

# BODY TRANSFORMATION SERIES

## PART I: WOMEN, WORKOUTS, AND WEIGHT LOSS

By

Wendy Shea, NASMCPT and Jason Shea, M.S., C.S.C.S, PES

Summer is right around the corner. New Year's resolutions have come and gone (average New Year's resolution lasts 17 days). Slowly we are falling back into our old eating and exercise (or lack thereof) habits. This was supposed to be the year we got back into our ideal shape (you know, the shape we were in back in our "Glory Days"). Though the intentions were good, the results did not live up to the expectations. It was easy at first. Just like the fad diet book claimed, if we performed 45 minutes of cardio a day and ate nothing, then we would shrink down to.....well..... nothing. But for some reason it stopped working after about one or two months. We felt, "I can't possibly eat less, as I hardly have any energy for basic daily tasks. Maybe I need to do more cardio. Perhaps I should also try some of those carb/fat blocker or energy supplements. After all look what they do for the spokespeople on the commercials".

So with renewed determination, and a stomach full of expensive, strategically marketed, synthetic S%#@, we increase our cardio, maintain our calories, and begin to see some results for another few weeks. People comment on how good we look. So it must be working. Eventually though, our body begins to break down (adrenal stress, annoying chronic pains, illness, etc..), and we have to either stop exercise all together, or push through the symptoms of break down continuing the downward spiral.

Once the exercise stops, so too does the fad diet, and we return to our old habits. This time though, it seems the weight comes back faster than ever. We then convince ourselves that maybe this is just the way our body is meant to be. Or is it? Every year this scenario plays out for thousands, if not millions, of men and women. After all, just look at how many diet books are out there (Amazon.com has more than 1,600 diet books for sale). Here is a sampling of just a few listed on [www.bestdietforme.com](http://www.bestdietforme.com):

## A Sampling of The Best Selling Diet Books in History

Following is a list of some of the more successful "classic" diet books in past years, with their retail price, authors, and year of 1st printing, when available....

- Dr. Atkins' Diet Revolution
- The 8-Week Cholesterol Cure-Robert E. Kowalski (\$17.95 hardcover) 1986
- The Beverly Hills Diet-Judy Mazel (\$3.95 paperback), 1981
- Jane Fonda's New Workout & Weight Loss Program (\$10.95 softcover), 1986 (paperback also)
- Elizabeth Takes Off-Elizabeth Taylor (\$7.95 softcover), 1988
- Better Homes & Gardens-The Dieter's Cookbook (\$24.95 hardcover), 1982
- The American Heart Association Cookbook (\$4.95 paperback-1980, 17.95 hardcover-1973)
- Weight Watchers Quick Success Program Cookbook (\$18.95 hardcover-Jan. 1989)
- Weight Watchers Quick Start Plus Cookbook 1987
- Weight Watchers Party & Holiday Cookbook (\$9.95 softcover-1981)
- Weight Watchers Fast & Fabulous Cookbook, 126,195 sold in 1986
- The Setpoint Diet-Dr. Gilbert Leveille (\$3.95 paperback-1985, General Foods)
- The Weighting Game-Lawrence E. Lamb (\$15.95 hardcover)
- The Pritikin Program For Diet & Exercise-Nathan Pritikin (\$5.50 paperback) 1979
- The Yo-Yo Syndrome Diet-Doreen L. Virtue (\$16.95 hardcover)
- The 35 Plus Diet For Women-Jean Perry Spodnick (\$4.50 paperback)
- Diets Don't Work-Robert Schwartz (\$9.95) NY Times bestseller
- The Diet-Type Weight Loss Program-Ronald Hoffman (\$17.95 hardcover)
- The Rotation Diet-Martin Katahn (paperback)
- Eat To Win-Robert Haas (paperback)
- The Complete Scarsdale Medical Diet-Herman Tarnower
- The L.A. Diet: The Eating Plan That Raises Your Metabolism to Lose Fat Forever (\$17.95 cloth)-James J. Kenney
- The Thin Plan-Michael LeBow 1987
- The Underburner's Diet (\$4.50 paperback) 1987
- The Staying Thin Cookbook-Nutilus Books (\$16.95), 1987
- Weight Watchers Favorite Recipes (\$13.95 cloth) 1987
- The Six Week Muscle-Fat Makeover-Ellington Darden (\$17.95 cloth) 1987
- Reset Your Appetat: A Successful Program For Achieving Permanent Weight Control Without Rigid Diets or Strenuous Exercise (\$12.95) 1988
- The Doctor's Diet-Type Weight-Loss Program-Dr. Ronald L. Hoffman (\$17.95) 1988
- The MiniMax Diet and Nutrition Program: Maximum Nutrition with Minimum Calories - David A. Phillips (\$8.95 paperback) 1988

If all these books worked, then why do we need so many?? With all this great diet information, why are obesity statistics the highest they have ever been. Annual Health Care costs stemming from obesity are roughly \$240 billion. To put this into perspective, that is greater than the gross domestic product of South Africa (\$239 billion), Greece (\$225 billion), or Ireland (\$200 billion). Not mention Americans spend more than \$33 billion on various weight loss schemes and diet products (17). So, what is the solution?

What is the number one goal of most women whom sign up at health clubs? To lose weight and/or "tone up". These women then use a simple bathroom scale to track their progress. A simple bathroom scale is capable of measuring one thing, the amount of heaviness according to gravitational

force exerted on the body. It makes no distinction between water weight, lean muscle weight, fat weight, soft tissue weight, or skeletal weight. By constantly “obsessing” (sorry, harsh term, but true in some cases) over what the scale reads, we are not getting an accurate depiction of our body’s composition and true health. By using body fat% and lean muscle mass as our guide, our goals will become much clearer, and therefore attainable.

What is the number one goal of men whom sign up at health clubs around the country? You guessed it. To.....meet chicks! (Just kidding). To put on muscle. Why is the goal of women so different from men? Shouldn’t women also want to put on muscle? Don’t men also need/want to lose weight. With this information in mind, what do most women think is the most effective exercise method to lose the weight? Cardiovascular activity. In other words, long duration, slow velocity, (we can’t really call it distance because technically you are not going anywhere. According to the laws of mathematics, distance is a numerical description of how far apart objects are at any given moment in time) treadmill running or elliptical exercise. Just look inside any health club during peak hours. Typically you can hear crickets and watch tumbleweed roll by in the weight training area, compared to the hustle and bustle on the cardiovascular machines. As a matter of fact, many gyms have sign-up sheets and duration restrictions (20-30 minute max) on their cardio pieces. I cannot remember the last time I had to sign up ahead of time to use a set of dumbbells for 2 minutes.

So which is better for body fat loss, weight training or cardiovascular exercise? Well, both. “When weight training and supportive nutrition are performed individually, they have a metabolic effect of 10% (increasing metabolism rate by 10%). When cardiovascular exercise is performed by itself, it has a metabolic effect of 5%. **When they components (weight training, cardio, and supportive nutrition) are performed in unison, they have an enormous synergistic metabolic effect of 30-40% (1).”**

Not only are most women solely performing the form of exercise which is least effective at raising metabolism, but they are also superseding it for the more effective method of raising metabolism (weight training). The take home point here is, all three components (nutrition, weight training, and cardiovascular) are necessary to achieve one’s weight loss and fitness goals. Let’s examine the myths and misconceptions of each, and the role these factors play in increasing one’s metabolic rate.

## **WEIGHT TRAINING**

### **Misconception I: *After weeks of weight training, why haven't I lost any weight?***

Which weighs more, muscle or fat? A pound of muscle weighs the same as a pound of fat. The question should be which weighs more according to volume/density? Muscle density is 1.06 g/ml and fat density is (about) 0.9g/ml. Thus, one liter of muscle would weigh 1.06 kg and one liter of fat would weigh 0.9 kg. In other words, muscle is about 18% denser than fat (20). Without knowledge of this, people begin to panic, because the reading on the scale has not changed. After weeks of weight training the scale reading has not changed, but your pant sizes have gone down. You may think, “why do my jeans fit better, but I have not lost any weight”. Understanding that muscle weighs more per unit volume, but takes up less space should explain this phenomenon.

In the beginning stages of weight training you are increasing your neuromuscular efficiency, thereby increasing your strength. As your strength and efficiency increase, your body responds by increasing the cross sectional areas of the stimulated muscle fibers (dependent on repetition ranges, sets, rest intervals, tempo, etc.), otherwise known as hypertrophy. As you increase the size of the cross sectional area of those fibers, your body is increasing its percentage of lean muscle mass. As your percentage of lean muscle mass increases, your metabolism will become more efficient. With a more efficient metabolism, your body will burn calories with greater efficiency, particularly fats, while preserving the muscle proteins.

As your body adds lean muscle, the reading on the scale may stay the same or even go in the opposite direction from which you were hoping. With the added muscle, your body composition (%fat, % lean muscle, etc..) will change, thus decreasing dress, shirt, and pant sizes. In essence, weight training (when done properly), can have profound positive effects on body composition, without any change in the reading on the scale.

### **Misconception II: *I don't want to get big and bulky muscles***

“An average woman has 40 to 60 nanograms of testosterone in a deciliter of blood plasma. An average man has 300 to 1,000 nanograms per deciliter (19).” That is roughly 10-20 times less than the amount circulating throughout the male body. Simply put, women do not produce enough testosterone to develop large muscles. For a female to develop “big muscles”, she would have to alter her hormonal profile through the use of exogenous testosterone, growth hormone, or steroids. She would then need

to weight train with extremely heavy resistances in compound movements, using a program designed specifically for increasing muscular strength and bulk. Her eating habits would then need to change. She would need to increase her calories by at least 500-1000 cal over her daily expenditure.

You get the picture. Even very few men can attain the type of muscle growth many of these women fear. Millions of men try daily to add large muscles to their frames. Look around the gym and see how many of those men actually succeed. I am sure they would love to increase their lean muscle mass. If men have such difficulty, while purposefully trying to develop big and bulky muscles (with some exception), how can a woman possibly add large muscle mass with 10-20X less testosterone circulating throughout her body.

***Misconception III: I tried weight training in the past, and it did not work (or only worked for a few weeks/months)***

Two words. Progressive training. The human body will basically adapt to the demands placed on it. If muscles are exposed to a resistance of 5 pound dumbbells during the initial phases of training, they will adapt to the point where they can accommodate those 5 pound dumbbells. Once this adaptation has occurred, the body and results will plateau, unless further stimulus is added (more weight, reps, sets, etc). If there is no stimulus progression, the body may begin to lose muscle tone, therefore burn less fat. The rationale here is that the body has less demand placed upon it to lift the same weight, so therefore your energy/caloric expenditure is less during the workout.

There are many variables of weight training that can be manipulated to decrease the possibility of reaching a plateau. Reps, sets, tempo, rest intervals, periodization, and exercise selection are some of the main variables of training that are often manipulated to keep the body progressing. Entire chapters can be and have been written on the manipulation of these variables, so to keep this particular article shorter than a Harry Potter novel, I recommend you read any of the following books for more detailed information on this subject.

1. Science of Sports Training by Thomas Kurz
2. Modern Trends in Strength Training by Charles Poliquin
3. The Development of Physical Strength by Anthony Ditillo
4. High Threshold Training by Christian Thibedeau
5. Fitness and Strength Training in All Sports by Hartmann and Tunnemann
6. Designing Resistance Training Programs by Kraemer and Fleck

**Misconception IV: Cardio exercise is better at burning calories than weight training**

During the next summer Olympics, compare the body type of a world class 100/200 (or even 400) meter sprinter to that of an Olympic marathon runner. The typical sprinter’s regimen is made up of an abundance of strength training, plyometric activity, sprinting, and prehabilitation/regeneration techniques. The average Olympic marathon runner’s regimen is lots of long distance runs, interval runs, tempo runs, some weight training, prehabilitation/regeneration techniques. Would you rather have the lean muscle tissue and muscle tone of an Olympic sprinter, or the thin, drawn look of an Olympic Marathon runner. Whichever you prefer, the training has to be geared toward the goal.

Your metabolism is increased through weight training by both active and passive methods. Actively, during the workout you increase your heart rate and body temperature, therefore raising your metabolic rate and burning more calories. After the workout, your metabolism is increased passively, because metabolism and lean muscle mass are intertwined. The more lean muscle you have the higher the metabolic rate. When you have a higher percentage of lean muscle tissue, your body actually burns more calories while at rest (otherwise known in the scientific community as NEAT, Non-Exercise Induced Activity Thermogenesis). “For every pound of lean muscle tissue you add to your body, your metabolism will burn an extra fifty calories per day! So one pound of added muscle will burn 18,250 additional calories or five pounds of fat weight a year! If you were to add five pounds of lean muscle tissue to your body, you would burn an additional 19,250 calories or twenty six pound of fat a year (1)!”

Below is a sample workout caloric expenditure chart and equation by Ivy and Portman (2004) based on body weight, workout time, and caloric demand of the exercise.

1. Determine total workout time by using this equation: # of sets X 75s(30s work + 45s rest)
2. WCE (Workout Calorie Expenditure)= Exercise Caloric Expenditure (chart) X Bodyweight X Total Workout Time

Exercise Intensity	Caloric Expenditure: Men (calories/lb/minute)	Caloric Expenditure: Men (calories/lb/minute)
Intense (80%) 1RM, 5reps/set	0.061	0,058
High (75%) 1RM, 8reps/set	0.058	0,055
Moderate (70%)1RM, 10 reps/set	0.055	0.048
Low (60%)1RM, 10 reps/set	0.048	0.042

Circuit Training, 15 reps/exercise	0.053	0.045
------------------------------------	-------	-------

Cardiovascular training works by a different mechanism. Most of the calories are burned during the workout. During long slow distance cardio workout your body will tap into your stored glycogen. Once your body uses up these stores, it will then breakdown amino acids from the muscle and transform them (gluconeogenesis) into sugars which can be used as fuel to continue the workout. With continued cardiovascular activity over periods of consecutive days/weeks/months, your body will become very adept at storing fat as a fuel source to compensate for the breakdown of muscle tissue.

“Anytime you perform aerobic activities, your body has three options for fuel. It can burn blood sugar, fat or muscle. If your blood sugar is fluctuating due to going long periods without supportive nutrition, our body will release less fat. If you consume simple sugars, fat release will be compromised due to insulin production. And if you don’t take in enough calories to support your activity, your body will actually “cling” to fat and will cause aerobic movements to seek out sugar as a fuel source. Thus aerobic exercise may *NOT* utilize your stored body fat at all. It may make you fatter (1)!”Ouch! \*\*\*This scenario pertains to the individual whom cardiovascular exercise is the only method of activity for weight loss purposes.

## CARDIOVASCULAR EXERCISE

### ***Misconception I: All I need to do is 45-60 minutes on the treadmill/elliptical and crunches 3X/week***

See misconception IV in the above weight training section.

### ***Misconception II: I burn more fat doing 45-60 minutes of cardio***

You may burn more calories during the long treadmill/elliptical workout, but what about calories burned after the workout? There is conflicting evidence on this topic. Studies have shown that fat oxidation and cortisol regulation can be optimal within the range of 60-65% VO2 Max (Romijn et al 1996, Sotsky et al 1989, Laforgia 2006). Others are proponents of High Intensity Interval Training (HIIT) only. The rationale to HIIT is that it increases the body’s temperature and oxygen consumption to very

high rates in short periods of time. Increasing the metabolism and EPOC (Excess Post Exercise Oxygen Consumption) to such a high rates will then increase caloric expenditure 24-48 hours post workout. Tremblay et al (1994) found the High Intensity group to burn 3 times more fat than the aerobic group. When used supplementary to weight training, high intensity intervals are also thought to increase the anabolic response because of their preferential recruitment of the Type II muscle fibers (20).

Both forms of cardio exercise have been shown to be effective, but in different capacities. So why not utilize both. One can perform them on separate days, scheduled around weight training workouts. Or for the trainees whom cannot dedicate the time, perhaps combining both methods into one workout. For example, performing 15 minutes of HIIT, followed by a 30 minute at 60-65% VO2 Max endurance workout. This should meet both criteria.

### **Misconception III: *All cardio is the same***

Different exercises illicit different caloric expenditures. Calculating out your workout caloric expenditure can be difficult, because 1 hour of long slow distance running on a treadmill is not the same as 1 hour of vigorous cycling in the French Alps. Be careful of calorie readouts on treadmill and elliptical, as they do not take into account important factors such as Basal Metabolic Rate, oxygen consumption, % bodyfat, or other necessary statistics to get a proper measurement of workout caloric expenditure.

According to a study done by the University of Michigan (1988) different modes of cardiovascular exercise can have completely different effect on total fat and calories burned. Below is a chart of the results of that study.



(\*Chart from [www.versaclimber.com](http://www.versaclimber.com))

Even weight training can be an effective form of cardiovascular exercise, with hormonal responses that set an environment for both muscle tissue anabolism and fat-metabolism (Hakkinen et al 1985, Kramer et al 1995, Izquierdo et al 2006)). Intensive circuit/weight intervals can raise heart rate, oxygen consumption, and blood lactate levels due to moderate/high intensity work intervals combined with low rest intervals. Increased lactate levels have been associated with increases in growth hormone secretion (Hakkinen et al 1985, Kramer et al 1995, Izquierdo et al 2006).

During intensive circuit weight training, fat oxidation is also increased through depletion of energy substrates such as glycogen. The greater the depletion of these substrates, the more the body has to work to replenish these stores to its baseline resting levels. Since the body lacks glycogen as a fuel source during the post workout period, it has two choices, it can utilize gluconeogenesis (the breakdown of muscle proteins to sugar) or it can utilize its fat stores. The body is a “smart machine”, therefore it would prefer to utilize the more readily available fuel source, fat oxidation, keeping its muscle tissue intact.

In order to achieve increases in lean muscle tissue and strength, while decreasing percentage bodyfat, it has been shown that a combination of weight training, high intensity interval training, and steady state moderate duration (60-65% VO2 Max) cardiovascular training can be very effective (when performed properly). Though these methods can have significant structural, biochemical, and physiological effects, they provide only half the pieces to complete the puzzle. To achieve a truly

efficient fat burning metabolism the nutritional component cannot be overlooked or underestimated. But that is the subject of **Part II of the Body Transformation Series: The Nutritional Element.**

## REFERENCES

1. Alessi, D., Alessi D. *The Promise*. Pp 17, 59, 60. Williamsville, Ny. 2002
2. Baechle T., Earle R. *Essentials of Strength Training and Conditioning*. Champaign, Il. 2000.
3. Costil D., Wilmore J. *Physiology of Sport and Exercise*. Champaign, Il. 2004
4. Ditillo A. *The Development of Muscular Bulk and Power*. Farmington, Mi. 1999
5. Fleck S., Kraemer W. *Designing Resistance Training Programs*. Champaign, Il. 1997
6. Hakkinen K, Pakarinen A, Alen M, Komi PV. **Serum hormones during prolonged training of neuromuscular performance.** *Eur. J. Appl. Physiol. Occup. Physiol.* 53(4). Pp287-93. 1985
7. Ivy, J., Portman R. *Nutrient Timing: The future of sports nutrition*. Laguna Beach, Ca. 2004
8. Izquierdo M., Ibanez J., et al. **Differential effect of strength training leading to failure versus not to failure on hormonal responses, strength, and muscle power gains.** *J of Applied Physiology.* 100; Pp 1647-1656. 2006
9. Kramer WJ, Patton J, Gordon SE, Harmon EA, Deschenes MR, Reynolds K, Newton RU, Triplett NT, Dziados JE. **Compatibility of high intensity strength and endurance training on hormonal and skeletal adaptations.** *J.Appl. Physiol.* 78(3). Pp976-989. 1995
10. Komi P. *Exercise and Sport Biology*. Champaign, IL. 1982
11. Laforgia J., Withers R., Gore C. **Effects of exercise intensity and duration on the excess post exercise oxygen consumption.** *Journal of Sports Sciences.* 24(12). Pp 1247-1264. 2006
12. Levine J., Earhardt N., Jenson M. **Role of non-exercise activity thermogenesis in resistance to fat gain in humans.** *Science.* 283; Pp 212-214. 1999.
13. Maughan R., Burke M., Coyle E. *The International Olympic Committee Consensus on Sports Nutrition: Food, Nutrition, and Sports Performance II*. New York, NY. 2004
14. Mercola, J. *Take Control of Your Health*. Schaumburg, Il. 2007
15. Rippetoe M., Kilgore L. *Starting Strength*. Wichita Falls, Tx. 2005
16. Romijn J., Coyle E., Sidossis L., Zhang X., Wolfe R. **Relationship between fatty acid delivery and fatty acid oxidation during strenuous exercise.** *Journal of Applied Physiology.* 81(3). Pp 1450-1452. 1996
17. Shea J. **An Investment in Health**. 2007.
18. Sotsky M., Shilo S., Shamon H. **Regulation of counterregulatory hormone secretion in man during exercise and hypoglycemia.** *Journal of Clinical Endocrinology and Metabolism.* 68(1); Pp 9-16. 1989
19. Sullivan A. **The he hormone.** *The New York Times Magazine.* 2007
20. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences.* 56; Pp B191-B197. 2001
21. Tremblay A., Simoneau J., Bouchard C. **Impact of exercise intensity on body fatness and skeletal muscle metabolism.** *Metabolism.* 43; Pp 814-818. 1994

22. Wilson G., Wilson J., Knowlton G. **Optimal cardio intensity for fat metabolism.** *Journal of Hyperplasia Research.* 2005
23. Yudai Takarada, HaruoTakazawa, Yoskiaki Sato, Shigeo Takebayashi, Yasuhiro Tanaka, and Naokata Ishii; **Effects of resistance exercise combined with moderate vascular occlusion on muscular function in humans.** *Journal Appl. Physical.* 88; Pp2098-2106. 2000