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For the Record: Comment on Muñoz *et al*'s paper *A New Perspective in the Estimation of Postmortem Interval (PMI) Based on Vitreous $[K^+]$*

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The importance of the recent paper by Muñoz *et al.* JFS 46(2) 209-214 cannot be overstated. Their assertion that the PMI (post mortem interval) must be deployed as the independent variable, and the K^+ as dependent in any regression based procedure used to establish a calibration function for PMI is entirely correct. This is because the converse arrangement must lead to bias, where estimates for short PMI's are systematically longer than the real PMI, and estimates for long PMIs shorter than the real PMI. The magnitude of the bias being equal to $1-r^2$ where r is the correlation coefficient, and follows as a result of the algebra of regression analysis. As r^2 in this case is relatively small the potential bias is therefore large. A formal proof is given by Aykroyd *et al.*(1), resulting from their work on age estimation and regression analysis. The same result can be found in the work of Eisenhart (2) and Draper and Smith (3).

It is important that all those in the forensic science community who employ regression analysis to derive calibration functions do so fitting the variables the correct way round. There are no hard and fast rules about which way as it is determined largely upon the dependency structure of the system. A useful *rule of thumb* is that the variable which is not affected by the other is the independent (x). This is easy to see in the case of K^+ and PMI as the level of K^+ cannot affect the PMI, the PMI affects K^+ . In other cases the position may not be so obvious, and the forensic scientist may have to consult a statistician.

References

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3. Draper NR, Smith H. *Applied Regression Analysis: second edition*. John Wiley and Sons 1981.