



Resting

Metabolic Rate

Does lifting weights to increase muscle mass boost your resting metabolic rate enabling you to burn more calories even at rest? **Dr Jason R. Karp, Ph.D.** on this and why increasing the intensity of your workouts is crucial in winning the battle of the bulge.

Among fitness professionals, the often (over)-used argument is that strength training adds muscle, which will increase your resting metabolic rate and, over time, will help you lose weight because muscles are "fat-burning machines." Contrary to what most people believe, research has shown that resting metabolic rate does not differ much between people, including between those who are fat and lean, averaging about 200 to 250 millilitres of oxygen per minute, or about 3.5 millilitres

it takes a 3,500-calorie deficit between caloric consumption and expenditure to lose just one pound.

While there is a positive relationship between fat-free weight and resting metabolic rate among animals and humans with large differences in body weight, whether an individual can significantly increase his or her resting metabolic rate is questionable. While a few studies have shown that resting metabolic rate (or total daily caloric



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One day, while running on a treadmill at the gym and listening to Britney Spears blast through the iPod of the overweight woman walking on the treadmill next to me, a personal trainer approached her to give her some advice. "If you want to lose weight," he said, "you should lift weights to increase your resting metabolic rate. Then you'll burn more calories throughout the day." A few minutes later, having suddenly noticed the absence of Britney's voice, I spotted the woman in the corner of the gym, heeding the personal trainer's advice and lifting weights, surely hoping for some better results.

of oxygen per kilogram of body mass per minute. In clinical practice, the resting metabolic rate is commonly referred to as one MET (metabolic equivalent), with the exercise prescription made in terms of multiples of METs. Since approximately five calories are burned for every litre of oxygen consumed, the oxygen consumption value of one MET equates to about nine to 11 calories per pound of body mass per day. Thus, heavier people actually have slightly higher resting metabolic rates because they have more mass to support all day. If resting metabolic rates were vastly different between people, we would not be able to define a MET the way we do since there would be too much inter-individual variability. Research, even dating as far back as 1971, has also shown that each pound of fat-free body mass burns 8 to 15 calories per day, a negligible amount since

expenditure) increases in response to either an aerobic or weight training program, many have shown that it does not, with one study reporting an increase only in men. A study published in American Journal of Clinical Nutrition in 1992 found that resting metabolic rate is also not significantly different between people of different aerobic fitness levels or training status. The few studies reporting an increase in resting metabolic rate with exercise have often been conducted on older adults who are more likely to show increases in resting metabolic rate due to the attenuating effect of weight training on age-associated losses in muscle mass. In other words, resting metabolic rate can increase in response to weight training in an older population likely because weight training has a greater impact on older people since they have lost a significant amount of muscle mass over the years.



Try This: Strategies for Boosting Metabolism and Preserving Muscle Mass

Interval Training

Interval training burns lots of calories in a short amount of time and keeps your metabolic rate elevated for hours after your workout. Do one or two of these workouts each week:

- 8 x 2 minutes at 100% max heart rate with 2 minutes active recovery
- 8 to 12 x 30 seconds fast with 1 minute active recovery
- 4 x 4 minutes at 100% max heart rate with 3 minutes active recovery

Weight Training

To preserve muscle mass while trying to lose weight, try these workouts:

- 3 sets of 8 reps at 80% 1 rep max with 2 minutes rest
- 3 sets of 8-10 reps at 8-10 rep max with 2 minutes rest
- 4 sets of 12-15 reps at 12-15 rep max with 1 min rest

Although weight training can increase muscle mass with the right stimulus—using at least 70 percent of your one-rep max and performing enough reps and sets to cause a significant amount of muscle breakdown and stimulate protein synthesis—research does not support the use of weight training alone or in combination with aerobic exercise for enhanced weight loss, but rather for the preservation of muscle mass while trying to lose weight. In other words, if

you're trying to lose weight, weight training can help you preserve muscle mass so you don't lose muscle while losing weight.

While resting metabolic rate cannot be expected to change significantly, your metabolic rate is acutely elevated after a workout (referred to as excess post-exercise oxygen consumption, or EPOC), with high-intensity and longer-duration exercise causing a greater and longer boost to post-exercise metabolic rate. Research has

shown that the more intense the exercise, the more and longer the post-workout metabolic rate is elevated and the more calories you'll subsequently burn. While the post-workout elevation in metabolism can certainly help you burn more calories over the long term, the elevated metabolism during your workouts (which is much higher than afterward) has a greater impact on your overall calorie burn and subsequent weight loss. And in workouts of equal duration, cardiovascular exercise burns many more calories than does weight training.

People lose weight only when caloric expenditure is greater than caloric intake. This is referred to as being in "negative energy balance." Research has shown that, when people are in negative energy balance and losing weight, resting metabolic rate actually decreases. This decrease in resting metabolic rate even occurs when muscle mass is maintained by weight training. No research has shown that resting metabolic rate is maintained much less increased when people are in negative energy balance.

For fat loss, the effects of training are not about how much muscle you add to your body, but rather about how you enhance the metabolic profile of the muscles, since it is the change in composition of the metabolically active portions of muscles that accounts for any change in resting metabolic rate. For example, endurance training enhances fat oxidation by increasing skeletal muscle mitochondrial content and cellular respiratory capacity (Muscle fibres of endurance athletes have a higher density of mitochondria than those of non-athletes. Resistance training decreases mitochondrial density but increase the overall number of mitochondria because of muscle growth). Weight training (or long, intense endurance training), provided it depletes muscle glycogen, helps repartition post-exercise food intake so ingested carbohydrates are used to replenish muscle glycogen stores rather than be stored as fat.

So, if you want to lose weight, the best way to do so is to burn many calories during your workouts (that will not be replaced by what you eat) and use alternating days of high-intensity and long-duration exercise to maximize calorie burn during the workouts and to maximize the increase in post-workout metabolic rate. Not only will your waistline be slimmer, you may even wait until the drive home to listen to Britney Spears. **UF**

Next issue's Peak Fitness column will explore the differences in muscle fibre types and the implications they have for your training.

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