These data corroborate those of Chiverton and colleagues, and, in our opinion, this processing method should be used routinely, at least when dealing with 24 hour gastric acidity studies on anti-secretory drugs.

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Reply

SIR, — We should like to thank Drs Mela and Savarino for their kind comments which relate to the methods which we used for the analysis of pH data, and they raise several important points. The collection of pH data, whether obtained by aspiration at hourly intervals and measured *ex vivo*, or by continuous recording at six second intervals by intragastric pH electrode, provides more pH data than should be used in an assessment of overall acidity. This requires that a summary variable be calculated across time for each subject studied. This summary variable should provide a physiologically relevant measure of gastric acidity, and is not to be confused with the statistical concept of 'central tendency'. Furthermore, as total exposure to acid concentration is likely to be of greatest physiological consequence, any attempt to use statistics to compensate for non-normal distribution of raw pH data over time, may well obscure important fluctuations in intragastric pH. Drs Mela and Savarino have drawn attention to our observation that the means of pH across time appear to be normally distributed. It is worth emphasising that this refers to the distribution of the summary variable itself and not the underlying raw pH data. They are

quite correct that skewness and kurtosis estimates require much larger sample sizes, but this is a practical impossibility in a single study.

We have also compared the mean and median as summaries of pH over time in a prospective series of six studies with 25 treatment arms, and involving a total of 296 individual 24 hour studies. Our results show that while the mean and median are highly correlated, the relationship is not linear, with the median significantly skewed to lower pH ($p < 0.00001$). The median 24 hour pH showed a greater skew in 20 of the 25 treatment arms, a higher variance in 21 of 25 treatment arms, and greater heterogeneity of variance in five of the six studies. These characteristics of the median result in a decreased sensitivity for detecting differences among drugs in all of the six studies. These results therefore confirm, in a prospective study, that the mean is a more robust summary of pH changes over time than is the median.

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Books

Statistics with confidence – confidence intervals and statistical guidelines. By M J Gardner and D G Altman. (Pp. 140; illustrated; £7.95.) London: *British Medical Journal*, 1989.

The use of confidence intervals in the presentation of data derived from clinical research is now required 'when appropriate' by a number of journals. This book is a compilation of articles, written for the *British Medical Journal*, that is intended as guidance and assistance for research workers with the new statistical orthodoxy. As one in need of guidance, I had two expectations from this book. First, a clear exposition of the benefits of confidence intervals, and second, an easily comprehensible demonstration of the methodology.

On the first point, I was looking for firm evidence that this shift in opinion does not merely represent the hijacking of the research community by a group of trendy statisticians, but I found myself not much the wiser. Certainly I agree that the abolition of the plus or minus sign for standard errors or deviation would be helpful because this sign is not usually found on computer keyboards and is not a standard