifuged and incubated for 30 min in a Ga-67 citrate-free buffer at pH 5.5, 6.0, and 6.8. Carrier-free Ga-67 citrate was determined. The authors found that the gallium bound to glass surfaces and to cells increased with an increase of pH up to about pH 5. Cell binding of Ga-67 reached a maximum at pH 5.5. Cells incubated at higher pH demonstrated decreased Ga binding, and Ga-67 washout increased with the increased pH as well. EDTA and citric acid blocked Ga-67 cell binding and glass adsorption when concentrations exceeded certain values. Tris and HEPES buffer, which form no complexes with Ga-67, failed to show this inhibitory effect. The bound-to-free ratio of Ga-67 citrate varied with the concentration of carrier-Ga citrate and was identical for the glass surface and for the cells. The authors point out that at slightly acidic pH, and, in the absence of chelating agents, large Ga-67 citrate particles may occur that can be deposited on cell surfaces and glass walls.

Clinical Evaluation of ^{201}Tl Chloride Scan for Thyroid Nodule. T. Harada, Y. Ito, K. Shimaoka, T. Taniguchi, A. Matsudo, and T. Senoo; Kurashiki, Japan and Buffalo, NY. *Eur J Nucl Med* 5: 125-130, 1980

The authors compared Tl-201 chloride thyroid images with those of radioiodine and/or Tc-99m pertechnetate. Fifty-five consecutive patients with thyroid nodules, who also had surgery, were studied. Pertechnetate scintigrams were obtained on 52 patients and I-131 scans on 13. Gamma camera imaging followed immediately after i.v. injection of 2 mCi of Tl-201. The camera was equipped with a pinhole collimator. Images were visualized on a computer display device. Following surgery, nodular masses were photorecorded and examined histologically. Thyroid disease was due to: carcinoma in 16 cases, adenoma in 14, colloid nodule in 13, degenerative cysts in six, chronic thyroiditis in five, and ossification in one. In 14 carcinomas a photon-deficient lesion was seen in the pertechnetate and/or Na^{131}I scans, whereas the Tl-201 scan demonstrated increased radioisotope uptake in 13 examinations. The pertechnetate scintigram in adenoma showed a photon-deficient lesion, whereas the Tl-201 chloride image showed increased uptake in the nodule of Hürthle cell and embryonal adenomas with photon-deficient lesions in the other nodules. In the thallium study cysts and ossification appeared as photon-deficient lesions but colloid nodules and chronic thyroiditis had inconsistent scintigraphic patterns. The authors conclude that Tl-201 chloride is suitable for thyroid imaging, with positive scans obtained in malignant or hyperplastic lesions and negative images in degenerative and cystic lesions. When a thallium study is combined with a pertechnetate or radioiodine scan, it is useful since it often permits differentiation of malignant from benign goiters.

Value of the Free Triiodothyronine Index in the Diagnosis of Hyperthyroidism. J. D. Wiener; Amsterdam, The Netherlands. *Eur J Nucl Med* 5: 119-124, 1980

The author compared the value of obtaining total T_3 and free T_3 (FT_3) for identification of hyperthyroidism on 264 patients. On the basis of the TRH test, patients were placed into three groups: normal, 126; doubtful, 6; and abnormal, 42. Hypothyroid patients were excluded. Two blood samples were drawn, one before and one 20 min after i.v. injection of 0.2 mg TRH. Normalized T_4 (T_4N), T_3 , and resin sponge uptake (T_3U) were determined from the first sample, TSH from both. FT_3 index was calculated as the product of T_3 and T_3U . The author reports FT_3 values to be age dependent. FT_3 values were slightly elevated in patients less than 20 yr old. Considerable overlap was found between euthyroid and hyperthyroid patients for both T_4N and T_3 values. Elevated T_4N values were seen in 4% of the euthyroid patients, and 16% had elevated T_3 values. Normal T_4N results were found in 38% of the hyperthyroid patients, and 5% had normal T_3 values. Separation between euthyroid and hyperthyroid was clearly better with the FT_3 index. Only 3% of euthyroid patients had elevated values, and 5% of the hyperthyroid patients had normal values. The author concludes that the FT_3 index may be useful as a routine test for hyperthyroidism, especially in a number of conditions where the TRH test may be invalidated. In serious nonthyroidal illness, however, it should not be the only criterion for diagnosis.

Evaluation of the Regional Lung Function Revealed in Radioaerosol Scintigram of Chronic Obstructive Pulmonary Disease. 1. The Comparison of Radioaerosol Scintigram with the Lung Function Tests in Chronic Obstructive Pulmonary Disease. T. Suzuki. *Nipp Acta Radiol* 40: 152, 1979

The author classified the findings of radioaerosol inhalation scintigrams of patients with various stages of obstructive pulmonary disease (COPD) into four grades, according to the extent of peripheral irregularity and central foci of increased activity. Stage I represents normal homogenous distribution; Stage II represents peripheral irregularity; Stage III, additional foci of increased activity; and Stage IV, further regional defect. These aerosol grading criteria were then compared with routine and specific lung function tests.

The aerosol grading criteria correlated well with $FEV_1\%$, which is a good indicator of the severity of COPD. The central foci of increased activity correlated well with $FEV_1\%$ and respiratory resistance (R_p) determined by the oscillation method, both of which are good indicators of abnormality in central airway resistance. Peripheral irregularity correlated well with: (a) flows at 50% VC and 25% VC in a maximum forced expiratory flow volume curve; (b) closing volume ($CV/VC\%$); (c) $\Delta N_2\%/l$ in N_2 single washout test; and (d) the regional delay of Xe-133 washout process, all of which are sensitive indicators of small airway disease. It is therefore reasonable to conclude that the radioaerosol scintigram reveals the regional lung function both in terms of airway resistance (R) and compliance (C). This criterion was found to be useful in quantitatively evaluating the regional ventilation distribution of COPD and the therapeutic effect on bronchial asthma. The mechanism of aerosol particle deposition related to characteristic central foci of increased activity accompanied with peripheral irregularity in a radioaerosol scintigram of COPD needs further exploration concerning the aerodynamic behavior of aerosol particles in the airways both during inspiration and expiration. It was estimated that such radioaerosol deposition mechanism differed in cases of bronchial asthma when compared to COPD.

Radionuclide Joint Imaging—Acute Rheumatic Fever Simulating Septic Arthritis. J. A. Wolff, E. I. Tuomanen, and I. D. Greenberg; Montreal Childrens Hosp., Quebec, Canada. *Pediatrics* 65: 339-340, 1980

The authors report a patient with acute rheumatic fever whose bone and gallium scan findings simulated those of a septic arthritis. Differentiation of these two entities could only be made on the basis of the clinical and biochemical picture. A 7-year-old girl developed a painful swelling of the foot without antecedent trauma. There was no skin rash. The ESR was 50 mm/hr. Throat culture was negative, but follow-up ASO titer was positive. Radiographs of the left foot showed no bony abnormality. A bone scan with Tc-99m MDP 48 hr after admission revealed diffusely increased activity involving the left ankle and tarsus. Gallium-67 scan also showed diffuse activity in the same areas. Penicillin prophylaxis was begun, and the joint effusion responded dramatically (within 12 hr) to treatment with aspirin. The authors state that these findings are not unexpected since the arthritis of acute rheumatic fever is associated with edema, hyperemia, and infiltration of lymphocytes and polymorphonuclear leukocytes. Although in most cases these symptoms reflect peptic arthritis, one must be aware of the possibility of noninfectious inflammatory arthritides.

Combined Use of Ultrasonography and Gallium Scanning in the Diagnosis of Pelvic Pathology. M. A. Pelosi, R. J. Damico, J. Apuzzio, J. T. Harrigan, and P. J. Goldstein; Coll Med & Dent of New Jersey, Newark, NJ. *Surg Gyn Obstet* 150: 331-336, 1980

The authors presented two patients with uterine enlargements, two instances of adnexal masses, one case of pelvic abscess, and one case of ovarian endometrioma, all of which were diagnosed by the complementary use of ultrasonography and gallium-67 citrate scanning. When a pelvic mass was discovered, sonography could provide accurate information rapidly, economically, and without delivering ionizing radiation. However, the accurate determination of whether a pelvic mass were benign or malignant could not be made ultrasonically. The complementary use of gallium-67 scan usually determined the neoplastic or inflammatory nature of the process. Ultrasonic examination could be directed specifically to the areas of increased gallium uptake. The authors conclude that both techniques help to image and assess the gynecologic tumors and the inflammatory processes.

Determination of Glomerular Filtration Rate (GFR) by Analysis of Capillary Blood After Single Shot Injection of ^{99m}Tc -DTPA. A Comparison with Simultaneous ^{125}I -iothalamate GFR Estimation Showing Equal GFR but Difference in Distribution Volume. K. Rootwelt, D. Falch, and R. Sjøkvist; Oslo, Norway. *Eur J Nucl Med* 5: 97-102, 1980

The authors compared Tc-99m DTPA clearance values estimated after capillary and venous blood sampling, and compared Tc-99m DTPA clearance results with those obtained with I-125 iothalamate. The Tc-99m DTPA blood cell and plasma protein binding was determined. GFR determination followed simultaneous, single, i.v. injection of 1 mCi of Tc-99m DTPA and 70 μ Ci I-125 iothalamate. Ten blood samples, drawn from 5 to 240 min after injection, were taken. Samples were drawn from indwelling cannulas or collected from ear or finger punctures. After centrifugation, 1-2 ml venous plasma or 150 μ l capillary serum were counted. Crosstalk and Tc-99m decay were corrected. Capillary serum was measured for 3-10 min. Count rates for 150 μ l serum varied from 1,000-20,000 cpm in the Tc window. Calculations were done for a two compartment model. For this model two calculations were made. The final monoexponential curve of Tc-99m disappearance was determined from samples drawn at 60-120 min

as well as at 120–240 min. Clearance values were also calculated for a single-compartment model in which only the final, monoexponential part of the plasma curve was used for the GFR calculation. Radiochemical purity of Tc-99m DTPA was determined and ranged from 98.5 to 99.7% for six samples. Following 240 min incubation of Tc-99m DTPA with blood, three in vitro studies demonstrated that red blood cells had no radiotracer uptake. Gel chromatography of two probes demonstrated that plasma protein had bound 0.2% of the total Tc-99m activity. In 11 patients who had simultaneously determined Tc-99m DTPA and I-125 iothalamate clearances, no significant difference in values was found. DTPA clearance calculated from venous plasma and capillary serum disappearance rates was found to be virtually identical in ten normal volunteers. In 15 patients GFR was calculated from the final slope of the Tc-99m DTPA plasma curve (single-compartment model) and from the total plasma curve observed (two-compartment model). GFR calculated using the single-compartment model was 115% of the mean results obtained using double-exponential analysis. GFR was also determined by double-exponential analysis from blood samples collected at 2 and 4 hr. GFR calculated from 2 hr plasma samples gave elevated values when compared to results from 4 hr samples in 16 patients. The authors believe that the radiochemical purity of the Tc-99m DTPA product used resulted in lack of red cell labeling; and they conclude that Tc-99m DTPA will not underestimate GFR as previously reported but that 2 hr sampling will overestimate GFR so that the use of the 4 hr plasma disappearance curve is necessary.

Processing of Incomplete Measurement Data in Computed Tomography. R. M. Lewitt. *Med Phys* 6: 412–417, 1979

In collecting data for transmission or emission computed tomography, certain conditions may cause the data for individual projections to be truncated. In nuclear medicine this situation may be a result of the limited useful field-of-view of an Anger scintillation camera. Although discussed and illustrated from the standpoint of transmission computed tomography, the techniques described may be applicable to the problem of incomplete measurement data that is encountered in nuclear medicine. The general approach is to estimate the unknown parts of the projections using a smooth continuation. An arbitrary function is fitted to the truncated projection to give a "completed" projection consisting of the original data and the extrapolated segments. In order for this method to work, independent knowledge of the object being studied must be available. As is demonstrated by the application of this technique to a mathematically defined thorax phantom, more information is available than was present when the original raw data were analyzed.

Whole-Body Single-Photon Emission Computed Tomography Using Dual, Large-Field-of-View Scintillation Cameras. R. J. Jaszczak, L. G. Chang, N. A. Stein, and F. E. Moore; Searle Diagnostics, Inc. *Phys Med Biol* 24: 1123–1143, 1979

A whole-body single-photon emission computed tomography system (SPECT) was constructed and evaluated. This system uses two large-field-of-view scintillation cameras with either parallel-hole or fan-beam collimators. Data collection times range from 2 to 22 min, typically acquiring 500,000 to 1 million counts. Image reconstruction times are several minutes for a complete set of eleven transverse sections using filtered and weighted backprojection algorithm based on Fourier methods. A simple attenuation correction is performed using data from lower energy windows on the cameras. System resolution is about 15 mm in the whole-body scanning mode and 12 mm in the head scanning mode. In phantom studies, photon-deficient lesions and foci of increased activity were visualized with increased contrast, and spheres as small as 1.5 cm

were detected. A variety of representative in vivo studies were presented, including longitudinal sections obtained by reorganizing the transverse section data. The system can be gated with an ECG signal to obtain multiple-gated, blood-pool studies although the authors presented no data on operation in this mode. The authors state the present system is adequate for qualitative work but that further improvements are necessary for quantitative measurements.

ECG-Gated Emission Computed Tomography of the Cardiac Blood Pool. M. L. Moore, P. H. Murphy, and J. A. Burdine; Baylor College of Medicine, St. Luke's Episcopal, Texas Children's Hospitals and Texas Heart Institute, Houston, TX. *Radiology* 134: 233–235, 1980

The hardware used in this study consisted of two opposed large-field-of-view scintillation cameras mounted in a gantry that rotates 360° about the patient. With the use of standard medium resolution, parallel-hole, low-energy collimators, up to 22 min were required for one complete revolution. A modified physiological gate was used to initiate data collection when an R wave was detected. Specific details of the organization and processing of the data are presented. Twenty to thirty mCi of Tc-99m-labeled albumin or red blood cells were administered to the patient for these studies. Due to hardware limitations, data collection was limited to a 2.5 in. strip centered over the cardiac chambers. Using this technique it was possible to see the chambers in motion without the superimposition of other structures. In addition, ventricular volumes can be accurately measured. Because of the need to have good statistics, cycles occurring at the end of a sampling interval were not rejected. As a result, there was some blurring of the angular samples although the authors stated that this was small.

Several limitations in the present system are described. The tunnel gantry does not permit the patient's arms to be removed from the field-of-view. As a result, detector-detector distance is increased and resolution degraded. The use of nonisotropic collimators would improve sensitivity. The quality of the images appears to warrant further study of this technique.

The Health Physics of Xenon-127. R. Y. L. Chu, N. D. Poe, F. W. Zielinski, and S. J. Ing; Jerry L. Pettis Memorial Veterans Hospital, Loma Linda, CA. *Radiology* 134: 493–495, 1980

Xenon-127 has been proposed as a replacement for xenon-133 for ventilation studies of the lungs because of the reduced patient dose, improved images, and longer shelf-life. However, the radiation safety aspects of xenon-127 are slightly more complex due to the longer half-life (36.4 days) and the presence of radionuclidic impurities. The model used for dosimetry calculations is described in detail and in contrast to previous studies takes into account a variable lung volume. The absorbed dose is calculated for the lungs, adrenals, kidneys, liver, pancreas, spleen, thyroid, and total body. These data are presented separately for Xe-127, Xe-131m, Xe-129m, and I-125 since the amount of each impurity that is present at a given time depends on when the gas is used relative to end-of-bombardment. The absorbed dose can be decreased by allowing the shorter lived contaminants to decay. Because of the higher photon energies, only 5 mCi of Xe-127 are needed per administration. Although the maximum permissible concentration (MPC) of Xe-127 for restricted areas is slightly less than for Xe-133, the use of smaller doses per administration means that a larger number of studies can be performed per year without exceeding the MPC.

Fundamental Studies of Lymphocyte Labeling with In-111-oxine and Its Application to Lymphocyte Kinetics in Mice and Rats. S.

Matsuda, T. Uchida, R. Kokubun, T. Yui, H. Kimura, T. Tanaka, T. Akitsuki, M. Saito, and S. Kariyone. *Jap J Nucl Med* 16: 1373, 1979

Fundamental studies of lymphocyte labeling with In-111 oxine and its application to lymphocyte kinetics in mice and rats were studied. Lymphocyte labeling with In-111 oxine was performed by using the method of Thakur et al. (1976). In order to extract In-111 oxine complex efficiently, the solution was adjusted to a pH of 5-6, and labeling efficiency of lymphocytes was $34.3 \pm 6.0\%$ at 37°C for 20 min. Cell viability evaluated by supervital staining with trypan blue was $93.3 \pm 1.8\%$. Two washings were sufficient to remove the free In-111 oxine radioactivity. In the mice the disappearance curve of In-111 oxine labeled lymphocytes from the bloodstream showed two exponential components. The $T_{1/2}$ of the first component was 0.51 hr and that of the second was 38.9 hr, respectively. In the studies of organ distribution, labeled lymphocytes accumulated in the lungs, liver, and spleen, similar to the distribution of Cr-51 and Tc-99m. By using the scintillation camera, organ distribution of In-111 oxine labeled lymphocytes was visualized in the rat 30 min after infusion. The authors felt that In-111 oxine is quite useful as a radioisotope for labeling lymphocytes, and its application to animal or human studies would overcome the difficulty encountered with lymphocytic kinetics and organ distribution using Cr-51 or Tc-99m.

Evaluation of Circulating Antigens by a Sandwich Radioimmunoassay, and of Antibodies and Immune Complexes, in *Schistosoma mansoni*-Infected African Parturients and Their Newborn Children. Y. Carlier, H. Nzeyimana, D. Bout, and A. Capron; Inst Pasteur, Lille, France. *Am J Trop Med Hyg* 29: 74-81, 1980

A solid-phase sandwich radioimmunoassay (SRIA) capable of detecting very low levels of circulating schistosomal soluble antigens (CSA) in human sera is described. Three groups of patients were studied along with noninfected European controls. Group 1 consisted of 26 infected African mothers (18-36 yr); Group 2, their newborn babies; and Group 3, 13 men and 10 nonpregnant women (20-42 yr) living in the same area and also infected with *S. mansoni*. In addition to CSA levels, circulating antibodies (CAb) and immune complexes (CIC) were compared in the three groups. Tubes coated with normal rabbit immunoglobulin were used to remove possible rheumatoid factors from 1 ml of a 1:5 dilution of human sera in PBS. These adsorbed test and control sera (to which *S. mansoni* soluble antigen had been added in varying amounts) were analyzed in triplicate using tubes coated with anti-*S. mansoni* rabbit immunoglobulin. After washing, I-125-labeled anti-*S. mansoni* antibody was added to each tube to reveal bound CSA. Cross-reactivity was reduced to $<2\%$ by immunoadsorption of the anti-*S. mansoni* rabbit sera with the antigens shown to cross-react. Intraassay variability was $<8\%$ and interassay variability did not exceed 12% of the mothers, 24 had CSA in their sera, and 24 of 26 newborns had CSA in the umbilical cord sera with significant correlation between mothers and newborn CSA levels ($r = 0.73$; $p < 0.01$). Only 11 of 20 patients in Group 3 had detectable serum CSA, and mean levels were significantly lower than in either the mothers or the newborns. No significant difference was seen between men and women in Group 3. Only eight mothers and four newborns had significant titers of CAb. The difference between these two groups was significant ($t = 8.17\%$; $p < 0.001$). In Group 3, 22 of 23 patients had detectable CAb; the mean titers were significantly higher than in the mothers ($t = 19.62\%$; $p < 0.001$) or newborns ($t = 21.69\%$; $p < 0.001$). Only two mothers and no newborns had significant levels of CIC but 12 of 23 patients in Group 3 had significantly higher levels of CIC than the mothers ($t = 4.93$; $p < 0.001$) or newborns ($t = 9.48$; $p < 0.001$). The authors conclude that: 1. It is possible to detect DSA by SRIA, which appears to be a good tool for further CSA investigations. 2. There

is probable transplacental transfer of CSA from mother to fetus, at least during delivery. 3. There is possible modulation of the CSA level by specific CAb and CIC formation.

Study of Serum Digoxin Status in Digtoxicity by Radioimmunoassay. A. Sarangi, N. Tripathy, D. Lal, B. C. Patnaik, A. K. Swain; S. C. B. Medical College, Cuttack, India. *Am Heart J* 99: 289-293, 1980

These authors report on 47 patients (ages 15-64 yr) with congestive heart failure (CHF) and on treatment with oral digoxin (0.25-0.75 mg/day). Serum digoxin levels were assayed by a commercial RIA. Thirty-two of the patients presented with clinical and electrocardiographic evidence of digitoxicity. Fifteen patients satisfactorily treated and without toxic features comprised the nontoxic control group (1.4 ± 0.4 ng digoxin/ml serum). Seven of the 32 with digitoxicity actually had subtherapeutic drug levels; symptoms were due to uncontrolled CHF that resolved with increased drug dosage. Although digoxin levels in toxicity (2.6 ± 0.7 ng/ml) were higher than in the nontoxic controls or toxicity recovery values, no relationship existed between serum drug levels and the incidence of arrhythmias. Hypokalemia rendered patients more sensitive to digoxin by eliciting toxic symptoms that occur only at higher digoxin concentrations in normokalemia. Four patients with ischemic heart disease experienced toxicity at low-serum drug levels (0.6-3.0 ng/ml), possibly due to increased sensitivity of damaged myocardium. These authors also found toxicity at lower drug concentration in serum than that reported by other investigators world-wide. They hypothesize that it may be due to general undernourishment and low body weight of patients in their sample.

Sensitive Radioimmunoassay for Quantitation of IgM Rheumatoid Factor. W. J. Koopman and R. E. Schrohenloher; University of Alabama, Birmingham, AL. *Arth Rheum* 23: 302-308, 1980

A sensitive solid-phase radioimmunoassay for IgM rheumatoid factor (RF) capable of detecting this substance in nanogram quantities has been developed. The method utilizes both IgG coated and bovine serum albumin (BSA) coated tubes to correct for the nonspecific binding of nonRF IgM (approximately 0.2%). Human IgG does not interfere with the binding of a constant quantity (10 ng) of IgMRF when added in amounts varying from 1000-2000 ng. Monoclonal IgM RF binds to the human IgG coated tubes in a dose-related fashion over the dose range 1-10 ng. Polyclonal IgM RF, tested over the range 0.5-10 ng, yields similar binding curves. Normal control sera contained less than 100 ng/ml of detectable IgM RF. IgM RF was detected in all patients with seropositive rheumatoid arthritis (mean \pm 1 s.d. = 652 ± 553 $\mu\text{g/ml}$). Most patients with seronegative rheumatoid arthritis had detectable levels of IgM RF (11.3 ± 13 $\mu\text{g/ml}$) that were much lower than those observed in the seropositive patients ($p < 0.001$). Non-RA patients' sera contained <100 ng/ml of IgM RF with the exception of two patients (SLE, fibrositis) who had low levels of IgM RF by this assay. Duplicate assays on two separate occasions showed close agreement between the two sets of values (analysis of variance using log transformation, $r^2 = 0.955$, $p < 0.001$). The capacity of this method to detect nanogram quantities of IgM RF should provide means by which cellular mechanisms underlying IgM RF production can be investigated.

Ultrasound of Femoral Artery Aneurysms. G. A. W. Gooding, and D. J. Effeney; University of California, San Francisco, CA. *Am J Roentgenol* 134: 477-480, 1980

The authors studied 63 patients, 44 with bilateral aortofemoral

grafts and 19 unoperated patients. Twenty-seven femoral artery aneurysms were identified in 17 patients. True and false aneurysms produce similar appearances; characteristic configuration for the smaller region was fusiform whereas the larger aneurysms tended toward saccular dilatation. False aneurysms occurred characteristically at the end-to-side anastomosis of the femoral graft limb to the native vessel. Diffuse aneurysmal dilatation of the graft was considered a manifestation of graft material failure. In the presence of true aneurysms of the femoral artery, a search of the aorta iliac, and popliteal vessels should be carried out to determine if additional lesions exist. Ultrasound proved a valuable method of screening for and evaluating both true and false aneurysms in the femoral region.

B-Mode Gray Scale Ultrasound of the Head in the Newborn and Young Infant. D. S. Babcock, B. K. Han, and G. W. LeQuesne; Cincinnati General Hospital, Cincinnati, OH. *Am J Roentgenol* 134: 457-468, 1980

A study accomplished with standard gray scale equipment is presented of 111 children younger than 2 years. Axial scans parallel to the plane of computed tomography, coronal, and posterior fossa scans are presented. The normal ventricles, cerebral peduncles, thalami, and choroid plexuses are visualized. Hydrocephalus, porencephalia, Dandy-Walker cysts, and extracerebral collections are identified as well. The technique is valuable for following the course of hydrocephalus without the use of ionizing radiation. Although some information can be gained by scanning through the membranous bone, liberal use is made of both open sutures and fontanelles, thereby producing more detailed anatomic views. Representative scans, anatomic sections, and correlating CT scans are provided.

Gray Scale Ultrasound of the Parotid Gland. G. A. W. Gooding; University of California, San Francisco, CA. *Am J Roentgenol* 134: 469-472, 1980

The normal parotid gland as visualized by using a 5 MHz focused transducer and standard gray scale equipment is homogeneously echogenic, superficial, flat, and somewhat elongated. The fine homogeneous echo pattern resembled that seen in normal

thyroid tissue. The normal borders are not sharply encapsulated but blend into the surrounding tissue. With acute inflammation the gland develops more sharp margination, and the echo pattern becomes more coarse and echogenic. Tumors noted were discrete with sparse echo production. At present, the specificity of ultrasound is relatively low with respect to detection of abnormalities of the parotid gland. Representative sonograms are provided.

Severe Hydronephrosis and Severe Renal Cystic Disease: Ultrasonic Differentiation. P. W. Ralls, M. L. Esensten, D. Boger, and J. M. Halls; University of Southern California, Los Angeles, CA. *Am J Roentgenol* 134: 473-475, 1980

In an analysis of 13 cases the authors examined criteria for the differentiation between hydronephrosis and cystic disease in patients with renal failure. Criteria for renal cystic disease included random pattern of fluid collections, ragged wall outline, and varying sizes of the fluid collections. The identification of a central large sonolucency representing the dilated renal pelvis was the single most reliable criterion in establishing the diagnosis of hydronephrosis as opposed to polycystic renal disease. In the absence of such a central lucency, polycystic disease was considered the most likely diagnosis. A parapelvic cyst has been seen to mimic the dilated renal pelvis. Scans comparing hydronephrosis with polycystic disease are provided.

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