

FAT LOSS: WHAT'S HOT & WHAT'S NOT

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Numerous theories on the cause of obesity & the difficulty of successful fat loss:

- Over-eating?
- Under-exercising?
- Energy balance?
- Sedentary lifestyle?
- Dietary carbohydrate?
- Dietary fat?
- Sugar?
- Fructose?
- Gluten?
- Genetics?
- Toxins?
- Gut microbiota?
- Lifestyle?
- Hormones?

The key word in reversing obesity is Motivation

- Motivation to exercise daily;
- Motivation to modify diet;
- Motivation to modify lifestyle.
- The motivation to do the above when one doesn't feel like it!

The Role of Exercise in Fat Loss

Aerobic, endurance & high-intensity interval training;

- Increased mitochondrial protein synthesis;
- Improved glucose/insulin & triglyceride control;
- Expend energy during & after the session
- Has only small potential to increase muscle hypertrophy.
- Aerobic modes of exercise - walking, cycling, swimming - are the most accessible form of training for most over- weight or obese individuals.
- The benefits of aerobic training on skeletal muscle include improved oxidative metabolism via an increase in both capillary density and mitochondrial content ¹

¹ Hawley JA. Adaptations of skeletal muscle to prolonged, intense endurance training. Clinical and Experimental Pharmacology and Physiology 2002;29(3):218-22.

- On a whole-body level, aerobic training increases cardiovascular function, aerobic capacity, basal metabolic rate and fat metabolism while at the same time producing changes in eating behaviours that may reduce energy intake in an individual's habitual diet².
- Such changes in whole body metabolism and dietary habits induced by regular aerobic exercise are undoubtedly beneficial to promote weight management ³
- Aerobic exercise can also elevate muscle protein synthesis and elicit modest increases in muscle mass⁴.

Strength/Resistance Training

- Increased myofibrillar protein synthesis;
- Increased muscle mass;
- Improved glucose/insulin control;
- Expend energy during & after session.
- Although resistance training retains or improves the relative quantity of lean tissue to total body mass the low energetic requirements associated with this type of exercise typically result in only modest effects on fat loss.
- Willis et al. demonstrated increased lean mass with resistance training compared to aerobic training; however resistance training failed to promote loss of fat mass of a similar magnitude to aerobic training and consequently the resistance-training group gained weight⁵.
 - 119 sedentary, overweight/obese adults.
 - 8-month exercise protocols: 1) resistance training; 2) aerobic training; and 3) aerobic and resistance training.
 - Primary outcomes included total body mass, fat mass and lean body mass.

² Bales CW, Hawk VH, Granville EO, et al. Aerobic and Resistance Training Effects on Energy Intake: The STRRIDE AT/RT Study:(Exercise Training Effects on Energy Intake). *Medicine and Science in Sports and Exercise* 2012;44(10):2033–9.

³ Evelyn B. Parr, Vernon G. Coffey, John A. Hawley. 'Sarcobesity': A metabolic conundrum. *Maturitas* In Press 2012.

⁴ Wilkinson SB, Phillips SM, Atherton PJ, et al. Differential effects of resistance and endurance exercise in the fed state on signalling molecule phosphorylation and protein synthesis in human muscle. *The Journal of Physiology* 2008;586(15):3701–17.

Donges CE, Burd NA, Duffield R, et al. Concurrent resistance and aerobic exercise stimulates both myofibrillar and mitochondrial protein synthesis in sedentary middle-aged men. *Journal of Applied Physiology* 2012;112(12):1992–2001.

Harber MP, Konopka AR, Jemiolo B, Trappe SW, Trappe TA, Reidy PT. Muscle protein synthesis and gene expression during recovery from aerobic exercise in the fasted and fed states. *American Journal of Physiology Regulatory, Integrative and Comparative Physiology* 2010;299(5):R62–1254.

⁵ Willis LH, Slentz CA, Bateman LA, et al. Effects of aerobic and/or resistance training on body mass and fat mass in overweight or obese adults. *Journal of Applied Physiology* 2012

- Resistance training: 3 days a week, 3 sets of 8-12 repetitions for 8 exercises (60 minutes);
- Aerobic training: 3 days per week for 40-45 minutes (~6.4km per session) at 80% HRmax;
- Aerobic training plus resistance training: both of the above.
- The aerobic training and aerobic and resistance training groups reduced total body mass and fat mass more than resistance training group, but they were not different from each other.
- Resistance training and aerobic and resistance training increased lean body mass more than aerobic training.
- "Balancing time commitments against health benefits, it appears that aerobic training is the optimal mode of exercise for reducing fat mass and body mass while a program including resistance training is needed for increasing lean mass in middle-aged, overweight/obese individuals."
- Resistance exercise has been ineffective at reducing visceral fat when compared with aerobic exercise⁶.
- **The primary consideration with resistance exercise prescription in isolation is that effects on fat metabolism are modest but that its role in retaining/increasing muscle mass is invaluable⁷.**

Negative energy balance

If exercise (strength or aerobic training) does not contribute to a negative energy balance, then fat loss does not occur⁸.

Current Exercise Guidelines

- Moderate-intensity aerobic exercise between 150 and 250 minutes per week (30-50 minutes 5 days per week) will improve weight loss in studies that use moderate diet restriction but not severe diet restriction .
- Greater amounts of aerobic exercise (225-420 minutes per week/ 60 minutes a day) have been associated with clinically significant weight loss.
- "Resistance training does not enhance **weight loss** but may **increase fat-free mass** and **increase loss of fat mass** and is associated with reductions in health risk."⁹

What About The Cortisol?

- There were no significant correlations between the exercise-induced elevations of GH, fT and IGF-1 and gains in LBM or leg press strength.

⁶ Ismail I, Keating S, Baker M, Johnson N. A systematic review and meta-analysis of the effect of aerobic vs. resistance exercise training on visceral fat. *Obesity Reviews* 2011;13(1):68-91.

⁷ Evelyn B. Parr, Vernon G. Coffey, John A. Hawley. 'Sarcobesity': A metabolic conundrum. *Maturitas* In Press 2012

⁸ Melanson et al. *Exerc Sport Sci Rev.* 2009; 37(2): 93-101.

⁹ ACSM (2009) Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults

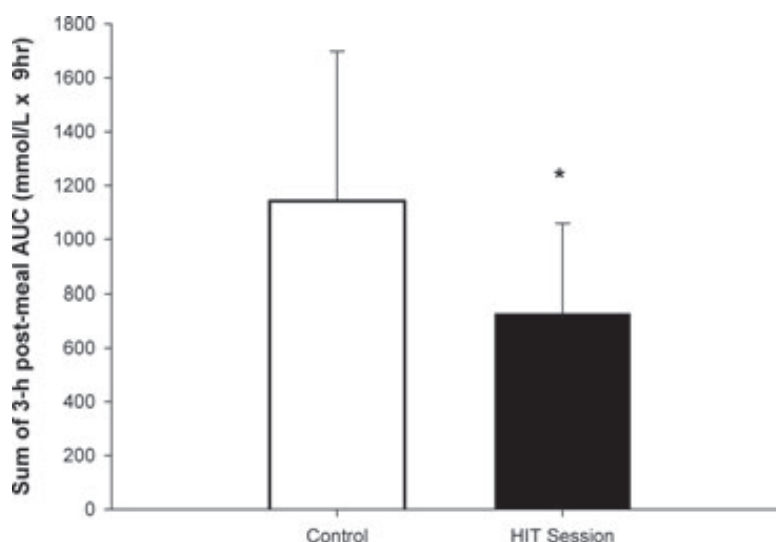
- Significant correlations were found for cortisol and increases in hypertrophy, even though it is usually assumed to be a hormone indicative of catabolic drive¹⁰.

Metabolic Syndrome

- A drug targeting all 3 metabolic disorders (insulin resistance, dyslipidemia, hypertension) and obesity would be ideal but to date does not exist.¹¹
- However, resistance & aerobic training increases insulin sensitivity, improves dyslipidemia, lowers blood pressure and reduces body fat, including visceral fat¹².
- “Based on our meta-analysis, resistance training has a clinically and statistically significant effect on metabolic syndrome risk factors such as obesity, HbA1c levels and systolic blood pressure, and therefore should be recommended in the management of type 2 diabetes and metabolic disorders.”¹³

High-Intensity Interval Training

- Fat Loss? Or Glucose control?¹⁴



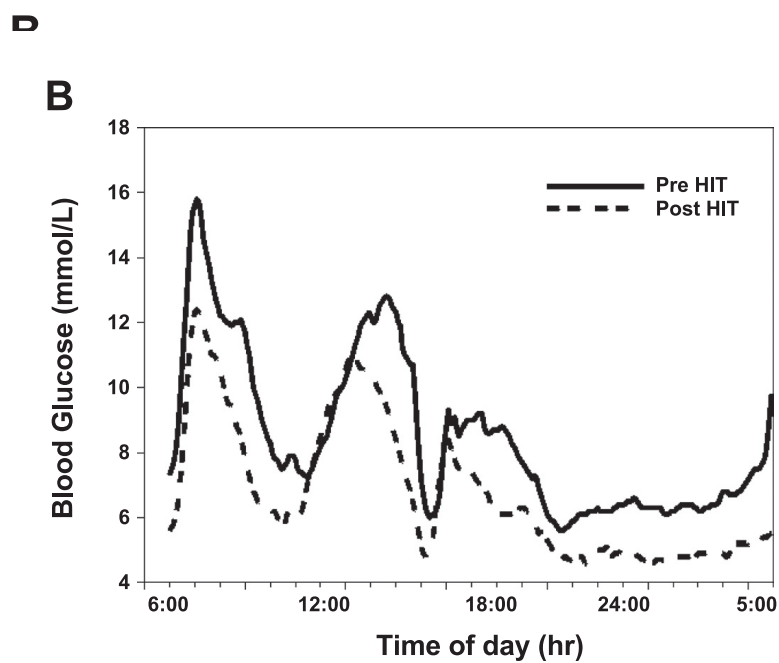
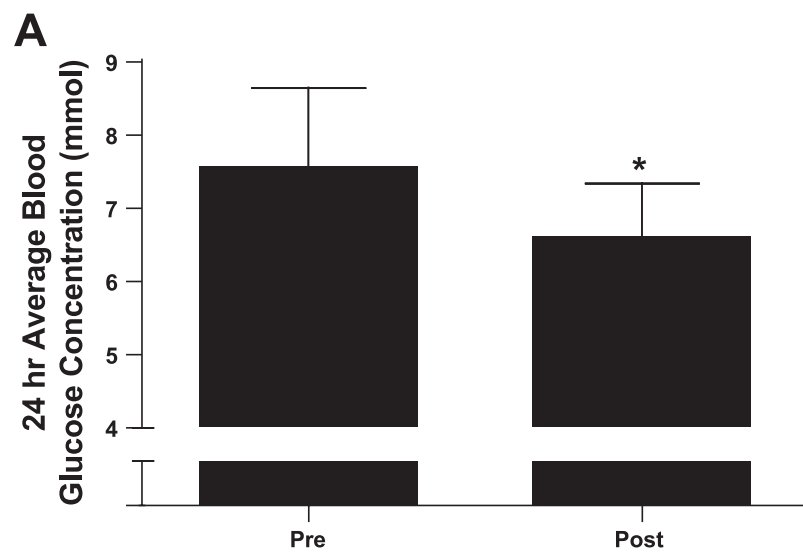
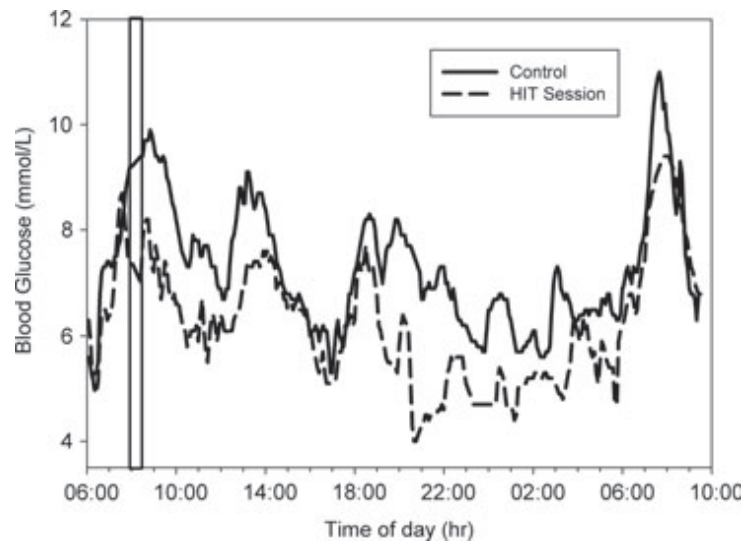
¹⁰ West D & Phillips SM. Associations of exercise-induced hormone profiles and gains in strength and hypertrophy in a large cohort after weight training. *Eur J Appl Physiol* (2012) 112:2693–2702

¹¹ Swislocki et al. *Curr Vasc Pharmacol*. 2012 Mar;10(2):187-205.

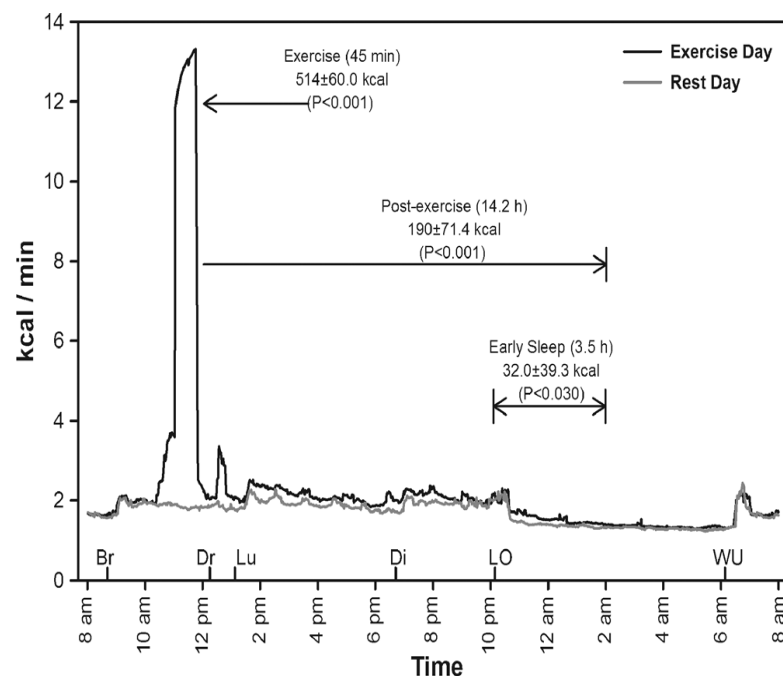
¹² Strasser et al. *Obesity Reviews* (2012) 13, 578–591

¹³ Strasser et al. *Sports Med* 2010; 40 (5): 397-415

¹⁴ Gillen et al. *Diabetes, Obesity and Metabolism* 14: 575–577, 2012; Little et al. *J Appl Physiol* 111:1554-1560, 2011.



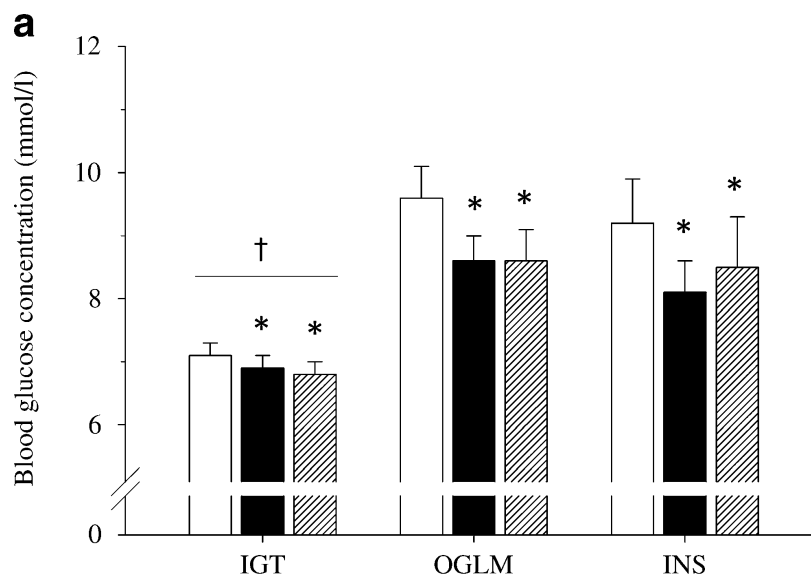
EPOC¹⁵



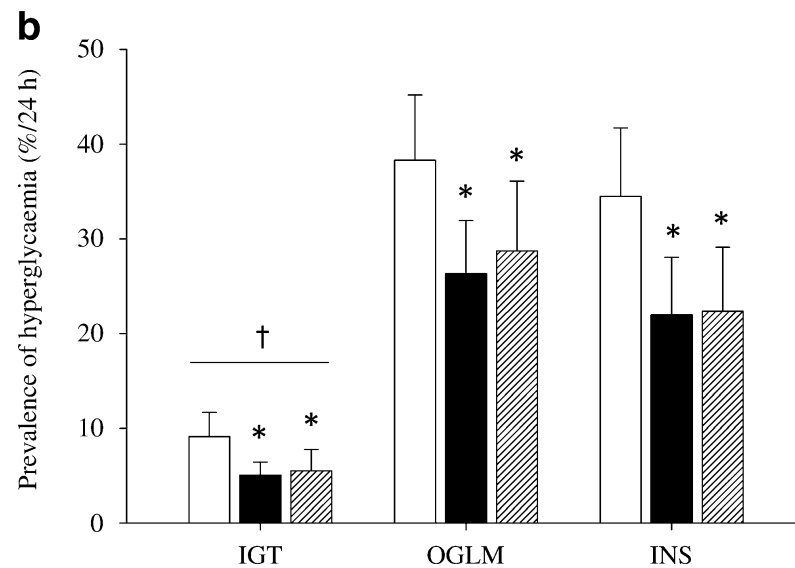
- 45 minutes of vigorous exercise expends ~520 calories.
- Metabolism is elevated for 14-hours after the session (EPOC) expending a further ~190 calories, which is another 37%!

Resistance training vs. Aerobic exercise

- Resistance training: 5 sets of 10 repetitions for lat pulldowns, chest press, leg press & leg extensions (45 minutes)
- Aerobic training: 45 minutes of moderate exercise on a stationary bike.

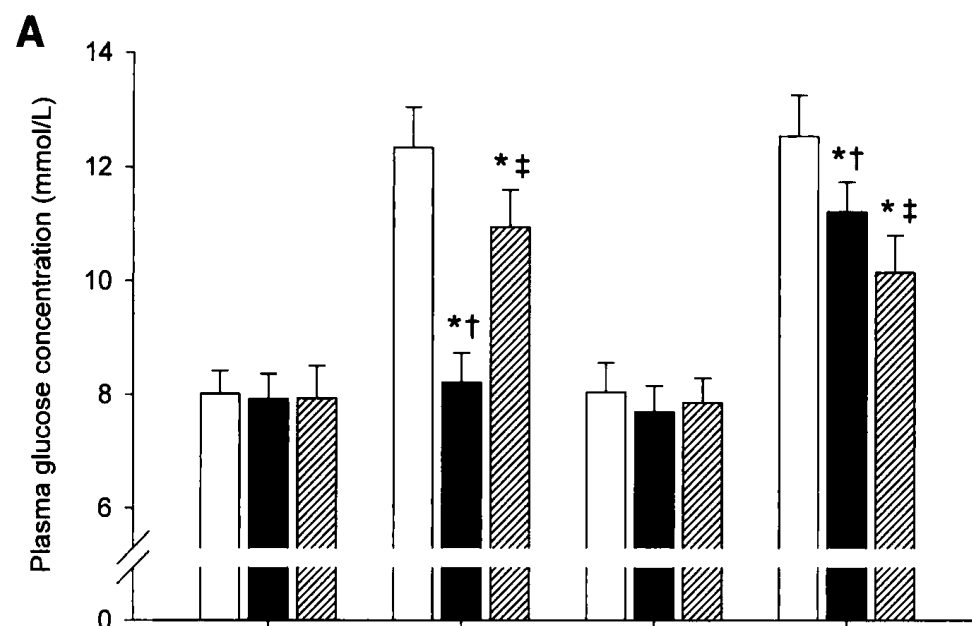


¹⁵ Knab, AM., et al. A 45-Minute Vigorous Exercise Bout Increases Metabolic Rate for 14 Hours. Med. Sci. Sports Exerc., Vol. 43, No. 9, pp. 1643–1648, 2011.



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Daily exercise?¹⁷



Take Home Message

Exercise works! Improves glucose/insulin control, expends energy during and after session, improves metabolic health.

Frequency: 7 days per week;

Duration: 60 minutes;

Mode: 2-3 days resistance training, 4-5 days aerobic exercise;

Intensity: 8-30RM for resistance training, 70-80% HRmax for aerobic exercise, 91%+ HRmax for interval training;

¹⁶ van Dijk et al. Diabetologia (2012) 55(5): 1273–1282.

¹⁷ van Dijk et al Diabetes Care 35 2012

Volume: 3-4 sets, 8-12 exercises for all major muscle groups;

Rest: 30-60 seconds between sets (longer between extended sets)

Equipment: Primarily multi-joint, large muscle groups using both machines & free weights.

Nutrition for Fat Loss

The First Law of Thermodynamics

Energy Balance?

- “In order to achieve a decrease in fat mass, a state of negative fat balance must be achieved. To achieve negative fat balance, one must alter intake or expenditure such that fat oxidation exceeds fat intake. Energy and macronutrient intake are powerful modulators of fat balance. If energy intake is less than expenditure, fat oxidation will increase, independent of macronutrient intake, inducing a state of negative fat balance.”

Nutrition vs. Exercise for Fat Loss

- Exercise plays an equivalent role to Caloric Restriction in terms of energy balance; however, it can also improve aerobic fitness, which has other important cardiovascular and metabolic benefits.
- Should You Monitor Calories? Or Monitor Portion Size?
- Is it about the calories? Or is it about the hormones?
- **Protein vs. Carbohydrate Calories**
- Are Protein Calories Better than Carbohydrate Calories for Fat Loss?
- “Under planned isoenergetic conditions, as expected, both dietary patterns resulted in similar weight loss and changes in body composition. The LC diet may offer clinical benefits to obese persons with insulin resistance. However, the increase in LDL cholesterol with the LC diet suggests that this measure should be monitored.”
- “Participants lost more fat than lean mass after consumption of all diets, with no differences in changes in body composition, abdominal fat, or hepatic fat between assigned macronutrient amounts.”
- “Reduced-calorie diets result in clinically meaningful weight loss regardless of which macronutrients they emphasize.”
- “calories alone account for the increase in fat”
- The success of the so-called 'low carb' diet that is usually high in protein can be attributed to the relatively high-protein content per se and not to the relatively lower carbohydrate content.¹⁸

Say No to Gluten?

- Epidemiological studies consistently demonstrate that higher intakes of whole grains, but not refined grains, are associated with lower BMI and/or reduced risk of obesity¹⁹.

¹⁸ Westerterp-Plantenga MS, Lemmens SG, Westerterp KR Dietary protein - its role in satiety, energetics, weight loss and health. Br J Nutr. 2012 Aug;108 Suppl 2:S105-12.

Wycherley, TP et al. Effects of energy-restricted high-protein, low-fat compared with standard-protein, low-fat diets: a meta-analysis of randomized controlled trials. Am J Clin Nutr 2012;96:1281-98.

- The results indicate that dietary patterns that include whole-grain bread do not positively influence weight gain and may be beneficial to ponderal status (measurement of leanness).²⁰
- Given the available evidence, it can be concluded that pulses could be useful as functional foods and food ingredients that combat obesity.²¹
- There are no published reports showing that a gluten-free diet produces weight loss in persons without celiac disease or gluten sensitivity.
- There is no evidence to suggest that following a gluten-free diet has any significant benefits in the general population. Indeed, there is some evidence to suggest that a gluten-free diet may adversely affect gut health in those without celiac disease or gluten sensitivity.²²

Ideal Macronutrient Distribution²³

- 30-50% Low GI Carbohydrate;
- 30% Protein;
- 20-40% Fat.

Ideal Macronutrient Distribution²⁴

- We conclude that the pattern of ingested protein, and not only the total daily amount, can impact whole-body protein metabolism. Individuals aiming to maximize protein synthesis would likely benefit from repeated ingestion of moderate amounts of protein (~20g) at regular intervals (~3h) throughout the day.

Body Composition Assessment

- Measure Body Composition: DXA
- How to Measure Caloric Expenditure
- Set the Parameters
- Set the total caloric intake based on DXA or equivalent;

¹⁹ Karl JP Saltzman E. The role of whole grains in body weight regulation. *Adv Nutr.* 2012 Sep 1;3(5):697-707.

²⁰ Bautista-Castaño, I et al. Relationship between bread consumption, body weight, and abdominal fat distribution: evidence from epidemiological studies. *Nutrition Reviews Vol. 70(4):218–233.*

²¹ Marinangeli, CP et al. Pulse grain consumption and obesity: effects on energy expenditure, substrate oxidation, body composition, fat deposition and satiety. *British Journal of Nutrition* (2012), 108, S46–S51

²² Gaesser Gluten-Free Diet: Imprudent Dietary Advice for the General Population? the Academy of Nutrition and Dietetics. Doi:10.1016/j.jand.2012.06.009.

²³ Westerterp-Plantenga MS, Lemmens SG, Westerterp KR Dietary protein - its role in satiety, energetics, weight loss and health. *Br J Nutr.* 2012 Aug;108 Suppl 2:S105-12; KJ Acheson Diets for body weight control and health: the potential of changing the macronutrient composition *European Journal of Clinical Nutrition* (2012), 1–5; Hooper, L et al. Effect of reducing total fat intake on body weight: systematic review and meta-analysis of randomised controlled trials and cohort studies. *BMJ* 2012;345: 6 December 2012)

²⁴ Moore et al. Daytime pattern of post-exercise protein intake affects whole-body protein turnover in resistance-trained males. *Nutrition & Metabolism* 2012, 9:91.

- Set the daily macronutrients (40 CHO: 30 PRO; 30 FAT);
- Set the daily caloric expenditure exercise goal using HR monitor;
- Help client in every way (nutrition, exercise etc);
- Retest in 3 months.
- Fine Tuning
- Measure Caloric Intake

What Happens During Caloric Restriction?

- Decreases in T3, BMR, GH, bone markers, IGF-1, leptin, testosterone & Increases in cortisol.

Low Energy Availability

- Many athletes & fat loss clients are chronically energy deficient. This energy deficiency impairs performance, growth and health. Reproductive disorders in females are caused by low energy availability (defined as dietary energy intake minus exercise energy expenditure), perhaps specifically by low carbohydrate availability, and not by the stress of exercise.

Avoid Prolonged Low Energy Availability

- Keep the daily energy deficit to 250-500 calories a day.

Supplements?

- Only caffeine and green tea have evidence to support a fat-metabolism benefit²⁵

Fasted State?

- Low-Moderate Intensity Exercise in the Fasted State promotes greater fat oxidation rates²⁶

Exercise & Fat Loss In Practice

- Aerobic Exercise
- 4-5 days per week (even 7 days per week if time allows);
- 30-60 minutes (even 90 if time allows, especially on the weekend);
- Primarily continuous endurance-based aerobic exercise (70-80% HR max);

1-2 interval based session per week.

Interval Approaches

- Short duration Intervals;
- Long duration Intervals;
- Short rest intervals;
- Long duration intervals;
- Fartlek intervals;
- Multi-mode intervals;
- Contrast duration/time intervals.

Strength Training Approaches

²⁵ Jeukendrup AE, Randell R. Fat burners: nutrition supplements that increase fat metabolism. *Obes Rev.* 2011 Oct;12(10):841-51. doi: 10.1111/j.1467-789X.2011.00908.x.

²⁶ Van Proeyen K, Szlufcik K, Nielens H, Ramaekers M, Hespel P. Beneficial metabolic adaptations due to endurance exercise training in the fasted state. *J Appl Physiol* 110: 236–245, 2011.

- Straight sets;
- Alternated sets;
- Supersets;
- Trisets;
- Giant sets;
- Circuits;
- Ascending reps per set (round);
- Ascending reps per exercise pairing .

Strength Training Approaches

- All major muscles groups;
- 30-60 rest between sets.

Straight Sets

- Deadlift
- Incline dumbbell press
- Back squat
- Pulldowns
- Romanian deadlifts
- Overhead press
- Standing barbell curl
- Close-grip bench press

Alternated Sets

- A1. Deadlift
- A2. Incline dumbbell press
- B1. Back squat
- B2. Pulldowns
- C1. Romanian deadlifts
- C2. Overhead press
- D1. Standing barbell curl
- D2. Close-grip bench press

Giant Sets

- A1. Deadlift
- A2. Incline dumbbell press
- A3. Back squat
- A4. Pulldowns
- B1. Romanian deadlifts
- B2. Overhead press
- B3. Standing barbell curl
- B4. Close-grip bench press

Circuit Sets

- A1. Deadlift
- A2. Incline dumbbell press
- A3. Back squat
- A4. Pulldowns
- A5. Romanian deadlifts
- A6. Overhead press
- A7. Standing barbell curl
- A8. Close-grip bench press

Ascending Reps per Set

- A1. Deadlift, 8 reps

- A2. Incline dumbbell press, 8 reps
- A3. Back squat, 10 reps
- A4. Pulldowns, 10 reps
- A5. Romanian deadlifts, 12 reps
- A6. Overhead press, 12 reps
- A7. Standing barbell curl, 15 reps
- A8. Close-grip bench press, 15 reps

Circuit Sets

- Set 1 (8 reps), set 2 (12 reps), set 3 (15 reps)
- A1. Deadlift
- A2. Incline dumbbell press
- A3. Back squat
- A4. Pulldowns
- A5. Romanian deadlifts
- A6. Overhead press
- A7. Standing barbell curl
- A8. Close-grip bench press