However the length of the unattended time is not equal to the sum of unattended times. The length of the unattended time depends on the laboratory organization. In some laboratories, workers can use short periods of walkaway time to leave the analyzer unattended while they perform other tasks. The maximum labor productivity (maximum RPI) is obtained when all walkaway periods can be used to perform other tasks. Therefore, theoretically even periods of <1 s are usable to leave the analyzer unattended and perform other tasks.

Finally, Quinn et al. state that the variability in RPI calculations was also highlighted when we simulated the effect of automated sample handling systems on RPI. They stated that we neglected to mention whether processing time and reportable results were corrected for reflex and autodilution testing and that this is relevant when using an automated sampling system because specimens would be transported away from the instrument after sampling. This means in practice, according to Quinn et al., that all instruments would require “either (a) operator intervention to locate specimens that required reflex or dilution testing, or (b) the instrument to wait for the automated system to return the samples for testing”. They also state that in this case, efficiency analysis would favor instruments with larger reagent storage capacities, greater reagent stability, and efficient waste management capabilities. However, they neglect to mention another possible option in which the instrument does not have to transport the specimen away to perform reflex and autodilution testing: the analyzer has the possibility of holding the samples until all assays, including reflex and autodilution testing, have been performed. In all situations (with or without the automated sampling system, with or without the ability of the analyzer to hold the specimen on board until all tests have been performed), the total number of reportable results is the same, and in all situations, the influence of larger reagent storage capacities, greater reagent stability, and efficient waste management capabilities on the efficiency analysis is equal.

In conclusion, we evaluated the efficiency and productivity of immunoassay analyzers by application of the same standardized workload protocol. The RPI values, as a result of this evaluation, depend on instrument characteristics and are useful when performing an independent comparison of the efficiency and productivity of immunoassay analyzers.

Reference

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Enhanced Time-saving Extraction Procedure for the Analysis of Fecal Fat by Fourier Transform Infrared Spectroscopy

To the Editor:

Recently, we presented an improved procedure for the determination of fecal fat by means of Fourier transform infrared spectroscopy (1). This method can be used in laboratories equipped with a mid-infrared spectrometer. With this method, fecal fat was extracted from stool samples with petroleum ether-ethanol. After extraction, the petroleum ether was dried, and the fatty acids were redissolved in chloroform before measurement. Because the extraction procedure in the previously described analytical method (1) was still rather time-consuming, we replaced the petroleum ether-ethanol extraction with a single chloroform extraction.

In the new extraction procedure, 1 g of homogenized stool sample was suspended in 2.5 mL of water. After the suspension was mixed, 0.5 mL of 12 mol/L HCl and 2.0 mL of chloroform (gradient grade) were added, and the sample was shaken vigorously for 10 min. At this stage, the samples were either stored at −20 °C or analyzed immediately. The extract was centrifuged for 5 min at 3000 g at room temperature, after which the organic layer was transferred to a transmission cell (pathlength, 0.05 mm) with calcium fluoride crystals.

Spectra (n = 111) were scanned in the mid-infrared region from 4000 to 650 cm⁻¹ with a Perkin-Elmer Spectrum 2000 spectrometer (Perkin-Elmer). Calibration was performed with a mixture of stearic and palmitic acid (65:35, by weight) ranging from 0 to 150 g/kg (1). For both the “old” and the “new” extraction procedures, the spectroscopic band at 2855 cm⁻¹ (C—H symmetric stretch vibration) was used to calculate the amount of fat (g/kg). Passing and Bablok regression was performed for method agreement.

The results obtained by the two methods showed good agreement (r = 0.991; Fig. 1). By Passing and Bablok regression, the slope was 1.055 (range, 1.026–1.088), the intercept was 0.241 (range, 0.181–0.296), and the standard deviation of the residuals (S_yx) was 0.365. For the new extraction procedure, the intra- and interassay imprecision (as the CVs; n = 10) was 4.0% and 5.0%, respectively, for a stool sample containing 43 g/kg fat. For a sample with 26 g/kg fat, the intra- and interassay CVs were 3.9% and 10%, respectively. Recovery of the stearic-palmitic acid (65:35, by weight) calibrator added to stool was >95% with the new extraction procedure. The majority of fecal fat is composed mainly of C₁₆:0 and C₁₈:0 free fatty acids, which can be extracted easily from the stool with the new extraction method. The reduction in analysis time gained in this way is ~2.5 h for a series of 10 stools.

We conclude that the new simplified extraction procedure for fecal fat determination gives comparable results to the old extraction procedure and allows considerable reduction in
analysis time, use of chemicals, and technical equipment.

Reference

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Serum and Plasma Samples for ACS:Systems Cardiac Markers

To The Editor:
The ACS:180® immunoassay system (Bayer Diagnostics) is an automated random analyzer that uses acridinium ester-based chemiluminescence detection. The architecture of the cardiac marker assays is a heterologous sandwich format, using monoclonal anti-marker antibody immobilized onto paramagnetic particles (capture) and polyclonal goat anti-human myoglobin, creatine kinase MB isoenzyme (CK-MB), or cardiac troponin I (cTnI) antibody labeled with acridinium ester (detector). Its processing time (~20 min if the analyzer is in standby mode) and precision (overall CV <5%) make the system suitable for emergency use (1). However, optimal performance of an assay system for cardiac markers depends not only on the instrument’s analysis time, but also on factors that affect the overall turnaround time, including the preanalytical steps necessary to prepare the sample (2). The use of plasma samples eliminates the extra time needed for clotting, thereby reducing the overall preanalytical time, but there can be significant differences between serum and plasma concentrations of cardiac markers (3). The aim of this study was to validate the possible use of two different anticoagulants (lithium heparinate and EDTA, tripotassium salt) for cardiac marker determinations on the ACS:180 immunoassay system.

Twenty-five patients with acute myocardial infarction were studied. All gave informed consent. We collected three separate tubes (Sarstedt) to prepare serum, heparin plasma, and EDTA plasma in random order during one phlebotomy. ACS myoglobin, CK-MB, and cTnI assays were performed in duplicate on each of the 25 samples. The mean results on plasma samples were compared with the paired serum values, and the significance of the differences was evaluated (Wilcoxon rank-sum test). The results obtained are shown in Fig. 1. ACS myoglobin concentrations in serum [median myoglobin value (range), 79 μg/L (24–607 μg/L)] and heparinized plasma [76 μg/L (24–588 μg/L)] showed no statistically significant difference (P = 0.0799). For plasma EDTA, the assay showed a mean change in myoglobin concentration [73 μg/L (25–601 μg/L)] of ~3.5% compared with paired serum samples (P = 0.0006). Results for serum [median cTnI value (range), 11.3 μg/L (0.4–43.6 μg/L)] and heparinized plasma [11.7 μg/L (0.4–47.7 μg/L)] also were not statistically different with the ACS cTnI test (P = 0.704). On the other hand, for plasma EDTA, this test showed a mean change in cTnI concentration [14.7 μg/L (0.5–49.3 μg/L)] of 30% compared with paired serum samples (P <0.0001). Finally, CK-MB values for heparin [35 μg/L (5–252 μg/L)] and EDTA samples [34 μg/L (5–243 μg/L)] averaged 18.6% and 14.6%, respectively, higher than those in serum samples [29 μg/L (4–199 μg/L); P <0.0001].

Although in our study serum and heparinized plasma results for myoglobin and cTnI showed no statistical differences, we cannot definitively conclude that there is no difference in results between these sample types because the statistical power of the performed tests was too low (0.38 for myoglobin and 0.05 for cTnI) to provide an acceptable degree of certainty. Furthermore, although there may not be a substantial overall mean difference in results obtained using heparinized plasma vs serum...