



S E A T T L E
PERFORMANCE
M E D I C I N E

The Basic Principles of Exercise Physiology

By Emily Cooper M.D.

The physiology of exercise can be complex. Even so, we all can understand and benefit from some basic principles.

One such principal is that when you truly are fit, during exercise your body unconsciously shifts between and blends the aerobic and anaerobic systems. Although none of us has the design specs of the human body, science clearly indicates that the aerobic system exists to support for light-to-moderate activity, while the anaerobic system kicks in during intense activity. It's common to correlate the aerobic system with activities such as jogging, and the anaerobic system with lifting weights or intense forms of yoga.

Similarly, the anaerobic system is affiliated with high heart-rate activity, while the aerobic system commonly is affiliated with lower heart-rate activity.

When your body—and diet—is in balance, the systems seamlessly and fluidly contribute to meet your exercise needs.

There are a number of reasons why we should care that our bodies have active aerobic and anaerobic systems, yet one thing seems to really catch our attention: when "you're aerobic," you can burn significant amounts of fats. Conversely, when "you're anaerobic," your primary fuel is carbohydrates.

Another valuable bit of knowledge about systems and fuels is that we strengthen these systems through use. Simply, you build anaerobic strength and capacity through intense workouts. And -- assuming that your diet is balanced, and you haven't already pumped up your anaerobic system -- you build aerobic capacity through lower to moderate-intensity activities.

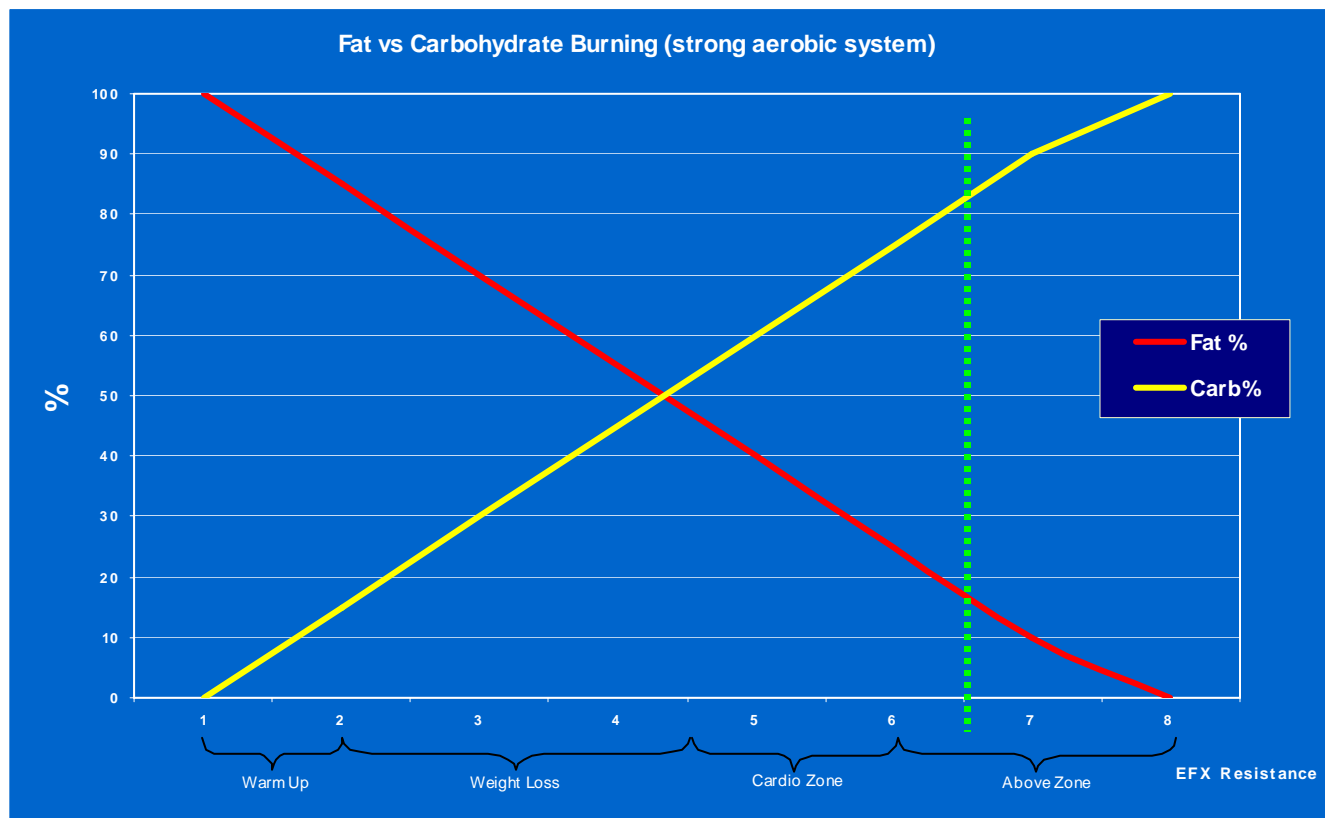
It adds up to a counterintuitive but important takeaway for those of us concerned with shape and weight management: The more intense your weight-loss workout, the stronger your anaerobic system -- and the greater likelihood your anaerobic system may smother your aerobic system and strangle your ability to burn fat. Lower to moderate intensity workouts train your aerobic system to burn fat more efficiently.

The graphs below demonstrate the point. Each graph represents a subject's performance during an anaerobic threshold test -- a basic test of a person's fitness, as measured by their aerobic system's ability to handle an increasingly intense workload.

The test begins at the left, and concludes about 25 minutes later, at the right. The yellow lines represent carbohydrate burning and the red lines represent fat burning. The higher the red line is, the more fat is being burned and the more trained the aerobic system is. In the top chart, the individual's healthy aerobic system allows her to burn fat right up to the threshold (vertical dotted line).

However, in the lower chart, the subject's fat burning never kicks in -- in fact, her powerful anaerobic system overwhelms her aerobic system from the very first step! What makes this especially interesting is that this subject works out six days a week with strength, a very intense form of yoga and "aerobic" EFX workouts so intense that there's little "aerobic" to it.

How hard are you working out, and how does that align with your objectives? For more information, go to "Optimizing Fitness Using Heart Rate Training Zones" on the Precor website, http://www.precor.com/pdf/articles/heart_rate.pdf



Fat vs Carbohydrate Burning (weak aerobic system)

