

## ABSTRACTS OF CURRENT LITERATURE

**Detection of Prostatic Cancer by Solid-Phase Radioimmunoassay of Serum Prostatic Acid Phosphatase.** A. G. Foti, J. F. Cooper, H. Herschman, R. R. Malvaez. *New Eng J Med* 297: 1357-1361, 1977.

The authors produced prostatic phosphatase antiserum in New Zealand rabbits with purified prostatic acid phosphatase. To polypropylene tubes coated with antiserum, patient serum samples and I-125-labeled antigen are added, mixed, incubated for 45 hr at 4°C, aspirated, washed, and the remaining radioactivity measured in a gamma counter. Enzymatic assay of serum prostatic acid phosphatase was performed by the Bessey method. Sera from 113 patients with prostatic carcinoma were analyzed in conjunction with pathologic staging (Stage I—24 patients, Stage II—33 patients, Stage III—31 patients, and Stage IV—25 patients). In addition, sera were measured from 50 controls, 36 patients with benign prostatic hyperplasia, 83 with other cancers, 20 with gastrointestinal disorders, and 28 with total prostatectomies. With an upper limit set at 8.0 mg per ml, the radioimmunoassay diagnosed prostatic cancer in 33, 79, 71, and 92% of patients with Stage I, II, III, and IV disease, respectively. Comparably, the enzyme assayed demonstrated elevated serum levels in 12, 15, 29, and 60%, respectively. No false-positives were found with either test in normal controls. The radioimmunoassay test was positive in two patients with benign prostatic hyperplasia, in one patient after total prostatectomy, in nine patients with other carcinomas, and in one of the group with gastrointestinal disorders. In those patients with intracapsular prostatic carcinoma, the radioimmunoassay test was five times more sensitive than the enzyme test.

**Radioimmunoassay of Free Thyroid Hormone Concentrations in the Investigation of Thyroid Disease.** P. P. B. Yeo, M. Lewis, and D. C. Evered. *Clinical Endocrin* 6: 159-165, 1977.

The authors describe the results of thyroid hormone radioimmunoassay (RIA) on sera from 52 normal adults and 21 clinically overt hypothyroid and 21 hyperthyroid subjects. For each subject the total thyroxine concentration (TT4) and total triiodothyronone concentration (TT3) in whole serum were assayed. The corresponding non-protein bound fractions (FT4 and FT3) were performed on a serum dialysate. Mean TT4 and TT3 in the normal subjects were  $108 \pm 23$  and  $1.66 \pm 0.31$  nmole/l (mean  $\pm$  SD), whereas FT4 and FT3 were  $10.35 \pm 3.15$  and  $10.08 \pm 2.80$  pmole/l, respectively. Thus, the total  $T_4:T_3$  hormone ratio was 65:1, with free hormone ratio being unity. The mean percentage of free-to-total hormone was 0.01% for  $T_4$ , and 0.6% for  $T_3$ . There was no overlap of assay results in hyperthyroidism with those of the normal group from any of the four tests. The TT3 assay was confirmed as a highly sensitive index of hyperthyroidism. Hypothyroid subjects (all having elevated thyroid-stimulating hormone levels) demonstrated lower than normal range values for TT4, FT4, TT3, and FT3 (95%, 71.4%, 71.4%, and 23.8%, respectively). Similarly, the TT4 test had high diagnostic sensitivity in hypothyroidism. A significant direct and linear relationship existed between corresponding free and total fractions of both  $T_4$  and  $T_3$  when the group of 94 subjects is considered. The presence of normal FT3 and FT4 levels in a considerable number of symptomatic hypothyroids challenges an extant

belief that non-protein bound thyroid hormone levels are the low determinants of thyroid status. The authors concluded that FT4 and FT3 assays are not likely to play a major role in the routine investigation of thyroid disease. Such assays may prove useful, however, when evaluating patients with altered thyroxine-binding globulin capacity, in "sick euthyroids," and perhaps in those with marginal alteration of thyroid function.

**The Absorption of Vitamin B-12 after Subtotal Pancreatectomy in the Rat.** G. Von Der Lippe. *Scand J Gastroenterology* 11: 683-688, 1976.

Subtotal pancreatectomy was performed on fasting male rats to abolish external pancreatic secretion while preserving some endocrine function for the purpose of avoiding diet restriction and the administration of insulin. Following surgery, mild diabetes mellitus ensued and intestinal absorption of fat and nitrogen decreased. Four weeks after surgery, the fasting animals were fed Co-57-labeled cyanocobalamine (Co-57  $B_{12}$  containing 10 ng  $B_{12}$ ). After a 2-hr fast, food and water were allowed. Half of the administered dose of Co-57  $B_{12}$  was absorbed in both the pancreatectomized and the unoperated control animals. One hundred mg of pancreatic extract (containing intrinsic factor from rat gastric mucosal scrapings) given simultaneously with Co-57  $B_{12}$ , increased the Co-57  $B_{12}$  absorption to 129% of levels found in the unoperated control rats but had no influence on absorption in operated rats. When 300 mg pancreatic extract was used Co-57  $B_{12}$  absorption was reduced to 46% of control values in the unoperated control animals. Therefore, suboptimal pancreatic secretion produced no effect on absorption, although large amounts decreased absorption. The results suggested that for pancreatic stimulation of vitamin  $B_{12}$  absorption to occur, the presence of an optimal amount of pancreatic secretion in the GI tract was required. The author concluded that the mechanism for pancreatic stimulation of vitamin  $B_{12}$  absorption in the rat remains unknown.

**A Radioimmunoassay for Measurement of 3,3'-L-Diiodothyronine ( $T_2$ ).** S. Y. Wu, I. J. Chopra, Y. Nakamura, D. H. Solomon, and L. R. Bennett. *J Clin Endocrinol Metabol* 43: 682-685, 1976.

The authors described the clinical application of a radioimmunoassay (RIA) procedure for the determination of 3,3'-L-diiodothyronine ( $T_2$ ) in serum and amniotic fluid. Three ml of the test sample was extracted with ethanol and the mixture then centrifuged. After an aqueous solution of the supernate was lyophilized, the residual powder was dissolved in barbital buffer and centrifuged. A quantity of the latter supernate (representing 0.83 ml test sample) was used in the RIA. Of the thyroid hormone analogues, 3-L-monoiodothyronine alone competed with  $^{125}I$ - $T_2$  for antibody binding sites. The assay had a sensitivity of 1.2 ng/dl serum.  $T_2$  was detectable in the serum of all 44 normal subjects studied:  $7.6 \pm 2.4$  ng/dl (mean  $\pm$  SD). In patients with hypothyroidism, in pregnant women, and in patients with cirrhosis mean serum levels were in the normal range. Patients with hyperthyroidism demonstrated significantly higher levels:  $20.2 \pm 7.5$  ng/dl as did newborns:  $16.4 \pm 3.8$ . Measurement of  $T_2$  in amniotic fluid at 15-16 wk gestation ( $4.1 \pm 0.9$ ) were significantly lower than at term ( $10.9 \pm$

2.9). Following the administration of a single dose of either L-triiodothyronine ( $T_3$ ) or of L-reverse- $T_3$ , a measurable rise in  $T_2$  was observed. The authors concluded that  $T_2$ , whose physiological importance is unknown at this time, was a normal component of human serum and amniotic fluid. The peripheral metabolism of  $T_3$  and reverse- $T_3$  to form  $T_2$  contributed significantly to levels of  $T_2$  detected.

**Bleomycin Serum Pharmacokinetics as Determined by a Radioimmunoassay and a Microbiologic Assay in a Patient with Compromised Renal Function.** S. T. Crooke, F. Luft, A. Broughton, J. Strong, K. Casson, and L. Einhorn. *Cancer* 39: 1430-1434, 1977.

This study reports the pharmacokinetics of bleomycin in doses of 7.5 units/m<sup>2</sup> in a 24-year-old male who had an orchiectomy and retroperitoneal node dissection for embryonal cell testicular carcinoma. Serum and plasma bleomycin was assayed by existing microbiologic assay and radioimmunoassay (RIA). Between microbiologic and RIA measurements of serum bleomycin a linear relationship existed for all drug concentrations. No difference between serum and plasma bleomycin levels was observed as measured by either assay technique. Recurrent disease with pulmonary metastases was also treated with vinblastine and cis-dichlorodiammineplatinum (II), (cis-DDP). Toxic acute tubular necrosis compatible with cis-DDP renal damage occurred in the patient and frequent hemodialyses were required, however, bleomycin is not dialyzable. When the patient's serum creatinine was 6.4 mg/dl and creatinine clearance was 10.7 ml/min, bleomycin had a biologic half-life of 21 hr in serum. A week later, serum creatinine had decreased to 3 mg/dl, creatinine clearance had improved to 15.2 ml/min, and the drug biologic half-life had decreased to 13 hr. In patients with normal renal function, the biologic half-life of bleomycin in serum is 15-60 min, but when renal function is reduced serum levels of bleomycin are markedly prolonged. Even during renal failure, however, serum bleomycin decreased to very low levels within 72 hr after an i.v. administration. According to the authors, the results observed in one patient suggest that bleomycin can be given safely on a weekly schedule without accumulation of the drug in serum.

**Regional Myocardial Perfusion Abnormalities on Xenon-133 Imaging in Patients with Angina Pectoris and Normal Coronary Arteries.** O. Korhola, M. Valle, M. H. Frick, M. Wiljasalo, and E. Riihimaki. *Am J Cardiol* 39: 355-359, 1977.

Twenty patients (12 male and eight female) with angina pectoris, abnormal exercise electrocardiograms, and normal coronary angiography were studied with semiselective Xe-133 injections of 30-50 mCi in saline solution administered through a Paulin catheter using an Elema-Schönander Cisl injector at a pressure of 5 atmospheres. The myocardial images were recorded at a rate of 1/sec on a 64 × 64 matrix and simultaneously recorded on a magnetic tape. Ten patients (Group I) exhibited localized perfusion defects and the other 10 (Group II) a homogeneous uptake of the radionuclide. Group I was characterized by more past myocardial infarctions and, significantly, by male preponderance ( $P < 0.001$ ).

Computer analysis of regional Xe-133 washout curves revealed that every patient in Group I had a reduced flow rate in the area of the perfusion defect. A comparison of this group with 26 patients who had similar abnormal scintigrams but coronary artery obstruction revealed that myocardial perfusion was 16-18% greater in the group with normal coronary arteries.

The presence of localized perfusion defects in this series suggests that some patients have regionally ischemic areas, a finding that has a bearing on lactate values in this syndrome. Some, but not all, patients have exhibited abnormal myocardial lactate metabolism under the stress of atrial pacing or isoproterenol infusion.

**Myocardial Imaging in a Patient with Reproducible Variant Angina.** P. R. McLaughlin, P. W. Doherty, R. P. Martin, M. L. Goris, and D. C. Harrison. *Am J Cardiol* 39: 126-129, 1977.

The authors reported a unique case of variant angina pectoris with reproducible chest pain and S-T segment elevation in the immediate postexercise period in a patient with normal coronary arteries. After injection of 2 mCi of thallium-201, the patient was evaluated in the resting-fasting stage and on two other occasions after maximal exercise with the patient seated upright, using a Godart electrical graded cycle ergometer to an endpoint of fatigue. The background-subtracted Tl-201 study at rest showed a posterior-inferior defect in the lateral view and the images recorded after the chest pain demonstrated marked perfusion defects in the inferior segment of the left ventricle in the territory perfused by the right coronary artery in addition to the perfusion defect seen at rest. Coronary arteriograms obtained after administering 0.25 mg of ergonovine maleate showed a spasm in the midthird of the right coronary artery with occlusion of approximately 60% of the lumen. Coronary arteriograms and left ventriculogram obtained before administration of ergonovine maleate were normal.

**Use of a Computer-based Postal Questionnaire for the Detection of Hypothyroidism following Radioiodine Therapy for Thyrotoxicosis.** L. C. Harrison, J. D. Buckley, and F. I. R. Martin. *Australian and New Zealand J Med* 7: 27-31, 1977.

A computer-processed postal questionnaire was developed for the purpose of detecting hypothyroidism in patients previously treated for thyrotoxicosis with radioiodine. Two hundred thirty-two patients treated at the Royal Melbourne Hospital between 4 and 10 yr previously participated. Response to symptomatic questions was a sensitive discriminator of hypothyroidism, and allowed 80% of euthyroid patients to be excluded from further assessment. Questions of general well-being and energy, voice and skin changes, showed the highest sensitivity and specificity. The incidence of hypothyroidism 6-8 yr after I-131 therapy was 20-35% and was related to the initial goiter size for a given dose of I-131. The postal questionnaire appears valuable as a tool for the detection of hypothyroidism following I-131 therapy.

**Absorbed Doses in Marrow During I-131 Therapy.** A. C. McEwan. *Brit J Radiol* 50: 329-331, 1977.

Recently published data were used to reevaluate the absorbed doses to red marrow and blood from I-131 therapy. Uncertainties in the calculations were discussed, and comparisons were made with previously published dose estimates. The mean dose to red marrow was estimated to be 0.36 rads/mCi, and the mean blood dose was 0.52 rads/mCi in euthyroid patients. The estimated doses were 0.59 rads/mCi and 0.84 rads/mCi for hyperthyroid patients. These estimates were lower than previously reported values.

**Computer Subtraction of CT Scans in Clinical Use and Calculation of Regional Cerebral Blood Volume.** E. Zilkha, G. Ladurner,

L. D. Liff, L. E. Claveria, J. Marshall, and G. H. Doubleday. *Brit J Radiol* 49: 330-334, 1976.

A computerized-subtraction technique has been described to measure regional cerebral blood volume (rCBV) using the EMI Scanner in 13 patients including four with normal EMI-scan, two patients with transient ischemic attack and normal scan, four cases of multi-infarct dementia, two patients with completed strokes, and one with a tumor.

Sodium iothalamate was injected to increase the absorption of x-rays in the cerebral circulation, and the EMI numbers before and after the injection were required. The outlines of the patients' skulls obtained from the two EMI-scans were displaced and superimposed. The computer then subtracted the pre-injection from the post-injection scans and the resultant subtracted pictures were displaced on the screen.

There were significant regional differences in CBV, with values in the frontal and temporal regions lower than the mean hemisphere value ( $4.9 \pm 0.7$ ) and values in the occipital region higher. The left hemisphere showed a significantly higher CBV when compared with the right. Measurements of CBV in the cortex showed no regional variation, but the mean cortical value of  $6.0 \pm 1.8$  was significantly higher than the hemisphere mean.

The greatest advantage of this method of rCBV estimation is its versatility. There is the possibility of measuring blood volume in a small localized area (as in a tumor), in a distinct type of tissue (cortex or thalamus), or in larger areas (lobes and even hemispheres).

**Spectrum Subtraction Technique for Minimizing Extracranial Influence on Cerebral Blood Flow Measurements by  $^{133}\text{Xe}$  Inhalation.** J. Risberg, B. P. Uzzell, and W. D. Obrist. *Stroke* 8: 380-382, 1977.

The Xe-133 inhalation method of estimating regional cerebral blood flow (rCBF) suffers from errors caused by radionuclide contamination from slow clearing extracerebral tissues. Subtraction of the 31 keV X-ray counts from the 81 keV gamma ray counts has been suggested as a means of correcting for the effect of the contamination on clearance curves. The present study compares rCBF measurements based on the total Xe-133 spectrum (X-ray plus gamma) with those obtained using the subtracted spectrum. Twenty young controls were studied using a two-compartment model for analysis of the curves. The subtracted spectrum data gave substantially higher estimates of blood flow for the slow compartment. This result, along with a shift in the relative weights of the two compartments, indicated a decreased contribution of slow tissue components, consistent with a reduction in extracerebral contamination. Blood flow values obtained from the subtracted data showed good agreement with the intracarotid method. A drawback of the subtraction technique is the relatively high activity of Xe-133 required for adequate signal-to-noise ratios.

**Medical Imaging by NMR.** P. Mansfield and A. A. Maudsley. *Brit J Radiol* 50: 188-194, 1977.

A new method of application of nuclear magnetic resonance (NMR) to in vivo cross-sectional imaging was presented. The method uses selective irradiation of the specimen in switched magnetic field gradients to measure the mobile proton spin density directly, line by line across the specimen cross-section. Previous methods formed two dimensional cross-sectional images by reconstruction from a number of projection absorption profiles. Cross-sectional images of a finger were shown in which the spatial resolu-

tion was sufficient to identify digital arteries and nerves. Images of excised rat specimen of normal and malignant tissue were also shown. The method appears promising for cross-sectional imaging of the head and limbs. Respiratory motion in other parts of the body may be troublesome. Good image contrast between malignant and normal tissues appears achievable.

**Ultrasonic Evaluation of the Obstructed Duplex Kidney.** V. J. Mascarello, E. H. Smith, G. F. Carrera, et al. *Am J Roentgenol* 129: 113-120, 1977.

The authors presented four cases in which urography demonstrated a nonfunctioning upper pole of one kidney. Further evaluation by ultrasonography clearly delineated the mass effect as cystic. Although the diagnosis of obstructed duplex kidney is frequently suggested by the urogram, demonstration of the upper pole region as cystic has proved to be of considerable diagnostic value. In addition, ultrasonic guidance was used for performance of puncture in conjunction with antegrade pyelography to confirm both the nature of the mass and the course of the ureter. The dilated ureter as well as a ureterocele of the ectopically inserted ureter were identified by ultrasound. The longitudinal sections were particularly valuable because the localized hydronephrosis as well as the normal lower pole calyceal system could be imaged on a single section. Since the remaining renal cortex of the upper pole may be insufficient to provide a diagnostic picture on i.v. urogram in 50% of patients with hydronephrosis, ultrasound has proved of considerable value in further delineating the nature of the nonfunctioning upper pole mass.

**The Relationship of Computed Tomography and Ultrasonography in Diagnosis of Abdominal Disease.** H. H. Holm, E. H. Smith, and R. J. Bartrum. *J Clin Ultrasound* 5: 230-237, 1977.

The authors compared the efficacy of CT scanning and ultrasonography by a number of parameters. In ultrasonography the success of the scan is highly operator-dependent, whereas the CT scan is essentially fully automated. It may be quite difficult to image the slender patient (with little internal fat) satisfactorily on a CT scan. Objective quantitation of differences in tissue character, possible with the CT scan, is not available with ultrasonography. Dynamic imaging is now used clinically in ultrasound but is not available with the CT scanner. For the parameters of space requirements, examination time, the need for the administration of contrast material, and requirements for patient cooperation during the examination, ultrasonography has the advantage over computed tomography. With respect to spatial resolution, the authors believe that neither scanning method has demonstrated superiority. The authors summarize that routine imaging for delineation of abdominal problems is best accomplished by ultrasonography, and that CT scanning, at this point, should be reserved for those situations in which ultrasonography fails to provide adequate clinical information.

**Improvement in the Ultrasonic Evaluation of the Gallbladder by Using the Left Lateral Decubitus Position.** S. C. Foster and S. M. McLaughlin. *J Clin Ultrasound* 5: 253-256, 1977.

The authors advocate the use of the left lateral decubitus position for evaluation of the gallbladder with the ultrasonic scans performed at  $90^\circ$  to the right costal margin. A gallbladder invisible on the supine scans may frequently be imaged in the lateral decubitus position, and equivocal find-

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ings in the routine projections may become quite clear with this technique. For example, a sonic shadow suggestive of cholelithiasis on the supine scan was obtained in one patient; the lateral decubitus view clearly demonstrated the stones themselves. A caution is noted with respect to two potentially confusing structures; the kidney is differentiated from the gallbladder by virtue of its calyceal echoes and venous structures by their branching nature. Additional advantages of the left lateral decubitus position include displacement of colonic gas to the hepatic flexure allowing transmission of the beam in the region of the gallbladder, and shift of the gallbladder from beneath the rib cage to an inferior and medial position that permits better visualization of the entire organ.

**Chronic Ectopic Pregnancy: Ultrasonic Diagnosis.** W. G. Rogers, M. Shaub, and R. Wilson. *J Clin Ultrasound* 5: 257-260, 1977.

The classic description of ultrasonic findings in ectopic pregnancy includes diffuse homogeneous uterine echoes, uterine enlargement, and the absence of a definable intrauterine pregnancy. Extrauterine findings include the demonstration of an ectopic gestational sac or fetal parts, a

cystic appearing irregular mass containing internal echoes, and evidence of hemoperitoneum, free or loculated. The authors presented several cases in which the ultrasonographic manifestations of chronic ectopic pregnancy differed from the classic description. These findings included: a) an ill-defined pelvic mass inseparable from the uterus that tended to mimic such entities as leiomyomata; and b) complex masses with cystic and solid components that may result from a combination of hemorrhage, inflammatory reaction, and adherence of adjacent structures. The authors concluded that obliteration of normal pelvic structures, cystic areas with or without free abdominal or pelvic fluid, and an ill-defined pelvic mass with irregular echo patterns should prompt consideration of ectopic pregnancy.

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## BOOKS RECEIVED

The receipt of the following books is acknowledged:

*Use of Ionizing Radiation and Radionuclides on Human Beings for Medical Research, Training, and Nonmedical Purposes. Report of a WHO Expert Committee.* World Health Organization Technical Report Series, 1977 No. 611 (ISBN 92 4 120611 4). 39 pp. Geneva, World Health Organization, 1977. Sw: fr. 6.-, US: \$2.40. (French, Russian, and Spanish editions in preparation.)

*Biological Implications of Metals in the Environment.* Proceedings of the Fifteenth Hanford Life Sciences Symposium at Richland, Washington, September 29-October 1, 1975, Harvey Drucker and Raymond E. Wildung, Chairmen. (ERDA Symposium Series; 42) "CONF-750929." 692 pp, illustrated. Springfield, Virginia, National Technical Information Center, Energy Research and Development Administration, 1977. US: \$10.50. Outside the USA and the North American Continent: \$21.00.

*Breast Carcinoma. The Radiologist's Expanded Role.* Wende Westinghouse Logan, M.D. 378 pp, illustrated. New York, John Wiley & Sons, Inc., 1977. \$32.00.

*Physicians' Desk Reference for Radiology and Nuclear Medicine.* Leonard M. Freeman, M.D. and M. Donald Blaufox, M.D., Editorial Consultants. 203 pp, illustrated. Oradell, N.J., Medical Economics Company, 1977. \$11.00.