Diabetes Vignette

Good with numbers: a professor's own HbA1c prediction

Case. A 77-year-old retired professor of biochemistry regularly attended the diabetes clinic for review. He was diagnosed with type 2 diabetes in 1989 and had been started on biphasic 30/70 pre-mixed insulin in 1993. He was fastidious with his diabetes, taking regular home blood glucose measurements (HBGMs). He periodically had plotted these on an hourly basis against the time action profile of his biphasic insulin (Figure 1).

In July 2008 he attended for an annual review. He had plotted his BG measurements over the previous few weeks and had plotted the mean on a graph that he had kept for several years. He thus felt he could predict his HbA1c on this basis (Figure 2), and that it would be 7.5% because his mean HBGMs were 9.7mmol/L. In fact his HbA1c was 7.7% – the furthest out it had been in his predictions for several visits.

Discussion. The presence of an abnormal haemoglobin fraction in people with diabetes was first described in 1968. Subsequently it was recognised that there was a correlation between HbA1c and the risk of developing the complications of diabetes. Since the large outcome trials of the 1990s, lowering HbA1c has been the goal of several studies, with the outcomes assessing morbidity and mortality.

Several factors are known to affect HbA1c values, including conditions that affect red cell survival and turnover rates, such as splenectomy or haemoglobinopathies.[1,2] Thus, those involved in the care of people with diabetes should be alert to these possibilities if there is an apparent discrepancy between HbA1c and HBGM values.

In individuals where there are no factors interfering with red cell survival there is a correlation between BG and HbA1c.[3] Whilst not a direct correlate, many studies looking at the relationship between self-monitoring of BG and HbA1c values show associations above 0.6,[3] with a recent analysis of data from the Diabetes Control and Complications Trial showing a correlation of over 0.9.[4] These studies looked at tens of thousands o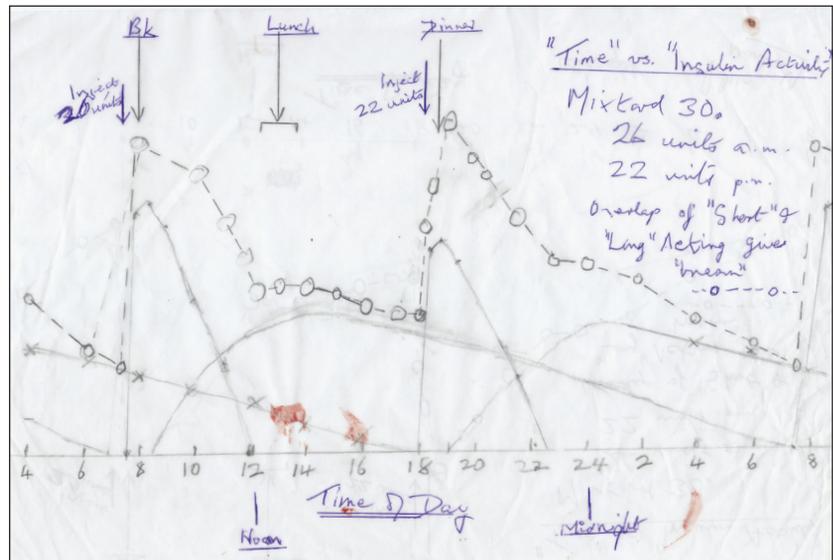f self-monitoring of BG measurements and regular HbA1c assessments. These analyses take several years and presumably cost a very large amount of money; however, the biochemistry professor managed to prove this relationship for himself.

Figure 1. The professor's 'Time *vs* insulin activity' chart
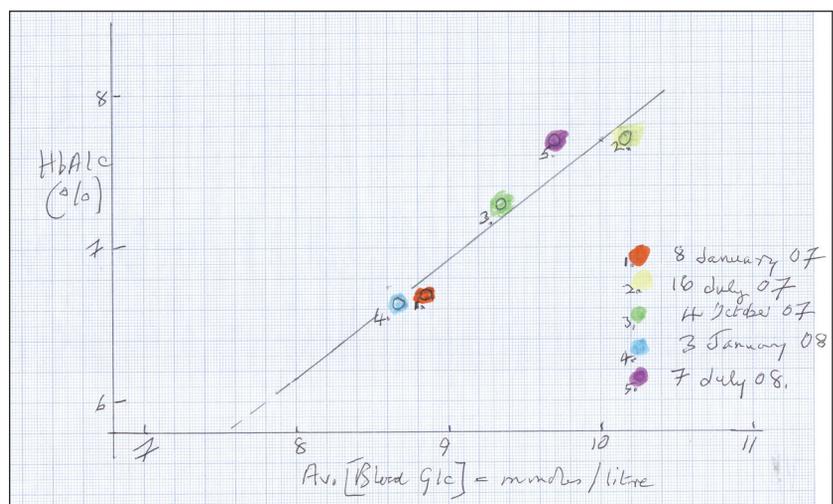
Figure 2. Mean blood glucose measurements plotted by the professor

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