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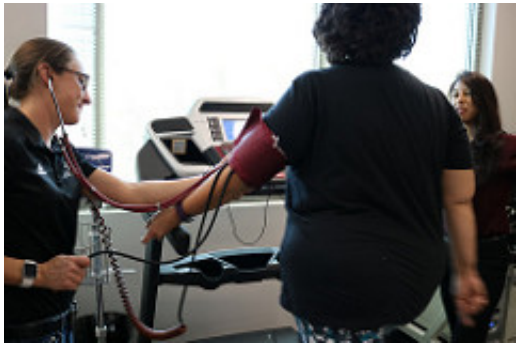
Exercise and Nutritional Strategies to Promote Weight Loss



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Disclosures: Has received funding from industry to conduct exercise and nutrition research. Serves as scientific and legal consultant.

Historical Perspective of Obesity

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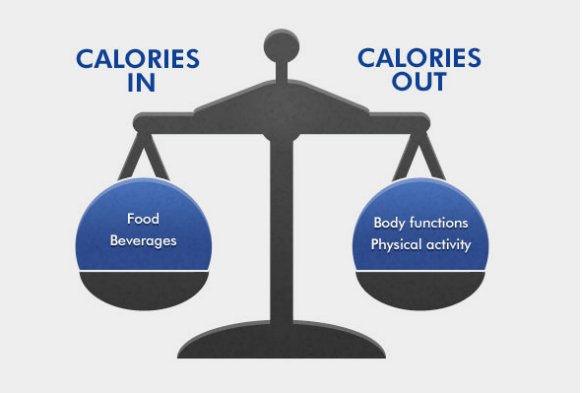
- Obesity has historically been thought to simply be related to an imbalance between energy intake and expenditure.
- Recommendations have focused on:
  - reducing energy intake;
  - maintaining a high CHO/low fat diet;
  - Increasing physical activity (e.g., walking).



Wilborn et al. J Int Soc Sports Nutr. 2005 Dec 9;2:4-31

Contemporary View of Obesity

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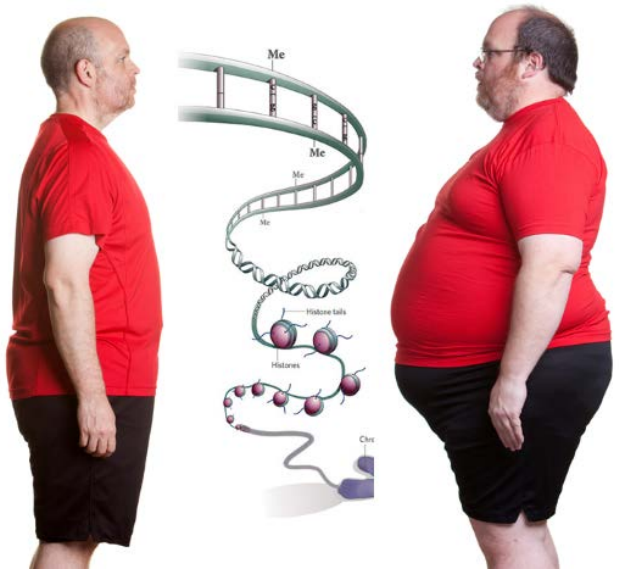
- Genetic, physiological, and behavioral factors also play a significant role in the etiology of obesity.
- The prevention and management of obesity through implementation of different types of exercise, programs; macronutrient diets; behavioral interventions; and/or medical interventions are at the forefront of obesity research.
- Seeing a paradigm shift from traditional approaches to personalized diet and exercise strategies.



Wilborn et al. J Int Soc Sports Nutr. 2005 Dec 9;2:4-31

Effects of Physical Activity on Weight Loss

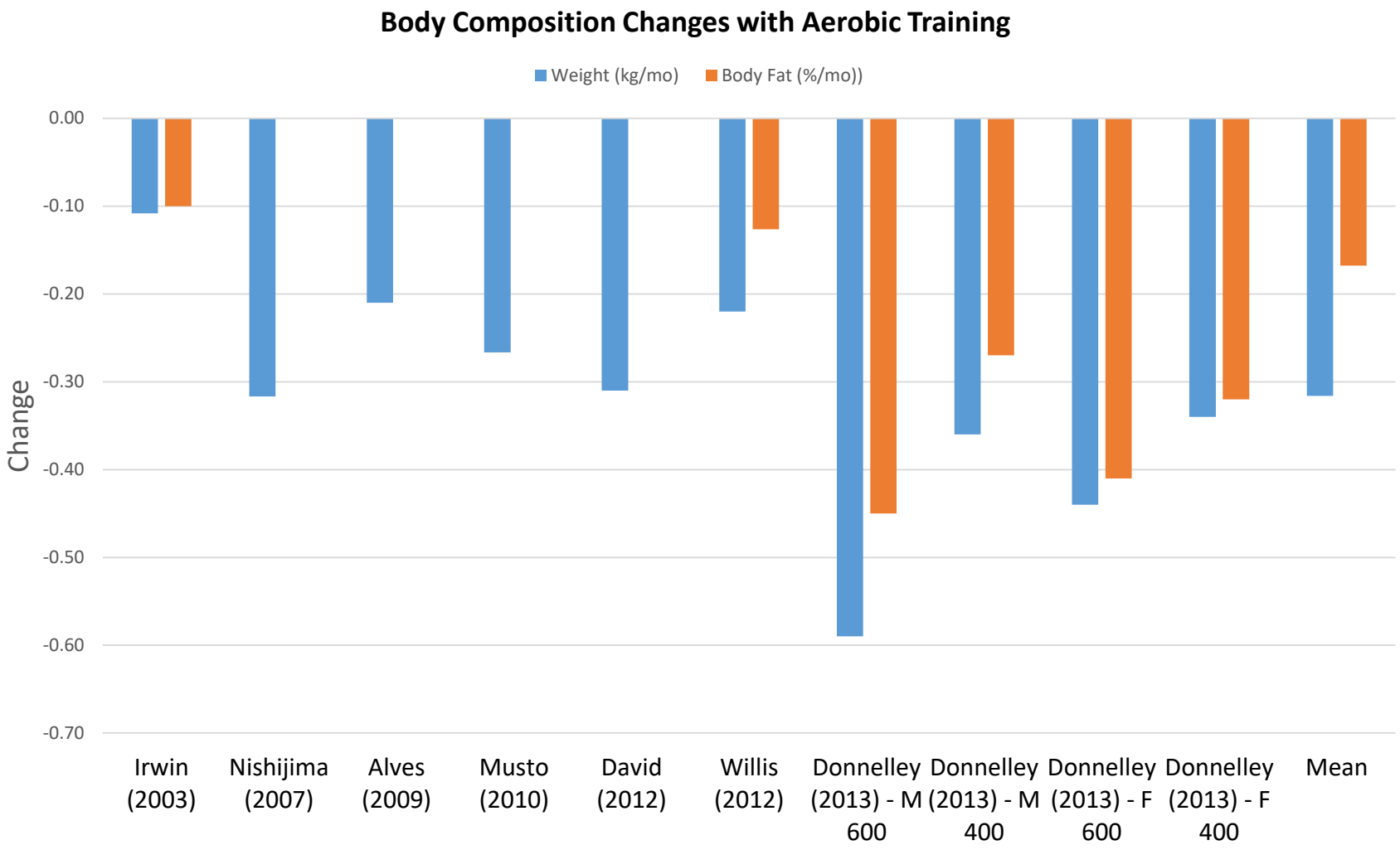
Physical activity and obesity: what we know and what we need to know

Chin et al., Obesity Rev. 17: 1226-44, 2016

Aerobic Exercise Only

Reference	Population	Duration (mo)	Intervention	Weight Change (kg)	Body Fat Change (%)
Irwin et al (2003)	87 F (≥25 BMI, 50-75 yrs)	12	60–75% max HR, 225 min/week	**-1.3**	**-1.2**
Nishijima et al. (2007)	281 M & F (≥30 BMI, 40-89 yrs)	6	70% VO_2 max, 80–160 min/wk	**-1.9**	**NR**
Alves et al. (2009)	78 F (≥ 25 BMI, 20-60 yrs)	6	40–60% HRR, 150 min/wk	**-1.26**	**NR**
Musto et al (2010)	43 F (30.4 BMI, 46 yrs)	3	Walking, steps ↑ 10% / wk until 10,000/wk, ↑ 3%/wk thereafter	**-0.8**	**NR**
David et al. (2012)	71 F (25-40 BMI, < 75 yrs)	3	Walking 10,000 steps/d	**-0.93**	**NR**
Willis et al. (2012)	38 overweight or obese adults	8	~12 miles/wk at 65–80% peak VO_2	**-1.76**	**-1.01**
Donnelley et al. (2013)	19 M (25-40 BMI, 18-30 yrs)	10	600 kcal/session, 70–80% max HR, 5/wk	**-5.9**	**-4.5**
	18 M (25-40 BMI, 18-30 yrs)	10	400 kcal/session, 70–80% max HR, 5/wk	**-3.6**	**-2.7**
	18 F (25-40 BMI, 18-30 yrs)	10	600 kcal/session, 70–80% max HR, 5/wk	**-4.4**	**-4.1**
	18 F (25-40 BMI, 18-30 yrs)	10	400 kcal/session, 70–80% max HR, 5/wk	**-3.4**	**-3.2**

Body Composition Changes with Aerobic Training



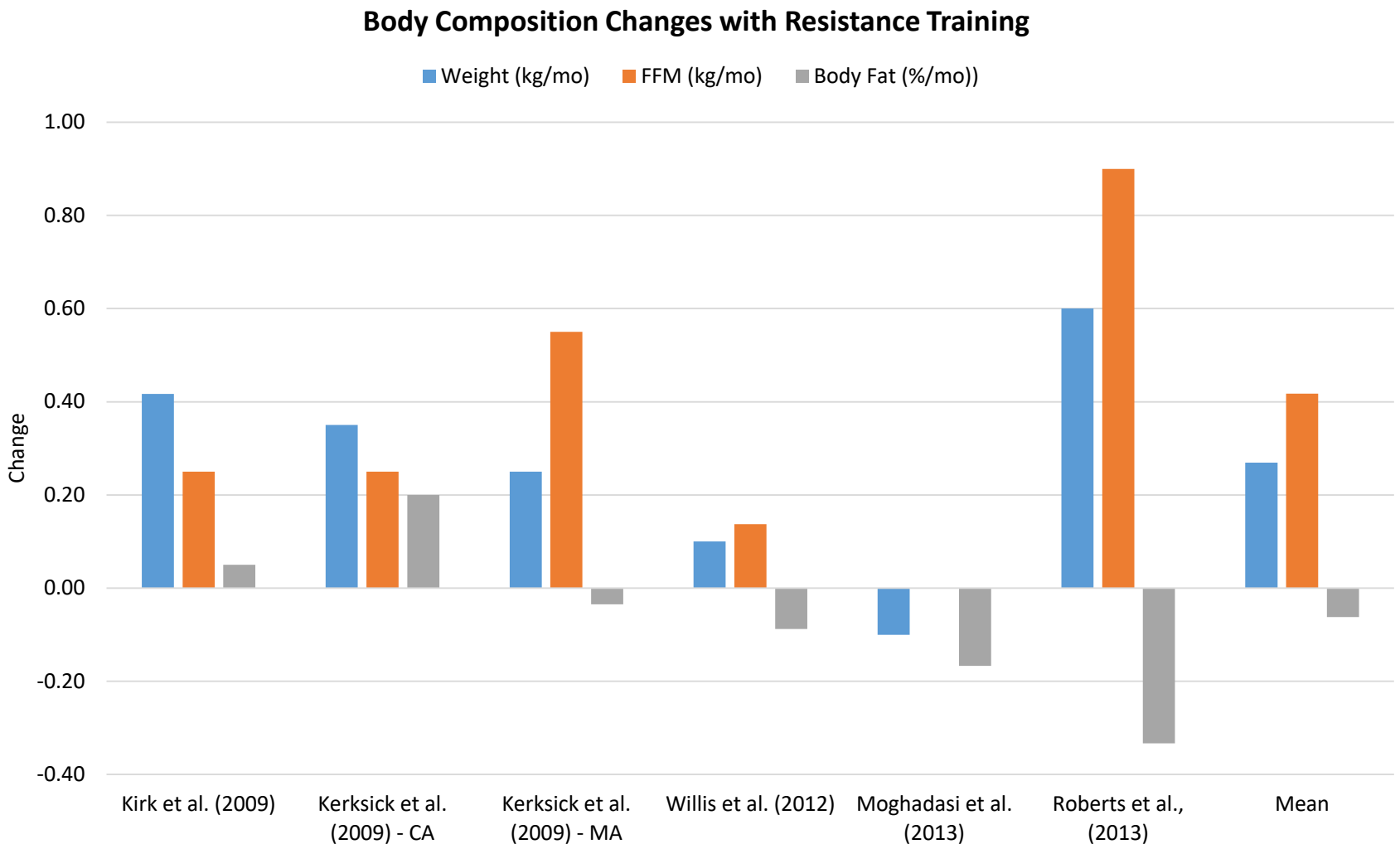
Physical activity and obesity: what we know and what we need to know

Chin et al., Obesity Rev. 17: 1226-44, 2016

Resistance Exercise Only

Reference	Population	Duration (mo)	Intervention	Weight Change (kg)	FFM Change (kg)	Body Fat Change (%)
Kirk et al. (2009)	22 M & F (27.7 BMI, 21 yrs)	6	Supervised, 3 d/wk, 1 set x 9 exercises at 85–90% 1RM	**2.5**	**1.5**	**0.3**
Kerksick et al. (2009)	24 CA men (18-22 yrs) 25 MA men (35 – 50 yrs)	2	2 x upper and 2 x lower workouts/wk; 3–6 sets at a 10-RM wks 1-4, 8-RM for weeks 5–8.	**0.7** **0.5**	**0.5** **1.1**	**0.4** **-0.7**
Willis et al. (2012)	44 M & F (25-35 BMI, 18-70 yrs)	8	8–12 reps/set, three sets/day, 3 d/wk	**0.8**	**1.1**	**-0.7**
Moghadasi et al. (2013)	11 M (32.7 BMI, 46.2 yrs)	3	8–12 repetitions of 65–80% 1RM, 50–60 min/day, 3 days/week	**-0.3**	**NR**	**-0.5**
Roberts et al. (2013)	28 M (≥ 27 BMI, 18-35 yrs)	3	Increasing intensity RT to reach 6–8 repetitions/set, 1 h/session, three sessions/wk	**1.8**	**2.7**	**-1.0**

Body Composition Changes with Resistance Training



Effects of Diet and Aerobic Exercise on Weight Loss

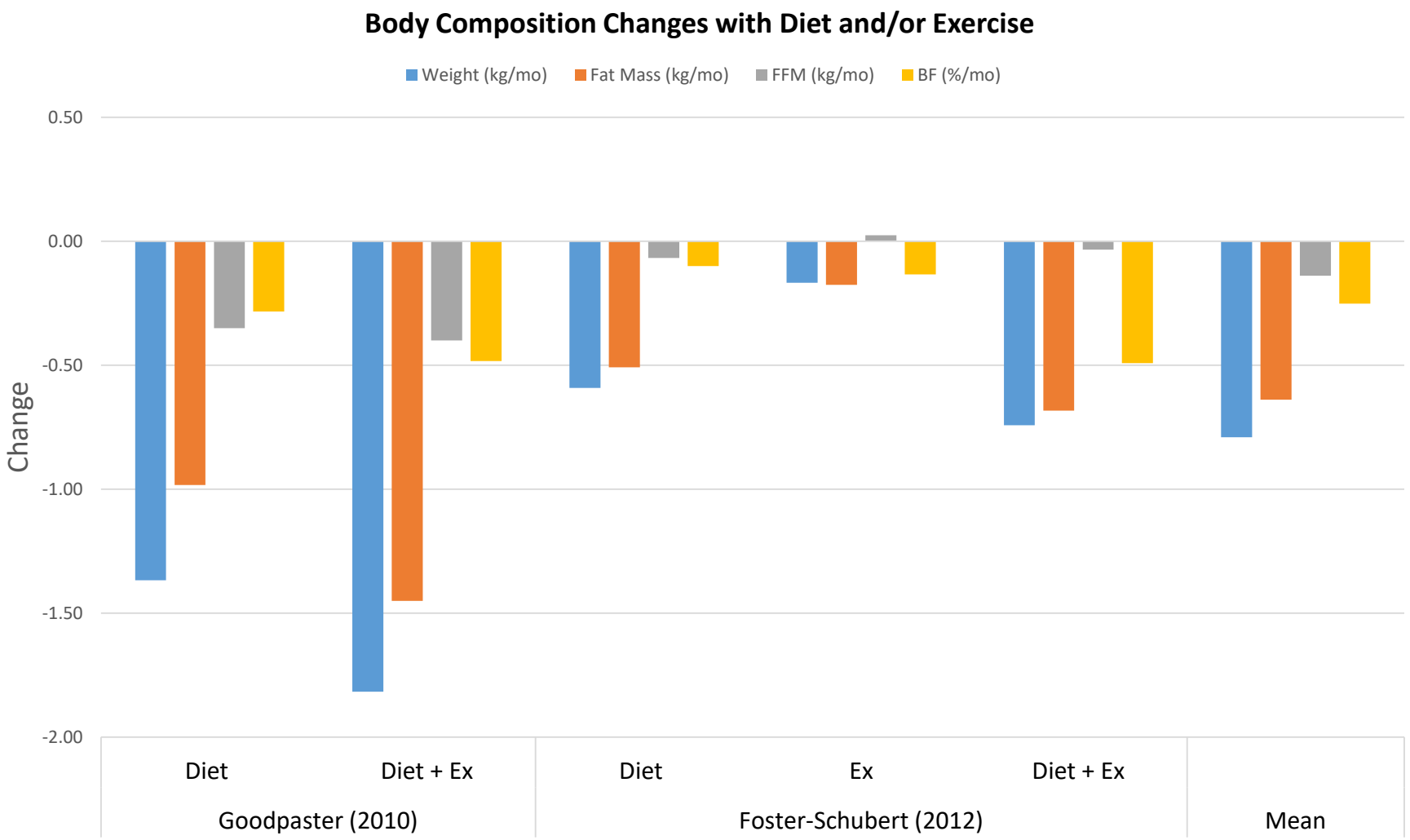
Physical activity and obesity: what we know and what we need to know

Chin et al., Obesity Rev. 17: 1226-44, 2016

Exercise with Diet Intervention

Reference	Population	Duration (mo)	Intervention	Weight Change (kg)	Fat Mass Change (kg)	FFM Change (kg)	Body Fat Change (%)
Goodpaster et al (2010)	63 AA M & F (35-40 BMI, 30-55 yrs)	6	DI (1,200–2,100 kcal/d)	**-8.2**	**-5.9**	**-2.1**	**-1.7**
	67 AA M & F (35-40 BMI, 30-55 yrs)	6	DI (1,200–2,100 kcal/d) + AE (moderate intensity, 300 min/wk)	**-10.9**	**-8.7**	**-2.4**	**-2.9**
Foster-Schubert et al. (2012)	118 Asian-Am F (≥ 23 BMI, 50-75 yrs)	12	DI (1,200–2,000 kcal/day, achieved 10% WL in 6 months	**-7.1**	**-6.1**	**-0.8**	**-1.2**
	117 Asian-Am F (≥ 23 BMI, 50-75 yrs)	12	AE (70–85% max HR 225 min/week)	**-2.0**	**-2.1**	**0.3**	**-1.6**
	116 Asian-Am F (≥ 23 BMI, 50-75 yrs)	12	DI+ AE	**-8.9**	**-8.2**	**-0.4**	**-5.9**
	87 Asian-Am F (≥ 23 BMI, 50-75 yrs)	12	No Diet or Exercise	**-0.7**	**-0.4**	**-0.1**	**-0.2**

Body Composition Changes with Diet and/or Exercise



Effects of a High Protein Diet with Resistance-Exercise on Weight Loss

Rationale

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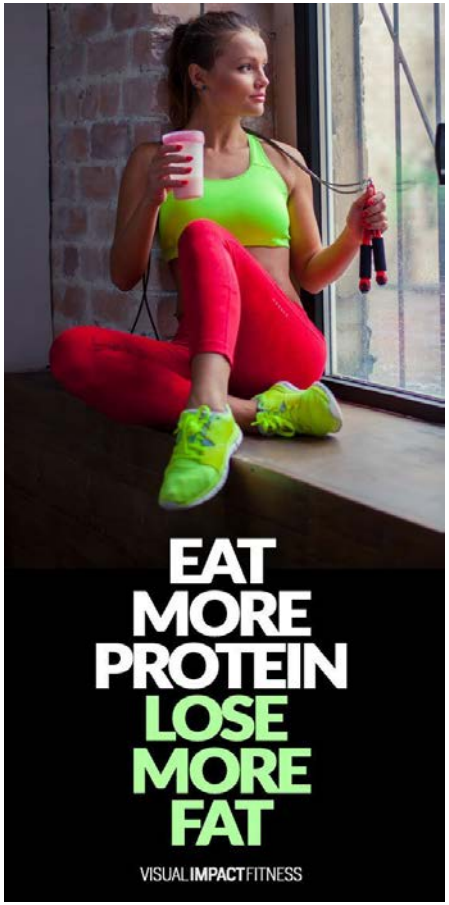
- Initial weight loss primarily due to diet-induced energy deficit.
- Rapid weight loss associated with reductions in FFM and REE while altering hormonal regulation of appetite and metabolism which makes it difficult to maintain weight loss.
- Goal should be to promote weight loss without loss of FFM or reductions in REE
- Weight loss programs typically involve caloric restriction and endurance exercise
- Resistance training can help maintain FFM and REE during weight loss
- Diet and/or nutritional strategies may have differential affects on weight loss



Health & Fitness Initiative

Established in 2002 to find ways to strengthen women through exercise and diet and provide research-based programs for Curves members

http://www.exerciseandsportnutritionlab.com/curves

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Weight Loss Approach

- Use of circuit-style resistance-exercise that promotes increases in energy expenditure and maintenance of FFM
- Slightly hypo-energetic higher protein/low fat meal plans
- Online monitoring and weekly coaching follow-up
- Social interaction and encouragement
- Scientifically tested and validated programs

http://www.exerciseandsportnutritionlab.com/curves

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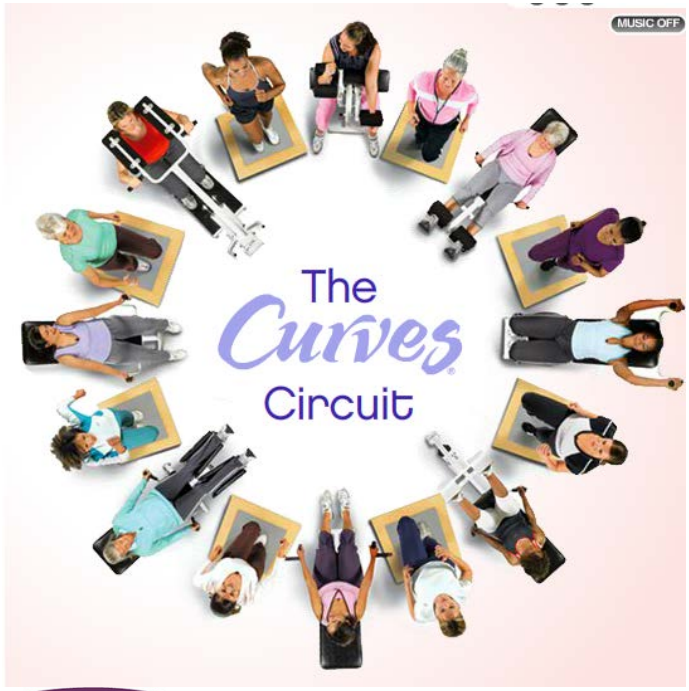
Training Approach



- Resistance exercises included:
  - Leg extension/curls
  - Shoulder Press/Lat Pull
  - Squat Push/Pull
  - Seated bench press/rows
  - Hip Adduction/Abduction
  - Abdominal Curl/Back Extension
  - Leg press
  - Arm curls/extensions
- Low impact calisthenics or Zumba® during recovery stations
- Stretching

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Effects of a popular exercise and weight loss program on weight loss, body composition, energy expenditure and health in obese women. *Kerksick et al., Nutri Metabol 6/1/23, 2009.*

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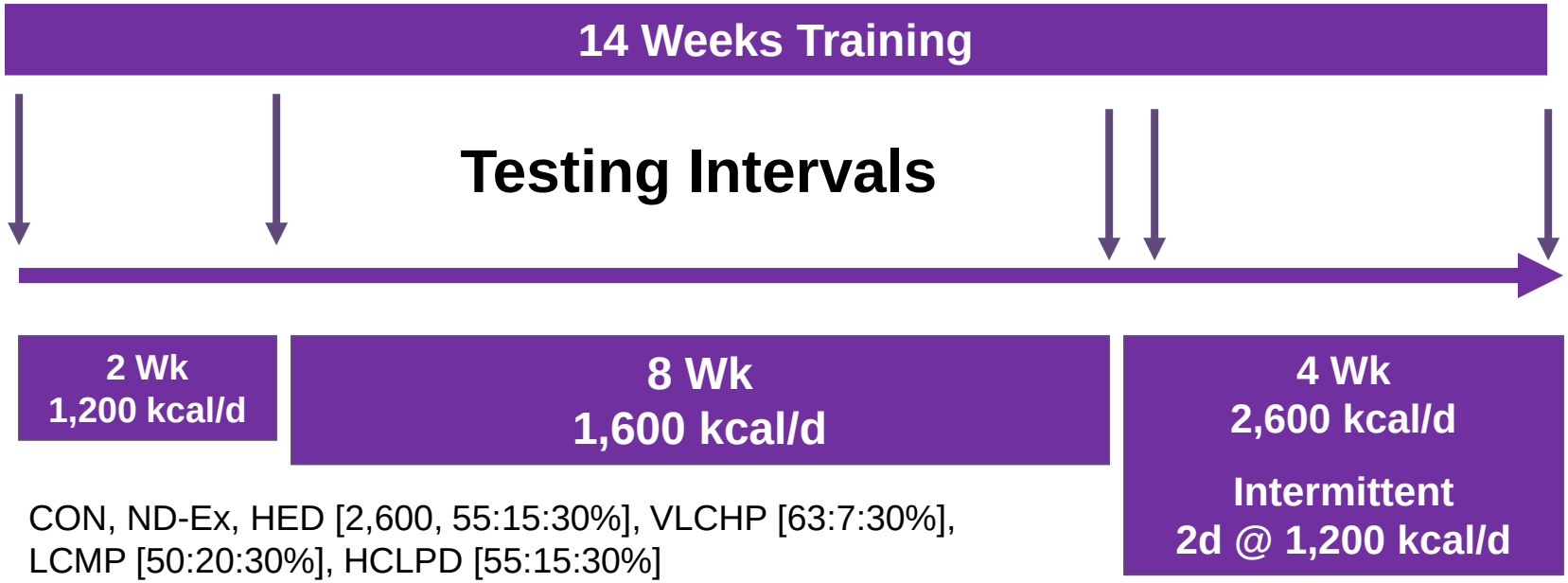

CON, ND-Ex, HED [2,600, 55:15:30%], VLCHP [63:7:30%], LCMP [50:20:30%], HCLPD [55:15:30%]

n = 161
38.5±8.5 yrs
94.2±18.8 kg
164.2±6.7 cm
34.9±6.4 kg/m^2
43.8±4.2% BF

- At ***0, 2, 10, 10.4, & 14 W***:
  - *Dietary Records* (4-d)
  - *Psychometric Tests*
  - *Body Composition/Bone Density* (DEXA)
  - *Total Body Water* (BIA)
  - *Hip & waist measurement*
  - *Resting HR & BP*
  - *Fasting Blood Samples* (12h)
  - *Resting Energy Expenditure* (REE)

- At ***0, 10, & 14 wks:***
  - *Maximal Stress Test*
  - *1RM Bench Press*
  - *80% of 1RM on Bench Press*
  - *1RM Leg Press*
  - *80% of 1RM on Leg Press*
- Side effects were monitored by an RN on a weekly basis

Effects of a popular exercise and weight loss program on weight loss, body composition, energy expenditure and health in obese women. *Kerksick et al., Nutri Metabol 6/1/23, 2009.*

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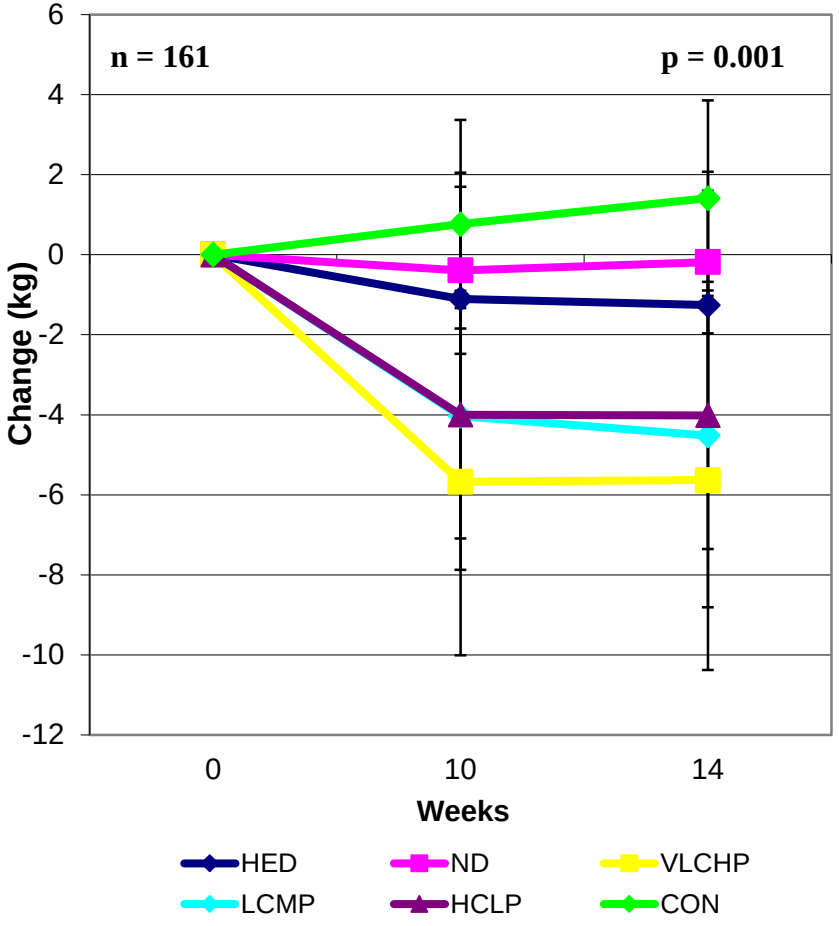
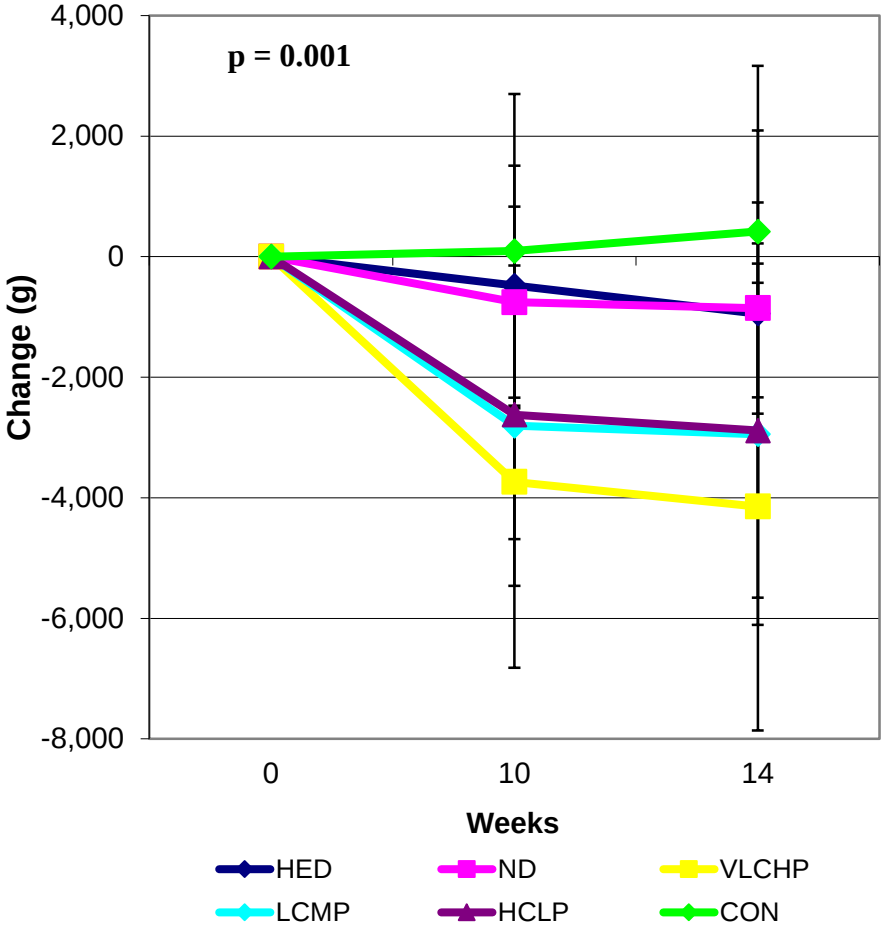
Body Mass



Fat Mass



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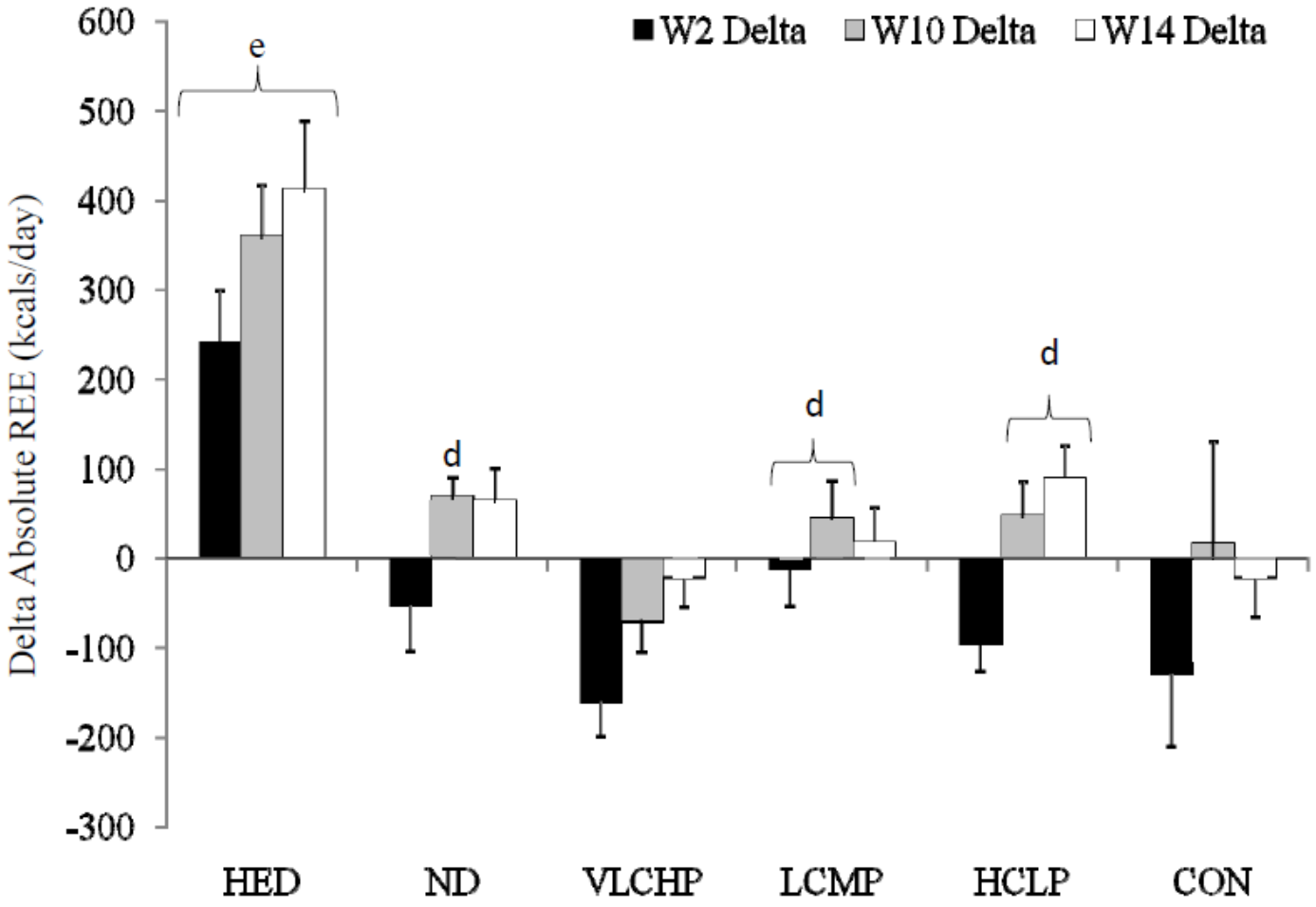

Changes in weight loss, body composition and cardiovascular disease risk after altering macronutrient distributions during a regular exercise program in obese women.

Kerksick et al., Nutri J 9:59, 2010

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14 Weeks of Curves Training

Testing Intervals

1 Wk	9 Wk	4 Wk
1,200 kcal/d	1,600 kcal/d	2,600 kcal/d Diet 2d @ 1,200 kcal/d only with 3 lb weight gain

CON, ND-Ex, HED [2,600, 55:15:30%], VLCHP [63:7:30%], LCMP [50:20:30%], HCLPD [55:15:30%]

n = 141
38.7±8 yrs
35.0±6 kg•m^{-2}
44.8±4% fat

- At ***0, 2, 10, 10.4, & 14 W***:
  - *Dietary Records* (4-d)
  - *Psychometric Tests*
  - *Body Composition/Bone Density* (DEXA)
  - *Total Body Water* (BIA)
  - *Hip & waist measurement*
  - *Resting HR & BP*
  - *Fasting Blood Samples* (12h)
  - *Resting Energy Expenditure* (REE)

- At ***0, 10, & 14 wks:***
  - *Maximal Stress Test*
  - *1RM Bench Press*
  - *80% of 1RM on Bench Press*
  - *1RM Leg Press*
  - *80% of 1RM on Leg Press*
- Side effects were monitored by an RN on a weekly basis

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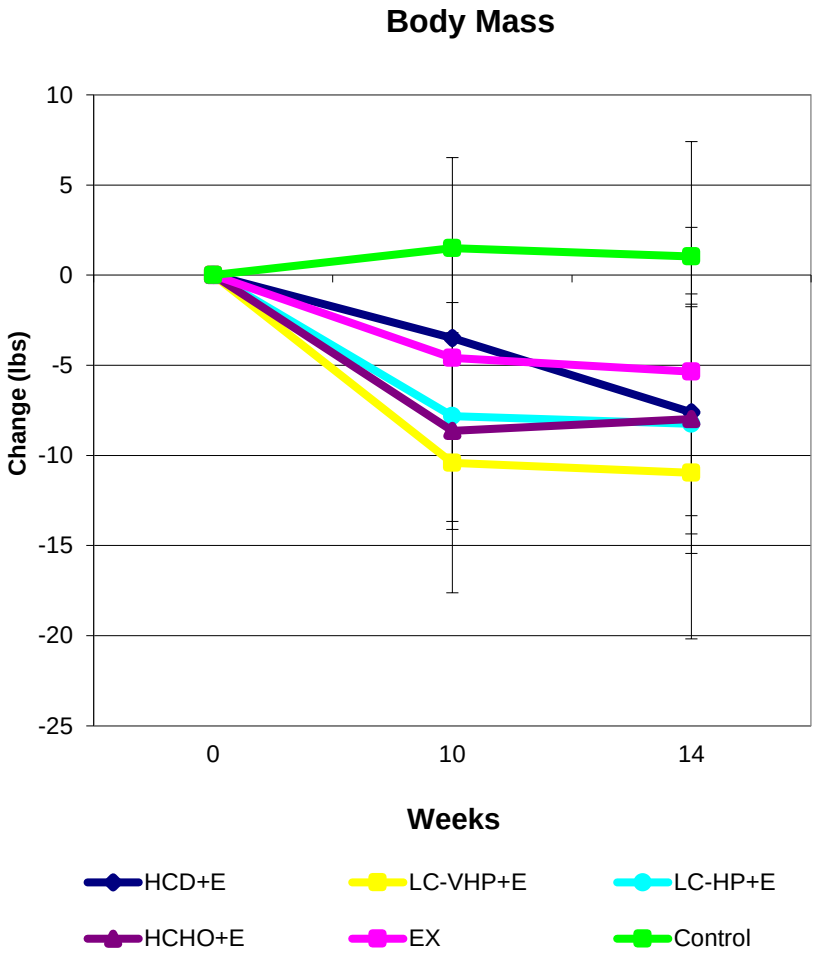

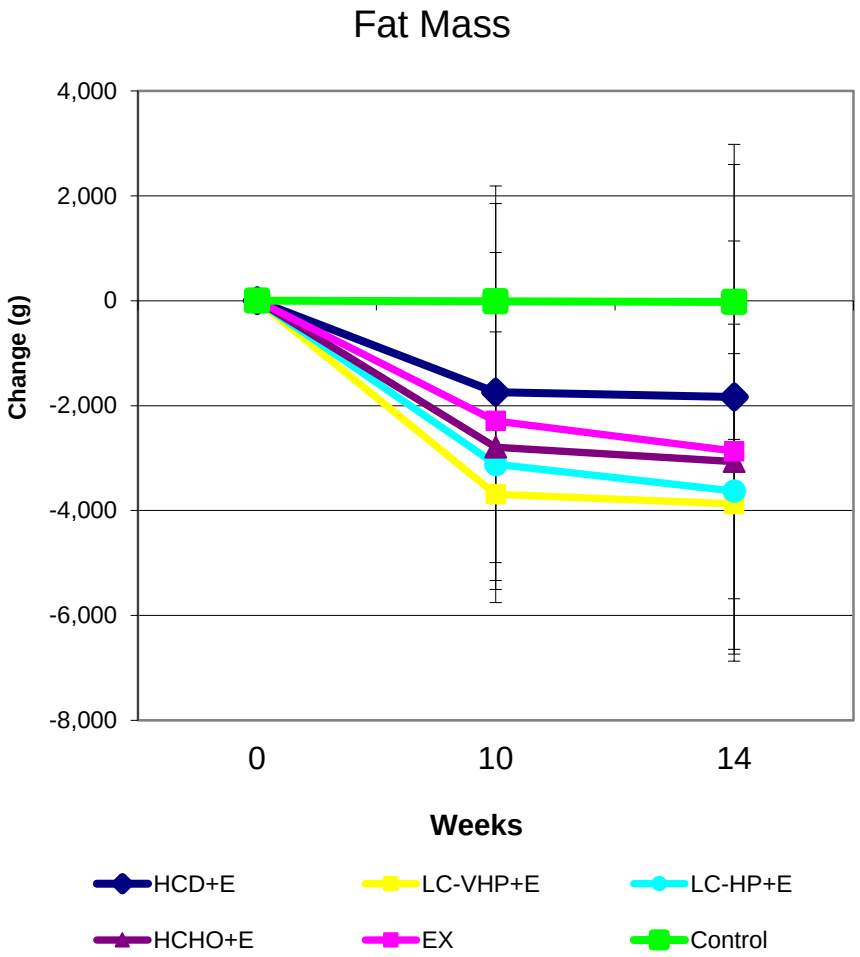

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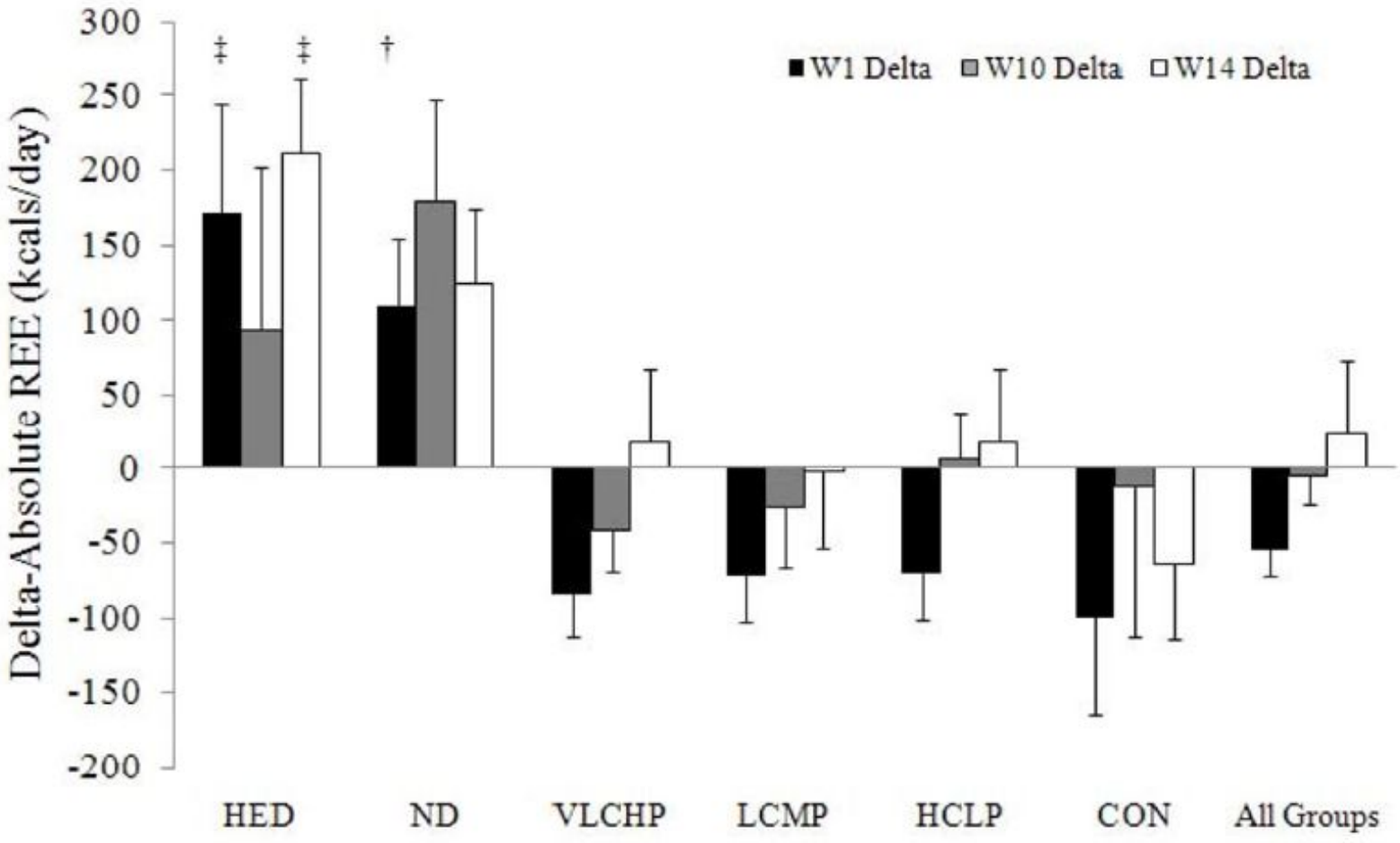

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Variable	Impact of Curves
Maximal Aerobic Capacity	↑ (7%)
Maximal Strength (BP & LP)	↑ (10%)
Hip & Waist Circumference	↓ (1.5 - 2")
Resting DBP	↓ (4%)
Total Cholesterol	↓ (4% during diet)
LDL Cholesterol	↓ (3% during diet)
Triglycerides	↓ (12%)
Leptin	↓ (18% during diet; 17% overall)
Fasting Insulin	↓ (19% during diet; 15% overall)
Insulin Sensitivity	19% Improvement

Effects of adherence to a higher protein diet on weight loss, markers of health, and functional capacity in older women participating in a resistance-based exercise program.

Galbreath et al., Nutrients. 10(8), 1070, 2018

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Exercise Only, HCHO [55:15:30 %] or HP Diets [30:40:30 %]

55 Women:

- 66±5 yrs (60 – 75)
- 174±23 lbs
- 63.4±2 in
- 44±4 % BF

- At ***0, 10, & 14 W***:
  - *Dietary Records* (4-d)
  - *Psychometric Tests*
  - *Body Composition/Bone Density* (DEXA)
  - *Total Body Water* (BIA)
  - *Hip & waist measurement*
  - *Resting HR & BP*
  - *Fasting Blood Samples* (12h)
  - *Resting Energy Expenditure* (REE)
  - *6 Minute Walk Test*
  - *Balance / Functional Testing*

- At ***0 & 14 wks:***
  - *Maximal Stress Test*
  - *1RM Bench Press*
  - *80% of 1RM on Bench Press*
  - *1RM Leg Press*
  - *80% of 1RM on Leg Press*
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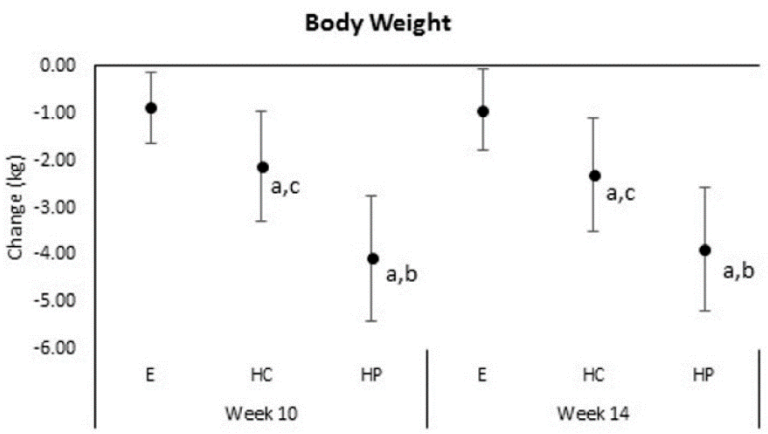

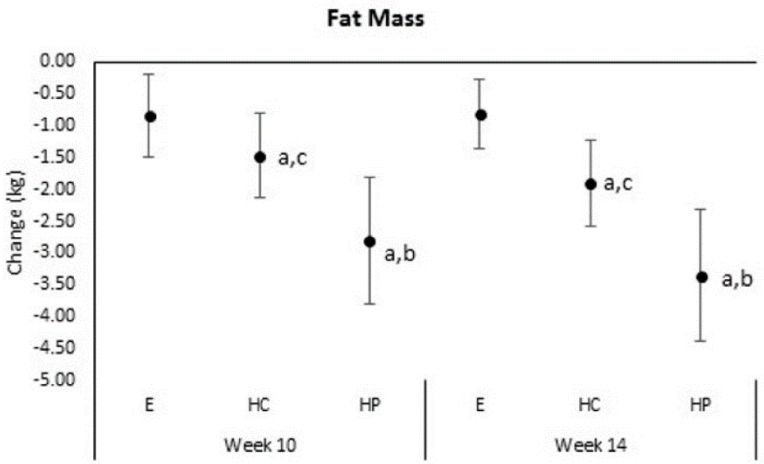

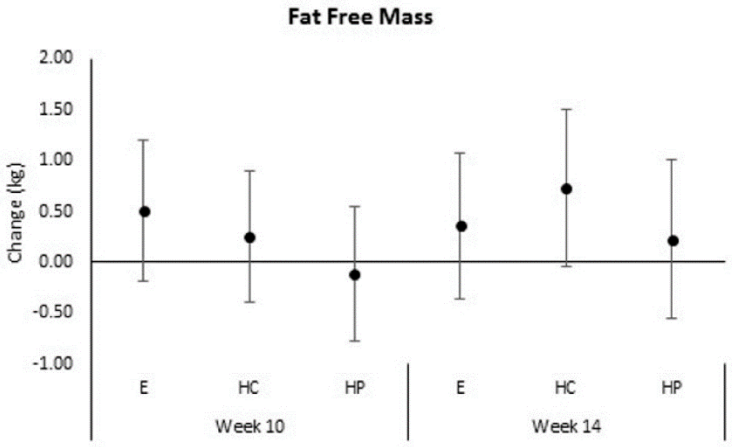

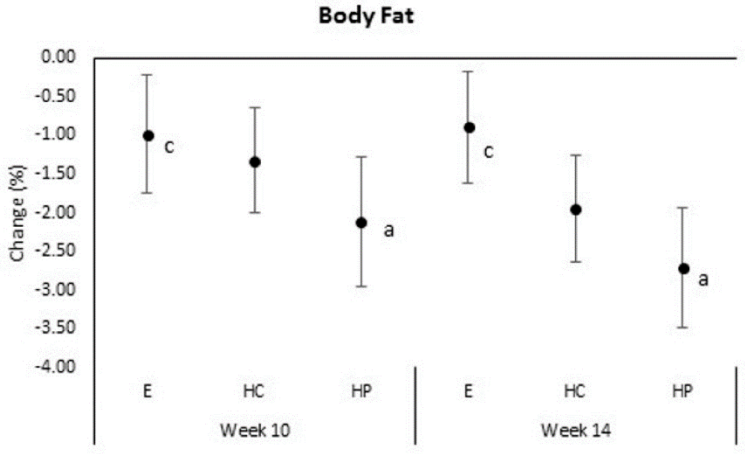

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Variable	Impact of Program
Waist & Hip	↓ (2 cm)
Resting HR	↓ (2.3cm)
Resting SBP	↓ (4 mmHg @ 10 wk)
Resting DBP	↓ (5 mmHg @ 10 wk)
1 RM Bench Press	↑ (21%)
1 RM Leg Press	↑ (32%)
BP Endurance	↑ (29%)
LP Endurance	↑ (23%)
Maximal Oxygen Uptake	↑ (12%)
6 Minute Walk-Test	↑ (6%)

A structured diet and exercise program promotes favorable changes in weight loss, body composition, and weight maintenance. *Kreider et al., J Am Dietetic Assoc. 111:828-43, 2011*

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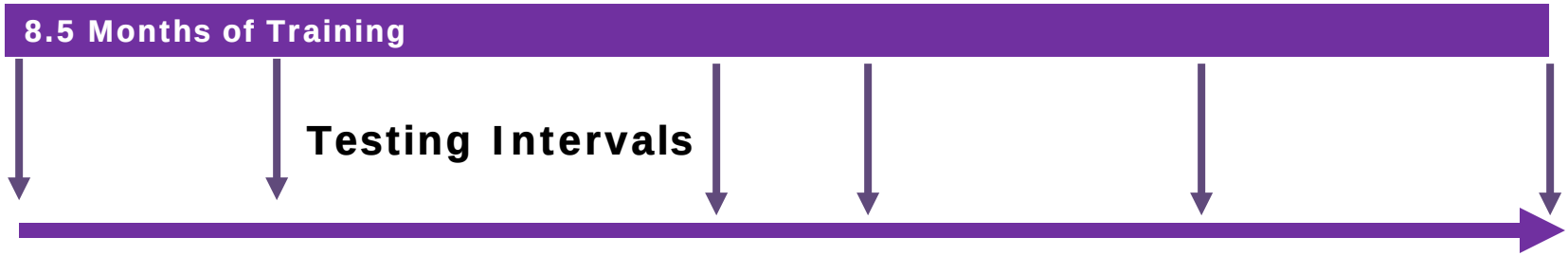

Curves/GM Program (HCHO [55:15:30])
vs. Special K® Weight Loss Program

N=77
42.6±10 yrs
89±14 kg
33.5±5 kg/m2
44.1±4 % fat

- At ***0, 2, 10, 14, 22, 34 W***:
  - *Dietary Records* (4-d)
  - *Psychometric Tests*
  - *Body Composition/Bone Density* (DEXA)
  - *Total Body Water* (BIA)
  - *Hip & waist measurement*
  - *Resting HR & BP*
  - *Fasting Blood Samples* (12h)
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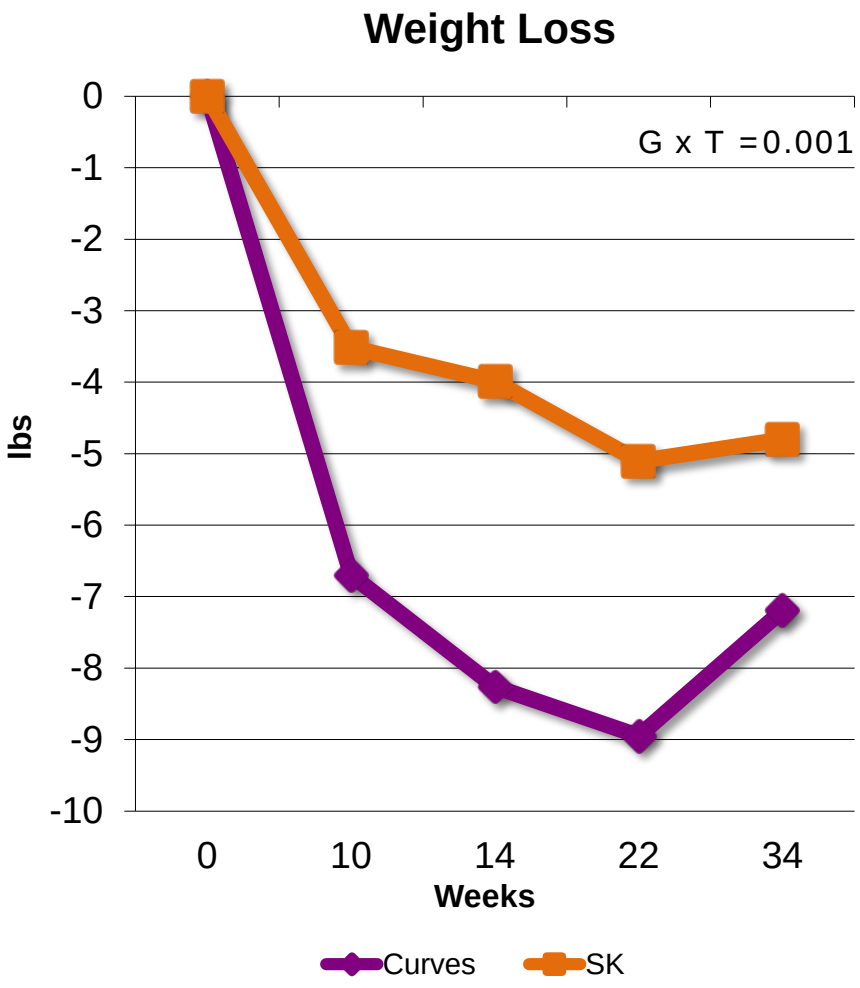

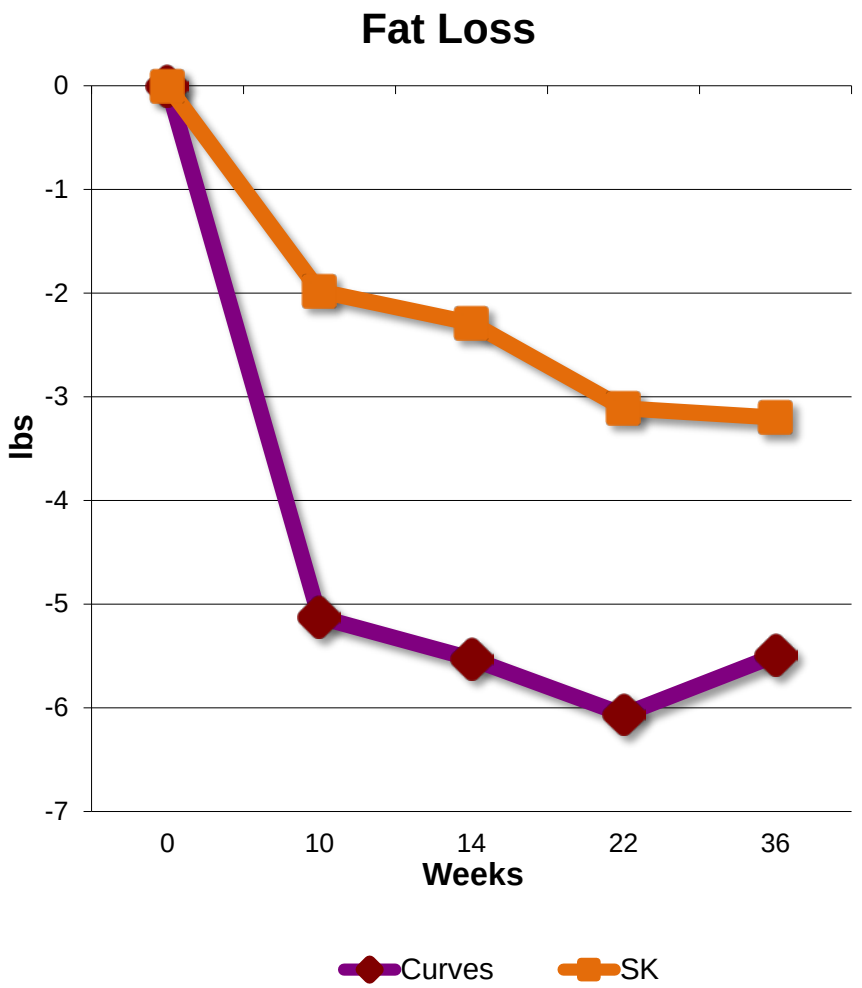

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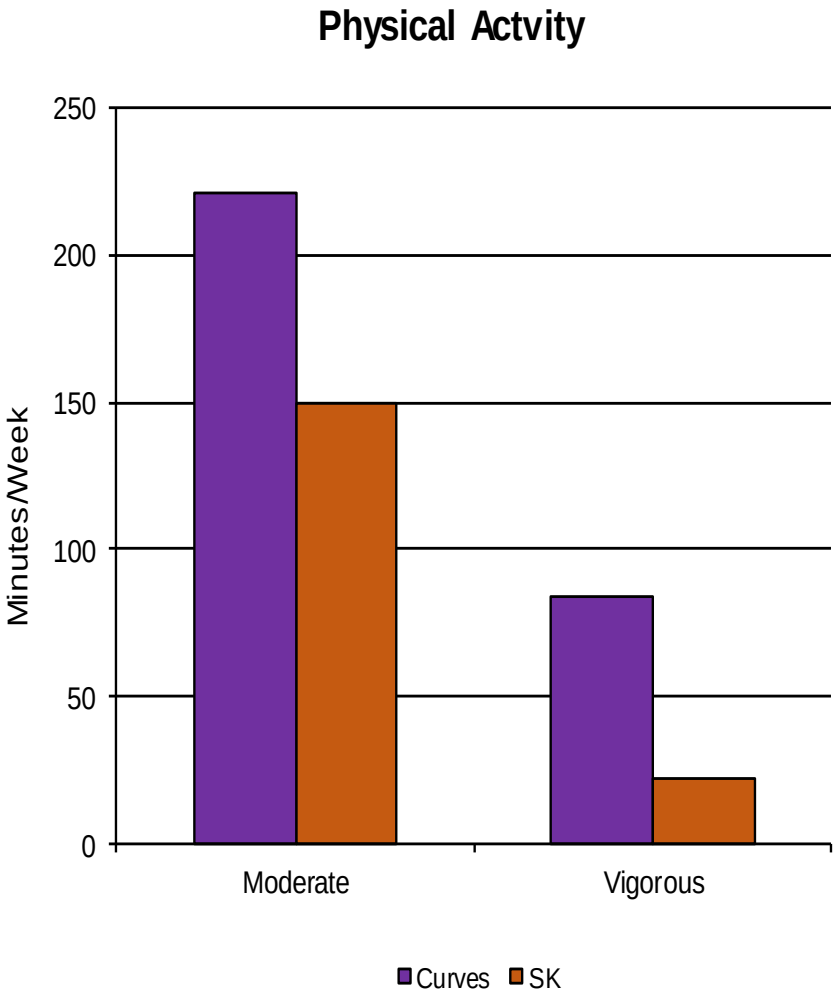

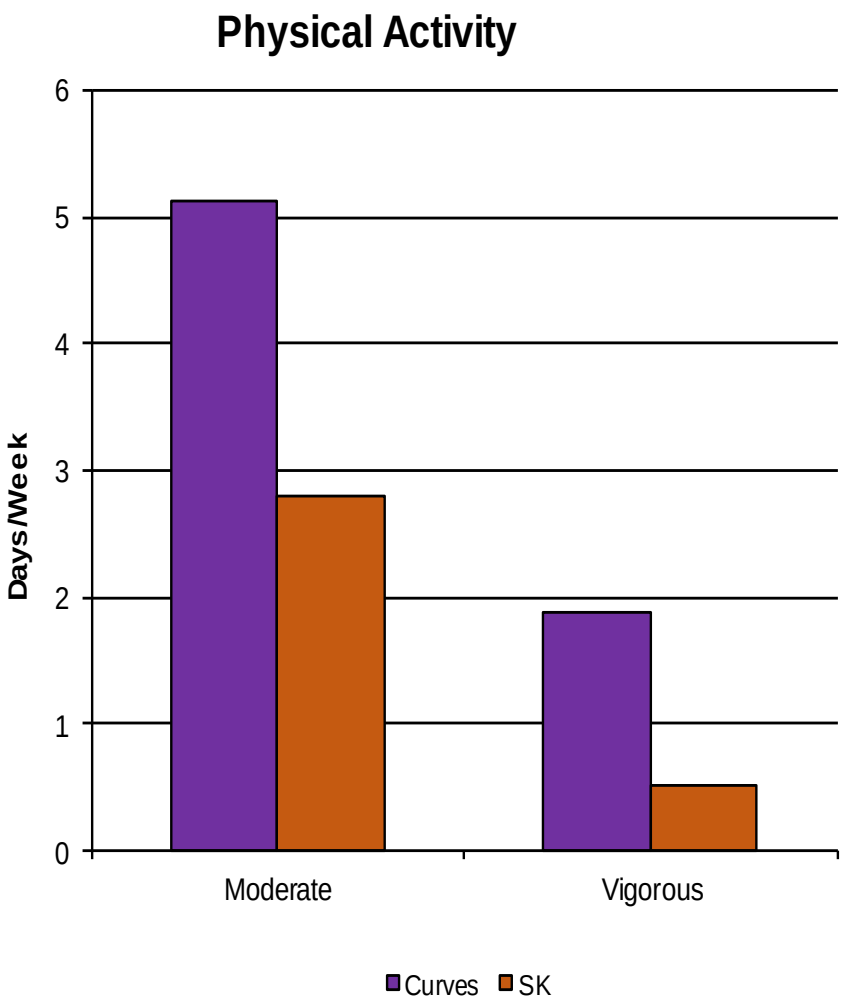

Comparative effectiveness of two popular weight loss programs in women I: body composition and resting energy expenditure. *Mardock et al., JISSN. 8(S1): 2011*

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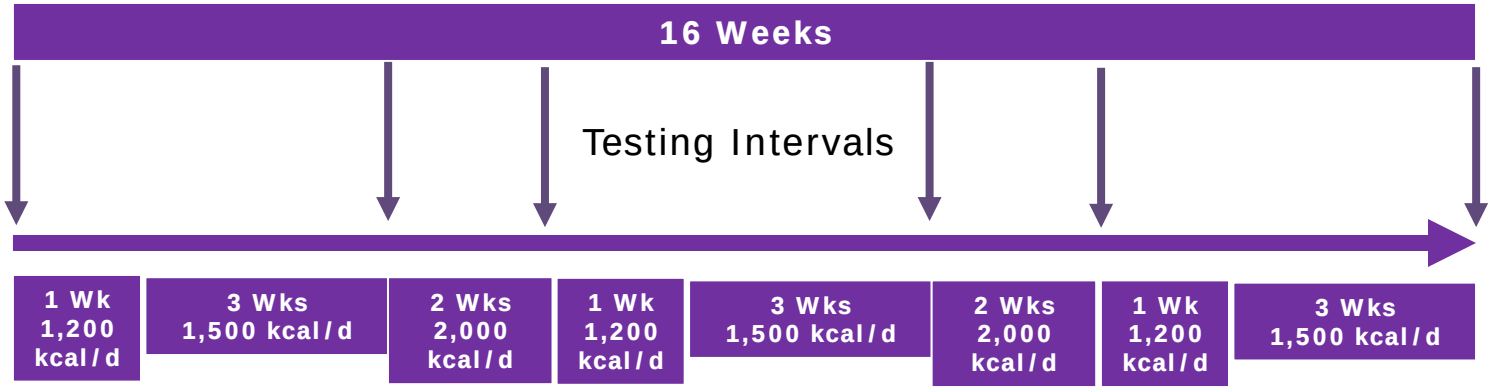

Curves with Zumba (I & II 30:45:25; III 45:30:25)
Weight Watchers Program & Counseling

N=51
35±8 yrs
90±14 kg
47±7% fat
34±5 kg/m^2

- At ***0, 4, 6, 10, 12, 16 W***:
  - *Dietary Records* (4-d)
  - *Psychometric Tests*
  - *IPAQ*
  - *Body Composition/Bone Density* (DEXA)
  - *Total Body Water* (BIA)
  - *Hip & waist measurement*
  - *Resting HR & BP*
  - *Fasting Blood Samples* (12h)
  - *Resting Energy Expenditure* (REE)

- At ***0 & 16W:***
  - *Maximal Stress Test*
  - *1RM Bench Press*
  - *80% of 1RM on Bench Press*
  - *1RM Leg Press*
  - *80% of 1RM on Leg Press*
- Side effects were monitored by an RN on a weekly basis

Comparative effectiveness of two popular weight loss programs in women I: body composition and resting energy expenditure. *Mardock et al., JISSN. 8(S1): 2011*

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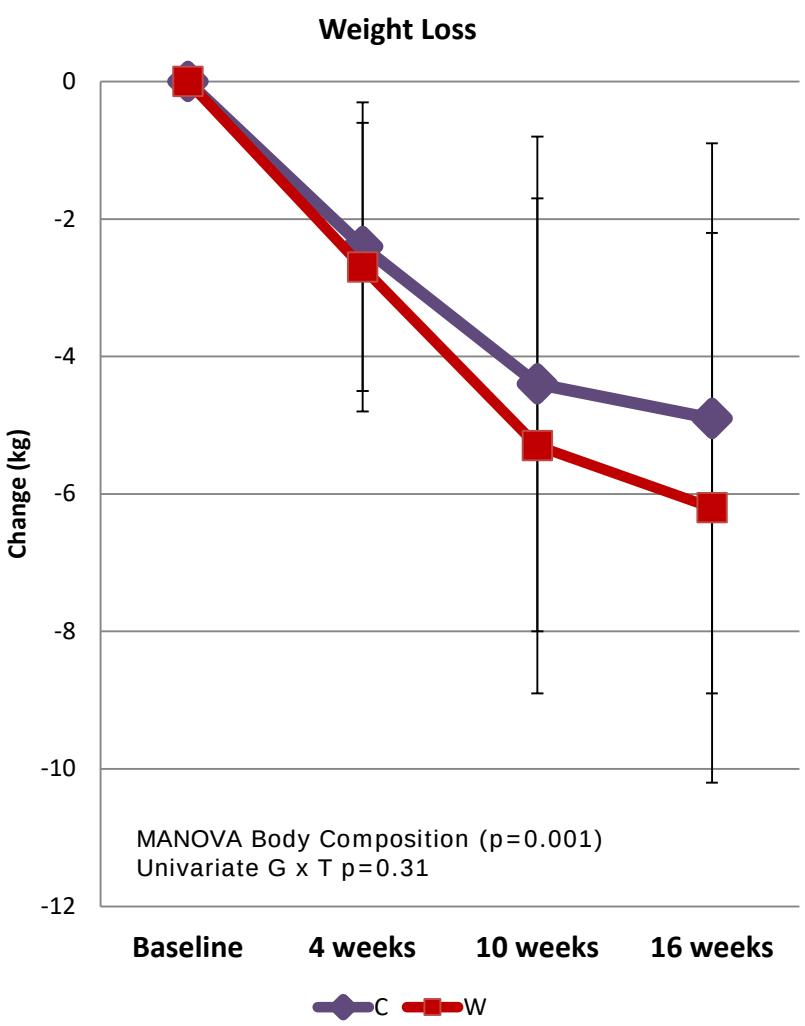

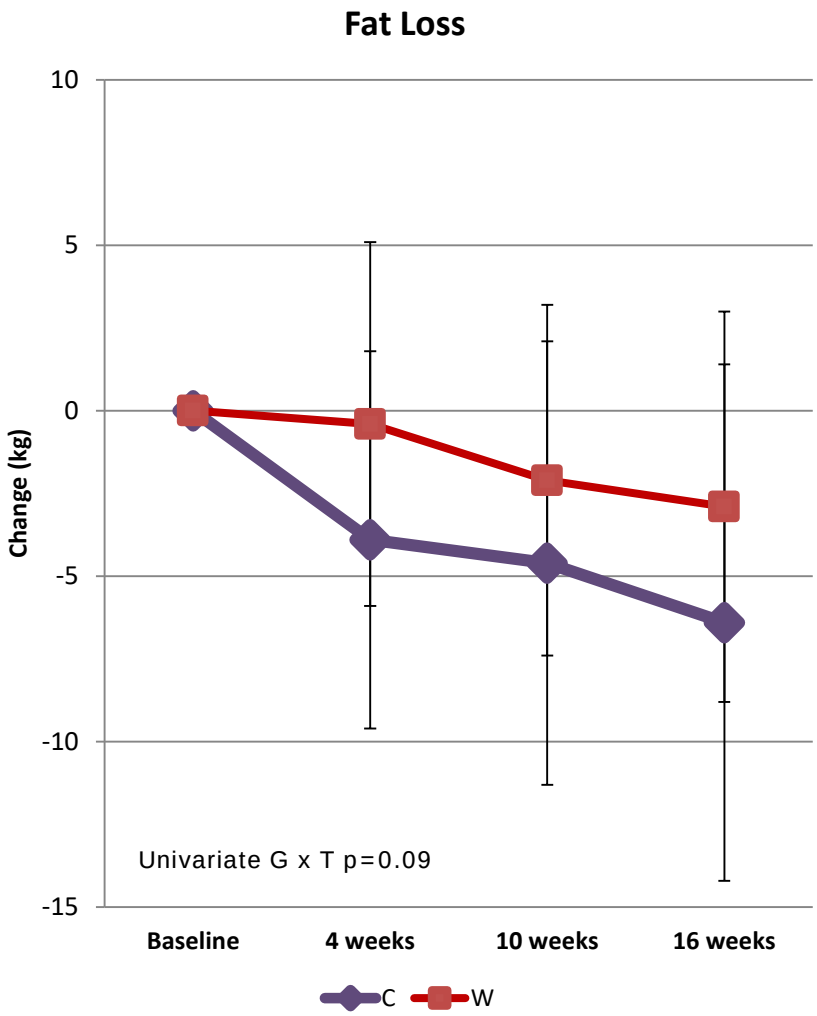

Comparative effectiveness of two popular weight loss programs in women I: body composition and resting energy expenditure

Mardock et al., JISSN. 8(S1): 2011

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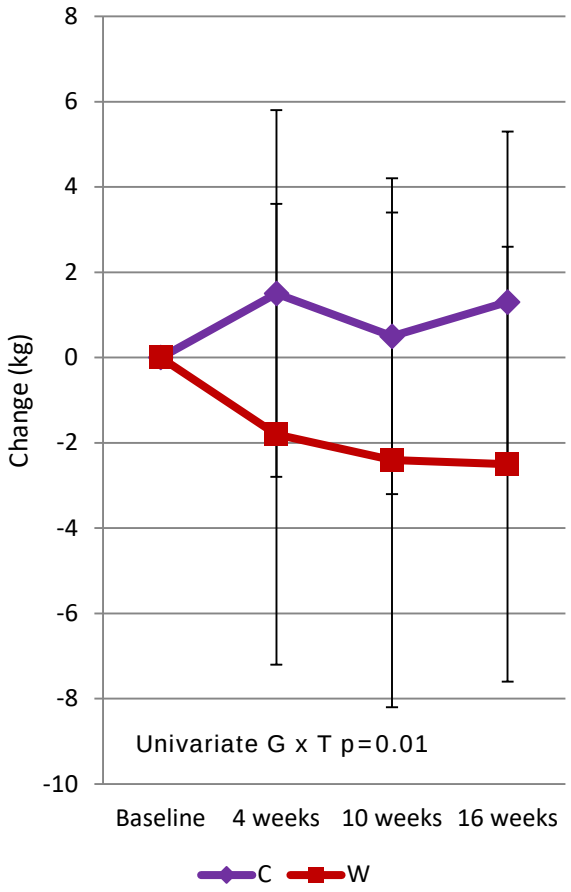
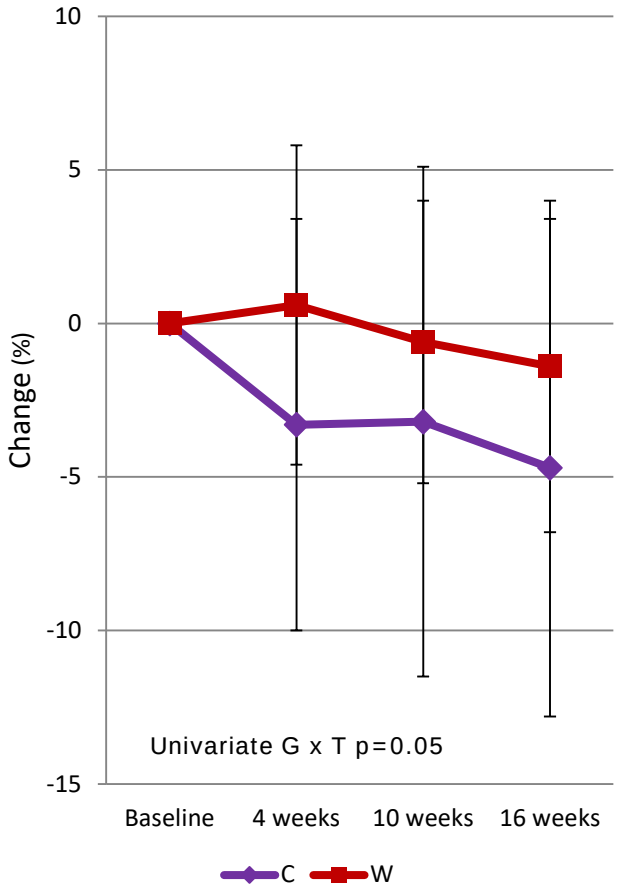
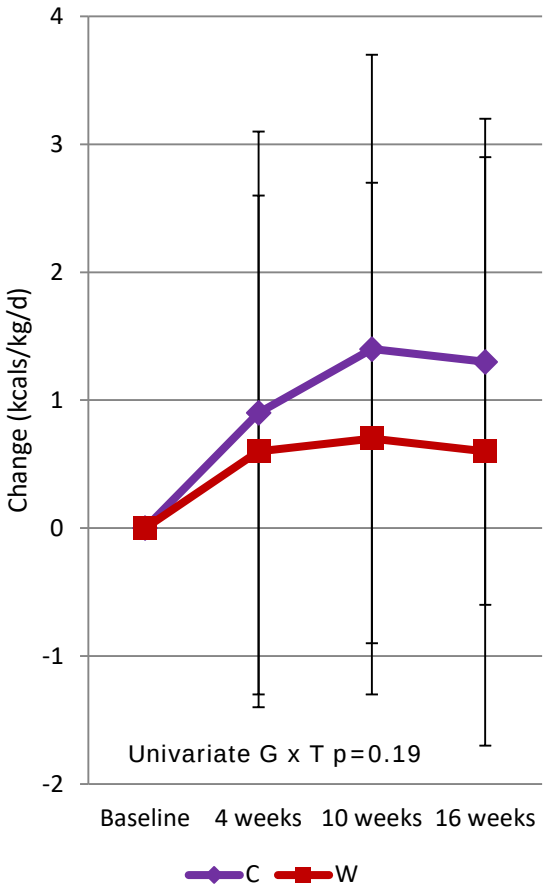
Fat Free Mass



Body Fat



REE



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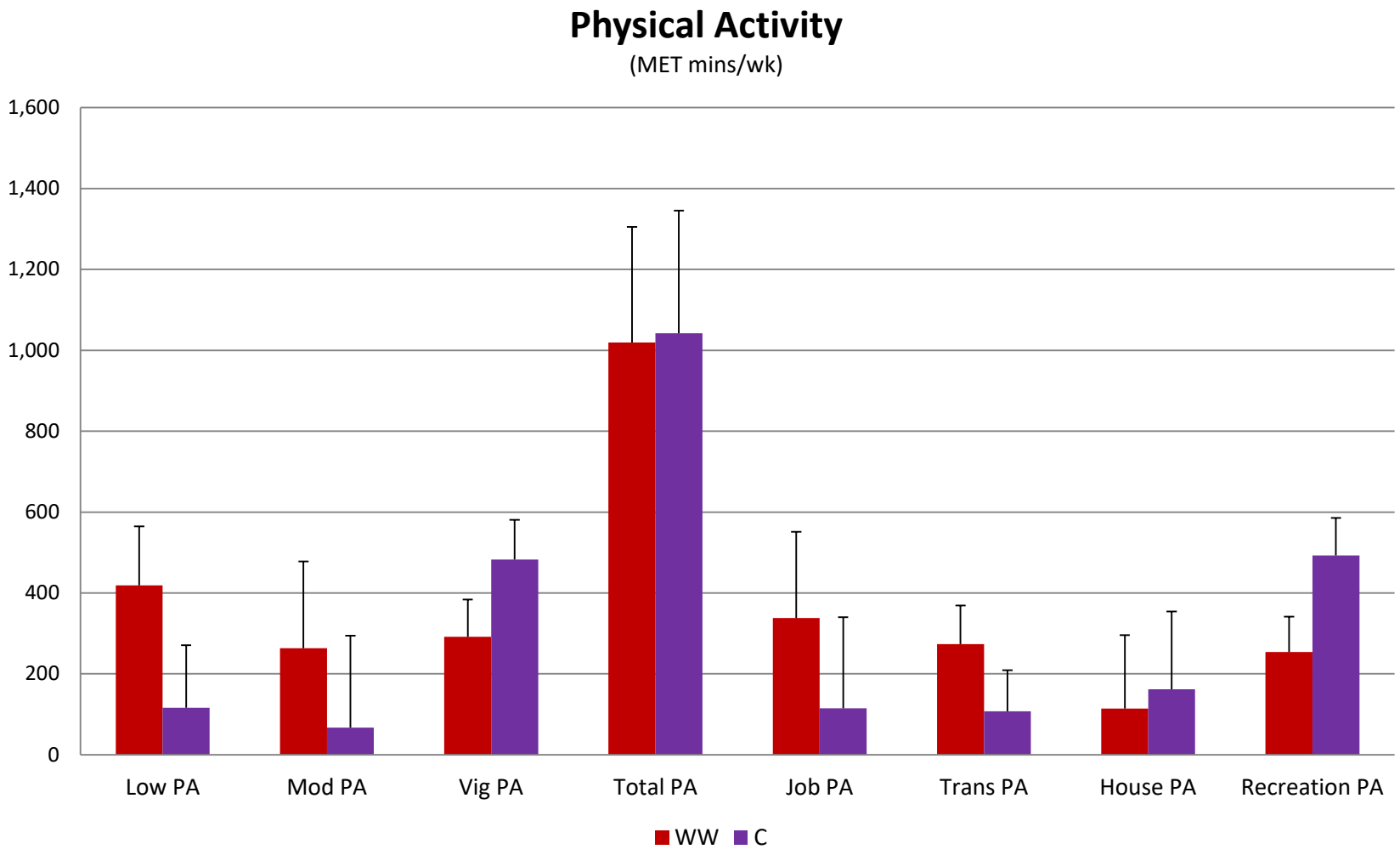

Efficacy of a randomized trial examining commercial weight loss programs on metabolic syndrome in overweight and obese women

Baetge et al., Appl Physiol Nutri Metabol. 1139/apnm-0456, 2017

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No Diet or Exercise Control; Curves Complete® 90-day Challenge (CC) with 30:45:25 C:P:F, Weight Watchers® Points Plus (WW), Jenny Craig® (JC), or Nutrisystem® Advance Select™ (NS)

N=126
44±12 yr
44.8±5% fat
35.4±6 kg/m^2

- At ***0, 4, 8, 12 W***:
  - *Dietary Records* (4-d)
  - *Psychometric Tests*
  - *IPAQ*
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	Control	Weight Watchers	Nutrisystem	Jenny Craig	Curves
Diet	No	Point Plus Program	Advance Select Online Program	Online Program	Curves Complete
Food Provided	No	No	Yes	Yes	No
Counseling	No	Weekly Group Meetings	Online Support Available	Online Support Available	Weekly Individual Progress Checks
Exercise Program	No	Encouraged but not supervised	Encouraged but not supervised	Encouraged but not supervised	Curves Circuit Training with Zumba
Cost	None	~ $135	~ $1,200 - $1,500	~ $1,200 - $1,500	$199

Efficacy of a randomized trial examining commercial weight loss programs on metabolic syndrome in overweight and obese women.

Baetge et al., Appl Physiol Nutri Metabol. 1139/apnm-0456, 2017

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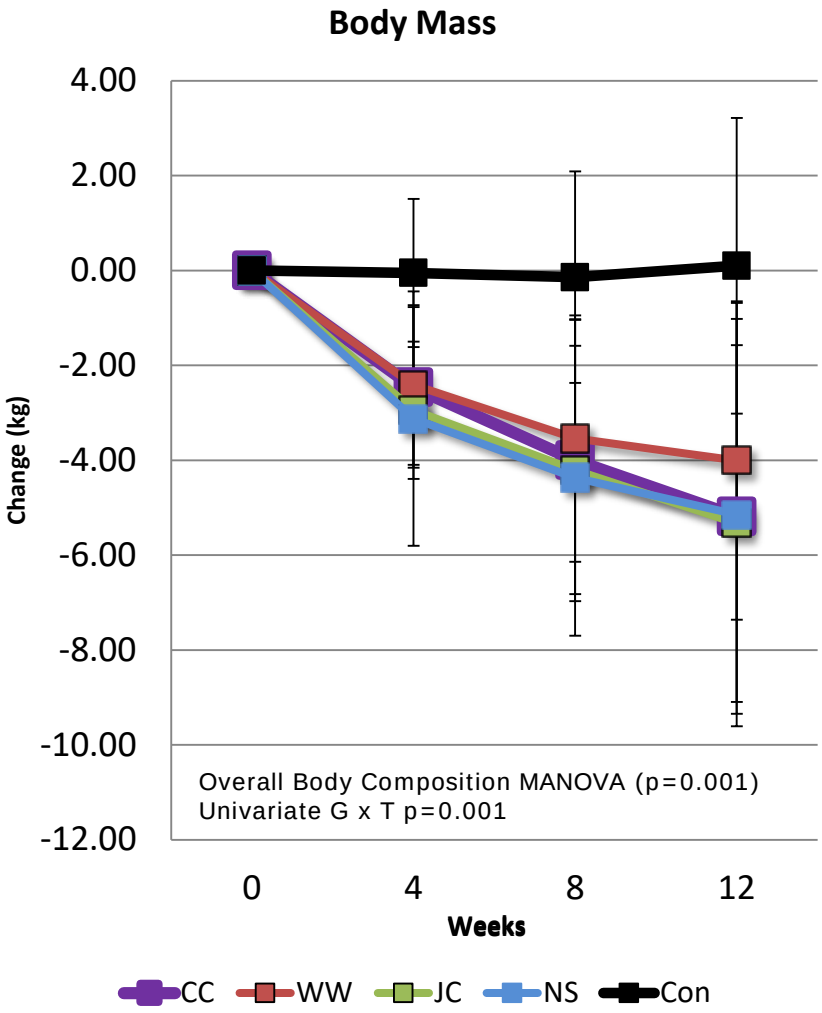

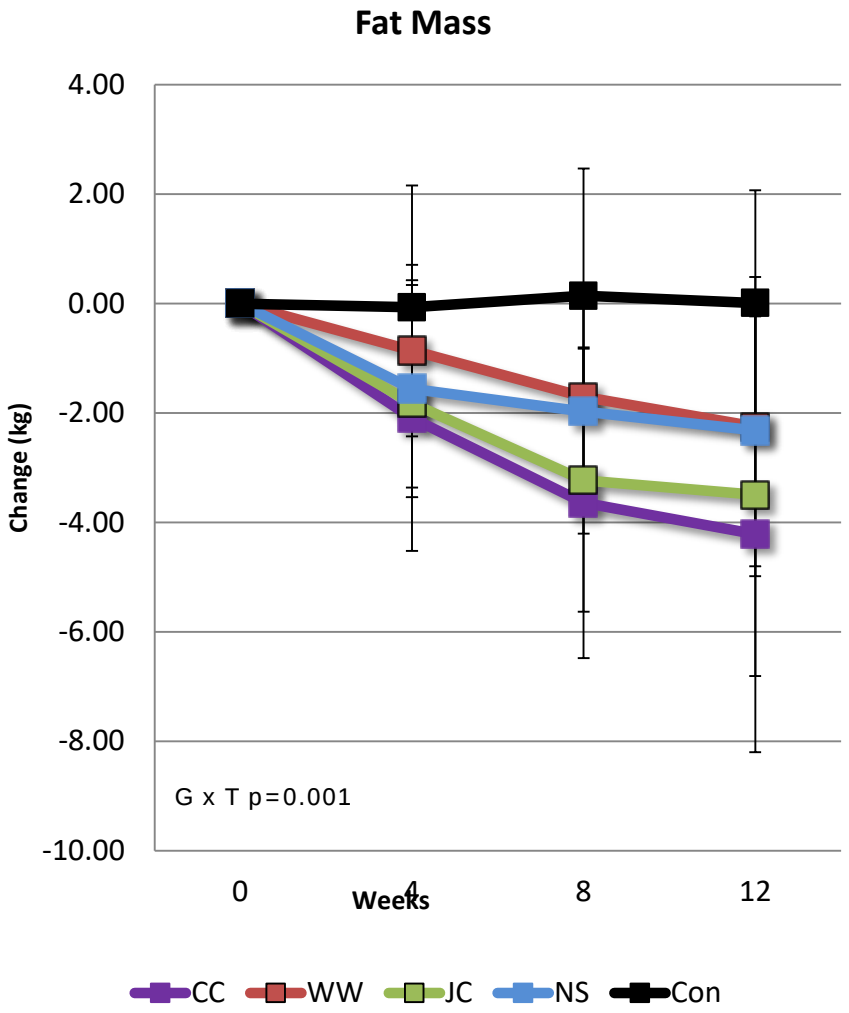

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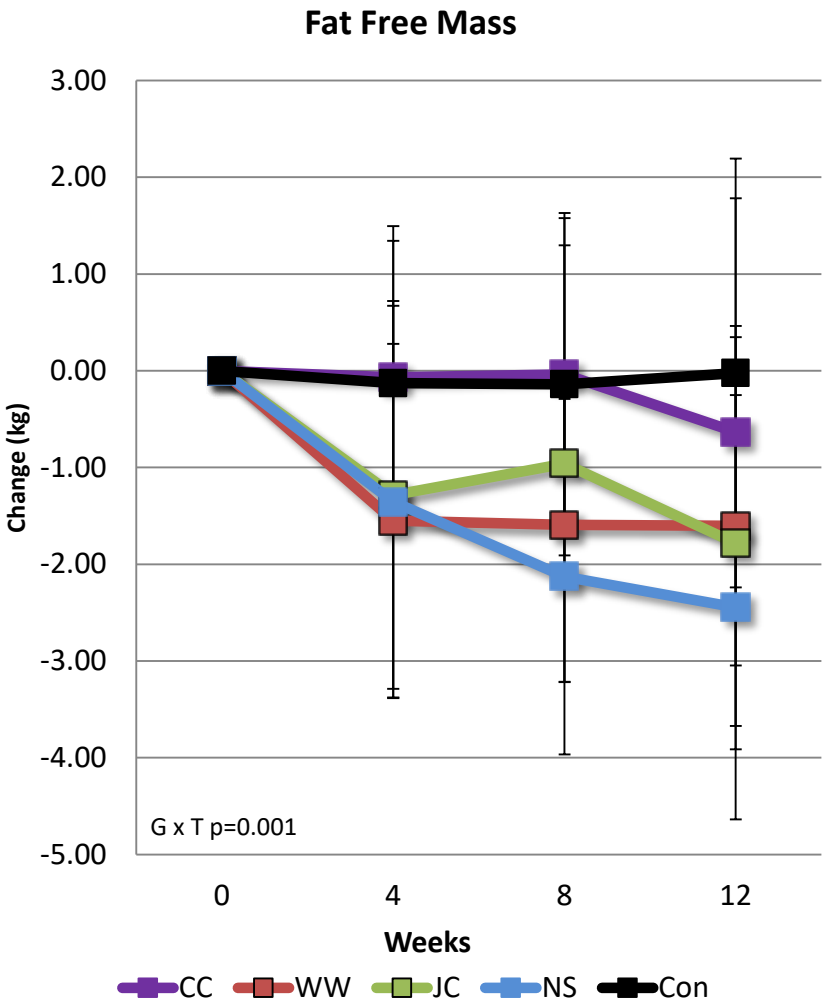

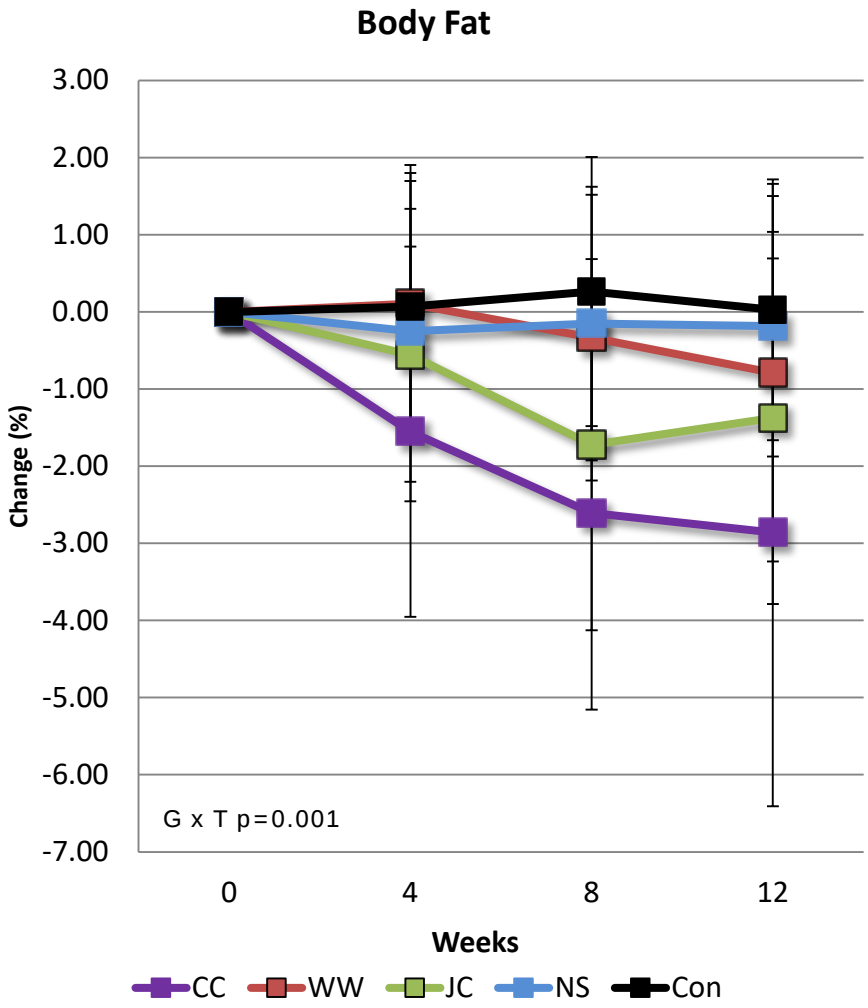

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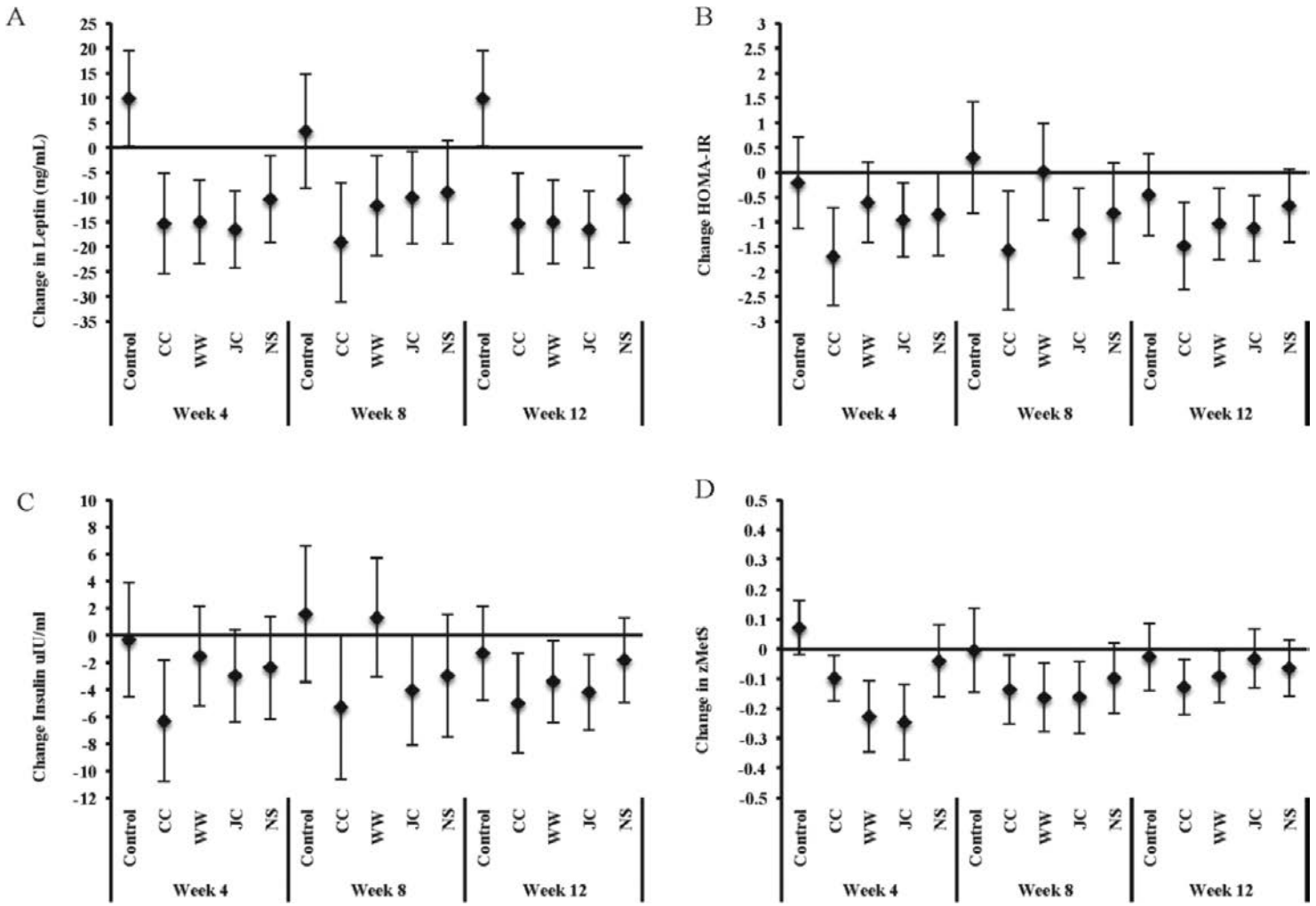

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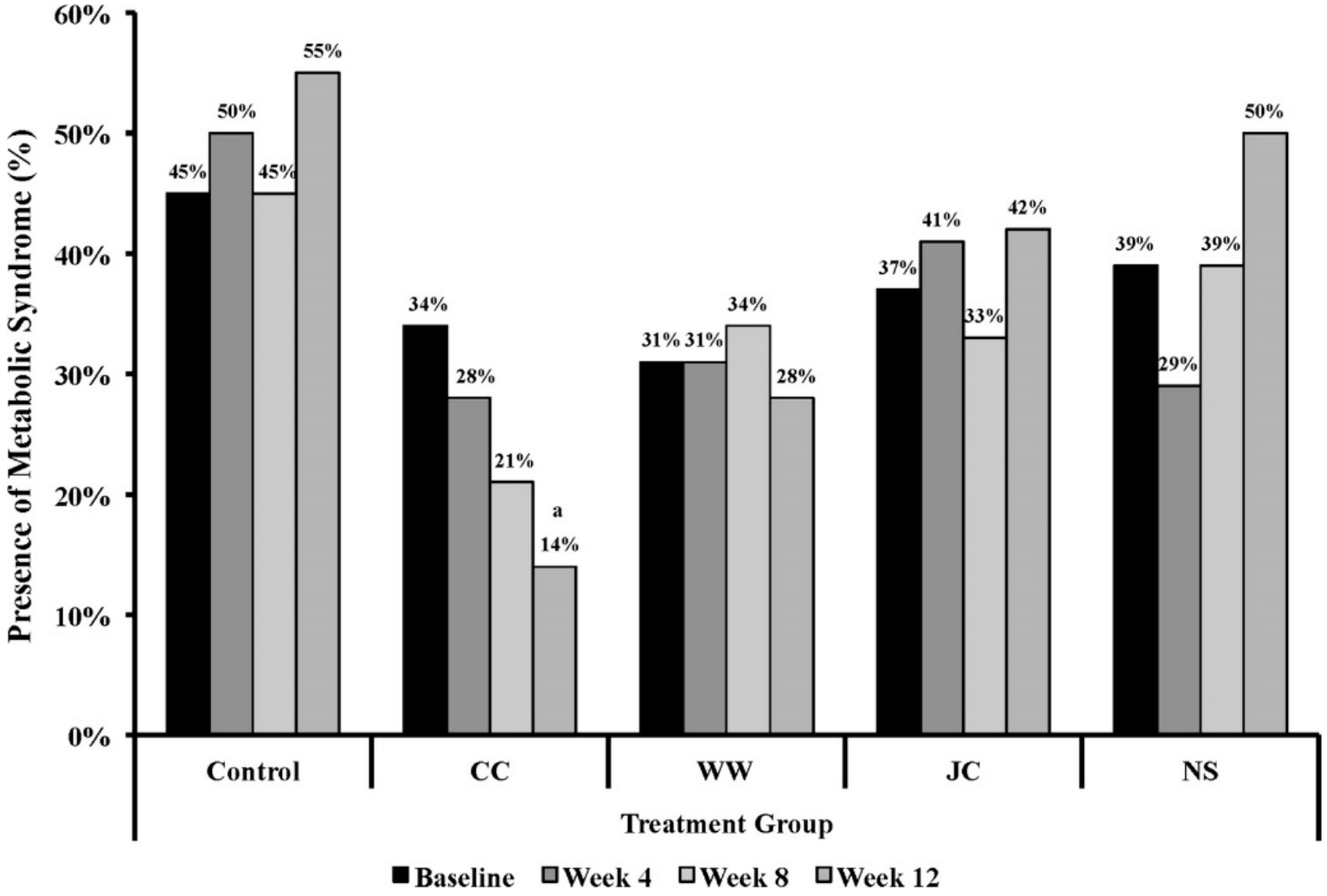

Variability of Body Composition Results

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		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Body Mass	HP	373	-4.28	3.56	.18	-4.64	-3.91	-16.56	6.01
	HC	293	-3.43	4.03	.23	-3.90	-2.97	-35.61	4.76
Fat Mass	HP	373	-3.23	3.72	.19	-3.61	-2.85	-50.39	10.65
	HC	293	-2.48	3.02	.17	-2.83	-2.13	-23.97	9.97
FFM	HP	373	-.78	2.03	.10	-.99	-.57	-9.89	5.78
	HC	293	-.60	2.08	.12	-.84	-.36	-12.97	7.31

Why is there so much variation in weight loss success when women adhere to the same exercise and diet intervention?

Alignment of diet prescription to genotype does not promote greater weight loss success in women with obesity participating in an exercise and weight loss program

Coletta et al., Obesity Sci Pract. Epub. Oct 16, 2018 https://doi.org/10.1002/osp4.305

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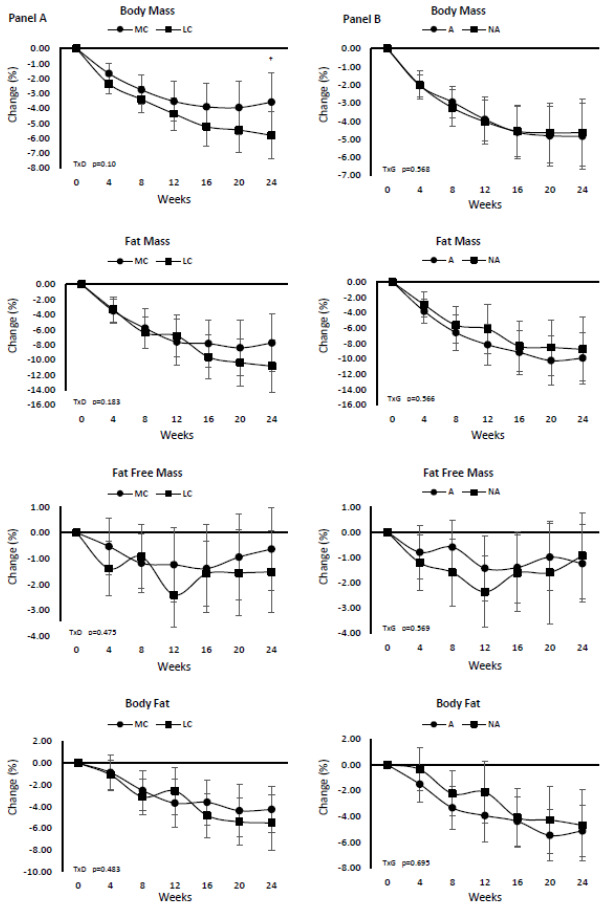
- 63 obese women had genotype (FABP2rs1799883, PPARG2rs1801282, ADRB3rs4994C3, ADRB2rs1042713, rs1042714) determined.
- Participants were randomly assigned to follow a moderate- (MC) or lower-carbohydrate (LC) hypo-energetic diet that aligned (A) or did not align (NA) with genotype for 24-weeks while participating in a resistance-training/walking program.
- Participants in the LC group experienced greater improvements ($p=0.051$, $\eta p^2=0.025$) in percent changes in body composition (weight: MC -3.32 [-1.4, -5.2], LC -5.82 [-4.1, -7.6]; fat mass: MC -7.25 [-3.2, -11.2], LC -10.93 [-7.3, -14.5]; fat-free mass: MC -0.32 [1.4, -2.0], LC -1.48 [0.7, -3.0]; body fat percentage: MC -4.19 [-1.6, -6.8], LC -5.60 [-3.3, -7.9] %) with no significant differences were observed between genotype groups.
- While individuals following the LC diet experienced greater benefits, alignment of these diets to this genetic profile did not promote greater health outcomes.



A carbohydrate-restricted diet during resistance training promotes more favorable changes in body composition and markers of health in obese women with and without insulin resistance. *Kreider et al. Physician and Sportsmedicine. 32:2, May 2011.*

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- 221 obese women were prescribed low-fat (30%) isoenergetic diets that consisted of 1,200 kcals per day for 1 week and 1,600 kcals per day for 9 weeks with HC or HP.
- Diet and training decreased body weight (–3.5 ± 3 kg), fat mass (–2.7 ± 3 kg), blood glucose (–3%), total cholesterol (–4.5%), LDL (–5%), TG (–5.9%), SBP(–2.6%), and waist circumference (–3.7%), while increasing peak aerobic capacity (7.3%).
- Subjects in the HP group experienced greater weight loss (–4.4 ± 3.6 kg vs –2.6 ± 2.9 kg), fat loss (–3.4 ± 2.7 kg vs –1.7 ± 2.0 kg), reductions in serum glucose (3% vs 2%), and decreases in serum leptin levels (–30.8% vs –10.8%) than those in the HC group.
- Participants in the HH (–14.1%) and HP-HH (–21.6%) groups observed the greatest reduction in serum blood glucose.
- ***A CHO-restricted diet promoted more favorable changes in weight loss, fat loss, and markers of health in obese women who initiated an exercise program compared with a diet higher in carbohydrate.***
- ***Obese women with higher HOMA levels experienced greater reductions in blood glucose following an HP diet***.

Retrospective analysis of protein and carbohydrate focused diets combined with exercise on metabolic syndrome prevalence in overweight and obese women.

Lockard et al. Metab Syndr Relat Disord. 14(4):228-37, 2016

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- We retrospectively analyzed effect of protein-focused (PRO, 1.14 g/kg/day) and carbohydrate-focused (CHO, ~2.2 g/kg/day) diets (~1600 kcals) combined with 10 weeks of circuit exercise training in sedentary overweight/obese women (***N = 661, age 46 ± 11 years***) on metabolic syndrome (MetS).
- Primary (MetS), secondary (MetS z-scores and individual MetS components), and tertiary outcomes [BMI by WHO cut points] were analyzed using chi-square, GLM, and McNemar's tests.
- ***Both groups experienced significant weight loss, improvements in fitness, and reductions in MetS prevalence from baseline to follow-up*** (PRO: 49% to 42%, CHO: 42% to 36%, both $P < 0.01$).
- MetS z-score improvement (~66.5%) was similar for both groups.
- ***No significant differences for waist circumference*** (-0.28 ± 0.02 vs. -0.28 ± 0.025 cm, P = 0.97), glucose (-0.07 ± 0.03 vs. -0.08 ± 0.04 mM, P = 0.87), triglycerides (-0.16 ± 0.04 vs. -0.09 ± 0.04 mM, P = 0.20), high-density lipoprotein cholesterol (-0.21 ± 0.03 vs. -0.19 ± 0.04 mM, P = 0.68), and systolic BP (-0.16 ± 0.4 vs. -0.24 ± 0.05 mmHg, P = 0.26).
- DBP showed a minor advantage for the PRO group (-0.14 ± 0.05 vs. -0.30 ± 0.05 mmHg P = 0.02).
- When stratified by BMI, those with morbid obesity did not show a significant improvement in MetS while following a PRO-focused diet.
- ***Low-moderate calorie diet partitioned for CHO and PRO is equally effective when combined with a structured exercise program for reducing the prevalence of MetS prevalence in overweight women.***

Retrospective analysis of weight loss relative to protein intake during short-term exercise training in women

Earnest al. Med Sci Sports Exerc. 49(5S):987, 2017

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- 8 exercise-training studies performed from 2002–2014 (***n=663***) were examined relative to tertiles of PRO ingestion (Low, <0.8 g/kg/d; Moderate; >0.8-1.2 g/kg/d; High >1.2 g/kg/d).
- The Primary outcome was clinically significant weight loss (CSWL, 5%).
- Protein ingestion was: Low (n=278; ***0.65 g/kg/d*** ± 0.12; range 0.24-0.80), Moderate (n=225; ***0.98 g/kg/d*** ± 0.12; range 0.891-1.19) and High (142 (n=142; ***1.66 g/kg/d*** ± 0.42; range 1.20-3.28).
- Weight change was: Gained weight (12%; 1.01 kg, 95% CI, 0.24, 1.78), exhibited non-CSWL (50%; -1.81 kg, 95% CI, -2.04, -1.59) and achieved CSWL (39%; -7.17 kg (95% CI, -7.42, -6.92).
- ***High PRO consumers did not gain a significant amount of weight (0.70 kg, 95% CI, -0.42, 1.81), while Low (0.97 kg, 95% CI, 0.30, 1.64) and Moderate PRO consumers did (1.36 kg, 95% CI, 0.84, 1.89).***
- ***57% of those consuming higher PRO (1.66 ± 0.42 g/kg/d) achieved CSWL vs. ~33% in low (0.65 g/kg/d) and moderate PRO 0.98 g/kg/d ± 0.12) consumers (P-for-trend, 0.001).***
- ***Low PRO consumers were significantly unlikely to achieve CSWL (adjres= -3.1), while those ingesting High PRO were significantly more likely to achieve CSWL (adjres = 4.9).***
- ***High PRO consumers were significantly more likely to achieve CSWL during a short exercise intervention consisting of resistance and aerobic training.***
- ***Higher PRO consumption may offset the magnitude of weight gain vs. lower PRO intakes if weight loss is not achieved.***

Behavioral Factors that Contribute to Weight Loss and Maintenance

Determinants of weight loss maintenance: a systematic review

Varkevisser et al. Obesity Reviews. Epub ahead of print, Oct 16, 2018

Strong Predictors

- Weekly data reports, monitoring weight (80%)
- Self-monitoring eating (75%)
- Increasing physical activity (76%)
- Not using meal replacement during weight loss and maintenance (80%)
- Portion control (75%)
- Cutting unhealthy food from diet (87%)
- Reduction in energy intake / energy dense foods (80%)
- Not eating fast food or at restaurants (100%)
- Increasing fruit & vegetables (83%)
- Reducing sugar-sweetened beverages (80%)
- Reduction in fat intake (75%)

Summary

http://www.exerciseandsportnutritionlab.com/curves

- Low to moderate intensity exercise provides significant health benefit but marginally affects weight loss in sedentary individuals initiating training.
- Diet intervention serves as the primary means of promoting weight loss in sedentary overweight or obese individuals but greater and more sustained effects are observed when combining diet and exercise.
- Low to moderate intensity aerobic exercise has been the most common form of physical activity in weight loss studies.
- Incorporating resistance exercise and higher protein / low fat diets can be an effective way to promote fat loss without loss in FFM or REE
- This approach is likely safe and effective for healthy men and women, individuals at higher risk for chronic disease, elderly, and individuals with controlled medical conditions.

Summary

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- Individuals initiating a diet and exercise program with metabolic syndrome or insulin resistance may experience greater benefit particularly in terms of reducing triglycerides and managing blood glucose.
- Maintaining a higher protein diet may help women achieve clinically significant weight loss and be more resistant to gaining weight.
- Maintaining physical activity after weight loss is a primary factor in preventing weight regain.
- Incorporating behavioral factors associated with weight loss or maintenance can improve outcomes.
- More work is needed to understand how genetics and/or gene expression influences outcomes as more personalize approaches are developed.

http://www.exerciseandsportnutritionlab.com/curves

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international society of sports nutrition®

The ISSN – Why Go Anywhere Else?!™

Additional Reading

International Society of Sports Nutrition position stand: diets and body composition *Aragon et al., J Int Soc Sports Nutri. 14:16, 2017.*

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The ISSN – Why Go Anywhere Else?™

1. There is a multitude of diet types and eating styles, whereby numerous subtypes fall under each major dietary archetype.
2. All body composition assessment methods have strengths and limitations.
3. Diets primarily focused on fat loss are driven by a sustained caloric deficit. The higher the baseline body fat level, the more aggressively the caloric deficit may be imposed. Slower rates of weight loss can better preserve lean mass (LM) in leaner subjects.
4. Diets focused primarily on accruing LM are driven by a sustained caloric surplus to facilitate anabolic processes and support increasing resistance-training demands. The composition and magnitude of the surplus, as well as training status of the subjects can influence the nature of the gains.
5. A wide range of dietary approaches (low-fat to low-carbohydrate/ketogenic, and all points between) can be similarly effective for improving body composition.

Aragon et al. Journal of the International Society of Sports Nutrition (2017) 14:16
DOI 10.1186/s12970-017-0174-y

Journal of the International Society of Sports Nutrition

REVIEW Open Access

International society of sports nutrition position stand: diets and body composition

Alan A. Aragon[1], Brad J. Schoenfeld[2], Robert Wildman[3], Susan Kleiner[4], Trisha VanDusseldorp[5], Lem Taylor[6], Conrad P. Earnest[7], Paul J. Arciero[8], Colin Wilborn[9], Douglas S. Kalman[9], Jeffrey R. Stout[10], Darryn S. Willoughby[11], Bill Campbell[12], Shawn M. Arent[13], Laurent Bannock[14], Abbie E. Smith-Ryan[15] and Jose Antonio[16]*

Abstract

Position Statement The International Society of Sports Nutrition (ISSN) bases the following position stand on a critical analysis of the literature regarding the effects of diet types (macronutrient composition; eating styles) and their influence on body composition. The ISSN has concluded the following. 1) There is a multitude of diet types and eating styles, whereby numerous subtypes fall under each major dietary archetype. 2) All body composition assessment methods have strengths and limitations. 3) Diets primarily focused on fat loss are driven by a sustained caloric deficit. The higher the baseline body fat level, the more aggressively the caloric deficit may be imposed. Slower rates of weight loss can better preserve lean mass (LM) in leaner subjects. 4) Diets focused primarily on accruing LM are driven by a sustained caloric surplus to facilitate anabolic processes and support increasing resistance-training demands. The composition and magnitude of the surplus, as well as training status of the subjects can influence the nature of the gains. 5) A wide range of dietary approaches (low-fat to low-carbohydrate/ketogenic, and all points between) can be similarly effective for improving body composition. 6) Increasing dietary protein to levels significantly beyond current recommendations for athletic populations may result in improved body composition. Higher protein intakes (2.3–3.1 g/kg FFM) may be required to maximize muscle retention in lean, resistance-trained subjects under hypocaloric conditions. Emerging research on very high protein intakes (>3 g/kg) has demonstrated that the known thermic, satiating, and LM-preserving effects of dietary protein might be amplified in resistance-training subjects. 7) The collective body of intermittent caloric restriction research demonstrates no significant advantage over daily caloric restriction for improving body composition. 8) The long-term success of a diet depends upon compliance and suppression or circumvention of mitigating factors such as adaptive thermogenesis. 9) There is a paucity of research on women and older populations, as well as a wide range of untapped permutations of feeding frequency and macronutrient distribution at various energetic balances combined with training. Behavioral and lifestyle modification strategies are still poorly researched areas of weight management.

Background

There are several major diet types interspersed with a multitude of subtypes. This creates a maze of conflicting principles that may be difficult for the general public and practitioners to navigate. Compounding the confusion is the continued propagation of fad diets across a range of media outlets, replete with unfounded practices. Therefore, it is important to examine the scientific evidence in a systematic way in order to devise recommendations to guide healthcare practitioners, coaches (including trainers, dietitians, and sports nutritionists), athletes, and the general public regarding all of the above. The purpose of this position stand is to provide clarity on the effects of various diets on body composition.

A general definition of "diet" is the sum of energy and nutrients obtained from foods and beverages consumed regularly by individuals. Thus, the following dietary archetypes will be assessed: very-low- and low-energy diets (VLED and LED), low-fat diets (LFD), low-carbohydrate diets (LCD), ketogenic diets (KD), high-protein diets (HPD), and intermittent fasting (IF). Diets with qualitative themes or commercial brands will inevitably fall under the

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[1]Department of Health and Human Performance, Nova Southeastern University, Davie, FL, USA
Full list of author information is available at the end of the article

BioMed Central

International Society of Sports Nutrition Position stand: diets and body composition *Aragon et al., J Int Soc Sports Nutri. 14:16, 2017.*

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Position Statement: The International Society of Sports Nutrition (ISSN) bases the following position stand on a critical analysis of the literature regarding the effects of diet types (macronutrient composition; eating styles) and their influence on body composition. The ISSN has concluded the following. 1) There is a multitude of diet types and eating styles, whereby numerous subtypes fall under each major dietary archetype. 2) All body composition assessment methods have strengths and limitations. 3) Diets primarily focused on fat loss are driven by a sustained caloric deficit. The higher the baseline body fat level, the more aggressively the caloric deficit may be imposed. Slower rates of weight loss can better preserve lean mass (LM) in leaner subjects. 4) Diets focused primarily on accruing LM are driven by a sustained caloric surplus to facilitate anabolic processes and support increasing resistance-training demands. The composition and magnitude of the surplus, as well as training status of the subjects can influence the nature of the gains. 5) A wide range of dietary approaches (low-fat to low-carbohydrate/ketogenic, and all points between) can be similarly effective for improving body composition. 6) Increasing dietary protein to levels significantly beyond current recommendations for athletic populations may result in improved body composition. Higher protein intakes (2.3–3.1 g/kg FFM) may be required to maximize muscle retention in lean, resistance-trained subjects under hypocaloric conditions. Emerging research on very high protein intakes (>3 g/kg) has demonstrated that the known thermic, satiating, and LM-preserving effects of dietary protein might be amplified in resistance-training subjects. 7) The collective body of intermittent caloric restriction research demonstrates no significant advantage over daily caloric restriction for improving body composition. 8) The long-term success of a diet depends upon compliance and suppression or circumvention of mitigating factors such as adaptive thermogenesis. 9) There is a paucity of research on women and older populations, as well as a wide range of untapped permutations of feeding frequency and macronutrient distribution at various energetic balances combined with training. Behavioral and lifestyle modification strategies are still poorly researched areas of weight management.

Background

There are several major diet types interspersed with a multitude of subtypes. This creates a maze of conflicting principles that may be difficult for the general public and practitioners to navigate. Compounding the confusion is the continued propagation of fad diets across a range of media outlets, replete with unfounded practices. Therefore, it is important to examine the scientific evidence in a systematic way in order to devise recommendations to guide healthcare practitioners, coaches (including trainers, dietitians, and sports nutritionists), athletes, and the general public regarding all of the above. The purpose of this position stand is to provide clarity on the effects of various diets on body composition.

A general definition of "diet" is the sum of energy and nutrients obtained from foods and beverages consumed regularly by individuals. Thus, the following dietary archetypes will be assessed: very-low- and low-energy diets (VLED and LED), low-fat diets (LFD), low-carbohydrate diets (LCD), ketogenic diets (KD), high-protein diets (HPD), and intermittent fasting (IF). Diets with qualitative themes or commercial brands will inevitably fall under the

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