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Letters to the Editor

Red Cell Volume in Diabetes

Dear Sir

Davidson et al. in their paper 'The Mean Red Cell Volume in Diabetes Mellitus' [Diabetologia (1981) 20: 583–584] report an increase in the mean red cell volume (MCV) in diabetic patients as measured in the Coulter counter. However, they made no attempt to check for any osmotic effects that may occur. When the MCV is measured in the Coulter counter, the red cells are suspended in a solution of fixed tonicity, whereas red cells in vivo are suspended in their native plasma, which varies in composition and therefore in osmotic properties [1, 2].

Hypernatraemia causes the MCV as recorded in the Coulter counter to be higher than that calculated from the red cell count and the spun haematocrit. Hyponatraemia has the reverse effect. The presence of glucose has a variable effect depending on the concentration and the rate of passage out of the red cell. In these cases the MCV will also depend on the length of time between dilution in isotonic solution and counting. With a high level of glucose, for instance, the MCV may be higher in the Coulter S+ (time from dilution to sizing about 10 s) than in the Coulter S (time from dilution to sizing about 35 s). Similar findings have recently been reported by Morse and Kalachie [3] and by Strauchen et al. [4].

Yours sincerely
W. Beautyman

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Dear Sir,

The recent article 'The Mean Red Cell Volume in Diabetes Mellitus' [Diabetologia (1981) 20: 583–584] by Davidson et al. is of great relevance for haemorheological studies on this subject. Using different techniques a number of research groups have found the red cell deformability in diabetes to be reduced [1–3]. Unfortunately there is no information about the mean corpuscular volume (MCV) in these studies. However an increase in MCV as described by the authors would inevitably result in a false indication of reduced deformability, especially so with filtration techniques, where the red cells' ability to pass through pores smaller than their resting size is tested. On the other hand, if it is the red cell deformability that is reduced, this might lead to higher MCV readings on the Coulter counter. In a series of experiments, we found that after artificially 'stiffening' red cells with 0.25% gluteraldehyde, which makes the cells virtually non-deformable, the reading of the Coulter Counter gave an 11% increase in MCV (unpublished observations). Hence it is possible that one of the two findings (increased MCV or reduced deformability) is due to an artefact brought about by the other. Further work is needed to clarify this question.

Yours sincerely
E. Ernst

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