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Comparison of the Automated Random Access Immunoassay Analysers, ACS-180 (Ciba Corning) and AIA-1200 (Tosoh)

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Summary: Two random access immunoassay analysers, the ACS-180 (Ciba Corning) and the AIA-1200 (Tosoh Corp.) were compared with respect to performance and user-friendliness. Precision studies revealed an almost equal intra-assay variation coefficient, but day-to-day reproducibility was better on the AIA-1200. Recovery of dilution series of tumour markers was too high with the ACS-180. Both systems were free from carry-over effects, on account of the extra wash step in the ACS-180 (for thyrotropin, carcinoembryonic antigen and human chorionic gonadotropin) and the separate pipetting tip in the AIA-1200. Reagent stability is better in the AIA-1200 than in the ACS-180. The AIA-1200 is more user-friendly and produces a higher throughput than the ACS-180 in daily routine operation (92 results/hour vs. 78 results/hour).

Introduction

Automation of patient blood analysis is becoming more and more inevitable. Automation is not only required in routine clinical chemistry and haematology, but can also confer great benefit in the immunoassay laboratory (1). Because of their around-the-clock availability, automated systems should be easy to handle and as flexible as possible to enable all laboratory personnel to work with them at all times. Availability of random access together with the use of primary tubes, using bar code labelling and connection with the administrative host computer, plays a crucial role in the automation process.

In our view, there are at present (May 1993) two important random access automated immunoassay analysers available in the Netherlands, the ACS-180 (Ciba Corning Diagnostics, Melfield, MA, USA) and the AIA-1200 (Tosoh Corporation, Tokyo, Japan, represented in Europe by Eurogenetics, Tessenderlo, Belgium). Because of the need for immunoassay automation in our laboratory, and in the context of the above-mentioned requirements, we decided to evaluate these two analysers. For this purpose we monitored precision, recovery, and the correlation between both systems and the routine method.

The user-friendliness, and ease-of-use were evaluated as well as the way in which both instruments behaved during three days of simulated heavy routine activity, without jeopardizing the quality of the results produced.

Materials and Methods

Apparatus

ACS-180

The instrument is a bench-top system (2, 3). Reagents and samples are placed in disposable plastic cuvettes, which are automatically loaded onto a linear process track. The reaction takes place at 37 °C. Samples are placed in a 60-position tray for loading patient samples in primary tubes, calibrators, controls and diluents. Close to the tray is a laser barcode reader and digital diluter. A second tray provides a carrier for 26 reagent bottles, sufficient for up to 13 different analytes at one time. When a cuvette reaches the end of the 7.5 minute incubation time, separation and washing of the solid phase, consisting of magnetic particles, is carried out. The particles are then resuspended in 300 µl of flash reagent 1, containing 5 g/l hydrogen peroxide in 0.1 mol/l nitric acid. Flash reagent 2, containing 0.25 mol/l sodium hydroxide is then injected into the cuvette, which results in oxidation of the acridinium ester tracer and emission of photons (430 nm). The end-point intensity of the emission is measured over a 5 second interval. The counts are used to calculate analyte concentration in the sample using a stored master curve.