

Hepatographic Patterns Following Rectal Administration of Radioiodine as seen in Chronic Liver Disease and Other Liver Disorders. M. Steinberg, I. L. Marner, and J. Waever Rasmussen. *Scand J Gastroenterol* 9:73-80, 1974.

The authors studied 38 patients: 10 normal controls, 18 with chronic liver diseases, 6 with liver metastasis, and 4 with other various liver abnormalities. After insuring that the rectal ampulla was empty, 10 ml of aqueous ^{131}I (30-50 μCi) was instilled high in the rectum and external monitoring of radioactivity was performed over the liver and the shoulder. Blood samples were obtained at 2, 4, 6, 10, 15, 20, and 30 min after instillation of the ^{131}I and two basic patterns were observed. Type 1, found in the normal control, indicated direct rectum-to-liver blood flow by way of the portal vein. Radioactivity in the liver increased faster than in the plasma and the liver-to-plasma ratio of activity decreased with time before a constant value was obtained at 20-30 min after instillation of the ^{131}I . In Type 2, radioactivity in plasma appeared to increase faster than the liver activity curve or at least simultaneously. The liver-to-plasma ratio increased with time before reaching a constant value. While the investigators found that Type 1, which included all normal controls, was characterized by rectum-to-liver blood flow via the portal vein, Type 2 was shown to be a combined portal and collateral blood flow that was found in 9 of 18 patients with chronic liver disease. Three patients with metastasis were classified as normal and two with metastasis were classified as variants of Type 1, whereas a Type 2 was found only in one case. The authors concluded that hepatography was useful for the demonstration of portal hypertension but not liver metastasis.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Technetium 99m Sulfur Colloid Spleen/Liver Ratio and Other Liver Function Tests in the Diagnosis of Cirrhosis. J. K. Goodrich and C. C. Harris. *South Med J* 68:5-12, 1975.

The results of six liver function tests and spleen-to-liver ratios of radionuclide concentration as reflected by densitometric analysis of the scans were evaluated in 50 patients with proven Laennec's cirrhosis. The mean densitometric determination of the spleen-to-liver ratio in normal individuals was 0.84 ± 0.26 s.d. and the spleen-to-liver ratio in those patients with Laennec's cirrhosis was 2.04 ± 0.59 s.d. An analysis of the liver function tests from the clinical chemistry laboratory demonstrated that no individual test was a wholly reliable indicator of Laennec's cirrhosis. None of the chemical tests separated cirrhosis from noncirrhosis as reliably as the spleen-to-liver ratio. Of the 50 proven cases of Laennec's cirrhosis, 41 (82%) had abnormal spleen-to-liver ratios. An abnormal spleen-to-liver ratio in combination with abnormal results from one or two of the clinical laboratory tests was relatively reliable in the detection of cirrhosis. Those tests that were most effective in complementing the spleen-to-liver ratio were serum albumin, serum bilirubin, and SGOT. The authors conclude that the

determination of the spleen-to-liver ratio of the radionuclide concentration extends the value of the liver scan.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Liver Scan and Carcinoma of the Breast. Henry F. Sears, Frederic H. Gerber, Donald L. Sturtz, and William J. Fouty. *Surg Gynecol Obstet* 140:409-411, 1975.

It has been believed that the detection of metastatic disease in the liver is significant in the determination of the appropriate therapy for a primary lesion. The liver is not the most frequent or earliest site of metastasis from carcinoma of the breast, but metastasis in the liver is relatively common enough to warrant presurgical or pretreatment evaluation. The authors reviewed 100 liver scans from patients with carcinoma of the breast that were part of an initial evaluation. Of the 100 patients studied in the liver scans, 95 demonstrated no evidence of hepatic disease. One study was considered to be questionable and four scans revealed abnormalities consistent with hepatic metastasis. Two of the four patients with abnormal liver scans had radical mastectomies and one of these patients had a subsequent normal scan. In one patient with a seemingly positive liver scan, surgery demonstrated benign lesions of the liver. In one of the four patients with a positive liver scan, metastatic lesions were found at postmortem examination. Thus in five seemingly positive liver scans from 100 patients with carcinoma of the breast, 4 were found to be false positives. During the same period 317 liver scans were performed on other patients who had known recurrent residual or metastatic disease of the liver. The information derived from the liver studies was found to be significant only in the group receiving therapy for the secondary tumor. The authors concluded that liver scan was not significant in the evaluation of the patient with carcinoma of the breast, prior to surgery.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Mechanism of Radioactive Iodine Uptake Depression Following Intravenous Urography. N. Coel, B. Talner, and H. Lang. *Br J Radiol* 48:146-147, 1975.

Thyroid uptake of ^{131}I is depressed following administration of iodinated contrast media such as that used for intravenous urography. The mechanism of the depression is not well documented but is presumably due to inorganic iodide. The authors studied the problem by the measurement of inorganic iodide in commercial contrast media. The agents tested were sodium iothalamate, sodium diatrizoate, meglumine and iothalamate, and meglumine-sodium diatrizoate. Trichloroacetic acid was added to these agents followed by sodium nitrite to convert iodide to iodine, I_2 . The iodine was extracted from the contrast media and then digested with chloric acid and the final sample titrated with sulfate (starch was used as an indicator). The contrast media had measurable inorganic iodide, as high as 4.6 mg/100 ml. The lowest

value was 0.2 mg/100 ml. They concluded that for a routine intravenous urogram the patient may receive between 1 and 4 mg of inorganic iodide. They noted that as little as 1-2 mg of ingested iodide will depress thyroidal radioiodine uptake. Since it has been previously observed that in vivo deiodination of contrast media occurs in the uremic patient, they postulate that it is possible that deiodination of these compounds may continue as long as they remain in the body. This time dependency of deiodination may explain the prolonged effect on the radioiodine uptake from myelographic contrast media that remains in the spinal canal.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

The Diagnostic Value of Renography in Suspected Obstruction of the Urinary Tract During Pregnancy. H. Bergstrom. *Acta Obstet Gynecol Scand* 54:65-70, 1975.

During normal pregnancy, high incidence of delay in renal excretion has been reported, beginning as early as the 20th week of gestation, increasing with the duration of the pregnancy and disappearing immediately after delivery. These findings appear to be related to dilation of the urinary tract. The author studied 93 pregnant women with ¹³¹I-Hippuran renography. Each patient had occasional or persistent pain in the abdominorenal region. Flank tenderness was found in 27 cases, microscopic hematuria in 19, macroscopic hematuria in 5, and positive urinary cultures in 14. Ten patients had initial fever and 9 women passed a renal calculus during pregnancy. Patients with toxemia of pregnancy or previous known chronic renal disease were not included. Renography was repeated in 29 patients who had significant delay in excretion of urine during pregnancy. The author found that the renographic pattern of excretion with clinically suspected obstruction of the urinary tract did not differ significantly from what would be expected in "normal" pregnancy on the basis of previous reports. He concluded that in pregnancy, renographic diagnosis of possible "pathologic" urinary tract obstruction is seriously impeded by the very high incidence of impaired excretion of a "physiologic" character, especially on the right side. The author felt that in pregnancy renography was of limited diagnostic value in cases of pain referable to the urinary tract and that its place in diagnosis was to exclude or confirm severe abnormality of excretory function.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Regional Cerebral Blood Flow and Intraventricular Pressure in Acute Head Injuries. C. Fieschi, N. Battistini, A. Beduschi, L. Bosselli, and M. Rossanda. *J Neural Neurosurg Psychiatry* 37:1378-1388, 1974.

Regional cerebral blood flow, jugular p_{CO₂} tension, and intraventricular pressure were measured in patients comatose from head injuries. These measurements were begun a few hours after the injury and repeated throughout the clinical course. Regional cerebral blood flow was determined by the ¹³³Xe intra-arterial injection method and data was obtained with eight external recording NaI scintillation probes. The authors found that initial cerebral blood flows (less than 12 hr after injury) were low (26 ml/100 gm/min). The low values were not explained by a low p_{CO₂} or reduced cerebral perfusion pressure. During the patients' hospital

stays, the course of regional cerebral blood flow fell into three prognostic groups. In three patients who died without regaining consciousness, the regional cerebral blood flow increased to high values between 36 and 96 hr before death with a persistently low p_{CO₂} that was interpreted as a reactive hyperemia. A second group of three patients died from extracerebral complications after regaining consciousness and in these patients the regional cerebral blood flow slowly increased toward normal after the second day without reactive hyperemia. In the third group of six patients who survived, regional cerebral blood flow returned to normal but these patients had had lesser cerebral blood flow impairment after injury as compared to the second group. Intraventricular pressure was recorded at rest and was low in eight patients. In four patients there was slight elevation of intraventricular pressure. Three of these patients died and the fourth had a right temporal hematoma.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Thyrotoxicosis Due to "Silent Thyroiditis." P. D. Papapetrou and I. M. D. Jackson. *Lancet* 1:361-363, 1975.

Three patients, two male, and one female who had symptoms of thyrotoxicosis associated with elevated blood levels of thyroid hormones, were studied. Two of the patients (males) did not have pain or swelling of the thyroid gland and the other patient did have a goiter but no discomfort in the neck. Thyrotoxicosis factitia was excluded. The subsequent course of their disease was typical of that of subacute thyroiditis. Over a period of several weeks the elevated serum thyroid hormone levels fell to normal, falling to low normal in one patient, suggesting chemical hypothyroidism. Since none of these patients presented with thyroid pain and two did not demonstrate evidence of swelling, all three could have been readily diagnosed as having hyperthyroidism. The correct diagnosis was suspected only after it was determined that the thyroid uptake of ¹³¹I was near normal. The authors conclude that thyroidal uptake of ¹³¹I is still an important procedure in the evaluation of thyroid disease.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

A Comparison of Phosphate Bone-Scanning Agents in Normal Subjects and Patients with Malignant Disease. D. I. Citrin, R. G. Bessent, F. B. Tuohy, S. T. Elms, E. McGinlay, W. R. Greig, and L. H. Blumgart. *Br J Radiol* 48:118-121, 1975.

In this study 29 patients with known bone metastases were scanned on two or three occasions, each time with a different compound: polyphosphate, pyrophosphate, or ethanehydroxide diphosphonate (EHDP). The scans were performed 4 hr after the administration of 10 mCi of the respective radiopharmaceutical. In 26 patients the ratio of isotope activity in the pathologic areas to that in the adjacent or contralateral bone was measured directly from the scintillation camera by means of a multichannel analyzer and was defined as "tumor-to-bone ratio." Tumor-to-bone ratios that were obtained with EHDP were significantly higher than those obtained with the other two compounds. Pyrophosphate yielded significantly higher ratios than one of the two polyphosphate compounds tested, but no higher than the other polyphosphate compound (different commercial source). The whole-body retention of EHDP was significantly lower than that of all other compounds. Pyrophos-

ABSTRACTS OF CURRENT LITERATURE

phate retention was significantly less than that found with one of the polyphosphate compounds, but not lower than the other one. They concluded that the lowered blood activity of EHDP contributed largely to the excellence of the scan with its low soft-tissue background. The more rapid whole-body excretion and lower radiation dose suggested that the EHDP was the current phosphate bone-scanning agent of choice.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Usefulness of ^{99m}Tc Pertechnetate in Periarthritis Nodosa. J. Abramovici, K. Samii, L. Vanhaelst, and M. H. Jonckheer. *Br Med J* 1: 373-374, 1975.

The authors report a case of periarthritis nodosa in which unusual radionuclidic images were obtained with ^{99m}Tc (10 mCi). The joints demonstrated little radioactive concentration but there was an intense patchy distribution in the muscles above and below the joint. The static images were followed by three dynamic studies on days 11, 25, and 76 after the first study. They found that after intravenous administration in six normal subjects the plateau of radioactivity over muscle was attained between 6 and 8 min. In the patient with periarthritis nodosa, plateaus were observed at 22, 16, and 7 min, respectively, for the sequence of dynamic studies. The time for equilibrium of the ^{99m}Tc was more than doubled at the onset of disease probably because of the inflammatory process involved in the angitis. With treatment, the dynamic studies returned to normal in about 11 weeks. The second study, performed 25 days after the static imaging, was still abnormal. Although the biopsy at that time was normal, the clinical state and increased erythrocyte sedimentation rate suggested that the disease was still active. The authors felt that the combination of dynamic scintigraphy provided an objective and valuable means of evaluating the extent of the disease and its response to treatment.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Incorporation of ^{125}I Fibrinogen in a Coronary Artery Thrombus, Detected in Vivo with a Scintillation Camera. C. B. Moschos, H. A. Oldewurtel, K. Lahiri, G. Manskopf, and T. J. Regan. *Cardiovasc Res* 8:715-720, 1974.

The authors undertook this study to determine if ^{125}I -fibrinogen would concentrate adequately for the detection of thrombus in coronary artery. Labeled canine fibrinogen was prepared with a specific activity of approximately 450 mCi/mg. In a series of dogs, coronary thrombosis was induced by a catheter electrode. The labeled fibrinogen was administered both systemically and at the site of thrombosis. Imaging was performed with a scintillation camera and pinhole collimator. When the ^{125}I -fibrinogen was administered systemically, images of the thrombus were not sharply demarcated from adjacent areas because the ^{125}I -fibrinogen lodged on the thrombus had a radioactivity level only three times that of circulating blood. When the ^{125}I fibrinogen was infused locally into the coronary artery during the formation of a thrombus in the artery, definition was markedly improved and the ratio of activity of the thrombus to that of circulating blood was 10-15:1. The major problem encountered in this study was adequately discriminating the

activity in the thrombus from the background activity of systemic blood in the underlying cardiac chambers. Possibilities of reduction of background by subtraction techniques during a systemic infusion of ^{125}I -fibrinogen might render this approach a useful method in clinical medicine. The authors point out that the time limits of incorporating the label into the thrombus must still be defined.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Survey of Xenon Contamination in a Clinical Laboratory. A. D. LeBlanc and P. C. Johnson. *Health Phys* 28:81-84, 1975.

The authors point out that the low solubility of xenon presents special problems in maintaining xenon in solution. Xenon injected into plastic and rubber materials and xenon leakage from syringes and multi-injection bottles were found to be a significant source of xenon laboratory contamination. Xenon inhaled by patients evolves as a respiratory gas making controlled disposal difficult. Measurement of ^{135}Xe at the point of release of the gas into the outside atmosphere demonstrated instantaneous dispersal of xenon with essentially undetectable levels. In contrast, release of xenon within a building can produce detectable levels for prolonged periods of time. The authors investigated the sources and extent of xenon contamination of air within a nuclear medicine laboratory. A ^{135}Xe monitor was fabricated with a sodium iodide detector system in contact with a glass jar that was designed for continuous sampling of air. The calibration factor was obtained in net counts/min/MPC where one MPC was equal to 10^{-5} $\mu\text{Ci}/\text{cm}^3$. The investigators found approximately 100 MPC peak level outside the hood where the dispenser was being assembled, 9-10 MPC from leaking spirometer hoses during the injection of xenon in saline solution, 15-17 MPC proximal to patients who had difficulty keeping their mouths closed around the mouthpiece during the ventilation study, and about the same level at the completion of the study when the technician emptied the spirometer too fast for the exhaust system to handle adequately. They determined that as the result of the rapid washout of ^{135}Xe from the laboratory, mean air concentration xenon did not exceed maximum permissible limits even after significant releases.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

A Multiwire Proportional Chamber Positron Camera: Initial Results. R. A. Reynolds, R. E. Snyder, and T. R. Overton. *Phys Med Biol* 20:136-141, 1975.

The authors describe a multiwire proportional chamber positron camera (MWPC) system developed in their laboratories and present the initial results. Two identical MWPCs, each with an active area of 25 cm^2 , were placed parallel to each other on either side of a source distribution. The gas mixture in the chambers was 93% argon and 7% CO_2 at atmospheric pressure. To compensate for the low detection efficiency of gas-filled detectors to high-energy gamma rays, the incoming annihilation radiation was converted to photoelectrons and Compton-scattered electrons by flat lead foils mounted in the entry and exit windows of the chamber. They measured two important parameters related to performance of a positron camera: spatial resolution and sensitivity. The lateral spatial resolution of their MWPC

system was 16 mm FWHM but the intrinsic resolution of the chambers was 2 mm. The primary reason for the loss of spatial resolution in their system was insufficient forward peaking of the distribution of electrons that left a converted plate. They found that with the background at 10% and a chamber separation of 25 cm, maximum coincidence counting rate was approximately 40 Hertz and the sensitivity about 20 $\mu\text{Ci-1/min}$. The detection efficiency of their chambers at the level of 511-keV gamma rays was 0.5%.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Mathematical Method to Utilize a Computer for Diagnosis of Site and Type of Intracerebral Mass Lesions. A. F. Stewart and L. A. Cala. *Br J Radiol* 48:97-100, 1975.

The authors have devised a mathematical process to utilize full clinical data (symptoms and signs) and the results of neuroradiologic procedures, EEGs, and isotope scanning in order to predict the site and pathologic process in patients presenting with disturbances of central nervous system function. This work is a further expansion and modification of the computer program described by DuBoulay and Price. A mean similarity index is calculated for each diagnosis that is obtained by dividing the combined similarity measure of the particular diagnosis by the number of cases with that diagnosis. Their computer program determines the six largest mean similarity index values in descending order. At this stage it is clear that positive basic results do provide more information as far as a diagnosis is concerned than do negative results. In this study 120 patients were considered to have intracerebral mass lesions. In ten cases that have been analyzed so far it was found that the method was very good for determining tumor group but less successful in determining the type of tumor and the site. When the data were given different weights, they provided more supportive evidence that positive results were more important than negative results. Further refinement is anticipated when more data have been accumulated. A mathematical description of the method is given in the appendix to this paper.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

The Fate of Labeled Bile Salts Introduced into the Colon. J. S. Morris and K. W. Heaton. *Scand J Gastroenterol* 9:33-39, 1974.

Nine patients had biliary tract surgery with insertion of a T-tube in the common bile duct for obstructive jaundice. At the time of surgery, ^{14}C -cholate, ^{14}C -taurocholate, and ^{14}C -deoxycholate had been injected into the colon. The sites of introduction were the transverse colon in six patients, the cecum in two, and the rectum in one. Unconjugated cholate and deoxycholate were absorbed more efficiently than

the conjugated bile salt taurocholate. Cholate and taurocholate were recovered largely in dehydroxylated form as conjugates of decholate. These studies indicated that dehydroxylation occurs readily in the colon and that the responsible organism is an anaerobic bacteria. It also appeared from this study that dehydroxylation was probably a slower process than the conjugation. The findings confirm that the human colon plays two roles in bile salts metabolism: bacterial dehydroxylation and absorption.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Radioimmunoassay of Gastrin. Fasting Serum Levels in Humans with Normal and High Gastric Acid Secretion. D. Gedde-Dahl. *Scand J Gastroenterol* 9:41-48, 1974.

The author studied 298 patients with a multitude of diseases but with normal or high pentagastrin-stimulated gastric acid secretion for fasting serum gastrin concentration. In 205 patients with normal gastrin acid secretion a mean of 65.9 pg/ml was found with a normal range of 10-150 pg/ml. There were no differences observed between sexes or age groups nor between those patients with normal acid secretions or those with high gastric secretions. Again no correlation was found between basal acid output or maximal acid output in fasting serum concentration. Patients with peptic ulcers did not demonstrate different levels of gastrin whereas those with *ulcus corporis ventriculi* had significantly higher fasting serum gastrin levels.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.

Alpha-Fetoprotein in Antenatal Diagnosis of Congenital Nephrosis. B. Kjessler, S. G. O. Johansson, M. Sherman, K. H. Gustavson, and G. Hultquist. *Lancet* 1:432-433, 1975.

Congenital nephrosis is a rare inheritable disease that is always fatal in early infancy and is inherited as an autosomal recessive trait. It is characterized by proteinuria, nephrotic serum protein electrophoretic pattern, extensive edema, and failure to thrive. Alpha-fetoprotein (AFP) was measured by radioimmunoassay and single radioimmunodiffusion. The authors found that the AFP levels were significantly elevated in the maternal serum and the amniotic fluid samples at 16 and 18 weeks of gestation in a woman with an apparently normal fetus but who had histologic evidence of congenital nephrosis of the Finnish type. The increased concentrations of AFP in early pregnancy with a living fetus were not specific for neural-tube defects.

FRANK H. DELAND, M.D.
University of Kentucky Medical Center
Lexington, Ky.