

Gallium Citrate Ga⁶⁷ Imaging in Patients with Suspected Inflammatory Processes. B. Kumar, R. E. Coleman, and P. O. Alderson. *Arch Surg* 110: 1237-1242, 1975.

Thirty-six patients with clinically suspected inflammatory processes were scanned with ⁶⁷Ga-citrate. Although the patients had had routine clinical and radiologic studies prior to imaging, the infectious process had not been localized. Imaging was performed with a dual-probe rectilinear scanner 48-74 hr after intravenous administration of the radiopharmaceutical.

Eleven of the 36 patients had normal studies. This group included seven patients with postsurgical fever for which no cause was found, one patient with hepatitis, one with diverticulitis, and two with bacterial endocarditis. Abnormal accumulation of ⁶⁷Ga-citrate was observed in 25 patients. In 16 of these patients the abnormality was confirmed by surgery, aspiration, or biopsy, and in nine the abnormality was confirmed clinically to be a localized bacterial infection. There were no false positives or false negatives in the series.

A Clinical Comparison of the Tumor-Imaging Radiopharmaceuticals ⁶⁷Gallium-Citrate and ¹¹¹Indium-Labelled Bleomycin. A. H. G. Paterson, D. M. Taylor, and V. R. McCready. *Br J Radiol* 48: 832-842, 1975.

The authors assessed the roles of ⁶⁷Ga-citrate and ¹¹¹In-bleomycin as tumor-imaging agents in a clinical trial that involved a variety of malignant diseases. Rectilinear scans were performed and the tumor uptakes of the two agents were compared from biopsy samples. In 28 examinations where the agents were used sequentially, ⁶⁷Ga-citrate provided a more satisfactory tumor image, and in 14 cases it exhibited a better correlation with the known sites of the disease. Scans were judged to be of similar quality in 14 cases. In no case was the ¹¹¹In-bleomycin scan judged to be superior to that obtained from ⁶⁷Ga-citrate.

Biopsy samples of spleen, liver, and lymph nodes were obtained in a number of patients who had undergone staging laparotomies for lymphomas. These patients had received ⁶⁷Ga-citrate and ¹¹¹In-bleomycin shortly before surgery. Of seven samples of spleen that were infiltrated with tumor, five contained more ¹¹¹In than ⁶⁷Ga. In contrast, four of five lymph nodes that were infiltrated with tumor showed ⁶⁷Ga concentrations greater than those of ¹¹¹In. The authors concluded that ⁶⁷Ga-citrate is a more useful tumor-imaging agent than ¹¹¹In-bleomycin, at least for lesions located above the diaphragm.

Tumors of the Liver as Demonstrated by Angiography, Scan and Laparotomy. D. K. Kim, J. McSweeney, S. D. J. Yeh, and J. G. Fortner. *Surg Obstet Gynecol* 141: 409-410, 1975.

Over a 4-year period commencing in 1970, the investigators reviewed 118 patients with primary and metastatic tumors of the liver, excluding carcinomas of the major bile duct. Prior to hepatic exploration each subject had preoperative celiac and superior mesenteric angiography and a ^{99m}Tc-sulfur colloid liver scan. For the 63 male and 55

female patients, there were 20 different diagnoses, including hepatoma (32%), metastatic carcinoma of the colon (27%), metastatic carcinoma of the breast (5%), cholangiocarcinoma (4%), and metastatic carcinoma of the stomach (4%). Eleven patients had benign lesions such as hemangioma or cyst. Thirty-three percent of the patients were treated by curative hepatic resection, 54% by ligation of hepatic artery, and 13% by miscellaneous procedures, mainly biopsy.

At surgery, tumors were found in the right, left, and both lobes in 22%, 13%, and 65% of the patients, respectively. Neoplasia was detected in 9% by angiography and in 87% by radionuclide scanning. Combining both methods provided a detection efficiency of 97%. Four patients had false-negative results by both angiography and scan. Location of the tumors by angiography was correct in 74% of the cases; the corresponding accuracy rate for imaging was 62%. The authors state that these rates are too low for determining preoperative resectability and that resectability can be ascertained accurately only at exploration. The larger the tumor, the greater the chances that angiogram and scan would detect it. In those patients with detectable tumors, the liver extended an average of 8.7 cm below the right subcostal margin, whereas in patients with normal angiograms or scans the average extent of the liver was only 3.3 cm below the margin. A common diagnostic error encountered in both imaging procedures was the tendency to localize the tumor in the right lobe.

Left Ventricular Performance Assessed by Radionuclide Angiocardiography and Echocardiography in Patients with Previous Myocardial Infarction. H. Henning, H. Schelbert, M. H. Crawford, J. S. Karliner, W. Ashburn, and O. O'Rourke. *Circulation* 52: 1069-1075, 1975.

Left-ventricular ejection fractions were determined by both echocardiography and a computerized radionuclide technique in 61 patients (77 studies). In 31 studies (26 patients) in which videotracking indicated normal left-ventricular wall motion and normal left ventricle size, the ejection fraction averaged 0.57 ± 0.09 (s.d.) by ultrasound and 0.52 ± 0.10 by the radionuclide method. Measurements of ejection fraction by both techniques correlated well ($r = 0.86$), and there was complete separation between patients with normal and reduced ejection fraction. In 46 studies (35 patients) in whom left-ventricular wall motion abnormalities were recorded by videotracking, the ejection fraction by the radionuclide method averaged 0.46 ± 0.08 , while the average ejection fraction found by echography was 0.62 ± 0.12 . The correlation between the ultrasound and radionuclide methods in these 46 studies was poor ($r = 0.33$), and in 28 studies the two techniques gave conflicting measurements of the ejection fraction. In 26 studies where there was a reduced ejection fraction by the radionuclide method and a normal value by echography, the dyssynergy involved the anterolateral left-ventricular wall. The authors conclude that echocardiographic measurements frequently

overestimate left-ventricular performance in patients with previous myocardial infarction associated with anterolateral wall motion disorders.

Thyroid Function in the Long-Term Follow-Up of Patients Treated with Iodine-131 for Thyrotoxicosis. A. D. Toff, W. J. Irvine, J. Seth, W. M. Hunter, and E. H. D. Cameron. *Lancet* 2: 576-578, 1975.

The investigators studied 233 euthyroid patients in 1972 who had received ¹³¹I for thyrotoxicosis between 1954 and 1966. In 58% of the patients the plasma thyrotropin (TSH) level was elevated (> 7.4 mU/liter); in the remainder of the patients it was normal. Sixty-nine patients (mean TSH level, 25.0 ± 2 mU/liter) were followed for 3 years. Overt hypothyroidism developed in three of the patients in the first year. In the second and third years of followup, hypothyroidism developed in an additional three and one patients, respectively. The mean plasma TSH level did not change in the patients who remained euthyroid. In a group of 61 patients who were euthyroid and had a normal TSH level in 1972, no cases of hypothyroidism developed over the next 3 years. Moderate elevation in TSH levels occurred in three patients in 1974, however, and in an additional six patients in 1975. Mean serum thyroxine and triiodothyronine levels were lower (but within normal limits) in euthyroid patients who had elevated TSH than they were in euthyroid patients with normal TSH values. Fasting serum cholesterol and triglyceride values in 40 euthyroid patients with elevated TSH levels were not found to differ from those in age-matched euthyroid patients with normal TSH levels. Since no incidence of overt hypothyroidism was observed in patients who had been treated 6-18 years earlier and who had normal TSH levels, the authors believe that less frequent followup is required in this group of patients than in those euthyroid patients who have an increased TSH level, who develop hypothyroidism at a rate of 2-5% annually.

The Influence of Fatty Acids on Serum Thyroxine Determination by Competitive Protein-Binding Radioassay. K. Rootwelt. *Scand J Clin Lab Invest* 35: 649-654, 1975.

The author determined thyroxine iodine concentration [T₄I(D)] by a competitive protein-binding assay. Concentration in serum was found to be stable for at least 1 month at -20°C and for at least 1 week at -4°C. Sera stored at 37°C for 1 week, however, showed an increase in T₄I(D). In sera stored for 7 days at 37°C, nonesterified fatty acids (NEFA) were found to increase and the increase in NEFA correlated well with the increase in T₄I(D) values. The in vitro addition of palmitic or oleic acid to the serum induced an increase in the T₄I(D), but the increase per mole of NEFA increase was clearly lower than that in aging serum. These findings indicate that one or more unidentified compounds besides the NEFA interfered with the T₄I(D) determination. Addition of mono-olein and diolein in amounts up to 6.0 mmole per liter of serum did not result in any increase in T₄I(D). The author states that lipolytic enzymes present in serum were probably responsible for the NEFA production during storage. In vivo increase in NEFA induced by postprandial heparin injection resulted in a proportional increase in T₄I(D) values. In contrast, protein-bound iodine and thyroxine iodine concentrations, as determined by radioimmunoassay, were not influenced by storage and changes in NEFA concentration. The increase in NEFA and the resulting spurious elevation of T₄I(D) values in stored serum may effectively be controlled by proper storage of samples until assay is performed.

Plasma Levels of Carcinoembryonic Antigen in Bronchial Carcinoma and Chronic Bronchitis. P. Pauwels and M. Van der Straeten. *Thorax* 30: 560-562, 1975.

Carcinoembryonic antigen (CEA) levels were determined in the plasma of 49 patients with histologically proven bronchial carcinoma and in 25 patients with an acute infective exacerbation of chronic bronchitis. The CEA level was determined by a zirconium gel radioimmunoassay method. The CEA levels were found to be increased (above 2.5 ng/ml) in 80% of the 25 patients with an acute exacerbation of chronic bronchitis. The authors found no statistically significant difference between the two groups.

In patients with chronic bronchitis, no significant lowering of CEA level was observed after the acute exacerbation had responded to treatment. No significant correlation was found between the initial CEA level and the survival time of patients with bronchial carcinoma who subsequently died. The authors feel that a single plasma level determination has no prognostic value in patients with bronchial carcinoma.

Thermography in Breast Carcinoma: Results of a Blind Reading Trial. C. M. Feasey, A. I. Evans, and W. B. James. *Br J Radiol* 48: 791-795, 1975.

The results of a blind reading trial for the detection of breast cancer by thermography are presented. Thermograms from 48 women with no known breast disease, 102 with benign disease, and 89 with carcinoma were analyzed using a previously described method for examination and assessment. Each record was read blind by three observers and the resulting scores from the assessment of the thermograms were compared for the three disease groups. Under the scoring system used, 69% of the patients with carcinoma had scores considered to indicate a high risk of breast disease, but 33% of the women with no breast lesions had scores that also fell into the abnormal range. Significant differentiation between the benign and malignant disease groups could not be achieved. There was a 31% false-negative rate for the carcinoma group.

Ultrasonic Study of Normal and Fractured Bone. M. Gerlanc, D. Haddad, G. W. Hyatt, J. T. Langloh, and P. St. Hilaire. *Clin Orthop* 111: 175-180, 1975.

Evaluation of fracture healing now depends largely on radiographic and clinical examination of the fracture site. Since the true state of healing may not be reflected by the radiogram, a more sensitive method to determine bone healing is needed. This study evaluated ultrasound measurement as an indicator of the status and progress of fracture healing. Ultrasound waves will travel in a material with velocities characteristic of that material and its physical attributes. Previous studies dating to 1958 are cited.

Ultrasonic measurements were taken through the tibia and ulna and across the humeral epicondyles; bony prominences served as landmarks to produce uniformity. Some 666 normal bones were examined; a slight variation in velocities with age was noted. No statistically significant racial differences were identified.

Since ultrasonic velocity varied significantly from patient to patient in the normal population, the status and healing progress of a fracture was based on sequential measurements using the unfractured limb as a normal control. Thus, the ultrasonic velocity in the fractured tibia was calculated as a percentage of that in the intact bone. Within a few days of fracture the initial measurement indicated a 24% decrease in velocity across the fractured limb, and by the end of the first month the transit velocity had decreased by 31%.

Thereafter, there was a gradual linear rise in the velocity across the fracture site: velocity returned to 82% of normal by the time the patient was ambulating comfortably, and the average velocity in a remote fracture (1-40 years) was 96% of normal. None returned to the 100% level. The results parallel both the clinical and radiographic patterns of healing and offer an objective measurement of the process.

Ultrasound of the Parotid Gland. H. L. Neiman, J. F. Phillips, D. A. Jaques, and T. L. Brown. *J Clin Ultrasound* 4: 11-13, 1976.

The authors present their experience with the application of B-mode ultrasonography to the parotid gland in five patients with varied lesions. An entirely sonolucent benign parotid cyst illustrated the characteristic cystic structure seen in all parts of the body. A Warthin's tumor appeared entirely cystic on low gain settings, but at high gain a lattice of internal echoes was identified. A solid benign tumor of the parotid gland appeared as an ill-defined mass defect with diffuse internal echoes, and much the same picture was seen with an adenoid cystic carcinoma of the parotid. As elsewhere, no differentiation between benign and malignant solid masses could be made. The authors suggest that percutaneous aspiration may be applied to lesions which are shown to be clearly cystic. In addition, a second or deeper lesion which eludes palpation may, in fact, be discovered on the ultrasound study.

Enhanced Clinical Diagnosis of Thyroid Disease Using Echography. M. Blum. *Am J Med* 59: 301-307, 1975.

The clinical and laboratory diagnosis of thyroid nodules is discussed, and ultrasonographic examination of "cold" nodules discovered by scintillation scanning is described with reference to biochemical, thermographic, radiographic, and fluorescent techniques. A series of A-mode scans is presented to show cystic, solid, and mixed echographic patterns in cold nodules discovered by radionuclide scanning. Caution is advised in the evaluation of solitary nodules greater than 4 cm in diameter, since both goiters and degenerating neoplasms may produce mixed patterns. The limitations of the method include failure to detect cystic

lesions below 1 cm in diameter, misplacement of transducer over adjacent tissue, and scanning artifacts. Emphasis was placed on correlation of the ultrasonographic results with palpation of the gland. The asymmetric but otherwise normal thyroid, suggesting a cold area at the pole of one lobe on scintillation studies, may be exposed as a normal variant by ultrasonography. Although percutaneous aspiration was performed on those lesions determined to be cystic, the author questions the accuracy of cytologic examination of the aspirate in determining the presence or absence of malignancy. Changes in the size of a thyroid nodule from tumor growth, hemorrhage, or resolution of either process can be determined by this method.

Choledochal Cyst: Report of a Case with Specific Ultrasonographic Findings. A. Filly and E. Carlsen. *J Clin Ultrasound* 4: 7-10, 1976.

Although the diagnosis of choledochal cyst can be made by oral cholecystography or intravenous cholangiography, the presence of jaundice in nearly 70% of such cases may render these methods ineffectual. The case of an icteric 17-month-old white female is presented. An excretory urogram was unremarkable and a liver scan showed an extrinsic mass in the right upper quadrant. Ultrasonography showed displacement of an elongated gallbladder superiorly and laterally by a cystic mass in the right upper quadrant. While demonstration of the direct entrance of the common duct or cystic duct into the cystic mass is difficult, it serves to confirm the diagnosis of choledochal cyst. Differentiation was made from such entities as enlarged obstructed gallbladder, hepatic artery aneurysm, and pancreatic pseudocyst. The similarity in ultrasonographic appearance of pancreatic pseudocyst and choledochal cyst has been noted in the literature previously.

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