

# Keeping abreast of the latest diabetes research: Closed-loop insulin delivery, hypos and heart surgery, and air pollution

Too busy to keep up to date with the latest research? In this series, Erwin Castro, Diabetes Specialist Nurse in Hastings, provides some research highlights from the ADA 78<sup>th</sup> Scientific Sessions.

## Glycemic management as the primary determinant of one-year mortality after CABG

Heller H et al (2018) *Diabetes* 67(Suppl 1): Abstract 103-OR

Mortality after coronary artery bypass graft (CABG) has separately been associated with postoperative hypoglycaemia and the use of veins, rather than arteries, as the graft source. This study sought to determine the interaction between these two risk factors in a cohort of 1323 patients undergoing CABG with intensive insulin therapy.

Severe hypoglycaemia (SH; <2.2 mmol/L) was associated with the highest 1-year mortality (46% vs 5% in those without SH). Of those without SH, people with two or more hypoglycaemic excursions (<3.9 mmol/L) had the highest mortality (17%) versus those with one (7%) or no excursions (4%). Graft source had little effect on 1-year mortality, except for the left internal thoracic artery, which was protective only in those who had no hypoglycaemia.

## Fully closed-loop glucose control in noncritical care settings – a randomised, controlled two-centre study

Bally L et al (2018) *Diabetes* 67(Suppl 1): Abstract 350-OR

These authors evaluated a fully closed-loop insulin delivery system, without the need for meal-time bolusing, in non-critical-care inpatients with hyperglycaemia requiring subcutaneous (SC) insulin.

Participants all chose their own hospital meals and were randomised to the closed-loop

system ( $n=70$ ) or conventional SC insulin as per local practice. In the intention-to-treat analysis, participants in the closed-loop group had a higher proportion of time spent in target glycaemic range (66% vs 42%), less time in hyperglycaemia (24% vs 50%), and reduced mean and standard deviation of sensor blood glucose levels.

Time in hypoglycaemia was similar between the two groups and there were no severe adverse events or severe hypoglycaemia. The authors conclude that the fully closed-loop system is safe and may improve glucose control.

## Air pollution exposure during pregnancy and lactation induces obesity and glucose intolerance in the offspring

Zordão OP et al (2018) *Diabetes* 67(Suppl 1): Abstract 223-OR

Air pollution, and particularly fine particulate matter (FPM), is known to be associated with type 2 diabetes. This study, conducted in mice, explored the effects of FPM exposure on insulin resistance and obesity.

Three months of FPM exposure increased body weight and fat mass in adult mice, without increasing food intake. Exposure during pregnancy and lactation increased body weight and fat mass in the male offspring, despite reduced food intake. These offspring had higher serum insulin levels and glucose intolerance.

The authors suggest that these changes may have been a result of elevated inflammation, leading to hypothalamic leptin resistance and a consequent reduction in energy expenditure.

Although caution is required in interpreting these results, as the study was conducted in mice and effects were not observed female offspring, this study suggests a role for FPM in obesity as well as type 2 diabetes risk.

## Addition of GLP-1 therapy to insulin in C-peptide-positive patients with type 1 diabetes

Kuhadiya ND et al (2018) *Diabetes* 67(Suppl 1): Abstract 110-LB

The glucagon-like peptide-1 (GLP-1) receptor agonist liraglutide, has previously been shown to improve glycaemic control when added to insulin therapy in people with type 1 diabetes and undetectable C-peptide levels. This study evaluated GLP-1 analogue therapy in people with C-peptide-positive individuals.

Eleven people with detectable C-peptide and positive GAD-65 antibodies (all Caucasian, mean diabetes duration 6 years) received GLP-1 therapy (liraglutide or dulaglutide) in addition to insulin for 12 weeks. During this time, C-peptide concentrations increased significantly from 0.14 to 0.47 nmol/L, HbA<sub>1c</sub> fell from 93 to 58 mmol/mol (10.6% to 7.5%) and total daily insulin dose fell from 34.5 to 12.3 units.

The authors conclude that the addition of GLP-1 therapy to insulin in C-peptide-positive people with type 1 diabetes results in a 3.5-fold increase in C-peptide concentrations, with improved glycaemic control and a >60% reduction in daily insulin requirements. ■

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