Comments on Physiology

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Some months ago, I received an inquiry from a reader whose body fat content had been estimated by a testing laboratory. She sent me a copy of the report and wanted advice on how to get rid of the excess fat indicated in the report. I was a bit surprised to receive such an inquiry from an ultrarunner, but the subject does come up quite frequently in my discussions with athletes in other sports. In fact, with the recent emphasis on sportsmedicine in the training of our country's athletes for the 1984 Olympics, the idea of measuring percent body fat has become one of the "in" things among athletes in general. So it is probably worthwhile for me to devote some comments to the subject here.

First, I'd like to emphasize that, among the various kinds of data that are possible to obtain describing the physical and physiological characteristics of an athlete, I can think of few more worthless than percent body fat. The reasoning behind this point of view is very simple. If the amount of body fat an athlete carries around is important to the quality of performance, then the diet and conditioning program that are best suited to prepare the athlete to perform will also assure a level of body fat that is most appropriate for the circumstances. So, why worry about how much body fat you have? If you're training properly, it will take care of itself. If you're not, any excess body fat you may be carrying around will be of minimal importance compared to the effect improper training will have on other factors that are more critically related to performance.

To help you understand now nutrition is involved in effective training, let's review some of the things you know, or should know, about how the human body uses energy to support its various metabolic activities. In one of my earlier columns, I discussed fuels in some detail and pointed out that, of the body's two significant fuel substances, carbohydrate is the preferred fuel and the body's most efficient energy source; fat, on the other hand, is an alternative fuel whose main attributes are a high calorie density and a high storage capability. Carbohydrate stores are limited in the body and a shortage of carbohydrate fuel can limit physical work capacity in a number of different ways. The body's stores of fat, even in well-conditioned athletes, are almost limitless. Another significant difference between these two fuels is the fact that only carbohydrate can be used as the fuel for what we call "anaerobic" metabolism, the body's high-energy system. This means that, whenever energy demand is high enough to generate an oxygen debt, carbohydrate becomes the only fuel for the metabolism involved.

But, of a much more practical significance to endurance athletes is the fact that the body at exercise will always use carbohydrate preferentially when it is available, even if the exercise is predominantly aerobic and fat supplies are plentiful. And, conversely, the body at rest has a greater tendency to use fat for its metabolism. For example, in one study, well-conditioned athletes were evaluated for their fuel use at rest and during low-intensity exercise. A representative subject showed the following patterns of carbohydrate and fat utilization on each of three different diets:

1) On a diet containing 3% of the calories as carbohydrate and 95% as fat, the athlete at rest used 99% fat and only 1% carbohydrate for metabolism. At exercise, 87% of the energy used came from fat and 3% from carbohydrate.

2) On a diet contributing roughly equal calories from carbohydrate and fat (40-45% each), the athlete at rest produced 61% of his energy from fat and 39% from carbohydrate. At exercise, 43% came from fat and 57% came from carbohydrate.

3) On a 90% carbohydrate - 3% fat diet, energy at rest came 42% from fat and 58% from carbohydrate. At exercise, energy metabolism was fueled 75% by carbohydrate and 25% by fat.

For those athletes who are worried about the accumulation or disposal of body fat, these data have a particular significance. What they tell us is that the accumulation of body fat is far less related to exercise than it is to diet, and that the most efficient disposal of excess body fat occurs not when you exercise but when you sit on your backside and do nothing. Even when you are on a diet that I would consider essential for maximum day-to-day endurance (more than 60% of the calories as carbohydrate and no more than 25% as fat), resting metabolism can be expected to use a significant proportion of fat. However, if your diet replaces the fat as rapidly as it is used up, no amount of exercise will help to decrease your percent body fat.

In the case of the runner who asked my advice on the subject, I suggested that she stop wasting her money on tests that provide worthless information. In her case, a 2500-2600 calorie per day, 65% carbohydrate diet, coupled with her 50 mile per week workout schedule, would essentially guarantee that she would not long maintain an accumulation of excess body fat. If her diet contains 55 grams of fat (20% of the calories), and if the carbohydrates used are predominantly of the complex type so that conversion to body fat is minimized, she could expect to lose about one pound of body fat per week without diminishing the endurance she needs to maintain her workout schedule. When she gets her weight down where she wants it (ideally in the low to middle part of the normal range), she can raise her calorie intake to a level that will maintain her weight. Then, if she continues both the diet and the workout schedule, her body will continue to adjust its proportion of fat until it has reached a steady state level that will be best suited for her under those conditions,