Anaerobic threshold units

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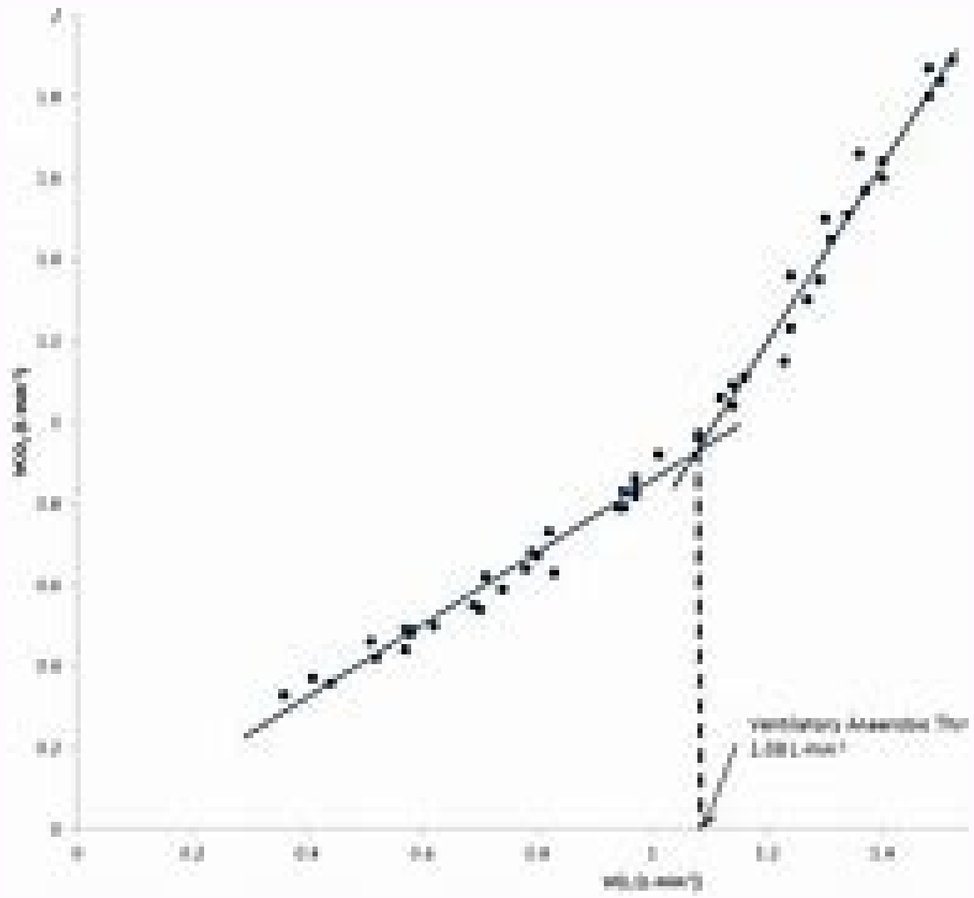

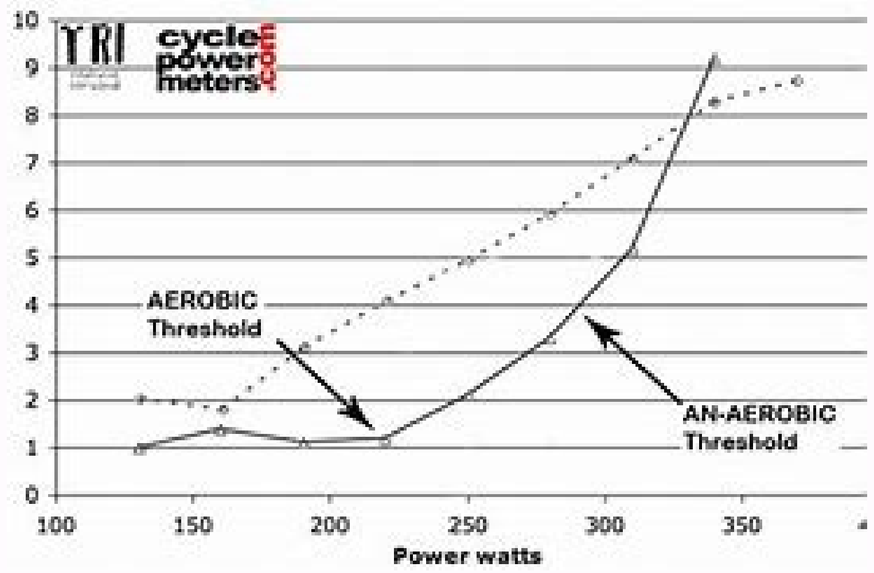

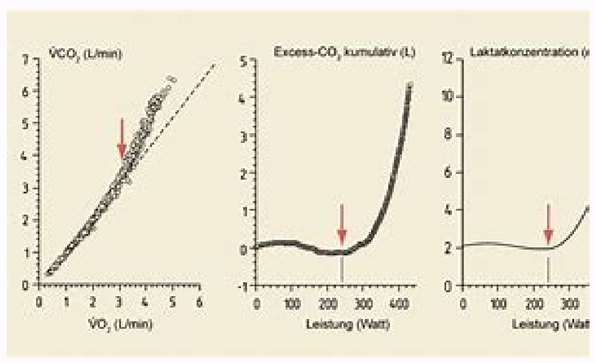

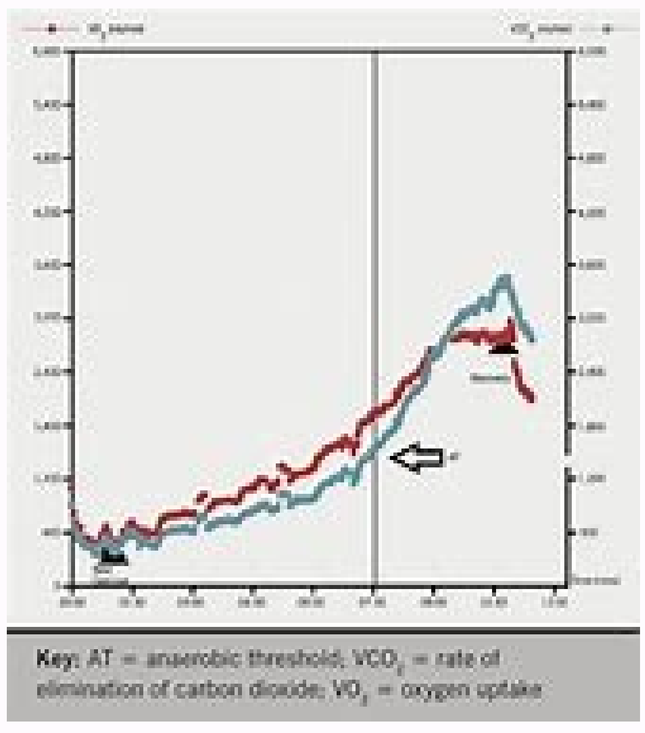

How to measure anaerobic threshold. What does anaerobic threshold mean. What is a good anaerobic threshold.

The lactation threshold is a term used for many years in all sports, and is one of the most used in the world of training by athletes and coaches around the world. However, do we really know what the threshold of lactation is? Do we at least know what lactate is, or its role in performance and metabolism? The fact is that there is still a lot of confusion as regards lactate and what constitutes the threshold of lactation. Lactation is a great unknown in human metabolism, despite its key role in its regulation. For many years it was thought that lactate was only a waste product due to anaerobic exercise. At some point it was even thought to crystallize after exercise, causing muscle pain (which we now know is not true). But the mystery surrounding milk is not due to lack of scientific effort. Studies on lactate date back to the 19th century, when the Nobel Prize Louis Pasteur proposed that lactate was produced by lack of oxygen during muscle contraction. Another Nobel Prize winner, Otto Meyerhof proposed that glycogen be a precursor to lactation. He also noted that muscle contraction produced lactation and loss of excitement. In the 1923's another Nobel Prize, AV Hill and his colleague Lupton described the term'O2A debt'and linked it to anaerobic milk production. However, it was only at the end of the 20th century that we really began to understand the role of lactate in physical exercise and metabolism. The doctor... George Brooks, an expert in the metabolism of the University of California in Berkeley, has studied lactate for over forty years. We owe most of what we know about milk to his work. Now we know that lactate formation can occur under aerobic conditions and that lactate production is the result of the use of glucose by muscle cells Aerobic conditions. From the work of Brooks, we also know that the lactate is not a waste product. In fact, it is the most important glucoseogenic precursor (new glucose generator) in the body. About 30% of The glucose we use during exercise is derived from the “recycling” of lactate to glucose. Lactate is also a key regulator of intermediate metabolism, regulating substrate utilization. It decreases and inhibits the breakdown of fats for energy purposes (lipolysis), as well as the rate of glucose utilization by cells (glucolysis). Believe it or not, lactate is even essential for the brain, being the main fuel neurons use. Lactate is actually essential for long-term memory and may also be involved in understanding Alzheimer’s disease. (Some studies show that when the absorption of lactate by neurons is suppressed, long-term memory is inhibited.) Lactate may also be involved in some chronic metabolic diseases such as type 2 diabetes. Blood lactate levels in this population are 2-3 times higher than in the healthy, physically active population. Cancer cells have a disturbed metabolism that uses too much glucose aerobically (Warburg effect) and produces large amounts of lactate which could contribute to tumor growth and progression. Clearly, lactate is not just a waste product of anaerobic exercise. It is an important fuel and a key regulator of metabolism. It’s also a possible epicenter of several chronic diseases. Lactate is the by-product of the use of glucose by muscle cells. The higher the glucose flow in the cell, the higher the lactate production, regardless of the availability of oxygen. During high-intensity exercise, Type II-Fast Twitch muscle fibers are fully recruited, due to the high contraction requirements of the skeletal muscle to produce energy (ATP). Type II muscle fibers are highly glycolytic (using a lot of glucose) which can be In the production of high quantities of lactate. This production is a natural by-product of the use of glucose by skeletal muscle cells. During intense physical exercise, lactate production is many times higher than that of rest levels. The release of hydrogen ions (H +) associated with the lactate can cause a significant reduction in contractile muscle pH, contractile, in acidosis. This excessive accumulation of H+, not only from lactate, but also from ATP breakdown for muscle contraction (ATP hydrolysis), can interfere with muscle contraction at different sites. For example, it can compete with football (CA ++) for the binding site troponin c (a protein involved in muscle contraction regulation). H+ can also inhibit calcium release and re-uptake from the sarcoplasmic lattice. Both processes are involved in muscle contraction. All of this can result in a decrease in the capacity of muscle contraction which can cause a significant decrease in the peak force, a decrease in the maximum speed of muscle shortening and performance. We know very well that the better the competitive level and training of an athlete is, the less accumulation of blood lactate that is observed. In Table-1 we can observe the blood lactation levels of different cycling categories at different exercise intensities (watt/kg) that I collected over the years during physiological tests. We can clearly see that the higher the competitive level of a cyclist, the lower the lactate blood and the higher the power and performance. Workload Junior Cyclist Top Amateurs Avg. Pro-Tour World Class Class w / kg Blood La (Mmol / L) Blood La (Mmol / L) Blood LA (MMOL / L) Blood LA (MMOL / L) 3 1.3 1.1 0.8 3.5 1.8 1.3 1.2 0.8 4 3 2.3 2 0.96 4.5 6.6 3.5 3.2 1.8 5 10 7.6 5.8 3.1 5.5 9.2 8.2 5.2 6. 8.9 Table 1. Differences in blood lactation levels (MMOL/L) between competitive cyclists of different levels. Table modified by San MillÃÂ¡n et al, 2009 This lower blood lactation levels observed in top athletes is due to a

higher liquidation capacity of lactate. Lactate can be exported into the bloodstream for purposes of liquidation and energy in almost all organs of the body. However, this process time (minutes) while the milk is produced continuously during the exercise. The well-trained athletes are very efficient and export less milk to the blood while clarifying it in higher amounts to the right in the muscle producing lactation takes seconds or milliseconds. This is very advantageous as it allows contractile muscles to remove more quickly H+ and a faster lactate for extra energy (ATP). During the exercise, lactate is produced mainly in muscle fibers with strong contraction, which use a lot of glucose for energy. It is mainly eliminated by muscle fibers with slow contraction. It is a complex process involving different transporters and specific enzymes of lactate. High-content fibre of a conveyor called MCT-4 (Monocarboxylate-4) transporting lactate away from these fibres. Fibers with slow ticks have a transporter called MCT-1 that takes lactate inside these fibers. This lactate is then converted into pyruvate in the mitochondrium by an enzyme called mLDH (mitochondrial lactate dehydrogenase), and then synthesized ATP (energy). The formation of endourance (Zone 2) aims to improve the lactate clearance capacity by increasing the number of mitochondria to eliminate lactate mainly in muscle fibres with slow contraction and increasing the number of MCT-1 and mLDH. Both the high intensity and the formation of resistance increase the number of MCT-4 to increase the transport of lactate away from fibers to strong contraction. As shown in Table-1 lactate is probably the parameter that discriminates the most between the different levels of athletic performance. Milk analysis can give us a lot of information about muscle metabolism during exercise, where we can indirectly assess mitochondrial density, oxidative state and substrate or muscle fibre recruitment patterns. The milk test is probably the best way to evaluate muscle metabolic stress and performance, especially in endurance athletes. It is probably also the best method that we need to anticipate performance in resistance events and a excellent for prescribing individual training areas for athletes. Among these training areas is that special training area that we all want to train and improve. The only way to directly measure the lactate threshold is to perform lactate test. Milk threshold is probably the most used training term by coaches and athletes around the world. However, there is widespread controversy over the real meaning of the lactate threshold and the intensity of exercise that causes it. The lactate threshold is commonly known as the exercise intensity or the concentration of lactate in the blood at which we can only sustain a high-intensity effort for a specific period of time. However, the controversy is this: what is the period of time? What's that lactate concentration in your blood? How long can we sustain that given exercise intensity before we collapse? Many writers and coaches have been trying to answer these questions for a long time. The first description of a blood lactate threshold dates back to the 1930s and was named by W Harding Owles, the Ã¢~Ø¢~ÔÂÂ. In 1964, Waserman and Mcilroy proposed the term âÂÂÂÂ based on the belief that the accumulation of lactate was due to the lack of availability of muscle oxygen and therefore the metabolism of the anaerobic muscle was necessary for the continuation of muscle contraction. Mader and co-workers determined in 1976 that it was achieved at the blood lactate concentration of 4 mmol/L (millimol per liter) which was in 1981 named by SjÈ" 182din and Jacobs Ã¢ÔÔÂ¶;; Blood Onset Lactate Accumulon6;Ô;;;;;;; (OBLA) at blood concentration of lactate lactate lactate lactate lactate blood, as well as lactate. Farrel and co-workers proposed in 1979 the term Onset Lactated Plasma Accumulation (OPLA) which was the intensity of exercise that resulted in a blood lactate concentration of 1 mmol/L above baseline. Another term proposed in 1981 by LaFontaine and colleagues was the âÂÂÂÂÂÂ which theoretically occurs at a blood lactate concentration of 2.2 mmol/L. In 1983 Coyle co-workers proposed the term â˜~~~ã oÔÀ;Â which was a nonlinear increase in lactate blood of at least 1/l. Another term. The stationary workload (MSSW) was proposed by Borch and colleagues in the 1993 and was set at the fixed value [La-] of 3 mmol/L. Veronique Billat in 2003 proposed the term Maximum Lactate Steady State (MLSS) as the intensity of exercise to the blood lactate can be sustainable. It's a little confusing, isn't it? There are many theories and hypotheses within the scientific community and there is no common consensus on what the "threshold of lactation" is. Mitochondria in the contracted muscles become more stressed to eliminate lactate in a timely manner and at a certain point, if the intensity of continuous exercise, the mitochondria of the contracted muscles become saturated and therefore cannot keep up with the lactate clearance, exporting it into the blood and this is when we see an increase in lactate levels in the blood that correspond to the metabolic event when it is not possible to maintain that given exercise intensity. In my opinion, it is important to consider the concept of the threshold for milk from another angle. Firstly, unfortunately, many athletes and coaches do not carry out lactation tests so that they can never know their lactate metabolism, even if they continue to talk about training at the threshold of lactation. "Many athletes and coaches do not perform lactate tests so they can never know their lactate metabolism, We tend to describe the lactation threshold efforts in terms of those high exercise intensities that we can sustain for relatively short periods of time without'swelling'and here there is a lot of confusion. Where do we define that intensity of exercise and time period to what we can support a great effort?. Are 5, 10, 30 or minutes? Is it three, four or six inches of lactate in the blood? Climb a 5 km climb Cat-1 for 25 minutes without getting requires a specific threshold/ maximum steady state lactate that could represent a lactate concentration in the blood of 4-6mmol/ L and an individual specific power (or fractional threshold power/ FTP). This intensity however is different to climb a 10 km Cat-2 climb without being decreased, which may take 40 minutes and therefore a different stationary state threshold / maximum that could represent a lactate concentration in the blood of 3-5 mmol / L and a different FTP that is at the same time different from that maximum level or stationary state of a TT 40 km. Execution of a step-by-step marathon requires a very important effort to maintain a state of maximum balance that is actually a threshold of lactation really for the entire marathon, which produces a lactate concentration in the blood of about 2-2,5 mmol / L. This threshold is different and results in a lactate concentration in the upper blood for marathon, 10K or 5K run. It seems that every endurance sport has different thresholdsas milked that are fundamental in order to perform successfully. This all seems too confusing and for this reason I think it is time to develop the concept of the threshold for milk in a more pragmatic way. We may need to consider different terminology such as a maximum metabolic stress concept that can be sustained for a certain period of time (maximum metabolic state constant/ MMSS). Depending on the sport and the event, there would be different MMSS that would represent the maximum metabolic stress that we can support for a specific distance and discipline such as a marathon, 1500m, a 10k race, a 40 km TT or a 5 km Cat-1 climb. Then we can translate this MMSS to a lactate concentration in the blood to get our lactate threshold or to other different parameters such as heart rate, power (FTP) or running pace. This is not just a useful way predict performance, but also to monitor progress. In a way this has already been done by many coaches and athletes who use FTP or target rhythm all the time. A typical Error that many athletes and coaches do is training at Ã ¢ â € œ ~ ‡ ‡ to improve the ability of lactate clearance. This is not correct because we know that during the lactate exercise it is produced mainly by glutical fibers (fast spasms) which are those recruited at Ã ¢ â € œ ~~~ â € â € Â. However, the lactate is mainly eliminated by slow adjacent contraction fibers that have a very high mitochondrial capacity and a much higher quantity of MLDH enzymes and MCT-1 teleports. To improve the ability of lactate clearance, and even if completely counterintive, it is essential to train those slow contraction muscle fibers to stimulate growth and mitochondrial function, as well as increasing MCT-1 and MLDH. Training to the lactate threshold is essential to improve glycolic fibers and their machines (our Ã ¢ â € â € â € â €) and to increase the number and function of glycolytic enzymes, as well as to increase the Number of MCT-4 teleprasports needed to transport via fibers to quick spasms and then be released from slow contraction fibers. Spend too much time at the lactate threshold is very challenging too, as it is a great effort and can lead to overholder that is something that we constantly observe in our laboratory. We constantly see in our athletes and coaches who have this incorrect conception and commit this mistake that leads to the overholder and not improving the ability of lactate clearance. With specific protocols we measure the metabolism of lactate, grease and carbohydrates during all exercise intensities to study the entire metabolic and physiological response to the physical exercise that allows us to provide for the performance and to define the individual training areas clearly, in Particular area 2 (Z2) which with the experience gained in the last diminight has been shown to be the training area that arouses the best results for The ability of lactate clearance. Ã ¢ â €; Zone 2 (Z2) has been shown to be the training area that arouses the best results to improve the ability of lactate clearance. lactate. The concepts and training too much at Ã ¢ â € ™ identifying your specific training programs Completely revealing their training programs and we constantly see very important improvements in their lactate clearance capacity And performance, while at the same time we significantly reduce the cases of overraining. To conclude, the lactate threshold remains as the most used training deadline around the world and yet there is no consensus on what exactly represents. There is too much confusion not only with regard to the lactate threshold, but also with regard to the lactate of for itself and its role and its importance in physical exercise and metabolism. I simply believe that after several decades of discussions and controversies, it is time for â € ¢ concept of evolving and being appointed and defined differently so that athletes and coaches can use it more significantly and understandable to describe such Ã ¢ ~~ â € â € â € â € â € â € â € Â €th Performance and for successful exercise. success.

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