

Evidence-Based Dietary Approaches: VLCD, LCD and Normocaloric Protocols in Obesity Clinical Practice

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DISCLOSURE

Conflicts of Interest

Nothing to disclose

What You Will Take Away

1

Differentiate Protocols

Distinguish VLCD, LCD, and Normocaloric strategies by caloric targets, macronutrient profiles, and clinical indications

2

Evaluate efficacy and clinical indications

Discussing the metabolic mechanisms underlying each dietary strategy

3

Integrate dietary therapy with modern obesity management

Implement protocols with appropriate monitoring, phase transitions, and medical and nutritional supervision frameworks

Dietary Protocols

	WEIGHT-LOSS PHASE		MAINTENANCE PHASE
Dimension	VLCD	LCD	Normocaloric Diet (ND)
Caloric Target	<800 kcal/day	800-1200 Kcal/d	= individual energy requirements
Components	Food-based and/or meal replacements	Food-based and/or meal replacement	Individualized dietary pattern
Primary goal	Rapid weight-loss	Weight loss	Weight stability/maintenance
Duration	< 12 weeks	Up to 6 months	Long-term

VLCD: Evidence & Prescription

The most intense non-surgical dietary intervention — requiring close clinical structure from initiation through transition.



Scientific Evidence for VLCD

SYSTEMATIC REVIEW

Very-low-energy diets and morbidity: a systematic review of longer-term evidence

Domain	Key finding
Safety	Effective and well tolerated when nutritionally complete and used for a limited period .
Efficacy	Weight loss is sustained, especially with exercise, behavioral therapy and/or medication .
Follow-up	Up to 5 years across different maintenance strategies .

32

STUDIES REVIEWED



12

Weeks DURATION



MD

UNDER SUPERVISION



VLCD: Nutritional Requirements



Protein

0.8–1.5 g/kg IBW/day

(60–100 g/day)

Preserves lean mass — high-quality protein plus resistance exercise counters loss and boosts satiety.

Carbohydrates

50–80 g/day

Varies with the VLCD formula — does not necessarily induce ketosis.

Lipids

20 g/day

(7–10 g/day)

Triggers CCK release, stimulating gallbladder contraction.

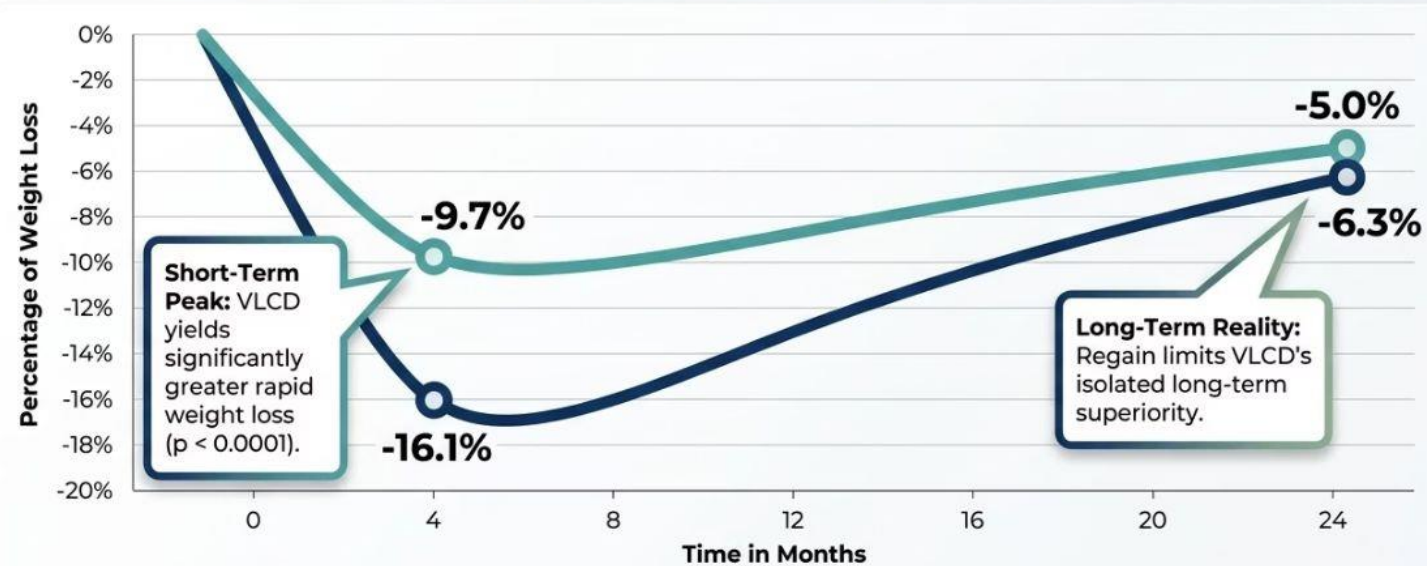
Supplies essential fatty acids — avoid unnecessary fat restriction.

Micronutrients

Daily multivitamin + mineral supplement — mandatory throughout the entire VLCD protocol.

Short-Term Gains vs. Long-Term Reality

The Efficacy Intersection: Short-Term vs. Long-Term Reality



Tsai & Wadden, 2006

Clinical Indications & Contraindications of VLCD

Indications

→ **Need for rapid weight loss**

No response to conventional diets after an adequate trial

→ **Urgent Comorbidities**

Uncontrolled T2DM, NAFLD, severe sleep apnea, obesity hypoventilation

→ **Pre-Bariatric Preparation**

2 weeks pre-op to reduce hepatic volume and operative risk

→ **Time-Sensitive Procedures**

Rapid glycemic, blood pressure or lipid control before scheduled procedures

Contraindications

Avoid

Pregnancy/lactation
Active eating disorder
Unstable cardiovascular disease

Adherence

VLCD does not necessarily result in higher dropout than LCD when delivered within a structured program
Depends strongly on treatment structure, support and patient's preference

LCD: Evidence & Prescription

The clinical workhorse of obesity management — balancing meaningful efficacy with the adherence and tolerability real-world practice demands.



LCD: Principles & Evidence

Key Principles



Caloric Target

Low energy diet: 800–1,200 kcal/day; up to 1600Kcal/d



Metabolic Outcomes

HbA1c, triglycerides, and blood pressure reduced across multiple RCTs — independent of dietary pattern



Definitions vary across guidelines

NICE 2025: VLED <800 kcal/d; LED 800–1,200 kcal/d.

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

Practical Prescription of LCD

Four practical levers make an LCD work: protein, fiber, meal structure and follow-up.

Protein Optimization

1.2–1.5 g/kg IBW/day across ≥ 3 meals — preserves lean mass and enhances satiety.

Fiber Intake

≥ 14 g/day per 1000 kcal from vegetables and whole grains; supplements may be needed.

Meal Planning

Portion control, meal timing and substitution lists — plate models or nutrition apps.

Adherence

Limited period of time
Allows more flexible food-based meal-planning than VLCD

Macronutrient split — LCD



■ Carbohydrate 40–55%

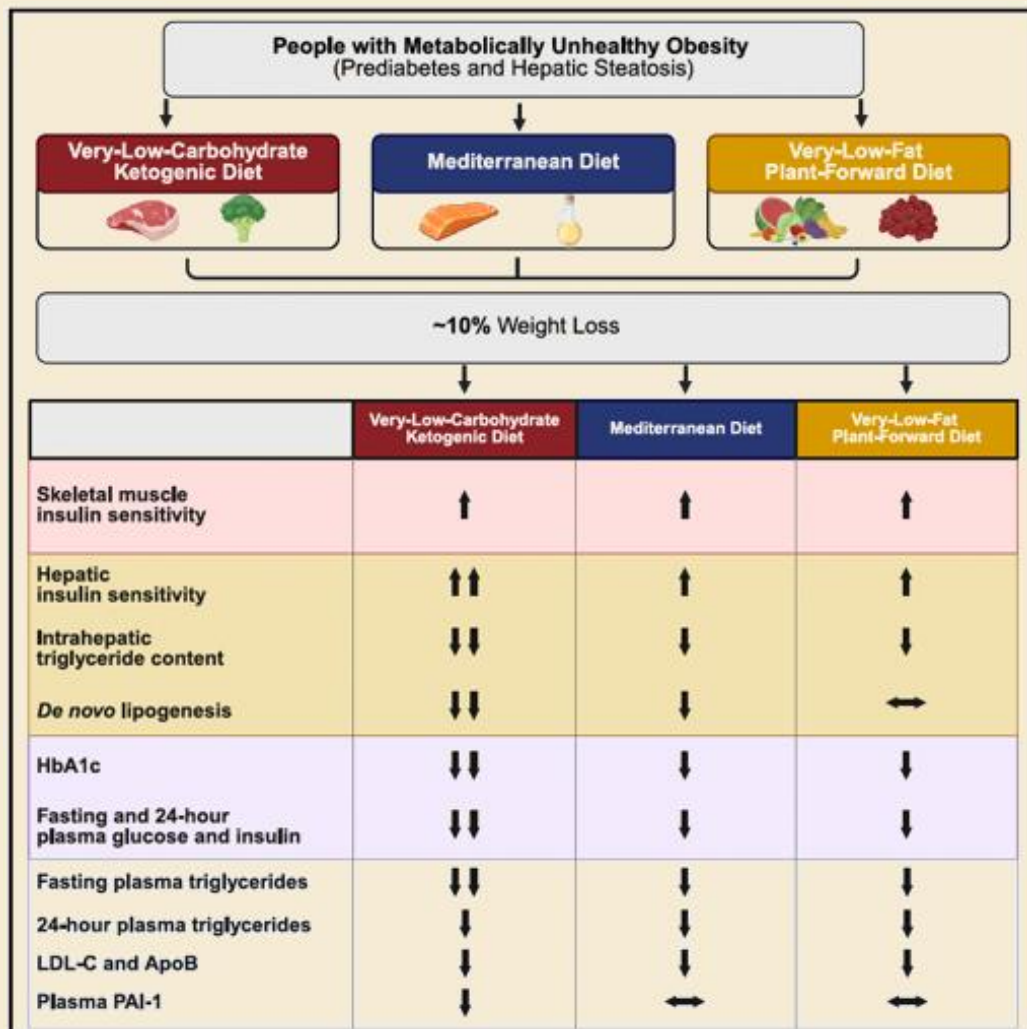
■ Fat 20–30%

■ Protein 25–30%

Energy Restriction vs Macronutrient Composition

Study	Design / Population	Dietary Intervention	Main Weight-Loss Finding	Key Message
Sacks et al., 2009 – POUNDS LOST	RCT; 811 adults; 2 years	4 calorie-reduced diets with different protein, fat and carb levels (~750 kcal/d deficit)	–2.9 to –3.6 kg across all arms; $P > 0.20$	Similar weight loss regardless of macronutrient mix
Ge et al., 2020	Network meta-analysis; 121 RCTs; 21,942 adults	Low-carb, low-fat and moderate-macronutrient diets	All patterns reduced weight; differences small and faded by 12 months	No macronutrient pattern is better long term
Churuangsuk et al., 2022	Umbrella +SR	VLED, LED and meal replacement	VLED: ~6.6 kg more than 1,000–1,500 kcal/d diets	Bigger energy deficit, bigger weight loss
DROPLET – Astbury et al., 2021	RCT; 3-year follow-up	~810 kcal/d total diet replacement, then reintroduction and maintenance	–3.3 kg vs usual care at 3 y (95% CI –5.2 to –1.5)	Intensive restriction works; maintenance is critical
Min et al., 2021	Meta-analysis; 22 RCTs	Meal replacement vs food-based energy-restricted diets	More weight loss with meal replacement (Hedges g 0.261)	Meal replacements make restriction easier to follow

Weight Loss vs Macronutrient Intake



Cell Metabolism Clinical and Translational Report

Effect of diet macronutrient content on the cardiometabolic response to weight loss: A randomized clinical trial

Key message

Weight loss reached ~10% with all three diets; cardiometabolic effects diverged — hepatic insulin sensitivity and triglycerides improved most in the ketogenic arm, while LDL-C fell further with the low-fat, plant-forward pattern.

Diet in the Era of Pharmacotherapy

GLP-1 receptor agonists and dual agonists have redefined obesity pharmacotherapy — but dietary quality, protein adequacy, and structured nutritional counseling remain indispensable.



GLP-1 + DIET

Combining Diet with GLP-1 Receptor Agonists



Caloric Synergy

Patients on GLP-1 RAs and dual agonists reduce caloric intake by **16–40%.**

VLCD/LCD

Adherence in a long term had increased.

Most studies -500 Kcal/d deficits



Macronutrient Intake: Study Results

Dietary Intake in GLP-1/GIP RA Users

753

kcal/day

Energy Intake

33.4

g/day

Protein

96.4

g/day

Carbohydrates

26.5

g/day

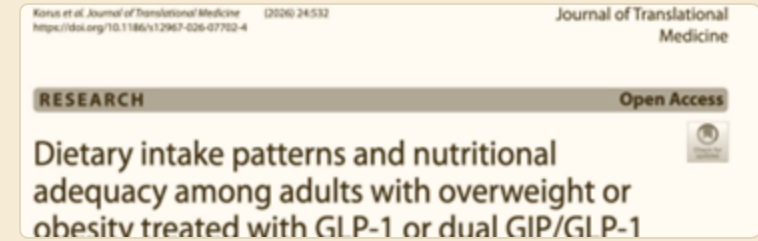
Fat

Pharmacologically-driven appetite suppression does not guarantee dietary quality – active nutritional counseling is required to prevent nutritional deficiencies during rapid weight loss.

These data should not be generalized to all GLP-1/GIP users.

ATTENTION

PTV · MVI
nutritional
care



Transition Phase & Conventional Hypocaloric Diet

Period of time

DROPLET: 4 weeks (LCD)

DiRECT: 2–8 weeks (LCD)

Satiety high-volume, low-energy-density meals help control hunger.

Fiber 25–30 g/day from vegetables, fruit, legumes and whole grains.

Protein 1.2–1.5 g/kg IBW/day to protect lean mass.

- Increase energy intake gradually — about 100 kcal per week

- **Conventional hypocaloric** 500-600 deficit



NORMOCALORIC —
MAINTENANCE

Normocaloric Diet & Long-Term Maintenance

Maintenance is not a passive default — it is an active clinical intervention requiring high-protein prescriptions, structured behavioral support, and evidence-based dietary patterns.



Normocaloric Protocol: what does it mean ?

1. Estimate REE

Indirect calorimetry OR

Mifflin–St Jeor equation (actual body weight)

2. Estimate Total Energy Expenditure

$$TEE = REE \times \text{Physical Activity Factor}$$

3. Apply the PAL factor

4. Normocaloric prescription

$$\text{Normocaloric intake} \approx TEE$$

PHYSICAL ACTIVITY FACTOR (PAL)

Physical activity	Factor
Sedentary	≥ 1.0 to < 1.4
Low active	≥ 1.4 to < 1.6
Active	≥ 1.6 to < 1.9
Very active	≥ 1.9 to < 2.5



Indirect calorimetry — reference method for measuring REE

Normocaloric Protocol: The Active Maintenance Phase



1 • Weight-loss induction

2 • Food reintroduction

3 • Weight maintenance

Comprehensive Lifestyle Intervention

Nutrition • Physical Activity
Sleep • Behavioral Therapy

Physical Activity

Increase to 200-300min/week.

Body composition

Evaluation needed
Muscle mass preservation

Satiety

Protein • Fiber
Quality

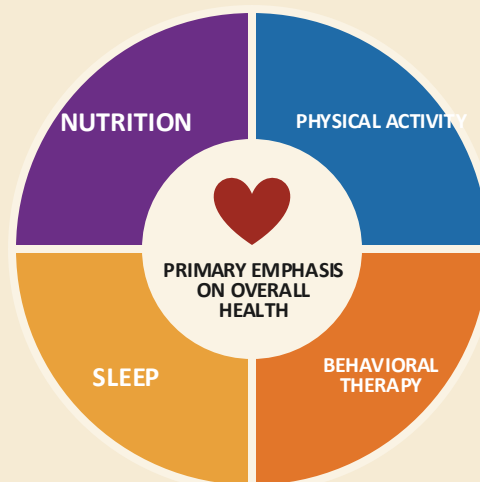
Comprehensive Lifestyle Intervention

NUTRITION

- Reduced-calorie diet while keeping diet quality
- Healthful patterns (e.g., Mediterranean diet)
- Minimally processed, nutrient-dense foods
- Limit energy-dense foods and beverages
- Ensure protein, fiber, iron, calcium and micronutrients
- Options: macronutrient strategies, meal replacements, strategic fasting, personalized targets

SLEEP

- Screen for sleep disorders
- Promote good sleep hygiene
- Optimize sleep quality and duration
- Refer for polysomnography if indicated



PHYSICAL ACTIVITY

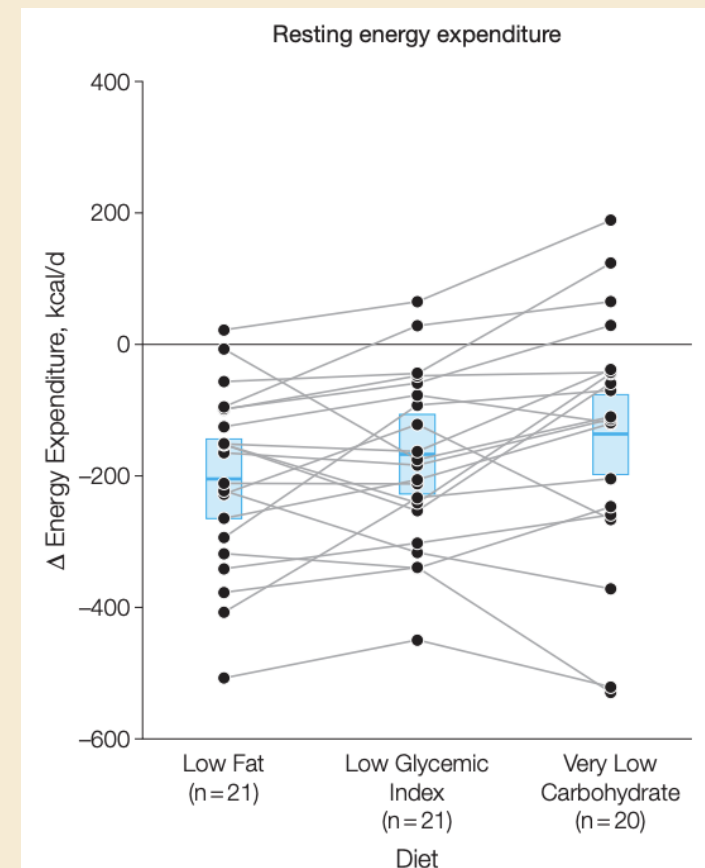
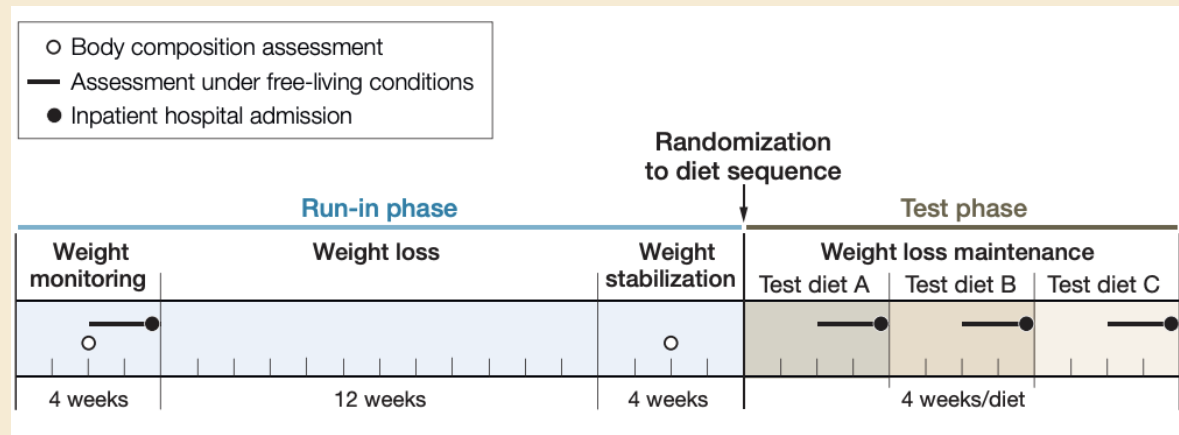
- Tailor to patient preference and functional ability
- Aerobic activity, progressively increased
- Resistance training — preserves lean mass
- Reduce sedentary behavior
- Refer to an exercise specialist if needed

BEHAVIORAL THERAPY

- Screen for anxiety, depression, eating disorders and internalized weight bias
- Goal setting, self-monitoring and problem-solving
- Cognitive behavioral therapy
- Stress reduction techniques
- Refer for psychological support as needed

Normocaloric diet vs Macronutrient

Effects of Dietary Composition on Energy Expenditure During Weight-Loss Maintenance



Key message: at equal calories during weight-loss maintenance, resting energy expenditure declined least on the very-low-carbohydrate diet. | Source: Ebbeling CB et al., JAMA 2012

Diet & Normocaloric Diet

Energy target

Individualize the deficit — no single best macronutrient split.

Protect lean mass

> 1.2–1.5 g/kg IBW/day protein + resistance exercise throughout.
(0,8g/Kg BW with DM)

Healthful eating patterns

Minimally processed, nutrient-dense foods, Mediterranean diet



What sustains long-term outcomes: personalized, multidisciplinary professional support.

Diet & Normocaloric Diet

Key points

- No restrictive diet is sustainable **long term**.
- Treatment structure, patient preference, behavioral support and early response strongly influence persistence.
- Chronic restriction raises the risk of eating disorders.



What sustains long-term outcomes is not the perfect diet, but personalized, multidisciplinary professional support.

Diet & Adherence

DIET — WHAT DRIVES INTAKE

Sociocultural / environmental

Cost · Access
Food environment
Consumption norms

Sensory / cognitive

Complexity
Flexibility
Expectations

Reward / pleasure

Palatability
Texture
Food cues

Postingestive

Gastric distention
GLP-1 · PYY
Ghrelin

Postabsorptive

Insulin · Glucose
Amino acids

Preprandial cues

Satiation — meal size

Satiety — inter-meal interval

Side effects and hedonic hunger modulate the meal cycle

Conceptual model of mechanisms by which different diets improve adherence and subsequent weight loss.

Source: adapted from Blundell JE et al.; Mela DJ.

ADHERENCE

Weight Maintenance

The question is no longer
“Which diet is best?”

It is now

“Which strategy can this patient sustain —
with energy balance, nutrition and
metabolic health?”

VLCD/LDL

- Specific period of time



Conclusions

1 Energy Restriction Drives Weight Loss

Primary driver of dietary weight loss; macronutrient composition can be individualized.

2 VLCD/VLED – Short-Term Induction

Powerful strategy, but requires nutritional completeness, clinical supervision and a planned transition.

3 LCD/LED – Intensive Restriction

Effective energy restriction through flexible food-based and/or meal-replacement approaches.

4 Food Reintroduction – The Bridge

Links weight-loss induction to long-term energy-balanced maintenance.

5 Comprehensive Obesity Care

Nutrition, physical activity, sleep, behavioral support and appropriate medical therapy.

Match the tool to the patient — and to the treatment phase



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Questions and discussion are welcome.

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