Comparison of two automated quantitative immunoassays for the determination of C reactive protein concentrations

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Abstract
Two quantitative, automated methods for the determination of C reactive protein (CRP) were compared: turbidimetry (Cobas Fara II, Roche, Welwyn Garden City, UK) and fluorescence polarisation TDx, Abbott, Wokingham, UK). One hundred and twenty routine serum samples submitted for measurement of CRP were tested using both procedures. The results were compared using regression line analysis and showed a high degree of correlation ($r^2 = 0.99$, X coefficient $= 1.01$, constant $= 0.11$). C reactive protein can be accurately measured using the automated turbidimetric method which can be recommended as an alternative to fluorescence polarisation.

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Serum C reactive protein (CRP) concentrations rise and fall rapidly as part of the “acute phase” response.1 Despite the nonspecific nature of this response, CRP measurement provides a sensitive indicator of inflammation in a variety of conditions and is an objective index of the clinical response.2 Early studies of the clinical use of CRP measurement were dogged by a lack of standardisation and of quantitative assays which could be performed quickly and conveniently. Recently, an international reference standard for proteins in human serum has been published.3 This, coupled with the availability of rapid, automated and quantitative assay systems, has facilitated the development of CRP measurement as a routine clinical laboratory investigation.

Fluorescence polarisation4 is currently in widespread use, while the alternative method,
immunoturbidimetry, also lends itself to automation. The greatly increased demand for CRP measurements prompted us to compare these methods.

Methods and results
One hundred and twenty sera submitted to the laboratory for the measurement of CRP were examined. Samples giving a value of 0-5 mg/dl or higher were chosen to give an even spread of results across all ranges. All specimens were initially tested using fluorescence polarisation and subsequently within four hours by the turbidimetric method, and within 24 hours of receipt by the laboratory. Specimens were stored at 4°C before processing, and equilibrated with room temperature before testing.

The reference fluorescence polarisation method was performed on an Abbott TDx analyser using Abbott reagents, according to the manufacturer’s instructions, with an appropriate control run for each protocol during each eight hour period. Samples were initially run using Protocol A of the manufacturer’s procedure, giving results between 1·5 and 26·0 mg/dl. For greater precision, samples yielding results less than 6·5 mg/dl were repeated using Protocol C. Samples giving results greater than 26·0 mg/dl were repeated using a 1 in 2 dilution protocol.

Turbidimetry was carried out on a Roche Cobas Fara II using Roche reagents, protocols, and controls. Routine calibration enabled readings to be taken within the range 0·5–16·0 mg/dl. Samples yielding results higher than 16·0 mg/dl were re-analysed using a 1 in 5 dilution protocol with saline and the CRP standard (16·0 mg/dl) was used as a control, according to the manufacturer’s instructions.

The results obtained on both methods were compared using Pearson’s linear correlation coefficient. The correlation of the two methods (figure) was highly significant ($r^2 = 0·99, X$ coefficient = 1·01, constant = 0·11).

Discussion
The results suggest that the turbidimetric method is a useful and an acceptable alternative to polarised fluorimetry for the measurement of CRP concentrations. Both methods permit the rapid, accurate, automated, and quantitative determination of CRP concentrations in the routine diagnostic laboratory.

The choice of method will be determined by a number of factors in any given situation. Clearly, if a laboratory already uses either instrument for performing other analyses, capital or maintenance costs, or both, may be reduced by using existing hardware. Equally, the use of familiar analysers may reduce the amount of staff training required for implementation of the test. These analysers may already be connected to departmental computer systems. The cost of consumables will be an important additional factor, particularly if further economies can be made by bulk buying.

There can be little doubt that with the availability of rapid, automated assays, CRP determination will play a greater role in the management of some patient groups, and there will be a growing demand for laboratories to provide this service. We recommend the turbidimetric assay as an acceptable alternative to the widely used polarised fluorimetric method.