

Lesson 8 - Analyzing Your Diet

Diet analysis is comprised of two parts, *needs* and *intake*. Optimal nutrition is a matter of balance (nutrients-in versus nutrients-out). In other words, a swimmer's intake of nutrients must match his/her output of nutrients during rest and exercise. In terms of *energy* (aka calories), if the needs are greater than the intake, the net result is weight *loss*. Conversely, if the needs are less than the intake, the net result is weight *gain*.

There are three variables that contribute to a person's total nutrient and energy needs:

Resting Energy Expenditure (REE) – REE is the energy required for cellular and tissue processes that maintain physiological functions at rest, plus small amounts of energy related to previous muscular activity. It is the energy the body needs to maintain itself in the sedentary state, and this need tends to decrease with age. REE remains relatively constant for a given age and gender. In other words, the REE for most 120-lb 16-year-old males is about the same. Typically, REE accounts for about 60% of a swimmer's daily expenditure. For swimmers, about 40% of it is used to support REE.

Thermic Effect of Food (TEF) – TEF is the energy required by the body to digest, absorb, transport, store and metabolize food. Eating actually increases a person's metabolic rate temporarily, which translates into an elevation in energy expenditure. This effect is higher for protein and carbohydrate meals, versus fat meals. In fact, fat has little effect in elevating the metabolic rate at all. Typically, TEF accounts for about 10% of a person's daily expenditure. Similarly, about 10% of a person's daily caloric needs are to support TEF.

Thermic Effect of Exercise (TEE) – TEE is the increase in a person's metabolism due to moderate and strenuous physical activity. The exact amount of energy this accounts for depends on the physiological "cost" of the activity. Determining this directly involves monitoring a person's oxygen consumption (VO₂) during exercise and translating that into calories burned. There are many reference charts available that indicate how many calories are required or spent to perform a given activity for a given period of time. Typically, TEE accounts for about 30% of a person's daily expenditure. For swimmers, about 60% of it is used to support TEE.

Since lean tissue is the site for most metabolic (energy conversion) processes, the more lean tissue a person has, the higher is their level of metabolic activity. For this reason, Resting Energy Expenditure and the Thermic Effect of Food are typically higher in males than in females, and higher in athletes than in non-athletes. Resting Energy Expenditure also tends to be higher in individuals who consistently meet their metabolic demands with an adequate intake of calories. Severe restriction of calories (<80% of calculated needs) for prolonged periods of time can lead to a decrease in the metabolic rate, usually because it results in a loss of muscle mass. It should be noted that although stimulants, such as caffeine and nicotine will also increase Resting Energy Expenditure slightly, these products are not recommended for various health reasons. Changes in temperature can affect Resting Energy Expenditure as well, but the most powerful environmental influence is EXERCISE.

Adding the Thermic Effect of Exercise to the Resting Energy Expenditure and Thermic Effect of Food constitutes calculating an individual's total energy needs for the day.

$$\text{Total Energy Needs} = \text{REE} + \text{TEF} + \text{TEE}$$

What changes with the competitive season is the relative contribution of each of the three variables to the total requirement. For example, during the **in**-season, Resting Energy Expenditure may account for about 50% (half) or a little less of the total energy expenditure, or total energy needs. During the **off**-season, Resting Energy Expenditure may account for 60-70%. This is because Resting Energy Expenditure does not change much, while *active energy expenditure* (i.e. the Thermic Effect of Exercise) is lower during the off-season due to a reduction in training volume. Because Resting Energy Expenditure plays a larger role during the off-season, keeping it elevated reduces the amount of dietary change that will be required to maintain body weight. This can be accomplished by maintaining lean tissue, as opposed to losing muscle during the off-season. Hence the role of exercise during this time.

Fortunately, the USA Swimming website offers a program to take care of calculating all three of the variables mentioned above. [Nutrition Tracker](#) is an on-line tool that calculates a swimmer's

nutrient needs, based on age, gender, current body weight and daily training schedule.

Of course, the other side of the equation involves intake, or the amount of energy an athlete *consumes* on a daily basis. Nutrition Tracker can do this too. Using Nutrition Tracker, a swimmer can enter an entire day's food intake to see how much carbohydrate, protein, fat and calories are in it, compare what he/she ate to his/her individual needs, and track his/her habits throughout the season and off-season. Upon comparing nutrient needs with the swimmer's current intake, the program generates a feedback report, and stores the information for future reference. Swimmers are provided with an analysis of their current diet on which they can base changes or interventions. Deficiencies and excesses are highlighted based on comparisons with reference ranges established for swimmers. The best part is that the analysis is specific to swimming and current level of training. (*Nutrition Tracker is available to all USA Swimming members. National Team athletes have pre-established accounts. All other users must **register prior to first use.***)

Any complete diet analysis, including Nutrition Tracker, involves a record of every food item that was eaten on that particular day. The most common way to do this is by using a *food recall*.

The typical food recall requires an athlete to report what he/she ate over a 3-7 day period of time. The energy content (i.e. kcal) of each food item and the exact amount eaten are used to determine the total energy content of a full day's menu. Total carbohydrate, protein and fat intakes can also be determined using this format. Knowing the contribution of each of these macronutrients provides information on where the calories are coming from. Unfortunately, when athletes know they have to record what they ate, they (especially females) tend to under-eat and/or under-report their food intake. Therefore, a person's typical caloric intake based on food recall is often misrepresented, under-estimated, or both.

Specifics regarding an athlete's caloric needs are individual. They vary with seasonal changes in training volume and should be discussed with a qualified Sports Nutrition professional. What works for one athlete may not work for another. However, the following guidelines are a good place to start and can be used by anyone who has issues with off-season nutrition:

Do-s and Don't-s of Optimal Off-Season Nutrition*

- Do... Focus on healthful eating and lifestyle habits.
- Do... Use performance and energy level variables to monitor success.
- Do... Decrease normal energy intake according to decreases in training.
- Do... Substitute lower-fat foods for whole-fat foods.
- Do... Reduce the intake of energy-dense snacks.
- Do... Eat more whole grains, cereals, beans and legumes.
- Do... Get at least 5 servings of fruits and 5 servings of vegetables each day.
- Do... Eat low-fat dairy products and lean cuts of meat, fish and poultry often.
- Do... Drink a variety of fluids to maintain hydration.
- Do... Keep snacks on hand for times when hunger might set in.
- Do... Find a place for "favorite foods" to fit in moderation.
- Do... Continue to exercise, even if it's not as much as the in-season.

- Don't... Focus on the scale.
- Don't... Eat low-energy diets (i.e. less than REE).
- Don't... Reduce energy intake by more than TEE.
- Don't... Reduce fat intake to less than 15% of total calories.
- Don't... Skimp on protein or calcium.
- Don't... Skip meals.
- Don't... Allow hunger to set in.
- Don't... Deprive yourself of favorite foods.

**These guidelines have been adapted from the American Dietetic Association, Dietitians of Canada and American College of Sports Medicine Position Paper on Nutrition and Athletic Performance and Melinda Manore's paper on Chronic Dieting in Active Women (Women's Health Issues 6:332-341, 1996).*