Management of type 1 diabetes

DIABETES RESEARCH AND CLINICAL PRACTICE

EEG monitoring during sleep in people with IAH

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

1 The authors set out to determine whether nocturnal hypoglycaemia-associated electroencephalography (EEG) changes occur and whether they can be detected in time for the person to restore normal blood glucose levels.

2 The study cohort was made up of 10 people with T1D complicated by impaired awareness of hypoglycaemia (IAH). All were exposed to insulin-induced hypoglycaemia in each of three study sessions.

3 During a daytime assessment and the first of two night assessments, an auditory alarm was triggered when the EEG changes reached a predefined threshold indicative of hypoglycaemia. The second night assessment proceeded without the use of an alarm.

4 People were provided with a sandwich and juice but without instructions during the hypoglycaemic episode. If they failed to respond to hypoglycaemia, blood glucose levels were restored using glucose infusion.

5 During daytime, hypoglycaemia-associated EEG changes developed in seven of eight people. During sleep, these changes occurred irrespective of sleep stage in nine out of 10 people, of whom eight awoke to the alarm – four corrected hypoglycaemia, whilst four required glucose supplementation.

6 The results highlight the potential of an alarm device (using EEG monitoring and real-time data analysis) that can encompass the entire night and prevent the events of severe nocturnal hypoglycaemia.

Snogdal LS, Folkestad L, Elsborg R et al (2012) Detection of hypoglycemia associated EEG changes during sleep in type 1 diabetes mellitus. *Diabetes Res Clin Pract* **98**: 91–7

EEG changes and hypo detection during sleep: No need to panic…

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In the film *Panic Room* (2002), recently divorced Meg Altman (Jodie Foster) and her 11-year-old daughter, Sarah (Kristen Stewart), have just moved into a house with a panic room in which there are hidden millions of dollars' worth of bonds. Unfortunately, as the burglars break in to the house and the new owners lock themselves in the panic room, seemingly for protection, Sarah – who has T1D – experiences a hypo. She knows this because the watch she is wearing is a hypo alarm watch. For reasons I'll never understand Sarah doesn't have any jelly babies on her and the glucagon is in the fridge outside the panic room!

Hypo alarms come in various forms – measurement of interstitial glucose, detection of changes in skin electrical resistance (induced by sweating), dogs trained to recognise when their owner has a low blood glucose level, and now electroencephalography (EEG) changes that trigger an alarm. All are methods that have been used to alert people with diabetes that their blood sugar is low before they recognise it themselves. In the accompanying article by Snogdal et al (2012; summarised alongside), people with T1D were connected to a continuous EEG recording whilst hypoglycaemia was induced during sleep and an alarm sounded to wake them up. Mostly, the EEG correctly identified hypoglycaemia and the alarm woke the person up. As with all hypo warnings (physiological or electronic), the person has to be able to respond by correctly treating him or herself with the appropriate fast-acting carbohydrate. Unfortunately, once the low blood glucose level starts to affect brain function (probably at a glucose level <3 mmol/L) this is not always possible, as was demonstrated in this study.

Physiological hypo warnings are of two types; initially, activation of the sympathetic nervous system (tremor, palpitations, sweating etc.) followed by brain dysfunction due to neuroglycopenia (confusion, delayed reaction times etc.). People with diabetes with loss or delay in the onset of autonomic symptoms are much more likely to experience a severe hypo requiring third-party help.

The hunt for a reliable hypo alarm that detects that narrow window of glycaemia that preceeds neuroglycopenia goes on. The other question for Kristen Stewart and *Twilight* fans is, "did hypoglycaemia result in a lust for human blood?"

DIABETOLOGIA

DKA frequency in children with T1D: A worldwide study

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

1 The authors characterised the frequency if diabetic ketoacidosis (DKA) at diagnosis of T1D in children worldwide, and explored the reasons for variation.

2 Searches of five databases yielded 65 cohort studies providing data on 29 000 children from 31 countries across five continents. Multivariate linear regression analysis took into account four features of the study country, and study characteristics.

3 There was a six-fold variation in DKA frequency, ranging from 12.8% (Sweden) to 80% (United Arab Emirates).

4 Frequency of DKA was significantly inversely associated with latitude (P=0.002) and T1D background prevalence (P=0.0028).

5 There was an inverse relationship between DKA frequency and healthcare cost as a percentage of gross domestic product but this was not significant (P=0.058) Study design characteristics did not affect DKA prevalence.

6 The authors concluded that DKA frequency variation may, in part, be explained by differences in disease awareness and healthcare provision.

Usher-Smith JA, Thompson M, Ercole A et al (2012) Variation between countries in the frequency of diabetic ketoacidosis at first presentation of type 1 diabetes in children: a systematic review. *Diabetologia* **11**: 2878–94

"Mean pancreatic volume index was 26% less in people with T1D compared with controls (P=0.001)."

DIABETIC MEDICINE

Eating problems in adolescents with TID: Prevalence and effect on HbA_{1c}

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

1 Eating problems encompass eating disorders and disordered eating behaviour. They often develop during adolescence, and, particularly in young people with T1D, are of major clinical importance, not least in terms of their effect on glycaemic control.

2 The authors conducted a meta-analysis to determine the prevalence of eating problems amongst adolescents with T1D (compared with their peers) and the association between eating problems and glycaemia in this patient group.

3 Electronic database searches yielded 13 empirical studies focusing on eating problems in young people with T1D (≥6 months), published between 1999 and 2011.

4 Effect sizes showed that the prevalence of eating problems was greater in adolescents with T1D compared with peers. However, when analyses involved diabetes-adapted measures, the differences were not significant; (T1D: 6.4% versus peers: 3.0%; *d*=0.43, 95% confidence interval [CI], -0.06–0.91).

5 Eating problems (both disordered eating behaviour and eating disorders) were related to poorer glycaemic control (*d*=0.40, 95% CI, 0.17–0.64).

6 Prevalence estimates of eating problems in people with T1D using generic measures may be inflated, suggesting that true like-for-like comparisons between this patient group and the general population are not suitable. The authors concluded that future sensitive measures of eating problems and effective interventions in people with T1D should be developed.

Young V, Eiser C, Johnson B et al (2012) Eating problems in adolescents with type 1 diabetes: a systematic review with meta-analysis. *Diabet Med* 22 Aug [Epub ahead of print]

DIABETIC MEDICINE

Physical activity and body composition in adults with T1D

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

1 The authors set out to investigate the relationship between physical activity level and body composition in 75 adults with T1D compared with 75 matched controls subjects.

2 Participants measured physical activity levels using a motion sensor worn for 1 week. All completed a cardiorespiratory fitness test. Body composition measurements were taken, including lean and fat mass and circumference measurements.

3 In people with and without T1D, body composition was comparable for similar activity levels (ratio total/resting expenditure, 1.68±0.37 versus 1.65±0.26; *P*=0.572).

4 In people with T1D, physical activity was not related to disease treatment (insulin doses), glycaemia (HbA_{1c}) or cardiovascular risk factors.

5 A physical activity level ≥1.7 was associated with a healthier body composition and weight in all subjects.

Brazeau AS, Leroux C, Mircescu H et al (2012) Physical activity level and body composition among adults with type 1 diabetes. *Diabet Med* **29**: e402–8

J CLIN ENDOCRINOL METAB

Pancreatic volume reduced in early T1D

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

1 The authors set out to determine the effect of recently diagnosed T1D on pancreas volume, and subsequent effects on beta-cell function or islet autoantibodies.

2 Pancreatic volume index (PVI) was determined using a validated noninvasive magnetic resonance imaging technique and adjusting for body weight in 20 people with newly diagnosed T1D and 24 matched control subjects. Fasting blood samples were collected and people underwent a glucagon stimulation test.

3 Mean PVI was 26% less in people with T1D compared with controls (*P*=0.001). There was no correlation between mean PVI and age, T1D duration, HbA_{1c}, glucose or C-peptide levels, or islet autoantibodies.

4 The authors concluded that pancreatic atrophy is a potential clinical marker of T1D progression.

Williams AJ, Thrower SL, Sequeiros IM et al (2012) Pancreatic volume is reduced in adult patients with recently diagnosed type 1 diabetes. *J Clin Endocrinol Metab* 9 Aug [Epub ahead of print]

J CLIN ENDOCRINOL METAB

Vildagliptin does not affect glucagon counterregulation

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

1 In this placebo-controlled cross-over study, the authors investigated whether vildagliptin treatment (50 mg twice daily for 28 days) affects glucagon counterregulation in people with T1D.

2 Following the treatment period, all subjects (*n*=28) were given a meal to raise incretin hormone levels; this was followed by a hypoglycaemic clamp (2.5 mmol/L glucose). Blood samples were collected for real-time glucose estimates.

3 During the test meal, compared with placebo, vildagliptin was associated with lower glucagon levels (*P*=0.002 for between-group difference). However, counterregulatory responses were not reduced by vildagliptin during hypoglycaemia.

Farngren J, Persson M, Schweizer A et al (2012) Vildagliptin reduces glucagon during hyperglycemia and sustains glucagon counterregulation during hypoglycemia in type 1 diabetes. *J Clin Endocrinol Metab* **97**: 3799–806