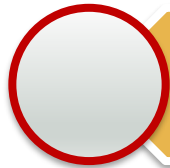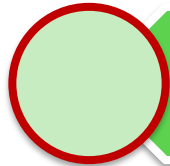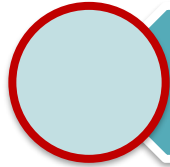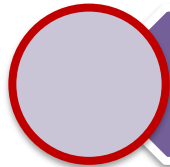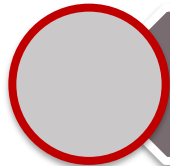# How to Lose Weight

- What Doesn't Work
- Why It Doesn't Work
- Why Fasting?
- Fasting Myths
- Fasting Benefits

The Biggest Loser

"NBC never does a reunion. Why? We're all fat again"
Susanne Mendonca – Season 2

The Biggest Loser Diet

- Reduce Calories
- Increase Exercise
- Eat Less, Move More

BEST DIETS

U.S.News & WORLD REPORT

RANKINGS

But Does it Actually Work?

Eat Less...

	Intervention	
	No.	Mean (SD)
Total energy, kcal		
Baseline	19 517	1788.1 (703.8)
Follow-up	14 246	1445.9 (510.1)
Change	14 246	−361.4 (653.8)
Energy from fat, %		
Baseline	19 517	38.8 (5.0)
Follow-up	14 246	29.8 (8.3)
Change	14 246	−8.8 (8.5)
Energy from saturated fat, %		
Baseline	19 517	13.6 (2.6)
Follow-up	14 246	10.1 (3.3)
Change	14 246	−3.4 (3.6)
Energy from carbohydrates, %		
Baseline	19 517	44.5 (6.2)
Follow-up	14 246	52.7 (9.8)
Change	14 246	8.2 (9.6)

Women's Health Initiative Trial

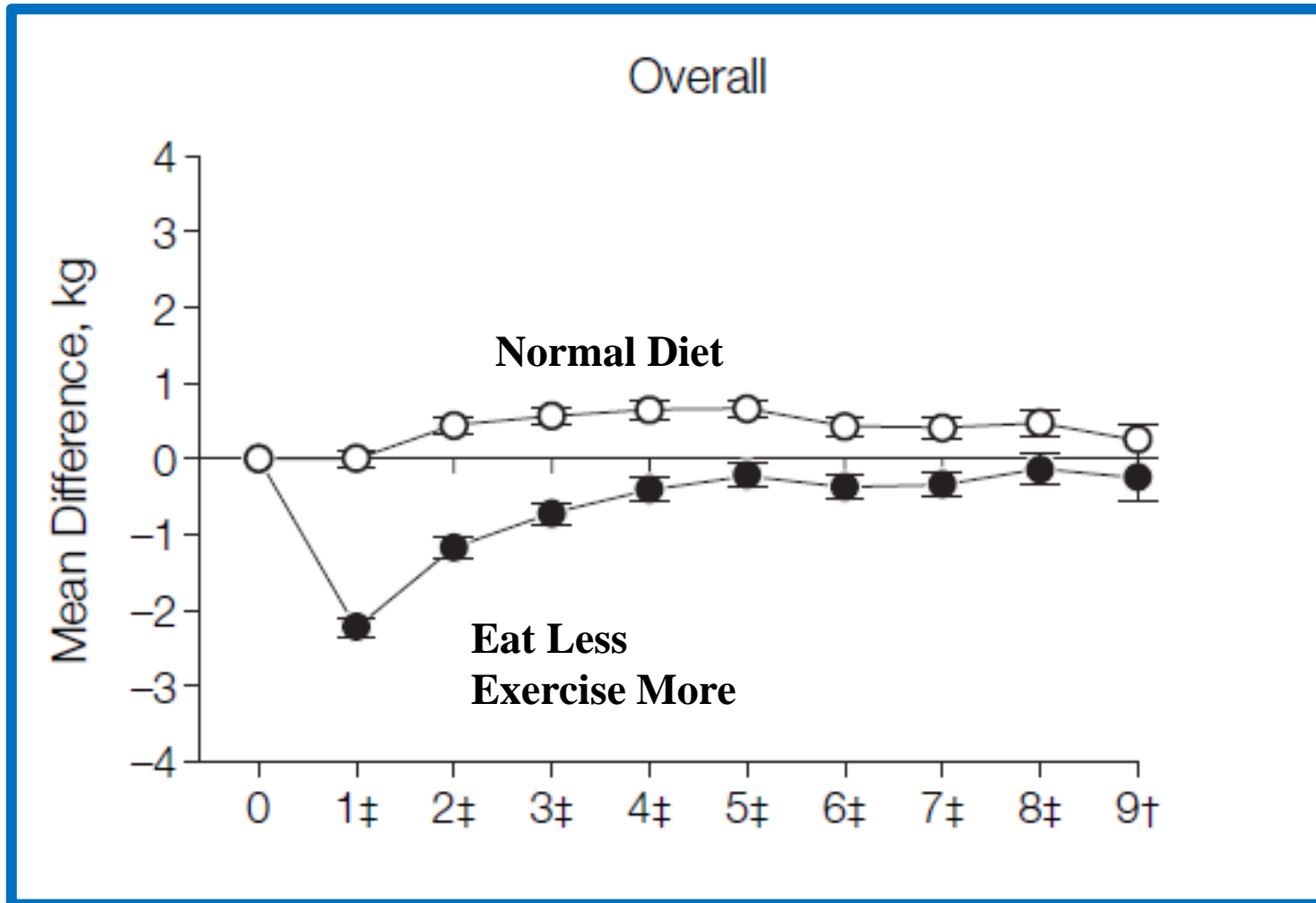Howard BV et al. JAMA 2006; 295:39-49

Move More...

Physical activity, METs/wk		
Baseline	17 507	10.0 (11.7)
Year 1	9962	11.4 (12.8)
Change	9962	1.1 (10.4)

Women's Health Initiative Trial

Howard BV et al. JAMA 2006; 295:39-49

Results

Overall

Mean Difference, kg

Normal Diet

Eat Less
Exercise More

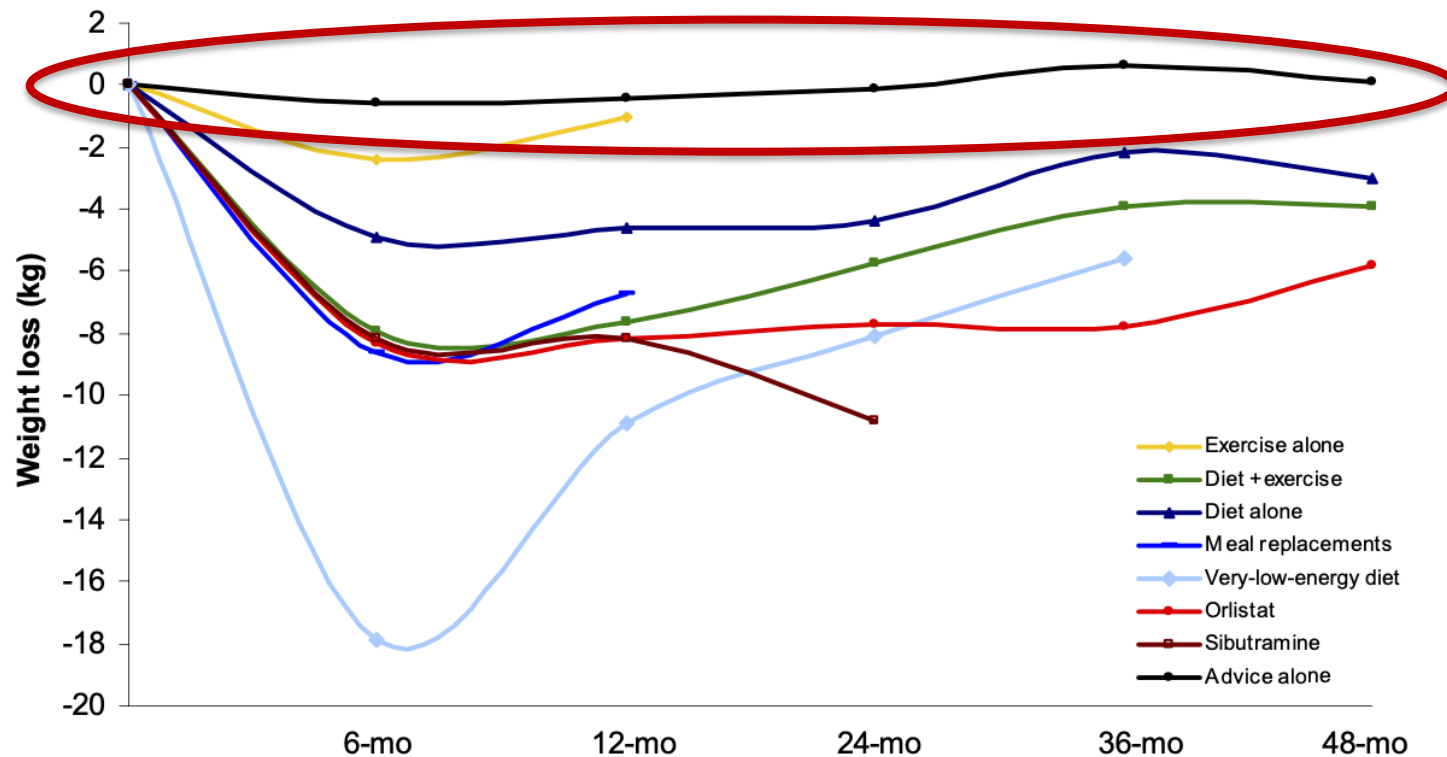0   1‡   2‡   3‡   4‡   5‡   6‡   7‡   8‡   9†

Figure 1. Average weight loss of subjects completing a minimum 1-year weight-management intervention; based on review of 80 studies (N=26,455; 18,199 completers [69%]).

J Am Diet Assoc. 2007;107:1755-1767.

Proven to Fail

Initial BMI Category	Success %	Annual Probability of Attaining Normal BMI, Estimate (95% CI)	Failure %
Men, kg/m^2			
30.0–34.9	0.5%	1 in 210 (197, 225)	99.5%
35.0–39.9		1 in 701 (619, 797)	
40.0–44.9		in 1 290 (1023, 1651)	
≥ 45.0		1 in 362 (300, 442)	
Women, kg/m^2			
30.0–34.9	0.8%	1 in 124 (118, 131)	99.2%
35.0–39.9		1 in 430 (390, 475)	
40.0–44.9		1 in 677 (599, 769)	
≥ 45.0		1 in 608 (527, 704)	

UK General Practice Database

80% regain within the year

We KNOW it doesn't work

Joslin's Diabetes Mellitus (2005)

"reduction of caloric intake" is "the cornerstone of any therapy for obesity"

However, "**none of these approaches has any proven merit**"

Handbook of Obesity (1998)

"Dietary therapy remains the cornerstone of treatment and the reduction of energy intake continues to be the basis of successful weight reduction programs"
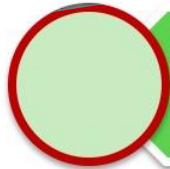
Results of such diets are "**known to be poor and not long-lasting**"
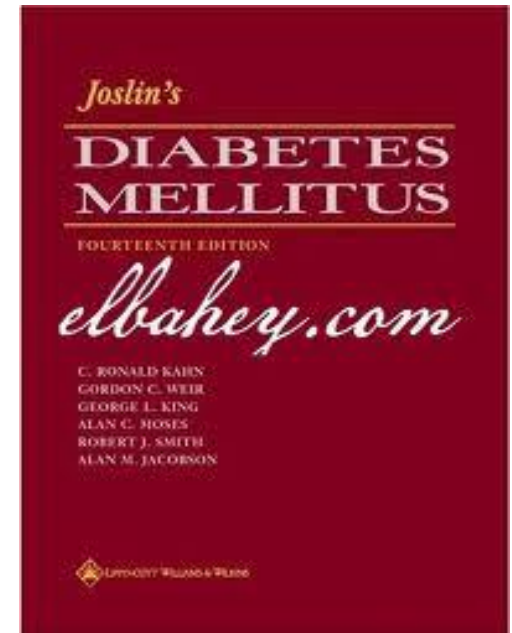
How to Lose Weight

- What Doesn't Work
- Why It Doesn't Work
- Why Fasting?
- Fasting Myths
- Fasting Benefits

Problem #1

Slowing Metabolic Rate

Body Fat = Calories In – Calories Out

Eat Less (Fewer Calories In) Balanced by

➡️ Lower Body Fat
1st Law of Thermodynamics (very science-y)

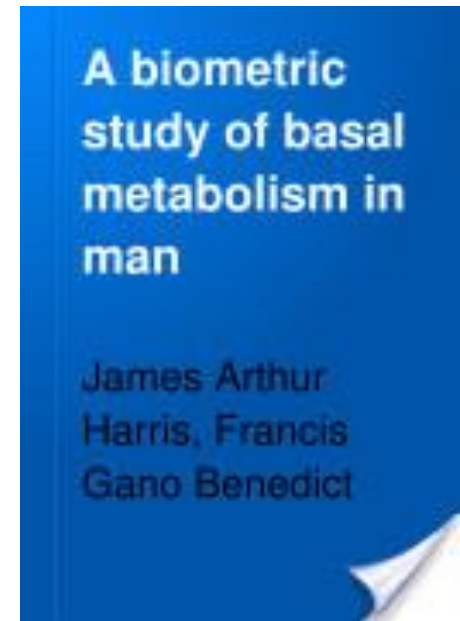➡️ Lower Calories Out (Decreased Metabolic Rate)

Slowing Metabolism

1400-2100 calories/day – 30% caloric reduction

"almost impossible to keep warm, even with an excessive amount of clothing"
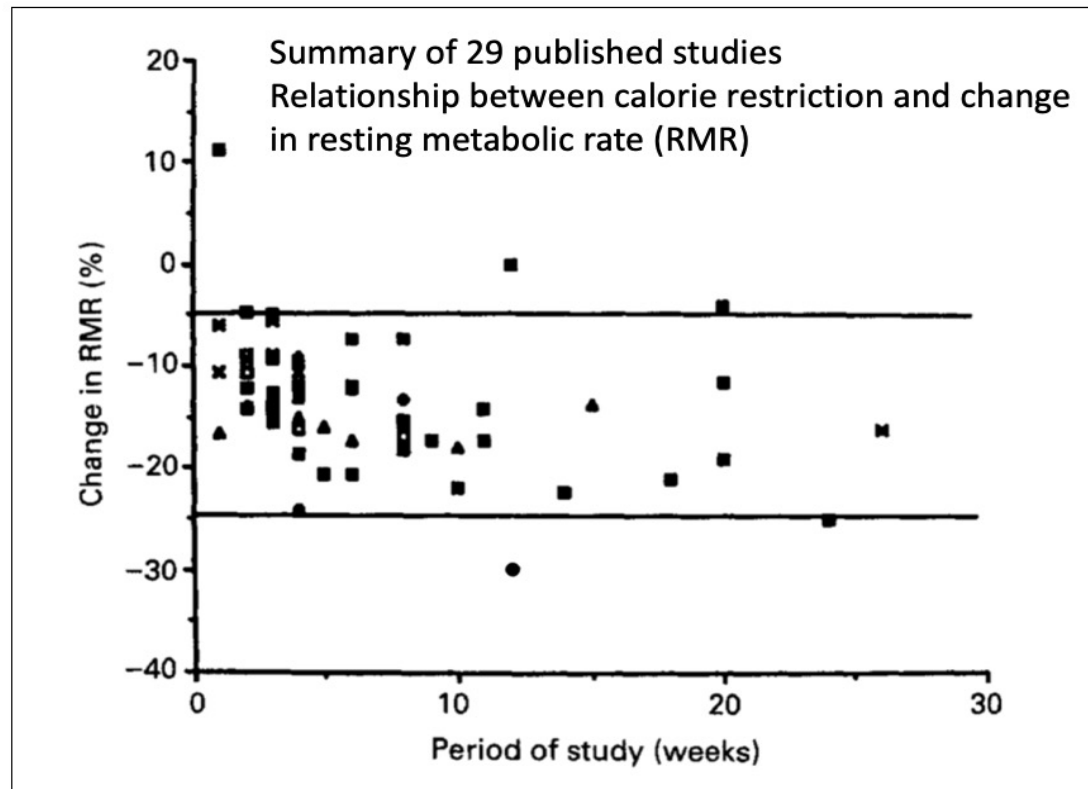
30% decrease in metabolism

Excess eating immediately after experiment - Weight regain

A biometric study of basal metabolism in man

James Arthur Harris, Francis Gano Benedict

Carnegie Institution of Washington's Nutrition Laboratory

1917

⬇ Calories In ⬇ Calories Out

Summary of 29 published studies
Relationship between calorie restriction and change in resting metabolic rate (RMR)

Prentice AM et al (1991) Physiological responses to slimming.
Proceedings of the Nutrition Society (50) 441-458.
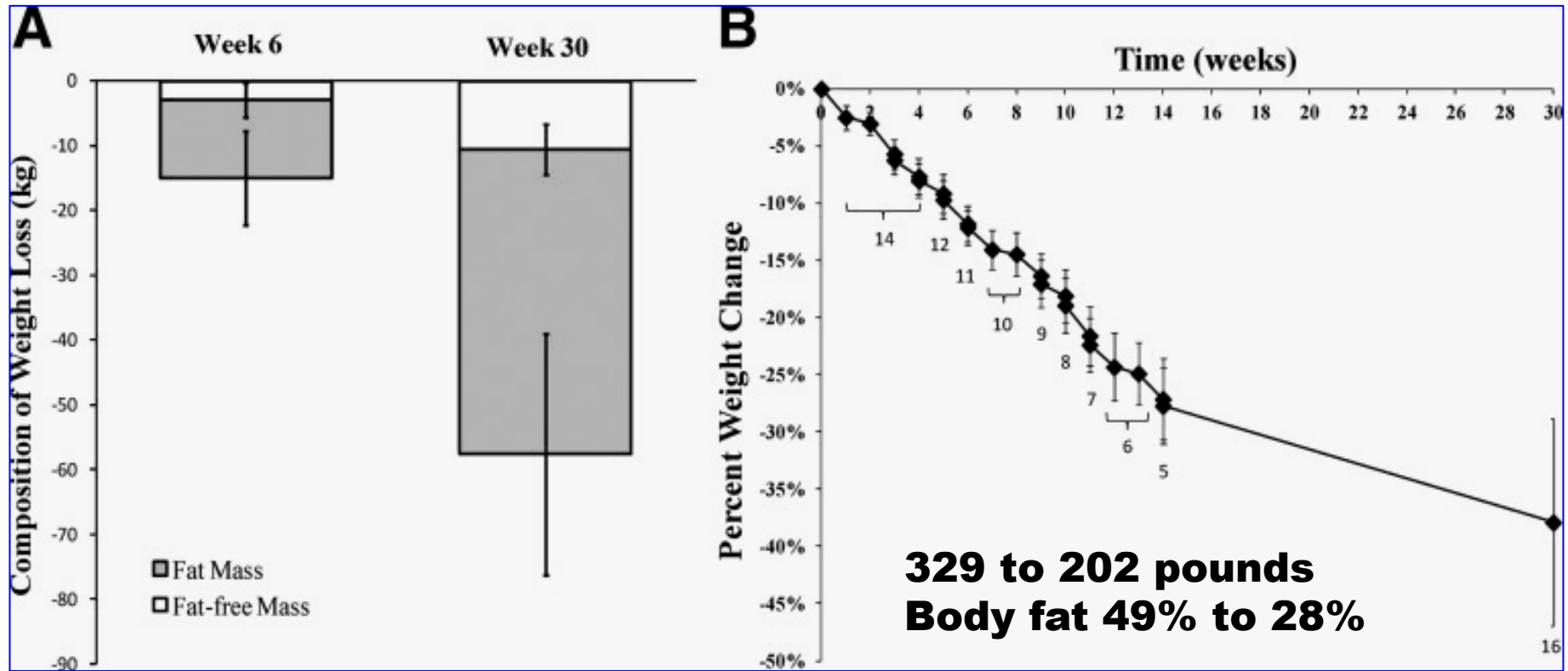
⬇ **Calories In** ⬇ **Calories Out**

"The first statement which can be made with some certainty is that a **decrease in energy expenditure** is a **universal response** to **energy restriction**."
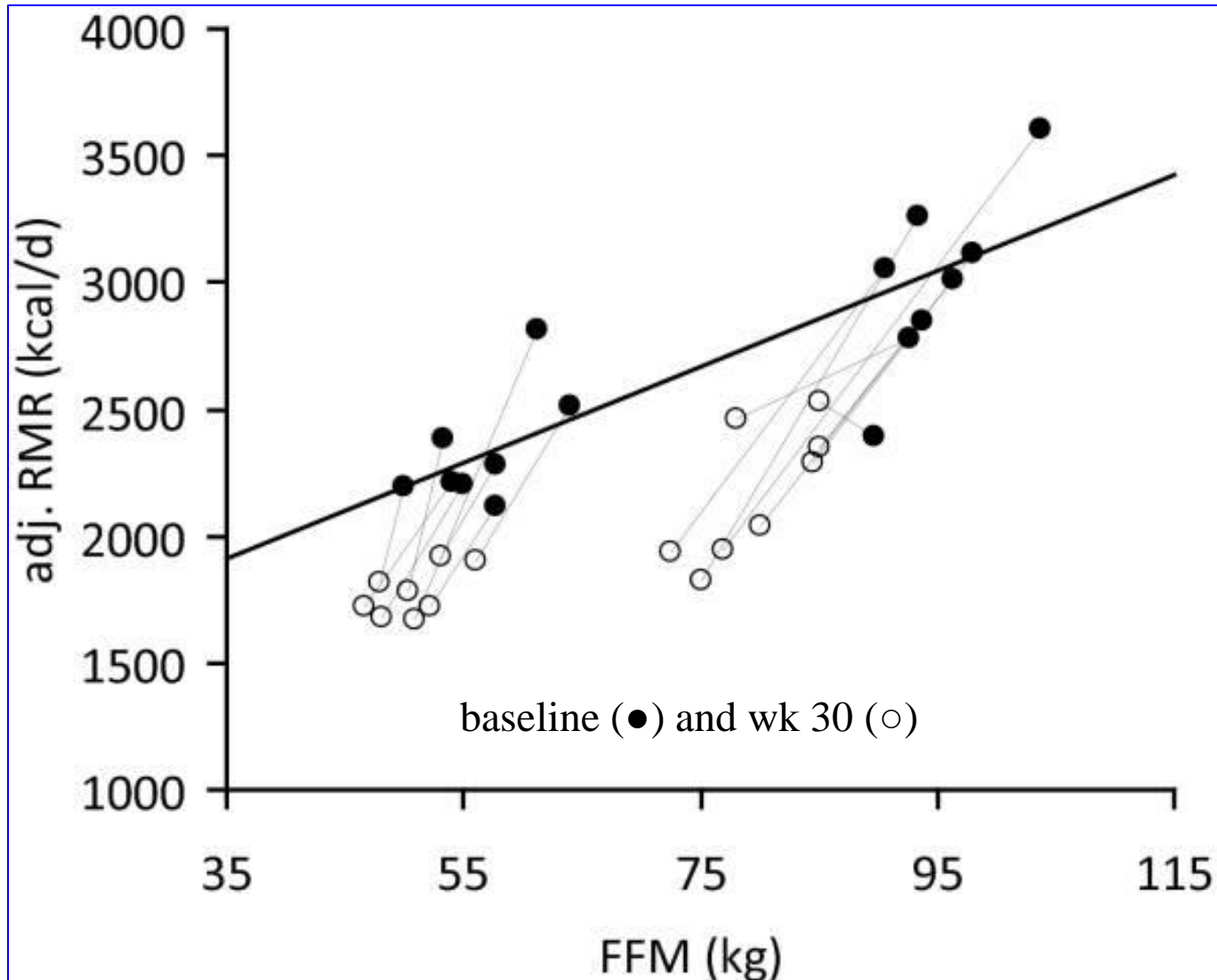
Slowing Metabolism
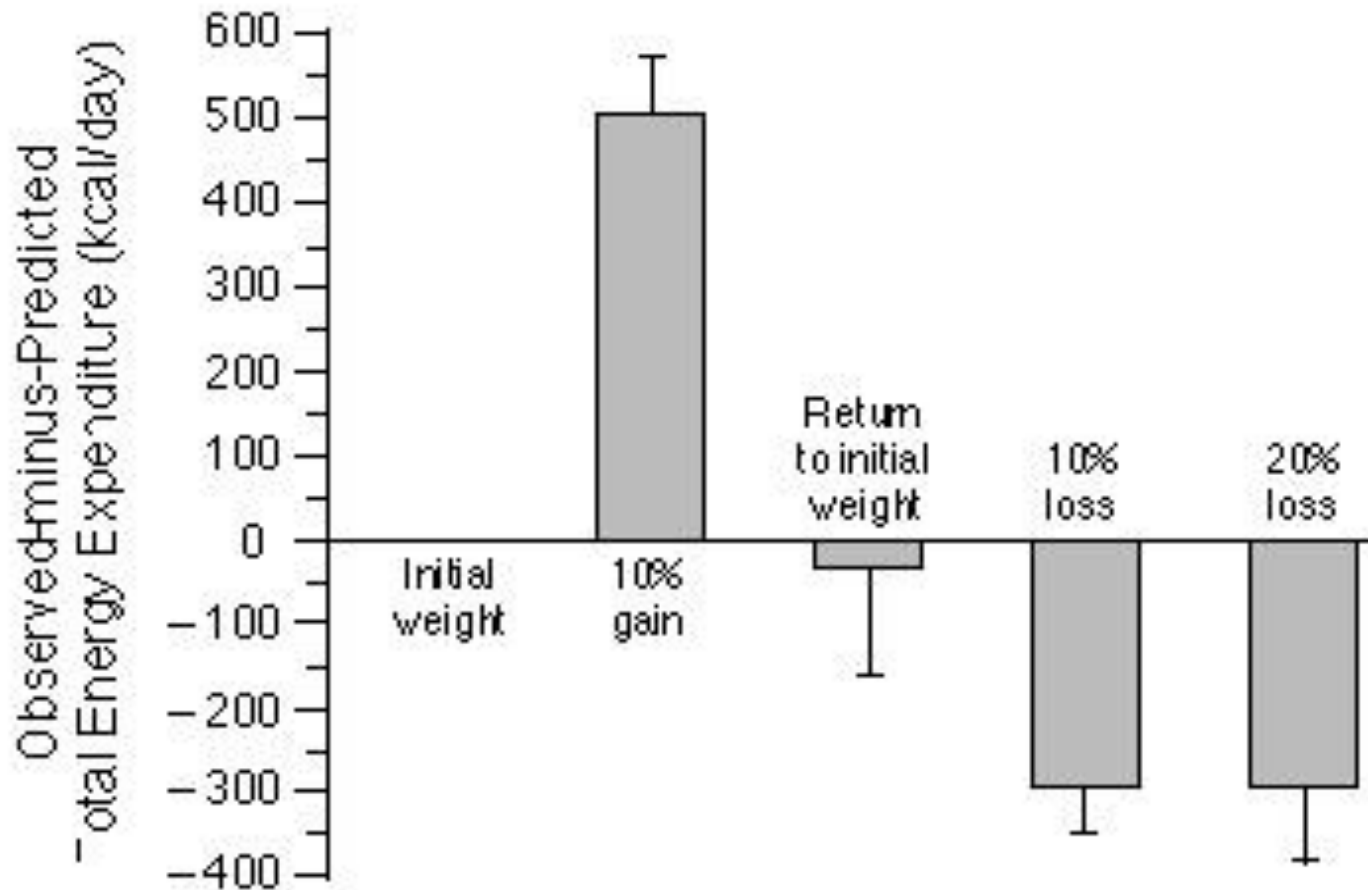
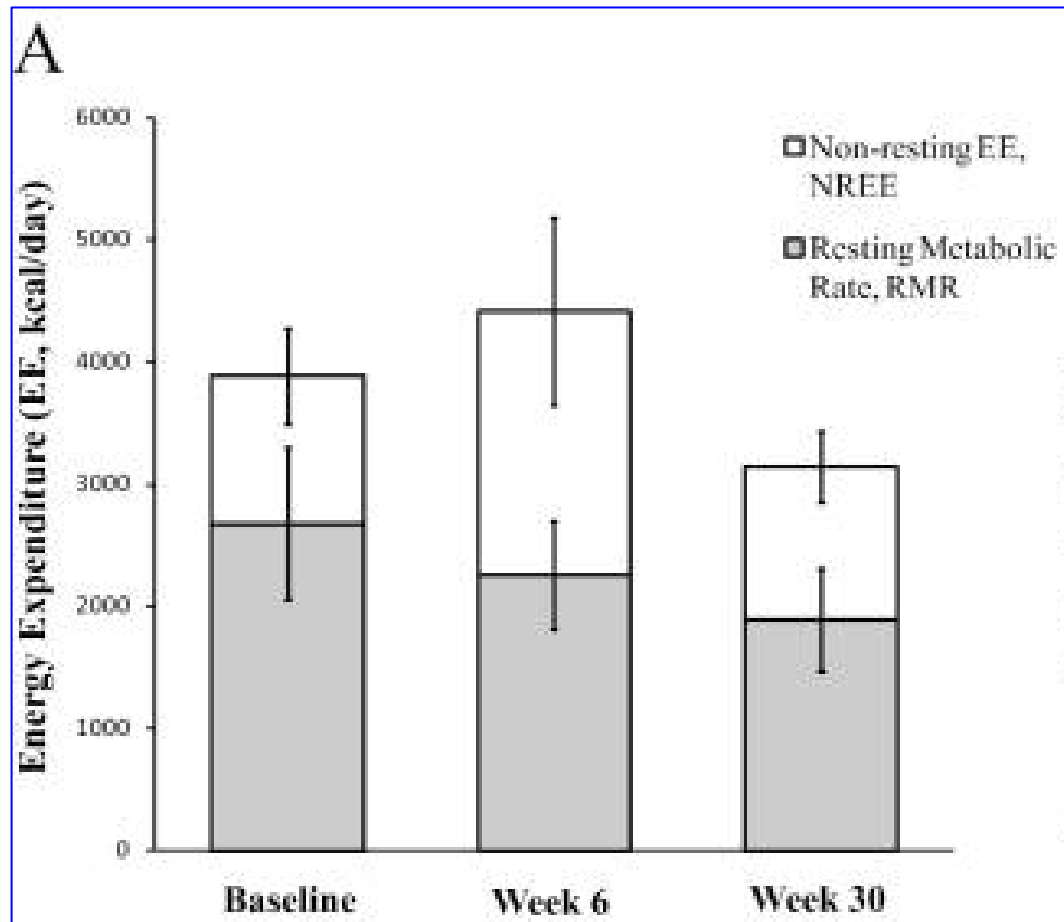Leibel RL et al. N Engl J Med 1995;332:621-628.

The Biggest Loser

329 to 202 pounds
Body fat 49% to 28%

J Clin Endocrinol Metab. 2012 Jul;97(7):2489-96

Slowing Metabolism

baseline (●) and wk 30 (○)

Slowing Metabolism

Slowing Metabolism
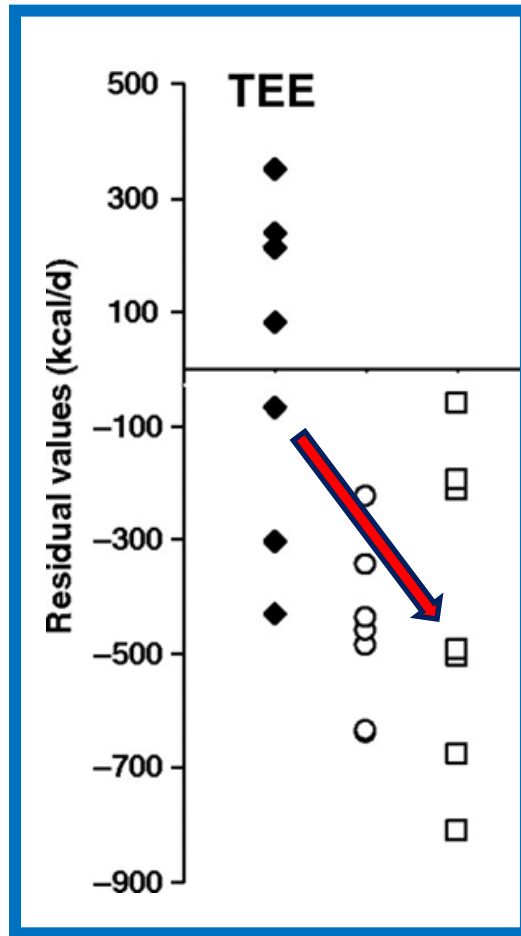
Maintained weight loss of 10% over 1 year

Eating

Calories = Food Energy
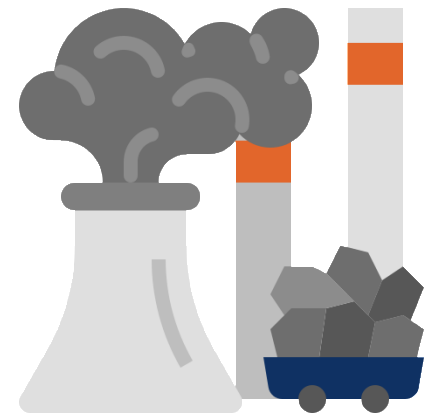
Hormones = Instructions to Body
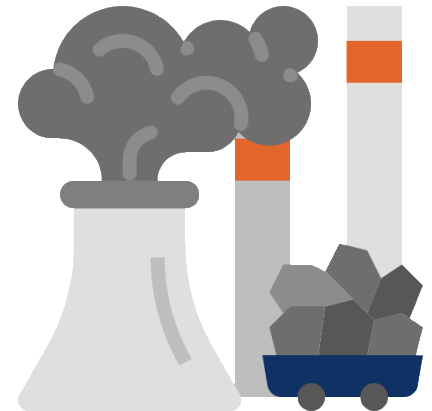- What to do with calories

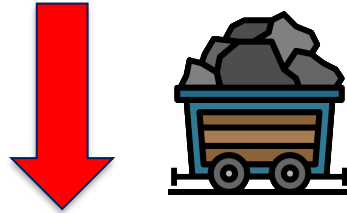**Energy In**

Insulin

Fat Stores

Energy Out

Not Eating

Insulin

Fat Stores
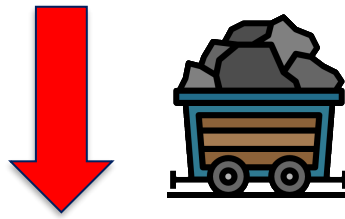
Energy Out

What we HOPE Happens

Energy In
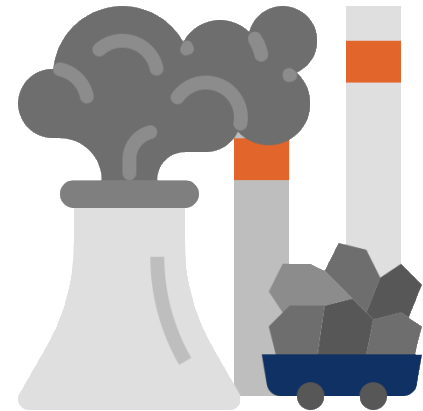
Fat Stores

Insulin

Energy Out

What ACTUALLY Happens

Energy In

Insulin

Energy Out

Fat Stores
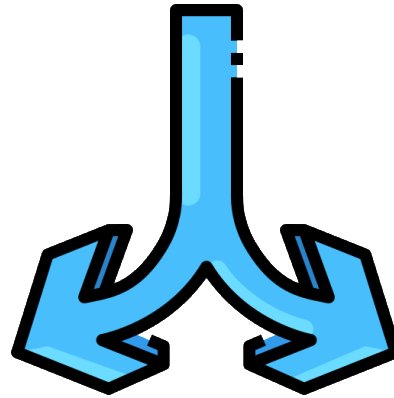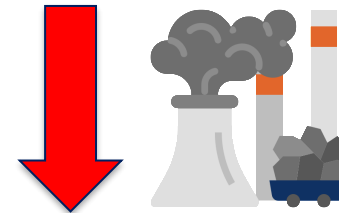
Problem #2

Hunger

Hunger
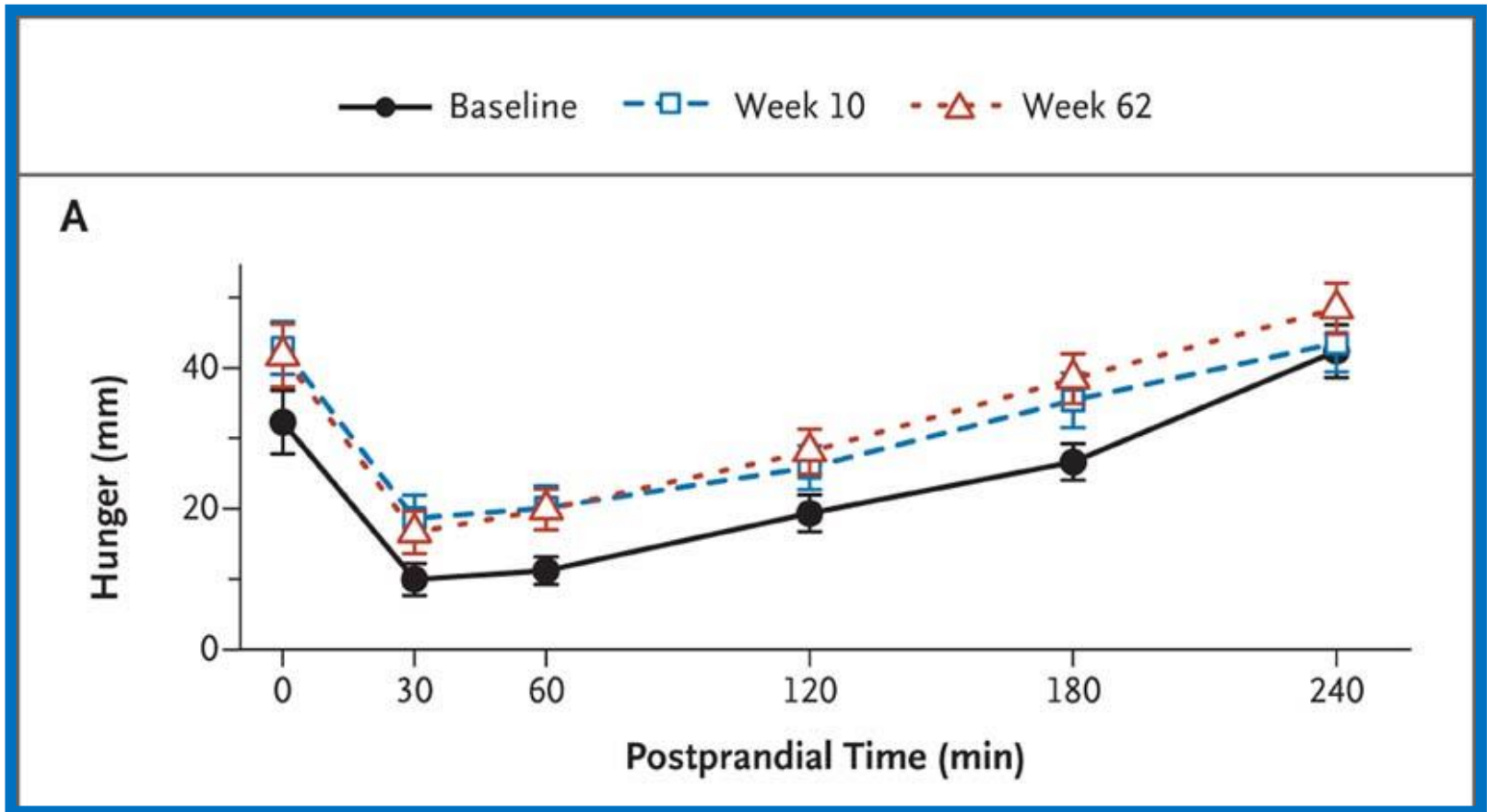
N Engl J Med 2011; 365:1597-1604October 27, 2011

Hunger
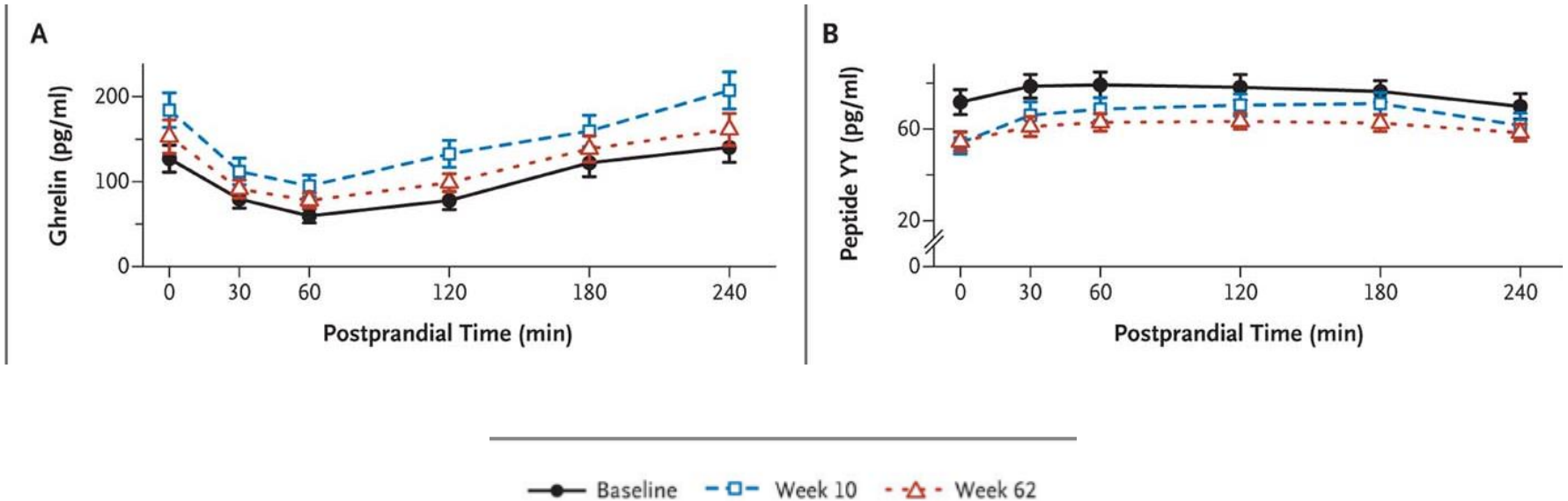
Long-Term Persistence of Hormonal Adaptations to Weight Loss
N Engl J Med 2011; 365:1597-1604October 27, 2011

Eat Less, Move More

Adaptions to weight loss:

- **Slowing Metabolism**
- **Increased Hunger**

Result: Weight Regain!

Vicious Cycle of Eat Less, Move More

Eat Less Calories

Regain Weight

Lose Weight

Decreased Energy Expenditure Increased Hunger
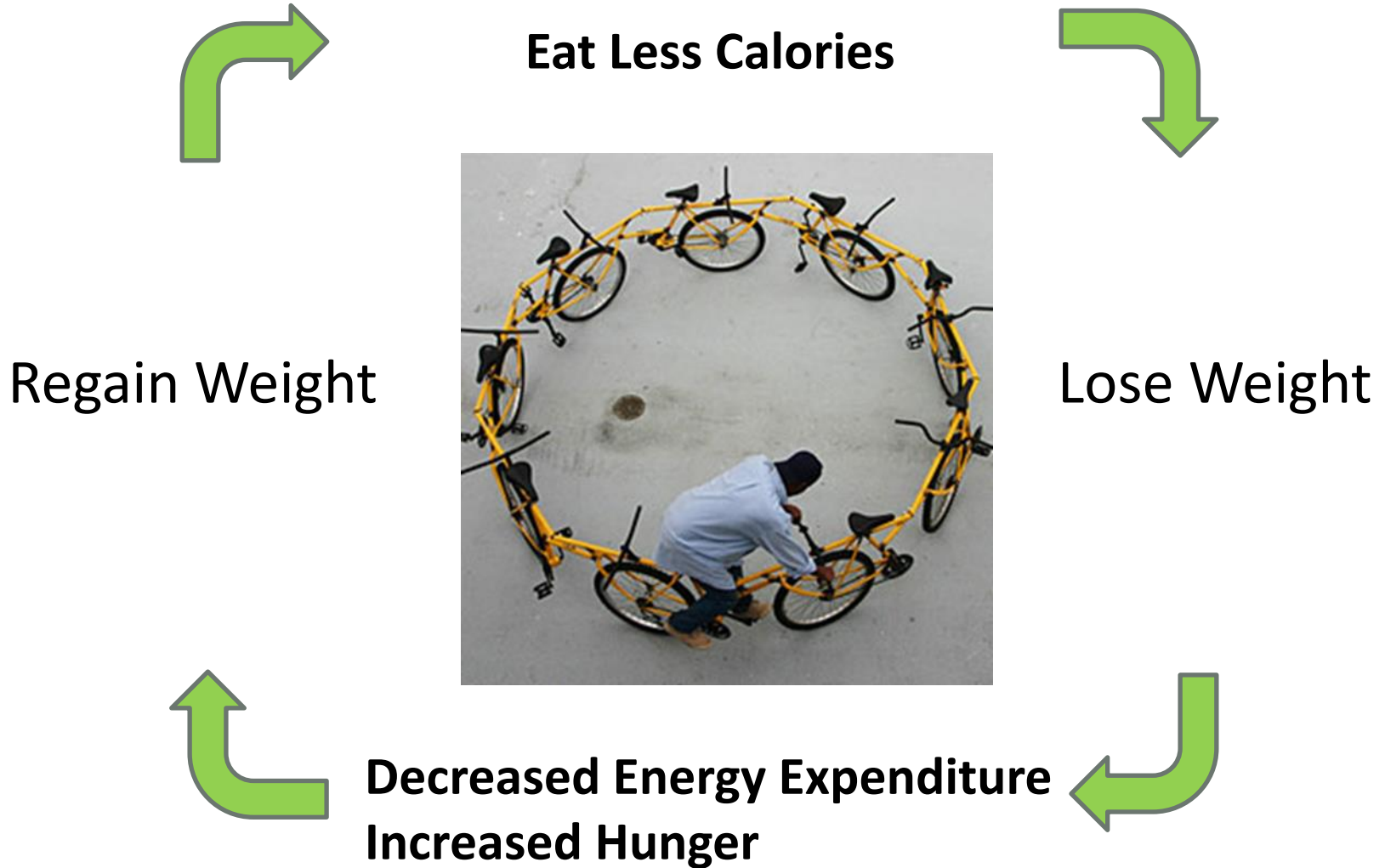
The Ultimate Proof...

How to Lose Weight
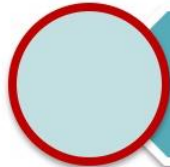
- What Doesn't Work
- Why It Doesn't Work
- **Why Fasting?**
- Fasting Myths
- Fasting Benefits

Fasting – Key is Insulin

Insulin
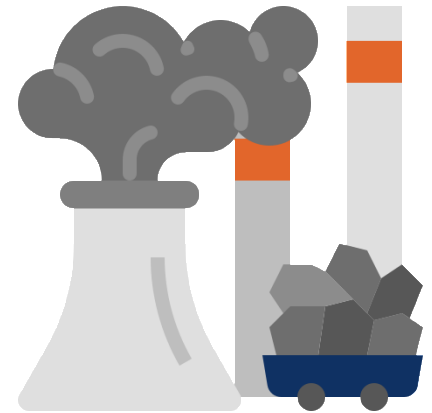
Fat Stores

Energy Out
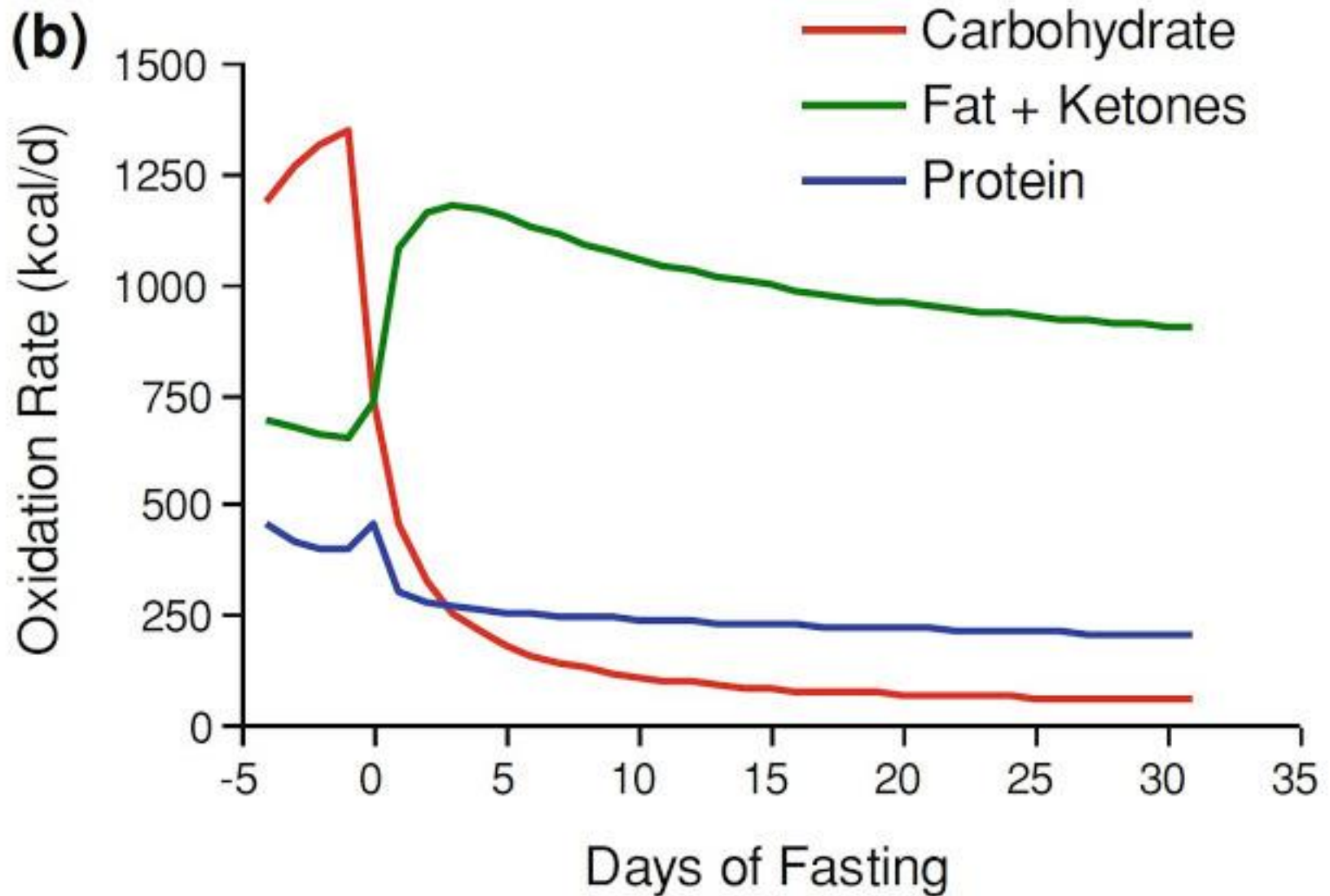
From: Kevin Hall

Problem #1

Basal Metabolic Rate

Increased Metabolic Rate with Fasting

Resting Energy Expenditure (kJ/min)
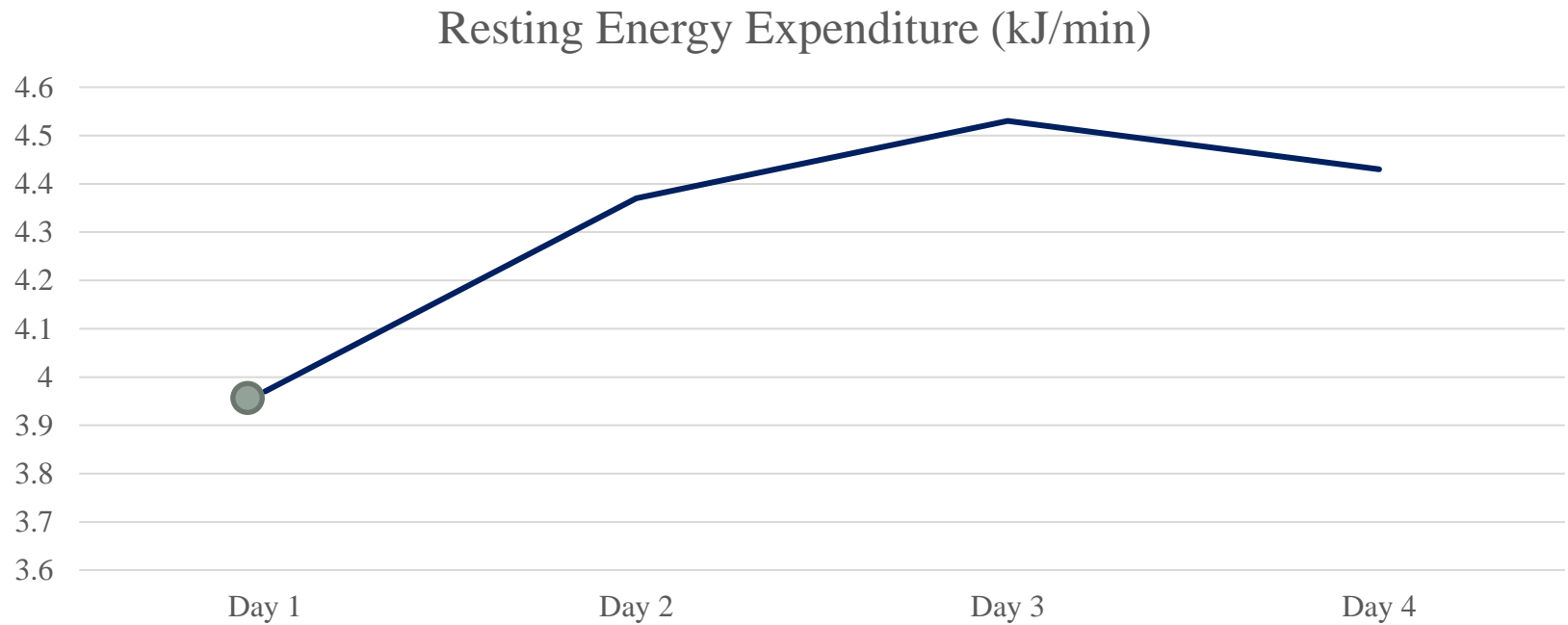
Norepinephrine Spillover from Human Adipose Tissue before and after a 72-Hour Fast

J. N. PATEL, S. W. COPPACK, D. S. GOLDSTEIN, J. M. MILES, AND G. EISENHOFER

TABLE 2. Metabolic changes before and after the 72-h fast

|	Before 72-h fast Day 1	After 72-h fast Day 4
Body weight (kg)	76.1 ± 4.5	74.0 ± 4.9[a]
Resting energy expenditure (kcal/24-h)	1684	1729 ± 123
Respiratory expiratory ratio	0.868 ± 0.009	0.804 ± 0.004[a]
Arterial insulin concentration (pmol/liter)	42.9 ± 5.0	23.4 ± 1.4[a]

Effect on Resting Metabolic Rate

Outcome variable and group	Assessment period			Week 8–baseline	P	ES	Week 32–baseline	P
	Baseline	Week 8	Week 32					
Unadjusted RMR (kcal/d)[b]								
CR	1,892.5 (67.7)	1,719.3 (69.3)	1,807.3 (72.2)	−173.2 (35.2)	<**0.001**		−85.2 (39.0)	**0.039**
ADF	1,640.1 (65.1)	1,539.7 (66.8)	1,567.2 (69.2)	−100.4 (34.1)	**0.007**		−72.9 (37.3)	0.063
CR–ADF	252.4 (93.9)	179.6 (96.2)	240.1 (100.0)	−72.8 (49.0)	0.151	0.62	−12.3 (54.0)	0.822
Adjusted RMR (kcal/d)[b,c]								
CR	1,757.6 (37.0)	1,646.0 (32.8)	1,681.53 (18.6)	−111.6 (36.9)	**0.006**		−76.1 (35.9)	**0.045**
ADF	1,689.0 (34.2)	1,672.8 (33.5)	1,659.8 (20.1)	−16.2 (36.6)	0.662		−29.2 (35.2)	0.416
CR–ADF	68.6 (51.1)	−26.8 (48.1)	21.7 (29.8)	−95.4 (51.4)	0.076	0.77	−46.9 (49.7)	0.356

Obesity (2016) 24, 1874–1883. Catenacci VA et al
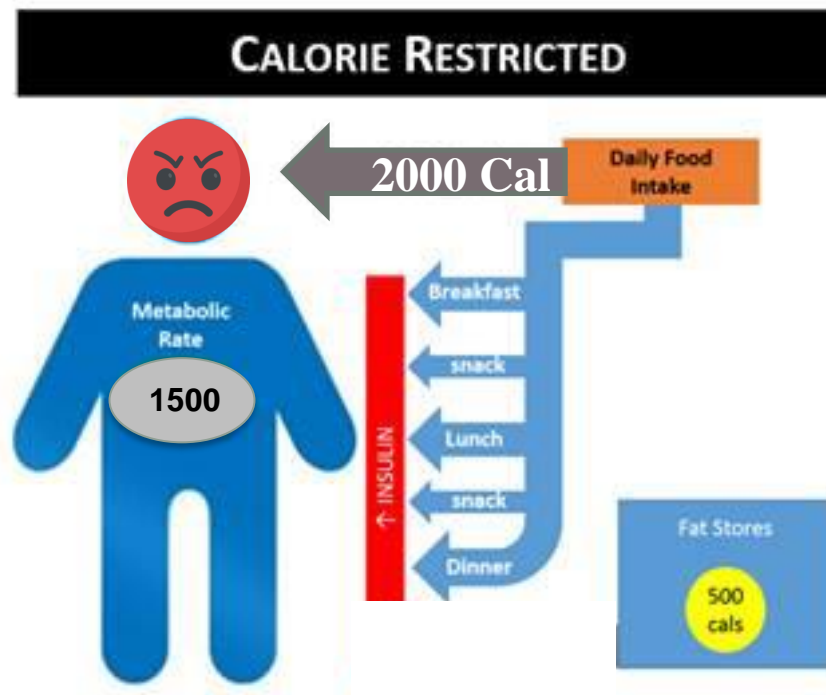
**Restricting daily calories 2000 →1500
Eating constantly = Insulin levels high
No access to body fat**

Same Calories, Different Hormones

INTERMITTENT FASTING

2000 Cal — Daily Food Intake

Metabolic Rate 2000

INSULIN — Meal

Fat Stores — 500 cals

INSULIN — Meal
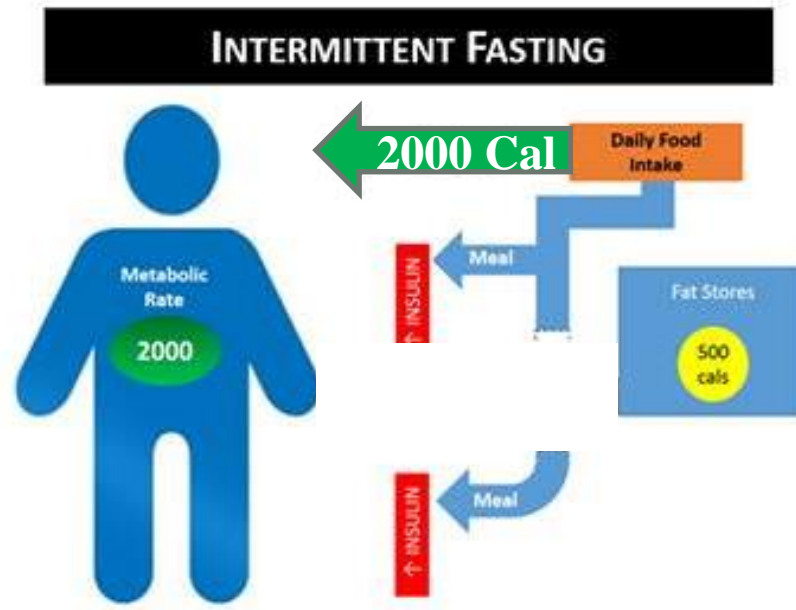
Periodic Fasting = Insulin Falls
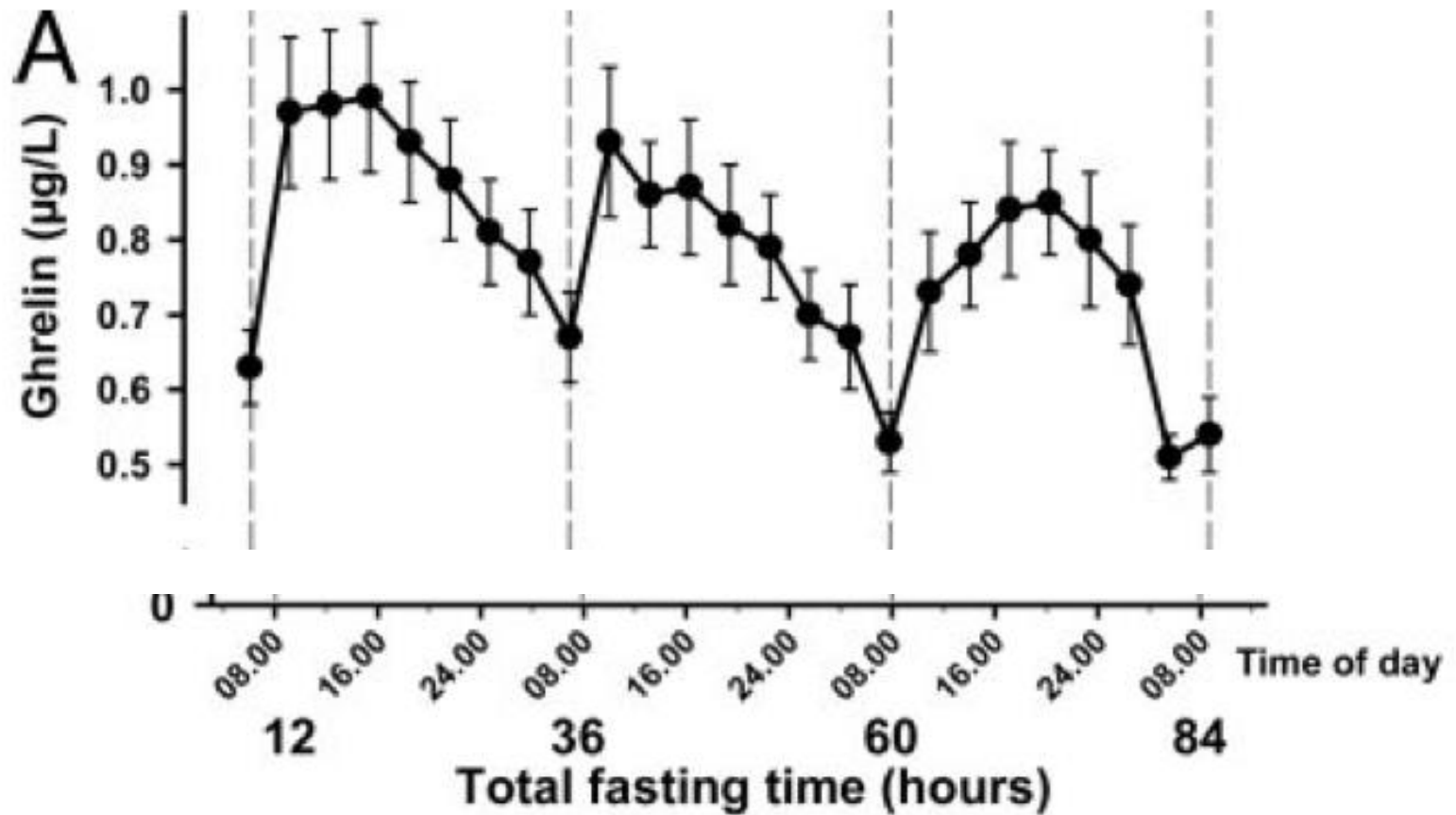# Allows access to Body Fat

Problem #2 - Hunger

Fasting and Ghrelin
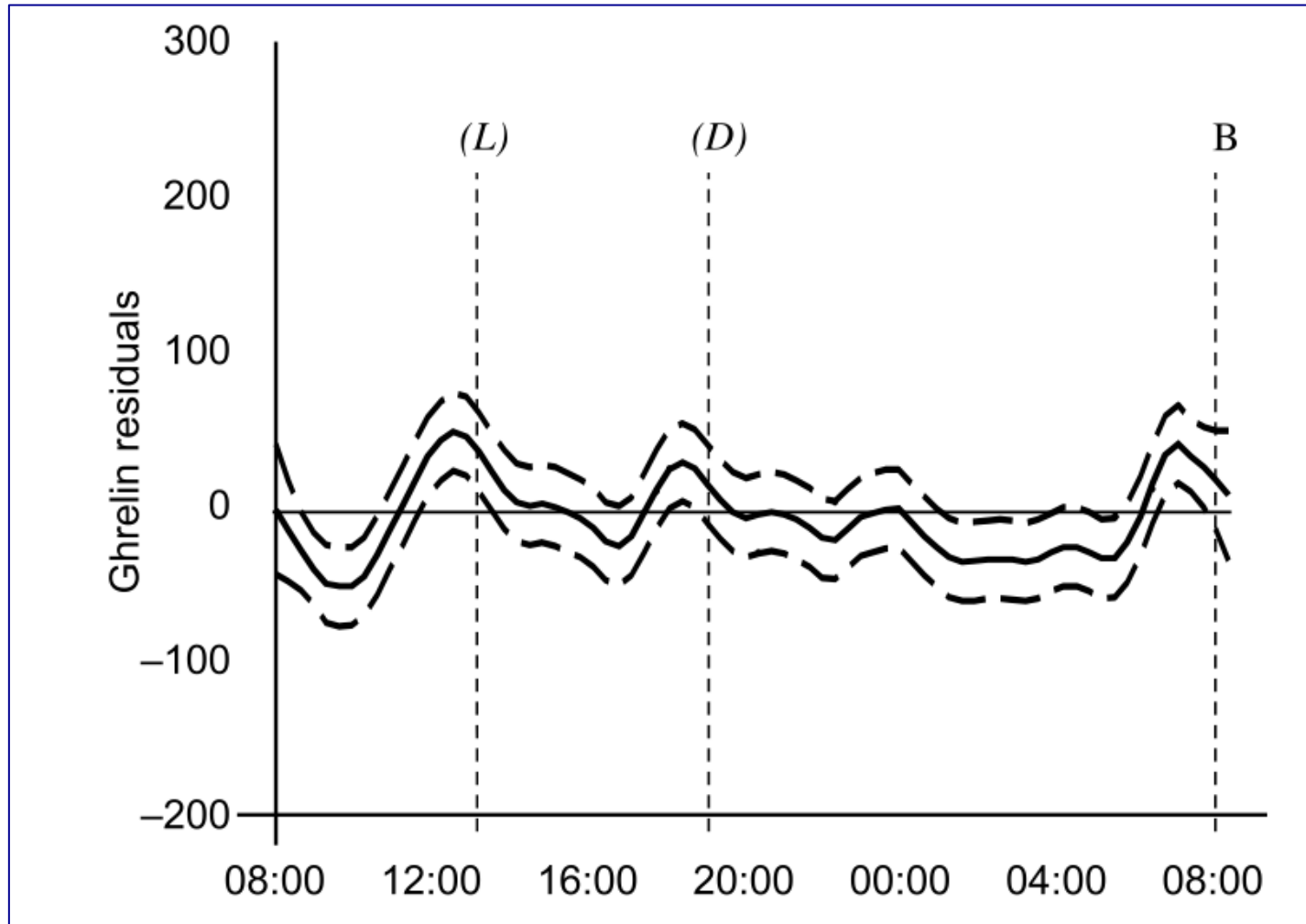
Natalucci G et al. European J Endo 152; 845-850

Hunger

A

J Clin Endocrinol Metab. 2005; 90(2):741– 746.

Fasting and Ghrelin
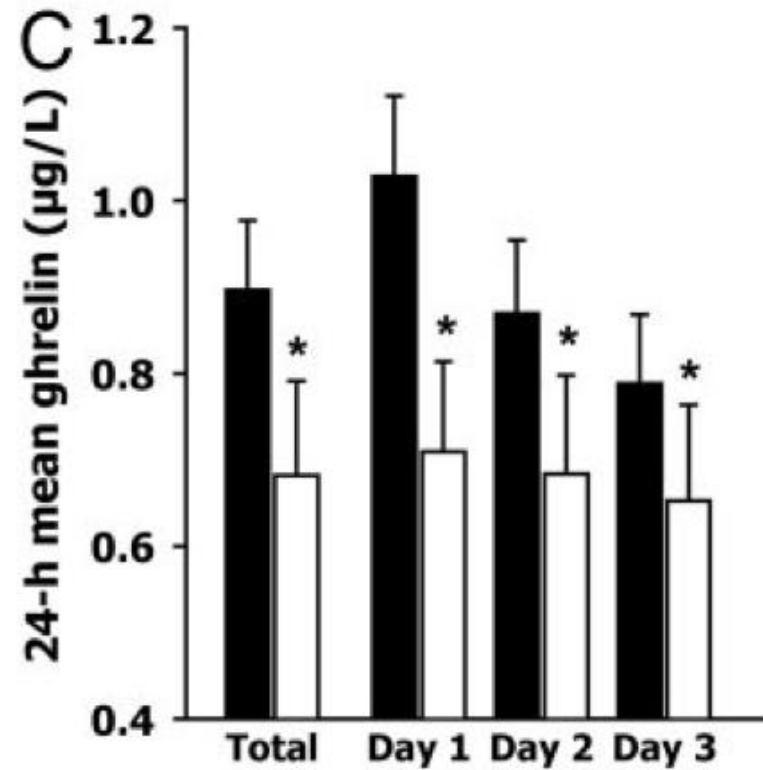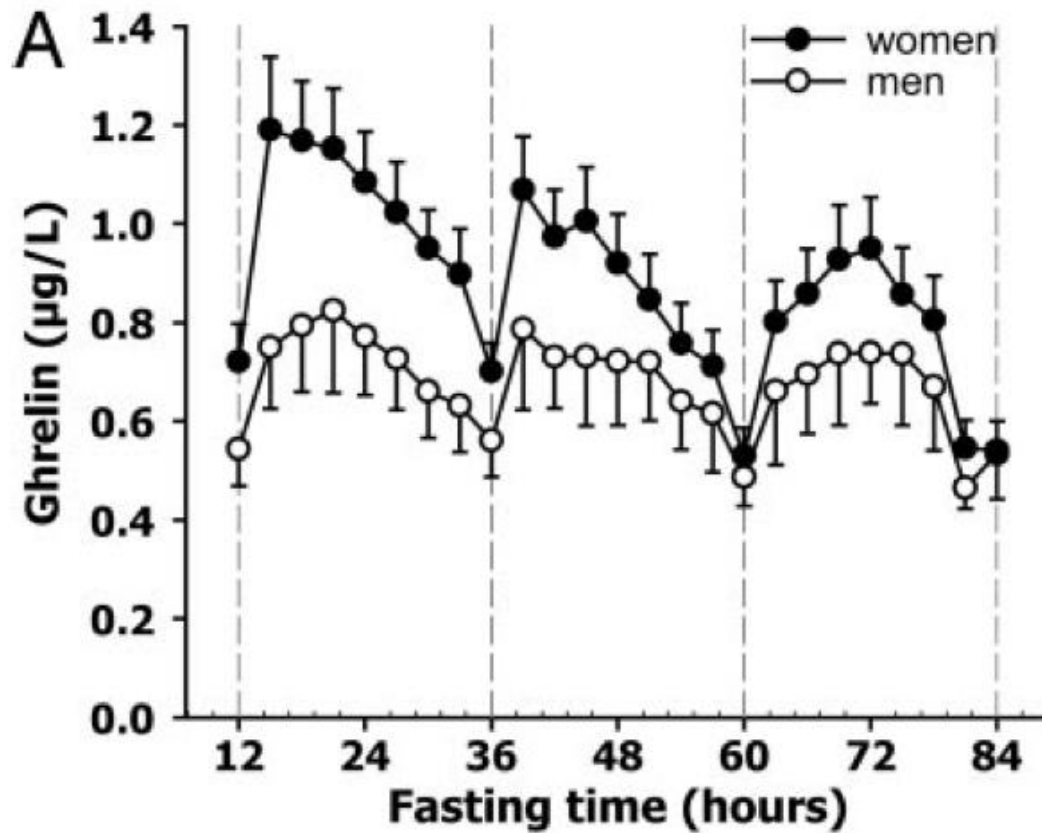
Decreased Cravings
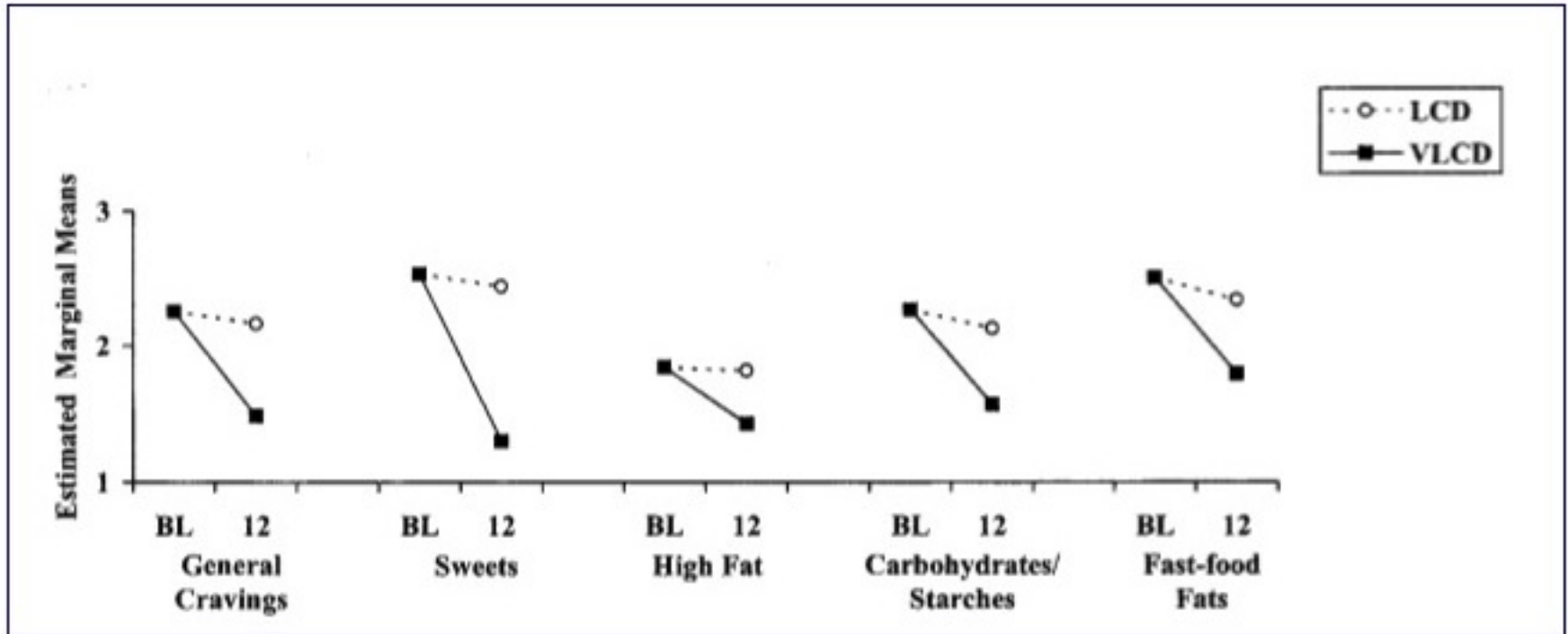
Martin CK et al. OBESITY Vol. 14 No. 1 January 2006

Decreased Cravings

Martin CK et al. OBESITY Vol. 14 No. 1 January 2006
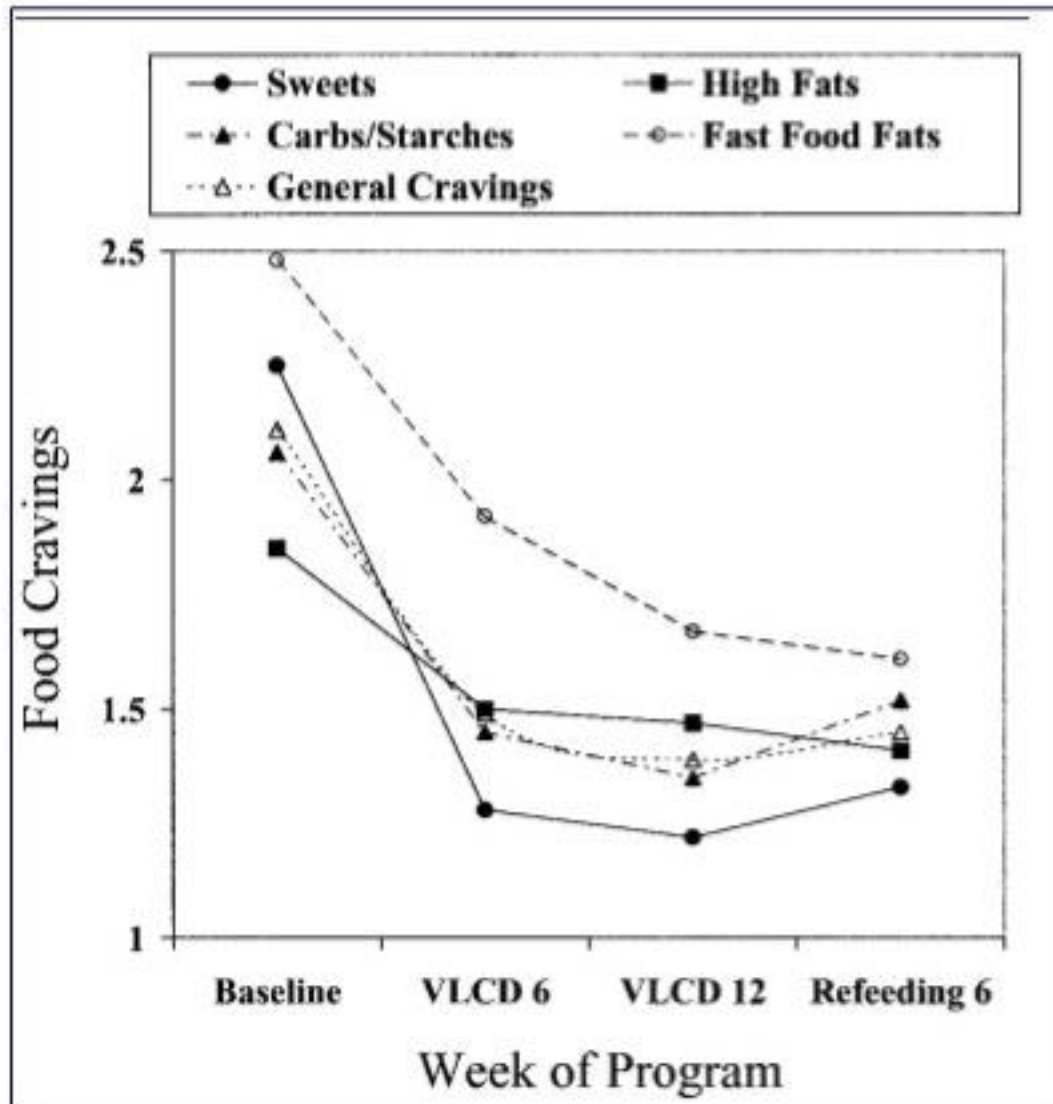
Outcome variable and group	Week 32–baseline	P	ES
Leptin (ng/mL)			
CR	0.9 (3.0)	0.761	
ADF	−3.1 (3.3)	0.363	
CR–ADF	4.0 (4.5)	0.379	−0.37
Ghrelin (pg/mL)			
CR	71.4 (34.2)	0.048	
ADF	16.6 (38.7)	0.673	
CR–ADF	54.8 (51.6)	0.3	−0.44

Body Fat – Hormones or Calories?

Hormones   Calories

Body Fat = Calories In – Calories Out

Diet		Exercise		Conscious Control
Hunger		Metabolic Rate		Unconscious Control
Hormones!		Hormones!		
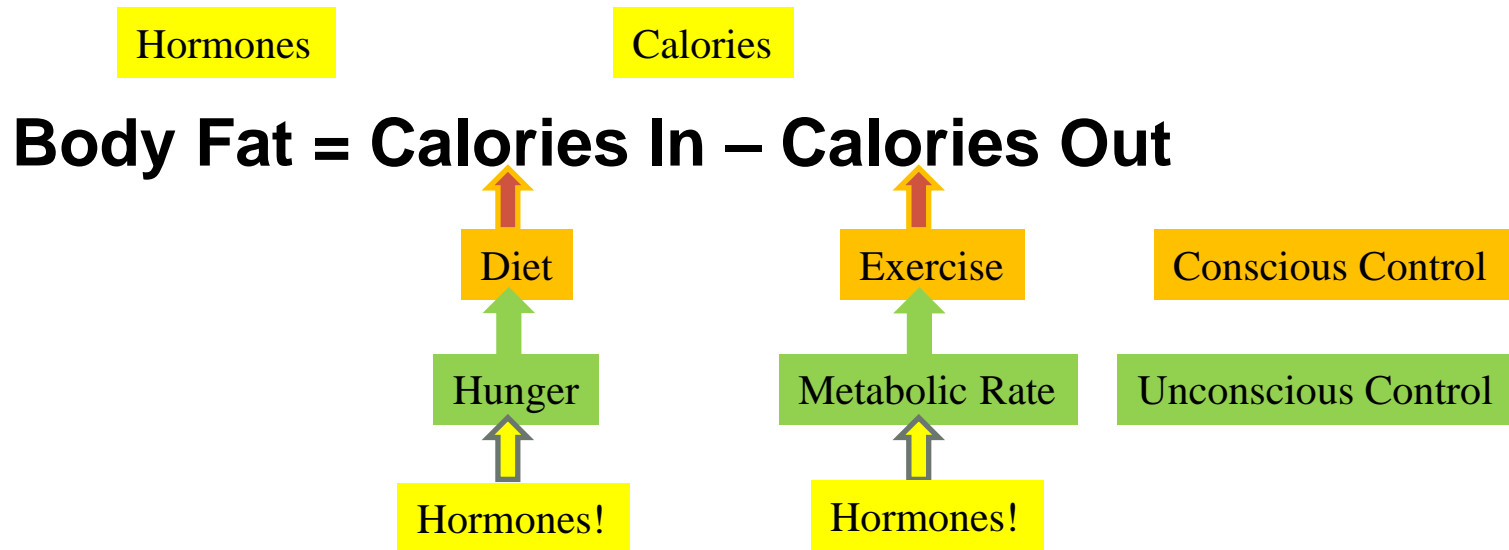
You can't decide to be less hungry
You can't decide to have a higher BMR
Key is controlling Hormones – esp Insulin

Long Term Weight Loss

Chronic Calorie Restriction

Hunger increases

Metabolism decreases

Weight Regain
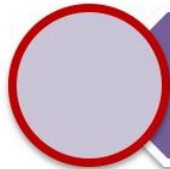
Myth - Burn Muscle

Burn Muscle

	Baseline control phase		Weight loss/ADF self-selected feeding phase	
	Day 1	Day 14	Day 69 Feed day	Day 70 Fast day
Body weight (kg)	96.4 ± 5.3	96.5 ± 5.2	92.8 ± 4.8*	90.8 ± 4.8*
BMI (kg/m²)	33.7 ± 1.0	33.7 ± 1.0	32.1 ± 0.8*	31.4 ± 0.9*
Fat mass (kg)	43.0 ± 2.2	43.5 ± 2.5	38.1 ± 2.6*	38.1 ± 1.8*
Fat-free mass (kg)	52.0 ± 3.6	51.4 ± 3.4	52.8 ± 3.3	51.9 ± 3.7
Waist circumference (cm)	109 ± 2	109 ± 3	105 ± 3*	105 ± 3*

Obesity (2010) 18, 2152-2159

| Outcome variable and group	Week 32–baseline
Weight (kg)	
CR	−5.0 (1.6)
ADF	−5.7 (1.5)
	0.7 (2.2)
Trunk fat mass (kg	−1.3 (0.7)
CR	−2.7 (0.6)
ADF	1.4 (0.9)
CR–ADF	
Trunk fat mass (%)	−0.3 (0.4)
CR	−1.8 (0.3)
ADF	1.4 (0.5)
CR–ADF	
Lean mass (kg)	
CR	−1.6 (0.6)
ADF	−1.2 (0.6)
CR–ADF	−0.4 (0.9)
Lean mass (%)	
CR	0.5 (0.5)
ADF	2.2 (0.5)
CR–ADF	−1.7 (0.7)

CR – Caloric Restriction
ADF – Alternate Daily Fasting

Myth – You Can't Do It

Dietary Weight Loss Strategies for Self and Patients: A Cross-Sectional survey of Female Physicians
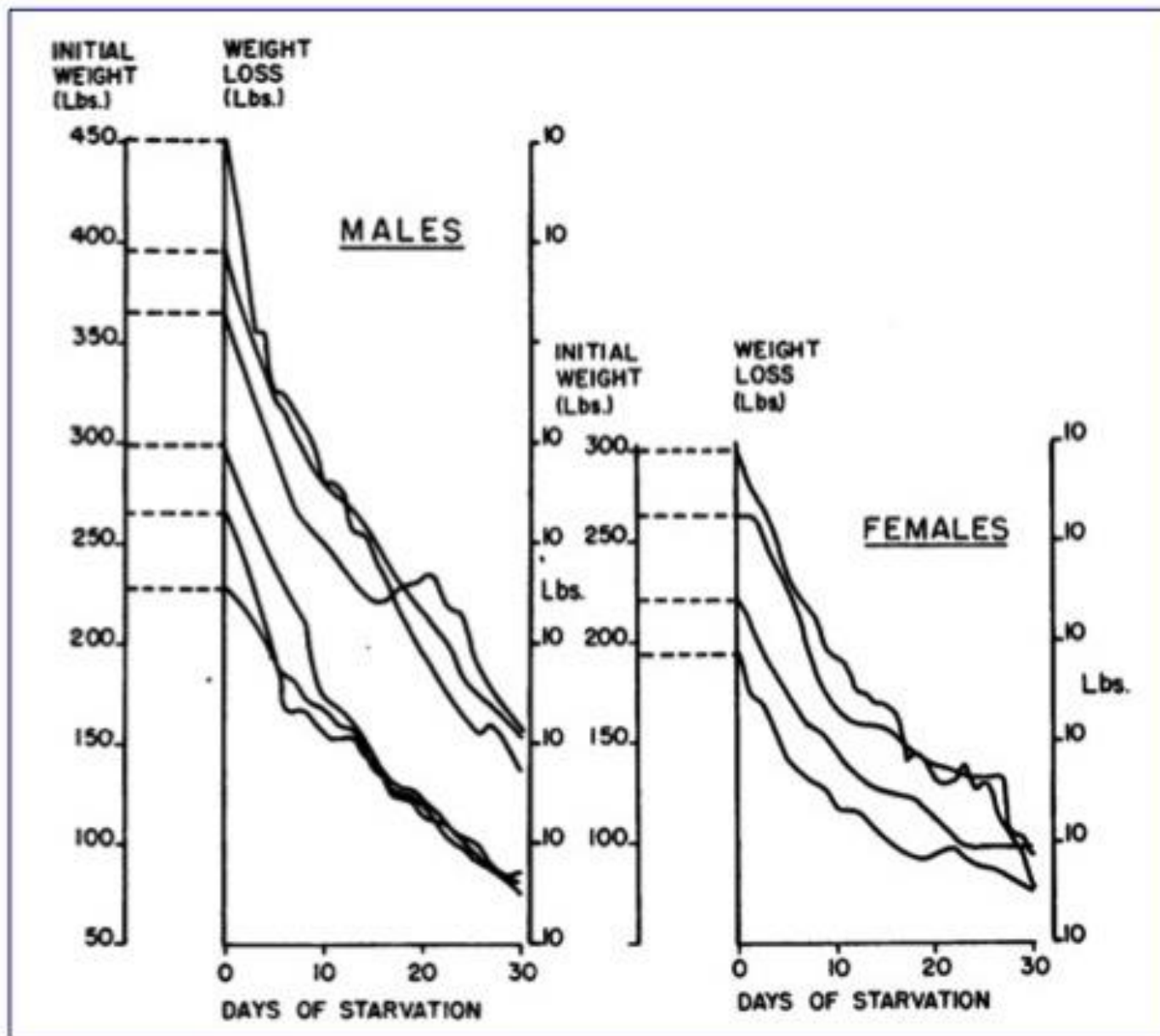
Jennifer Kovaric Hendrix, James E. Aikens, Laura R. Saslow
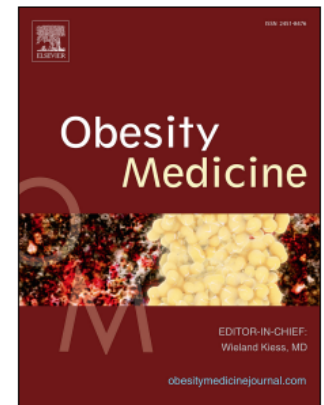
- Female physician group – 900 respondents in all specialties
- Average BMI 24.9, wgt loss (last year) -13.2 pounds, 55.3% lost at least 10 pounds, 6.3 % lost more than 40 pounds

Table 2. Percent of members reporting use of weight-loss strategies for themselves or recommending them to their patients.[a]

	For self: losing weight	For self: maintaining weight	For patient: overweight but otherwise healthy	For patient: overweight with type 2 diabetes	For patient: overweight with hypertension	For patient: overweight with prediabetes
Intermittent fasting[b]	72	75	35	27	21	35
Ketogenic[c]	46	31	36	37	25	41
Low-carbohydrate calorie restriction[d]	26	20	47	47	30	47
Prolonged fasting[e]	14	9	1	2	2	2

Drenick EJ. Am J Public Health Nations Health. 1968 Mar; 58(3): 477–484.
INFLUENCE OF FASTING AND REFEEDING ON BODY COMPOSITION
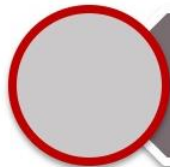
How to Lose Weight

- What Doesn't Work
- Why It Doesn't Work
- Why Fasting?
- Fasting Myths
- Fasting Benefits

Fasting Advantages

- **Flexibility**
- **Convenience**
- **Free**
- **Simplicity**

Add To Any Diet

You don't eat meat?

You don't eat wheat?

You have a nut allergy?

You don't have time?

You don't have money?

You are travelling all the time?

You don't cook?

Unlimited Power