Management of type 1 diabetes

Continuous glucose monitoring from research to clinical use

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People using insulin therapy, particularly those with type 1 diabetes have to walk a tightrope with poor glucose control and the risk of complications on one side and the risk of hypoglycaemia on the other. This problem of balance was very clearly demonstrated by the Diabetes Control and Complications Trial group who demonstrated a very close link between HbA_{1c} and risk of hypoglycaemia.

Since the time of this landmark trial, technology has moved on and we have made significant advances in reducing the risk of hypoglycaemia as HbA_{1c} falls. The development of analogue insulins has greatly enhanced our control of blood glucose levels. We understand the importance of individual patient education and now focus particularly on balancing dietary carbohydrate, exercise and insulin doses.

The other exciting development has been the interest in continuous glucose monitoring technology. In a very short time this has moved from an interesting research tool to mainstream clinical care. The paper by Sachedina and Pickup provides a useful summary of their experience with the Medtronic-Minimed device. The overall conclusion is that the device has clinically acceptable accuracy and is useful in detecting glycaemic trends although they found a surprisingly high failure rate (28%) at sensor insertion. The paper does not address the question of cost and where the continuous glucose monitoring system (CGMS) should fit in to clinical care. We cannot afford to use the device in every individual receiving insulin therapy. A possible target group are those individuals with HbA_{1c} above target and evidence of erratic blood glucose control with both high and low readings.

A useful first step before employing the CGMS is the use of a downloadable glucose meter in combination with intensive input from a diabetes clinician and dietetic support. If this fails to address the problem then the CGMS may provide further information. The extra information that the glucose sensor can provide is that it may highlight unexpected periods of hypoglycaemia or postprandial hyperglycaemia.

DIABETES CARE

Benefits and risks of islet transplantation

Readability	✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓✓✓

1 In 1999, the National Institutes of Health (NIH) launched the Transplantation and Autoimmunity Branch with the aim of establishing islet transplantation as a clinical research protocol.

2 This paper reports their initial islet transplantation experience in six patients with diabetes with hypoglycaemia unawareness and no endogenous insulin secretion.

3 Participants were transplanted with allogenic islets procured from brain dead donors.

4 At 1 year, all patients had less frequent and less severe hypoglycaemia and half were insulin independent. Serum C peptide was found in five patients, which indicates islet functions.

5 There were two complications related to the transplantation: partial portal vein thrombosis and intra-abdominal haemorrhage.

6 There was a 50% insulin independence rate after at most two islet infusions. These data support the promise of islet transplantation and highlight the hurdles, such as limited islet supply, complications and suboptimal glycaemic control.

Hirshberg B, Rother KI, Digon BJ et al (2003) Benefits and risks of solitary islet transplantation for type 1 diabetes using steroid-sparing immunosuppression. Diabetes Care **26**: 3288–95

DIABETIC MEDICINE

Accuracy of continuous glucose monitoring

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

1 There has been little clinical evaluation of the continuous glucose monitoring system (CGMS) in comparison with the blood glucose self-monitoring system (BGSM).

2 The aim of this article was to assess the accuracy, reliability and measurement of glycaemic control associated with the Medtronic MiniMed CGMS compared with BGSM in patients with type 1 diabetes.

3 Patients with poor control (n=18) who were undergoing assessment for management by continuous subcutaneous insulin infusion were recruited.

4 Control was compared on the CGMS for up to 72 h with BGSM done eight times daily.

5 CGMS had acceptable clinical accuracy, with 96.6% of paired sensor-BGSM readings falling in the clinically acceptable zones A and B of the Clarke error grid.

6 CGMS detected significantly more hypoglycaemia and postprandial hyperglycaemia than BGSM. However, the total duration of hyperglycaemia, blood glucose oscillations and day-to-day variability were similarly assessed by both methods.

7 This CGMS has acceptable accuracy if management decisions are not based on short-term readings, but rather on glycaemic trends.

Sachedina N, Pickup JC (2003) Performance assessment of the Medtronic-MiniMed continuous glucose monitoring system and its use for measurement of glycaemic control in type 1 diabetic subjects. Diabetic Medicine **20**: 1012–15