

## Coach Ron was more Anaerobic than Aerobic/What does that Mean?

Aerobic training and anaerobic training are words that are often used by coaches. This column will discuss the meaning of these terms as they relate to our swimmers in the CCSC. Briefly, the body uses different processes to find energy. This process is known as "energy metabolism". Our purpose here is not to explore the biology of these processes. But, it can be helpful for swimmers to understand some of the process and it is a great way for young athletes to get interested in High School biology. Both the anaerobic and aerobic processes tap glycogen to transport energy to the muscles. Our training in the pool is designed to teach the body to do this more efficiently so that one can swim faster!

The first steps in the process of getting that energy to the muscles are done without oxygen. This is the anaerobic phase. The final steps are done with oxygen which is then the aerobic phase. When you use a wood stove to heat your home, the waste byproduct is ash. When you burn gasoline in your car, the waste by-product is carbon monoxide. We need to get rid of these wastes and in the case of the ash, we can just dump it somewhere outside. In the case of our car's carbon monoxide, we just dump that into the atmosphere. When an athlete burns glycogen-akin to the wood in a wood stove or gas in your car- there is also a byproduct called lactic acid. The swimmer may not know the biology or know the term lactic acid but every swimmer knows what it feels like. When you are swimming a 200 and you sprint out a little too fast, your muscles feel very heavy and tired on the second 100 of the race. That's the result of too much lactic acid. Training in swimming helps you to deal with that lactic acid production in a more efficient way. Just like we need to clean out the ash from our wood stove for it to operate efficiently, a swimmer needs to clean out the lactic acid from his body.

Anyone who has run a few miles on a consistent basis may have an understanding of the feelings and systems mentioned above even without knowing the terms. When one begins a five mile jog often times one feels really tired at the beginning. Legs feel lethargic and the miles seem impossible after just half a mile. Then, at some point one begins to feel better and the running becomes easy. What happened? Well...there is a biological explanation. If the runner is not well trained or not warmed up well, the aerobic system didn't "kick-in" right away. Maybe the runner started a little fast and the anaerobic system began producing some acid. Then, until the aerobic system got into some more efficient level, the body just felt heavy. The muscles were not getting the energy they needed. Once the aerobic system began getting oxygen and energy to the muscles, everything felt better. At the same time, the runner might have jogged slowly enough and long enough to wash out some of the lactic acid.

In swimming, each athlete needs to train the aerobic and anaerobic systems as every swimming race requires both systems. In the 1950s or 60s it may have been that the 1650 was an almost totally aerobic race. The paces were slower than today's paces. But, today, the pace is so fast that there is more chemistry going on at all levels. It was rare, for example, that a swimmer kicked an entire 1650, fifty years ago. Today, that is commonplace. If a swimmer maintains a six beat freestyle throughout a 1650, there is probably going to be anaerobic as well as aerobic chemistry going on. But, the 1650 tends to be for the aerobic athlete while the 50 and 100 suit the anaerobic athlete. There are very few swimmers who can be equally good at the 100 and the 1650 or the 100 and the 400 I-M. Generally a swimmer who is good at the 1650 often swims well at the 400 I-M, and 500 free as well as possibly the 200 fly or some of the 200s. The "natural" 50, 100 man can often move up to the 200 and 500. Each athlete tends to be suited best for different distances. Of course, we are not considering here the entire mental/emotional component. There are certain mental/emotional traits required to swim a good 1650 which are different than those talents needed for a 50 sprint. Often times an athlete is better suited for a 500 free but doesn't have the personality to do well in that event. She has better success in the 100....but she may have had

more potential in the 500. However that potential in the 500 was just a physical potential without consideration of the mental side. But, the discussion of the emotional/mental factors we will save for another day.

There are difficult challenges whether one is suited to the mile or the 50. In today's swimming, most athletes need to first develop an aerobic base and this is going to be mostly from ages 11-16. Without this aerobic base, swimmers cannot reach their potential. For the sprint type athlete, workouts during this age can become quite challenging. Their bodies don't repeat work as well in 5000-8000 yards workouts. They often get beaten by young swimmers that are not as good but have the aerobic ability to do long workouts. And, boys often get beaten by girls. This then is the challenge for the anaerobic/sprint athlete and the coach- to build the aerobic base without losing speed or enjoyment of the sport. Yet, it is my experience, and that of most National level Coaches in the last fifty years, that the best path even for the sprinters is to build the aerobic base during the window of biological opportunity- from ages 11-16. Once the aerobic base is built, that swimmer can then easily "come down" to shorter events. And, he/she is a better, healthier swimmer because of building that aerobic base. The great Mark Spitz was a good example and set many age group records through age 16 as a 1650 or 1500 swimmer. In Munich, at the 1972 Olympics, he won the 100 free and 100 fly. Natalie Coughlin is a current example of a great 100 meter swimmer who spent the early part of her career swimming tremendous over distance and raced lots of big events.

Here are some "looks" at certain swimmers that you all know. Head Coach Ron ZuWallack was a good example of an athlete who had great speed, jumping ability and quickness. He had dominance of the fast twitch muscles or sprint type muscles. His quickness and jump off the blocks was tremendous. His first Jr. National qualifying swim was in the 50 free. But, at one of his best meets and in a field of many New England Olympic Trials qualifiers and National qualifiers, Ron won the 100, 200, and 400 free at New England Seniors and the only swimmer we ever had in the CCSC to do that incredible trifecta. ( I can't remember anyone else doing it either ) Because Coach Ron had a good work ethic too, he developed an ability to swim longer and longer events as he grew older. Finally, the 200 and 400 meters became two of his best events. Those events took advantage of all of his abilities. They are short enough to require some natural speed. The 200 meters requires a little more endurance and training than the 200 yard free and Ron's stroke was also well suited for meter swimming. But, the 200 and 400 also require good aerobic training so Ron's good work ethic could be put to better use. Ron's speed and anaerobic abilities had a flip side. When his body hit the wall, he would just collapse in the water. So, long workouts were difficult for Ron and often lesser swimmers who were aerobic machines would swim circles around him in workout when he was younger. But because of his good work ethic, character and perseverance, he came through that to develop into a great swimmer.

When discussing these topics we usually bring up Dillon Delaney. Dillon graduated from Brown two years ago and swam four great years at the Ivy League Division I level. She was also New England Champion in the 800 meters and a Jr. National Qualifier. Dillon was a classic aerobic machine/distance swimmer. If you asked her to jump, she could get about one inch off the ground. She was a good runner and worked out every day but could barely do a pull up. If Ron jumped liked Michael Jordan, then Dillon jumped liked Larry Bird. I would guess that Jordan had a dominance of fast twitch muscle fibers typical of an anaerobic athlete while Bird had a dominance of slow twitch muscles typical of an aerobic based athlete. Dillon was an example of an extreme case-no fast twitch muscle at all. Typical of this type of swimmer, she had no 100 speed. She struggled to break 1:00 for the 100 free, but would generally go out in 1:00 for her 500 or 1650. She never went faster than 5:00 for the 500 free but we often saw her go

out at 5:04 or 5:05 for her 1650. She was a great workout swimmer and got lots of reward from her workout performance. But, she struggled to stay with the other swimmers at the Jr. National level because she didn't have the speed to get out with National level swimmers and we had to deal with that in racing. Dillon had a great swimming career but needed to have the opportunity to train properly. If Dillon had been in a less professional program with a less committed or experienced Coach, possibly no one would have ever seen anything but average swimming. Her 100, and 200 were just "average". Like Ron, Dillon had her greatest success in meters because one of her best abilities was her ability to train. Long Course swimming tends to favor those athletes who are in better shape and that is where Dillon could perform. Long Course tends to separate the women from the girls in terms of who has really put in their training time.

It's important for Coach and swimmer to maximize the swimmer's performance by building on the swimmer's strength and picking the right events to maximize those strengths. To try to get a great sprinter to perform in a 400 Individual medley is like trying to get a Ferrari to pull 50 tons of cement. One needs a tractor. And, it is helpful for swimmers to understand their bodies and their abilities. In that way a great sprinter knows that while there are ten twelve year old girls in the club that can beat him on 6 x 400 free on 4:45, he can still beat everyone in New England for one fifty free. And, he can do that important training with his eyes on the goal at the end of the process without feeling defeated by long workouts. Likewise, our great aerobic athlete can take a feeling of pride in doing long tough sets. The 1650 swimmer may be "toughing out" 4 x 1000 while the sprinters are doing 8 x 50 with 2 minutes rest between each. But, she knows the goal is that aerobic base and performance over a long race.