Dr Easton makes two relevant comments regarding North American and United Kingdom quality control results in prothrombin time testing. The first is his surprise at the better precision of manual *versus* automated results in the United Kingdom surveys. The long established proficiency in the manual technique in the United Kingdom is well recognised and may relate to the centralisation of coagulation procedures in the United Kingdom in district general hospitals and other large laboratories.

The second point concerns the relative precision (CV) in prothrombin time testing obtained in recent United Kingdom and College of American Pathologists' (CAP) surveys. The CV is influenced by the difference in sensitivity of reagents used in the United Kingdom compared with those in North America. The former, with ISI values close to 1.0, give considerably longer prothrombin times on Coumarin treatment and hence higher CV. For meaningful comparison of precision, however, the results must be expressed on a uniform scale using INR. We have shown that the CV of the INR approximates to the CV of the PT ratio $\times$ ISI. For example, with a thromboplastin with an ISI of 2.0 (most North American reagents have even higher ISI values), a CV of 4% for a prothrombin time expressed in seconds, quoted for the North American surveys by Dr Easton, increases to 8% when expressed as INR. In contrast, as most hospitals in the United Kingdom use a thromboplastin with an ISI of 1.1 the effect is relatively insignificant. Thus when results are reported as INR precision with this thromboplastin is at least as good as with American reagents.

Responsive thromboplastins with an ISI close to 1.0 have been shown to give greater safety in anticoagulant dosage.³ They also provide at least equal precision in testing to high ISI reagents using the INR system, irrespective of whether a manual or automated technique is used.

Morphometric analysis of suprabasal cells in oral white lesions

Shabana *et al* compare what they describe as *two* morphometric indices of cell shape.¹ They define the "first" of these the form factor (PE) given by:

$$PE = 4 \times \frac{22}{7} \times \frac{\text{cell area}}{\text{cell perimeter}^2}$$

The "second" of these, the contour index (CI), is given by:

$$CI = \frac{\text{cell perimeter}}{\sqrt{\text{cell area}}}$$

Both of these are indices of departure of any outline from a perfect circle² that are in widespread use to describe shape.³ Although superficially, the two formulae seem to be different—PE for a circle being 1 while CI for the same shape is $3.54 (= 2/\sqrt{\pi})$ —it is clear that both indices are a ratio of perimeter² to area with some constants included in the former case.

Indeed, if we substitute the second formula into the first we get:

$$PE = (4 \times \frac{22}{7})/CI^2$$

These indices are therefore not separate but a fixed mathematical function of each other, both describing the same features of shape in the same way. It is not surprising that the authors state, "the contour index seemed to have a similar pattern to the factor PE."

In defining the indices separately and devoting a section of the discussion to comparison between them, the authors create a misleading impression that they are measuring different attributes. A range of morphometric shape descriptors has been advocated as having genuine differences in properties,⁴ some of which are better detectors of departure from circularity than the relatively insensitive² form factor.

TJ STEPHENSON

Department of Pathology,
University of Sheffield Medical School,
Beech Hill Road,
Sheffield S10 2RY

References

- 1 Hull R, Hirsch J, Jay R, *et al*. Different intensities of oral anticoagulant therapy in the treatment of proximal-vein thrombosis. *N Engl J Med* 1982;307:167-81.
- 2 Turpie ACC, Hirsch J, Gunstensen J, *et al*. Randomised comparison of two intensities of oral anticoagulant therapy after tissue heart valve replacement. *Lancet* 1988;i:1242-5.

- 1 Shabana AHM, El-Labban NG, Lee KW, Kramer IRH. Morphometric analysis of suprabasal cells in oral white lesions. *J Clin Pathol* 1989;42:264-70.
- 2 Young IT, Walker JE, Bowie JE. An analysis technique for biological shape. I. *Inform Control* 1974;25:357-70.
- 3 Crocker J. Morphometric and related quantitative techniques in the study of lymphoid

neoplasms. A review. *J Clin Pathol* 1984;143:69-80.

- 4 Gschwind R, Umbricht CB, Torhorst J, Oberholzer M. Evaluation of shape descriptors for the morphometric analysis of cell nuclei. *Path Res Pract* 1986;181:213-22.

Dr Shabana comments:

I would like to advise that our work started in 1982 when the two described factors were available. Whereas form PE was a "built-in" parameter in program Videoplan of the IBAS-1, CI was described in the literature. The practical experiment using the two factors showed differences in reproducibility, PE being more reproducible than CI. This could be explained by the differences in reproducibility in measuring the perimeter which would change the results of these factors to a greater extent than similar changes in area. The results then reflect the accuracy of the system, including the operator.

ISI value of thromboplastin

Taberner *et al* argued that the ISI value of a thromboplastin strongly influences the interlaboratory variability of the INR obtained with it.¹ A few comments on this are appropriate. The authors derived the equation $CV(INR) = CV(PR) \times ISI$ in which CV(PR) is the interlaboratory variation of the measured prothrombin time ratio. In this equation the variation of the ISI and the biological variation among individual anticoagulated patients are not accounted for. The purpose of external quality assessments to determine the deviation of an individual laboratory's test result from the true value.

Multicentre calibration studies have shown that there is variability of the ISI.² The variation of the ISI is also taken into account, the total variation of the INR may be obtained as:

$$CV(INR) = \sqrt{(CV(PR) \bullet ISI)^2 + (1n(INR) \bullet CV(ISI))^2}$$

It should be noted that if the total variation of the INR of an individual patient's sample is to be assessed, the biological variation of the INR among patients should be included as well.³

My second comment relates to the observed difference of CV(INR) between two different groups of laboratories using different (rabbit) thromboplastin reagents. CV of 13% was obtained for the laboratories using a reagent with an ISI of 1.4, and a CV of 9% was obtained for the other group using a reagent with an ISI of 1.1. Although