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Determinations of Ionized Calcium with the Orion SS-20 and AMT Electrion Auto Compared

To the Editor:

Recently, in a Letter to the Editor, Fuchs and McIntosh (1) suggested that a side-by-side comparative investigation of ionized calcium as determined with the Orion SS-20 and Auto AMT Electrion would be the only valid procedure for resolving the discussions concerning aerobic and anaerobic sample handling when ionized calcium (Ca++) is being measured in serum (1, 2). Here, we report such a comparison.

Blood was collected from normal staff members by venipuncture without stasis into a plain evacuated blood-collection tube and centrifuged at 2000 rpm. After 30 min, two samples of serum were removed with 1-ml tuberculin syringes. All air was expelled from the syringes, and the syringes were capped. The pH of one sample was measured with a pH/Blood Gas Analyzer IL 813 (instrumentation Laboratory, Lexington, Mass. 02173); ionized calcium was measured in the other anaerobic sample with the Orion SS-20. The remaining serum was not treated anaerobically, and was used to determine the ionized calcium with the AMT-Auto-Electrion system (Applied Medical Technology, Menlo Park, Calif. 94025). The tube was filled as completely as possible, leaving no more than 0.5 ml of air (vacuum) over the blood. This resulted in only insignificant loss of CO2 from the sample. As discussed by Schwartz (2) the AMT-Auto-Electrion system equilibrates aerobically handled serum with 5.22% CO2, and measures pH and ionized calcium. It then calculates ionized Ca++ to a given pH (set by the operator) according to an algorithm developed by Schwartz. Our values presented here are based on the pH measured with the IL Model 813, which is the pH under which the measurement in the Orion SS-20 was performed. The Orion SS-20 is equipped with one calcium ion-selective electrode, whereas the AMT Electrion has two electrodes and values are printed out individually for both. The data therefore allowed a comparison between two AMT electrodes as well as the comparison between the Orion and the AMT electrodes. In 16 normal subjects, ages 26–56 years, nine men and seven women, with pH ranging from 7.31 to 7.45, we found with the SS-20 electrode 41.3 ± 1.2 (1 SD) mg of ionized calcium per liter (note: the measurements were made in duplicate). The values for the 2 Electron electrodes were 42.3 ± 1 and 42.1 ± 1.2 mg/liter, respectively. There is no significant difference among any of these three groups.

Another question raised by Fuchs and McIntosh (1) concerns the validity of the serum used in the AMT Electrion system. We considered that, for comparative purposes, the best answer would be obtained by measuring the AMT standards with the Orion SS-20 as if they were regular specimens, after equilibration with CO2 to pH 7.4. Four vials of AMT standards were tested this way with repeated measurements. For the 42 mg/liter standard we found 42 ± 0.7 (1 SD) mg/liter. We conclude that the Orion SS-20 and the AMT Electrion give comparable results and identical precision. The choice of instrument thus depends on considerations such as the need for automation, and the usual sample volume (0.5 ml non-retrievable for Orion SS-20, 1.3 ml retrievable for the AMT).

Identification of any commercial product does not imply recommendation or endorsement by the Veterans Administration, nor does it imply that the material or equipment identified is necessarily the best available.

References


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Comparison of Agarose and Polyacrylamide Techniques for Lipoprotein Electrophoresis

To the Editor:

Quantitation of plasma lipoprotein fractions by electrophoresis is known to correlate with the quantitation of fractions prepared by ultracentrifugation. The relation was demonstrated by Hatch et al., using agarose gel as a support medium for the electrophoresis (1). In a more recent study, polyacrylamide gel was used (2).

We have compared the electrophoretic patterns obtained by using agarose and polyacrylamide gels. Agarose scans and the quantitative densitometry were carried out at the Donner Laboratory by the method of Hatch et al. (1). The qualitative polyacrylamide gel patterns were determined by use of the Ames Co. “Redi-Disc” polyacrylamide gel electrophoresis kit (3).

A comparison of some Type 2b patterns is given in Figures 1 and 2. In Figure 1 it is seen that patterns obtained with the polyacrylamide gel kit in cases of Type 2b hyperlipidemia (right-hand photographs) actually resemble the patterns expected for Type 4 (left, bottom photograph) and are not similar to the Type 2 patterns (left, middle). The examples are clearly of Type 2b, for the serum cholesterol concentrations and the quantitative values for beta-lipoproteins in serum are significantly increased (Table 1). Nevertheless, in the polyacrylamide gel patterns the beta

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