

ABSTRACTS OF CURRENT LITERATURE

Defective Fc-Receptor Function in Lupus Erythematosus. M. M. Frank, M. I. Hamburger, T. J. Lawley, R. P. Kimberly, P. H. Plotz, NIH, *N Engl J Med* 300: 518-523, 1979

The functional capacity of splenic macrophage Fc-receptors to remove IgG sensitized Cr-51 labeled autologous red cells was studied in 15 patients with systemic lupus erythematosus. Thirteen of the 15 patients showed impaired clearance that demonstrated an impaired Fc-receptor function in a majority of patients with this disease. This finding contrasts with the results of previous studies of reticuloendothelial system function in this condition. In this and previous studies, microaggregates of I-125 labeled human serum albumin showed accelerated or normal clearance from the bloodstream. These data suggest that there is a difference between immunospecific or receptor-specific clearance and particulate clearance. Defective clearance of the IgG-coated Cr-51 labeled erythrocytes correlated significantly with both the disease activity as assessed clinically and with the levels of circulating immune complexes. Correlation of this clearance rate with C1q-binding activity and DNA-binding activity levels in the serum approached but did not reach statistical significance. The authors postulate that there may be a primary Fc-receptor defect in patients with systemic lupus erythematosus that prevents them from clearing immune complexes efficiently and contributes to the pathophysiology of this condition.

Solid-Phase Radioimmunoassay for Detection of Staphylococcal Antigen in Serum of Rabbits with Endocarditis Due to *Staphylococcus aureus*. L. J. Wheat, R. B. Kohler, A. White, Indiana University School of Medicine. *J Infect Dis* 138: 174-180, 1978

Staphylococcus aureus infections are characteristically fulminating, and delay in initiating effective therapy may have serious consequences. Cultures remain a major means of diagnosis but require a minimum of 24-48 hr for isolation and identification. Detection of teichoic acid antibody is useful in the diagnosis but 10 days to 2 weeks may be required to mount an IgG antibody response. The authors describe a solid-phase radioimmunoassay for rapid detection of staphylococcal antigens in serum and have applied it to *S. aureus* endocarditis in rabbits. Rabbit IgG antiserum to *S. aureus* was radioiodinated with I-125 by a modification of the chloramine-T method. Polystyrene tubes were coated with noniodinated rabbit anti-*S. aureus*, incubated, washed, and treated with bovine serum albumin and washed. The sample to be tested for *Staphylococcus aureus* antigen was added, incubated, followed by aspiration, washing, and the tagged rabbit anti-*S. aureus* was added. After incubation, aspiration, and washing, the tubes were counted in a gamma counter. Sensitivity for antigen was 0.312 $\mu\text{g/ml}$ in buffer and 1.25 $\mu\text{g/ml}$ in 50% rabbit serum. *Staphylococcus epidermidis* antigen could be detected at low concentrations but antigens from *S. bovis*, *Streptococcus mutans*, enterococci and *Pseudomonas aeruginosa* sero-type 6 did not show cross-reactivity. This assay is sensitive, specific, reproducible, and capable of detecting staphylococcal antigens in serum from rabbits with staphylococcal endocarditis.

Clinical Study of Synthesis of Carcinoembryonic Antigen and Calcitonin in Patients with Medullary Carcinoma of the Thyroid. Nobuyoshi Ishikawa. *Jap J Nucl Med* 16: 27-35, 1979

Serum carcinoembryonic antigen (CEA) levels were measured in 53 patients with various thyroid cancers. Fourteen of 15 cases

with medullary cancer studied were found to have significantly elevated CEA levels and in five cases values exceeded 100 ng/ml. Values apparently were not related to the extent of the tumor or presence of metastasis.

In four cases with medullary cancer, CEA was extracted from tumor tissue with perchloric acid, and demonstrated values ranging from 26 to 105 $\mu\text{g/g}$ wet tissue weight, more than 100 times the values found in Graves' thyroid.

Serum and tissue calcitonin levels were also measured, disclosing a roughly parallel correlation between CEA and calcitonin. These results were relevant to the phylogenetic specificity of medullary cancers and were thought to represent a further development in research into specific antigen in tumors.

Evaluation of RIA Kits and Commercial Control Sera. Shigenobu Nagataki, Yasunori Kanazawa, Toshio Tsumihama, Hidemasa Uchimura. *Jap J Nucl Med* 16: 37-45, 1979

Measurements of serum hormone concentrations are very important for the diagnosis of patients with various endocrine disorders. At present, a number of assay kits for measuring serum hormone concentrations and various control sera for standardizing assays are available from commercial sources.

The purpose of the present study was to investigate the variances among 13 types of control sera obtained from five commercial sources and 34 types of assay kits from nine commercial sources (12 for T_4 , six for T_3 , six for TSH, seven for insulin and three for HGH).

In a control serum the concentration of a hormone varied greatly according to the RIA-kits employed. The values for a hormone among several RIA-kits varied also according to the control serum employed. For example, serum T_4 concentration in a control serum is 17 $\mu\text{g}/100\text{ml}$ with one assay kit but is 0.5 $\mu\text{g}/100\text{ml}$ with the other.

The variances among the several RIA assay kits and control sera are so great that it is absolutely necessary to make some efforts to improve the measurements of serum hormone concentrations using the commercial RIA assay kits and commercial control sera.

Distribution and Metabolism of Gastrin—An Experimental Study of the Fate of ^{125}I -Gastrin in the Rat as Studied by External Detection with a Gamma Camera. H. Lundqvist, S. Gustavsson, G. Lundqvist; Uppsala, Sweden. *Eur Surg Res* 10: 1-12, 1978

Gastrin kinetics were investigated using I-123 gastrin and a gamma camera. I-123 labeled synthetic human gastrin was separated from damaged gastrin fragments and unbound iodine by means of column chromatography. The labeled hormone's biologic activity was tested on isolated frog gastric mucosa, and compared with that of unlabeled gastrin. Twenty-nine rats, weighing about 300 g each, were placed into three groups: intact (N = 12), laparotomized (N = 6) and nephrectomized (N = 11). After i.v. injection of either I-123 labeled gastrin, or I-131, gamma camera scintiphotoscans containing 100,000-200,000 cts were obtained. The camera was equipped with a high resolution collimator. Detection time varied from 1-2.5 hr. Appearance time of various organs was noted. Accuracy of detection was controlled in another 17 animals that received I-123 gastrin and I-131, and were sacrificed 5 min (N = 4), 15 min. (N = 6) and 60 min (N = 7) after radionuclide injection. Radionuclide accumulation in the stomach, small and large bowel, liver, and kid-

neys was measured in a scintillation well counter and results were expressed as percentage of administered activity. The authors found that labeling will not destroy the biological activity of gastrin. In a comparison of I-131 with I-123 gastrin the authors found that I-123 appeared quickly in the kidneys of intact animals. I-131 was seen shortly after injection in the stomach and kidneys. Following nephrectomy animals accumulated I-131 as rapidly in the stomach as did intact animals, whereas I-123 gastrin appearance time was delayed. Change in stomach appearance time of labeled gastrin after nephrectomy was also examined in rats after laparotomy. Following laparotomy and nephrectomy rats received I-123 gastrin. Again I-123 gastrin appearance time in the stomach showed statistically significant delay in the nephrectomized animals. In control animals the dynamic patterns of I-131 and I-123 gastrin were found to be similar to results seen in the camera studies. Although I-123 gastrin accumulated rapidly in the kidneys, urinary excretion of the radionuclide was not seen prior to the 20th min. The authors conclude that I-123 that appears in the stomachs of animals is split off during gastrin degradation in the kidneys. The authors feel that hypergastrinemia in renal failure may be due to a loss of ability to catabolize gastrin.

Reversal of Impaired Splenic Function by Plasma Exchange. C. M. Lockwood, S. Worledge, A. Nicholas, C. Cotton, D. K. Peters, Royal Postgraduate Medical School, London. *N Engl J Med* 300: 524-530, 1979

Investigations of the splenic clearance of autologous IgG-coated Cr-51 labeled erythrocytes and of Tc-99m labeled heat-damaged red cells was carried out in 10 patients receiving plasma exchange treatment for nephritis or vasculitis due to immune-complex disease and in five control patients with similar clinical findings who were not receiving plasma exchange therapy. Splenic function was assessed in two of the 10 patients by quantitative scanning before and after plasma exchange to determine the splenic uptake of Tc-99m labeled heat-damaged red cells. Before plasma exchange, all six patients tested with IgG-coated cells and six of seven patients studied with heat-damaged cells had prolonged clearance times. After plasma exchange the IgG-coated cell clearance time became normal in five of six patients and the clearance of heat-damaged cells improved in all six of the patients having prolonged clearance times prior to exchange. In both groups of patients studied by quantitative scanning, the splenic uptake of the injected dose was increased after plasma exchange. The authors conclude that impairment of splenic function is a common, if not general, phenomenon in patients with fulminating immune-complex disease, that this hyposplenism is associated with active disease, and is a functional defect rapidly reversible by plasma exchange. Improvement in splenic function with disappearance of circulating immune complexes also occurred in the patients receiving only conventional drug therapy, but the effect was much more gradual.

The Diagnosis of Liver Metastases. A Comparison of Sonography, Scintigraphy and Biochemical Findings. K. Scherer, M. Roters, R. Beeger, Hamburg, Germany. *Fortschr Rontgenstr* 130: 180-184, 1979

The authors compared the usefulness of noninvasive diagnostic procedures in the detection of hepatic lesions from extrahepatic malignant disease in 83 patients. Gamma camera scintigraphy followed injection of 2 mCi Tc-99m sulfur colloid. Each scintiphotoscan contained 400,000 cts. Transverse and sagittal sections were made with gray scale ultrasonography commonly supplemented by subcostal cuts. Results were excluded from the study when ultrasound and scintigraphy were separated by more than 4 weeks. Biochemical parameters measured included: gamma-GT, alkaline phosphatase, GOT, and GPT. The

diagnoses were verified at autopsy, with angiograms, histology, biochemical data, repeat examinations, or clinical course. The authors found ultrasound diagnosis to be correct 91% of the time, with 6% false-positive and 3% false-negative errors. Liver scintigrams provided the correct diagnosis 78% of the time, with 17% false-positive and 5% false-negative results. The frequency of correct positive results was equal for ultrasound and scintigraphy. Gamma-GT findings were correct 82% of the time, with a frequency of 17% false-positive results. The alkaline phosphatase was burdened with a 23% frequency of false-positive errors, and the GOT and GPT had numerous false-negative findings. The authors conclude that gamma-GT and gamma camera scintigraphy can be effectively used to screen patients to exclude hepatic involvement in malignant disease since false-negative errors were low with both methods. Positive or equivocal findings should be verified with ultrasound.

Determination of Lymph Shed by Colloidal Gold Scanning in Patients with Malignant Melanoma—Preliminary Study. J. H. Fee, D. S. Robinson, W. F. Sample, L. S. Graham, E. C. Holmes, D. L. Morton; University of California, Los Angeles. *Surgery* 84: 626, 1978

Lymphatic drainage distribution was determined in 32 patients with primary malignant melanoma of the trunk. Imaging was performed 24 hr after an injection of 0.1 μ Ci of Au-198 colloid placed intradermally around the primary lesion or periphery of the excisional scan. Laminographic images were obtained by means of a longitudinal multiplane tomographic scanner. Regional lymphadenectomies were performed in 27 of the 32 patients using accepted anatomic guidelines. The resected specimens were examined for the presence of metastatic malignant melanoma, and results of the clinical and microscopic findings were correlated with the scan data. Nine patients showed histological demonstration of nodal metastases in the areas of tracer uptake. No metastases have been found in areas not showing tracer uptake (55 weeks follow-up). The authors conclude that the direction of lymph shed, as evaluated by colloidal gold scanning, correlates well with the flow of metastatic disease in malignant melanoma of the trunk. Colloidal gold scanning appears to provide a useful adjunctive tool in clinical evaluation and therapeutic planning.

Evaluation of the Mediastinum by Gallium-67 Scintigraphy in Lung Cancer. R. G. Fosburg, G. B. Hopkins, M. K. Kan; Scripps Memorial Hospital. *J Thorac Cardiovasc Surg* 77: 76-82, 1979

The medical records of 75 patients, in whom the presence or absence of mediastinal metastases was known, were retrospectively reviewed to evaluate the accuracy of Ga-67 scintigrams compared with chest roentgenograms, mediastinal tomograms, and endoscopic findings. Scintigraphy commenced 40 to 72 hr following the intravenous administration of 3 to 5 mCi of Ga-67 citrate, and the majority of patients were imaged with a Raytheon scanner.

The five patients with Ga-67 negative primary tumors were excluded from statistical analysis. In the 70 patients having Ga-67 positive lung lesions, mediastinal Ga-67 uptake had a sensitivity of 88%, a specificity of 86%, predictive values of 93% for a positive test and 76% for a negative test, and a test accuracy of 87%. Ga-67 scintigrams proved superior to routine chest roentgenograms and comparable to mediastinal tomograms in assessing the presence or absence of mediastinal disease.

The authors conclude that Ga-67 scintigraphy is an accurate diagnostic adjunct in staging malignant lung tumors. If the primary is Ga-67 positive, a negative mediastinal scan obviates mediastinal biopsy. If the lesion and mediastinum are Ga-67

positive, mediastinal exploration is mandatory. They have also emphasized the low yield of multiogram scans and have lowered the costs of staging through the use of Ga-67 scintigraphy.

Application of ²⁰¹Tl Scanning for Bone Diseases. Masahiro Nakama, Kohji Shibuya, Tadashi Sugawara, *Jap J Nucl Med* 16: 7-15, 1979

Tl-201 chloride is used for myocardial imaging, renal medullary imaging, and tumor detection, but there is little published information on the Tl-201 scanning in patients with bone disease. A comparative study of the value of Tl-201 and Tc-99m MDP bone scanning in detecting bone disease was carried out on 25 patients with abnormal radiographic bone findings. The results in these patients showed that: (1) Tl-201 and Tc-99m MDP bone images were in agreement in four of 11 lesions with benign disease and five of 13 lesions with malignant disease; (2) positive images with Tl-201 were obtained in 11 of 13 malignant lesions, whereas only three of 11 benign lesions were positive with Tl-201. On the other hand, with Tc-99m MDP, 10 of 11 benign lesions and seven of 13 malignant lesions were observed; and (3) all four cold lesions in malignant disease seen by Tc-99m MDP images were positively delineated with Tl-201.

From these observations, Tl-201 may be of value to differentiate between malignant and benign bone disease. Also Tl-201 may delineate bone lesions that show decreased radioactivity with Tc-99m MDP.

Treatment of Thyrotoxicosis with 125-Iodine: Results in 93 Patients 3 to 5 Years After Treatment, and Comparison with 131-Iodine Therapy. Ch. Glanzmann, W. Horst; Zürich, Switzerland; *Strahlentherapie* 155: 1-5, 1979

The authors report results following therapeutic application of I-125 for Graves' disease in 93 patients with follow-up periods of 3-5 years. I-125 was administered to patients over 40 years in age, having thyroids weighing less than 60 g, without palpable nodules. Preceding therapy and at follow-up, radioiodine-three-phase-study, and triiodothyronine resin-uptake, thyroxine, triiodothyronine, and thyrotropine plasma levels were determined. Radioisotope dosage was individually calculated and thyroid weight, radioiodine uptake and transit time entered into the calculation. The authors report that 60 of the 93 patients with Grave's disease were euthyroid after therapy, four patients required a second I-125 therapy. Twenty-four patients needed secondary therapy; 21 received I-131, and 3 thyroid suppressive medication. Five patients were lost for follow-up. Only two per cent of patients given I-125 therapy were hypothyroid 4-5 yr after therapy. The authors conclude that following I-125 therapy hypothyroid function is not more frequent than after subtotal thyroid resection and less common than after I-131 therapy.

The Dynamics of Fetal Breathing Movements. E. Bernardi, G. A. Brugnoli, G. Elena, L. Landini, A. Pellegrini, E. Righi, A. Zacutti; La Spezia, Italy. *J Nucl Med Allied Sci* 22: 141-145, 1978

Using real time techniques, the authors sought to document the changes in the dynamics of fetal breathing movements that occur in normal pregnancy at different gestational ages. Three pregnant women were studied at 30, 34 and 38 weeks. The ultrasonic transducer was directed to display a mid-sagittal cross-section through the fetal thorax and upper abdomen, and was kept in this position to visualize breathing movements. Images were recorded on videotape and each frame of each respiratory phase was photographed. Distances between the spinal column and anterior thoracic wall and displacement of the diaphragm were measured, and alterations that occurred from one picture to the next were registered. The areas of the apical, mid-pulmonary, and base pulmonary fields were calculated. The

authors found breathing movements begin with a diaphragmatic movement followed by thoracic cage retraction. At 30 weeks the thoracic cage movements are observed as rhythmic retractions of the anterior thoracic wall at the upper thorax level, and the expansion of the thoracic base is very limited at this time. At 34 weeks better coordination is noted between diaphragmatic motility and expansion of the pulmonary base. At 38 weeks more coordinated expansion occurs at the different levels of the thoracic cage. The authors conclude that progressional changes in the dynamics of breathing movements occur with the advance of gestational age.

Prospective Comparison of Ultrasound and Computed Tomography in the Evaluation of Gynecologic Pelvic Masses. James W. Walsh, Arthur T. Rosenfield, C. Carl Jaffe, Peter W. Schwartz, Joseph Simeone, Alan G. Dembner, K. J. W. Taylor; Yale University School of Medicine, New Haven, CT. *Am J Roentgenol* 131: 955-960, 1978

In a series of 24 consecutive patients the authors found that ultrasound examination provided important clinical information in 17 and computerized tomography in 15. With each method there were three false-negative and no false-positive examinations. Ultrasound proved diagnostic in 13 of the 24 examinations; in comparison, CT was diagnostic in nine of 24 patients. In those patients with ovarian neoplasms or cervical carcinomata ultrasound appears to provide advantages over computed tomography largely because of the easily obtained sagittal projections as well as the ability of ultrasound to delineate normal ovaries, a feature not currently obtained by CT examinations. The diagnosis of uterine fibroids proved particularly difficult for both methods. Although a slight advantage of ultrasound over CT examinations for gynecologic masses is suggested, the size of this series precludes statistical analysis, and the authors feel that the methods are, in fact, not complementary. Either method is advocated in the workup of gynecologic masses.

The Complementary Uses of Nuclear Medicine and Ultrasound in the Kidney. Roger C. Sanders, Shamen Menon, Angelita D. Sanders; Johns Hopkins Hospital, Baltimore, Md. *J Urol* 120: 521-527, 1978

The authors present a number of clinical situations in which the complementary use of ultrasonography and nuclear medicine can provide a definitive diagnosis without the necessity for invasive techniques, and also in those circumstances when problems may be encountered with routine studies. The diagnosis of hydronephrosis can be made by ultrasonography when allergy to contrast medium, pregnancy, or renal failure preclude visualization by intravenous urography. The per cent of renal function attributable to a damaged kidney can then be estimated by means of technetium dimercaptosuccinic acid (Tc-DMSA) examination. Polycystic kidney disease can be diagnosed by ultrasonography and the possibility of co-existent hydronephrosis can then be evaluated by radionuclide techniques. Renal infarction is also amenable to diagnosis by a combination of these methods. Renal pseudotumors (including hypertrophied columns of Bertin), fetal lobulations, normal hypertrophied cortex in scarred kidneys, and renal aplasia can be adequately diagnosed by the combination of radionuclide and ultrasonographic techniques without the need for angiography. The distinction between abscess and simple pyelonephritis, the identification of urinoma, and the assessment of renal trauma can best be accomplished by the combination of sonography and radionuclide studies. Several instances are presented in which artifacts produced

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by one technique can be clarified by the second. For example, by means of delayed function images on the (Tc-DTPA) studies, unusually located kidneys on radionuclide study and adrenal lesions may be clarified.

Differential Diagnosis of Intrahepatic Shadowing on Ultrasound Examination. Landon E. Weeks, Bruce R. McCune, James F. Martin, Thomas F. O'Brien, Jr.; Emory University School of Medicine, Atlanta, GA. *J Clin Ultrasound* 6: 399-401, 1978

A number of situations are presented in which echodense structures within the liver parenchyma or high in the porta hepatis produce distinct sonic shadows. The lesions are not characteristic, however, of biliary calculi and are not associated with cholelithiasis. Air in the biliary tree secondary to a nonsphincteric common duct or, less commonly, endoscopic cannulation of the biliary tree can produce dense intraparenchymal echoes with distal sonic shadowing. Calcified granulomata in the liver or porta hepatis and foreign bodies in the liver can produce similar pictures. The fibrous structures of the porta hepatis and round ligament may also cause decreased sound transmission in this region, but the degree of shadowing is slight and inconstant and can be traced to the normal appearing structures in the porta hepatis.

Normal Ultrasonic Appearance of the Ligamentum Teres and Falciform Ligament. Peter J. Sones, William E. Torres; Emory University, School of Medicine, Atlanta, Ga. *J Clin Ultrasound* 6: 392-394, 1978

An intensely echogenic focus, commonly demonstrated approximately at the junction of the right and left lobes of the liver on transverse scans may be indistinguishable from a focus of tumor, primary or metastatic. The sonic focus is produced by imaging the ligamentum teres in cross-section and can be clarified by closely spaced sequential scans. The ligament can be followed and seen to extend ventrally to the anterior aspect of the liver and dorsally to the porta hepatis, thus clarifying its origin. The authors presented computerized tomographic scans through this region as well as water-bath scans of a liver with and without a barium-filled tube adjacent to the ligamentum teres to provide confirmation of the nature of this echogenic focus.

PEGGY DOMSTAD
ANDREW FRIED
EUI SHIN KIM
University of Kentucky
Medical Center and VA
Hospital
Lexington, Kentucky

JOHN H. CLORIUS
Deutsches Krebsforschungs-
zentrum
Heidelberg, Germany
MASAHIRO IIO
Tokyo Metropolitan Geriatric
Hospital
Tokyo, Japan

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The Scientific Program Committee of the Greater New York Chapter of the Society of Nuclear Medicine solicits abstracts from members and nonmembers of the Society for the 5th Annual Scientific Meeting to be held Oct. 26-28, 1979 at the Sheraton Centre in New York City, NY. In addition to selected scientific papers and commercial exhibits, the meeting will feature survey papers and teaching sessions conducted by invited faculty.

Abstracts should not exceed 300 words. The title, authors, and institutional affiliations should be included at the top of the first page. The name of the author presenting the paper must be underlined. Abstracts should contain a statement of purpose, the methods used, results, and conclusions.

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