Management of type 1 diabetes

Poor blood glucose control associated with cognitive decline

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'Improving glycaemic control over a number of years reduces the risk of developing the microvascular complications of diabetes. Improved control also appears to reduce the risk of macrovascular disease in type 1 diabetes. But what our patients repeatedly tell us is that this is not the main worry. The main concern of having to use insulin treatment is the risk of hypoglycaemia. The issues relate to day-to-day concerns about the possibility of a sudden collapse and the practicalities of dealing with this. Of less concern for our patients, it would seem, is the possibility that repeated hypoglycaemia may be causing permanent brain damage. We know that acute hypoglycaemia reduces the ability to think clearly. In the background has been the worry that in some ways, following repeated episodes of hypoglycaemia, this cognitive impairment might be permanent. We have a dilemma: tight glycaemic control is inevitably associated with more frequent and severe hypoglycaemic episodes. Is it possible that in a susceptible individual running a low HbA_{1c} may be doing more harm than good?

The DCCT group have published yet another significant paper addressing this problem (summarised on the left). The large group of individuals followed for a mean of 18 years show no significant decline in cognitive function despite relatively high rates of hypoglycaemia. In fact the opposite was seen. A higher HbA_{1c} was associated with deterioration in some cognitive tests. It is important to remember that these results relate to a specific age group. The mean age at entry to the study was 27 years with a standard deviation of 7 years. The data do not tell us anything about the risk of hypoglycaemia related cognitive impairment in children or the elderly – perhaps the two groups where we have the most concerns.

The Diabetes Control and Complications Trial Research Group (1997) Hypoglycemia in the Diabetes Control and Complications Trial. The Diabetes Control and Complications Trial Research Group. *Diabetes* **46**: 271–86

DIABETES CARE

Diabetes control is unsatisfactory

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

1 The authors of this study attempted to find out whether recommended treatment goals for glycaemic and risk factor control in type 1 diabetes were being met.

2 HbA_{1c} levels, risk factors and treatment were investigated in two cross-sectional samples of 9424 people in 1997 and 13612 people in 2004 and in a smaller longitudinal cohort study of 4296 people.

3 There was a significant mean decrease in HbA_{1c} from 1997–2004 from 8.2±1.3% to 8.0±1.2% ($P<0.001$), and the proportion of individuals reaching $HbA_{1c}<7.0\%$ increased from 17.4 to 21.2% ($P<0.001$).

4 There were also improvements in blood pressure level and lipid control but only 61.3% of people reached the blood pressure target and 38% reached their total cholesterol target.

5 The authors conclude that, despite a slow improvement in diabetes control, the gap between clinical results and treatment goals must be improved.

Eeg-Olofsson K, Cederholm J, Nilsson PM et al (2007) Glycemic and risk factor control in type 1 diabetes: results from 13,612 patients in a national diabetes register. *Diabetes Care* **30**:496–502

NEJM

Recurrent hypoglycaemia does not impair cognitive function

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

1 This study was conducted to investigate the long-term effects of type 1 diabetes on cognitive ability, specifically whether treatment group (in the DCCT), history of hypoglycaemia and long-term glycaemic control were associated with cognitive decline.

2 The individuals who were enrolled on the DCCT took a battery of cognitive tests, which were then repeated an average of 18 years later in the Epidemiology of Diabetes Interventions and Complications (EDIC) study.

3 The total number of people who completed both the DCCT and EDIC was 1144. The frequency of severe hypoglycaemic events (those leading to coma or seizures) and HbA_{1c} were recorded during the follow-up period.

4 Neither frequency of severe hypoglycaemia nor previous treatment-group (intensive or conventional therapy) was associated with decline in any cognitive domain. High HbA_{1c} values were associated with declines in motor speed ($P=0.001$) and psychomotor efficiency ($P<0.001$).

5 The authors suggest that these results can be used as a message to young people with type 1 diabetes that intensive control to prevent complications later will not impair their cognitive function.

Diabetes Control and Complications Trial/ Epidemiology of Diabetes Interventions and Complications Study Research Group, Jacobson AM et al (2007) Long-term effect of diabetes and its treatment on cognitive function. *NEJM* **356**: 1842–52

'Higher insulin resistance was associated with a higher risk of subsequent micro- and macro-vascular complications'

'Analogue basal-bolus insulin can be considered better value for money than human basal-bolus insulin.'

CURRENT MEDICAL RESEARCH AND OPINION

Analogue insulin has improved QALE

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

1 This investigation was carried out in order to compare the long-term economic and clinical outcomes of analogue basal–bolus insulin versus human basal-bolus insulin in people with type 1 diabetes in the UK.

2 Quality-adjusted life expectancy (QALE) was 0.66 quality-adjusted life years (QALY) higher in the analogue versus the human insulin group. Lifetime costs were £1654 greater with analogue versus human insulin treatment, which gave an incremental cost effectiveness ratio (ICER) of £2500 per QALY gained.

3 The authors conclude that analogue basal–bolus insulin can be considered better value for money than human basal–bolus insulin.

Palmer AJ, Valentine WJ, Ray JA et al (2007) An economic assessment of analogue basal-bolus insulin versus human basal-bolus insulin in subjects with type 1 diabetes in the UK. *Current Medical Research and Opinion* **23**:895–901

JOURNAL OF PEDIATRICS

Management of type 1 is improved in 'post-DCCT era'

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

1 The aim of this study was to look at temporal trends in the management of type 1 diabetes in people aged between 8 and 16 years and to observe the effects on outcomes.

2 The study enrolled two cohorts; one in 1997 (4 years after the DCCT) comprised of 299 individuals and the second in 2002 (9 years after the DCCT) made up of 152 individuals. Eligibility criteria included: aged 8–16 years, diabetes duration >6 months, no major psychiatric problems, a stable living environment and an intent to attend the follow-up sessions.

3 The outcome measures were HbA_{1c}, BMI Z-score and incidence rates of hypoglycaemia, hospitalisation, and emergency room visits.

4 Cohort 2 measured blood glucose more often ($P<0.001$) and received more intensive therapy ($P<0.001$) at baseline. At the end of the study, HbA_{1c} was lower ($P=0.04$) in cohort 2 and there was also a lower incidence of severe hypoglycaemic episodes and ER visits.

5 The authors found that management was intensified in the 5 years between cohorts, indicated by a lower mean HbA_{1c}.

Svoren BM, Volkening LK, Butler DA et al (2007) Temporal trends in the treatment of pediatric type 1 diabetes and impact on acute outcomes. *Journal of Pediatrics* **150**: 279–85

ACTA DIABETOLOGICA

Pregnancy outcomes similar with CSII and MDI

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

1 In this study the authors looked at the outcomes of pregnancy in women with type 1 diabetes treated with either continuous subcutaneous insulin infusion (CSII) or multiple daily injection (MDI) therapy.

2 There were 29 women in each group of the study. Metabolic control and complications were recorded, including severe hypoglycaemic episodes and hypertension induced by pregnancy and pre-eclampsia.

3 The authors found no difference between the groups in HbA_{1c}, insulin dose and BMI throughout gestation.

4 The study shows similar results in metabolic control, maternal, foetal and perinatal outcome during pregnancy when using CSII compared with MDI.

Giménez M, Conget I, Nicolau J et al (2007) Outcome of pregnancy in women with type 1 diabetes intensively treated with continuous subcutaneous insulin infusion or conventional therapy. A case-control study. *Acta Diabetologica* **44**:34–7

DIABETES CARE

Insulin resistance can predict complications in type 1 diabetes

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

1 This study looks at whether the presence of insulin resistance and the metabolic syndrome are predictors of micro- and macrovascular complications in people with type 1 diabetes.

2 The authors used the IDF criteria of the metabolic syndrome to identify 1337 participants in the DCCT eligible for the study.

3 Their insulin resistance was calculated using estimated glucose disposal rate (eGDR) and their insulin dose was also used as a separate marker of insulin resistance.

4 The prevalence of the metabolic syndrome increased over the study period, primarily due to weight gain, in conventionally treated people, and more so in intensively treated people but was not a predictor of complications: neither was insulin dose.

5 eGDR predicted the development of several risk factors: retinopathy ($P<0.001$), nephropathy ($P=0.005$) and cardiovascular disease ($P=0.002$).

6 At baseline, a higher insulin resistance was associated with a higher risk of subsequent micro- and macro-vascular complications. In comparison, insulin dose and presence of the metabolic syndrome according to the IDF were poor predictors.

7 Despite a higher prevalence of the metabolic syndrome among those receiving intensive treatment in the DCCT, the authors believe that the benefits of improved control outweighed the risk related to the metabolic syndrome.

Kilpatrick ES, Rigby AS, Atkin SL (2007) Insulin resistance, the metabolic syndrome, and complication risk in type 1 diabetes: "double diabetes" in the Diabetes. *Diabetes Care* **30**: 707–12