

Building an Aerobic Engine

The Engine Room by Grant Giles

As Triathlon is an aerobic sport it requires the athlete to have a well-built aerobic engine if they are to reach the goals in the sport that they are looking to attain.

So I thought it would be a good idea to go over the aerobic system in a little detail as many athletes neglect this most important aspect in their training programme. You need only to look at any Ironman results to see how many people run slower or get close to their bike split for the run. This of course has something to do with pacing as many people just over bike to blazes, but a lot of people just ignore one vital factor. As the race gets longer it becomes more important that one needs a very solid endurance base and the ability to tap into fat stores. Now by this I don't mean belting out more kilometres. It's more a case of doing the right amount of training in the right heart rate zones for the amount of time that you have to work with, whether that is 9hrs per week or 29hrs.

When there is a good aerobic base and fat burning capacity, there is a good opportunity to race well over longer courses regardless of whether you've done speed work or not and many people don't believe that but it is a fact.

So let's start by looking into the fuels used and the aerobic system a little and see what science knows as fact.

Source of fuel

Source of fuel depends upon the intensity of exercise. For Triathlon, especially the longer races, there are two primary fuels, carbohydrate & fats. The body has relatively limited supplies of carbohydrate. They are generally distributed in the forms of blood glucose, liver and muscle glycogen.

Fat stores contain an abundance of energy, which can last us for weeks while protein is only a minor fuel source.

Higher intensity exercise depends solely on carbohydrate for energy so the less intense the exercise rate the more fat that is burnt for fuel.

Exercise intensities and fuel demands for exercise are as follows-

- **60-75% of vO_2max = more fat - less carbohydrate.**
- **75-85% of vO_2max = higher % of carbohydrate but fat is still a major fuel source.**
- **85-100% of vO_2max = mainly carbohydrate.**

So for the longer Triathlon - the main fuel source is carbohydrate and fats, as the exercise is mainly aerobic state that depends on fat and carbohydrate for the fuel source. It makes sense then that after 6hrs of biking & swimming you are going to be down to a high portion of fat burning and if your body is not well adapted to fat burning, you are going to be in for a long shuffle to the finish line.

Duration of the aerobic energy system

The main energy system that is used in triathlon is called the **aerobic energy system**, it comes into play approximately 2 minutes into exercise and is dependant on the availability of oxygen. It uses fats and carbohydrates and certain portions of the protein chain called amino acids as its fuel. In a race it becomes by far the main provider of **ATP** which is-(**adenosine tri phosphate**), then energy for muscle contraction will be released when **ATP** is broken down to **ADP (adenosine di phosphate)**. The aerobic energy system although slow in production of energy compared with the anaerobic energy system is tremendously efficient, as it produces 12-18 times as much ATP from one molecule of glucose compared to the anaerobic system.

The end products of the aerobic system are plenty of energy, water and carbon dioxide, which are released into the atmosphere by the lungs and can be maintained for long periods of time, such as endurance events.

It is my opinion that the best way to keep the base and fat burning going is to train in the following zones almost exclusively –

77-83% of anaerobic threshold - for base miles and higher % fat burning rate. This is the training zone most often ignored by people who train in groups or with training partners. The temptation to train at a higher level is overwhelming for a lot of people and quite understandably so given the circumstances. But make no mistake this is the training zone that when it is all said and done gives you the ability to race solidly throughout an Ironman or long course race. It just takes a commitment on the athlete's part to put the training ego in check in order to reap the rewards on race day.

84-88% of anaerobic threshold - for long course race tempo work and strength work – this zone gives the strength and speed necessary to race hard while still burning a decent amount of fat for fuel.

Personally when I go over this zone I can feel the change up into a different energy system –it gets difficult not to go into oxygen debt and so in my opinion I would leave that type of training to the end of my build-up to top up my fitness. There are people who's base is not very well developed and have to go slow to even stay at under 88% of (AT). If you are one of these people then really you would do yourself a huge favour by going back to basics and really working the lower heart rate zones.

Anaerobic threshold work is fine in its place but so many people do a lot of work in this zone without realising they're even in this zone. I wonder how many people go to the track twice a week for speed work, then complete two sessions in the pool doing speed work then one session for speed on the bike and then during their long ride push to Threshold on hills. That's 6 sessions of threshold work in 1 week. I know of athletes who do that for Ironman 3 months out. They tear past me every Saturday morning. Now that is a hell of a lot of damage to an aerobic system trying to get ready for an Ironman and, yes it does damage the aerobic system. Every threshold session is a withdrawal on your aerobic base and if you keep doing it, pretty soon your going to be busted and it's no fun in the middle of a long course, finding the vault is empty and you can't access your fat stores because you haven't been training to do so by topping up your base.

There's enough fat in your body to keep you going for a very long time at a very good pace if you train it right. So look after your aerobic engine and it will look after you, both in racing and in the maintenance of good health.

Many people keep the routine of speed work at threshold going all year and can often be heard saying that they cannot understand why they plateau after a few years and just can't get any better, no matter how hard they train. They "blow" at the same point in every race. They feel "really good" at 2 months out and then end up flat for the rest or worse taking an injury or illness into the race. The simple fact is that there has been no foundation left for these people to work from.

The periodisation idea is an old one but a very sound one in practise and when there is solid foundation there are results. Every year that the aerobic foundation is increased so to will the improvement in performance at the goal event.

So the upshot is a good aerobic base takes time and patience to develop. Training may become boring at times and can give your ego a kicking when training in group situations, but if real improvements are what you are after and more than a couple of years enjoyment in the sport, investing some time in developing your aerobic engine is essential.