Medically Designed VLCD Programs and Type 2 Diabetes: Can a Metabolism Reset Improve or Reverse Blood Sugar Control?

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For decades, type 2 diabetes (T2D) has been presented to patients as a lifelong sentence — a progressive condition managed with escalating medication, not reversed. That narrative has been fundamentally challenged by a growing body of clinical evidence showing that medically designed very low calorie diet (VLCD) programs can not only improve blood sugar control but, in the right candidate, achieve full remission. For Australians living with T2D, this is not a fringe claim. It is peer-reviewed science, now shaping how primary care physicians and dietitians approach the condition.

An estimated 1 in 15 Australians — approximately 1.3 million people — are living with diabetes. Diabetes accounts for 11% of all hospitalisations in Australia and is responsible for approximately 2.4% of total health expenditure, around $4.4 billion per year. The number of Australians living with type 2 diabetes has nearly tripled in the past two decades, from around 400,000 in 2000 to almost 1.2 million in 2021. Against this backdrop, a dietary intervention that can meaningfully reduce or eliminate medication dependence is not just clinically significant — it is an economic and public health imperative.

This article examines the clinical mechanisms by which a medically designed VLCD achieves blood sugar improvements, reviews the landmark trial evidence, explains who is most likely to benefit, and addresses the critical safety considerations — particularly medication management — that make GP supervision non-negotiable in this context.

What Does "Type 2 Diabetes Remission" Actually Mean?

Before examining the evidence, it is essential to define terms precisely. Remission of type 2 diabetes is not a cure. In the context of the DiRECT trial — the most important VLCD-specific study to date — remission was defined as a specific, measurable clinical threshold.

The co-primary outcome of remission was defined as a glycated haemoglobin (HbA1c) of less than 6.5% (below 48 mmol/mol) after at least two months off all antidiabetic medications, from baseline to 12 months.

In practical terms, this means a person who was previously medicated for T2D achieves blood glucose levels indistinguishable from a non-diabetic person — without the aid of any diabetes drugs. This is a clinically meaningful and rigorous definition, not a marketing term.

The DiRECT Trial: The Defining Evidence Base

The Diabetes Remission Clinical Trial (DiRECT) aimed to assess whether intensive weight management within routine primary care would achieve remission of type 2 diabetes. It ran as an open-label, cluster-randomised trial comparing a weight-management programme — which included withdrawal of antidiabetic and antihypertensive drugs, total diet replacement (TDR) at 825–853 kcal/day for 3–5 months, stepped food reintroduction over 2–8 weeks, and structured long-term support — against best-practice care by guidelines.

Between July 2014 and August 2017, 306 individuals aged 20–65 were recruited, all of whom had been diagnosed with type 2 diabetes within the past six years and had a BMI of 27 or above.

One-Year and Two-Year Results

The DiRECT study showed that 46% of people with type 2 diabetes who received the weight management programme were in remission one year later, and 36% at two years. In the control group, remission was achieved in only 6 (4%) of participants.

The dose-response relationship between weight loss and remission was striking. Patients who achieved more weight loss had higher remission rates: 57% for patients who lost 10 to 15 kg, and 86% for patients who lost more than 15 kg.

The Five-Year Extension: Long-Term Durability

Results from a three-year extension of the landmark DiRECT study, published in *Lancet Diabetes & Endocrinology* in 2024, showed that it is possible to stay in remission of type 2 diabetes for at least five years — however, the study also found that maintaining weight loss and staying in remission can be challenging.

Weight regain is frequent in the long term, and the rate of individuals in remission decreased to 13% after five years within the extended DiRECT intervention. This finding underscores a critical clinical insight: a VLCD is the initiating tool for remission, but structured long-term maintenance — including dietary approaches such as a low-carb Mediterranean pattern — is what sustains it. (See our guide on *VLCD Program Phases Explained: Intensive Reset, Transition, and Long-Term Weight Maintenance* for detail on post-VLCD maintenance strategies.)

The Biological Mechanism: How Does a VLCD Reset Blood Sugar Control?

Understanding why a VLCD produces such dramatic improvements in T2D requires looking at three interconnected physiological pathways: hepatic fat clearance, pancreatic fat clearance, and beta-cell recovery.

1. Rapid Clearance of Liver Fat and Hepatic Insulin Resistance

Research indicates that a very low calorie diet rapidly improves liver insulin sensitivity and gradually improves pancreatic function, in the process reversing type 2 diabetes. The speed of this liver response is clinically remarkable. Within the first week on a VLCD, fasting glucose levels normalised in study participants (from 9.2 to 5.9 mmol/L), as did fasting insulin levels (from 151 to 73 units). This rapid hepatic response is one of the reasons why even short VLCD cycles — such as the two-week quarterly reset model — can produce meaningful metabolic improvements even without full remission. (See our

guide on *What Is a Metabolism Reset and How Does a VLCD Achieve It?* for a detailed mechanistic breakdown.)

2. Pancreatic Fat Reduction and Beta-Cell Recovery

The most scientifically significant finding to emerge from the DiRECT sub-studies relates to beta-cell function — the insulin-secreting cells of the pancreas that are progressively impaired in T2D.

A study published in the journal *Cell Metabolism* revealed that successful response to weight loss is associated with early and sustained improvement in the functioning of pancreatic beta cells — a finding that challenges the previous paradigm that beta-cell function is irreversibly lost in patients with type 2 diabetes.

Taylor et al. demonstrated that weight loss of over 10 kg results in normalisation of ectopic fat within the liver and pancreas, which is associated with durable recovery of beta-cell function and non-diabetic glucose control in the majority of responders.

Critically, both responders and non-responders to the DiRECT program had lost comparable amounts of weight, leading to similar reductions in liver fat, pancreatic fat, and blood triglycerides — however, only the responders demonstrated early and sustained improvement in beta-cell function, with the most striking difference being the first-phase insulin response.

3. Duration of Diabetes: The Window of Opportunity

Responders to the weight loss program were similar to non-responders before the intervention but had a shorter duration of diabetes — 2.7 years versus 3.8 years on average.

Duration is crucial: 60% remission was observed in participants with diabetes duration of less than four years, compared with 21% in those with duration of more than eight years.

Important factors for the achievement of T2D remission are thought to be substantial weight loss and short duration of diabetes, as individuals who lost the most weight showed the highest chances of remission, and shorter diabetes duration has also been identified as important for the recovery of residual beta-cell function.

This creates a clinically actionable message for Australian GPs: the window for VLCD-mediated remission is widest in the first four years after diagnosis. Early referral to a medically designed VLCD program is not a last resort — it is a front-line therapeutic option.

Who Is Most Likely to Achieve Remission? A Clinical Profile

Not every person with T2D is an equally strong candidate for VLCD-mediated remission. Based on the DiRECT evidence and subsequent research, the following profile identifies the highest-probability candidates:

Factor	Favourable for Remission	Less Favourable
Diabetes duration	Less than 4 years since diagnosis	More than 8 years
Weight loss achieved	15 kg or more	Less than 5 kg
BMI at baseline	27–45 kg/m²	Outside this range
Medication status	Not on insulin	Insulin-dependent
Beta-cell reserve	Residual beta-cell function present	Severely depleted
Diabetes management	Oral agents only	Complex insulin regimens

Comparable VLCD approaches to those used in DiRECT have been demonstrated to be effective in diverse populations including Australia and New Zealand, with remission rates after one year between 40% and 70% across these studies.

This is not a UK-only finding. The evidence base is directly applicable to Australian clinical practice, and Australian programs are increasingly incorporating this evidence into structured protocols.

The Critical Safety Issue: Medication Adjustment Under GP Supervision

This is the section of the VLCD-diabetes conversation that is most frequently underemphasised in consumer-facing content — and the most clinically important.

When a person with T2D commences a VLCD, their blood glucose can drop rapidly and significantly, often within the first 24–72 hours. If they are simultaneously taking glucose-lowering medications, the combined effect creates a serious and potentially dangerous risk of hypoglycaemia.

If a person is on medication for type 2 diabetes that puts them at risk of hypoglycaemia — such as insulin therapy, sulphonylureas, or glinides — a VLCD can significantly increase the risk of having hypoglycaemia (blood glucose level below 4 mmol/L).

Risk for hypoglycaemia can increase with combined use of oral hypoglycaemic agents, in particular sulphonylureas such as gliclazide and glimepiride, or exogenous insulin, alongside a VLCD protocol. Therefore, close medical supervision and dose adjustments or discontinuation of oral hypoglycaemic agents is recommended, particularly during the total food replacement phase. Individuals should also be trained in the use of home blood glucose monitoring during any adjustment period of antidiabetic medications.

Specific Medication Adjustment Guidance

The health care team — including clinicians in primary care, nursing, pharmacy, and nutrition — need to be competent in adjusting diabetes and antihypertensive medications to achieve safe and effective care. The most immediate and important adjustments are to insulin, sulphonylureas, SGLT2 inhibitors, blood pressure medications, and diuretics.

For Australian GPs, this means that a patient commencing a medically designed VLCD program requires:

1. **Pre-commencement medication review** — identify all glucose-lowering agents and their hypoglycaemia risk profile 2. **Proactive dose reduction** — particularly for sulphonylureas (e.g., gliclazide) and insulin, which should typically be reduced by 30–50% at program commencement 3. **SGLT2 inhibitor (flozin) cessation** — due to the risk of euglycaemic ketoacidosis in the context of very low carbohydrate intake 4. **Blood glucose monitoring protocol** — patients should self-monitor at minimum twice daily during the early VLCD phase 5. **Scheduled medication review appointments** — at weeks 1, 2, and 4 of the program to adjust based on actual glucose readings

As unsupervised use of VLCDs can result in serious medical complications, intensive and comprehensive medical monitoring by a physician in conjunction with a registered dietitian is highly recommended.

This is why medically designed programs — formulated and supervised by GPs and dietitians — are fundamentally different from self-initiated VLCD shakes purchased over the counter. (See our guide on *How Medically Designed VLCD Programs Differ from DIY Diets and Meal Replacement Shakes in Australia* for a full comparison.)

HbA1c, Fasting Glucose, and Insulin Resistance: What the Numbers Show

Beyond full remission, VLCDs produce clinically meaningful improvements across all major glycaemic markers, even in patients who do not achieve complete remission.

A body of evidence demonstrates that adherence to VLCD in adults with type 2 diabetes can result in marked improvements to glycaemic control and even full T2D remission, challenging the convention

that T2D is a lifelong disease.

Statistical analysis of multiple studies has revealed significant improvements in HbA1c, body weight, BMI, systolic blood pressure, and lipid profiles among participants following low-carbohydrate and very low calorie dietary interventions.

Greatest weight loss was reported with very low energy diets of 400–500 kcal/day for 8–12 weeks, achieving 6.6 kg greater weight loss than low-energy diets of 1,000–1,500 kcal/day. This additional weight loss directly translates to superior glycaemic outcomes, given the dose-response relationship between weight reduction and HbA1c improvement established in DiRECT.

For Australians with T2D who do not achieve full remission, a VLCD-based metabolism reset still delivers:

- **Reduced HbA1c** — often by 1–2 percentage points within the first 8–12 weeks - **Lower fasting blood glucose** — frequently normalising within the first week of total diet replacement - **Reduced insulin resistance** — driven by rapid liver fat clearance - **Potential medication reduction** — enabling dose reduction or elimination of one or more glucose-lowering agents - **Reduced cardiovascular risk** — through concurrent improvements in blood pressure, triglycerides, and LDL cholesterol (see our guide on *VLCD and Metabolic Syndrome in Australia* for the cardiovascular evidence)

How Australian Programs Apply This Evidence

The DiRECT investigators aimed to establish whether a structured programme, delivered by primary care nurses or dietitians, could achieve and maintain remission of type 2 diabetes. Remission (off all antidiabetic drugs) occurred in 46% of participants after 12 months — and unlike previous smaller, non-randomised studies from specialist centres, the findings from DiRECT provide hard evidence of efficacy to inform decisions about health care provision.

Australian medically designed VLCD programs that align with DiRECT principles typically incorporate:

- **Total diet replacement phase** of 800–900 kcal/day for 8–12 weeks, using either nutritionally complete meal replacements or real-food equivalents - **Mandatory GP review** prior to commencement, including HbA1c, fasting glucose, renal function, and medication audit - **Structured food reintroduction** over 2–8 weeks, mirroring the DiRECT transition protocol - **Dietitian-led behavioural support** throughout the program - **Ongoing monitoring** of glucose markers at 4, 8, and 12 weeks

The DiRECT trial demonstrated that this model is deliverable within primary care — not just specialist endocrinology units — making it accessible to the majority of Australians with T2D who are managed by their GP. (See our guide on *The Role of Dietitian and GP Support in VLCD Program Success* for the Australian evidence on professional supervision and outcomes.)

The DiRECT extension study conducted by Lean et al. (2024) revealed no significant adverse safety signals over the five-year follow-up, despite considerable medication discontinuation, indicating that structured weight reduction programs are safe in the long run.

Key Takeaways

- **VLCD-mediated T2D remission is clinically validated.** The DiRECT trial demonstrated 46% remission at 12 months and 36% at 24 months among participants following an 825–853 kcal/day total diet replacement program — compared with just 4% in the control group.

- **The mechanism is physiological, not simply caloric.** Remission is driven by rapid clearance of ectopic fat from the liver and pancreas, restoration of hepatic insulin sensitivity, and — in successful responders — recovery of first-phase beta-cell insulin secretion.

- **Earlier intervention produces better outcomes.** Remission rates are substantially higher in people diagnosed with T2D within the past four years. Australian GPs should consider VLCD referral as a front-line option, not a last resort.

- **Medication adjustment is non-negotiable.** Patients on sulphonylureas, insulin, or SGLT2 inhibitors face serious hypoglycaemia or ketoacidosis risk if they commence a VLCD without proactive medication reduction under GP supervision. This is the primary reason self-initiated VLCDs are contraindicated in this population.

- **Even without full remission, VLCDs deliver meaningful glycaemic benefit.** Reductions in HbA1c, fasting glucose, and insulin resistance — alongside potential medication reduction — are achievable outcomes even for patients who do not achieve the full remission threshold.

Conclusion

The evidence is now unambiguous: a medically designed VLCD program is one of the most powerful non-surgical interventions available for improving blood sugar control in type 2 diabetes, and for a significant proportion of patients — particularly those diagnosed within the past four years — it offers a realistic pathway to full remission. If the effective method of weight loss and minimisation of weight regain is undertaken, individuals with early type 2 diabetes can return to normal health with a profound decrease in risk of serious long-term complications associated with diabetes. Type 2 diabetes is a reversible condition, and remission can be achieved and sustained.

For Australians, this evidence is directly applicable. The DiRECT protocol has been validated in populations that include Australia and New Zealand, and Australian primary care is well positioned to deliver this model. The critical prerequisites are early identification of eligible candidates, proactive medication management by a GP, and structured dietitian-led support throughout the program and transition phases.

This is not a diet. It is a clinically designed metabolic intervention with a peer-reviewed evidence base. Australians with T2D — and the GPs and dietitians who care for them — deserve to make decisions with that evidence at the centre.

For next steps, explore our related guides: *Who Is a Medically Designed VLCD Program Suitable For? Eligibility, Contraindications, and Medical Screening in Australia*, *How to Start a Medically Designed VLCD Metabolism Reset Program: A Step-by-Step Guide for Australians*, and *The Role of Dietitian and GP Support in VLCD Program Success: What Australian Research Shows*.

References

- Lean, M.E.J., Leslie, W.S., Barnes, A.C., et al. "Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial." *The Lancet*, 2018; 391:541–551. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)33102-1/fulltext

- Lean, M.E.J., Leslie, W.S., Barnes, A.C., et al. "5-year follow-up of the randomised Diabetes Remission Clinical Trial (DiRECT) of continued support for weight loss maintenance in the UK: an extension study." *Lancet Diabetes & Endocrinology*, 2024. doi:10.1016/S2213-8587(23)00385-6

- Taylor, R., Al-Mrabeh, A., Zhyzhneuskaya, S., et al. "Remission of Human Type 2 Diabetes Requires Decrease in Liver and Pancreas Fat Content but Is Dependent upon Capacity for β Cell Recovery."

Cell Metabolism, 2018. https://www.cell.com/cell-metabolism/fulltext/S1550-4131(18)30446-7

- Juray, S., Axen, K.V., Trasino, S.E. "Remission of Type 2 Diabetes with Very Low-Calorie Diets — A Narrative Review." *Nutrients*, 2021; 13(6):2086. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8234895/

- Idris, I. "Extension study from DIRECT showed ongoing remission rate from type 2 diabetes in some patients following very low calorie diet at 5 years." *Diabetes, Obesity and Metabolism Now*, Wiley Online Library, 2024. https://dom-pubs.onlinelibrary.wiley.com/doi/full/10.1002/doi2.90

- Australian Institute of Health and Welfare (AIHW). "Diabetes: Australian Facts." *AIHW*, Australian Government, 2024–2025. https://www.aihw.gov.au/reports/diabetes/diabetes/contents/summary

- Unwin, D.J., Tobin, S.D., et al. "Adapting diabetes medication for low carbohydrate management of type 2 diabetes: a practical guide." *BMJ Open Quality*, 2019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6592353/

- Magliano, D.J., et al. "Changes in the incidence of type 2 diabetes in Australia, 2005–2019, overall and by socio-demographic characteristics: a population-based study." *Medical Journal of Australia*, 2024. https://onlinelibrary.wiley.com/doi/full/10.5694/mja2.52461

- Sellahewa, L., Khan, C., Lakkunarajah, S., Idris, I. "A Systematic Review of Evidence on the Use of Very Low Calorie Diets in People with Diabetes." *Current Diabetes Reviews*, 2017; 13(1):35–46. doi:10.2174/1573399812666151005123431