^{67}Ga Lung Scan. A. H. Niden, F. S. Mishkin, M. M. L. Khurana, and R. Pick. *JAMA* 237: 1206–1211, 1977.

Five patients with clinically proven pneumonia and 23 patients with clinically suspected pulmonary embolism and acute infiltrative changes on the chest X-ray, were studied to determine the value of gallium citrate (Ga-67) lung scan in differentiating embolic from inflammatory lung disease. All five patients with clinically proven pneumonia had ventilation-perfusion studies that showed corresponding deficits of ventilation and perfusion. All had increased concentration of gallium in the radiographically demonstrable areas of infiltration. In 11 patients without angiographically proven embolism, only seven had corresponding ventilation-perfusion defects compatible with inflammatory disease, indicated by the Ga-67 concentration. In the 12 patients with angiographically confirmed pulmonary embolic disease, six had corresponding ventilation-perfusion defects compatible with inflammatory disease. On the other hand, none of these patients had uptake of Ga-67 in the area of infiltration.

These findings demonstrate that gallium concentrates in areas of pulmonary infiltrate caused by pneumonitis but not in areas of infiltrate associated with embolism. Thus, gallium imaging is beneficial in the selection of patients with lung infiltrates who need angiography, since ventilation-perfusion lung scans are of limited value in these cases.

Evaluation of Routine Pre-Operative Bone Scintigraphy in Patients with Breast Cancer. R. M. J. M. Butzelaar, J. A. Vandongen, J. B. Vanderschoot, and B. J. G. Vanulden. *European J Cancer* 13: 19–22, 1977.

One hundred and ten patients with palpable breast tumors, clinically suspected to be carcinomas in stages T_1, T_2, N_0, and N_{1a}, were investigated by means of skeletal scans performed three hours after the intravenous administration of 15 mCi of Tc-99m diphosphonate. For every abnormal scan, extensive radiological examination was done and, whenever possible, a direct biopsy was performed. By histologic examination, 20 patients proved to have benign breast lesions. An abnormal scan was obtained in 14 of the remaining 90 patients, seven of which were equivocal with no radiological or clinical evidence of metastases. Of the remaining seven patients, metastases could be excluded as the reason for the abnormal scan. Thus, in only three cases (3.4%) was the scan positive, suggestive of bone metastases, and these lesions were not definitely proven by histology. Statistically, the chance of a "hot-spot" suggesting bone metastases on a radionuclide study could not exceed 8.4% with a confidence of 95%. The authors therefore decided to omit routine bone scanning in patients with breast carcinoma, stages T_1, T_2, N_0, N_{1a}.

Usefulness of Preoperative and Postoperative Tc-99m (Sn)-Pyrophosphate Scans in Patients with Ischemic and Valvular Heart Disease. A. Righett, R. A. Orourke, H. Schelbert, H. Henning, T. Hardarson, P. O. Daily, W. Ashburn, and J. Ross. *Am J Cardiol* 39: 43–49, 1977.

Myocardial imaging with Tc99m (Sn)-pyrophosphate was performed in 66 patients undergoing open-heart surgery in order to assess the usefulness of the procedure for detecting acute myocardial necrosis during and after the operations. Scans were obtained preoperatively in 45 patients and three to six days postoperatively in all patients. Electrocardiogram and serum samples for measuring myocardial isoenzyme of creatinekinase (mb ck) levels were obtained before and serially after cardiac surgery. Of the 46 patients undergoing myocardial revascularization, seven had definite new MI's by ECG and MB CK isoenzyme concentrations. Postoperative pyrophosphate scans were abnormal in six of the seven. In addition, six of the patients with possible MI by the other indicators had abnormal postoperative scans. Of the 20 patients undergoing aortic or mitral valve replacement or both, seven had possible postoperative MI by ECG and MB CK criteria. The scan was positive in two of the seven. All patients with a normal ECG and normal MB CK levels had normal pyrophosphate scans. Heavy mitral and aortic valve calcifications produced false positives in two of 22 preoperative scans performed on patients with valvular heart disease. Both scans were normal following valve replacement.

The authors conclude that the Tc-99m (Sn)-pyrophosphate scan is useful for detecting the occurrence of MI in patients undergoing cardiac surgery and, in conjunction with the ECG, helps to confirm or rule out the diagnosis of MI.

Limited Clinical Diagnostic Specificity of Technetium-99m Stannous Pyrophosphate Myocardial Imaging in Acute Myocardial Infarcton. M. Ahmad, J. P. Dubiel, K. W. Logan, T. A. Verdon, and R. H. Martin. *Am J Cardiol* 39: 50–54, 1977.

Myocardial imaging with Tc-99m stannous pyrophosphate was performed in 115 patients in order to assess the sensitivity and specificity of the procedure in the diagnosis of acute myocardial infarction (AMI). Positive scans were observed in all 48 patients with confirmed AMI. In 31 patients with transmural infarction, 29 exhibited localized uptake, and two showed diffuse uptake of the agent, as did 17 patients with subendocardial MI. Positive scans were also observed in 31 of 67 patients without clinical evidence of AMI. Diffusely positive uptakes were observed in all three patients with unstable angina pectoris, four of 13 patients who had undergone aortocoronary bypass surgery, each of four patients with congestive cardiomyopathy, and one patient studied one day after direct current cardioversion. Localized uptake was found in nine of ten patients with ventricular aneurysm and in three of 13 patients following aortocoronary bypass surgery.

The authors conclude that the data confirm previous reports of high sensitivity and low specificity of Tc-99m pyrophosphate imaging for acute myocardial infarction.

Autopsy Correlations of Computerized Tomography: Experience with 6,000 CT Scans. L. Jacobs, W. R. Kinket, and R. R. Heffner, Jr. *Neurology* 26: 1111–1118, 1976.

Correlations of computed tomographic findings and autopsy examinations were reported from a series of 6,000 CT scans on 4,850 patients. Of the 4,850 patients examined, 79 came to autopsy (1.6%) and the average time interval be-

tween CT scan and autopsy was 9.5 days. There was an excellent correlation between the cranial structures and spaces of six normal brains. The ventricles, however, appeared larger in the CT images than at post-mortem examination. During life, the ventricular borders appeared smoothly rounded, but at autopsy they were more sharply angulated. In four patients with obstructive hydrocephalus, a distinctive CT scan appearance was observed that differentiated this group from 12 cases of nonobstructive hydrocephalus both with and without cortical atrophy. Ten cases of cortical atrophy, occurring alone or in combination with nonobstructive hydrocephalus, presented a characteristic CT scan appearance that correlated with the atrophy demonstrated at autopsy. In 19 patients with cerebral infarctions, the abnormal areas appeared as regions of decreased density within a vascular distribution that correlated with infarcted areas found at autopsy. Cerebral hemorrhage (17 patients) demonstrated a distinctive CT scan appearance that easily differentiated hemorrhage from infarctions and, in general, from all other types of pathologic processes found in this autopsy correlation study. There were 11 false-negative scans (13.8%) that included brain stem infarction (4), brain stem hemorrhage (4), and small metastases (3). The brain stem was extremely difficult to analyze in detail because of its small size, its close proximity to high density bone, and the low density air in the mastoid sinuses. The cases of metastases not observed on the CT studies were small (<1 cm) and located at the periphery of the brain near the inner table of the skull. The overall accuracy of correctly identifying the pathology of the brain was 86.2% of CT scanning.

Abnormal CT-Scans in Migraine. N. T. Mathew, J. S. Meyer, K. M. A. Welch, and C. R. Neblett. *Headache* 16: 272–279, 1976.

Twenty-nine patients with migraine headache, as classified by accepted criteria (based on clinical profile, life history, and associated neurologic features), were studied by CT scans. Intravenous infusion of contrast medium was carried out in six patients. Of 29 patients, ten showed abnormalities, and all were women between the ages of 18 and 50 with an average duration of illness of 11.4 years. In all cases, the CT scans were performed between four and nine days after an acute attack of migraine. The cases included two common migraine, two classical migraine, two complicated migraine with features of vertebrobasilar migraine, and four hemiparetic migraine. Six patients demonstrated areas of low density ranging between +4 and +16 on the EMI scale in the parenchyma of cerebral hemispheres. In three cases, the lesions had disappeared when the CT scans were repeated after three months. Four cases showed moderate enlargement of the lateral ventricles, and cortical atrophy was observed in three. The incidence of complicated migraine was higher in patients who showed abnormalities on the scans (60%) than in those with normal scans (3 of 19).

It was suggested that the parenchymal low density areas on CT scans were the result of cerebral edema, but that repeated insults might lead to permanent changes in brain parenchyma, which might be recognizable as ventricular enlargement and cortical atrophy.

Intraventricular Isotope Encephalography: A Methodological Study. F. Jensen, R. Malmros, H. H. Hansen, and G. Gold. *Dan Med Bull* 24: 7–13, 1977.

Intraventricular isotope encephalography (IIE) was performed in 120 patients clinically suspected of hydrocephalic disorders or impaired reabsorption of CSF into the blood. With the patient under local anesthesia, a frontoparasagittal burr-hole opposite to the right coronal suture and 2–3 cm from the median line was made for the injection of 50 mCi I-131 albumin. All patients were given penicillin from 24 hr before to at least 24 hr after the study.

Imaging was performed on a gamma camera, and scintiphotos from frontal and lateral views were obtained at 1, 3, 6, 24, and 48 hr. From the retention curves, calculations were made of the half-life for the initial component of the curve, the 24-hr value, and the 50% value. In 29 patients with a history of cranial traumas, they found the scintiphotographic pattern to be normal in 13 and pathologic in 16. In 24 of the patients (ten with normal and 14 with pathologic IIE), pneumoencephalography had shown dilatation of the third ventricle in 13 of the patients with pathologic IIE. In nine of the ten patients with normal IIE, it showed a normal third ventricular diameter. All patients had dilitation of the lateral ventricles. They found IIE superior to lumbar isotope encephalography and isotope cisternography for three reasons: a) it is applicable to all types of hydrocephalus; b) it does not involve a greater risk than do the other methods; and c) it is based on accurate and highly reproducible results.

Regional Cerebral Blood Flow Alterations Remote from the Site of Intracranial Tumors. H. Endo, B. Larsen, and N. A. Lassen. *J Neurosurg* 46: 271–281, 1977.

The authors investigated regional cerebral blood flow (rCBF) in 12 patients with brain tumors, using the xenon-133 internal carotid injection method and a high resolution 254-channel multidetector gamma camera. In nine of the 12 cases, hyperemic regions with loss of autoregulation for CBF were seen in sites remote from the tumor. Six cases with frontal and posterior fossa mass lesions demonstrated hyperemia in the lower part of the temporo-occipital regions, and three cases with centroparietal mass lesions had hyperemia predominately in the frontal region. These characteristic rCBF abnormalities were primarily seen in areas that might be related to local tissue compression against unyielding anatomical structures, such as the falx and tentorium. It is likely that focal lactacidosis, which provides a chemical basis for post-hypoxic luxury perfusion, may be a major factor causing remote rCBF abnormalities in the compression site.

The authors suggest that remote hyperemia might be interpreted as a danger sign (a state of preherniation), since one patient with a meningioma over the frontal lobe deteriorated rather suddenly some hours after the rCBF study, suggesting hermiation.

Normal and Abnormal Upper Abdominal Venous Structures as Seen by Ultrasound. R. C. Sanders, M. R. Conrad, and R. I. White. *Am J Roentgenol* 128: 657–662, 1977.

The normal course, configuration and relationships of the portal vein and its branches, inferior vena cava, and the hepatic vein are described and their contiguities with neighboring structures, notably the pancreas, emphasized. The normal courses of the superior mesenteric, splenic, and left renal veins are described as well, and particular attention paid to their value in localizing portions of the pancreas. Anterior impingement upon the inferior vena cava may be produced by enlargement of the head of the pancreas, and posterior impressions may be caused by retroperitoneal lymphadenopathy. Persistent dilatation of the inferior vena cava and hepatic veins may be seen in con-

ditions generating increased pressure within the right atrium; significant tricuspid insufficiency is reflected in prominent pulsations within the vena cava, particularly well demonstrated with real-time imaging. Absence of reduction in size of the inferior vena cava with expiration is noted with increased right atrial pressure as well. Extension of a hypernephroma into the inferior vena cava has been previously documented by ultrasound, and the authors identify two additional cases. The differentiation between portal veins, hepatic veins, and dilated biliary ducts is reviewed.

Perinephric Abscess Aspiration Using Ultrasound Guidance. M. R. Conrad, R. C. Sanders, and A. D. Mascardo. *Am J Roentgenol* 128: 459–464, 1977.

A series of five cases is presented in which diagnostic percutaneous aspiration of a sonolucent perinephric collection was accomplished and proved of considerable value. Ultrasound was successful in guiding aspiration of one perinephric abscess in which fluoroscopic guidance was unsuccessful. In a second case, inspiratory and expiratory films during urography demonstrated normal renal mobility; ultrasonography identified a perinephric abscess. In another case, a sterile perinephric hematoma was identified and aspirated using ultrasound, thus obviating surgical intervention. The method is ideally suited to the demonstration of a cystic perinephric collection; other considerations such as hematoma or urinoma must be weighed in the light of the clinical situation. No complications were encountered, nor was evidence of seeding along the needle tract identified. The method is also of value if surgery is not immediately possible.

Ultrasonography in Pediatric Gynecology and Obstetrics. J. O. Haller, M. Schneider, E. G. Kassner, et al. *Am J Roentgenol* 128: 423–429, 1977.

A series of 144 pediatric patients is presented in which ultrasonography contributed significant positive or negative information to the diagnosis of amenorrhea, pelvic mass, and abnormal or ambiguous genitalia. Pregnancy remains the most frequent cause of amenorrhea; of 84 intrauterine pregnancies identified, five were unsuspected clinically. Both benign and malignant ovarian tumors, totaling 16 cases, presented the same sonographic picture as that described in adult disease. In several pseudohermaphrodites, ultrasonography was of value in identifying the presence or absence of internal portions of the female reproductive tract. Pelvic inflammatory disease in four patients presented a typical sonographic finding previously described. The method is of value to determine the presence or absence of ovarian tumors as a cause of precocious sexual development, representing albeit only 5% of girls so affected. The authors recommend that ultrasonography be performed as the first study in a patient with amenorrhea to avoid inadvertent irradiation of the fetus.

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BOOKS RECEIVED

The receipt of the following books is acknowledged:

Anatomy and Physiology for Radiographers and Radiologic Technicians. C. K. Warrick, 294 pp, illustrated. Chicago, Year Book Medical Publishers, 1976. $15.95.

1977 Year Book of Nuclear Medicine. James L. Quinn III, ed. 380 pp, illustrated. Chicago-London, Year Book Publishers, Inc., 1977. $24.00.

Nuclear Medicine: Volume 25. 1,269 Multiple Choice Questions and Referenced Explanatory Answers. Nathan A. Solomon, ed. 247 pp. Flushing, N.Y., Medical Examination Publishing, Inc., 1977. $15.00.

Nuclear Medicine Technology Review. Sheila Dworkin Rosenfield and Susan A. White. 250 pp, illustrated. Chicago-London, Year Book Medical Publishers, Inc., 1977. $13.95.

Annual Report: Programme Radiation Protection 1976. The Commission of the European Communities. 623 pp. Old Woking, Surrey, England, The Gresham Press, 1977.