Reference Values for CK-MB Isoenzyme Compared with Acute Myocardial Infarction

To the Editor:

The development of a simple sensitive determination of CK-MB isoenzyme in serum has widely improved the clinical diagnosis of acute myocardial infarction (AMI), because this isoenzyme represents 20% of the total CK in cardiac muscle, but is practically absent from other tissues (1). This determination, however, still presents some problems of technique standardization and reference values. This latter point has lately given rise to a discussion as whether the ratio of CK-MB to total CK (3) or the absolute CK-MB activity, with (2-4) or without (7) blank subtraction, should be considered the better index to AMI. Our goal was to verify with the aid of receiver operating characteristic (ROC) curves (5) and predictivity calculations (6) which of the three procedures allowed the best clinical performance in AMI diagnosis in an emergency ward.

During four months, sera of all patients admitted to this department with suspected AMI and a value for total CK exceeding 200 U/L were assayed for CK-MB activity, with blank determination. All these patients were later classified on the basis of clinical and laboratory findings according to the WHO recommendation: chest pain typical for ischemia, positive electrocardiogram for AMI, value for total CK >400 U/L. The appearance of at least two of these clinical and laboratory signs classified the patients as positive for AMI. Total CK and CK-MB were assayed at 37 °C with the kits of Boehringer Biochemia Robin, with minor modifications of the supplier’s instructions. Serum blank activities for CK-MB were assayed for 5 min before the starter was added, to evaluate residual adenylate kinase (AK; EC 2.7.4.3) activity. The instrument used was an Eppendorf PFP 6121 spectrophotometer supplied with a circulating water bath.

We evaluated true positive and false positive rates for different reference values and constructed ROC curves (Figure 1). As can be seen, the absolute reference values, with or without blank subtraction, provide a better clinical performance than does a reference value expressed as a percentage. At a sensitivity level of 0.96 we found a specificity of 0.75 in the former and of 0.30 in the latter case.

In predictivity calculations, reported in Table 1, we used a prevalence of 0.34 (27 cases of AMI in 79 patients), with a decision threshold set to provide sensitivity of 0.96 for all procedures: that is, 5% for the CK-MB/total CK ratio, 24 U/L for absolute CK-MB value with blank subtraction, and 30 U/L for absolute CK-MB value without blank subtraction. Predictivity for negative values is quite similar in all cases, while overall diagnostic efficiency is better with absolute CK-MB values.

Our predictivity data and ROC curves confirm that, at least in emergency use, absolute CK-MB values allow a diagnostic efficiency better than the CK-MB/total CK ratio, which we believe should be used only in cases of doubtful interpretation (extensive muscular damage). The use of blank subtraction has no advantage in the case of a single CK-MB determination.

References


Renzo Fenoil
Giulietta Weiz
Rosangela Alfieri

Laboratorio Analisi
Ospedale Martini Nuovo USL 1-23
Via Tofane 71
10141 Torino, Italy

One-Step Immunoassays for Free (Unbound) Hormones: The Effects of Tracer Binding by Serum Proteins

To the Editor:

I welcome the recent study of Geiseler et al. (1) describing a new analog-based free thyroxin (FT4) radioimmunoassay (RIA). Regarding specific points in their paper, however, I offer the following comments:

1. The mathematical model presented is similar to that published earlier in our own paper (2). Whereas we allow for distortion of the binding-protein equilibria by the presence of antiseraum in the assay, Geiseler et al. do not. But provided FT4-extraction by the antiseraum is insignificant, as is the case in, e.g., the Amerlex™ FT4 assay (2), the