ABSTRACTS FOR TECHNOLOGISTS' SCIENTIFIC PROGRAM

ORAL PRESENTATION

Small-Laboratory Preparation of Indium Compounds for Scanning—Technical Considerations BY B. BUGELE, M. ADATEPE, E. ARCHER, M. WELCH AND E. J. POTCHEN, Washington Univ. School of Medicine, St. Louis, Mo.

^{113m}In is a generator-produced radioisotope which has a 1.7 hour physical half-life and 390 kev monoenergetic gamma emission which are ideal for organ scanning. The ^{113m}In is eluted from a ^{113}Sn generator with HCl. By adjusting the *p*H of the eluent with a phosphate buffer and adding the proper carrier, the particles obtain a homogeneous organ specific size. This preparation results in selectivity of the clinical organ distribution. A simplified technique has been developed which permits a reliable and reproducable small-laboratory preparation of organ specific indium colloids to be used for lung, liver, spleen, bone-marrow and blood-pool scanning. The long half-life of the parent tin generator and short physical half-life of the indium result in a low dose to the patient and low cost per scan. In addition, the scanning versatility of this isotope makes it the agent of choice for the small laboratory where the organ specific radiocolloid can be prepared on short notice. The technical considerations and methods used in our laboratory will be discussed.

Serum Cardiac Glycoside Assay Method and Possible Clinical Use BY DIANE COINER, CAMERON C. BANGS, JOHN R. WALSH AND LEONARD W. RITZMANN, V. A. Hospital, Portland, Ore.

With the widespread use of digitalis preparations and the problems of digitalis intoxication, a practical method for measuring blood levels of cardiac glycosides would be desirable. Until recently there has not been a method of assay sensitive enough to determine clinically the small amounts present in human serum. Lowenstein in the *J. Lab. Clin. Med.* 67:1,048, 1966, presented a method for measuring plasma concentrations of cardiac glycoside. ^{86}Rb was used since its uptake by red cells is inhibited by cardiac glycosides. Lowenstein reported a standard curve of $\pm 5\%$ standard deviation, but on personal communication stated that his method actually yields a high, medium and low range. We have therefore worked at modifying the method and technique to increase the reproducibility.

The method is as follows:

1. Extract cardiac glycoside from serum sample with dichloromethane and evaporate extraction to dryness.
2. Add ^{86}Rb chloride in saline glucose solution.
3. Add 0.5 ml 70% erythrocyte suspension (washed with saline) and incubate 2 hr at 45°C.
4. Wash RBC four times with saline.
5. Count radiation in a well-type scintillation counter.
6. Calculate mμg/ml against plasma standards.

The main modification of Lowenstein's method is a temperature increase from 37°C to 45°C which increases the range of difference between 0 and 35 mμg/ml, thus giving greater accuracy. Also we made our extractions by adding 1.3-ml dichloromethane to the serum, mixing, centrifuging and removing 1 ml of the dichloromethane extraction from beneath the serum layer with the aid of a small-bore 1-ml disposable glass pipet.

In the graph to be presented, the curve flattens at higher concentration, giving rise to a source of error. Therefore, in patients with high digoxin values, samples are repeated with 0.5-ml aliquots to use the steeper portion of the curve. Speed and accuracy are achieved by using automatic pipeting devices for adding dichloromethane, ^{86}Rb-chloride and the erythrocytes. Washing is facilitated by using an Adams sero-fuge with two 12-place heads and suction apparatus. Twenty-four tubes, including standards and unknowns can be easily run with about 2 1/2-hr technician work time excluding counting. With this method and our technical modifications, our standard curve with digoxin has a standard deviation of $\pm 2.5\%$ and serum determinations ± 3 mμg/ml standard deviation.

The following groups of patients are being studied and will be reported: (1) patients on a well-maintained digitalizing dose, (2) patients being digitalized and (3) patients manifesting digitalis toxicity.

Dynamic Studies with the Digital Autofluoroscope BY DAVID S. FISCHER, PETER VITALE AND LINDA BARKER St. Peter's Hospital, Albany, N.Y.

The digital autofluoroscope is a camera-type imaging

device designed to present a map of the distribution of an isotope in an organ. The unit consists of a detector and a console panel. The detector is a rectangle 6 × 9 in. composed of 294 NaI(Tl) crystals. It is divided into 14 horizontal and 21 vertical rows. Each row is coupled to a photomultiplier tube. There are 35 photomultiplier tubes, one for each vertical and horizontal row. When a scintillation occurs in any crystal, an impulse is registered simultaneously in two photomultiplier tubes. A count is then stored in a magnetic memory core corresponding to the crystal in which the scintillation occurred. The unit can be set to count 1,000 preset counts (a static study) or any preset time from 0.03 sec to 1.0 min. In the preset count or static mode when 1,000 counts are reached in any memory core, a data processor displays the information on a cathode-ray tube. This information is stored in the magnetic memory core and transferred to magnetic tape for permanent storage, visualization and analysis of the individual component events on the autofluoroscope console.

The autofluoroscope also provides the means for following dynamic processes in the body—that is passage of an isotope through an organ compartment. In the dynamic mode, counts are accumulated for a preset time, transferred to magnetic tape, the memory core is erased and the accumulation is started again. Once the examination is completed, the information from the tape is displayed on the cathode-ray tube; any three areas of interest are selected. These areas are zoned off by the use of a special photocell. The study is then replayed in its entirety and the counts from each selected zone are transfered to a strip-chart recorder.

At the present time we are using the instrument for renal, liver and brain dynamics. Further studies are being investigated for their feasibility.

Effects of the Heart-Lung Machine on Electrolyte Balance BY BARBARA A. FRITSCH, JUDITH M. BRANDLY AND NADZOA STEFANOVIC, V.A. Research Hospital, Chicago, Ill.

Patients undergoing cardiac surgery which requires the use of a "heart-lung" machine often exhibit bizarre changes in electrolyte balances. To evaluate these changes better, we chose to measure two parameters simultaneously: total exchangeable sodium and total body water. The patients were injected with 2.5 μc ^{22}NaCl and 700μc $^{3}H_2O$ and were studied preoperatively, immediately postoperatively and 2 to 3 weeks after surgery. The samples were counted first for ^{22}Na in a gamma system; then the tritiated water was removed by lyophilization and counted by liquid scintillation. Although all patients had decreased serum-sodium values in the immediate postoperative period, only one had an actual decrease in total exchangeable sodium; the rest showed increases in total-body sodium ranging from 8 to 50% above preoperative values. All showed increases in total-body water from 5 to 32% or 2 to 12 liters. In the 2 to 3 week ensuing period both the sodium and water spaces returned to preoperative values in all patients.

These preliminary studies seem to indicate that the changes are independent of the extent of surgery but reflect instead the fluid volume the pump has delivered to the body.

Technical Adaptations for the Scintillation Camera BY JACK N. HALL AND ROBERT A. STIGLITZ, V. A. Center, Wood, Wis.

Adaptations to the scintillation-camera procedure were initiated to (1) maintain constant picture orientation regardless of patient position with respect to camera, (2) eliminate difficulties in interpretation due to the high contrast of Polaroid film and (3) provide a method for evaluating uniformity of crystal response.

Patient position and picture correlation was solved using a chart depicting a patient's outline in various positions below the camera with corresponding orientation-mode settings that would always portray the patient in the same position on the CRT display. The problem of picture evaluation was alleviated using a reasonably priced plane-source plastic phantom. Weekly scintiphotos are made of this phantom to check for uniform sensitivity of the system. A combination Graflok back attachment and Graflex 6-film holder was installed which let us use 4 × 5-in. x-ray films in conjunction with Polaroid pictures as scan records. The system for flashing patient data onto the films was modified so that a typewritten card could be employed.

The orientation chart has saved valuable technician time as well as made the scan evaluation easier for the physicians. The plastic phantom enables the physicians to have a picture of a flooded crystal showing any variation in uniform sensitivity on its surface, and it indicates when retuning is necessary. The x-ray film can display many more levels of information density and yields fewer false positive results.

Sequence of Performing Radioisotope Procedures BY WALTER HENDERSON, DONALD MARTINSON AND GERALD A. WILLIAMS, V. A. West Side Hospital, Chicago, Ill.

Very often the physician in charge of the radioisotope laboratory or his technician is faced with the problem of selecting the order of performing two or more radioisotope procedures on the same patient. By taking into consideration the factors involved, the sequence of performing the procedures can be chosen

to minimize the total patient and technician time involved with a minimum of interference of one procedure with the other. These factors, including effective half-life, dose, tissue distribution, spectrometry, physical and chemical separation, background correction and the point at which background may be neglected will be reviewed. Examples illustrating the recommended order of performing procedures will be presented and a chart suitable for day-to-day laboratory use will be available.

Cooperative Approach to Nuclear-Medicine Technology Training BY DELORES L. HUBBARD, D. BRUCE SODEE, PAUL J. EARLY, Nuclear Medicine Institute, Cleveland, Ohio

A cooperative program has been initiated to overcome the deficit of well-trained personnel in the field of nuclear medicine. To date the number of registered personnel in the field numbers about 350. Because the need for nuclear medicine technologists should reach 4,000 by 1970, a new approach to education in this field was considered necessary.

We reasoned that the question of how to train adequately enough personnel to meet the present demand must meet the following criteria: (1) an adequate didactic training program must be presented, (2) a clinical training program to cover all phases of nuclear medicine on a variety of equipment must be provided and (3) the number of trained personnel must be increased.

Using the cooperative approach, all three criteria can be met satisfactorily. Realizing that the didactic phase is the most difficult to present from the standpoint of time and adequate personnel, this criterion can be met by providing a concentrated didactic course in a centralized training institution. On successful completion of this phase when the student technologist possesses a good foundation in nuclear science, instrumentation and clinical applications, he is considered prepared to enter the clinical-training phase.

For the clinical phase, the student is placed in an approved affiliate or associate hospital through the cooperative effort of these institutions. In this way, the second criterion is satisfactorily met. In doing so, the third criterion is also satisfied because the number of trained personnel has been increased.

The training program will be presented in detail. The results of 2 1/2 years of operation will be discussed.

The T-4 Resin Test in Radio-opaque Contrast Contamination of Thyroid-Function Studies BY K. M. JACOBS, R. UTIGER, B. DEMPSEY AND E. J. POTCHEN, Mallinckrodt Institute of Radiology, Washington Univ. School of Medicine, St. Louis, Mo.

It is established that organic iodinated contrast materials interfere with the PBI determination. Although variations of the T-3 uptake test are theoretically unaltered by contrast media, it has recently been suggested that false hyperthyroid readings may be obtained for short intervals after administration of these compounds. A new, direct, *in vitro* isotope-resin-test for serum thyroxine (T-4) is highly specific and appears to eliminate spurious results from exogenous iodide.

A known amount of ^{125}I-T-4 bound to thyrobinding globulin is added to an ethanolic extract of the patient's serum which contains 70–77% of the total serum thyroxine. Following incubation, a resin sponge is added which binds all free thyroxin not attached to TBG. The liquid is removed and the sponge counted. The patient's serum is evaluated against a standard curve derived from known amounts of thyroxin.

A group of normal volunteers receiving oral "Telepaque" and a series of patients undergoing cerebral or cardiopulmonary arteriography are being evaluated with serial PBI, TBI and T-4 by column determination and by the new T-4 resin test. The results of these experiments will be discussed.

Pancreas Scanning Technique with a 5-in. Scanner BY BARBARA Y. JUMP AND THEODORE T. NIZNIK, North Charles General Hospital, Baltimore, Md.

Although the use of ^{75}Se-selenomethionine for pancreatic scanning is still being evaluated, it is available to the community general hospital equipped with radioisotope scanning facilities. This paper will present our experience with pancreas scanning using a 5-in. rectilinear scanner. Emphasis will be on locating the pancreas and setting up a high-contrast photoscan for optimal visualization of the organ. The anatomy and physiology of the pancreas and the pharmacology of the isotope will be reviewed to correlate their importance to patient protocol and scanning technique. Slides of pancreas scans will be shown and corroborated with pathology whenever possible.

Evaluation of a Modified Murphy Method for Determining Serum Thyroxine BY ROSEMARY LEGEAY, JOHN A. BURDINE, JR., Baylor Univ. College of Medicine, Houston, Tex.

The T-3 resin test has not succeeded in consistently separating the hypothyroid from the euthyroid patient. False negatives as well as false positives occur as a

result of abnormalities in serum protein level and binding capacity. A resin method introduced in 1964 using ^{131}I-labeled thyroxine has recently been simplified and placed in kit form. Results from this test were compared in 200 patients with the T-3 resin 4- and 24-hr uptakes and with the PBI. Using low, normal and accelerated function as the three categories for grading, the T-4 test produced impressive separation between these groups. The average normal uptake was 9–10%, while the average hypo and hyper were 2–3% and 15–16%, respectively. Iodine contamination does not appear to influence the test, but the level of serum proteins has definite effect. The procedure appears to warrant considerable further use in clinical medicine.

Factors Influencing Blood-Volume Determinations BY CHERYL MITCHELL, PHILIP C. JOHNSON AND FRED B. VOGT, Baylor Univ. College of Medicine, Texas Medical Center, Houston, Tex.

Duplicate red-cell-mass and plasma-volume determinations were performed on nine adult healthy males on two separate occasions 1 month apart. Subjects were fasted overnight but were given 120 ml of a protein-supplemented milk on the test morning. They remained recumbent for 1 hr prior to and during the entire testing interval. Simultaneous plasma volumes and red-cell masses were performed at the beginning of two consecutive hours. Blood samples were drawn every 15 min in the interim and for 1 hr after the second test series. Disposable plastic syringes were used for injecting the ^{125}IHSA and for preparing the dilute standards. Red cells were tagged with ^{51}Cr at room temperature in standard plastic bags. Aliquots of this solution were pipetted for standards. From these data, blood volumes, red-cell masses, plasma volumes, total body/peripheral venous hematocrits and disappearance curves for the albumin and tagged red cells were calculated. The technical variation of both the red-cell mass and plasma-volume technique was determined *in vitro*.

The average variation was 0.94% ± 3.34% for the plasma volume and 1.72% ± 2.92% for the red-cell mass and less for the blood volume. The technical variation of the tests performed *in vitro* were approximately 1%.

The importance of factors that influence the determinations will be discussed such as (1) plastic-syringe variability (is it necessary to weigh syringes?), (2) one independent blood sample vs. a disappearance curve, (3) the effect of too much ACD solution and too much ascorbic acid on red cells and (4) total body/peripheral venous hematocrit ratios.

Evaluation of the Lead-Filter Method of Calibrating ^{99m}Tc and ^{99}Mo BY WILLIAM K. OTTE, JR. AND RICHARD S. BENUA, Univ. of Texas Medical Branch, Galveston, Tex.

With the development of a sterile, pyrogen-free, sealed ^{99}Mo-^{99m}Tc generator, ^{99m}Tc compounds are now being used for a wide variety of nuclear-medicine procedures. The yield of ^{99m}Tc depends on the amount of original ^{99}Mo, the time elapsed since the last elution and the efficiency of removing the ^{99m}Tc from the generator. Therefore, a method of calibrating the ^{99m}Tc in the laboratory is absolutely essential. The method we are currently using to assay bulk quantities of ^{99m}Tc was first described by Murano and Nelp (*J. Nucl. Med.* 6:610, 1965). We have modified it slightly to include a single-channel analyzer. This technique is rapid, does not require the preparation of aliquots, uses relatively common electronic equipment, employs a relatively small amount of ^{57}Co and permits the measurement of possible contaminants of ^{99}Mo. The use of lead filters in this method prevents overloading of the scintillation crystal by the large amounts of ^{99m}Tc.

Calibration of the ^{99m}Tc is performed at a distance of 50 in. from the surface of a well-collimated scintillation crystal with a 1/16-in. lead filter placed in front of the crystal. The net counting rate of the ^{99m}Tc sample is then compared to 0.5–2.0 mc of ^{57}Co without the 1/16-in. lead filter, and an attenuation factor is used. Thus the amount of ^{99m}Tc can be calculated easily.

The sterile ^{99m}Tc is then checked for radioactive contamination with ^{99}Mo by counting the vial a second time with a 5/16-in. lead filter in front of the crystal and at a distance of 11 in. In this manner the 740- and 780-kev gammas of ^{99}Mo are easily detected while the ^{99m}Tc activity is essentially eliminated. Calibration of the sample is then made by comparing it with the 722-kev gammas of ^{131}I.

In attempting to evaluate the lead-filter method of calibrating ^{99m}Tc, a well-type ionization chamber was adjusted to give a direct reading for ^{57}Co. However, a correction factor is required when measuring ^{99m}Tc because of the x-rays produced from the internal conversion present in the ^{57}Co source. The x-rays will cause the ^{99m}Tc to read too low. The correction factor was determined by simultaneous comparison of various millicurie amounts obtained by the lead-filter method and the ionization-chamber method. Using this correction factor, we have observed less than a 2% variation between these two methods. We have also compared the results obtained by the two methods on several preassayed shipments of ^{99m}Tc, and the results of this comparison showed that the mean of the percent difference was less than 9%.

Several sources of ^{99}Mo of known activity have been obtained and their assay checked. Although the correspondence of our valves with the stated amounts

are less exact than with ^{99m}Tc, it has been sufficiently good for a screening procedure. The amount of ^{99}Mo contamination has been low in almost all of our elutions.

We believe that the lead-filter method is an easy, accurate and economical method of calibration of ^{99m}Tc and permits a reliable check for ^{99}Mo contamination.

Preparation and Uses of a New Technetium Sulfur Colloid BY JANET D. QUIRK, AND CHARLES K. HELLMAN, Madison General Hospital, Madison, Wis.

A method for making a simple, rapid stabilizer free colloid of ^{99m}Tc has been developed for reticulo-endothelial studies. The preparation of the colloid in the hospital radiopharmaceutical laboratory permits scans of liver, spleen and bone marrow in any hospital with standard scanning equipment. Colloid preparation time is 10 min with stability for 24 hr. Temperature control and a simple buffering process makes the omission of any type stabilizer possible.

Distribution studies of intravenous colloid revealed a high degree of radioactivity uptake by all organs of the reticulo-endothelial system in mice, rabbits, calves and man. Because of its low gamma radiation of 0.140 Mev and its short half-life of 6 hr, low tissue radiation makes it a safer colloid for clinical use. Absence of stabilizer or carrier also reduces risk. The results of scans of liver, spleen and bone marrow were of high resolution and required short waiting time or no patient set-up time at all. The doses used in all cases were low; 0.5–1.0 mc for spleen and liver and 2.5–4 mc for bone marrow. A posterior view of the spleen takes approximately 10 min and a combination scan of liver and spleen takes 35–45 min. The bone-marrow scans depend on the area scanned and the size of the patient, but were usually limited to extremities.

The use of this colloid permits an inexpensive preparation in the hospital which is readily available for patients and expands the use in R-E studies to bone marrow without significant cost or radiation hazard.

Renal Localization Prior to Biopsy Using ^{99m}Tc-Iron Complex and the Gamma Camera BY VIOLET STARK, Argonne Cancer Research Hospital, Univ. of Chicago, Chicago, Ill.

The development of ^{99m}Tc as an isotope scanning agent and the gamma scintillation camera as an imaging device has brought about many technical innovations in the University of Chicago Clinics.

One such innovation deals with kidney localization prior to renal biopsy and has been in use for the past 2 1/2 years with over 90% accuracy.

The scanning agent in question is the ^{99m}Tc iron-ascorbic acid complex which is taken up by the renal parenchymal tissue. The advantages of this particular agent are a short half-life, a high counting rate and a low radiation dose to the kidneys. ^{57}Co sources are used as position markers, and the kidneys are mapped out on the patient's back by moving the sources until they coincide with the renal borders. These points are then marked with ink.

Using the scintillation camera with its large field of view and shorter examination time, the study is done with the patient lying in the biopsy position and in most cases does not take longer than 1/2 hr to perform. Thus the method can be used on children and patients who are unable to lie still for long periods. In consequence, the doctor performing the biopsy is provided with a better picture of the location of the kidneys.

A complete description of the technique with examples will be presented.

In Vitro Study of Variables in Myocardial Scanning with ^{131}Cs BY JEANNINE M. TIEMAN, J. GILCHRIST AND H. N. WELLMAN, Univ. of Cincinnati Medical Center, Cincinnati, Ohio.

Because of the selective concentration of ^{131}Cs in the myocardium, the nuclide has been suggested as a promising radiopharmaceutical for detecting myocardial infarcts. However, scintigraphy of the heart with this agent is hampered by its inherent low-energy, 29.4 kev x-ray, resulting in considerable tissue absorption due to the structure of the chest wall. Furthermore, interpretation of myocardial scans is complicated by cardiac contraction and chest-wall respiratory movement.

An *in vitro* preparation was designed to simulate some of the above factors which interfere with myocardial scanning both singly and in combination. A heart phantom was constructed with chambers representing the myocardium which can be filled with a ^{131}Cs solution. Areas corresponding to the usual distribution of myocardial infarctions were filled with solid plastic to represent myocardial defects. An autopsy specimen, including the sternum, ribs and intercostal muscles overlying the heart, was used to study the effects of the chest wall. Scans were then performed to study the effects of the variables on visualization of myocardial infarcts in the following sequence:

1. the ^{131}Cs filled heart phantom alone with "infarcts,"
2. the effect of the stationary chest wall,
3. the effect of normal respiratory motion of the chest wall and
4. an intercomparison of scans with the high-resolution Brookhaven-type collimator with

standard collimators with regard to scan image, resolution, quality and counting rate.

The results of the effects of these variables will be discussed in addition to the advantages of using a high-resolution collimator for visualization. Although myocardial contraction could not be simulated, its probable effects are considered. Plans for future *in vivo* studies based on these results will be reviewed.

Segmental Pancreatic Scanning BY CYNTHIA A. WARD, HOWARD J. COHN AND STEWART R. REUTER, Wayne County General Hospital, Eloise, Mich.

Pancreatic scanning has not been of consistent value as a diagnostic procedure because of the frequently poor localization of the scanning agent. In an attempt to increase relative pancreatic uptake without increasing the amount of radionuclide given to the patient, ^{75}Se-selenomethionine was injected into the segmental arterial branches perfusing the pancreas following localization by arteriography. This method resulted in increased uptake with better definition in the areas of injection. It is hoped that the technique may improve the diagnostic accuracy of locating space-occupying lesions and possibly permit differentiation of normal and impaired function.

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Evaluation of a Simplified Schilling Test BY MARIAN COPPLER, LESLIE R. GRAMS, BERNADINE KOVALESKI AND JORGE FRANCO, O'Connor Hospital Medical Center, San Jose, Calif.

A test which would use blood levels instead of urinary excretion as an index of the intestinal absorption of vitamin B_{12} would have obvious advantages over the standard Schilling test. Since ^{57}Co became available, a number of investigators (Nelp 1963, McCurdy 1965 and Forshaw 1966) have advocated the use of plasma or serum counting instead of urinary excretion methods. In our studies we took a 10-min count of the radioactivity of 5 ml of heparinized plasma obtained 8 hr after the ingestion of the test dose, (0.5 μg of vitamin B_{12} labeled with 0.5 μc of ^{57}Co). Normal values in 25 controls ranged from 26–74 cpm/5 ml of plasma. In five patients with known PA the plasma counts were below 20. In one nonanemic patient with subacute combined degeneration syndrome the plasma counts were extremely low; they raised the normal range upon addition of intrinsic factor. Serum levels of vitamin B_{12} were extremely low. The clinical response to B_{12} therapy was satisfactory. Similar patterns of abnormality were found in three additional anemic patients with untreated pernicious anemia.

In our opinion the modification of the Schilling test as proposed by Forshaw and McCurdy is a simple and reliable way of measuring the intestinal absorption of vitamin B_{12}.

New Microanalytical Procedure for the Assay of Antistreptolysin-O using Radioisotopes BY F. H. DELAND, SISTER AUSTIN MARIE DONNELLAN AND HENRY N. WAGNER, JR., Johns Hopkins Medical Institutions, Baltimore, Md.

Antistreptolysin-O determination measures the response of the immune mechanism of the body to streptococcal infection. Current methods of assay involve the fixation of serum antibody by streptolysin after a suitable period of incubation. Excess (unbound) streptolysin is measured by the hemolysis of added erythrocytes. These methods have certain disadvantages. They require multiple pipetting manipulation. All control sera must be standardized relative to an international standard using indirect methods. Variations in susceptibility of erythrocytes to lysis can introduce up to 30% error.

F. H. Deland and Henry Wagner, Jr., described a macro-technique for the ASO determination using a single serum sample and two nonspecific controls. (*J. Clin. Invest.* **46**:1,049, 1967). This method quantitates the degree of hemolysis using red blood cells labeled with ^{51}Cr. We have now developed a microanalytical technique based on this principle. The procedure is as follows: A 1/90 dilution of the serum is incubated for 2 hr with Streptolysin-O. The control tubes contain buffer instead of serum. A standard volume (100 λ of a 40% suspension) of ^{51}Cr-labeled rabbit erythrocytes is then added, and 30 min later the amount of free radioactivity is measured.

The antistreptolysin-O titer is the ratio of the erythrocyte-bound activity in the unknown to the amount of free activity in the control.

Both the macro- and micro-techniques eliminate variation in erythrocyte susceptibility to lysis. It is possible by these methods to assay a range of values from 75 to 425 Todd units in a single serum sample. Further advantages are accuracy and simplicity. We are currently evaluating the clinical application of the micro-method.

Differentiation of Medical and Surgical Jaundice using ^{131}I-Rose Bengal 2 and 24-hr Liver Scan BY DAVID S. FISCHER, PETER VITALE AND LINDA BARKER, St. Peter's Hospital, Albany, N.Y.

The use of ^{131}I-rose bengal in liver function and scanning techniques is well known. At this laboratory jaundiced patients are being scanned at 2 and 24 hr to determine the excretion of this agent by the hepatic system. Preliminary results indicate that it is possible to differentiate medical from surgical jaundice using this technique.

One hundred microcuries of ^{131}I-rose bengal is administered by intravenous injection; 2 and 24 hr later routine scans are performed. In normal subjects and cases without mechanical obstruction, a scan at 24 hr reveals the bulk of the tagged rose bengal in the colon. In abnormal cases, mechanical obstruction in the cystic or common-bile duct can be determined by the location of the tagged rose bengal.

We have found this procedure to be a useful adjutant to the routine blood study of liver function. It also affords the physician an opportunity to visualize the results of the study as well as receive a written report. Examples of obstruction, cirrhosis and normal studies will be shown.

Organization of a Nuclear-Medicine Laboratory from the Technologists' Standpoint BY WILLIAM K. OTTE, JR., Univ. of Texas Medical Branch, Galveston, Tex.

The development and growth of nuclear-medicine laboratories in hospitals and clinics throughout the country during the past 15 years has been somewhat fantastic. Even more exciting is the increase in the number of different procedures available for the use of nuclear energy in the detection and treatment of diseases. In addition to the vast amount of biomedical information being obtained, tremendous strides are being made in electronics and nuclear technology. Due to the complexity of these advancements, the field of nuclear medicine is on the verge of becoming a medical specialty, not only for the physician but the technologist as well.

In order for the laboratory to function as efficiently as possible, proper care must be given to the organization of the laboratory — not only from the standpoint of the physician, the administrator and the hospital, but also from the standpoint of the technologist as well. Frequently, the organization of the day-to-day routine in the laboratory is left up to the technologist. The manner in which he shoulders this responsibility may often determine the success or failure of the operation.

The technologist's role is not only to perform the procedures but to work hand in hand with the physician in planning laboratory procedures. It is his responsibility to relieve the physician of many routine tasks. One area in which the assistance of the technologist is most valuable is keeping abreast of new methods and equipment, thereby ensuring maximum efficiency in the performance of procedures. The technologist should also be responsible for organizing the daily schedule, maintaining accurate records, assuring radiation safety in the laboratory and selecting and training technical personnel. The need for constant attention to all of these areas will be emphasized. Therefore the technologist has an important contribution to make to the planning and organization of the nuclear medicine laboratory.