reversible HbA1 is dissociated faster than by dialysis; and (d) after dialysis, samples no longer require further concentration before HbA1 is measured.

References

V. T. Innanen
F. Recknagel
Women’s College Hospital
76 Grenville St.
Toronto, Ontario M5S 1B2
Canada

Application of Hewlett-Packard Calculator (Model 9815A) to NCCLS Documents PSEP-2, 3, 4: Data Analysis

To the Editor:
In PSEP-2, -3, and -4, the NCCLS (National Committee for Clinical Laboratory Standards) Subcommittee on Instrument Evaluation has made considerable progress toward satisfying the need for sound experimental design and data analysis according to which manufacturers make claims on imprecision and inaccuracy of a method or instrument (1). Though some typographical and mathematical errors exist in these draft documents, the standards, when universally applied, will facilitate interpretation and inter-instrument comparison of such data.

The Subcommittee also correctly recognized the importance of providing extensive computer programs, which may be used for data reduction. These FORTRAN computer programs are intended for use on relatively large, batch-oriented machines and are available from NCCLS (see address in reference 1).

The data analyses for PSEP-2, -3 and -4 can also be performed on less elaborate equipment, such as programmable desktop microcomputer systems. I recognize, note, documented, and tested the required programs for the Hewlett-Packard 9815A(S) calculator (Hewlett-Packard Desktop Computer Div., Ft. Collins, CO 80525). These programs can be run on any HP 9815A(S) calculator having at least 1910 steps of available program memory. Thus, even a 9815 interfaced to analytical instruments (ABA-100, Hyland Nephelometer, Calbiochem Behring Laser Nephelometer, various scintillation counters, Poli Mak 900/1900, etc.) can be used without removing the instrument interface.

The program for PSEP-2, the Performance Check Equipment, calculates the true grand mean, the unweighted grand mean, the standard error, the upper and lower control limits for the mean, and the average run range. As an option, one-way analysis of variance for a balanced or unbalanced experimental design is available. The F-test for significant difference among run means [including p(F)] is automatically performed. Bartlett’s test for homogeneity of variance [including p(x^2)] is also executed.

For the PSEP-3 precision data, the individual run statistics, the grand mean, the total standard deviation, a complete analysis of variance (for the nested analysis of variance) with relevant F-tests and a listing of appropriate imprecisions (biased and unbiased) are calculated and printed after data entry. As an option, the one-sided upper tolerance limits for standard deviations can be calculated.

The Method Comparison data analysis for PSEP-4 includes standard regression analysis with linearity tests (2), Deming regression analysis, and sample distribution statistics. Options include calculation of residuals, confidence limits for the slope and intercept, and the average bias and tolerance limits for user-specified medical-decision level concentrations.

Using the HP 9815 for these calculations has been very helpful to us and we offer, on a non-profit basis, our instruction manual, keyboard overlay, and programs contained on a single magnetic tape to those who would like them.

References

Robert F. Martin
Dept. of Pathology
Baylor College of Medicine
And The Methodist Hospital
3565 Fannin
Houston, TX 77030

Keeping a Glucose Analyzer Free of Bacterial Contamination

To the Editor:

A year ago, we purchased a Model 23AM Glucose Analyzer (Yellow Springs Instrument Co., Inc., Yellow Springs, OH 45387) for measuring whole-blood glucose in the Newborn Unit. After three weeks, gentamicin-resistant bacteria were cultured from the instrument and the analyzer was withdrawn from service. Buffer supplied by the manufacturer contains gentamicin to minimize bacterial growth.

Culture of the analyzer consumables and spare parts before use in the instrument did not yield growth. Evidently bacteria were introduced into the instrument during normal use, where conditions are favorable for growth.

A simple procedure was required for disinfecting the instrument that would not have a destructive effect on it or interfere with glucose measurement. First we disassembled the analyzer and cleaned the components as described under the monthly maintenance procedure in the YSI Model 23AM instruction manual. This decreased but did not eliminate bacterial growth, which soon was again prolific.

Next we used a commercial preparation of glutaraldehyde (20 g/L), containing sodium bicarbonate (2.27 g/L), to disinfect the instrument. We found that if the buffer in the instrument was replaced with glutaraldehyde for 5 min before being flushed out with fresh commercial buffer, then daily cultures made from the instrument, as described below, did not yield growth for as long as 10 days, an interval varying with the number of samples analyzed.

After this treatment, we saw no significant change in the accuracy or precision of the instrument. The standard curve was still linear to at least 30 mmol/L, and calibration drift was within 1.0% per hour.

The following daily and weekly procedures for disinfecting the instrument have now been in successful use for eight months.

Daily: Wash out the waste bottle and add 20 mL of glutaraldehyde. Replace the disposable plastic rinse jar and add fresh rinse solution—glutaraldehyde (2 g/L) and sodium bicarbonate (0.23 g/L). Replace 5 mL of glutaraldehyde in the disposable waste jar, into which pipette rinsings are expelled.

Weekly: Collect 3 mL of buffer from the waste tube. Pipette 1 mL onto a blood-agar plate and examine after 48 h incubation at 37 °C. No growth should be found. Flush glutaraldehyde through the instrument via the supply line for 40 s. Leave the line full of it for 5–10 min. Flush glutaraldehyde from the instrument with freshly prepared buffer containing gentamicin for 40 s or until a