LONG-TERM WEIGHT MAINTENANCE FOLLOWING ACTIVE WEIGHT LOSS

START

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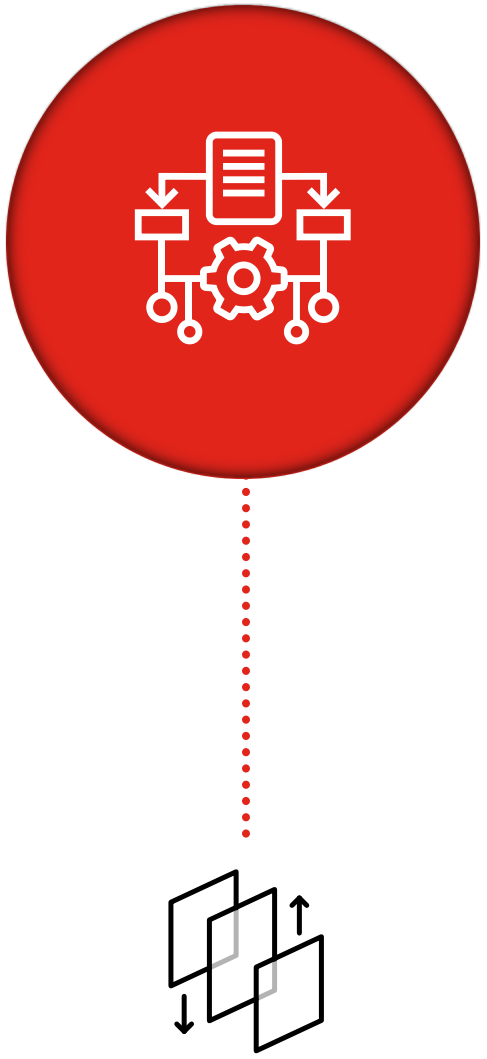
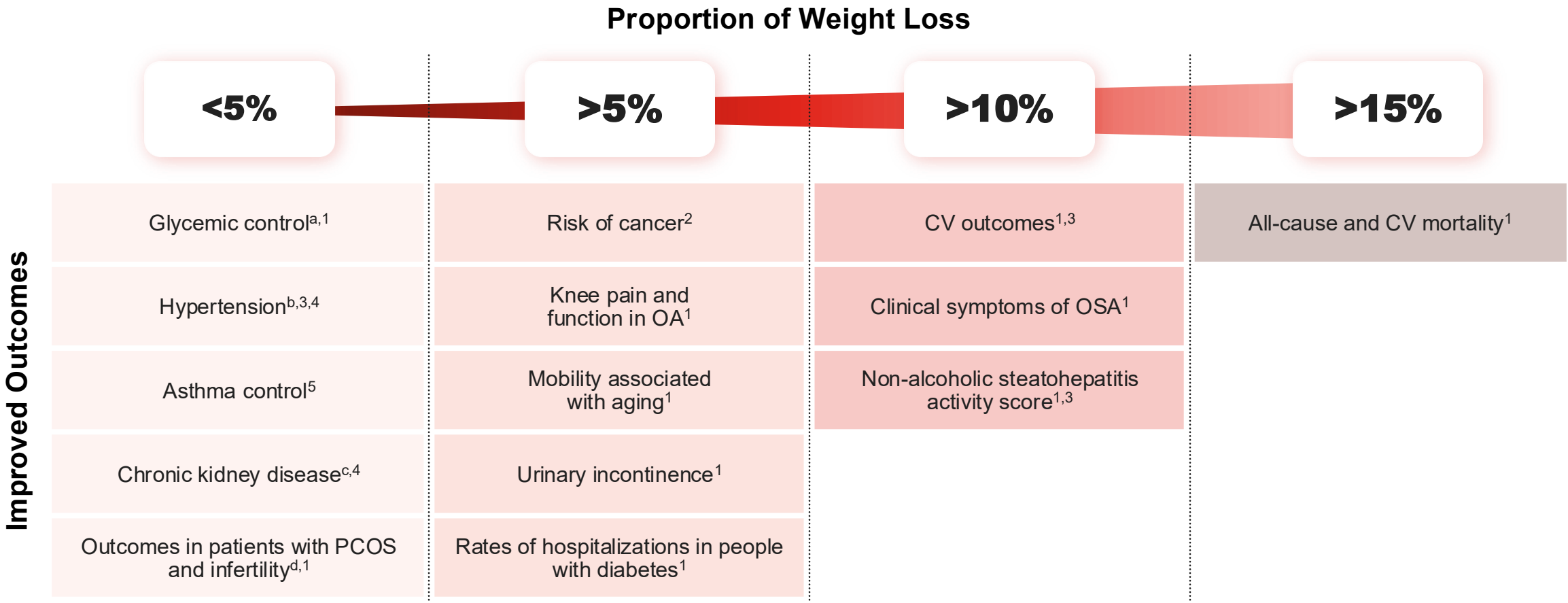
Outline

- Clinical benefits of weight loss
- Phases of weight loss
- Weight regain
- Physiological adaptations that favor weight regain
- Successful maintenance of weight loss
- Summary



Clinical Benefits of Weight Loss



[a]Greater weight loss associated with greater glycemic improvement. [b]Rate reductions over 3-10 years. [c]Rate reduction after 10 years. [d]Improved ovulatory cycles and subsequent pregnancy, with greater weight loss associated with a more robust effect.

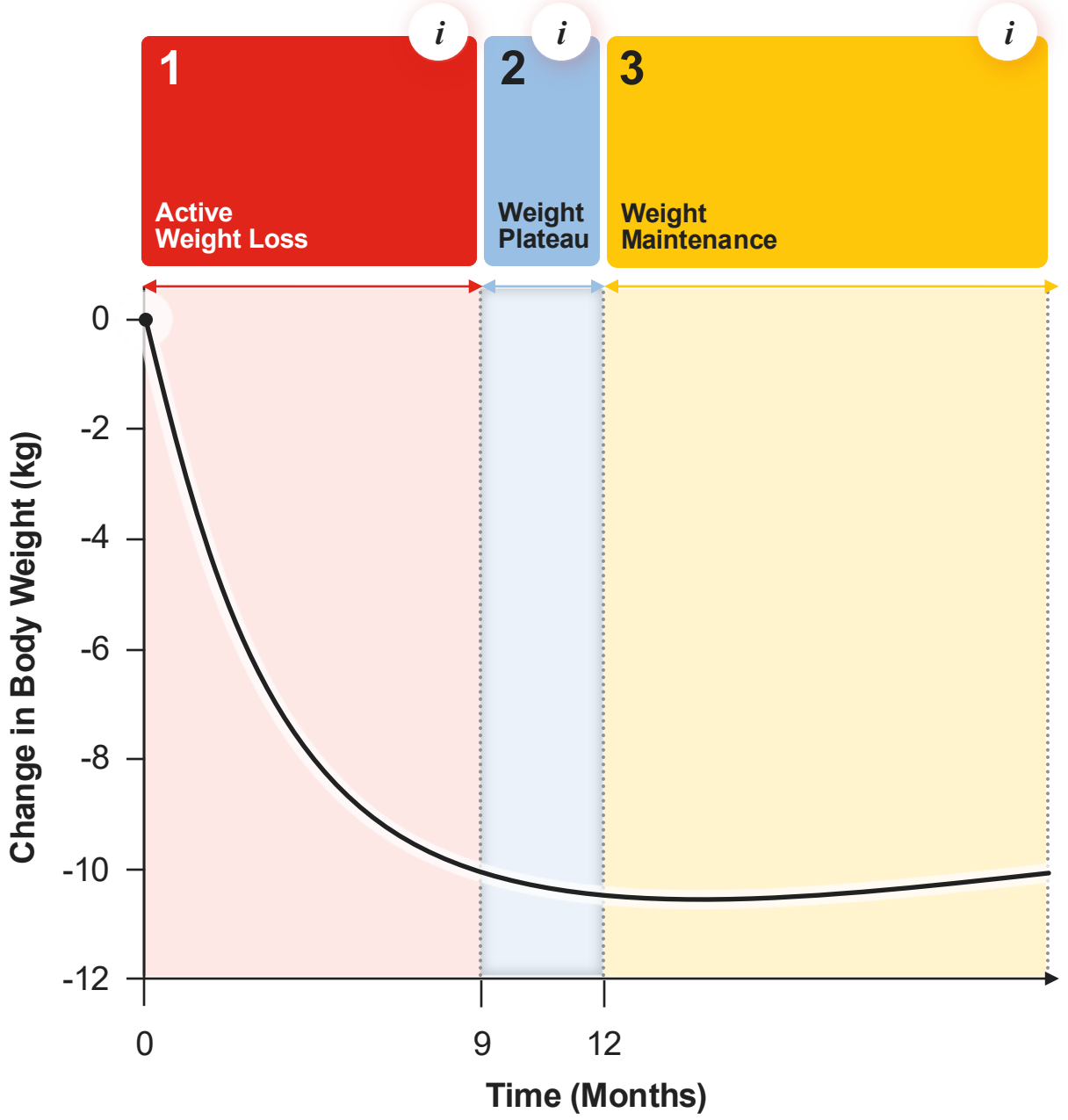
CV=Cardiovascular; OA=Osteoarthritis; OSA=Obstructive Sleep Apnea; PCOS=Polycystic Ovarian Syndrome.

1. Ryan DH, Yockey SR. *Curr Obes Rep*. 2017;6(2):187-194. 2. Luo J, et al. *JNCI Cancer Spectr*. 2019;3(4):pkz054. 3. Garvey WT. *J Clin Endocrinol Metab*. 2022;107(4):e1339-e1347.
4. Mariam A, et al. *Diabetes Obes Metab*. 2021;23(12):2804-2813. 5. Johnson O, et al. *J Allergy Clin Immunol Pract*. 2022;10(6):1577-1586.e3.

Phases of Weight Loss[1-3]

The typical pattern of weight loss in response to weight management interventions is associated with three distinct phases:

- Active weight loss
- Weight plateau: A variable period of relative weight stability
- Weight maintenance

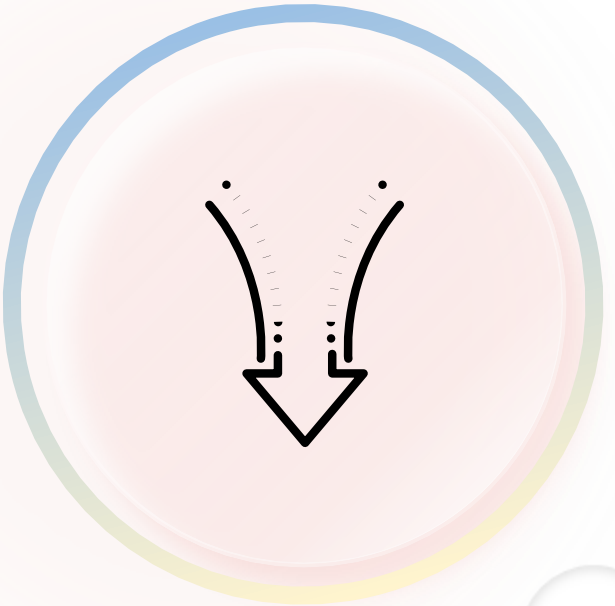


Note: Patterns of weight loss vary between interventions; figure is for illustrative purposes only.

1. Rosenbaum M, Foster G. *Nat Metab*. 2023;5(8):1266-1274.
2. Hall KD, Kahan S. *Med Clin North Am*. 2018;102(1):183-197.
3. Aronne LJ, et al. *Obesity (Silver Spring)*. 2021;29(Suppl.1):S9-S24.

Active Weight Loss

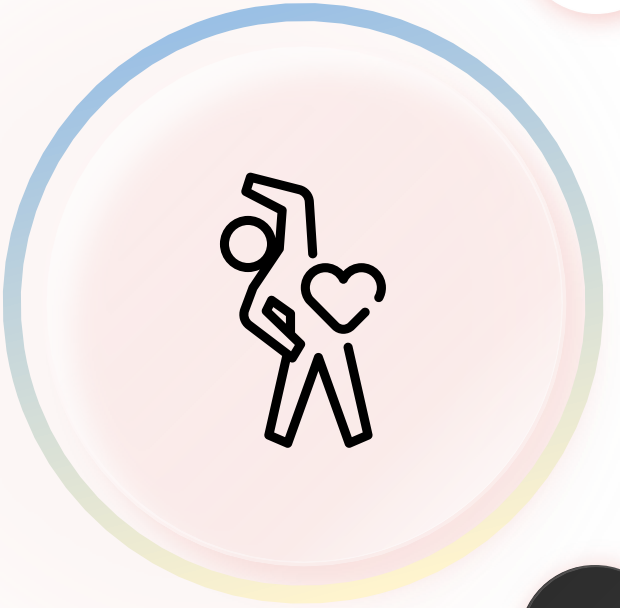
- Weight reduction from lifestyle changes, pharmacotherapy, or bariatric surgery typically begins with an initial phase of weight loss lasting up to 9 months[1,2]
- The magnitude and/or rate of weight loss varies by intervention; pharmacotherapy and bariatric surgery generally result in more rapid weight loss than other interventions[1]



1. Rosenbaum M, Foster G. *Nat Metab*. 2023;5(8):1266-1274. 2. Hall KD, Kahan S. *Med Clin North Am*. 2018;102(1):183-197.

Active Weight Loss

- Negative energy balance leads to lipid oxidation, lower resting energy expenditure, and hormonal adaptations that increase hunger[1]
- Cortisol rises as a result of caloric restriction, promoting muscle protein degradation and reducing lean mass, further decreasing metabolic rate[2]
- Weight loss typically slows approximately 6-9 months after the initiation of a weight management intervention[3]



1. Greenway FL. *Int J Obes (Lond)*. 2015;39(8):1188-1196. 2. Theodorakis N, et al. *Int J Mol Sci*. 2024;25(24):13438. 3. Rosenbaum M, Foster G. *Nat Metab*. 2023;5(8):1266-1274.

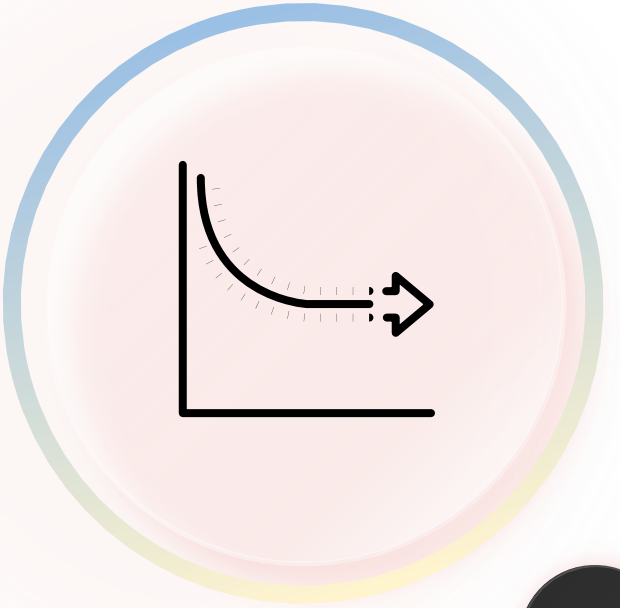
Weight Plateau

- After active weight loss, additional weight reduction typically slows and plateaus within about a year as energy expenditure declines[1,2]
- This phase can be defined as a <5% fluctuation from the achieved body weight[3]

1. National Institutes of Health. *Obes Res*. 1998;6(2):51S-209 (updated 6(6):464). 2. Aronne LJ, et al. *Obesity (Silver Spring)*. 2021;29(Suppl. 1):S9-S24.
3. Horn DB, et al. *Obesity (Silver Spring)*. 2025;33(10):1873-1885.

Weight Plateau

- Metabolic adaptations reduce total energy expenditure, favoring carbohydrate over lipid oxidation and minimizing loss of lean mass; body weight stabilizes despite continued efforts to reduce body weight[1-3]



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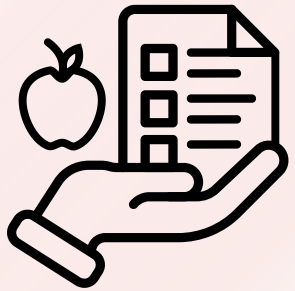
Weight Plateau

- Further interventions (eg, changes in lifestyle, changes in pharmacotherapy) are required for additional weight loss[1]
- At this point, if the person's weight loss goal has been met, weight maintenance should be prioritized[1]



1. National Institutes of Health. *Obes Res*. 1998;6(2):51S-209S (updated 6(6):464).

Weight Maintenance

- Weight maintenance can be defined as sustaining approximately

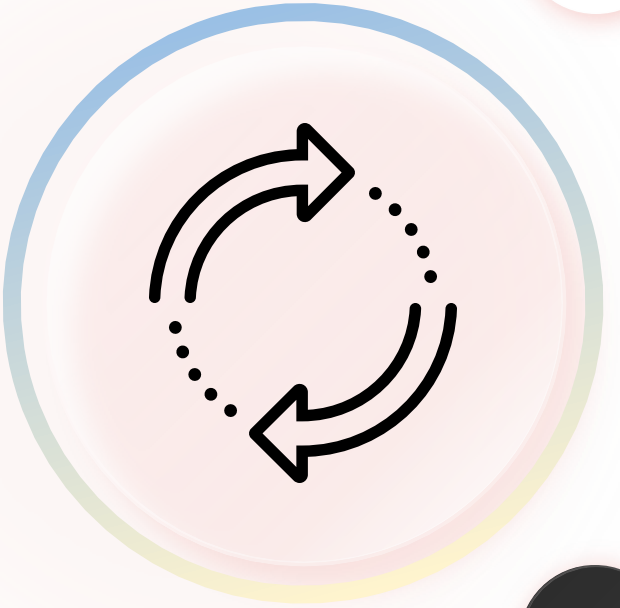
75-80%

of the body weight reduction following a period of active weight loss[1,2]

1. Horn DB, et al. *Obesity (Silver Spring)*. 2025;33(10):1873-1885. 2. Berger SE, et al. *J Am Heart Assoc*. 2019;8(20):e010951.

Weight Maintenance

- As weight loss progresses, biological responses that oppose further weight reduction make long-term weight maintenance increasingly challenging[1,2]
- Hormonal and metabolic adjustments from the weight loss period persist, promoting energy efficiency; weight is regained or maintained depending on intake relative to the new lower energy needs[2,3]



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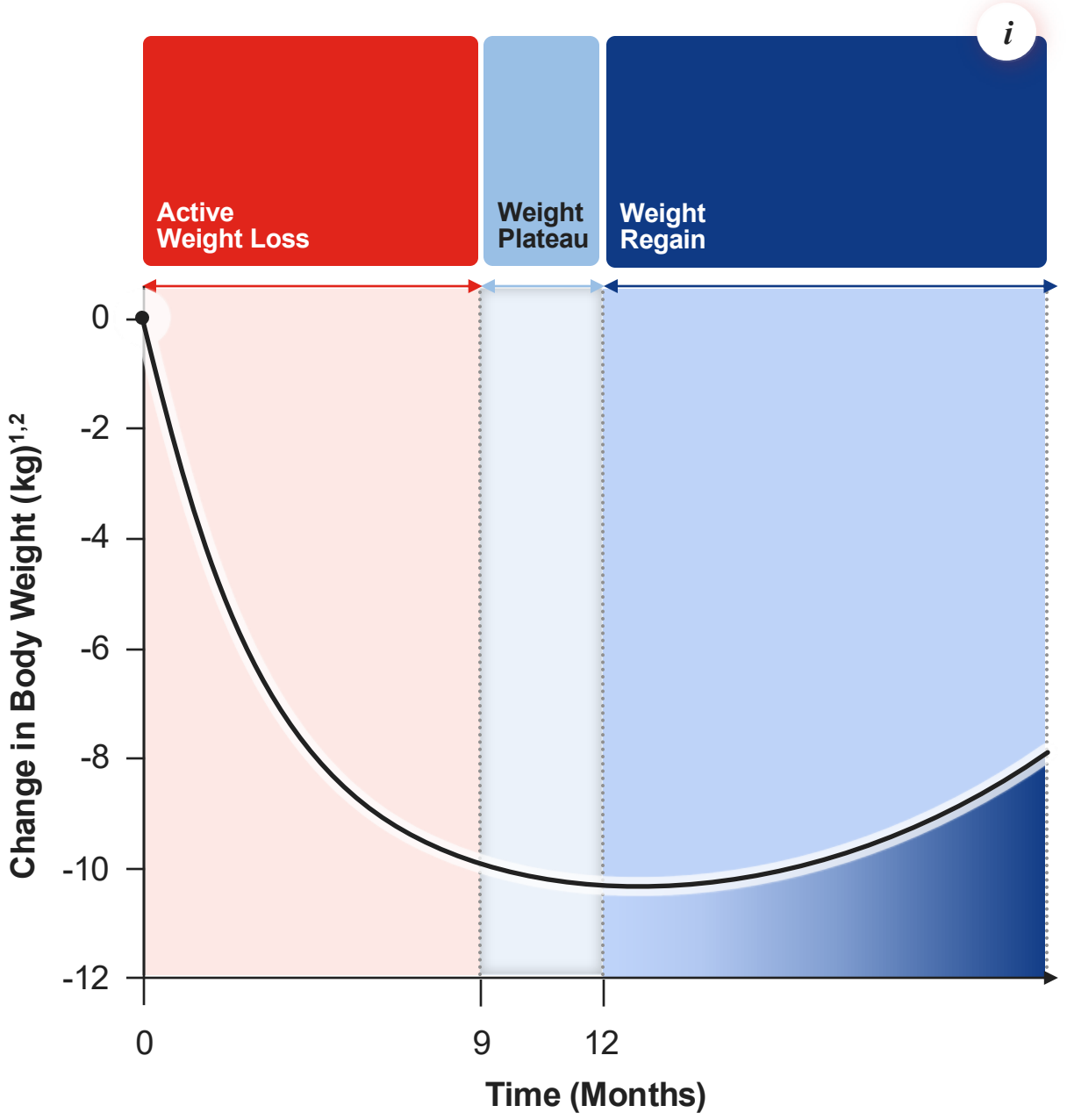
Weight Regain

- Despite substantial differences in the degree of weight loss between treatments (with surgical and pharmacological treatments leading to greater weight loss than lifestyle changes) and within treatments, weight regain tends to occur between approximately 1 and 2 years after the initiation of therapy across interventions[2]



Note: Patterns of weight loss vary between interventions; figure is for illustrative purposes only.

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2. Rosenbaum M, Foster G. *Nat Metab*. 2023;5(8):1266-1274.

Weight Regain

- Weight regain refers to the increase in body weight following the weight plateau or weight maintenance period, often occurring 1-2 years after the initiation of therapy[1,2]

1. Greenway FL. *Int J Obes (Lond)*. 2015; 39(8):1188-1196. 2. Rosenbaum M, Foster G. *Nat Metab*. 2023;5(8):1266-1274.

Weight Regain

Weight regain usually occurs as a result of several factors[1,2]:

1. Physiological priority imbalances
2. Neurobiological responses to weight reduction
3. Decreased resting metabolic rate
4. Increased musculoskeletal efficiency
5. Behavior pattern reversion
6. Treatment cessation

1. Bays H, et al. *Obesity Pillars*. 2022;3:100034. 2. Elmaleh-Sachs A, et al. *JAMA*. 2023;330(20):2000-2015.

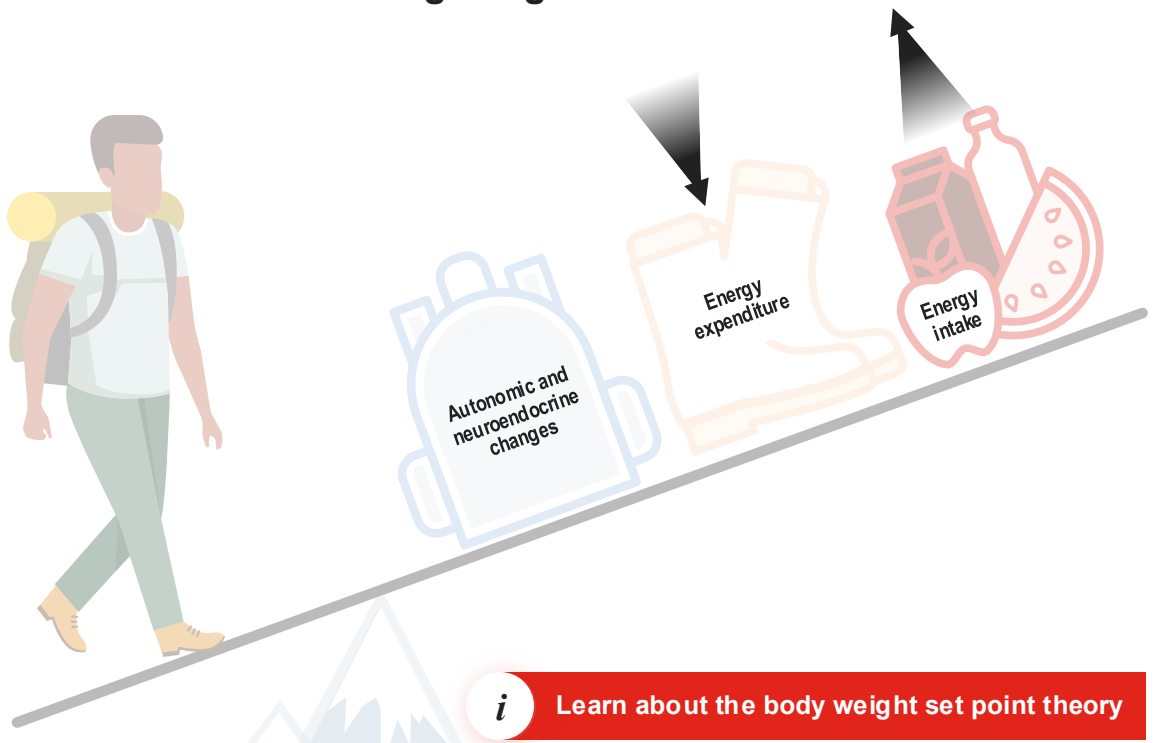
Physiological Adaptations That Favor Weight Regain

- Following weight loss, prolonged maintenance of non-surgically reduced body weight can often be challenging[1]
- Sustained periods of reduced body weight are associated with hypometabolism and hyperphagia, which collectively can predispose towards weight regain[2]
- These homeostatic changes are generally due to changes in skeletal muscle, neuronal signalling related to hunger and satiety, and neuroendocrine function[2]

AS A RESULT, only about…

15-25% of individuals can achieve and maintain ≥10% weight loss with ongoing lifestyle intervention only[2]

Systems Favoring Weight Regain Following Weight Reduction[2]

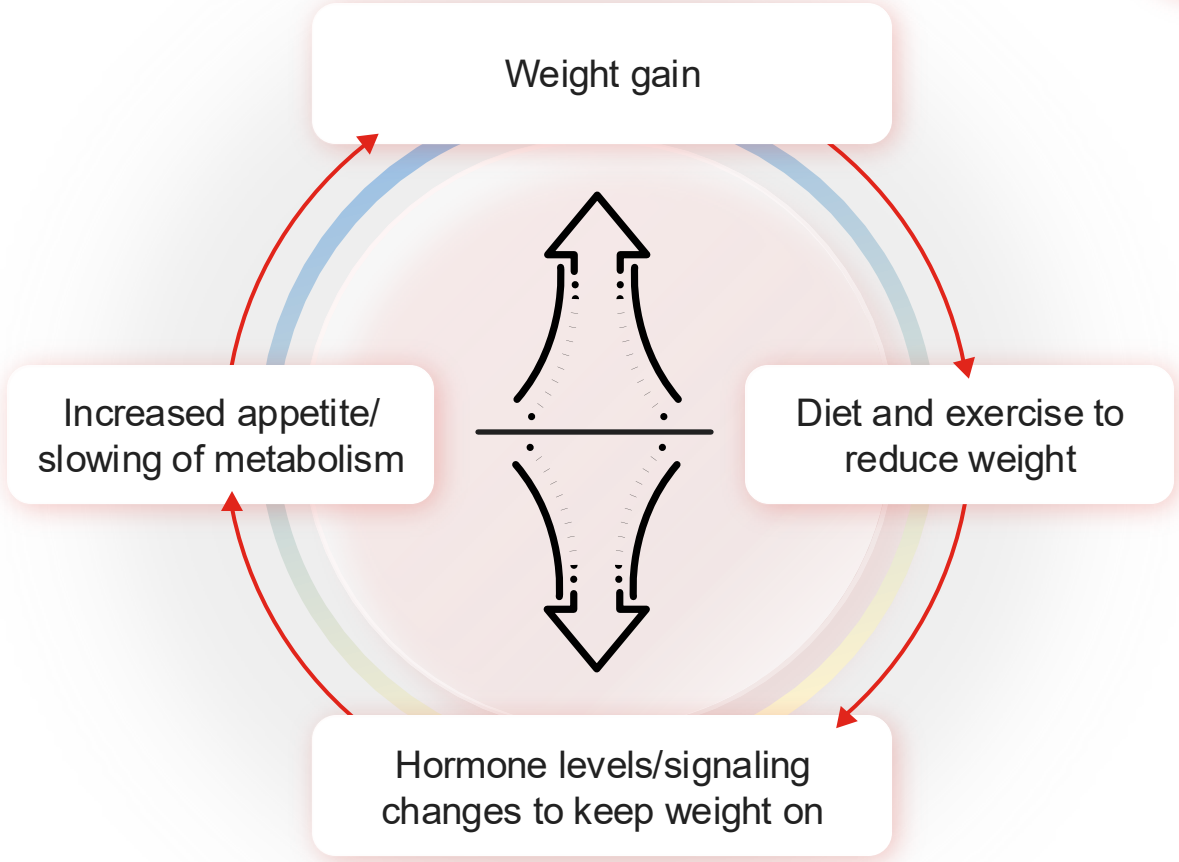


i Learn about the body weight set point theory

1. Aronne LJ, et al. *Obesity (Silver Spring).* 2021;29(Suppl. 1):S9-S24.
2. Rosenbaum M, Foster G. *Nat Metab.* 2023;5(8):1266-1274.

The Body Weight Set Point Theory

The body weight set point theory suggests that, following weight loss, maladaptive changes in satiety hormone levels and energy expenditure increase appetite and slow metabolism, resulting in a positive energy balance until weight is regained[1]



1. Garvey WT. *Endocr Pract*. 2022;28(2):214-222.

Successful Maintenance of Weight Loss

(1 of 2)

- Weight maintenance is crucial for retaining the clinical benefits of weight loss[1]
- Successful long-term maintenance of weight loss usually requires a similar combination of interventions required for initial weight loss, and should be individualized to patient needs[1,2]:

Appropriate nutrition and physical activity

Behavioral modification

Pharmacological interventions

1. Nadolsky K, et al. *Endocr Pract.* 2025;31(11):1351-1394.
2. Bays H, et al. *Obesity Pillars.* 2022;3:100034.

Appropriate Nutrition and Physical Activity

- Metabolic response is patient-specific; therefore, personalized dietary guidance or “nutritional precision” is an important aspect of successful weight maintenance[1]

- General dietary guidance for successful weight maintenance emphasizes the importance of:

- **Vitamins and minerals**: Adequate nutrition, consistent with established dietary guidelines, is associated with maintenance of weight loss[2,3]

- **Protein**: Sufficient protein intake increases satiety and helps to preserve lean mass, preventing the decline of resting energy expenditure associated with active weight loss[3-5]

- **Hydration**: Maintenance of adequate fluid intake supports appetite regulation and overall physiological balance[3,6,7]

1. Theodorakis N, et al. *Int J Mol Sci*. 2024;25(24):13438. 2. Pascual RW, et al. *Nutrients*. 2019;11(12):3046. 3. Almandoz JP, et al. *Obesity (Silver Spring)*. 2024;32(9):1613-1631.
4. Kim JY. *J Obes Metab Syndr*. 2021;30(1):20-31. 5. Leidy HJ, et al. *Am J Clin Nutr*. 2015;101(6):1320S-1329S. 6. Davy BM, et al. *Physiol Behav*. 2025;297:114953.
7. Pan A, et al. *Int J Obes (Lond)*. 2013;37(10):1378-1385.

Appropriate Nutrition and Physical Activity

- Physical activity should also be advised as medically appropriate, and should include resistance or strength training to increase lean muscle mass[1,2]

1. Theodorakis N, et al. *Int J Mol Sci.* 2024;25(24):13438. 2. Nadolsky K, et al. *Endocr Pract.* 2025;31(11):1351-1394.

Behavioral Modification

- Behavioral modification addresses patients' psychological and emotional needs, helping them to identify and change detrimental behaviors that contribute to obesity[1]

- Techniques such as CBT, mindfulness, and goal-setting may help patients to develop healthier habits and sustain long-term weight management[1]

CBT=Cognitive Behavioral Therapy.

1. https://obesitymedicine.org/about/four-pillars/ (Accessed October 23, 2025).

Pharmacological Interventions

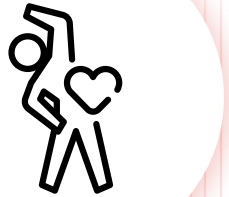
- Pharmacotherapy can be used to help overcome the compensatory mechanisms that drive weight regain, thereby supporting weight loss maintenance[1]

1. Schmitz SH, Aronne LJ. *Gastroenterol Clin North Am*. 2023;52(4):661-680.

Successful Maintenance of Weight Loss

(2 of 2)

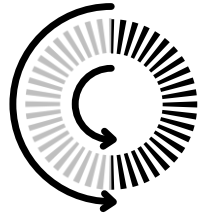
Additional clinical considerations for successful long-term maintenance of weight loss include:



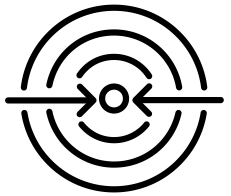
Practicing stimulus control[1]

Leveraging an interdisciplinary team[2]

Acknowledging successes[3]



Developing relapse prevention techniques[1]



Goal-setting[3] *i*

1. Olateju IV, et al. *Cureus*. 2021;13(9):e18080. 2. https://obesitymedicine.org/blog/obesity-management-team/ (Accessed October 23, 2025). 3. Bays H, et al. *Obesity Pillars*. 2022;3:100034.

Goal-Setting

- The success of weight maintenance can be enhanced with setting weight loss goals[1]
- In people living with obesity, improved health outcomes can be achieved with modest weight loss, such as improved mobility following ≥5% weight loss[2]

1. Bays H, et al. *Obesity Pillars*. 2022;3:100034. 2. Ryan DH, Yockey SR. *Curr Obes Rep*. 2017;6(2):187-194.

Goal-Setting

- Weight loss goals should therefore be individualized to the patient's overall health, preference, and body composition, and should be realistic and aligned with patient expectations[1,2]
- Recognizing patients' weight maintenance and highlighting clinical improvements in obesity-related risk factors may help to motivate patients and improve long-term persistence with weight maintenance efforts[3]

1. Bays H, et al. *Obesity Pillars*. 2022;3:100034. 2. Elmaleh-Sachs A, et al. *JAMA*. 2023;330(20):2000-2015. 3. Hall KD, Kahan S. *Med Clin North Am*. 2018;102(1):183-197.

Summary

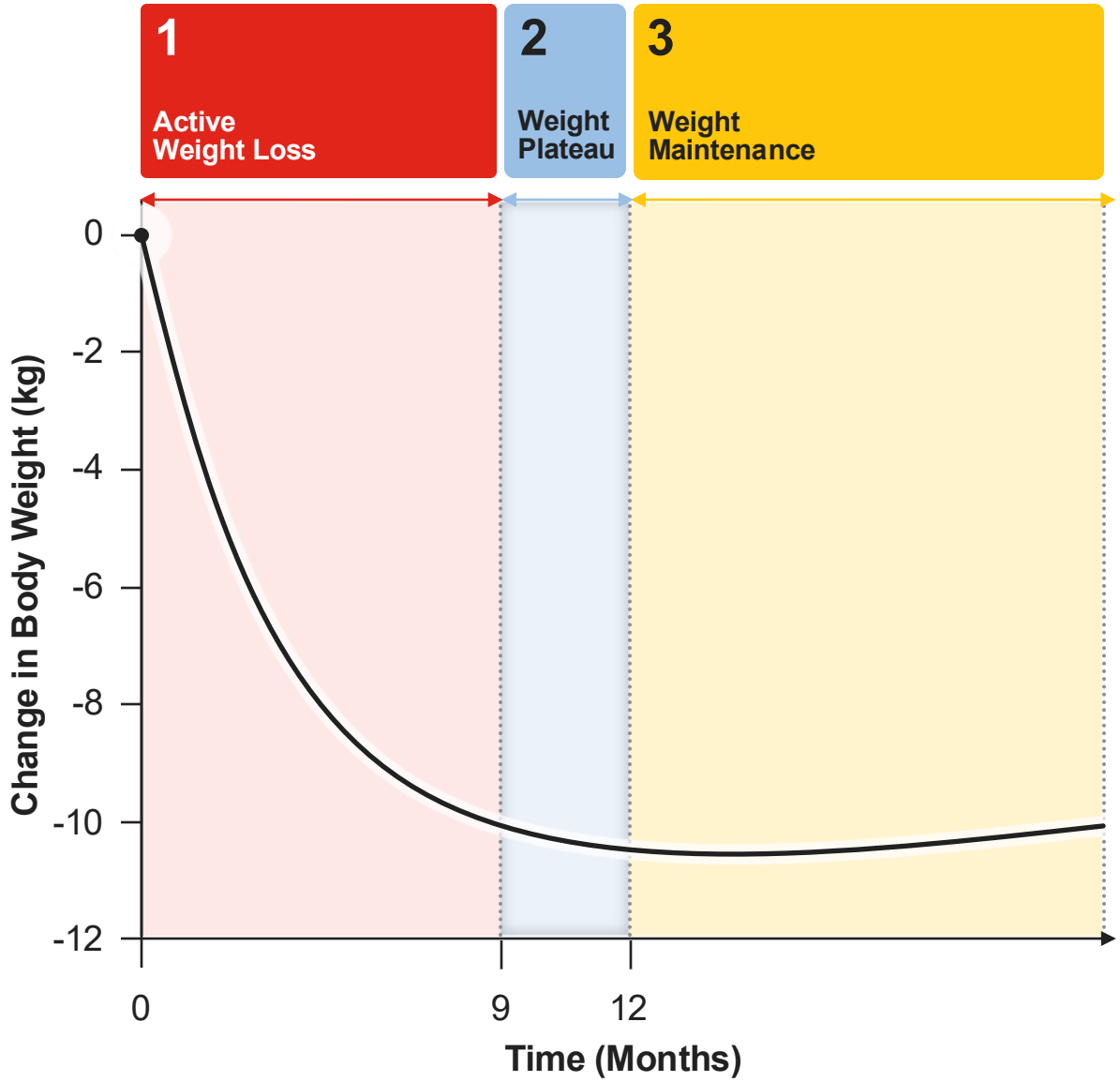
Successful long-term maintenance of weight loss usually requires[1]:

- Appropriate nutrition and physical activity
- Behavioral modification
- Pharmacological interventions

Note: Patterns of weight loss vary between interventions; figure is for illustrative purposes only.
EE=Energy Expenditure.

1. Bays H, et al. *Obesity Pillars*. 2022;3:100034. 2. Rosenbaum M, Foster G. *Nat Metab*. 2023;5(8):1266-1274. 3. Hall KD, Kahan S. *Med Clin North Am*. 2018;102(1):183-197. 4. Aronne LJ, et al. *Obesity (Silver Spring)*. 2021;29(Suppl.1):S9-S24. 5. Greenway FL. *Int J Obes (Lond)*. 2015;39(8):1188-1196. 6. Theodorakis N, et al. *Int J Mol Sci*. 2024;25(24):13438.

Phases of Weight Loss[2-4]



Active weight loss[5,6]	
Negative energy balance	✓
↑ Lipid oxidation, hunger, cortisol	✓
↓ Resting EE, lean mass, metabolic rate	✓

Weight plateau[4-6]	
↓ Total EE	✓
↑ Carbohydrate vs. lipid oxidation	✓
Lean mass spared	✓
Stabilized body weight	✓

Weight maintenance[2,4,5]	
↑ Energy efficiency	✓
↓ Energy needs	✓
Risk of weight regain	✓

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(1 of 2)

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