Endurance: Projects about Tolerance; Training Ideas For 200m and 400m Sprint

Alberto Borges Moreno

ABSTRACT

In this project I point out facts about endurance; I selected two events from athletics just to make some examples 200m and 400m, and made a comparison to the aerobic and anaerobic training for sprinter populations. At age that maturity is usually to be completed it is possible press this capability and develop level; it is good for boys that have been on training for some years, as you can see the occurrence of the methods suitable to use in training, measurement and evaluation of the above training elements for athletics are inside the proposition of literature today an specially mentioned by books for this meaning and some other literature. I have certainly found some points that are similar according to biological growth.

INTRODUCTION

One of the most interesting aspects of the theory of sports training is growth and human development linked to capacity building and training methods proposed for the development of endurance capacity at different ages. In this sense I found interesting ideas demand for this work, that’s help on this paper because I try to describe the selection of methods to develop the aerobic and anaerobic endurance lactic and alactic affecting tolerance and how training do realize this factor at all ages and stages of development from childhood to adulthood. Growth, development, and maturation are terms used to describe changes that occur in the body; starting at conception and continuing through adulthood about this literature pointed the period of life from birth to the stars adulthood is generally divided into three phases: Infancy, childhood, and adolescence. Infancy is defined as the first year of life. Childhood spans the period of time between the end of infancy (the first birthday) and the beginning of adolescence...the period of adolescence is more difficult to define in chronological years (Wilmore, Costill, & Kenney, 2008, p. 384).

I focus either with persons who engage in particular track and field; sprinter boys with competition in mind but also I refer to the benefits that this can offer to training for health, as you can see I mentioned the occurrence of the methods suitable for use in training, measurement and evaluation of the above training programs for develop endurance.

Run at different rates cannot be performed if the athlete is unable to withstand changes during the course of the entire distance, rhythm disturbances can affect so it requires a lot of practice; in this regard is a specialized practice which is not desirable in youth where general preparation is usually more convenient, on this criterion think that preparing young athletes should be general and directed the easy to the difficult; this indicates that in principle should work with methods for the development of resistance to suit this age and aerobic work and games are more advantageous. My opinion coaching experience tells me that we must take into account the principles and general laws governing sports training and
thus take the process on the right track to get better benefits and protect the health of people with whom we work; coincidence paper (Panagiota Klentrou, n.d.).

For example the load applied to children must be addressed more general games and classes should be more teaching of simple actions of teaching complex actions, this will allow the body not yet developed biologically of children that can assimilate best sports classes. Pointed by: (Heyward, 2010), next citation explain better this idea follow maturation.

“Many literatures refer the importance of maturation of nervous system, and follow the windows of opportunity for development of speed and other fitness or capabilities.” (Farrell, Joyner, Caiozzo, & American College of Sports Medicine, 2012)This idea we will see later, as following.

Myelination of cerebral cortex occurs most rapidly during childhood but continues well beyond puberty. Although practicing an activity or skill can improve performance to a certain extent, the full development of that activity or skill depends on full maturation (and myelination) of the nervous system, the development of strength is also likely influence by myelination (Wilmore et al., 2008, pp. 386–387). Is therefore appropriate to take account of this part of the theory to apply to practice in working with children and youth, and other think is having present evolution in athletics as long term sport at list rules of 10 year.

The first speed window is also related to the development of the nervous system and its ability to now carry messages much more quickly. (J L Thompson, 2009, p. 100) This idea is on the same way, and relating with maturations, but should be carefully observed for endurance.
It must be very careful when developing lessons with long endurance than worrying too stressful to avoid interference in bone growth at the epiphyseal plate cartilage, bones grow longitudinally monitor the loads must not be excessive; in this can help alternating loads with rest days to aid recovery and growth; in training practices is also recommended by sciences adequate nutrition with micronutrients in the diet. The most common vitamin and mineral found to be of concern in athletes’ diets are calcium and D vitamin and are required for adequate calcium absorption, regulation of serum calcium and phosphorus levels, and promotion of bone health. Vitamin D also regulates the development and homeostasis of the nervous system and skeletal muscle. Some studies expand on this position; see (Michael F. Holick, M.D., Ph.D., 2007, p. 261) and (K. Nakagawa, 2006, pp. 1182–1187). Other opinions express the relevance of this nutrient to the location in which the sport is practiced.

“Athletes who live at northern latitudes or who train primarily indoors throughout the year, such as gymnasts and figure skaters, are at risk for poor vitamin D status, especially if they do not consume foods fortified with vitamin D” (S. Volpe, 2006, pp. 61-63) “These athletes would benefit from supplementation with vitamin D at the Dietary Reference Intake level (5 mg/day or 200 IU for ages 19 to 49 years)” (K. Nakagawa, 2006, pp. 1182–1187).

Recent studies clearly indicate that athletes in countries such as Iceland, with adverse weather conditions during winter and spring, can benefit with oral vitamin D and calcium supplements as they help to prevent seasonal changes in bone turnover and loss in healthy adults. It appears conceivable that annually recurring cycles of low vitamin D and mild secondary hyperparathyroidism during the winter months contributes, at least in part and over many years, to age-related bone loss. This perennial problem can be avoided by following this recommendation and is an efficient and inexpensive strategy for the primary prevention of bone loss in northern latitudes (Christian Meier & Henning W Woitge 2, 2004, p. 1221).
**DEVELOPMENT:**

Let the children play said popular expressions, in this sense and in my experience the method of play is the best way to develop tolerance to long-term careers with children, this avoids the monotony in training and supporting the growth and logical development on these ideas and IAAF athletics kid’s program is the basis for initiating proposals. For develop endurance It is my opinion that many games on the agenda IAAF can be used and others that the coach can create and also use suggest the program proposed by Australia games for kid's athletics? Very nice for kid’s ("Athletics_Play_manual_v1.0_-_28_9_10.pdf," n.d.).

In all training examples you can keep track of the pulse; is a simple and easy for coaches and provides insight as start development of resistance by the responses of the heart and heart rate check step can prevent any accident, the proposition (220-age= max heart rate) is easy and good to follow, so we can have some possible control and calculate of 60-65 % on this range to evaluate what we are development aerobic endurance or not and what can be dangerous for children’s, other fact is checking by 1 minute into next 3-5 minutes after repetitions of distances and see how is recovery of heart rate working.

Testosterone has a number of effects in the body, testosterones promote muscles development and this is well known by most coaches. But it also has effects on the energy systems essential for tolerance and resistance work. Testosterone promotes an increase in the number of red blood cells which are responsible for transporting oxygen around the body and to exercising muscles. It also increase the efficiency of the mitochondria the parts of the muscle cells were oxygen is use to make energy as mentioned by introduction to coaching IAAF book (Peter J L Thompson P. 49). These postulates make me think on the possibility of considering what the theory proposes as windows of opportunity that we will see later in this project, good opinion on hypertrophy and load training adaptation pointed also by: (Farrell et al., 2012, pp. 152-162). On the other hands the circulatory system by the respiratory they play an essential role in the development of this physical capacity tolerance for that reason scientific literature explains the sport should try to increase the capacity of these systems progressively and this affects much the career field method through cross country and the method of long-term career that can be used more after puberty with good results example run 10- 12 minutes to begin, and progressive increase to 15-20 minutes; this will create the basis for further work in the future with more specific methods; when athletes arrive to event group or specialization stage mentioned into stages of the preparation of the athlete, athlete career as recommend by IAAF on introduction to coaching (J L Thompson, 2009) it is possible to pressure more this capability.

To be careful it is good to test periodically, children suggest easy tests and pulse control that is very accessible and provides good information, the properly training is the way to test how they improve; but when you start to work harder and age over 13 years, you can use some of the recommended test by literature, but I personally do not use any of them.
although I admit they are a good option but I prefer to control all over the training process heart rate and blood pressure and periodically test on distances 150m and 300m from youth age, on my case I do usually training with youth sprinters 200-400m that are objectives proposal for this project. Information about test can find on (“Cardiovascular / Aerobic Endurance Fitness Tests,” n.d.).

Because brain development is very sensitive and the entire nervous system takes more time to develop than other systems as general studies proposes we must be alert all the time, this process is completed after the stage of childhood when the system has triggered hormonal secretions abundant in the biologically body and affects the completion of this important guidance system, then we will be able to use some more rigorous methods to challenge the development of tolerance in the body with specific methods such as extended intervals, always giving chances to break and rest for adequate recovery. Some very good literature related experiences and studies on this topic, but also nutrition is very important for example, regarding power sports, and sprinters the studies give very similar opinions on recommended intakes and give particular attention to proper protein consumption. Resistance exercise may necessitate protein intakes in excess of the (RDA) Recommended Daily Allowance, as well as that needed for endurance exercise, because additional protein, essential amino acids in particular, is needed along with sufficient energy to support muscle growth (S.M. Phillips & J. Tang, 2007, pp. S58–S76) and (Tipton K.D, 2007) studies are with very similar opinions. This is particularly true in the early phase of strength training when the most significant gains in muscle size occurs. In my opinion this also applies to power specific preparation for sprinters and participants in other strength sports. They require increased power and muscle mass is essential for this. The amount of protein needed to maintain muscle mass may be lower for individuals who routinely perform resistance training due to more efficient protein utilization. See (S.M. Phillips & J. Tang, 2007) and the recent studies from (Tipton K.D, 2007). Recommended protein intakes for strength-trained athletes range from approximately 1.2 to 1.7 g/kg/day (S.M. Phillips & J. Tang, 2007) and this particular opinion is similar to that of (L. Burke, 2006). Best study today about endurance and protein relationship is on book (Farrell et al., 2012, pp. 423-444), especially in the acute effects of endurance exercises, to do with the resynthesized of proteins after loads of endurance and anabolic signaling loads after resistance training to pages 433 and 437 of the book cited. I wish to express that growth of muscle mass can increase strength and be beneficial to better performance.

But the training principles must be considerate if we want good results on our training; they made good guidance in our job. If we take carefully vision of this principles many of them has been mentioned before by: (N.G. Ozolin and D.P. Markov, 1991). Introduction to coaching IAAF, related the most important and on the same ideas, for example Principle of overload, Principle of reversibility, principle of specificity, principle of individualization, principle of variety, and principle
of active involvement; in general are the same but summarize proposal for; (J L Thompson, 2009, pp. 131–138).

Training principles from other opinion show coincidence:

“1.-Multilateral development versus specialization.

2.-Individualization, tolerance level, individualized the training load account for gender differences, incorporate training variation.

3.-Development of the training model.

4.-Load progression, standard loading, linear loading, step loading, concentrated loading, conjugated sequence loading paradigm, flat loading.

5.-Sequence of the training load.” (Bompa & Haff, 2009, pp. 31–55).

The explanation is coincident on these laws, and my personal view is that all the principles of training are related and conditioned between them. None of them can be analyzed without the help of others. Specialization is based on a multilateral development, and is what is pointed out in the introduction to this paper work as this is not possible without a certain gradualism; and whereas the alternation of work and rest so that the adaptations of the cells and the body occur in general with all its systems to the training that takes place. At the same time it is impossible to conceive training without a conscious athlete attitude, every athlete should know what trains and why do the exercises that effect have and how to get your body to assimilate better.

The principles of sports training only can be performed provided that their intimate relationship between them, as different parts of a planned and organized process that is controlled and is adapted to each individual, and that form part of a process of education and improvement of physical and functional capabilities of the body in the long term approaches, in which intervenes directly alternation of work and rest, the repetitions of the exercises that are best suited to the sport and discipline practiced and demands that each sport makes to the different systems of the human body, whereas, the physical, psychological, moral, volitional, theoretical, technical and tactical.

Other sciences studies reinforce the fact to act follow the windows of opportunity for Youngers, one of the best examples can be found in the book is illustrated introduction to coaching the IAAF with the table and coincidences ideas with other literatures, and easy to understand.

The proposition is for the importance on training physical abilities in the best stages of development of the human body, and help you work better respecting the biological laws of life and health, in accordance with the principles of sports training as I mentioned before, this not indicate that they cannot develop their physical progress in other stages but should depend and use that time for their best development here comes the special attention to the resistance is primary objective in this work, and as you can see its proposal for the development of resistance is located at the end of the first sexual maturation, coinciding with the end of puberty.

So it is possible to use the ideas, because endurance term is associated in most cases with aerobic resistance on many different ways of training able to increase general endurance but the specialized tolerance requirements related fields became quite identifies, in many cases, the direction of anaerobic endurance.

It is very important to keep on mind, maximum oxygen uptake VO2max, lactate threshold, efficiency - the degree of oxygen consumption at a given stress the peak as had been mentioned on the class room during the presentation of main ideas for developed endurance capabilities and also necessary think about systems on body functioning, on this way coaches should be clear.

You can specify different emphasis on these aspects by analyzing the requirements for the practitioners (Gunnar Páll Jóakimsson, 2013) Coach of Anita Hinriksdóttir World champions 800m youth 2013. Also keep on mind the differences between females and males, and age for example related with endurance:

“VO₂max values decrease by 9% per decade after age 25, you can slow this process with aerobic exercise, the most obvious quantifiable factor is reduced max heart rate and hence lowers Q values, women generally have lower VO₂max values, reduced muscle mass, reduced muscle power, reduced hemoglobin, and trained women have VO₂max values far above the mean men.” (Gunnar Páll Jóakimsson, 2013).

I agree and mentioned that I found coincidence on many studies as(Wilmore et al., 2008), (McRae et al., 2012), (Weinberg & Gould, 2011), (L.J. Tarnopolsky, S.A. Atkinson, & J.R. Sutton, 1990).
For this reason it seems logical to place food on matters related to the iron, additionally and directly related to iron, I found studies that refer to iron deficiency health problems in females. These are two research papers that delve into iron related impairments in females and their work capacity: The first by (E. Haymes, 2006, pp. 203–216) talks about iron depletion (low iron stores) as one of the most prevalent nutrient deficiencies observed among athletes, especially women and, the second by (Susan J Whiting, 2006, pp. 80–85) relates that the condition of iron deficiency, with or without anemia, can impair muscle function and limit work capacity. There are also excellent studies that explain this from a different direction but are concurrently consequent to the referenced studies and are important because:

“To perform well, an athlete must replenish her energy sources through proper nutrition and hydration.” (Bompa & Haff, 2009, p. 23).

The high incidence of iron depletion among athletes is usually attributed to inadequate energy intake, this fact have been reinforced by many studies, other factors that can affect iron status include vegetarian diets that have poor iron availability, periods of rapid growth, training at high altitudes, increased iron losses in sweat, feces, urine, menstrual blood, intravascular hemolysis, foot-strike hemolysis, regular blood donation, or injury (S. Volpe, 2006, pp. 61–63), (E. Haymes, 2006, pp. 203–216) and (D. Benardot, 2006, pp. 289–293) refer to similar facts attributable to this problem and that we analyze many literature mention the importance of nutrition and hydration, (Armstrong, L.E, 2002), (Goulet, 2012), (S.K. Powers & J. Quindry, 2004), (Susan J Whiting, 2006), (M. Dunford, 2005), (J. Otten, 2006), (Sawka, M.N, Eichner, E.R, & Montain, S.J, 2007).

On the other hands: Divide for better understanding in contemporary literature the two most important types of resistance or tolerance, low intensity and high intensity then explained as the ideas contained in the basic literature.

“Low intensity activities that are predominated by aerobic energy supply tend to exhibit lower peak powers and thus can be classified as being of lower intensities.”(Conley M.S. & R.L.Jhonson, D.R. Honeycut and T.P.Hoke, 1993) take from:(Bompa & Haff, 2009).

Oxygen transport relates to other components of blood, skeletal muscle; type of fiber muscle mitochondrial density capillary density arterial-venous oxygen difference, lactate threshold, economy of movements as well mentioned by (Bompa & Haff, 2009, pp. 288–298).

To end do a summary of some of the methods to develop the overall endurance or aerobic tolerance and are commonly used by many specialists in my experience and the literature reviewed: The fartlek or career change of pace that has several variants or types as control, free, leader, led by Coach, accurate piecewise go fast and slow, with increased demand, with decreased demand.

The method of continuous or long-distance running, where athletes go jogging at a pace determined by their development, work with games, the method of cross-country race, and the method of repeated stretches at a rate planned active rest good in all cases heart rate use of between 140-160, because:

“To maximize the athlete´s performance the coach must regularly challenge the athlete´s physiology, which elevates ceiling of adaptation and ultimate performance (fig1.12). This means that the coach must alternate high-intensity training with lower-intensity training. If done appropriately, this schedule will enhance compensation and lead to a super compensation effect.” (Bompa & Haff, 2009, p. 20).

It is very clear the table proposes textbook methods for the development of the aerobic endurance quoted below to illustrate all the questions raised by my earlier and which is based on the current literature contemporary, coincidence with opinion (Gunnar Páll Jóakimsson, 2013), and on the same way I agree, because is possible adaptive at different stages of development of athletes.
In my interpretation of this scientific point, loads can be switched in the week with a day or two of work at low and high intensity in general preparation. On special preparation I prefer high intensity loads earlier in the week and on day before the weekend; working about the possibility to offering the weekend to recover the body and mind with active rest, using the pool, whirlpool, outdoor gear light and pure oxygen and proper nutrition and hydration. As a result of more leisure can take every athlete with the help of family, this provides a margin of more than 24-36 hours as the scientific literature set necessary for the replacement and restoration of cells and compounds tissues and energy that would help restore these energy resources caused by the training stress like high intensity exercise endurance on sport that relies on anaerobic metabolism, it is the case of disciplines includes analyzing on this project 200m - 400m and I will explain later. I have mentioned some factors affecting aerobic performance, aerobic power, hemoglobin, pulmonary systems, and cardiac output page attention to the maximal heart rate and stroke volume, elite athletes should exhibit increase demand on both, because:

“If we wrong type of endurance training is implemented, the athlete might develop endurance characteristics that do not meet the needs of the sport, and thus capacity can be reduced” (Elliott, M.C. & L. Chiu, 2007).

This is an important fact to consider when coaches plan training, giving proper charge at the right time, and this helps the experience in connection with the present theory. To illustrate better this conception here I pointed good picture from book with excellent representation of load and the alternation wave of training this should be on the session or during the week or on meso-cycle actually have to keep track of everything you do every athlete in training and also as daily information has stayed, as fed, how it feels, and adjust it according to the work plan or continue in forward with the plan, in other words the use of communication technique will allow us to share and know the effect that will make training in the person you're working, the control indicators such as pulse, blood pressure and some another simple indicator will help us assess the assimilation of the load, and then we will be able to find out how the ripples and the recovery, other studies mentioned here that different types of methods proposed for the development of this capacity endurance, (Faulkner, J.A. & B, Balke., 1968), (Taipale et al., 2012) direct pointed about health next study:

“The article presents the nine ways that help guide the runners achieve their personal records (PR) through

<table>
<thead>
<tr>
<th>Training method</th>
<th>Recommended frequency (times per week)*</th>
<th>Duration of training portion</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active rest</td>
<td>1 or 2</td>
<td>30-60 min</td>
<td>Heart rate (% max)</td>
</tr>
<tr>
<td>Long slow distance (LSD)</td>
<td>1 or 2</td>
<td>≥30 min (race distance or longer)</td>
<td>55-65%</td>
</tr>
<tr>
<td>Continuous pace or tempo training</td>
<td>1 or 2</td>
<td>20-30 min</td>
<td>At lactate threshold heart rate and VO₂ max</td>
</tr>
<tr>
<td>Interval training</td>
<td>1 or 2</td>
<td>30-40 min total time (depending on structure)</td>
<td>80-85% or maximum</td>
</tr>
<tr>
<td>Anaerobic intervals</td>
<td>1 or 2</td>
<td>&lt;2 min work bouts (work rest interval 1:1-1:5)</td>
<td>Maximum</td>
</tr>
<tr>
<td>Fartlek</td>
<td>1</td>
<td>&gt;30 min</td>
<td>VO₂ max</td>
</tr>
</tbody>
</table>

*Other training days contain other training methods or rest and recovery. Pmax= peak power at VO₂ max.

(Bompa & Hoff, 2009, p. 301)
performance training (PT). It states that achieving PRs are supposed to be difficult to attain, thus it means performing the absolute best during a race and finishing faster than ever had before. It relates that the shoe selections may contribute negatively impact for running and can contribute injury. It adds that recognizing failure works can improve the performance.” (Wilk, 2011).

Then graphs showing the character of alternating loads and rest to promote super-compensation and better adaptation to training loads, critical factor when working with high intensity levels that challenged major systems of the human body in order to protect health, this example it is well known on the literature of sport sciences.

But to do that it is necessary develop the special endurance that challenge the systems for competition; about this we need to define what is tolerance or resistance for this event on special; it is the capacity of the body to fight against fatigue this capability permit execution of prolonged exercise on long time duration on many sport and activities, resistance is based first and foremost on the capacity of the central nervous system to continuous working against fatigue, it is frequently strongly a ported for functional heart and circulatory system, respiration and metabolism on human body, a curious
method that is not commonly used features a way to help develop this capability repetition speed on short races with 45s rest (Plisk, S.S., 1997) and other methods for strength development also can help us with endurance (Jones, A.M., 2000), (S.Nance, 1999), (Tomlin, D.L., 2001).

Many studies in general define two can of endurance I have mentioned before about Aerobic:

Aerobic endurance that is the ability of the body's resistance against fatigue due to prolonged exercise, when aerobic metabolism on oxygen presence; anaerobic endurance it is frequently presented as the ability of the body's resistance when anaerobic metabolism occurs and the body is in great use of ATP or glycolytic sources, and accumulate lactate on muscles (N.G. Ozolin and D.P. Markov, 1991), (J L Thompson, 2009). Aerobic it is necessary for all sport and on these two disciplines also so I recommend develop at the beginning of preparation and more for youngest athletes. But on this disciplines anaerobic endurance is core foundation on 200m - 400m sprint.

“Endurance can be classified several ways. For example, aerobic endurance, sometimes called low-intensity exercise endurance, allows a person to perform activities continually for a long duration, whereas anaerobic endurance, or high-intensity exercise endurance, provides the ability to repetitively perform bouts of high-intensity exercise.”(Bompa & Haff, 2009, p. 287).

As we know there are several factors that affect the development of resistance, including the literature mentions the development of cardiovascular system with the fundamental aspect of the pumping of the heart and respiratory system where the volume of oxygen and its consumption is valued and transport, hemoglobin as biochemical aspect involved in the transport of oxygen by the blood, the incidence of musculoskeletal system at work which affect the types of muscle fibers, the density of mitochondria in the cell nucleus, the density of capillaries and its incidence in the transport of nutrients and oxygen to the proper functioning of the human body during and after physical work, and the accumulation of lactate in the blood known as lactate threshold and mentioned by (Bompa & Haff, 2009, pp. 289–296).

Several authors recognize the technique as a main factor in the implementation of economy of movement, especially defined by, (Jones, A.M., 2000), The same factors affect the development of anaerobic resistance, and in addition to other bio-energy factors such as PCR, ATP, systems Buffer of blood affecting the balance of blood PH, muscle glycogen and others, all mentioned by (Bompa & Haff, 2009, pp. 298–300), I agree with these criteria which have been mentioned before by many researchers in the literature of the 1970s discussed the same issues, and in the Decade of the 80 equally, so there are updating in some key points in this work only concerning but in general it is the same theory that has been known ever since.

In relation to the methods for the development of resistance of basic book cites the following: for low intensity aerobic resistance active rest consisting of racing at comfortable rate, where the heart rate is below 60% of their maximum, distances to low intensity, career continuous rhythm, for aerobic resistance and the anaerobic cite intervals methods, aerobic intervals, anaerobic intervals, and Fartlek.

I personally used the interval extensive repetition method to develop endurance with my athletes 300m to 500m at the beginning of preparations two times per week, pause 5 minutes control of pulse around 160-180 after run, and 100-110 before go next repetition, usually controlled heart rate between 1 minute to follow recovery and adaptation during three weeks, see (Borges, A, Ramos, R. 1996). That’s for sprinters.

On the development of anaerobic resistance and on special and pre-competitive preparation I usually work with intervals by extended pause, and stretches between, 120m and 150m that go well for 200 m runners, this combination go direct on development of speed endurance like is mentioned by (Bompa & Haff, 2009, p. 325).

Very relate with the endurance necessary for this event 200m and 400m is the methodic that I come to citation here to finish my comments about speed endurance, and more clear is the next information that precise very pointed that according to the energy system and oxidative demand on 200m- 400m need attention to endurance aerobic, we know it is necessary for all athletes to create the base on general physical preparation, but more short speed run need on 200m than 400m and challenge glycolytic system more for 400m, it is clear the proposition for develop way of capability indicate as following is correct.

<table>
<thead>
<tr>
<th>Sport reference</th>
<th>Event</th>
<th>Phosphate</th>
<th>Glycolytic</th>
<th>Oxidative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athletics</td>
<td>200m</td>
<td>36</td>
<td>57</td>
<td>5</td>
</tr>
<tr>
<td>Athletics</td>
<td>400m</td>
<td>40</td>
<td>55</td>
<td>5</td>
</tr>
</tbody>
</table>
“Recently, a novel type of high-intensity interval training known as sprint interval training has demonstrated increases in aerobic and anaerobic performance with very low time commitment.” (Bayati, Farzad, Gharakhanlou, & Agha-Alinejad, 2011).

Consistent with this approach and the existing theory for the two selected disciplines in this project I focus on the factors that affect anaerobic endurance and results and go certainly to the energy resources as you can see below; but in my opinion and I stress even when these disciplines are quite similar in energy resources they use, the 400m race requires more liver glycogen and muscle glycogen stores in line should work more long runs in training to challenge these reserves and improve their biological supplies, example 300m-500m. Another interesting aspect is that although the classification shown is directly related to the aerobic nature, this source of energy is needed in recovery must therefore train in the general preparation and do not forget to keep a light aerobic capacity in all stages and phases of the annual because it helps faster recovery and to protect the health of athletes; and removal lactate and PCr regeneration (Tomlin, D.L., 2001).

The following chart supports what I explained above and you can see that there is more reliance on these races of which I speak in this paper of between 20-50 seconds in competition for the anaerobic system, and lactate accumulates, the oxidative system is used to a lesser extent but ultimately is used, because the whole body of work and you cannot use one-way energy at work, the enzymatic reactions occur in the presence of oxygen, which is also a recovery of carbohydrates energy and their transformation on ATP, as the duration of the competition is superior in time, then more oxygen is needed, (Bompa & Haff, 2009, pp. 20-26).

But nevertheless investigations refer to prioritize higher intensity workouts because they are an advantage in these long sprint disciplines, for example two studies are cited below.

“Recent work suggests that performing high intensity intervals can result in significant elevation in endurance perform in the LT, allowing the endurance athlete to work at a higher intensity before experiencing lactic acid buildup” (Esfarjani, F., 2007).

The second study is very clear about this and I agree with the two opinions, that are why in my experience preferably use
those training methods as I mentioned before, and connected much with short speed workouts on alternate days. And because relationship with aerobic also, for the importance that pointed before here I cited:

“Sprint interval training has been demonstrated to increase glycolytic and oxidative enzymatic activity, improve maximal short term power out-put, and increase maximal aerobic power.” (Macdouglas, J.D. & J.R. Macdonald, 1998)

As we know there are factors that directly affect the development of tolerance anaerobic capacity, among them, the bioenergy of which we have spoken and is related to energy sources, then you have to mention the acid basic mechanisms controlling the systems buffer blood, cardiovascular and lung capacity for transport, the neuromuscular system and its particularities in motor control, muscle strength is directly tied to this ability muscle elasticity and strength if all this mentioned by the textbook on pages 301-306, (Bompa & Haff, 2009), coincidence with are literature (Stone, 2007).

With all the teachings herein and matching methods that I have raised I personally used to work with sprinters anaerobic endurance in these 400m 200m distances; propose cite the following table summarizes the methods proposed by Bompa, and are also recognized in other materials and some of which have been mentioned here in other studies.

<table>
<thead>
<tr>
<th>Type of training</th>
<th>Target Energy System</th>
<th>Objective</th>
<th>Distance (m)</th>
<th>% of Best</th>
<th>Recovery Time</th>
<th>Repetitions</th>
<th>Sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>Anaerobic</td>
<td>Speed anaerobic</td>
<td>20-80</td>
<td>90-95</td>
<td>3-5 min</td>
<td>6-8 min</td>
<td>5-8 min</td>
</tr>
<tr>
<td>Speed endurance</td>
<td>Anaerobic</td>
<td>Short speed power</td>
<td>50-80</td>
<td>90-95</td>
<td>1-2 min</td>
<td>5-7 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glycolytic</td>
<td>Short speed</td>
<td>&lt; 80</td>
<td>90-95</td>
<td>2-3 min</td>
<td>7-10 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ATP-PC and glycolytic</td>
<td>Power</td>
<td>&lt; 80</td>
<td>90-95</td>
<td>1 min</td>
<td>3-4 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glycolytic</td>
<td>Speed endurance</td>
<td>80-150</td>
<td>90-95</td>
<td>1 min</td>
<td>4 min</td>
<td></td>
</tr>
<tr>
<td>Tempo Extensive</td>
<td>Aerobic</td>
<td>Aerobic capacity</td>
<td>&gt; 200</td>
<td>&lt; 70</td>
<td>&lt;45 s</td>
<td>&lt;2 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mix</td>
<td>Aerobic capacity</td>
<td>&gt; 100</td>
<td>70-79</td>
<td>30-90 s</td>
<td>2-3 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glycolytic</td>
<td>Anaerobic capacity</td>
<td>&gt; 80</td>
<td>80-90</td>
<td>30 s to 5 min</td>
<td>2-3 min</td>
<td></td>
</tr>
<tr>
<td>Special Endurance</td>
<td>Anaerobic</td>
<td>Long speed</td>
<td>150-300</td>
<td>90-95</td>
<td>10-12 min</td>
<td>Full</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ATP-PC and glycolytic</td>
<td>Anaerobic power</td>
<td>150-300</td>
<td>95-100</td>
<td>12-15 min</td>
<td>Full</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glycolytic</td>
<td>Lactate tolerance</td>
<td>300-600</td>
<td>95-100</td>
<td>Full</td>
<td>Full</td>
<td></td>
</tr>
</tbody>
</table>

(Bompa & Haff, 2009, p. 325).

As recommended investigations and according to my experience at the beginning of the preparation you can use these methods with demand between 60% and 70% of the athletes' chances and controlling the pulse, then the special preparation and pre-competitive may be required work between 85-95% of the speed progression from week to week, then as it approaches competition decreases and run length can be achieved by improving the speed and capacity of resistance to high speed anaerobic and more rest, to quote an example given purpose by other studies:
“Suggest that a series of 10-16 sprints performed with 3 to 5 work interval and 20 to 45 s recovery...was an ideal interval training program for this population.” (Plisk, S.S., 1997).

Finally to test control of this capacities proposals are following from literature, Anaerobic Cycling Power and The Margaria-Kalamen stair Climb Test, mentioned by: (Haff & Dumke, 2012, pp. 347-360), other test very interesting are illustrated on next literature and I personally had made the Matzudo, J. Test for anaerobic potency well described on this web site (“Cardiovascular / Aerobic Endurance Fitness Tests,” n.d.).

“Resistance. Test 40 seconds of Matsudo. OBJECTIVE: Total anaerobic power, DESCRIPTION / PERFORMANCE: Use a running track marked every meter, basically between 150 and 350mts. It takes two raters, the first of which begins the test's voice "and" activating the timer. Immediately, this goes to the second assessor who is 350m to 250mts of the game, who will be responsible for determining the final assessed support when the timekeeper will report "Attention ... You" at the completion of the test. During the 40 seconds, the evaluation should cover as much ground as possible with maximum effort.

MEASURE / Evaluation: Determine the distance traveled in 40 seconds, with accuracy of 1 (one) meter, some formulas used for assessing anaerobic power (Test Matzudo) Potency anaerobic = weight (kg) x distance (mts) = kgm/sec.”

CONCLUSION

The aerobic endurance work with children is generally better with games and start following the ideas proposed by the IAAF athletics program kid’s. The proposition is for the importance on training physical abilities in the best stages of development of the human body, and help you to work better respecting the biological laws of life and health, in accordance with the principles of sports training as I mentioned before, this does not indicate that they cannot develop their physical progress in other stages but should depend and use that time for their best development at this point, the special attention to the resistance is the primary objective in this work, and as you can see its proposal for the development of resistance is located at the end of the first sexual maturation, coinciding with the end of puberty.

In this work we must pay close attention to the control and the easiest way to do this is by controlling the pulse and maintaining proper communication with athletes.

Pay attention to the development of cardiovascular and respiratory systems as a basis for developing aerobic endurance and then on this basis can usually in later stages of life below the athleticism to get proper maturation and growth, it may start work anaerobic endurance.

Some methods split developing the resistance and anaerobic and aerobic development can serve and stimulate development of technics that will be able to use better tactics in these long sprints.

Consistent with this approach and the existing theory for the two selected disciplines in this project we focus on the factors that affect anaerobic endurance and results and go certainly to de energy resources as you can see below; but in my opinion and I stress even when these disciplines are quite similar in energy resources they use, the 400m race requires more liver glycogen and muscle glycogen stores in line should work more long runs in training to challenge these reserves and improve their biological supplies. Another interesting aspect is that although the classification shown is directly related to the aerobic nature, this source of energy is needed in recovery must therefore train her in the general preparation and do not forget to keep a light aerobic capacity in all stages and phases of the annual plan because it helps faster recovery and to protect the health of athletes; and removal lactate and PCr regeneration.

Different types of test for resistance control can be used to help coaches to monitor the development of this capability, if repeated regularly may provide better information on the development of athletes, specifically, I propose two very special test Matzudo 40 s test to control development of resistance and anaerobic lactic and the Margaria-Climb test Kalamen stair especially for power control anaerobic alactic, but in my opinion the best test are the 150m and 300m sections for these disciplines to analyze in my work and 400m and 200m competitions that offer the best information confidential.
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