

CURBING THE **ROLLER COASTER** OF TYPE 1 DIABETES

Individuals with type 1 diabetes have no insulin production and are wholly dependent on injected insulin to maintain normal glucose levels. For those living with Type 1 diabetes, glucose management involves negotiating a tightrope between high and low glucose levels, often resulting in confusion and frustration.

The previous mantra of leading regimented lifestyles with dietary restrictions and fixed insulin doses in order to achieve stable glucose control should no longer have a role in contemporary Type 1 diabetes management.

The Singapore Dose Adjustment For Normal Eating (SgDAFNE) Programme is currently in the seventh year of running, and seeks to provide education in self-management and advanced carbohydrate counting in a group setting for those with Type 1 diabetes.

In delivering a standardised comprehensive curriculum which covers topics ranging from blood glucose targets to glucose management during sick days or exercise, SgDAFNE has seen through 20 groups with Type 1 diabetes, with noticeable improvements in glucose control alongside reduced insulin doses.

CARE CORNER

Each SgDAFNE programme spans over five days (typically over the weekends to allow less time taken off work/school) and accepts all Type 1 diabetes individuals across the island above the age of 18 years into the programme. Each course is also followed up with three group review sessions within the year, to reinforce learning points and to discuss practical challenges in the 'real world setting'. Carbohydrate is the main macronutrient resulting in post-meal rises in glucose levels. Counting carbohydrates (estimating carbohydrate content to guide insulin dosing) remains an important component in self-management, particularly in Asia, where cultural influences in cooking styles and eating habits may present difficulties in the form of 'hidden carbohydrates', 'grazing through the day' or 'love for buffets'. Locally relevant food plates and dietary information therefore becomes crucial in delivering SgDAFNE and to date, we remain the only DAFNE centre in Asia.

Counting carbohydrates aside, learning about blood glucose targets, why the highs and lows happen and how to pre-empt these, are integral components in self-management. After all, besides the three to four healthcare provider visits a year, every type 1 diabetes individual will have to make multiple

decisions on insulin doses based on the blood glucose levels, carbohydrate intake and the level of activity daily. Blood glucose records move from being merely a report card for the healthcare providers' viewing towards meaningful numbers to guide insulin dose titration. For example, knowledge about safe bedtime blood glucose targets, and interpretation of overnight glucose readings allows self-management practices such as consuming carbohydrates or reducing basal insulin doses to prevent nocturnal hypoglycaemia.

To illustrate these points above, here is the retrospective (blinded) continuous glucose monitoring sensor tracing of a 20-year-old man (Mr T) who has had Type 1 diabetes since he was seven years old (Figure 1). His HbA1c at the time of doing this tracing was 8.1% and he hadn't been taking capillary blood glucose readings regularly. His insulin doses were high with a total daily dose of 59 units (0.92u/kg/day) and skewed towards his bolus doses (background insulin 15 units at bedtime, 8/18/18 (total 44 units) quick acting insulin at mealtimes). These tended to be fixed doses which were not changed regardless of the amount of carbohydrate intake.

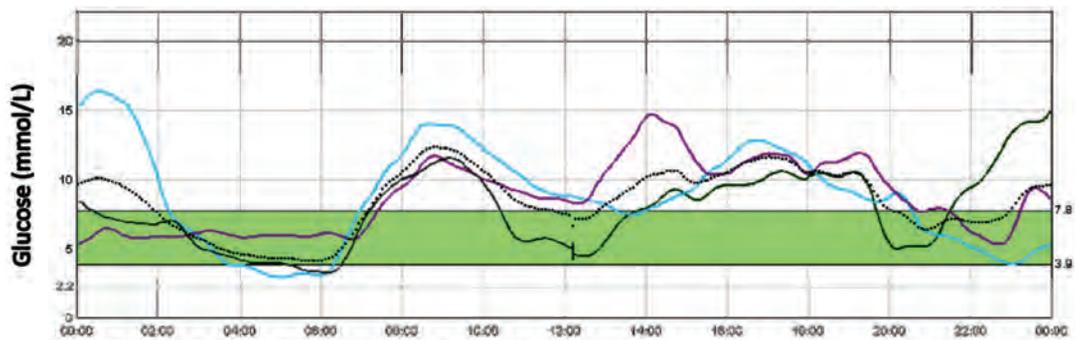


Figure 1: Mr T's CGMS tracing in 2014.

The pre-DAFNE CGMS tracing in 2014 demonstrated much variability with his glucose readings with episodes of nocturnal hypoglycaemia overnight. There was often post-meal hyperglycaemia (high glucose levels) with each meal, and towards the evening. At the end of 2014, Mr T attended the SgDAFNE programme. In learning to accurately count his carbohydrates and interpreting his own glucose levels, it became clear to Mr T that his background insulin was not lasting the duration of the 24 hours and he needed twice daily background insulin dosing. Increasing and splitting the background insulin dose to twice daily enabled him to reduce the use of quick-acting insulin boluses during the day.

Over the next four years following the DAFNE course, Mr T has maintained a HbA1c level of 7 to 7.4%. He has achieved this on split background insulin doses (11 units in the morning, seven in the evening) and much reduced doses of quick acting insulin according to his carbohydrate intake (on average eight units with each meal, total daily dose 42 units of insulin or 0.66 units/kg/day). This was significantly lower than his pre-DAFNE dose of 59 units/day. His CGMS tracing two years post SgDAFNE (figure 2 on next page) demonstrated much less glycaemic variability (particularly after meals suggesting better carbohydrate counting skills) and importantly, minimal hypoglycaemia.

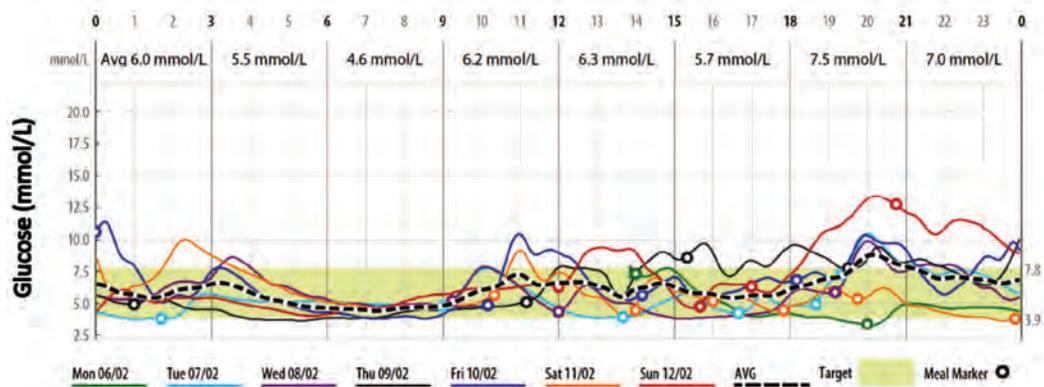


Figure 2: Mr T's CGMS tracing in Feb 2017

This very much demonstrates the importance of knowledge in advanced carbohydrate counting and self-management in those with Type 1 diabetes. It also clearly shows that it is the quality rather than the quantity of insulin use that matters.

In these seven years, we have learnt from and alongside many, the struggles and challenges of living with Type 1 diabetes in Singapore or Asia. In Asia, mealtimes are often communal, social activities shared between family members or friends. Checking blood glucose levels, counting carbohydrates and taking the insulin pen out for injections may invite awkward conversations or stares. The regular snacking culture which is part of the office tea-time activity is not one that those with Type 1 diabetes can easily take part in since any carbohydrate snacks without insulin cover shows up in a higher HbA1c level. Activities that those without Type 1 diabetes take for granted e.g. unplanned exercise, consuming alcohol, school sports activities, often need forward planning in Type 1 diabetes, with either insulin dose reduction or topping up of carbohydrates to prevent hypoglycaemia.

Where does SgDAFNE go from here? From a lean team of just three DAFNE accredited educators consisting of a diabetes nurse educator, dietitian and endocrinologist, we have now expanded to a team of four diabetes nurse educators, six dietitians and three endocrinologists who are now aligned and familiar with intensive insulin therapy and insulin dose titration in type 1 diabetes. This has enabled the incorporation of diabetes technology such as real-time continuous or flash glucose monitoring and insulin pump therapy in order to improve flexibility, quality of life and ultimately outcomes for those with Type 1 diabetes.

SgDAFNE remains committed to empowering those with Type 1 diabetes with knowledge and skills to gain control over glucose management during physical activity, sick days and other unpredictable life circumstances, whilst allowing flexibility in dietary choices. We recognise that life isn't all about glucose management; having support and gaining insight

into problem solving from peers can help in overcoming life challenges. Currently still supported by Sanofi and Abbott Laboratories (for glucometers), we welcome enquiries, from those with Type 1 diabetes themselves, at the following email address: gsodia@sgh.com.sg. Dates for SgDAFNE programme for the year, and any Type 1 diabetes-related events are posted on SgDAFNE facebook. A pre-assessment is required prior to the programme, to assess aetiology, insulin doses and dietary knowledge. That aside, all it takes to attend is a desire to be self-empowered and take control.



About the Author: Dr Daphne Gardner is a senior consultant with the Department of Endocrinology, Singapore General Hospital. Graduating from Oxford University, United Kingdom, she did part of her specialty training in Plymouth (Devon) and attained her AST in Endocrinology in 2011. Dr Gardner's main interests are in young individuals with diabetes, including type 1 diabetes incorporating education and technology, monogenic diabetes and transition services.