Diabesity Digest

Diabesity Digest summarises recent key papers published in the area of coexistent diabetes and obesity – diabesity. To compile the digest a PubMed search was performed for the 3 months ending February 2015 using a range of search terms relating to type 2 diabetes, obesity and diabesity. Articles have been chosen on the basis of their potential interest to healthcare professionals involved in the care of people with diabesity. The articles were rated according to readability, applicability to practice, and originality.

Sign it!

David Haslam
GP, Hertfordshire and
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"During the 8-week very-low-calorie diet, 50% of people with long-duration type 2 diabetes and 87% with short duration diabetes returned to non-diabetic fasting glucose levels despite withdrawal of all anti-diabetic therapies." Take a moment to pick your chin up off the floor, and read that again. In 1976, Dr Robert Linn, an American osteopath, himself a "snacker" weighing 235 lb, discovered and exploited the liquid protein regimen, "The Last Chance Diet", making $40 million in the process. Linn opened clinics "with thick carpets and thin nurses", attracting the attention of celebrities such as Jacqueline Onassis, but unfortunately the diet contributed to the sudden deaths of a large number of individuals. The cause of the problem was reportedly the quality of the protein utilised within the regimen; basically collagen scooped up from the slaughterhouse floor. So the bad reputation of very-low-calorie diets (VLCDs) was born.

However, a gradual rehabilitation of the concept of VLCDs is now gaining momentum, and the paper by Steven and Taylor, summarised alongside, adds substantially to their renewed acceptance. The diets' ability to induce weight loss has been well proven, and now with high-quality protein utilisation their safety is assured, but this article provides evidence that they also induce a reduction in risk factors and dramatic improvements in the comorbidities of obesity. Their ability to improve or eliminate sleep apnoea has previously been shown, and studies have been carried out in short-duration diabetes (Lim et al, 2011). The new evidence that this study reports on is the effect of VLCDs in more severe, long-duration diabetes, and the effect is dramatic. Participants stopped all glucose-lowering agents prior to the study, even if they were on insulin, and then initiated the diet of under 700 calories plus non-starchy vegetables with the results stated above. As if that wasn't enough, in the long-duration group blood pressure improved from an average of 160/90 mmHg to 133/80 mmHg, total cholesterol from 4.8 to 3.7 mmol/L, and triglycerides from 2.2 to 1.0 mmol/L indicating an improvement in LDL-cholesterol quality. This is not the first study to show that dietary changes can be superior to drugs – the DPP (Diabetes Prevention Programme) proved that lifestyle changes were superior to metformin in preventing the condition (DPP Research Group, 2002) – but Steven and Taylor emphasise the fact that VLCDs have more to them than brief weight loss.

The provisos are that this study is very small, and very brief, and the challenge following VLCDs is in the successful maintenance of weight loss long term, although there is a growing weight of evidence that suggests that durable success is possible. The underlying message is that, when that form to sign someone up for a commercial VLCD appears on your desk, sign it! ■

DPP Research Group (2002) Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* **346**: 393–40

Lim EL, Hollingsworth KG, Aribisala BS et al (2011) Reversal of type 2 diabetes: normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol. *Diabetologia* **54**: 2506–14

Diabet Med

Very-low-calorie diet for people with diabetes duration over 8 years

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓✓
Originality	✓✓✓✓

1. The aim of the study was to establish whether a very-low-calorie diet is effective in improving glycaemic control in people who have had diabetes for a long duration (defined as over 8 years).
2. The 8-week diet was followed by 15 people with T2D for less than 4 years, and 14 people with T2D for more than 8 years.
3. All T2D medication was stopped prior to the study and participants had to achieve weight loss targets of 3.8% and 9.3% body weight at weeks 1 and 4 respectively to remain in the study.
4. The two groups were well-matched at baseline for weight and BMI, and achieved a similar weight loss of approximately 14% (P=0.662 for the difference). Both groups achieved a similar and significant decrease in BMI.
5. The short- and long-duration groups both had significant decreases in fasting plasma glucose.
6. The responders were defined as achieving a fasting plasma glucose of <7 mmol/L at week 8 of the diet. Of the 29 participants, those who responded tended to be younger, have a shorter diabetes duration and lower baseline fasting glucose and required less treatment compared to non-responders.
7. Blood pressure, total cholesterol and LDL-cholesterol improved markedly and to a similar extent in both groups. There was no change in HDL-cholesterol in both groups.

Steven S, Taylor R (2015) Restoring normoglycaemia by use of a very low calorie diet in long- and short-duration type 2 diabetes. *Diabet Med* 12 Feb [Epub ahead of print]

J Clin Endocrinol Metab

Liver fat content: Lower in obese people with T1D than people without diabetes

Readability	✓✓✓
Applicability to practice	✓✓✓
Originality	✓✓✓

1. People with T1D may have protection against non-alcoholic fatty liver disease due to their liver physiology. The authors sought to compare liver fat content and insulin sensitivity of hepatic glucose production and lipolysis between overweight people with T1D and overweight people without diabetes. They hypothesised that low liver fat content might protect from obesity-associated increases in insulin requirements.
2. The participant groups (32 in each) were matched for age, BMI and gender. Cases were selected from a Finnish diabetes study and the controls were recruited from occupational health services in Helsinki, Finland.
3. Liver fat content was lower in people with T1D than people without diabetes (0.6% vs 0.9% respectively; $P<0.001$). Liver function, based on clinical tests, was also significantly lower in people with T1D than in people without diabetes.
4. The endogenous rate of glucose production during euglycaemic hyperinsulinemia was significantly lower ($P<0.012$) and the percent suppression of endogenous glucose production by insulin was significantly greater ($P<0.009$) in people with T1D than in people who did not have diabetes.
5. People with T1D had significantly higher insulin sensitivity of hepatic glucose production and insulin sensitivity to lipolysis compared to people without diabetes.
6. The authors conclude that people with T1D might be protected from liver steatosis and hepatic insulin resistance, and increasing BMI does not seem to increase insulin resistance or insulin requirements in T1D.

Llauradó G, Sevastianova K, Sädevirta S et al (2015) Liver fat content and hepatic insulin sensitivity in overweight patients with type 1 diabetes. *J Clin Endocrinol Metab* **100**: 607–16

Surg Obes Relat Dis

Understanding the "metabolically healthy but obese" phenotype

Readability	✓✓✓✓
Applicability to practice	✓✓✓
Originality	✓✓✓

1. The aim of the study was to determine the prevalence of individuals who are "metabolically healthy but obese" (MHO) and to understand the risk factors associated with the MHO phenotype.
2. The MHO phenotype is defined as a person being obese with normal insulin sensitivity, no high blood pressure and favourable lipid and inflammation profiles.
3. In this retrospective study, the cohort was of 710 consecutive adult participants who underwent bariatric surgery. Of the total 523 people who had complete data on diabetes, hypertension and the investigated risk factors, 150 people were identified as MHO.
4. Multi-variable logistic regression was used to examine the association between cohort groups and the potential risk factors associated with the MHO phenotype.
5. Among those without diabetes or hypertension, 88.7% had liver steatosis, 7.3% had non-alcoholic steatohepatitis and 19.3% had liver fibrosis. There was a significant difference in age, gender and prevalence of liver dysfunction ($P<0.05$) between participants that were MHO and those that were not.
6. Approximately a third of people undergoing bariatric surgery could be considered as MHO. Those who were MHO were more likely to be white, young, female and have less liver injury.
7. As there was a high prevalence of liver steatosis in MHO individuals, this suggests that the idea that MHO is a truly metabolic health entity is wrong.

Lee CJ, Clark JM, Asamoah V et al (2015) Prevalence and characteristics of individuals without diabetes and hypertension who underwent bariatric surgery: lessons learned about metabolically healthy obese. *Surg Obes Relat Dis* **11**: 142–6

Obes Surg

Surgical treatment for T2D with mild obesity – What effect does it have and what are the underlying mechanisms?

Readability	✓✓✓
Applicability to practice	✓✓✓
Originality	✓✓✓

1. The physiological and clinical effects of Roux-en-Y gastric bypass (RYGB) on T2D and mild obesity (BMI 30–34.9 kg/m^2) were under investigation in this small, Brazilian study of 36 people.
2. Twenty-four people were on insulin therapy plus oral anti-diabetes drugs, and 12 were on oral anti-diabetes drugs only. The study period was 24 months after surgery, and follow-up was conducted at baseline and 3, 6, 12 and 24 months' post-surgery.
3. The factors under investigation were changes in HbA_{1c}, fasting glucose and insulin, anti-diabetes treatments, BMI and a range of biochemical markers.
4. After 3 months, all the participants in the study achieved normal-to-overweight BMI and experienced some form of clinical improvement, but not all achieved diabetes remission. Over the full 24-month period, 86% of participants had reduced HbA_{1c} to <7% (<53 mmol/mol), and there was complete and partial remission in 22% and 3% of participants respectively.
5. Those that did not experience diabetes remission had at baseline and 12 months' follow-up longer diabetes duration, higher HbA_{1c}, lower beta-cell secretory function, and higher first 30-mins glucose-dependent insulinotropic polypeptide (incremental area under curve) compared to those with remission.
6. RYGB improved glucose metabolism in people with T2D who were mildly obese, although the authors are cautious that not everyone receiving surgery will achieve diabetes remission.

Fellici AC, Lambert G, Lima MM et al (2015) Surgical treatment of type 2 diabetes in subjects with mild obesity: mechanisms underlying metabolic improvements. *Obes Surg* **25**: 36–44

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