Intensive lifestyle interventions: Is type 2 diabetes reversible?

In this section, a panel of multidisciplinary team members give their opinions on a recently published paper. In this issue, we focus on whether intensive lifestyle interventions are beneficial to people with type 2 diabetes in achieving reversal to normoglycaemia or prediabetes.

Association of an intensive lifestyle intervention with remission of type 2 diabetes

Gregg EW, Chen H, Wagenknecht LE et al (2012) *JAMA* **308**: 2489–96

JAMA

Intensive weight-loss regimen is associated with T2D remission

1 The prevalence of T2D in the western world is increasing. Although previous evidence suggests that remission of T2D can be achieved with lifestyle interventions, the efficacy of such interventions is unknown.

2 The authors aimed to investigate the effects of a long-term intensive weight-loss intervention on the frequency of T2D remission to a state of normoglycaemia or prediabetes in a cohort of American adults.

3 The authors performed an observational analysis on the results of a randomised control trial in which 4503 adults with a BMI of 25 kg/m^2 or over were randomised to receive an intensive lifestyle intervention (ILI) or diabetes support and education (DSE) for 4 years.

4 Participants receiving ILI (n=2241) underwent individual and group counselling sessions every week for the first 6 months of the study. After this, participants attended three sessions every month for the subsequent 6 months in addition to bi-monthly contact session and frequent refresher group meetings between years 2 to 4. In comparison, the DSE arm (n=2262) were given three group sessions per year with support offered for diet, social and physical activity.

5 Individuals in the ILI group displayed a significantly greater weight loss and had achieved higher fitness levels at years 1 and 4 (P<0.001 for each).

6 ILI was associated with an increased chance of partial and complete remission. A total of 11.5% (95% CI, 10.1%–12.8%) achieved remission in year 1, and 7.3% (95% CI, 6.2%–8.4%) at year 4, which was significantly greater than the DSE group, who displayed remission rates of 2.0% (95% CI, 1.4%–2.6% at year 1 and 1.5%–2.7% at year 4; P<0.001 for each).

7 Considerably more ILI participants achieved continuous remission that was maintained for at least 2, 3, or 4 years (9.2%, 6.4% and 3.5%, respectively, versus <2%, 1.3% and 0.5%) compared to the DSE group.

8 The authors concluded that partial remission rates were greater with ILI, although only moderate absolute remission rates were achieved within this cohort.

"The answer, based upon the evidence here, is that it is unlikely that the majority of people with T2D will be able to effect complete remission by conventional lifestyle change, but there may be a minority who would benefit."

Pamela Dyson, Research Dietitian, Churchill Hospital Oxford

Dietitians routinely offer consultations to people with T2D and are often asked if diabetes can be "cured" by diet and exercise. Although the concept of a cure is debatable, there is good evidence of remission with bariatric surgery (Adams et al, 2013) and, more recently, some evidence of effect with a very low calorie liquid diet (VLCLD) providing 800 kcal/day (Lim et al, 2011). However, what is not known is whether remission can be achieved with less intensive lifestyle strategies including weight loss, dietary change and increased physical activity.

"However, what is not known is whether remission can be achieved with less intensive lifestyle strategies including weight loss, dietary change and increased physical activity."

This study reports that these lifestyle strategies, applied in a community setting, achieved significantly greater rates of partial or complete remission of T2D in the intervention group, compared with a control group. This is the first time that any study has reported that conventional lifestyle change can result in diabetes remission and although the results were modest, and showed attenuation over the 4 years of the study, this adds useful information to what is already known about the chance of remission in people with T2D.

Data from studies of bariatric surgery, a trial of a VLCLD, and the present study confirm that diabetes remission is more likely in those who lose substantial amounts of weight, have a shorter duration of diabetes, a lower baseline HbA_{1c} and who are not receiving insulin therapy (Adams et al, 2013 and Stevens et al, 2013). A significant increase in physical fitness can now be added to this list. So, what does this mean for clinical practice and should dietitians be telling people that they could cure their T2D by diet and exercise? The answer, based upon the evidence here, is that it is unlikely that the majority of people with T2D will be able to effectively complete remission by

"The alternative view is that people newly diagnosed with T2D should be informed that they have a potentially reversible condition and that the conventional view of inevitable progression may not be true for all."

conventional lifestyle change, but there may be a minority who would benefit. Those most likely to achieve remission are newly diagnosed with lower HbA_{1c} values, who are not treated by insulin therapy, who can achieve substantial weight loss (>20% of baseline weight), and who are able to significantly increase their physical fitness.

The cynical amongst us would say that the lifestyle modifications needed to accomplish the degree of weight loss leading to remission are impossible for most people with diabetes, and that simply suggesting that people can cure their diabetes by changes in diet and exercise will induce a sense of guilt and hopelessness when they fail to reach these goals. The alternative view is that people newly diagnosed with T2D should be informed that they have a potentially reversible condition and that the conventional view of inevitable progression may not be true for all.

Diabetes UK's latest nutritional guidelines emphasise that all dietary advice should be based on scientific evidence and then be tailored specifically for the individual, taking into account their personal and cultural preferences, beliefs, lifestyle and the change that the individual is willing and able to make (Dyson et al, 2011). Based upon this, it is not unreasonable to suggest that those with newly diagnosed T2D who wish to attempt to reduce their weight, change their diet and increase their physical fitness in an attempt to reverse T2D can be informed that there is no guarantee of remission, and that they will need to lose a significant amount of weight, but should still be supported in their choice. After all, what have they got to lose? They may not reverse diabetes, but may well lose some weight, improve their physical fitness, need less medication and improve their quality of life.

Adams S, Salhab M, Hussain Z et al (2013) Preoperatively determinable factors predictive of diabetes mellitus remission following Roux-en-Y gastric bypass: a review of the literature. *Acta Diabetol* [Epub ahead of print]

Dyson PA, Kelly T, Deakin T et al; on behalf of Diabetes UK Nutrition Working Group (2011) Diabetes UK evidence-based nutrition guidelines for the prevention and management of diabetes. *Diabet Med* **28**: 1282–8

Lim EL, Hollingsworth KG, Aribisala BS et al (2011) Reversal of type 2 diabetes is associated with decrease in pancreas and liver fat. *Diabetologia* **54**: 2506–14

Steven S, Lim EL, Taylor R (2013) Population response to information on reversibility of Type 2 diabetes. *Diabet Med* **30**: e135–8. doi: 10.1111/dme.12116

"The question that needs to be asked is are these modest reductions in remission rates worth it when compared to the costs of the intensive intervention. A further question is can this sort of intervention be delivered by the NHS?"

Roger Gadsby, GP and Associate Clinical Professor, Warwick Medical School, University of Warwick, Coventry

There has been renewed debate about the importance of weight loss in the management and even reversal of T2D with the publication of papers from Professor Roy Taylor's group in Newcastle, with their suggestion that T2D can be reversed by very significant weight loss (Lim et al, 2011). Doubters have always said that weight gain would occur after a few months or years and therefore any benefits of weight reduction would be short lived. This paper from Gregg et al looks at a population of 4503 adults in the US with T2D who had a BMI at or above 25 kg/m^2 and received intensive lifestyle intervention or a diabetes support control intervention. Those in the intensive lifestyle arm had lost more weight at 1 and 4 years and were more likely to experience partial or complete diabetes remission with prevalences of 11.5% at 1 year and 7.3% at 4 years compared to 2% in the "control" group. In the intensive arm 9.2% had continuous sustained remission for at least 2 years, 6.4% for at least 3 years and 3.5% at 4 years compared with the "control" comparative figures of less than 2% at 2 years, 1.3% at 3 years and 0.5% at 4 years.

The authors conclude that the intensive lifestyle intervention was associated with a greater likelihood of partial remission, but that the absolute remission rates were modest. So we can say to the "doubters" that weight loss does seem to result in some diabetes remission at 4 years.

The question that needs to be asked is are these modest reductions in remission rates worth it when compared to the costs of the intensive intervention. A further question is can this sort of intervention be delivered by the NHS?

The intervention was very intensive and consisted of weekly group and individual counselling in the first 6 months followed by three sessions per month for the second 6 months and twice monthly contact and regular refresher group series and campaigns in years 2 to 4. The "control" group were offered 3 group sessions per year. Such an intensive programme is likely to be costly. However, the main costs of diabetes to the NHS are in treating complications and people who achieve diabetes remission should have vastly lower rates of complications and hence costs to the NHS.

Roy Taylor states that his research shows that health motivated people can reverse their T2D completely and maintain long-term normoglycaemia (Taylor, 2013). Perhaps, rather than offering an intensive lifestyle intervention programme to anyone, we should develop ways of identifying these health motivated people and specifically target them with intensive lifestyle intervention. It would be almost guaranteed to be cost-effective in these people.

Lim EL, Hollingsworth KG, Aribisala BS et al (2011) Reversal of type 2 diabetes is associated with decrease in pancreas and liver fat. *Diabetologia* **54**: 2506–14

Taylor R (2013) Banting Memorial lecture 2012: reversing the twin cycles of type 2 diabetes. *Diabetic Medicine* **30**: 267–75