Management of type 1 diabetes

METABOLISM

Buccal spray insulin effectively lowers blood glucose

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

1 This study aimed to assess the effectiveness of buccal spray insulin compared with regular (soluble) subcutaneous insulin in people with type 1 diabetes.

2 Eighteen people participated in this 2-day study. On day one, normal basal and pre-prandial subcutaneous insulin was administered; a controlled meal of 630 kJ was then provided. From post-prandial glucose levels, ideal pre-prandial buccal spray insulin levels were calculated. No intermediate or long-acting insulin was administered to any participants over the 2 days.

3 On day 2, with no basal insulin administered, calculated amounts of buccal spray insulin were administered followed by a controlled meal of 630 kJ.

4 Post-meal blood samples were collected every 30 minutes for 2 hours, then every 60 minutes for a further 2 hours on both days.

5 No statistically significant difference was observed between blood glucose, insulin and C-peptide levels between the subcutaneous and buccal spray insulin groups.

6 Three participants were treated with buccal spray insulin for a further 2 days. No significant differences were observed between these three participants and those treated with buccal spray for 2 days.

7 The authors concluded that buccal spray insulin is as effective as regular subcutaneous insulin in controlling blood glucose levels.

Pozilli P, Manfrini S, Costanza F, et al (2005) Biokinetics of buccal spray insulin in patients with type 1 diabetes. *Metabolism* **54**(7): 930–4

Insulin therapy: Exploring new methods of delivery

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It is hard to get away from the fact that people with diabetes do not like giving themselves insulin injections. The DARTS study from Tayside, Scotland (Morris et al, 1997), demonstrated that young people with diabetes may miss approximately 1 in 3 injections, and anyone who has worked in an adolescent diabetes clinic will know just how common insulin omission is.

It is interesting, therefore, that while we are seeing the development of more and more sophisticated injectable insulin analogues and gut hormone (such as glucagon-like peptide 1) analogues for the treatment of diabetes, at the same time the search continues to find a form of insulin that can be administered without a needle. We have seen insulin sniffed and swallowed, and we know that the inhaled insulins will soon be reaching the medical high streets. Many remain sceptical about the size of the delivery device compared with the discreteness of most insulin pens, but, nevertheless, the launch of such devices is imminent.

In this paper by Pozzilli and colleagues (see left) we see yet another route of delivery for insulin: a buccal aerosol which 'introduces a fine particle aerosol at high velocity into the patient's mouth'. The highly vascularised mucosa of the mouth allows rapid absorption. This small proof of concept study demonstrates similar efficacy to 'regular', or soluble, insulin, although between 5 and 7 times higher doses of buccal insulin were needed to achieve similar reductions in blood glucose.

It remains to be seen if tight glycaemic control can be achieved in longer-term studies or whether it can compete with the short-acting insulin analogues, but when talking to patients it is clear that they would love to have the option to sometimes not have to inject.

Morris AD, Boyle DI, McMahon AD, Greene SA, MacDonald TM, Newton RW (1997) Adherence to insulin treatment, glycaemic control, and ketoacidosis in insulin-dependent diabetes mellitus. The DARTS/MEMO Collaboration. Diabetes Audit and Research in Tayside Scotland. Medicines Monitoring Unit. *Lancet* **350**(9090): 1505-10

DIABETIC MEDICINE

Trend towards less physical activity in adolescent girls with type 1 diabetes

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

1 Adolescent girls with type 1 diabetes often gain weight during puberty. This prospective cohort study aimed to compare energy intake and physical activity in girls with or without type 1 diabetes.

2 Twenty-six girls with type 1 diabetes (mean age: 15.7 ± 2.1 years; mean HbA_{1c}: 7.6 ± 1.4%; mean daily insulin dosage: 1.1 ± 0.3 U/kg) and forty-nine control girls without diabetes were recruited.

3 Using a uniaxial accelerometer, physical activity was measured in both groups over 7 consecutive days. Energy intake was calculated using food diaries.

4 The investigators found that there was a tendency towards a lower amount of physical activity in the girls with diabetes compared to their healthy counterparts (464 ± 123 counts/min/day versus 523 ± 138 counts/min/day, respectively; P=0.06). No difference in energy intake was observed between the groups.

5 The investigators concluded that there is a need for larger studies to investigate further the importance of physical activity in adolescent weight gain in girls with type 1 diabetes.

Särnblad S, Ekelun U, Åman J (2005) Physical activity and energy intake in adolescent girls with Type 1 diabetes. *Diabetic Medicine* **22**: 893–9

'*Only albuminuria was found to be an independent risk factor for all-cause mortality and heart disease.*'

DIABETIC MEDICINE

Nephropathy but not retinopathy increases risk of heart disease

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

1 A cohort of 462 people (216 females) with type 1 diabetes with no history of heart disease participated in this 12-year observational study. All participants were examined during routine clinic vists three time a year. The primary endpoint was to observe if any association existed between the presence of microvascular diseases (such as nephropathy and retinopathy) and heart disease (myocardial infarction [MI], heart failure and death).

2 Eighty-five participants developed at least one of the endpoint markers: MI, n=41; heart failure, n=17; death, n=56.

3 Participants with sight-threatening retinopathy had a 7.0-times higher risk of death ($P<0.01$). In this same group, the risk of heart disease was found to be 4.4 times higher compared with people without retinopathy ($P<0.05$). However, this association disappeared when adjusted for the presence of macroalbuminuria.

4 The risk of an MI was found to be 3.9 times higher in participants with sight-threatening retinopathy compared with those with no retinopathy ($P<0.05$).

5 Participants with macroalbuminuria had a 9.0-times higher risk of all-cause mortality ($P<0.001$) and a 6.3-times higher risk of MI ($P<0.001$) compared with those normal kidney function.

6 Those with microalbuminuria showed a lower, non-significant, risk of all-cause mortality and a 2.5-times increase in MI ($P<0.001$) compared to those with normal kidney function.

7 The study also found that those with macroalbuminuria had an 18.3-times increased risk of cardiovascular-related deaths compared with those without.

8 The authors concluded that heart disease is a major outcome of people with type 1 diabetes with abnormal kidney function and sight-threatening retinopathy. However, only albuminuria was found to be an independent risk factor for all-cause mortality and heart disease. Retinopathy was only found to be a risk factor in the presence of nephropathy.

Torffvit O, Lovestam-Adrian M, Agardh E, Agardh CD (2005) Nephropathy, but not retinopathy, is associated with the development of heart disease in type 1 diabetes: a 12-year observation study of 462 patients. *Diabetic Medicine* **22**(6): 723–9

DIABETES CARE

Psychosocial factors and risk of acute diabetes–related death

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

1 A nested case-control study of the Diabetes UK register of people with insulin-treated diabetes was conducted to determine whether psychosocial and socioeconomic factors had any effect on all-cause mortality in people with type 1 diabetes.

2 A total of 98 cases and 137 control cases (53 and 71 males, respectively; matched by sex, age, date of birth and area) were analysed for those who died before the age of 40 years.

3 All deaths were categorised as either acute events or chronic conditions related to type 1 diabetes.

4 Data for psychosocial and socioeconomic factors (such as employment and marital status) were gathered from the case notes.

5 The individual's socioeconomic status was derived using ACORN (A Classification Of Residential Neighbourhoods), which uses postcodes to classify people into social categories which take into account their lifestyles.

6 A total of 51 people died from acute causes, which included 34 from those that are diabetes-related. Thirty-four people died from diabetes-related chronic conditions. The remaining 13 people died from causes not related to diabetes, such as cancer and respiratory diseases.

7 Psychosocial and socioeconomic related factors such as living alone, past drug abuse and psychiatric referral were all found to be associated with deaths from acute causes, but with deaths from diabetes-related chronic conditions.

8 An analysis between deaths from acute causes and retinopathy, nephropathy and neuropathy revealed no association, although all of these conditions were related to deaths caused by chronic causes.

9 Psychosocial factors, the authors concluded, can, therefore, be used to highlight a group of people at risk of mortality due to type 1 diabetes-related acute causes, but not from related chronic conditions.

Laing SP, Jones ME, Swerdlow AJ, et al (2005) Psychosocial and socioeconomic risk factors for premature death in young people with type 1 diabetes. *Diabetes Care* **28**(7): 1618–23

'*Psychosocial factors can be used to highlight a group of people at risk of mortality due to type 1 diabetes-related acute causes.*'