

FAT and Body Weight Regulation

In today's society, the word "fat" conjures up many negative images of being overweight, having cottage-cheese thighs or stretch marks, and as something that should be avoided at all costs. As you have learned over the past couple of articles, fat can be an endurance athlete's best friend, in terms of providing a lot of energy. But, it can also be an enemy, in terms of over-indulging and long-term health implications. These days it seems that everyone is on some kind of diet or new exercise program to shed a few pounds. But is shedding a few pounds really necessary for all of these people? The last few articles have dealt with fat in terms of what role it plays in the body and what types to eat or not eat. In this article, I will aim to tackle the controversial area of body weight and body composition and provide some basic information to allow you to make practical long-term goals, instead of unrealistic short-term gains.

The basics regarding body weight regulation

When considering body weight regulation, the teeter-tatter (Figure 1) outlines just how simple it can be. In a nutshell, if your energy expenditure (how many calories you burn each day) is greater than your energy intake (how much you eat) this will result in an energy deficit and overtime weight loss. On the contrary, if your energy intake is greater than your energy expenditure, over time you will gain weight.

On the left hand side you can see that the major macronutrients of carbohydrates (CHO), protein and fat are your major sources of energy input. It is worth noting that fat is over twice as energy dense (9 calories / gram) as compared to carbs or proteins (~4 calories/gram). So, that is one reason to keep fat intake to a minimum. Another good reason to minimize fat is based on the well-established fact that the addition of extra fat to a meal does *not* increase your body's ability to burn the extra fat. Instead, most of the fat is directed towards storage (Schultz, 1989). In contrast, dietary CHO and protein are much more tightly regulated. The body is much better at maintaining CHO balance by closely matching the amount of CHO that it burns with the amount of CHO that you eat. It is also important to note that most of the fat storage in humans eating normal mixed diets is not caused by production of fat from CHO (Horton, 1995). Instead, the increase in fat storage is generally caused by people over eating on fat.

On the right hand side of Figure 1 I have outlined all the major ways that you can burn energy, which all contribute to your total daily energy expenditure. First, TEF stands for the Thermic Effect of Food. This is the amount of energy your body needs to expend in order to breakdown the food you eat into a usable form. For example, the body uses more energy to breakdown protein, due to its structural complexity and density, as compared to a simple carbohydrate, which is already in the usable form of glucose. The basal metabolic rate (BMR) is the minimum amount of energy that your body needs to stay alive and function normally as you rest. Any movement above this "basal" level would be considered an increased activity level and activity is the input that you have the most control over. There really is no secret here: the more calories you can burn during an exercise period, the more you will force your body into an energy deficit. Thus, the more intense your exercise, the higher the rate of calorie burning. But, this can be limiting. In the end, you will burn more calories in a steady one hour tempo run, as compared to a five minute warm-up jog, followed by 10 minutes of close to sprinting, and a five minute cool-down.

It is also important to understand the detriment of energy deficit. For some elite athletes who are already ultra lean, increasing energy expenditure can become a problem, as they need to compensate increased training load (or activity) with an increased nutrition intake. For individuals looking to lose a few pounds and become leaner, increased activity with a sound nutritious diet is a great way to keep the lean muscle while shedding the unwanted fat.

Another misconception about dieting and weight loss has to do with the effectiveness of different types of diets. Many individuals and companies currently promote low-carbohydrate (less

then 20% carbs) diets as a *more* effective way to lose weight than compared to normal recommended mixed diets (50-60% carbs). Regardless of the macronutrient content (e.g., high-carb and low-fat diets vs. low-carb and high-fat diets), weight loss will only occur if the diet results in an energy deficit, not because of the proposed optimal ratios of macronutrients.

Short-term goals result in long-term gain

Losing weight or achieving a better body composition, which generally means a lower % body fat and an increase in lean muscle mass, takes time. Here are some pointers:

- The primary aim of all weight-loss protocols should be to restrict food intake and increase energy expenditure, so that the body's fat stores are gradually reduced while the normal functions of the body are maintained. Depending on your normal caloric intake, an energy deficit of 500 to 1000 calories per day is recommended
- A calorie reducing diet should primarily restrict extra fat intake, rather than carbohydrate or protein
- Combining increased exercise (increase energy expenditure) *with* a diet will help minimize the potential for losing lean muscle mass
- Given that the energy content of 1 pound of fat is about 3500 calories, which is about what most athletes expend in a day, it is clearly impossible to lose more than a few pounds of *FAT* per week. Losing more than a few pounds per week means you are losing muscle, energy stores (glycogen) and water.

Food choices: low fat doesn't necessarily mean low calorie

Canadian and U.S. governments have been amplifying public awareness of the negative health consequences of being overweight for over a decade now, yet the prevalence of obesity in adults and children is still increasing (Kuczmarski, 1994). At least for the U.S. government, a major component of this anti-obesity campaign was promoting low-fat foods. Unfortunately, as Table 1 outlines, low-fat foods don't necessarily mean low calorie foods. As you can see, some foods that are marketed and promoted as either no-fat or low-fat have nearly the same amount of total calories as the products with normal fat content. Many obese individuals have fallen into this trap of thinking that they are making wise food choices by purchasing these low-fat and no-fat items. Many of these individuals then continue to go on and *not* practice eating in moderation and end up consuming way too many calories for their given daily energy expenditure. A more successful approach would have been to educate and promote eating lower calorie foods, instead of low-fat foods per se, in moderation, coupled with increasing energy expenditure through increases in physical activity. More and more research is pointing to the fact that the accumulation of body fat appears to be more closely linked to inadequate fat burning through insufficient daily activity, rather than being linked to daily fat intake. Therefore, without a committed weekly exercise routine it is quite possible to become obese even on a low-fat diet because, without physical activity, nearly all of the extra energy taken in is stored as fat.

Are spot reductions possible?

Spot reduction is targeting a specific portion or section of the body, usually hips or waist, for desired fat losses. There is a multi-million dollar industry based on this very concept, using unfounded and totally unproven programs and/or procedures that claim to be able to achieve spot reductions. Unfortunately, the proposal of spot reduction is not supported by any scientific studies.

Likely the best study out there was completed at the University of Massachusetts. This study took 13 males with larger than desired waistlines and had them complete nearly a month of abdominal work with up to 5000 sit-ups total per subject. The researchers took abdominal biopsies, before and after the month. (A biopsy is a small muscle sample that can then be analyzed at a lab). Contrary to popular belief of spot reduction, all subjects lost fat to the same extent in all areas, despite having only trained their abdominal area.

So what does this mean? Spot reduction doesn't necessarily work, but just increasing total energy expenditure will help decrease fat over the *entire* body, and not just one location. One can also achieve much greater caloric expenditure through running or biking (activate more muscles), than through something such as sit-ups (only selected muscles activated). Now, does that mean you should not do any spot specific exercises- of course not. Specifically training certain muscles through weights or sit-ups will help strengthen your entire body by adding balance and may also prevent injuries. Just don't expect sit-ups *alone* to take inches off your waist.

In summary, after reading the last three articles on fat hopefully you now will have some good tips on what to watch for when making food choices, how to eat in moderation and how vital your daily and weekly exercise routine is for achieving and maintaining your ideal body composition. Remember as well, that adopting a new and healthy lifestyle is like rolling a snowball: initially it is hard to get rolling, but once you have started and gained some momentum it is much easier to maintain.

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References

Kuczmarski, R.J. et al. Increasing prevalence of overweight amount US adults. The National Health and Nutrition Examination Surveys, 1960 to 1991. *J. Am. Med. Assoc.* 272: 205-211, 1994.

Horton, T.J. et al. Fat and carbohydrate overfeeding in humans: different effects on energy storage. *Am. J. Clin. Nutr.* 62: 19-29, 1995.

Figure 1.

Energy Inputs

Nutrition / Hydration

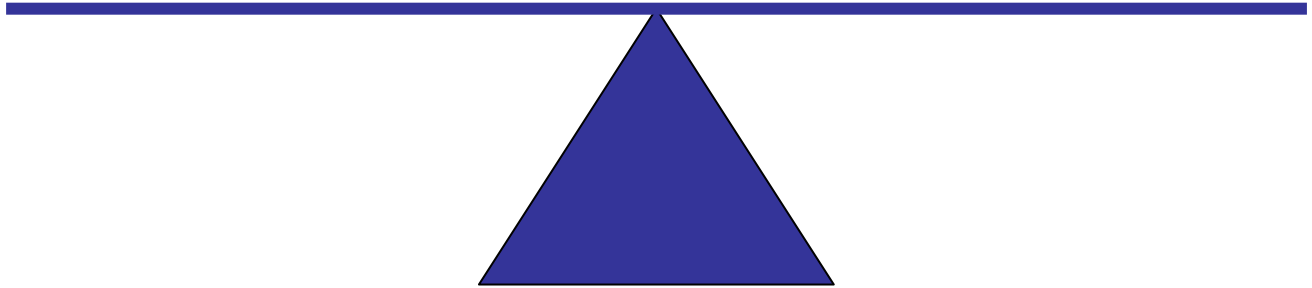
- Carbs (~4 kcal / gram)
- Proteins (~4 kcal /gram)
- Fats (~9 kcal

Energy Expenditure

BMR

Activity Level

TEF



AIM for ENERGY IN = ENERGY OUT
for optimal body composition (not weight per se)

Table 1.

Fat-Free or Reduced Fat	Calories	Regular	Calories
Reduced- fat peanut butter 2 tablespoons	187	Regular peanut butter 2 tablespoons	191
Reduced-fat chocolate chip cookies (3 cookies- 30g)	118	Regular chocolate chip cookies (3 cookies- 30g)	142
Non- fat vanilla frozen yogurt, 1/2 cup	100	Regular vanilla frozen yogurt	104
Low fat cereal bar	130	Regular cereal bar	140