A Strategy for Thyroid Function Tests. K. E. Britton, Valerie Quinn, and B. L. Brown. *Br Med J* 3: 350–352, 1975.

The authors state that the variety and complexity of laboratory tests applicable to any individual diagnostic problem have made the interaction between clinician and clinical laboratory increasingly inefficient. The use of "decision-aiding ranges" may permit the laboratory to automatically decide from the result of one screening test, what test should be performed next. A decision-aiding range of free thyroxine index (FTI) values was determined. Clinical categories included definitely hypothyroid, borderline low, definitely euthyroid, borderline high, and definitely hyperthyroid, and each category had its numerical range of FTI values. In patients with borderline-low results, serum thyroid-stimulating hormone (TSH) was determined; in those with borderline-high results, triiodothyronine (T_3) was evaluated. Decision-aiding ranges were generated for these specific tests in turn. In this situation the FTI was a "screening test" and serum TSH and total T_3 were the more specific tests. The clinical uncertainty in the diagnosis of borderline hypothyroidism and borderline hyperthyroidism among 1569 consecutive tests for thyroid function amounted to 47%. By means of the FTI screening, the uncertainty was reduced to 22%, and with specific tests determined by the decision-aiding ranges the uncertainty fell below 2%.

Changes in Cerebral Blood Flow during a Migraine Attack. J. W. Norris, V. C. Hachinski, and P. W. Cooper. *Br Med J* 3: 676–677, 1975.

Regional cerebral bloodflow studies during a typical prodromal phase of a migraine attack in a young woman showed a global decrease of cerebral blood flow in the field of the carotid artery. During the subsequent headache phase of the same attack, repeat studies showed that hemispheric blood flow had increased considerably. Ergotamine tartrate, administered intramuscularly, brought definite relief of symptoms but no change in cerebral blood flow. Carotid angiography performed immediately afterwards showed retrograde filling of the proximal portion of the basilar artery, suggesting that the brain stem was the site of hyperperfusion. These findings illustrate certain features underlying both the pathophysiology of migraine and its response to ergotamine preparations.

^{125}I-Labeled Fibrinogen Scanning. J. Hirsh and A. S. Gallus. *JAMA* 233: 970–973, 1975.

Venous thrombosis is often asymptomatic in patients developing major pulmonary embolism. When used expectantly, ^{125}I-fibrinogen scanning is a very sensitive method for detecting subclinical leg-vein thrombi. Fibrinogen scanning is less useful for the diagnosis of established venous thrombosis, but it is valuable for detecting extension of venographically diagnosed calf-vein thrombosis. The technique is safe if the fibrinogen is obtained from carefully screened donors.

The limitations of the method include its inability to distinguish between superficial and deep venous thrombi and its sensitivity to fibrin in hematoma and inflammatory exudates. Although the results agree closely with those of phlebography, scanning seems less reliable for detecting femoral rather than calf vein thrombi and it is insensitive to thrombi above the inguinal ligament. Screening for these major thrombi may be improved by combining fibrinogen scanning with impedance plethysmography or ultrasonic examination.

Clinical Appraisal of a New Lyophilized ^{99m}Tc Stannous Pyrophosphate Kit for Skeletal Imaging. Norman S. Anderton, Linda Monroe, and John A. Burdine. *Am J Roentgenol Radium Ther Nucl Med* 124: 625–629, 1975.

The authors report their evaluation of a commercially available ^{99m}Tc-stannous pyrophosphate (Sn-PyP) kit. The TechneScan PyP kit (Mallinckrodt, Inc., St. Louis, Mo.) was compared with ^{85}Sr, the radionuclide which yields the highest lesion-to-background ratio of all commonly used radiopharmaceuticals for skeletal visualization. Strontium-85 scans were performed in a group of 20 patients who had abnormal ^{99m}Tc-Sn-PyP studies. The ^{99m}Tc-Sn-PyP scans were normal in six patients, abnormal in 14, and questionable in none. Corresponding data for the ^{85}Sr studies were 4, 13, and 3. Of the questionable ^{85}Sr scans, two were equivocally positive and one was equivocally negative. The definition of bone structure was found to be fair or poor in all of the ^{85}Sr scans. Definition was described as good in 79% of the ^{99m}Tc-Sn-PyP studies, and fair to poor in the remainder. Nonosseous activity was a problem in one-quarter of the subjects receiving ^{85}Sr and interfered with interpretation in three patients. The urinary bladder was visualized in 80% of the ^{99m}Tc-Sn-PyP scans, which interfered with the interpretation. Lesion-to-bone contrast was good in 62% and 85% of the ^{85}Sr and ^{99m}Tc-Sn-PyP groups, respectively; the remainder were listed as fair or poor. The authors conclude that ^{99m}Tc-Sn-PyP is probably more effective than ^{85}Sr in the detection of bone lesions.

Is "T4 Toxicosis" a Normal Biochemical Finding in Elderly Women? K. E. Britton, Valerie Quinn, Sheila Ellis, and A. C. D. Cayley. *Lancet* 2: 141–142, 1975.

A group of thyroid function tests was performed in young, middle-aged, and elderly women. The free thyroxine index (FT_4I) was calculated by dividing total serum thyroxine concentration by the corresponding triiodothyronine (T_3) uptake value. A free triiodothyronine index (FT_3I) was calculated by dividing total serum T_3 concentration by the corresponding T_3 uptake value. The normal FT_4I range in women aged 15–65 years was 68.3 ± 26.8 ng/ml (mean ± 1 s.d.), compared with 90.2 ± 43.8 ng/ml in women over 65 years of age. This mean increase was statistically significant ($p < 0.05$). There is a recognized fall in total T_3 concentration with increasing age. The FT_3I values were

1484 ± 734 pg/ml in women aged 15–65 years and 1040 ± 483 in women over 65 ($p < 0.05$).

The authors describe individual clinical data on clinically euthyroid women over 60 years of age who had elevated FT_4I but normal FT_3I. When an elevated FT_4I is discovered in an elderly woman with cardiac disease, caution must be used in interpreting the finding as an indication of cardiac disease from thyrotoxicosis. In such cases, the laboratory determination of total or free (i.e., not bound to protein) T_3 may be useful in confirming euthyroidism.

Digital Processing of Images from a Zone Plate Camera. B. C. Wilson, R. P. Parker, and D. R. Dance. *Phys Med Biol* 20: 757–770, 1975.

The authors describe a method for the digital decoding of data obtained with a scintillation camera fitted with a zone plate aperture. Taking a line source as the object, computer simulations were used to examine the effects of noise, solid angle variations, shape of detector, and detector resolution. Various methods for dealing with these effects were considered. Both a line source and a thyroid phantom containing ^{99m}Tc were well reconstructed by means of an Anger scintillation camera and a zone plate aperture. The behavior of the system with regard to resolution, signal-to-noise ratio, and tomographic capability were also discussed.

A Radioreceptor Assay for Follicle Stimulating Hormone. K. W. Cheng. *J Clin Endocrinol Metab* 41: 581–589, 1975.

The author reports the development and use of a radioreceptor assay (RRA) for human follicle-stimulating hormone (hFSH). The iodination of hFSH was performed by a modified lactoperoxidase method. The receptors employed were partially purified membranes from bovine testes. A mixture of 0.1 ml of hFSH standard (or a patient sample), ^{125}I-hFSH, and the plasma membrane receptors was incubated at room temperature for 20 hr. The reaction was stopped by adding cold Tris–HCl buffer. The mixture was then centrifuged, the supernatant liquid decanted, and the remaining precipitate counted in a gamma spectrometer. A standard curve was generated for quantitating the hFSH levels in serum samples. The method showed a sensitivity of 2.5 ng/ml hFSH in human serum. Precision was determined by using 5 and 50 ng/ml hFSH assays: the within-assay coefficient of variation was less than ±10% and the inter-assay coefficient of variation was less than ±15%. A slight reduction of ^{125}I-hFSH uptake by the receptors was caused by luteinizing hormone (LH) and thyroid-stimulating hormone; no competition was seen with insulin, hGH, hCG, prolactin, and subunits of LH. A comparison of results from radioimmunoassay (RIA) and this radioreceptor assay for hFSH levels in serum samples from men and pre- and postmenopausal women yielded a mean RIA/RRA ratio of 1.08. The hFSH level in nine human anterior pituitary lobes was found to be 108.6 ± 59.5 ng/mg and 63.0 ± 32.9 ng/mg by RIA and RRA, respectively.

The Effect of Fenfluramine on Insulin Binding and on Basal and Insulin Stimulated Oxidation of 1-^{14}C-Glucose by Human Adipose Tissue. L. C. Harrison, A. King-Roach, F. I. R. Martin, and R. A. Melick. *Postgrad Med J* 51: 110–114, 1975.

Samples of human abdominal subcutaneous adipose tissue and fat cells isolated from this tissue were incubated with ^{125}I-insulin and various concentrations of fenfluramine, an anorectic agent. Specific binding of ^{125}I-insulin to both tissue and cells was completely inhibited by fenfluramine over the narrow concentration range used therapeutically. Fenfluramine was found to have no direct effect on the insulin molecule itself, indicating that the inhibitory effect was not due to degradation of ^{125}I-insulin. When human insulin standards were incubated with guinea-pig anti-insulin antibody and ^{125}I-insulin in a standard radioimmunoassay procedure, fenfluramine over a wide range of concentrations had no effect on the ratio of bound to total insulin. Adipose tissue was incubated at 37°C with ^{14}C-1-glucose in the presence of varying concentrations of fenfluramine; at therapeutic concentrations, the anorectic agent enhanced conversion of labeled glucose into $^{14}CO_2$ by the adipose tissue. Fenfluramine also enhanced the usual stimulation of ^{14}C-1-glucose conversion to $^{14}CO_2$ by adipose tissue in the presence of insulin. The authors conclude that fenfluramine mimics the action of insulin on glucose oxidation by adipose tissue while it reduces specific insulin binding. An action of fenfluramine at the insulin receptor could be responsible for its insulin-like behavior.

Detection of Cannabis Products in Urine by Radioimmunoassay. Vincent Marks, Derrick Teale, and Denys Fry. *Br Med J* 3: 348–349, 1975.

A radioimmunoassay was developed for tetrahydrocannabinol cross-reacting cannabinoids (THC-CRC) in urine. The assay was specific for the closed three-ring cannabinoid nucleus. This had the advantage of not distinguishing between the structurally similar Δ^9-THC and 11-hydroxy-THC: the former (a pharmacologically active natural cannabinoid) is excreted in the urine in minute amounts, whereas the latter is its major metabolite and is equally psychoactive. The authors evaluated 475 urine specimens with this method. Of the patients tested 82 had been hospitalized and no drug abuse was suspected. Although this group of patients had been receiving a wide range of medications, no true-positive or false-positive THC-CRC values were detected. Between one-third and two-thirds of the urine samples from drug-abuse treatment clinics yielded positive results for THC-CRC. The overall range of THC-CRC values was from "nil" to over 1500 μg/liter.

The authors emphasize that caution must be used in interpretation of these urine data: the concentration of a drug in the urine is a poor indication of the amount actually ingested. A low urinary concentration could result from a large dose taken a long time previously or from a small dose consumed a short time earlier. The authors conclude that cannabis intake among users may vary over a very large range.

Evaluation of Solitary Cold Thyroid Nodules by Echography and Thermography. O. H. Clark, F. S. Greenspan, G. C. Coggs, and L. Goldman. *Am J Surg* 130: 206–211, 1975.

Most medical centers report the incidence of carcinoma in a thyroid nodule at surgery to be between 5% and 35%. In this prospective study, preoperation evaluation of thyroid nodules was performed by means of echography and thermography. In a series of 61 patients with solitary cold thyroid nodules (found by clinical examination and ^{131}I scanning), 27 were confirmed by histologic examination and two additional patients by aspiration.

The ultrasonographic image of a thyroid cyst characteristically has a thin discrete posterior wall with good through-transmission of sound; the cyst is itself sonolucent. Poor resolution of lesions less than 1 cm in diameter and non-visualization of lesions in the retrosternal area present diag-

nostic problems with most current instruments. The resolution of some of the newer units is 1–2 mm.

Of 13 patients thought to have cystic lesions by echography, ten (77%) subsequently proved to be fluid-filled at surgery or by aspiration and three proved to be solid masses. All 13 lesions diagnosed as solid by echography were confirmed at surgery. The overall diagnostic accuracy of echography was 82% and that of thermography was 57%. Previous studies report the diagnostic accuracy of echography to be 92% and 98%. When echography and thermography were used correctly, all solid and cystic nodules were differentiated. Benign and malignant solid tumors of the thyroid gland were not distinguished by ultrasonography.

B-Mode Scanning of the Infant Brain; A New Approach. Case Report—Craniopharyngioma. A. Shkolnik. *J Clin Ultrasound* 3: 229–231, 1975.

The author presents a case report of a 3-month-old infant with cephalomegaly, bulging fontanelles, and suprasellar calcification. Carotid contrast angiography revealed bilateral hydrocephalus, and radionuclide brain imaging showed an abnormal concentration corresponding to the suprasellar calcification observed on the roentgenograph.

Contact B-mode scanning was performed from the nasofrontal suture to the anterior fontanelle, sagittal suture, and posterior fontanelle. Coronal scans were obtained in similar fashion. The suprasellar mass produced predictably strong echoes from its calcified portions and showed a cystic component that extended posteriorly and superiorly, slightly to the left of midline. A prominent echo pattern along the clivus suggested extension in this region as well. Surgery confirmed the cystic portion of the tumor in the region of the third ventricle, as well as extension along the clivus.

The thinness of the infant cranial bones coupled with patency of the fontanelles made B-mode ultrasonography a feasible adjunctive technique. Since ultrasonography differentiates cystic from solid masses, the method can be employed to add information to the existing diagnostic modalities.

A Spectral Approach to Ultrasonic Scattering from Human Tissue: Methods, Objectives and Backscattering Measurements. R. C. Chivers and C. R. Hill. *Phys Med Biol* 20: 799–815, 1975.

The authors discuss the growing need for information on the physical processes involved in the propagation of ultrasound in tissue. The ultrasonic diagnostic process is considered in terms of a wave phenomenon, and the limitations and advantages of frequency spectral analysis as a means of obtaining information are briefly discussed. A description is given of an experimental measuring system that uses a time gate to select echoes scattered from a particular volume in soft tissue. Attenuation by overlying tissue and the influence of the acceptance-gate duration on the frequency spectra are considered. Backscattering measurements were performed on formalin-fixed samples of human fat, liver, and spleen in the frequency range 0.5–5.0 MHz. The results suggest that the approach may have diagnostic value in the characterization of structure in specific volumes of soft human tissues.

The Current Status of Ophthalmic B-Scan Ultrasonography. L. Fisher. *J Clin Ultrasound* 3: 219–223, 1975.

Diagnostic ophthalmic ultrasonography utilizes relatively high frequencies (5–25 MHz) compared with those used in other parts of the body. The anterior portions of the globe, including the cornea, anterior chamber, and iris–lens diaphragm, are well visualized by means of a water bath; contact methods lack sufficient resolution for this portion of the eye.

Vitreous hemorrhage or inflammatory reaction produce echogenic areas in the normally sonolucent vitreous. Elevated intraocular tumors (malignant melanoma being the most common primary malignant neoplasm in the eye) present a variety of ultrasonographic patterns: by the contact technique, tissue density is evaluated by attenuation of the signal and observation of change in surface and internal echoes with decreasing signal gain. Metastatic lesions tend to be flatter and are associated with more extensive secondary retinal detachments. Complete retinal detachment typically presents as a V-shaped density with its apex at the optic nerve head.

Diagnosis of intraocular foreign bodies, both radiolucent and radio-opaque, is possible; magnetic and nonmagnetic materials can also be localized and differentiated ultrasonographically. Complete shadowing of the structures behind the ultrasonically dense foreign body is characteristic. The dislocated normal or cataractous lens produces a readily identifiable pattern in the vitreous cavity. Ultrasonography is also applicable to the detection and characterization of intraorbital tumors outside the globe; mucocele and orbital hemangioma are cases in point.

Ultrasonography and Possible Ruptured Abdominal Aorta Aneurysms. J. C. McGregor, J. G. Pollack, and H. C. Anton. *Br Med J* 3: 78, 1975.

In four patients who presented with possible ruptured abdominal aortic aneurysm, ultrasonographic examination confirmed the diagnosis in three and excluded it in the fourth. Ultrasonograms show the aneurysm as a localized widening of the aortic lumen and the accompanying hematoma as a relatively echo-free area. In view of the extremely grave clinical condition of patients who present with this entity and the hazards of angiography, ultrasonography is recommended as a rapid noninvasive screening procedure.

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