Myths of a Fighter's Cardio Training

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One of the biggest misconceptions of fighters is that they must be aerobically fit. In part this may be true, but it is how one becomes aerobically fit that is of paramount importance. If you were to take a poll on how many fighters do long-slow-distance (LSD) cardio work, I'm willing to bet the house that most would admit to doing some form of LSD running or cycling. The idea is obvious—to develop the cardiovascular system so that it does not fail in combat. Although everyone is on board with the benefits of a well-developed cardiovascular system for health, fitness, and wellness, we have to examine just what kind of cardiovascular adaptations are specific to combat.

Traditionally, combat athletes have engaged in long hours of "road work," running several (i.e., 3-7) miles to help cut weight and develop combative stamina. Although this approach to caloric burn is effective and may be needed in the case of fighters carrying excessive body fat, it does little to develop the type of conditioning needed in combat. To better understand this concept, a brief overview of how the body provides energy is in order, which we will attempt to do without turning it into an exercise physiology class.

The body provides energy via a molecule named adenosine triphosphate (ATP). You can think of ATP as "energy currency": If you want energy, you have to pay for it in ATP. The body has three basic energy systems, or pathways, that replenish ATP. These pathways do not replenish ATP on an "on-off" basis. Instead, ATP is always being replenished as a continuum: All three energy systems replenish ATP at the same time, each contributing its appropriate share depending on the rate at which energy is needed **(9)**. The **phosphagen system** provides most of the immediate energy for short durations (roughly 0-15 seconds) **(2)**. This system uses the ATP that is located in the muscle cells, which is the main reason why it can provide high amounts of energy very fast. The drawback of this system is that is has a very short supply of ATP for immediate use; therefore, the high energy won't last long **(3).**

If the energy demand continues to be high past the 15-second range, the body is forced to slow down to allow the slower **glycolytic system** to provide much of the energy for up to about the three-minute range. The glycolytic system involves a process called glycolysis, which is the breakdown of carbohydrates. The reason the glycolytic system is a bit slower in supplying energy is because it takes time for muscle glycogen or blood glucose to be broken down and produce ATP **(1).**

For energy demands beyond the three-minute mark, the body is forced to slow down so the slower **aerobic (oxidative) system** can provide most of the energy. The aerobic energy system uses about 30% carbohydrates and 70% fats to produce ATP. This is the energy system we use during rest and very low energy activities. The good thing about the aerobic system is that it can provide energy for long periods. The drawback is that the energy demand must stay low for the aerobic system to be able to supply the energy **(9).**

The energy system used is determined by the rate at which energy is needed and the amount that is needed **(9)**. The intensity and duration of exercise also affect hormones, which further affect energy utilization. So, in basic terms, the higher the energy demands, the shorter the time you can have energy. The lower the energy demands, the longer you will have energy. Simple!

The physiological facts just discussed bring us to a simple conclusion: Since fighters go, and go hard, the slow energy production of a standard 3-to-7-mile jog will not train the body to the intermittent, high power demands of combat. When you jog, you are training your aerobic system to produce small amounts of energy at a slow and steady pace—nothing like combat. It is obvious the ATP and glycolytic systems provide the type of energy that combat athletes use in their sports, and using repetitive sprints with short recovery periods is a more specific approach to train your cardiovascular system for the intermittent, high power nature of combat **(4, 9).**

So, the answer seems simple: Train your explosive movement and sprints and you are done. Not so fast. In oversimplifying the energy systems we left a few particulars out. When you are going hard and your body is using the ATP and glycolytic system to provide energy, what makes you eventually slow down? Why can't you keep going like a bat out of hell forever? As we previously mentioned, the body will give you fast energy, but only for a short period. A high rate of energy production causes the body to produce certain by-products the body does not like. One of the main by-products of fast energy production is lactic acid (HLA) **(1, 5).**

Here is the skinny on HLA. Everyone thinks that HLA is some evil thing in your body that makes muscles sore and lingers for days. However, none of this is accurate. When glycolysis really gets going, high amounts of HLA are produced. The HLA production begins to exceed the body's ability to regulate it, and the accumulation of HLA eventually forces us to slow down **(5).** Here is how it happens.

Lactic acid is quickly separates into its two major components, hydrogen (H^+) and lactate (LA) **(1).** Lactate has never done anything to anybody—it does not cause muscle soreness, does not linger in the body for days, and is easily regulated and used for energy by certain muscles **(6).** Now, the H^+, that's another story.

High H^+ concentration creates an acidic environment. The high acidic levels are what make your muscles burn when you engage in any prolonged high energy activity. It is what makes your lungs burn during sprints, your muscles fatigue during long and hard contractions. High acidic levels are what make us slow down and not able to contract muscle, and there is nothing we can do about it—it is a physiological reality **(6).** The only way to deal with the H^+ production of combat is to train for it. Again, slow and steady LSD training will not do this **(9).**

The body regulates H^+ in several ways, and these regulatory mechanisms can be enhanced by specific training. As an athlete trains continuously in an explosive and repetitive manner, the body's ability to buffer H^+, or reduce the H^+ concentration, improves. This buffering occurs at all levels, at the muscle and in the blood. The respiratory system also helps by getting rid of H^+ via the exhalation of water (H_20). The improved buffering mechanism produced by training allows the combat athlete to better regulate H^+ concentration in the blood and at the muscle. There are also psychological factors involved in this metabolic mechanism. The more an athlete trains at high levels in an intermittent fashion, the more he or she can mentally tolerate the effects of high H^+ concentrations. The local muscle burn, shortness of breath, nausea, and other uncomfortable symptoms of high power output are better tolerated with appropriate training **(7, 9).** Again, LSD training is not the optimal method of training to develop the adaptation that allows combative athletes to better regulate and tolerate the negative effects of repetitive high power outputs.

The current method of training the body to deal with the high H^+ concentration resulting from the repeated high energy demands of combat is sprints. There is no doubt that sprints are, by far, the preferred method of running to train for the explosive and intermittent nature of combat. However, this approach misses a very important but obvious detail. When combat athletes, especially grapplers, are in the middle of it, they are producing high energy with the major core muscles and limbs. These specific areas start producing HLA at the local level. That means if you are working for control from your opponent's back or are holding on to your opponent when they have mounted you, you may require high energy levels for 30 to 60 seconds. In this situation, your arms, legs, and core will be "going acidic" very quickly. They will start to burn and eventually the H^+ concentration will chemically prevent you from contracting those muscles **(8).** What happens? You slow down, lose position, or get ground and pounded!

Sprinting allows the combative athlete to develop good H^+ regulation at the systemic level and in the lower body (especially during running). We like to use 300-yard shuttles and various protocols on the NordicTrack Incline Trainer, Airdyne, and Versa Climber (figure 1). These nonimpact modalities are excellent for developing killer cardiovascular conditioning without the joint wear and tear of the long-distance jogs or repeated sprints. Taking joint health into account is especially important for heavier athletes or those with lower-extremity injuries. The systemic and lower-body adaptations developed by sprinting protocols are certainly appropriate and needed by the combat athlete. However, when it comes to developing the local muscle adaptations needed to deal with the high H^+ concentration that results from combative training and competition, running and cycling sprints may not be the most efficient way to train the cardiovascular system.. In order to more specifically train the cardiovascular system as well as the local muscle environment, we have to teach the body how to adapt to high HLA production and high H^+ concentrations at the systemic level and at the local muscle level. We have found that the best way to do this is by creating "fighting circuits." These fighting circuits are the best type of training for developing the ability to deal with the cardiovascular and metabolic challenges of combat competition and training.

The process of developing a fighting circuit is easy to understand, but it is a bit challenging to actually to design. To begin, we study a tape of the particular competitive event and the particular athlete. Every grappling discipline has specific characteristics and every fighter has a specific style. Some matches use more submaximal isometric contractions (Abu Dhabi), while others are forced to be more explosive (Greco-Roman wrestling). Some MMA (mixed martial arts) athletes prefer standup, requiring more core and lower-body explosiveness. Others prefer groundwork and submission, requiring more isometric holds. When studying the "perfect match," we look at time intervals between action and rest ratios. We also look at what type of intensity is required during the work intervals and what type of rest is provided (active or inactive recovery). In addition, we observe the frequency and type of muscle contractions and body movements that are utilized. Armed with this information, we put together a circuit to fit the specific cardiovascular demands of the sport and the athlete's style. The circuit will not look like the match, but it will feel worse, therefore preparing the athlete for the "worst possible scenario." Designing the circuits and properly implementing them into the training scheme is where the real science of training begins. Figure 2 illustrates a general fighting circuit, while figure 3 shows some exercises in the circuit.

In conclusion, it has been tradition to run long distances for aerobic conditioning. However, LSD training will do very little to prepare a fighter for the intermittent nature of combat (e.g., wrestling and MMA). Long-distance work can play a role in the weight management of a fighter throughout the year if making a weight class becomes a major factor, but proper nutrition is an easier route to that. Additionally, cycling and other nonimpact modes of LSD training will reduce wear and tear and save a fighter's joints, especially for heavier athletes. Therefore, our concept of conditioning for a fighter must change. Sprints and specific fighting circuits must rule the conditioning of a fighter from a cardiovascular and power endurance perspective.

JC Santana and Rhadi Ferguson are the directors of Intocombat. Intocombat serves as a consultant on elite training, conditioning, nutrition, and education for some of the world's top combat athletes and fighting teams, such as the American Top Team (ATT). To see many of the exercises and concepts described in this article, visit www.intocombat.com.

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Figure 1.
These pictures show some of the cardio equipment used for sprint protocols at the Institute of Human Performance, headquarters of Intocombat. Abu Dhabi champion (2000), Jeff Munson, bangs out 10-second sets on the NordicTrack Incline trainer at 50% incline (left). Grappler's Quest champion, Marcel Ferreira, crushes one of our ramped protocols on the Airdyne (center). Judo Olympian, Rhadi Ferguson, keeps time for judo player, Anthony Turner, on the Versa Climber. ***The grease gets hot at IHP!***

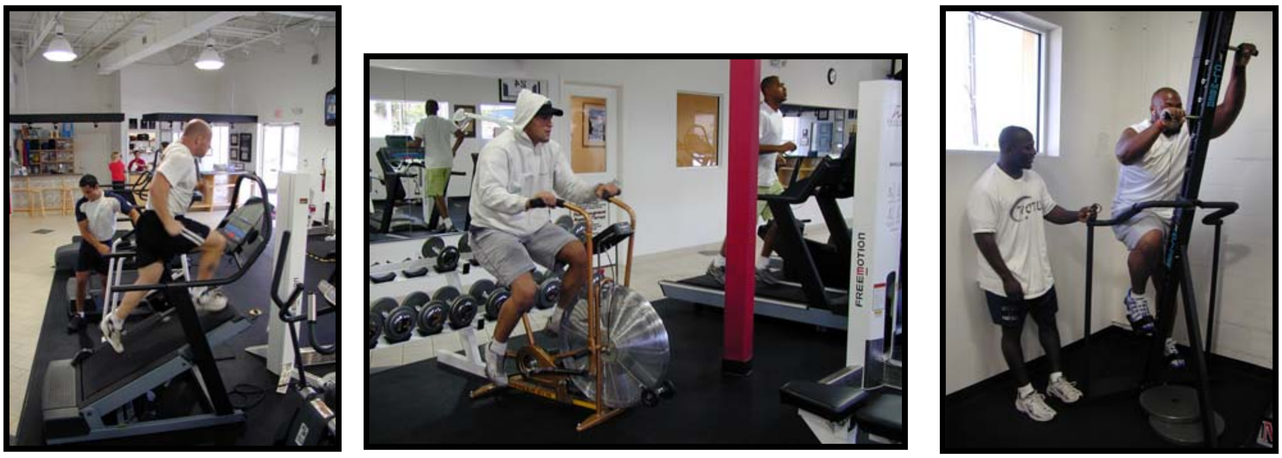

Figure 2.

Following is a sample general fighting circuit that can be used for an MMA fighter. Each station is performed for the number of reps indicated, then a 10- to 15-second transition is used to go to the next station. We keep the weight and reps consistent and try to reduce the time it takes to go through the entire circuit. Go to **www.intocombat.com** for a video of the circuit.

What: Advanced metabolic circuit program. This protocol involves a circuit of movements specific to MMA.
Who: MMA athletes needing brutal conditioning for 5-minute rounds.
Why: Circuit mimics a 5-minute round without the wear and tear of live sparring.
How: Create a 5-minute circuit of MMA-specific movements. Match the number of circuits to the number of rounds in a match (i.e., 3 circuits if you are preparing for 3 rounds). We perform this program 1 to 2 times per week, depending on the emphasis of the cycle and what the demands for sparring are.

NOTES

- ✓ **EQUIPMENT:** 18-ft rope, stability ball, 15- to 20-lb dumbbells.
- ✓ Our fighters finish this circuit under 5 minutes.
- ✓ After each circuit we allow a 5-10 minute recovery at first. Then, we gradually reduce the rest periods between each circuit to match the competition format. For Judokas –we keep it to 5-7 minutes. Our PRIDE and UFC fighters we eventually get work to a one-minute rest between each circuit (i.e. to simulate rounds).
- ✓ It is not unusual for our MMA fighters to repeatedly finish these circuits in about 4:30, especially the lighter weight calluses.

<u>Fighting Circuit 1</u>

Matrix (72-rep protocol w/ 15-20 lb dumbbells)	**Time: ~120 seconds**
10-second transition to the next station	
30-Second Hanging Isometric Hold	**Time: ~30 seconds**
10-second transition to the next station	
20 Squats/Thrusts/Jumps	**Time: ~40 seconds**
10-second transition to the next station	
10 Stability Ball Skiers (to each side)	**Time: ~15 seconds**
10-second transition to the next station	
10 Flying Arm Bars	**Time: ~15 seconds**
10-second transition to the next station	
1 Rope Climb (18')	**Time: ~20 seconds**
10-second transition to the next station	
20 Partner Cleans or Dummy Suplexes	**Time: ~20 seconds**
	Time: 320 sec = 5:20

Figure 3.
These are some of the exercises in the Intocombat Fighting Circuits. JC with ATT (American Top Team) fighter Jeff Munson as he hangs on for dear life during a hanging isometric hold (left). JC keeps time as Pride Fighter, Marcus Aurelio, comes down to the wire with the 100-lb Dummy Suplexes (right).