

Exercise: agreement between methods of measuring blood potassium

The following is the abstract of a paper. Read the abstract and answer the questions.

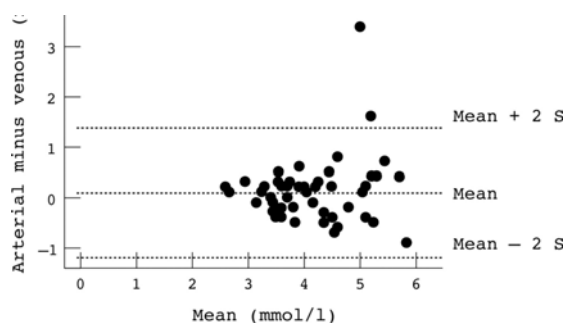
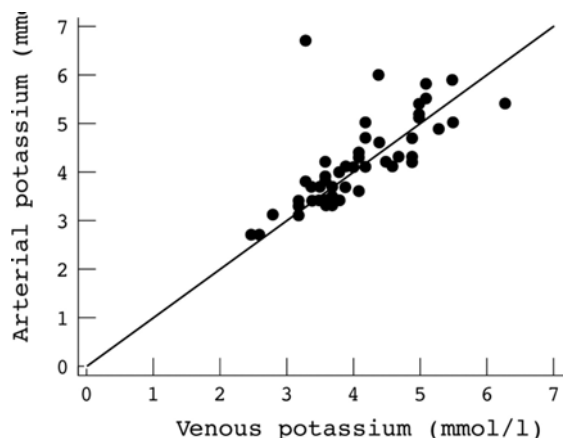
Background and objective: Rapid measurement of potassium is crucial in the resuscitation of patients in cardiac arrest. This is often done on an arterial blood gas sample taken during resuscitation and analysed in an emergency department based blood gas analyser. No-one has assessed how accurate or reliable this is when compared with the traditional method of sending a venous sample to the laboratory for standard analysis. This study looked at the agreement between potassium measurements in arterial blood gas samples and venous blood samples in patients in cardiac arrest.

Method: Arterial and venous blood samples were taken at the same time and analysed in the usual way from 50 patients in cardiac arrest. It was found that the mean difference between each pair of arterial and venous potassium measurements was low at 0.106 mmol/l. However, the standard deviation of these differences and subsequently the 95% limits of agreement were wide (-1.182 mmol/l to 1.394 mmol/l) that is, 95% of differences will lie between these limits. It is felt that these limits are too wide for safe use in clinical practice.

Conclusion: Based on these results, it is advised that arterial blood gas analysers should be used with caution to measure potassium in patients in cardiac arrest.

Ref: Johnston HLM, Murphy R. (2005) Agreement between an arterial blood gas analyser and a venous blood analyser in the measurement of potassium in patients in cardiac arrest. *Emergency Medicine Journal* **22**, 269-271.

The paper contained the following graphs:



Questions about this report

1. The 95% limits of agreement were -1.182 mmol/l to 1.394 mmol/l. What does this statement mean and what can we conclude about the agreement between arterial and venous potassium?
2. Why do the authors say that these limits were wide?
3. In the first figure, what is the line of equality and why is it shown?
4. In the second figure, what can we conclude about these potassium measurements?
5. What would be a better way of analysing these data?
6. In the text of the paper, the authors quote 'Pearson's correlation coefficient between the venous and arterial measurements was 0.73.' What can we conclude from this about the agreement between the two measures of potassium?