Paediatrics

Fat and protein counting: Adding more complexity to determining meal-time insulin dosages?

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Current algorithms commonly used in intensive insulin regimens in children consider only the carbohydrate content of the meal in determining meal-time insulin dosages. It is, however, not uncommon for parents and children to report prolonged hyperglycaemia when they consume high-fat foods, such as pizza. The impact of high-protein diets have not been previously studied in children, so consistent advice on the best management options for high-fat, high-protein meals are lacking.

In this paper by Smart et al (summarised alongside), the separate and combined effects of high-protein and high-fat diets on 33 children with T1D, diagnosed for more than 1 year and managed by either continuous insulin infusion therapy or multiple daily injections, were studied.

Four standardised test meals (high fat [HF], low fat [LF], high protein [HP] and low protein [LP]) with the same carbohydrate content were consumed as breakfast. The children fasted for 10 hours before and 5 hours after the meal, and activity was standardised during the 5-hour fast. The insulin dose was based on each participant's insulin–carbohydrate ratio and kept constant for each of the test meals.

The key findings of the study are that both HP and HF diets led to significant postprandial hyperglycaemia (from 180 minutes to 300 minutes) when compared to the LF/LP diet. This late effect was increased and prolonged when the combined HF/HP meals were consumed by the participants. Dietary protein had an independent effect on postprandial glycaemia. The HF diet initially lowered glucose excursions in the first 90 minutes, but this effect was ameliorated by the addition of protein.

This is a well-conducted study with potential practical applications. The test meals contained similar amounts of fats and protein to those present in real meals consumed by children and adolescents. The suggestion that dietary protein appeared to have a protective effect against hypoglycaemia needs further exploration.

The study highlights the need for both additional insulin and prolonged insulin delivery when HF/HP meals are consumed. For children on pump therapy, dual-wave or square-wave boluses can be given to achieve the effect of prolonging insulin delivery. Algorithms that include fat and protein content of foods (to determine meal-time insulin dosages) need further refinement and validation before they can be recommended for widespread use, especially as a recently published study showed that one such algorithm in use led to rather high rates of postprandial hypoglycaemia in children (Kordonouri et al, 2012).

Whilst these findings are interesting, it is important the message and clinical application are kept simple, otherwise many parents and children may find them all very confusing as meal-time planning gets more complex! ■

Kordonouri O, Hartmann R, Remus K, Bläsig S et al (2012) Benefit of supplementary fat plus protein counting as compared with conventional carbohydrate counting for insulin bolus calculation in children with pump therapy. *Pediatr Diabetes* **13**: 540–4

Diabetes Care

Consider protein and fat in insulin dosing?

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓✓

1 This Australian study investigated the separate and combined effects of high-protein (HP) and high-fat (HF) meals, with the same carbohydrate content, on postprandial glycaemia in children with T1D using intensive insulin therapy.

2 In total, 33 adolescents aged from 8–17 years consumed four test breakfasts on 4 consecutive days: HF/HP; HF/LP; LF/HP and LF/LP diets (HF=35 g of fat, LF=4 g of fat; HP=40 g of protein, LP=5 g of protein).

3 Participants received individually standardised insulin doses for each meal. Postprandial glycaemia was assessed using continuous glucose monitoring for 5 days.

4 Compared with the LF/LP meal, mean glucose excursions were greater after the LF/HP meal from 180 minutes (2.4 mmol/L [95% confidence interval [CI], 1.1–3.7] versus 0.5 mmol/L [–0.8–1.8]; P=0.02); after the HF/LP meal from 210 minutes (1.8 mmol/L [0.3–3.2] versus –0.5 mmol/L [–1.9 to 0.8]; P=0.01); and after the HF/HP meal from 180–300 minutes (P=0.001).

5 Hypoglycaemia risk after the HP meals was significantly lower than after the LP/LF meal (odds ratio 0.16 [95% CI, 0.06–0.41]; P<0.001), suggesting protein may be protective against hypoglycaemic events.

6 This study shows that protein and fat have an additive impact on delayed postprandial glycaemic rise, and suggests the amount of protein and fat consumed should be considered in insulin dosing.

Smart CE, Evans M, O'Connell SM et al (2013) Both dietary protein and fat increase postprandial glucose excursions in children with type 1 diabetes, and the effect is additive. *Diabetes Care* **36**: 3897–902

Diabetes Care

T1D care: Paediatric to adult transition perspectives

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓

1 The aim of this study was to understand the concerns, expectations, preferences and experiences of pretransition adolescents and their parents and post-transition young adults when transitioning from paediatric to adult care.

2 Participants completed interviews with a healthcare professional or questionnaires online and were incentivised.

3 The pretransition adolescents had a mean age of 16.1±0.6 years (n=20), and from the survey the mean diabetes self-management self-efficacy score was 85.4±10.1.

4 The post-transition group had a mean age of 21.1±1.4 years (n=59). They generally experienced positive interactions with adult care providers, and reported relatively high diabetes self-care self-efficacy.

5 Cross-cutting themes emerged among participants for the desire for early preparation for the transition of care and, perhaps, specially designed transition-oriented clinics.

Hilliard ME, Perlus JG, Clark LM et al (2014) Perspectives from before and after the pediatric to adult care transition: a mixed-methods study in type 1 diabetes. *Diabetes Care* **37**: 346–54

Diabetes Care

Early complications in youth with T2D

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓✓

1 Cohorts of 342 youths with T2D, 1011 youths with T1D and 1710 youths without diabetes were compared to assess the long-term outcomes of T1D and T2D in the young. Youth was defined as 1–18 years of age, and participants were identified from a registry of people diagnosed from 1986 to 2007 from Manitoba, Canada.

2 Young people with T2D had an increased risk of developing a complication compared to youths with T1D (hazard ratio 1.47; 95% confidence interval, 1.02–2.12). Clinical factors which contributed to an increased risk included age at diagnosis and HbA_{1c}.

3 Analyses showed there was an earlier diagnosis of nephropathy and neuropathy in those with T2D, but there was no difference in the diagnosis of retinopathy compared to those with T1D. However, the *HNF-1alpha* G319S polymorphism seemed to have a protective effect in the T2D cohort.

4 Youth with T2D exhibit complications sooner than young people with T1D, but younger age at diagnosis is potentially protective and glycaemic control is an important modifiable factor that should not be ignored to lower risk.

Dart AB, Martens PJ, Rigatto C et al (2014) Earlier onset of complications in youth with type 2 diabetes. *Diabetes Care* **37**: 436–43

"Young people with T2D have an increased risk of developing a complication and generally exhibited complications sooner than youths with T1D."

The Lancet

Dextrose gel for hypoglycaemia in neonates

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓

1 A randomised, double-blind, placebo-controlled trial of dextrose gel for the treatment of hypoglycaemia in babies over 35 weeks gestation and younger than 48 hours was reported. In total, 237 babies were randomly assigned (1:1) to receive 40% dextrose gel 200 mg/kg or placebo gel, which was rubbed into the buccal mucosa before feeding.

2 Blood glucose (BG) concentration was measured 30 minutes later, and if hypoglycaemia persisted, the procedure was repeated. The primary outcome was treatment failure defined as BG concentration of less than 2.6 mmol/L after two treatment events.

3 Dextrose gel reduced the frequency of treatment failure compared with placebo (relative risk 0.57; 95% confidence interval, 0.33–0.98; P=0.04).

4 Dextrose gel is inexpensive, safe and simple to administer, so should be considered when treating late pre-term and term babies with hypoglycaemia in the first 48 hours after birth.

Harris DL, Weston PJ, Signal M et al (2013) Dextrose gel for neonatal hypoglycaemia (the Sugar Babies Study). *Lancet* **382**: 2077–83

Diabetologia

Vitamin D deficiency in prediabetes

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! Factor	✓✓✓

1 Vitamin D deficiency is common in people with T1D, but its role in the progression of the condition is unclear, especially in children with prediabetes (defined as the presence of multiple islet autoantibodies). The aim of this article was to investigate whether vitamin D deficiency affects the speed of diabetes progression in children.

2 Levels of 25-hydroxyvitamin D (25[OH]D) were measured in 758 children.

3 25(OH)D levels were lower and the prevalence of vitamin D deficiency (<50 nmol/L) was higher in children with multiple islet autoantibodies than in children who were islet autoantibody-negative (P=0.021).

4 Vitamin D levels were lower in children with multiple islet autoantibodies (prediabetes) and in children with T1D than in autoantibody-negative children.

5 Vitamin D deficiency was not associated with faster progression to T1D for children with prediabetes.

Raab J, Giannopoulou EZ, Schneider S et al (2014) Prevalence of vitamin D deficiency in pre-type 1 diabetes and its association with disease progression. *Diabetologia* **57**: 902–8