The Physiology of Endurance

Energize or exhaust? The answer to this question could very well depend on the type of workouts you regularly do. Ideally, a properly periodized exercise plan should consistently energize your day, and rarely leave you exhausted. Your primary mission is to safely and effectively reach your individual goals in the most efficient manner. To help you reach your goal you must first understand you are a unique athlete. Every athlete has distinct training zones, goals, available training time and recovery time. The key is putting it all together in a way that makes sense for YOU! Action follows thought (goal), body follows mind (plan to achieve goal).

To understand what your goals might be, look at the industry trends. According to the Sporting Goods Manufacturing Association (SGMA) men and women exercise for similar reasons. The number one reason for exercising for females is weight control, for males muscle toning. Interestingly, males and females had the same top five reasons for exercising, they are: weight control, increasing energy, toning muscles, feeling good afterward and cardiovascular conditioning. The order of the top five for men and women are different. The next six reasons for exercising are stress reduction, flexibility, having time for oneself, enjoyment of exercise, building strength and improving self-esteem. Increasing strength made the top-ten list among males, but not among females, who chose improving self-esteem over increasing strength.

Endurance training is the foundation to achieving the top ten reasons for fitness for both men and women – as well as launching a race season! Most periodization plans define training zones in aerobic or anaerobic terms. The lower zones tend to be aerobic and the upper zones anaerobic. The endurance zones tend to be referred to as Zone 1 and Zone 2 in most programs. The first step is to identify your unique training zones. This can be done by calculations (remember there are hundreds of ways to do this and are beyond the scope of this article to identify which one is best for you as most depend on sex, age, fitness level in one degree or another), by field testing, power testing, or metabolic testing (listed in order of accuracy from low to high). Once you identify your zones of training you now can begin to shift your training from just working out to training!

Endurance training challenges the mind and the body. Only a conditioned body and a focused mind can create consistent power output, heart rate, strong form for an extended period of time. The use of a power meter, or at minimum a heart rate monitor, is essential in endurance training because of the importance of maintaining a consistent heart rate and perceived exertion (RPE). Often a rider's perceived exertion will rise over the course of an endurance training session because of their emotional state (focus), form deterioration, and/or the accumulation of metabolic waste products. Their heart rate generally will reflect this change in RPE. However, riders training with a power meter will focus on their power output as the primary metric of concern and be able to hold this at a prescribed wattage. The key is to develop an even application of energy over an extended period of time.

Physiologically, the development of endurance improves performance because it helps in the development of the efficient use of oxygen (aerobic training), delivering it to the working muscles through the development of the capillary network and the entire cardiovascular system. It is chiefly through endurance training that a participant develops their ability to use fat as a primary fuel. The utilization of fat as a preferred fuel for muscular contraction occurs below lactate threshold, or between heart rate parameters of approximately 50-80% of maximal heart rate. Keep in mind these percentages are just estimates and may vary widely with each individual. Remember, once lactate accumulates, fat utilization is impaired. Thus, endurance training teaches the body to use fat as a preferred fuel – sparing stored sugar and glycogen and minimizing post-exercise sugar cravings and probable over consumption of calories!

Endurance training also strengthens the immune system, reduces injuries, increases energy, increases efficiency, and increases mental focus. All of these relate directly to the reasons why people exercise! Training anaerobically, is important, and may only efficiently be undertaken once a strong aerobic base has been established. It typically takes a person 8-12 weeks, training aerobically 4-6 times per week for approximately 45-90 minutes each session (some longer sessions are recommended), to develop a strong aerobic base. Endurance training (a.k.a. Aerobic Base Building) takes patience, there are no shortcuts. This training should incorporate Zone 1 and Zone 2 rides as the main ingredients. The key is to train below threshold. Then, through proper training, training consistently at and below that number, monitor improvement over time!

Invigorate or ignore…the answer of what to do with these facts is up to you. High heart rate Olympics and chasing the watts is like trying to get more out of more. Endurance training allows your body to get more out of less! Visualize a pine tree shaped like a triangle. Zone 1 and Zone 2 rides are the foundation, roots and trunk of the tree. Zone 3 and Zone 4 (often called Tempo and Threshold) rides are the upper part and branches, and Z5 (Race) is the epitome of the tree. Too many people have their trees planted upside down, they train with the mantra of higher, harder, and faster. So will it be the same old, same old this season…or will you try a new path towards success?!

Building a Base One Capillary and Mitochondria at a Time,

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