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JOURNAL OF BIOMEDICAL RESEARCH & ENVIRONMENTAL SCIENCES
issn: 2766-2276
SUBJECT AREA(S): METABOLIC SYNDROMES | METABOLISM | NUTRITION | NUTRITIONAL DISORDERS
DOI: 10.37871

CASE REPORT

Sustained 48% Weight Loss with Muscle Preservation and 80% Visceral Fat Reduction Over 4 Years: A Case Report

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Abstract

Background: Long-term data on lifestyle interventions in severe obesity beyond 1–2 years are scarce. This case documents 4-year outcomes of Intensive Lifestyle Modification (ILM) with Meal Replacement (MR), emphasizing the relationship between muscle preservation and weight-loss sustainability.

Case Presentation: A 52-year-old Thai female (BMI 44.1 kg/m², 102 kg, 152 cm) enrolled in a structured ILM+MR program. Body composition was assessed by bioelectrical impedance analysis (BIA; Omron HBF-375) at baseline, 8 weeks, and annually for 4 years.

Results: At 4 years, weight was 53 kg (48.0% reduction), BMI 22.9 kg/m², and waist circumference 71 cm (−51 cm). Body fat decreased from 42.0% to 29.5%; muscle mass percentage increased from 19.2% to 26.8%. BIA-estimated visceral fat level fell from 30 to 6 (80% reduction). Lean mass constituted only 16.9% of weight lost at 8 weeks, below the typical 20-30%.

Conclusion: ILM+MR achieved sustained 48% weight loss with preferential fat loss and relative muscle preservation, which may support long-term maintenance by preserving metabolic rate. This case represents an upper-extreme outcome from a parent cohort (n = 702, mean loss 14.43 kg at 52 weeks) and should not be generalized. BIA-derived estimates are acknowledged as a limitation.

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DOI: 10.37871/jbres2297

Submitted: 20 April 2026

Accepted: 24 April 2026

Published: 27 April 2026

Keywords

- Obesity
- Weight loss
- Lifestyle modification
- Meal replacement
- Body composition
- Visceral fat
- Muscle preservation
- Case report

VOLUME: 7 ISSUE: 4 - APRIL, 2026

How to cite this article: Vanichakulthada N, Pitchaiprasert S, Jaroenying R, Hantragool S, Samhugkanee C, Tarcome P. Sustained 48% Weight Loss with Muscle Preservation and 80% Visceral Fat Reduction Over 4 Years: A Case Report. J Biomed Res Environ Sci. 2026 Apr 27; 7(4): 8. Doi: 10.37872/jbres2297

Introduction

Obesity affects over 650 million adults worldwide, with Thailand reporting over 42% prevalence [1,2]. Severe obesity (BMI ≥40 kg/m²) substantially elevates cardiometabolic and psychological risks [3,4]. Approximately 80% of individuals regain lost weight within 3–5 years [5], partly because conventional interventions deplete metabolically active lean tissue, reducing resting energy expenditure [6,7].

Lifestyle modification remains first-line therapy, yet long-term data beyond 1–2 years in severe obesity are limited [8]. The Look AHEAD trial sustained ~4.7% mean weight loss over 8 years [9]. Meal replacements improve adherence and caloric control [10]. A critical determinant of sustained maintenance, however, is body composition quality—specifically, the preservation of skeletal muscle mass [6,7]. Interventions that minimize lean-tissue loss may confer a fundamental sustainability advantage by maintaining metabolic rate.

Rationale for case selection

We recently published a retrospective cohort study (n = 702) evaluating ILM with meal replacement over 52 weeks, in which the ILM+MR group achieved mean weight loss of 14.43 kg [11]. The present case was selected because she represents the most extensively documented participant with the longest follow-up (4 years), offering a unique opportunity to examine the trajectory of body composition changes—particularly muscle preservation—well beyond the typical 1-year reporting horizon. Her selection was based on data completeness, not on outcome magnitude alone.

Novelty

To our knowledge, this is among the first case reports to provide serial body composition data (both percentage and absolute values) at six time points over 4 years in severe obesity managed with lifestyle modification alone, with explicit analysis of the lean-mass fraction of weight lost at each interval.

Case Presentation

A 52-year-old Thai female presented with 10-year progressive weight gain (70 to 102 kg, height 152 cm). Medical history was unremarkable; family history included parental type 2 diabetes and cardiovascular disease. Previous weight-loss attempts yielded <5 kg loss with regain within 6 months. She worked in an office with irregular meals, minimal activity, and <6 hours sleep nightly.

Examination revealed severe central obesity (blood pressure 128/82 mmHg, heart rate 76 bpm). Baseline: weight 102 kg, BMI 44.1 kg/m² (Class III), waist 122 cm.

Body composition assessment

Bioelectrical impedance analysis (BIA; Omron HBF-375) was used at all time points. BIA was selected for its non-invasive nature, low cost, and practicability in the community-based setting of this program. The same device was used throughout to ensure internal consistency. BIA limitations are acknowledged: it provides estimates rather than direct measurements, accuracy is reduced at extreme body weights, and hydration shifts may confound results [12]. The visceral fat level is a proprietary device-derived estimate (scale 1–30+), not equivalent to CT/MRI-measured visceral adipose tissue area [13,14]. All body composition values in this report should be interpreted as BIA-derived estimates.

Baseline BIA: body fat 42.0% (est. fat mass 42.8 kg), muscle mass 19.2% (est. muscle mass 19.6 kg), visceral fat level 30.

Biochemical parameters

No laboratory investigations (fasting glucose, HbA1c, lipid profile, inflammatory markers)

were performed during follow-up. This is acknowledged as a limitation; cardiometabolic improvements are inferred from anthropometric changes only.

Therapeutic Intervention

The intervention followed the parent cohort protocol [11] with four components:

- **Dietary:** Soy-based meal replacement (220 kcal, ~18 g protein/serving) twice daily for 8 weeks. Protein targeted at 1.0–1.2 g/kg adjusted body weight to attenuate lean-mass loss [7,15]. Gradual transition to whole foods thereafter.
- **Physical activity:** 20 min/day walking initially, progressing to 45–60 min/day with resistance exercises (bodyweight and elastic bands, twice weekly from month 3) for mechanical muscle-loading stimulus.
- **Behavioral:** Weekly 50-min group therapy for 8 weeks, biweekly for 12 months, then monthly (self-monitoring, goal-setting, stimulus control, stress management, relapse prevention).
- **Sleep/stress:** Sleep hygiene targeting 7–8 h; mindfulness and cognitive-behavioral strategies for emotional eating.

Follow-up and Outcomes

8-week: Weight 86 kg (-15.7%), BMI 37.2 kg/m², waist 107 cm. Fat 34.3% (est. 29.5 kg), muscle 21.3% (est. 18.3 kg). Visceral fat level 24. Lean mass was 16.9% of total weight lost (2.7/16 kg)—below the 20–30% benchmark [6].

1-year: Weight 70 kg (-31.4%), BMI 30.2 kg/m², waist 99 cm. Fat 32.5% (est. 22.8 kg), muscle 23.4% (est. 16.4 kg). Visceral fat level 14.

2-years: Weight 59 kg (-42.2%), BMI 25.5 kg/m², waist 86 cm. Fat 31.8% (est. 18.8 kg), muscle 24.8% (est. 14.6 kg). Visceral fat level 8.

3-years: Weight 58 kg (-43.1%), BMI 25.1 kg/m², waist 86 cm. Fat 31.4%, muscle 25.4% (est. 14.7 kg). Visceral fat level 7.5.

4-years: Weight 53 kg (-48.0%), BMI 22.9 kg/m², waist 71 cm. Fat 29.5% (est. 15.6 kg), muscle 26.8% (est. 14.2 kg). Visceral fat level 6 (Table 1) (Figures 1-3).

Discussion

Contextualizing the outcome

This case achieved 48.0% weight loss (49 kg) sustained over 4 years, progressing from Class III obesity (BMI 44.1) to normal weight (BMI 22.9). Within the parent cohort (n = 702, mean ILM+MR loss 14.43 kg at 52 weeks) [11], this case

Table 1: Summary of key outcomes at all follow-up points [29,30].

Parameter	Baseline	8 wk	1 yr	2 yr	3 yr	4 yr
Weight (kg)	102	86	70	59	58	53
BMI (kg/m²)	44.1	37.2	30.2	25.5	25.1	22.9
Waist (cm)	122	107	99	86	86	71
Fat (%)	42.0	34.3	32.5	31.8	31.4	29.5
Fat mass (kg)*	42.8	29.5	22.8	18.8	18.2	15.6
Muscle (%)	19.2	21.3	23.4	24.8	25.4	26.8
Muscle (kg)*	19.6	18.3	16.4	14.6	14.7	14.2
VF level (BIA)	30	24	14	8	7.5	6
Lean % of wt lost	—	16.9	37.2	44.2	45.5	44.5

*Estimated from BIA percentage × body weight. VF level: proprietary BIA estimate (Omron HBF-375). Lean % of wt lost = (total weight lost − fat mass lost) / total weight lost × 100.

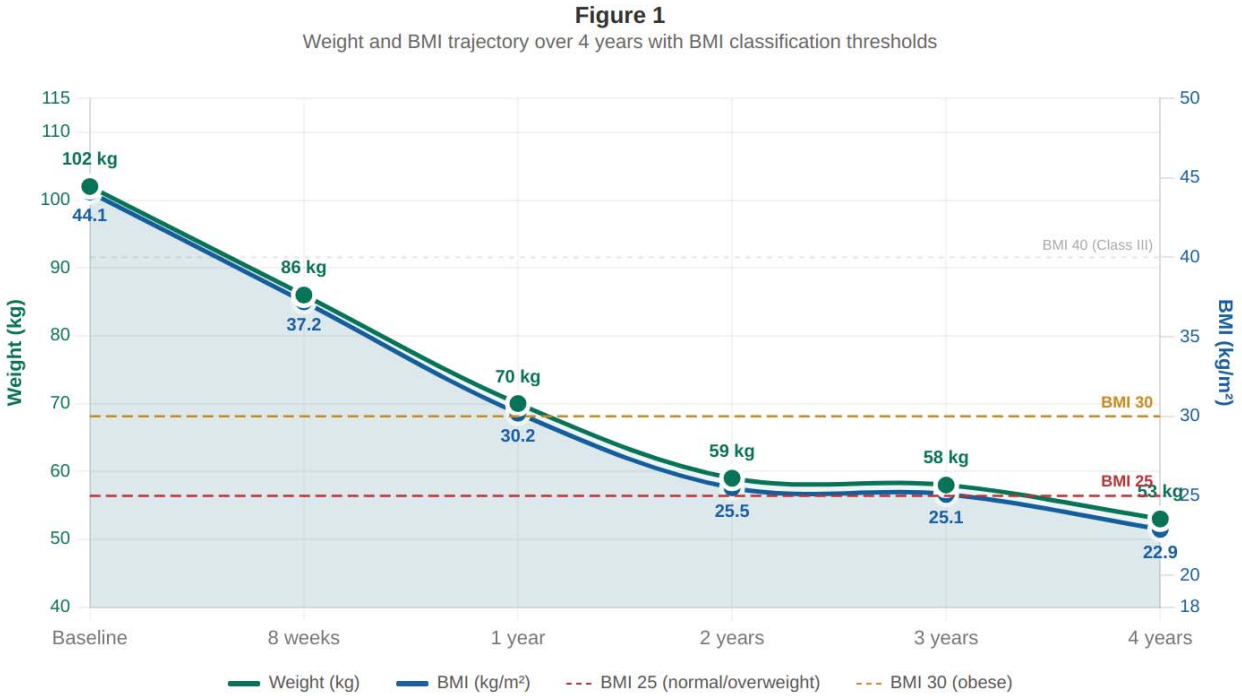

Figure 1 Weight and BMI trajectory over 4 years. Dashed lines: BMI 25 (normal/overweight) and BMI 30 (obese) [28].

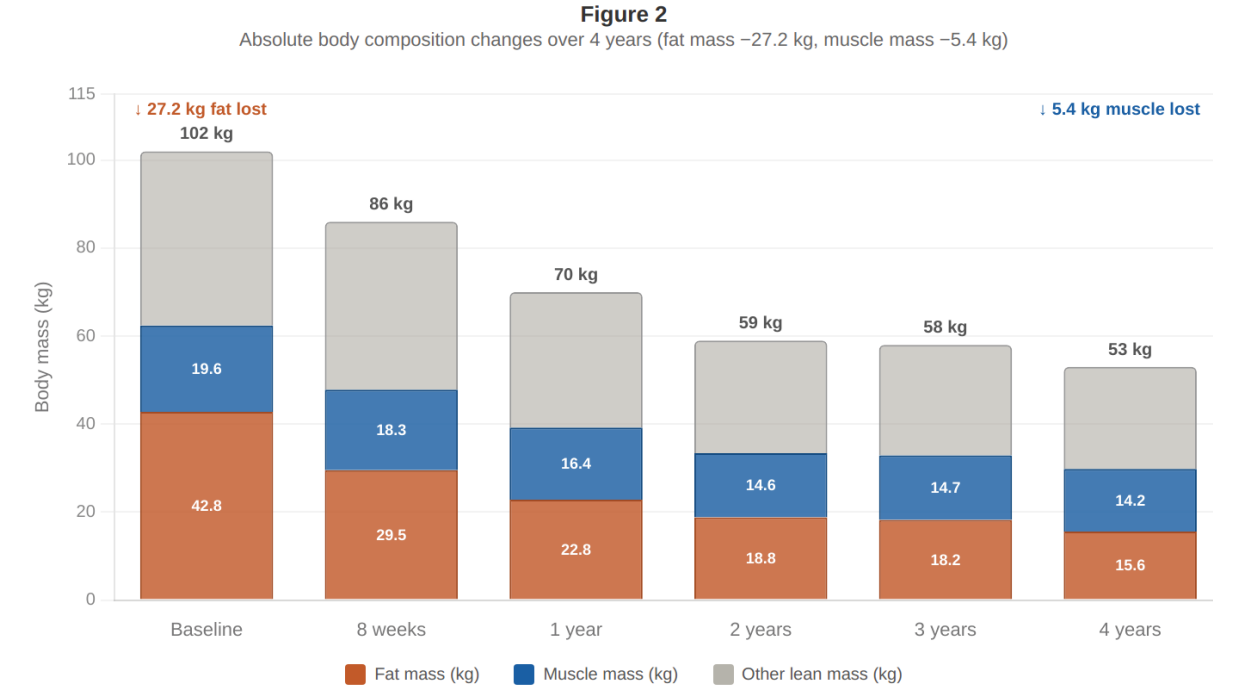

Figure 2 Absolute body composition. Fat mass −27.2 kg; muscle mass −5.4 kg, demonstrating preferential fat loss [28].

represents the upper extreme. The progressive trajectory and stable weight between years 2–4 (59→58→53 kg) suggest successful metabolic and behavioral adaptation beyond the high-risk regain window [5,16].

Muscle preservation and sustainability

The central finding is that lean mass

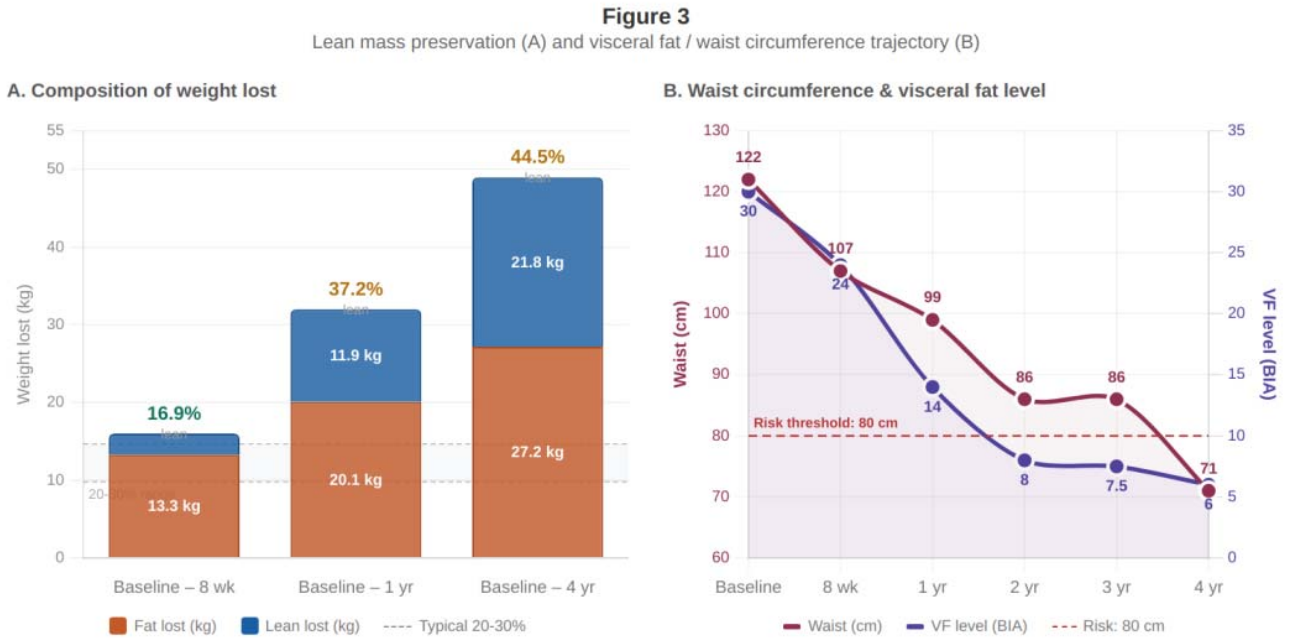

Figure 3 (A) Lean mass as percentage of cumulative weight lost. (B) Waist circumference and BIA visceral fat trajectory.

comprised only 16.9% of weight lost at 8 weeks—well below the 20–30% typically reported [6]. This early preservation is clinically significant: it suggests that resting metabolic rate was maintained during the critical initial phase, potentially preventing the metabolic slowdown that drives regain.

While muscle mass percentage increased from 19.2% to 26.8%, absolute muscle mass decreased from 19.6 to 14.2 kg (-5.4 kg). This distinction is important: the percentage shift reflects improved body composition ratio, while the absolute decrease reflects inevitable lean-tissue loss during major weight reduction [6,7].

The mechanism likely involves synergistic protein adequacy (1.0–1.2 g/kg) and progressive resistance training from month 3 [7,15]. Preserved muscle creates a virtuous cycle: maintained metabolic rate reduces caloric surplus at any given intake, facilitating maintenance without extreme restriction. This may explain the continued gradual loss between years 2–4 without apparent effort intensification.

Visceral fat reduction

BIA-estimated visceral fat level decreased from 30 to 6 (80% reduction), corroborated by 51 cm waist reduction (122→71 cm). Visceral adipose tissue functions as a metabolically active endocrine organ, secreting proinflammatory adipokines (TNF-α, IL-6, MCP-1) that drive insulin resistance, systemic inflammation, and atherosclerosis [13,14,17,18].

Reducing visceral fat therefore attenuates the upstream signaling that generates cardiometabolic disease—significance exceeding what BMI alone predicts [14,19]. The progressive trajectory (30→24→14→8→6) aligns with evidence that lifestyle interventions preferentially mobilize visceral before subcutaneous depots [19,20], underscoring the value of waist circumference measurement alongside body weight.

Contributing factors

Success factors include: (1) absence of baseline metabolic comorbidities (metabolically favorable phenotype); (2) meal replacements

simplifying dietary decisions (94% adherence in ILM+MR vs. 87% ILM alone) [11]; (3) graduated behavioral support facilitating autonomous self-regulation [9,21]; and (4) progressive weight-loss trajectory minimizing compensatory neuroendocrine responses [22,23].

Public health relevance

The global economic burden of obesity is projected at USD 4.32 trillion annually by 2035 (~3% of GDP), with Thailand facing up to 4.9% GDP impact by 2060 [24,25]. Visceral adiposity drives a disproportionate share through its role as upstream determinant of multiple chronic diseases simultaneously [13,14]. The ILM+MR model—requiring no surgical infrastructure or continuous pharmaceutical supply—offers a scalable, low-cost approach implementable in primary care across resource-constrained settings. Even the cohort-average outcome (14.43 kg) exceeds the 5–10% threshold for clinically meaningful cardiometabolic benefit [8,26].

Limitations

This case represents an upper-extreme outcome under favorable conditions (no comorbidities, exceptional motivation) and must not be generalized to typical clinical populations. The parent cohort [11] provides more realistic expectations.

No biochemical data were obtained; all cardiometabolic inferences derive from anthropometric surrogates. BIA (Omron HBF-375) provides estimates, not precise measurements; accuracy is reduced at extreme weights and during rapid composition change [27]. The visceral fat level is device-specific and unvalidated against imaging in this population.

The single-case design precludes causal attribution among intervention components. Self-reported adherence was not objectively verified. Follow-up beyond 4 years is needed. Potential negative consequences (excess skin, nutritional deficiencies, bone density changes) were not systematically assessed.

Conclusion

This case documents 48.0% weight loss sustained over 4 years through ILM+MR, progressing from Class III obesity to normal weight. Favorable lean-mass preservation (16.9% of early weight lost) may underpin sustainability by maintaining metabolic rate. The 80% visceral fat reduction suggests meaningful attenuation of cardiometabolic risk infrastructure. While this outcome is exceptional and not generalizable, it demonstrates the potential of muscle-preserving lifestyle interventions for selected cases with severe obesity, complementing the parent cohort evidence [11].

Case perspective

"The program provided structured meal replacements, nutritional education, group support, and behavioral strategies. After 4 years, healthy eating and daily activity have become integral to my lifestyle. The most significant change has been psychological—gaining confidence in my capacity for sustained behavioral change."

Learning points

1. ILM+MR can achieve sustained weight loss (48% over 4 years) from severe obesity to normal weight, though this represents an upper-extreme outcome.
2. Lean-mass preservation (16.9% of early weight lost vs. typical 20–30%) may sustain maintenance by preserving metabolic rate.
3. Visceral fat reduction (80%) suggests attenuation of the upstream metabolic infrastructure driving cardiometabolic disease.

4. Protein adequacy (1.0–1.2 g/kg) plus resistance training is essential for lean-tissue preservation during major weight loss.

Declarations

Informed consent

Written informed consent was obtained. The case reviewed and approved the manuscript. This report follows CARE guidelines [27].

Ethics

Approved by Ubon Ratchathani University Ethics Committee (UBU-REC-103/2567), following the Declaration of Helsinki.

Author contributions

Study design: N.V., C.S. Data collection: S.P., R.J., P.T. Manuscript drafting: N.V. Critical revision: C.S., S.H. All authors approved the final version.

Funding

None.

Conflicts of interest

None declared.

Acknowledgment

The authors thank the case for her cooperation, Dr. Gittipat Taweepkul for guidance, and the group therapy staff for their support.

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