

Obesity

A low carbohydrate, ketogenic diet is superior to a low glycaemic index diet for people with type 2 diabetes



Jonathan Pinkney, Consultant Physician, Royal Cornwall Hospital, Truro, and Senior Lecturer, Peninsula Medical School

As highlighted repeatedly in this commentary, obesity is the main treatable cause of type 2 diabetes, and dietary interventions that lead to significant, sustained weight reduction (>10% body weight) are the

key to successful, long-term prevention and control of the condition.

Although major dietary change is not easy for patients, it is still to be embraced by many diabetes teams and their dietitians, partly because the optimum strategies and goals have been controversial.

Westman and colleagues (2008; abstract alongside) address an important and topical question: is a low carbohydrate, ketogenic diet superior to a low glycaemic index diet for bringing about weight loss and metabolic improvement in obese people with type 2 diabetes? The answer in this study is "yes". The latter dietary approach is currently in vogue,

although the logic of a ketogenic diet for type 2 diabetes is more compelling. The appearance of ketones in plasma and urine indicates that lipolysis is occurring. Without lipolysis, adipose tissue mass will not be lost, and if adipose tissue is not lost, diabetes will not be controlled.

"A low carbohydrate, ketogenic diet is an important option when simple advice on calorie restriction has not produced weight loss."

Still far too few people in the UK with new-onset type 2 diabetes have prompt referral to a specialist dietician with a specific interest in type 2 diabetes and obesity, or have weight loss set as the major treatment goal at the outset. Many continue with diets that are still too rich in carbohydrate, sometimes under the guise of high fibre, low glycaemic index diets.

While it would be wrong to suggest that there is a "one size fits all" diet for type 2 diabetes, a low-carbohydrate, ketogenic diet is an important option when simple advice on calorie restriction has not produced weight loss.

Westman EC, Yancy WS Jr, Mavropoulos JC, Marquart M, McDuffie JR (2008) The effect of a low-carbohydrate, ketogenic diet versus a low-glycaemic index diet on glycaemic control in type 2 diabetes mellitus. *Nutr Metab* 5: 36

NEW ENGLAND JOURNAL OF MEDICINE

Four diets achieved similar weight loss

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

1 Four diets with different emphasis on fat, protein and carbohydrate content (20, 15 and 65%; 20, 25 and 55%, 40, 15 and 45%; and 40, 25 and 35%, respectively) were evaluated to determine their effectiveness at long-term weight loss.

2 The study comprised 811 overweight adults who were randomly allocated to one of the four diets with ongoing support (group and individual) over 2 years.

3 After 6 months all participants had lost an average of 6 kg, although weight was put on after 12 months.

4 At 2 years, weight loss was similar for people allocated to all four diets, with an average weight loss of 4 kg at study end.

5 People from all four diet groups gave similar reports of satiety, hunger, diet satisfaction and attendance at support sessions.

6 Regular attendance at group sessions was strongly related to weight loss, with an average of 0.2 kg lost per session attended.

7 These diets can be tailored to individuals to maximise successful, long-term weight loss.

Sacks FM, Bray GA, Carey VJ et al (2009) Comparison of weight-loss diets with different compositions of fat, protein and carbohydrates. *N Engl J Med* 360: 859–73

NUTRITION AND METABOLISM

HbA_{1c} improved by diet low in carbohydrate

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

1 The authors tested the hypothesis that a low carbohydrate diet would improve glycaemic control in obese people with type 2 diabetes over 24 weeks.

2 In total, 84 obese people with type 2 diabetes were randomised to a low-carbohydrate, ketogenic diet (LCKD; <20 g carbohydrate a day) or to a low-glycaemic index diet (LGID; calories reduced by 500 kcal/day from weight maintenance) for 24 weeks.

3 Both groups attended group meetings and received diet instruction, nutritional supplements and exercise recommendations for support during the study.

4 All participants had their HbA_{1c} measured at baseline and at 24 weeks; the primary outcome was change in glycaemic control at 24 weeks, as measured by HbA_{1c}.

5 In total, 49 people (58.3%) completed the study.

6 Both diets resulted in improved HbA_{1c}, fasting glucose and fasting insulin and weight loss, with the LCKD group showing greater improvements in HbA_{1c} (−1.5% vs. −0.5%), body weight (−11.1 kg vs. −6.9 kg) and high-density lipoprotein cholesterol (+5.6 mg/dL vs. 0 mg/dL) compared with the LGID group.

7 People in the LCKD group who had improved glycaemic control had more frequent medication reduction or cessation than those in the LGID group (95.2% vs. 62%).

Westman EC, Yancy WS Jr, Mavropoulos JC et al (2008) The effect of a low-carbohydrate, ketogenic diet versus a low-glycaemic index diet on glycaemic control in type 2 diabetes mellitus. *Nutrition and Metabolism* 5: 36

ARCHIVES OF GENERAL PSYCHIATRY

Cessation of binge eating improves weight loss

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

- 1 Binge eating is prevalent in overweight and obese people with type 2 diabetes (estimated prevalence of 1.4–9% in this population).
- 2 For those people seeking to lose weight, binge eating has an impact on the success of the weight loss intervention.
- 3 This study examined the relationship between binge eating and weight loss after 1 year in overweight and obese people with type 2 diabetes participating in the Look AHEAD (Action for Health in Diabetes) trial ($n=5145$).
- 4 People were randomly allocated to an intensive lifestyle intervention or to enhanced usual care; weight was measured, a fitness test completed and dietary intake and binge-eating status was self-reported at baseline and 1 year.
- 5 Most people (85.4%) did not report binge eating at baseline or 1 year, 7.5% were binge eaters only at baseline, 3.7% recorded binge eating at both baseline and 1 year, and 3.4% reported binge eating at 1 year only.
- 6 No significant differences were seen in weight loss between the intensive lifestyle intervention and enhanced usual care groups.
- 7 Across both intervention groups, greater weight loss was measured in people who stopped binge eating at 1 year and in those who had never shown binge-eating behaviour.
- 8 Once binge-eating behaviour is stopped, people can successfully lose weight following a treatment plan.

Gorin AA, Niemeier HM, Hogan P et al (2008) Binge eating and weight loss outcomes in overweight and obese individuals with type 2 diabetes. *Arch Gen Psychiatr* **65**: 1447–55

DIABETES CARE

Childhood weight gain predicts risk of islet autoimmunity

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

- 1 The study examined the relationship between early growth and the risk of islet autoimmunity.
- 2 In total, 548 infants who had a first-degree relative with type 1 diabetes were followed for

5.7 ± 3.2 years. Dietary intake was recorded and islet antibodies measured.

- 3 The study identified 46 children with islet autoimmunity; 12 progressed to type 1 diabetes at 4.2 ± 2.1 years.
- 4 Weight and BMI z-scores were continuous predictors of risk of islet autoimmunity. Weight gain up to 2 years was more predictive than weight gain up to 4 years.

Couper JJ, Beresford S, Hirte C et al (2009) Weight gain in early life predicts risk of islet autoimmunity in children with a first-degree relative with type 1 diabetes. *Diabetes Care* **32**: 94–9

“Although the low glycaemic index diet improved glycaemic control by only a modest amount, this lowered HbA_{1c} would be expected to reduce microvascular complications by about 10–12%.”

DIABETOLOGIA

Diabetes affects the brain's response to pictures of food

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

- 1 Functional magnetic resonance imaging was used to examine brain responses to pictures of food shown to 11 people with type 2 diabetes and 12 healthy controls; the images varied in terms of fat and sugar content and portion size.
- 2 People with type 2 diabetes showed increased responses to the food images in the insula,

orbitofrontal cortex (OFC) and basal ganglia compared with controls.

- 3 Foods with higher fat content had an increased effect on brain responses in people with diabetes.
- 4 Increased response to food images within the insula and OFC was positively associated with dietary adherence, dietary self-efficacy and external eating.
- 5 Response to images in subcortical structures (amygdala and basal ganglia) was linked with emotional eating and dietary non-adherence.
- 6 Type 2 diabetes affects the brain's response to food modulated by dietary self-care (e.g. dietary adherence).

Chechlac M, Rotshtein P, Klamer S et al (2009) Diabetes dietary management alters responses to food pictures in brain regions associated with motivation and emotion: a fMRI study. *Diabetologia* **52**: 524–33

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Low GI diet improves HbA_{1c} levels

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

- 1 The study assessed the effectiveness of a low glycaemic index (GI) diet on glycaemic control in 210 people with type 2 diabetes controlled with oral medications (HbA_{1c} range 6.5–8.0%).

- 2 People were randomly assigned to either a high cereal fibre diet or a low GI diet for 6 months.
- 3 In the high cereal fibre group, HbA_{1c} decreased by –0.18%; in the low GI group, HbA_{1c} decreased by –0.50%.
- 4 Although the low GI diet improved glycaemic control by only a modest amount, this HbA_{1c} reduction would be expected to reduce microvascular complications by about 10–12%.
- 5 A low GI diet can improve HbA_{1c} levels in people with type 2 diabetes taking oral medications.

Jenkins DJA, Kendall CWC, McKeown-Eyssen G et al (2008) Effect of a low glycaemic index or a high cereal fibre diet on type 2 diabetes. *J Am Med Assoc* **300**: 2742–53