rect. We did not even try to answer that question; we believed that troponins are used as stat tests. The data in Table 2 of our article (2) clearly show the change of mean values of P/S ratios ± 95% confidence intervals for three time intervals after onset of chest pain (1–12, 13–48, and >48 h) calculated from the eight cases shown in the online supplement.

6. “With reference to Fig. 3 in the article, the authors fail to provide a statistical analysis of the data at each time point.”

Statistical treatment of serial data for individual patients is an interesting issue (6), but it is far beyond the scope of our short report. A t-test based on a day-to-day imprecision for TnT of 5.6% yields a least significant difference of 16% between two individual measurements at a concentration of 0.4 μg/L. If the imprecision in the measurement of ratio is estimated to 8%, the least significant difference between two samples is 22%. We omitted a discussion of these data in the short report in favor of the group mean values in Table 2.

7. “We agree with the recent National Academy of Clinical Biochemistry Recommendations that suggest using plasma or anticoagulated whole blood for the stat analysis of cardiac markers. The calibration of immunoassays must be specific to the sample type when matrix effects are known to exist. Therefore, immunoassays that are recommended by the manufacturer for use with heparin plasma should be calibrated with heparin plasma to minimize the bias.”

We think this approach is highly questionable. An average difference between serum and plasma troponins can easily be calculated, but given the great variability of P/S ratios during myocardial infarction, it seems to be a dangerous oversimplification to use a mean difference as a bias correction.

References


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Cerebrospinal Fluid Xanthochromia Testing Simplified

To the Editor:

We previously published a method that determines xanthochromia in cerebrospinal fluid (CSF) to detect subarachnoid hemorrhage (1). The method involved a spectrophotometric scan of the CSF in which the absorbances of hemoglobin (Hb; 415 nm) and bilirubin (440 nm) were determined by subtracting a background obtained by drawing a tangent from 360 to −530 nm. The net absorbance of bilirubin was then determined from an equation that compensated for Hb absorbance. A closer examination of this method showed that the Hb spectrum gave zero absorbance at 476 nm even at Hb absorbances up to 1.5 at 415 nm. We then tested 476 nm to measure net bilirubin absorbance because, although it is not the λmax for bilirubin, the mathematics for the calculation are much simpler. We compared results for 112 CSF samples submitted for CSF xanthochromia analyses by the older method (1), which compensates for Hb interference in the bilirubin estimation, with results of the new method, which measures the absorbance of bilirubin at 476 nm and therefore does not use compensation for Hb absorbance. The new method, like the old one, uses the tangent approach to measure the net absorbance at 476 nm.

Linear regression of the absorbances yielded:

Xantho (new) = 0.87 × Xantho (old) + 0.001

with r² = 0.93 (P <0.001) and mean absorbances (SD) of 0.0145 (0.0313) and 0.0136 (0.0191) for the old and new methods, respectively. In this group of samples, there was one pair of discrepant results with a marginally positive absorbance of 0.017 (reference >0.015) by the old method and borderline positive (0.013; reference interval, 0.01–0.014) by the new. In general, patients who are either positive or borderline positive have the same clinical follow-up, namely,
an angiogram to confirm the presence or absence of an aneurysm. This patient was subsequently found to have a CSF infection with associated inflammation; no aneurysm was detected.

Because of the excellent correlation, we are now using the new method because it is simpler, thereby making the method potentially less prone to error. We have used the old method for >3 years now in >250 analyses.

Vitamin C and Glycohemoglobin Revisited

To the Editor:

Blood glucose (BG) concentrations averaged over a 2- to 3-month period are represented by blood glycohemoglobin (GHb) as a percentage of total hemoglobin. Strict glycemic control is important to the successful outcome of diabetic pregnancy and in avoiding development of many diabetic complications (1). Hyperglycemia in nondiabetes is a major risk factor in cardiovascular disease and cancer (2). Thus, knowledge of an individual’s true GHb value is vital. This need has prompted continuing investigations of potential interferences in GHb assays (3, 4), including conflicting reports on the effect of vitamin C on GHb (5–7).

As a part of our research on effects of dietary variables on tumor growth, two groups of 18 mice each were provided either ascorbic acid (AA; vitamin C) in drinking water (2.5 g/L) or unsupplemented water. Blood glucose was measured six times during the 2-month study (Glucometer; Bayer Diagnostics). We observed no differences in BG between the groups. At the beginning of the study, baseline BG concentrations (mean ± SD) for the non-AA and AA groups were 82 ± 16 and 79 ± 15 mg/100 mL, respectively. The BGs at the end of the study were, respectively, 90 ± 16 and 87 ± 18 mg/100 mL. Also at the end of the study, GHb by affinity chromatography (Glycotest; Pierce) was determined. For this variable, the AA group exhibited a significantly lower value (i.e., GHb, 4.39% ± 0.78% for non-AA mice and 3.39% ± 0.60% for the AA-supplemented mice; t = 4.324; P = 0.0001).

AA may lead to interferences in GHb assays, particularly in some based on charge separation (e.g., electrophoresis and ion exchange), where a positive interference has been observed (6). The affinity-chromatography method we used, however, was not affected. This suggests that the AA-associated decrease in GHb reflected a genuine in vivo decrease in glycation.

In 1988, Ely et al. (5) reported antagonism of hemoglobin glycation by AA in animals and humans. Since then, two contradictory reports of the effect of AA supplementation (750–1500 mg/day) on GHb in humans have appeared (6, 7). Using affinity chromatography, Davie et al. (6) found an 18% decrease in GHb, whereas Weykamp et al. (7) found no significant change. Our data show a 23% reduction in GHb in mice consuming ~7.5 mg of AA/day. Thus, the important question of whether GHb measurements accurately represent average BG in persons who take AA supplements remains unanswered.

AA is the most commonly consumed nutritional supplement after multivitamins (8), and in the western United States, >11% of adults take an AA supplement daily. Laboratory, epidemiologic, and intervention studies suggest that antioxidant vitamins, especially AA, have long-term benefits in attenuating the progression of diabetic complications, and diabetics are encouraged to take AA. In light of these facts and the importance of BG in other aspects of human health, including immunity and aging, the uncertainty regarding the influence of AA on GHb demands further investigation.

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