jaundice are probably ascribable to the liver; the changes in TGB in uncontrolled diabetes are more difficult to explain. Low TGB concentrations are a recognized feature of major illness (5) and rapid declines in it may be provoked by gamma-globulin infusions (6), but we are unaware of previous reports of such changes in diabetes mellitus. Distillation of circulating proteins by fluid-replacement therapy seems unlikely because in patient T's, the patient for whom the changes were most marked, the data on total protein concentration (ranging from 59 to 42 g/L in four samples) would not account for the changes in free T4 and total T4. We can only speculate that TGB is being sequestered extravascularly, possibly in the liver. The relevance of these findings to the clinical application of free T4 assays is that an unexpected result should lead the laboratory to enquire about associated illness. For example, in poorly controlled diabetes mellitus, therapy with heparin, and hepbaticary disease the result with this kit will be low. Clearly, users need to know the effect of major illnesses on results obtained by the methodology used in their particular laboratory. By demanding a thyrotropin assay, the strategic approach (7, 8) will exclude primary hypothyroidism, but the thyrotoxic diabetic remains a problem (9).

Major illness can produce changes in the concentrations of thyroid hormone in the circulation that do not represent the typical operation of the pituitary/thyroid axis, so thyroid-function tests should be deferred to the convalescent phase of major illness (10).

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Direct Radioimmunoassay and Gas Chromatography–Mass Spectrometry Compared for Determination of Melatonin in Plasma

To the Editor:

We recently reported a direct radioimmunoassay (RIA) for melatonin in human plasma (1). Results correlated well with those by an established RIA involving solvent extraction, a different antibody, and a different separation procedure. We now report results of a comparison with a previously described gas chromatographic–mass spectrometric (GCMS) method (2).

Venous blood samples for analysis were collected in tubes containing lithium heparin, centrifuged (1500 × g, 15 min, 4°C), and the plasma was stored frozen at −20°C until assayed. Twelve samples, six obtained at 1400 hours and six at 2400 hours, were assayed by both methods (1, 2). Four of the 1400-h samples had unetectable melatonin (<20 pmol/L) by the RIA, and these results were therefore excluded from the comparison. Regression analysis of the remaining eight values gave the equation y = 0.83x + 32 pmol/L (where y is RIA), not significantly different from the equation y = x. The correlation coefficient was 0.96.

The results of this comparison, albeit a small-scale one, strengthen our belief that our direct RIA for melatonin (1) validly measures melatonin in human plasma.
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Analysis of Thororast Granuloma by Scanning Auger Microscopy

To the Editor:

With scanning auger microscopy (SAM), a relatively new technique, one can obtain information on the chemical composition and bonding within the first few atomic layers of the surface in a solid material; and one can analyze for trace elements without damaging the specimen, a rare capability among measurement techniques. So far, the usefulness of the method has been demonstrated in fields such as plastics and metallurgy. Here, a clinical diagnostic problem suitable for SAM analysis is briefly illustrated in a study of a bone-biopsy specimen.

A 62-year-old woman was admitted for evaluation of pain and swelling of the left thigh and calf. The left lower limb was cyanotic and edematous, and Homans' sign was elicited. Except for a high erythrocyte sedimentation rate, results of routine laboratory tests were normal or within the normal range. Intravenous therapy with heparin was started. After disappearance of the edema, a hard mass, 12 cm in its largest diameter, was palpated in the inguinal region. A plain radiograph revealed an irregular, high-density opacity; phlebography exhibited complete obstruction of the femoral vein with formation of a rich collateral venous system.

Trans-sartor arteriography demonstrated occlusion of the femoral artery at the site of the opacity. A biopsy specimen of the mass showed dense, collagenous, mostly hyalinized, almost acellular connective tissue containing a multitude of deposits of various sizes and shapes, composed of a finely granular metallic material. The patient recalled that at the age of 27 arteriography was attempted but was unsatisfactory because of extravasation of the contrast material.

Electron spectroscopic analysis was used to definitely identify the nature of the granular deposits. The spectrum was obtained with a Perkin-Elmer Physical Electronics Model 590 Scanning Auger Microprobe in a vacuum of 10⁻¹⁰ Torr. The expanded scan in the 320–360 eV region highlights a typical high-resolution thorium 4f auger spectrum (Figure 1). Metallic thorium is identified by the characteristic 4f⁰ and 4f₂ electron doublet at 342.25 and 330.05 electron volts, respectively, and thorium oxide at 345 and 336 eV. As seen in the figure, the doublet at 347 and 336.5 eV clearly demonstrates thorium oxide (Thororast) in the granular material.

Chemical determination of foreign materials of unknown nature in tissue sections is often nearly impossible, and is a frustrating task. The technique described here clearly illustrates the usefulness of SAM for studying trace elements in biopsy specimens at the molecular level.

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A Simple Kinetic Assay for Plasma Ammonia, Suitable for Small Laboratories

To the Editor:

We reported (1) a fixed-time, kinetic enzymic reaction-rate procedure for directly determining plasma ammonia with a centrifugal analyzer, with NADPH as cofactor. The method is automated, rapid, and suitable for batch-wise analyses. However, a centrifugal analyzer may not be available, or, if it is, providing "stat" service with it may not be feasible. For these reasons, we have developed a simple kinetic procedure for use with a routine spectrophotometer such as the Gilford 102 System (2) that we used here.

The test can usually be completed within 5 min. We believe that this semi-automated, relatively simple method for plasma ammonia can replace the cumbersome manual procedure and make ammonia determination accessible to every laboratory.

Briefly, the procedure is as follows (details in ref. 1): Reconstitute BMC Ammonia Reagent Set (cat. no. 125887, UV method; Boehringer Mannheim, Indianapolis, IN 46250) containing Reagents 1 (NADPH), 2 (buffer/substrate), and 3 (glutamate dehydrogenase >750 kU/L) as instructed by the manufacturer. Prepare ammonia standards as described previously (1). Prepare working standards of ammonia at 143 and 57 μmol/L by diluting the CAP nitrogen standard with ammonia-free de-ionized, distilled water. Reagents, sample volumes, and Gilford 102 settings are as follows:

Spectrophotometer

Wavelength, 340 nm
Sample vol, 100 μL
Reagent vol, 500 μL
Temp, 37 °C