Management of type 1 diabetes

Peaks and troughs: Seasonality in the presentation of childhood type 1 diabetes

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The observation that there are peaks in the presentation of children with type 1 diabetes has long been known, and many regional studies have suggested that this variation was seasonal. Certainly, UK diabetes centres are very familiar with the peaks in presentation that occur every winter.

Other (smaller) studies have suggested that there may be a pattern in the seasonality of birth, with spring and summer births predominating, although this pattern has not been confirmed by all studies.

The present study by Molchanova et al (summarised alongside), based on the World Health Organization Diabetes Mondiale Project incidence study, looked at the onset of type 1 diabetes across 53 countries (the majority of which were in the Northern Hemisphere).

Data on over 31 000 children diagnosed with type 1 diabetes under the age of 15 years were examined and the winter peaks and summer troughs were documented both in Northern and Southern Hemispheres (although because of the smaller numbers the data are less robust for African and Asia).

Although many reasons for the peaks have been speculated, viral infections are most often implicated. This is curious since family studies have shown that autoimmune destruction (as indicated by the appearance of islet-cell antibodies) may begin some years before glucose tolerance deteriorates. Perhaps viral infections are the straw that breaks the camel's back, and the physical stress of the viraemia tips the child from mildly raised blood glucose into symptomatic hyperglycaemia.

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So does it matter? Although the nature of the autoimmune process is well documented, the trigger remains elusive. Confirmation of the seasonality of presentation may allow these precipitants to be identified.

DIABETES CARE

Effects of primary graft function after islet transplantation

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

1 The authors of this phase 2 study aimed to determine the influence of primary graft function (PGF) on graft survival and metabolic control after islet transplantation in people with brittle type 1 diabetes (T1D).

2 Fourteen people were enrolled and received a median 12 479 islet equivalents per kg of body weight. Primary outcome was graft survival, defined by insulin independence with HbA_{1c} levels ≤6.5% (≤48 mmol/mol).

3 Insulin independence was attained by all patients by 12 days. PGF was optimal (ß-score ≥7) in nine individuals and suboptimal (ß-score ≤6) in five.

4 At final follow-up 3.3 years post-transplantation, eight patients were insulin independent, seven had optimal PGF and one was suboptimal (P=0.01).

5 Compared with baseline, HbA_{1c}, mean glucose, glucose variability and tolerance were all improved. The authors concluded that optimal PGF was associated with prolonged graft survival and improved metabolic control after islet transplantation in people with T1D.

Vantyghem MC, Kerr-Conte J, Arnalsteen L et al (2009) Primary graft function, metabolic control, and graft survival after islet transplantation. *Diabetes Care* **32**: 1473–8

DIABETIC MEDICINE

Seasonal variation in childhood T1D diagnosis worldwide

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

1 Several studies have explored the seasonality of onset or diagnosis of type 1 diabetes (T1D), as well as how variation in the seasonality of birth, gender and environmental factors impact on T1D. Their results are generally conflicting.

2 The authors of this study sought to determine if there is a worldwide seasonal pattern in the clinical onset of T1D.

3 An analysis was undertaken based on T1D incidence data in children aged 0–14 years from the WHO Diabetes Mondiale Project between 1990 and 1999 from 105 centres across 53 countries. Incidence seasonality was also examined in age–sex subgroups.

4 Of the 105 centres studied, 42 exhibited significant seasonality in T1D incidence (P<0.05).

5 The existence of seasonal patterns correlated with higher incidence levels and average yearly counts. After adjustments for latitude this correlation disappeared. Of these centres, 28 had peaks in Oct–Jan and 33 had troughs in June–Aug. Of four centres with significant seasonality in the Southern Hemisphere, two demonstrated a peak in July–Sept and a trough in Jan–March.

6 T1D incidence seasonality was exhibited more in boys than girls (33 vs. 26 centres) and children of older age groups (5–14 years).

7 The authors concluded that seasonality of T1D incidence in children aged <15 years is a real phenomenon, and appears to be dependent on geographical position.

Moltchanova EV, Schreier N, Lammi N, Karvonen M (2009) Seasonal variation of diagnosis of Type 1 diabetes mellitus in children worldwide. *Diabet Med* **26**: 673–8

"Hypo- and hyperglycaemia reduced cognitive function in children with type 1 diabetes, and at blood glucose levels >400 mg/dL, cognitive deterioration equalled that associated with significant hypoglycaemia."

DIABETES CARE

Glycaemic excursions reduce cognition in children with T1D

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

1 Few studies have explored the impact of hypo- and hyperglycaemia on cognitive function in paediatric populations with type 1 diabetes (T1D).

2 Using personal digital assistant (PDA) technology, the authors of this study developed a field procedure to test their hypothesis that hypo- and hyperglycaemic episodes are associated with decreased cognitive function in children with T1D.

3 Each child (n=61; age 6–11 years) was given a PDA programmed with two tests – one on maths and one on choice reaction time. A total of 70 trials were performed over 4–6 weeks.

4 The time taken to complete both the maths and reaction time tests were significantly longer (P=0.017 and P=0.01, respectively) during hypoglycaemia (<3.0 mmol/L [<54 mg/dL]) compared with euglycaemia.

5 Time taken to complete the maths test during hyperglycaemia (>22.2 mmol/L [>400 mg/dL]) compared with euglycaemia was longer (P=0.0001); the time taken to complete the reaction time test was also longer, but was not statistically significant (P=0.08).

6 Decline in mental mathematical performance was equivalent at glucose levels <3.0 mmol/L (<54 mg/dL) and >22.2 mmol/L (>400 mg/dL).

7 The authors concluded that hypo- and hyperglycaemia reduced cognitive function in children with T1D, and at blood glucose levels >400 mg/dL, cognitive deterioration equalled that associated with significant hypoglycaemic.

Gonder-Frederick LA, Zrebiec JF, Bauchowitz AU et al (2009) Cognitive function is disrupted by both hypo- and hyperglycemia in school-aged children with type 1 diabetes: a field study. *Diabetes Care* **32**: 1001–6

DIABETIC MEDICINE

Blood glucose level risk perception

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

1 Using a structured questionnaire, 50 healthcare professionals (HCPs) and 50 children with type 1 diabetes (T1D) were asked how dangerous a blood glucose value was.

2 Those aged <8 years had their questionnaires completed by carers (n=23), both patient and carer complete questionnaires for those aged 8–11 years (n=15), and those aged >11 years completed them on their own (n=12).

3 A significant difference was observed between the median risk assessments of the groups (P<0.0001). The zero level of assessed risk chosen by people with T1D (and their carers) was 0.8 mmol/L higher than the HCPs.

4 Children and young people with T1D (and their carers) assess the risk from blood glucose levels differently from that of HCPs. The authors suggested that this may indicate a fear of hypoglycaemia, a more pragmatic approach or less exposure to current trends in glycaemic control

Hill NR, Thompson B, Bruce J et al (2009) Glycaemic risk assessment in children and young people with Type 1 diabetes mellitus. *Diabet Med* **26**: 740–3

DIABETES RESEARCH AND CLINICAL PRACTICE

Two-thirds of people with T1D do not perform daily SMBG

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

1 To assessed frequency and motives for self-monitoring of blood glucose (SMBG) in people with type 1 diabetes (T1D), 1076 people completed a questionnaire in this cross-sectional, Danish-British, multicentre survey.

2 Thirty-nine per cent of participants performed SMBG daily, and 24% less than weekly.

3 Routine SMBG was reported by 67%, while 33% only tested on suspicion of hypo- or hyerglycaemia.

4 Age, gender, and level of diabetes-related concern was associated with patterns of SMBG testing. More frequent testing was associated with a lower HbA_{1c} level.

5 The authors concluded that patient compliance with SMBG is sub-optimal and that further work is required.

Hansen MV, Pedersen-Bjergaard U, Heller SR et al (2009) Frequency and motives of blood glucose self-monitoring in type 1 diabetes. *Diabetes Res Clin Pract* **85**: 183–8

DIABETOLOGIA

Effect of home CGM on self-management

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

1 This study investigated the home use of the Freestyle Navigator (Abbott Diabetes Care, Kent) continuous glucose monitoring (CGM) system for self-management of type 1 diabetes (T1D).

2 Fourty-eight people with T1D (mean age 35.7±10.9 years) undertook a 20-day masked phase in which no real-time data or alarms were available, followed-up by a 40-day unmasked phase. Two people did not complete the study for personal reasons.

3 Time outside euglycaemia decreased from 11.0 to 9.5 hours/day (P=0.002). Mean HbA_{1c} level reduced from 7.6% (60 mmol/mol) at baseline to 7.1% (54 mmol/mol; P=0.0001), and nearly all current measures of variability were reduced in the unmasked phase.

4 The authors concluded that the home use of a CGM system had a positive effect on the self-management of people with T1D.

Danne T, de Valk HW, Kracht T et al (2009) Reducing glycaemic variability in type 1 diabetes self-management with a continuous glucose monitoring system based on wired enzyme technology. *Diabetologia* **52**: 1496–503