Estimating plasma albumin concentration from the buffering properties of blood

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Introduction

Hypoalbumania is common in acutely ill patients and is associated with an increased risk of mortality [1]. Plasma albumin concentration is usually measured at the central laboratory, but information exists as to the concentration from the buffering properties of blood. Albumin is the major non-bicarbonate buffer in plasma. The other buffers in blood, haemoglobin and bicarbonate, are easily measured or calcu- lated. This means that the effects of albumin on blood buffering can be isolated and albumin concentrations estimated using standard blood gas analysis.

Method

An algorithm was developed to calculate plasma albumin concen- tration from venous blood measured for acid–base and oxygenation status before and after its exposure to air. This algorithm is based upon the mathematical model of blood acid–base and oxygenation status of Rees et al. [2].

To evaluate the method, venous blood was taken in 19 normal subjects and diluted, such that for each of the 19 samples, three different subsamples were obtained with different albumin concen- trations, spanning the range 10–50 g/l. These samples were then analysed before and after exposure to air and calculated values of albumin compared with values measured using rate nephelometry. Results and conclusion

Calculated values of albumin compared well with measured, with a correlation coefficient $r^2 = 0.9$. Little bias existed between measured and calculated values (bias = 0.7 g/l) and the standard deviation of the difference between measured and calculated values is 4.7 g/l. Application of this method may mean that an estimation of values of plasma albumin concentration can be obtained from a blood-gas analyser, enabling identification and monitoring of hypoalbumina- emia as a routine part of critical care.

References

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