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The Olympic Issue

TRAINING PERIODISATION

An obsolete methodology

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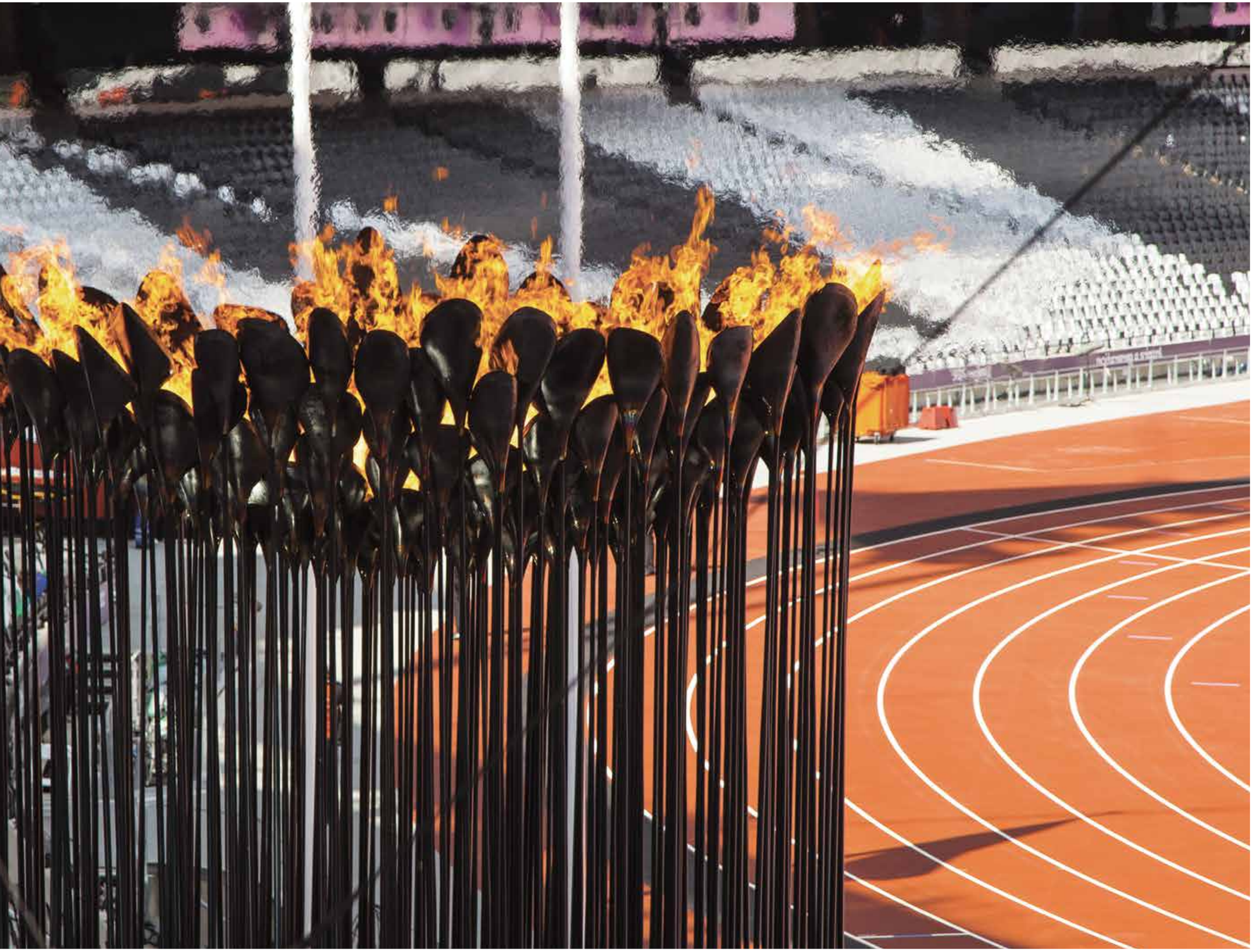

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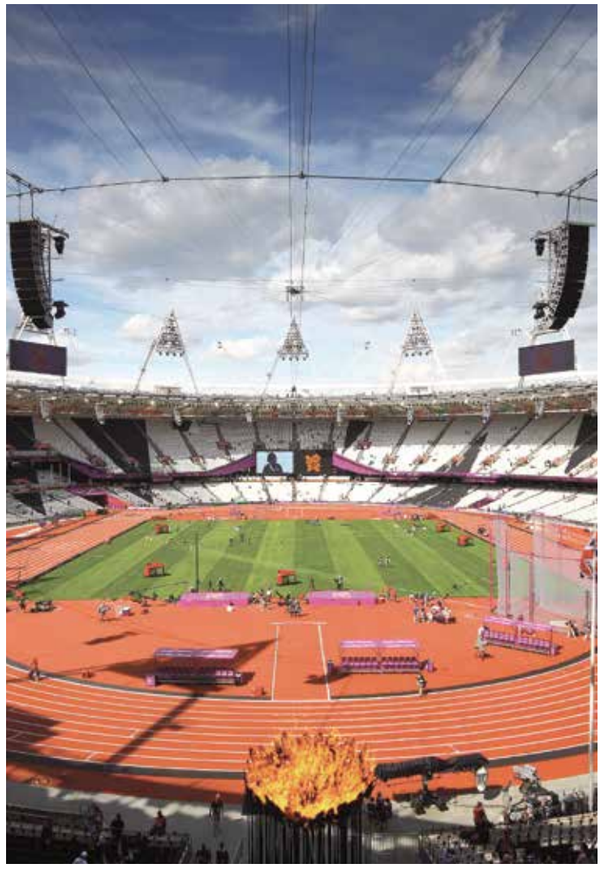

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HYPOTHESIS:

The hypothesis of the NAQI® Therapeutic Magazine is that the quality and the outcome of therapeutic care and sports performance will substantially increase if treatment is supported by skin therapy/care. The condition of the skin (ao scars, dry skin) can negatively influence therapeutic care and sports performance, even to a degree that skin care becomes a necessity before any other treatment.

EDITOR'S LETTER

In the spirit of the Olympic games we set out to discuss the significance of training periodisation.

Is the generally accepted periodisation model for training becoming past tense? This discussion is opened by an article of Irineu Loturco and Fabio Y. Nakamura which was published in Aspetar Sports Medicine Journal.
This is followed by Tim Laaglands reflection on the position of the physiotherapist/therapist in the preparation of the training cycle. Is optimum power zone proving to be a better training scheme?

Belgian renowned physical trainer, Steve Vandebos shares his views on these statements by questioning the outcome of periodisation models and offering his professional opinion.

Quintessential to this discussion is that no matter which training schedule an athlete follows, not only the physical and mental conditions are important, but also a healthy skin is a prerequisite for optimal training conditions. This topic is discussed in depth by Greet Claes.

Finally, in this edition we focus on Jolien D'hoore, Belgian Olympian cyclist, with her personal view on training periodisation.

Edgard Geyskens

EDITOR

OLYMPIC ART & SPIRIT

Years before the athletes compete for the Olympic Gold, designers in the host country are competing for the Olympic Logo. The honor to be the creative force behind such an iconic symbol doesn't come without hard work and occasionaly some controversy. The one thing they have in common is trying to symbolize the Olympic Spirit.

Flipping through years of Olympic design history is a treat for the eyes. Personalities of the designer, the country and the trends shine through.

This years honor went to Brazilian agency Tatil, they defeated 139 designers, but not without blood, sweat and tears. The agency made a beautiful, even sentimental video on their website that describes the process (and 150 design drafts) they went through to end up winning design gold. A symbolic big embrace around "the Sugarloaf" of Brazil which also embraces the Olympic spirit. Some see a heart in the embrace, other see Rio spelled in it, it feels three-dimensional and filled with movement.

The logo for 2020 in Tokyo had created controversy even before the games of 2016 started. In July 2015 Tokyo unveiled the logo by Kenjiro Sano, it received bad press just a month later when the artist received allegations of plagiarism: it was too similar to the Belgian Théâtre de Liège. Even though the Belgian designer didn't trademark his clients logo and the 2020 marketing manager supported the designer, the logo was replaced. This year Tokyo released the new logo by Tokyo-based artist Asao Tokolo. 3 different rectangular shapes that represent diversity: sets us apart but brings us together. Diversity becomes unity.

In line with the Olympic spirit we can pose **two critical questions:**

The athletes: from human being to a machine?
Young people are continuously pushed to hone their skills to perfection resulting in seclusion from a normal social environment and being assisted by a team of physicians, psychologists, physical coaches, sports doctors , nutritional experts, mental coaches, physical therapists and other specialists. The question arises: where is the limit, when does dehumanization start and what is the sense of all these medals?

Economically biased effects?
Can we justify building very expensive single use infrastructures when a country is suffering from poverty, lack of basic infrastructure and a low Gini index where a small group have the majority of welfare. A thorough debate about the future of such infrastructures is required. Why not opt to integrate these new Olympic buildings, halls, locations into society and have local citizens use them after the games? Why can't the IOC finance these infrastructures with an additional financial participation of the participating countries? The guest country offers his locations and services while the IOC finances the infrastructures?

TRAINING PERIODISATION

an obsolete methodology?

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ALI SAMIEIVAFA

GENERAL CONCEPT

Periodisation is probably the most important and fundamental concept in sports training. Typically, it consists of a 'training cycle' divided into different training phases (Figure 1) – with distinct physical and physiological objectives – to enable the best performance from athletes in a competition (i.e. peak performance). Theoretically, using the periodisation concept, peak performance occurs in a controlled way, as a result of the summation of the particular adaptations provided by each training phase (mesocycles)[1-4]. In fact, several studies have reported that different periodisation regimens are superior to non-periodised models for improving performance in elite athletes[5,6]. However, from a practical point of view, this research is limited by the fact that the authors – throughout the experimental period – only investigated the changes in physical capacities (i.e. muscle strength and power), but not in actual sports performance (competition results). Therefore, it is accepted that programmed training interventions produce greater enhancements in athletes' fitness scores than unplanned (non-periodised) exercise regimens. However, when examining the role of the periodisation concept in achieving the maximum specific performance in selected sports events (season's best result), an important drawback emerges: very low rates of effectiveness. In a unique study published in New Studies in Athletics, Bartonietz and Larsen[7] presented these low rates statistically, after comparing the results obtained in the 'peak oriented phase' with all other results attained by the athletes throughout the competitive season (Table 1). More specifically, the number of athletes achieving their personal season's best during the target competition of the year (World Championship) varied between 17 and 25%. In addition, a further dissimilarity has been identified between peak performance and performance variation obtained by high-level sprinters (who train following an identical periodised training regimen), targeting the same main events in the same competitive season (unpublished data) (Figure 2). Taken together, this evidence brings into question the role of periodisation in optimising actual performance during the planned peaking phase and reinforces the need to identify better strategies to control and improve the athletes' sporting capability.

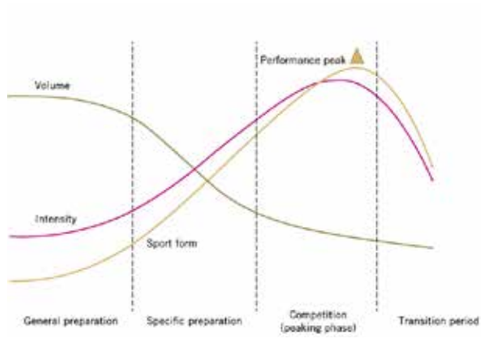

Figure 1: *Classical periodisation model, shifting from high-volume/ low-intensity training to low-volume/high-intensity training. Theoretically, sport form is gradually enhanced through the successive training cycles, until the target competition (▲ performance peak). Adapted from Matveyev*[3,46,49].

Table 1

Event	Number of athletes	WC better than season PB	% EFF
All throws (finalists)			
Men	48	8	17
Women	36	9	25
High jump			
Men	33	6	18
Women	35	9	26
Triple jump			
Men	43	7	16
Women	32	8	25
110m and 100m hurdles			
Men	47	13	28
Women	32	8	25

Table 1: *Effectiveness of the preparation for the World Track and Field Championships, 1995 in speci c events: Championship results versus the best performance in the season. WC = World Championships result. PB = Personal best. EFF = Effectiveness.*

12.5
12
11.5
11
10.5
10
Feb Mar Mar Apr Apr May Jun Jun Aug Oct Feb Feb Mar

Figure 2: *Actual results of eight high-level sprinters in 100-metre sprint events throughout a year-long periodisation cycle. The vertical axis shows the competition time (in seconds). The horizontal axis shows the month. (–*–) = male sprinters, (–●–) = female sprinters, (▲) = season's best performance, (◆) = season's worst performance.*

PHOTOCREDIT:
TUNTURI

THE PHYSIOLOGICAL PARADOXES: BASIC OR CONCURRENT CAPACITIES?

The traditional periodisation model assumes that a relatively prolonged period of basic training (general preparation) is a prerequisite to a more specific phase (special preparation)[8-15]. During general preparation, strength and conditioning coaches aim to improve cardiorespiratory endurance and strength-endurance, even in athletes competing in power-speed sports disciplines (sprint and long jump events). This is surprising, as it has been known since the early 1980s that high volumes of endurance training are capable of attenuating the chronic gains in muscle strength and power, principally in highly trained subjects[16-21]. Although the molecular aspects of this interference effect have been extensively debated in sport sciences[19-21] and still need to be fully elucidated, it seems that the multiple signaling responses induced by endurance training are capable of inhibiting protein synthesis and muscle hypertrophy, which is possibly related to the antagonism between the adenosine monophosphate activated protein kinase (AMPK) and mammalian target of rapamycin complex 1 or mechanistic target of rapamycin complex 1 (mTORC1) signaling cascades[19]. Another common belief related to strengthpower development, is that the so-called 'strength foundation phase' will provide positive transfer of maximum strength to the ability to produce muscle power in the subsequent training phases[22]. To date, there is no strong evidence supporting this belief, mostly held in traditional literature written at best on the basis of authors' personal experiences and not supported by research work[3,23-26]. Conversely, there are extensive studies showing that training using heavy-loads (i.e. maximum strength training) results in improvements only in the high-force/low-velocity portion of the force-velocity curve, without necessarily affecting the ability to produce higher amounts of force at high velocities (muscle power)[27-31]. In effect, it appears that the parametric relationship between force and velocity (i.e. the higher the load, the lower the velocity) plays a key role in modulating chronic neuromechanical adaptations[32]. Some studies have even reported significant decreases in power-speed related motor tasks (i.e. short sprints, agility tests and peak velocity in vertical jumps) after periods of heavy strength training[33,34].

Importantly, the theoretical and speculative 'delayed training effect' concept assumes that training basic capacities at earlier phases of the periodisation cycle has positive effects on actual performance long after this period of general overloading. The question that remains to be answered, is whether these unwanted adaptations (i.e. decreases in power-speed abilities) are really able to boost future (and targeted) neuromuscular training responses. The same holds true for specific endurance adaptations. The research does not support the existence of some physiological posterior (and also enhanced) positive effect, by showing that the 'fatigue valley' induced by high-intensity training sessions is not effective at increasing VO2max or inducing peak performance in high-level endurance athletes[35]. Surprisingly, for this selected group of non-elite but highlytrained athletes, the management of levels of fatigue at non-detrimental levels was more effective in provoking performance improvements. Furthermore, physical capacities gained in 'shock microcycles' were moderately to largely reduced only a few days after the last exposure to highintensity training sessions[36]. Therefore, the delayed training effect is not completely supported by the scientific literature and its use as a tool to improve actual results is highly controversial, as its outcomes are very unpredictable[35]. To be more succinct, there is no physiological basis to sustain the idea that the body is 'compartmentalised' into basic and specific capacities and that the overloading of a given basic capacity will suddenly 'super-compensate' later in the training cycle. Essentially, we can state that so-called basic training may potentially be a period of concurrent training stimulus. The predicted effects (high endurance level and impaired strength-power characteristics) are detrimental to the desired training targets in the subsequent seasonal phases, especially due to the absence of solid scientific evidence regarding the delayed training effect and its purported benefits. Strength and conditioning coaches should ask themselves whether basic training is a real basis for competitive performance in their respective sports disciplines, or whether it is a loss of precious time to athletes[37-41], sometimes causing malfunction of the systems mobilised during actual performance. For instance, in endurance sports, athletes appear to benefit from performing high volumes of low-intensity training (i.e. below lactate thresholds[41]) during their basic/specific periods of preparation. Furthermore, the role played by prolonged periods of basic training on muscle-tendon tissues and injury prevention[37,38,40] cannot be ignored. However, it is likely that these positive adaptations in muscles and tendons may also be obtained by typical strength power exercises, which can be directly implemented during the course of the season[42,43]. On the other hand, the counterproductive effects of prolonged basic preparation phases in team sports were recently evidenced by the impairments in the speed capacity presented by elite athletes during their pre-season training44,45, with faster players (at baseline) presenting higher levels of deterioration in the maximum sprinting performance in comparison with their slower peers45. In this regard, it is important to note that sprinting speed is a key component of match performance in many team sports46. More importantly, the accumulated effects of several years of heavy and long-lasting concurrent training each season might have a role in the performance ceiling effect experienced by most athletes during their careers. It is possible that the ability to sustain progress in sporting capability over years will benefit from training strategies that are less aggressive and targeted i.e. concurrent, making the sports training process more economical, simple and focused on the specific physical capabilities that really matter to actual competitive outcomes.

A COMPLICATED METHOD VERSUS A COMPLEX PHENOMENON

The periodisation structure is quite complicated and is centred on a series of rigid and inflexible concepts which emphasise the necessity to progress (within the same training cycle) from basic to particular aspects of the specific sports performance[8,43]. Indeed, for most sports disciplines, the current congested competition (and training) schedules[44,47] make it extremely difficult for strength and conditioning coaches to adopt this classic and theoretical method. Even recent 'undulated periodisation training regimens'[48,49] are difficult to implement in high-level sports, where the preparatory events are qualifiers for the main competitions (e.g. competitions during an Olympic training cycle) and/or tournaments where all matches have the same importance (e.g. a national soccer championship). To meet the needs generated by this increased competitive demand, some authors have proposed the use of the 'block periodisation model'[4,50] – a periodisation regime based on the original idea of exclusively concentrating a specific training target during a block (e.g. a maximum strength block), in order to reduce the possible concurrence between two or more physical capacities. In fact, this training model showed to be more effective than the traditional periodisation in achieving positive adaptations in certain aspects related to specific sports performance[51,52]. Nevertheless, this 'specialised training system' usually requires considerable amounts of time to be implemented (4 to 5 weeks per block), which highly compromises its usefulness in top-level sports. In addition to the 'periodisation puzzle', actual competitive performance in elite sports is somewhat complex and depends on a wide range of unpredictable and changeable factors[53]. Therefore, considering the technical hitches that arise from the problematic combination of managing training schedules and controlling peak performance, seeking simpler and more effective methods than the segmented programmes of periodisation is highly recommended to train professional athletes, who frequently have to maintain their peak or optimal performance.

TRAINING TO THE POINT

Identifying practical measures which best correlate to actual sports performance in elite athletes may assist strength and conditioning coaches in selecting appropriate tests to monitor variations in peak performance and choose the best methods/exercises to enhance athletes' competitiveness. For instance, Loturco et al[54] found that simple and timesaving vertical and horizontal jump tests are strongly associated with competitive performance in the 100 metre sprint. When combined in a multiple regression linear equation, squat jump height and lower limb muscle power (assessed in the squat jump exercise) could be good predictors of competitive sprinters' competitive results, besides being directly related to their performance peaks[55]. Furthermore, loaded and unloaded jump tests have been extensively associated with sport-specific motor skills such as punching acceleration in karate[56], punching impact in boxing[57], speed for swimmers[58] and change-of-direction agility in rugby players[59]. From an applied perspective, coaches could use these rapid field measurements to increase or decrease training volume and intensity, in individual or team sports according to the performance presented by a given subject during a particular test. Moreover, since actual athlete performance may be directly related to a determined capability (e.g. vertical jumping ability)[60], coaches could simplify their training regimes, by adopting methods/exercises able to improve this specific capacity. Certainly, further studies should be carried out to identify other functional assessments or simple physiological measures to predict sports performance in a wide range of sports disciplines[61]. It is suggested that sports practitioners should interpret these training outcomes in the context of the loads applied to the athletes. Since large inter-subject variability in 'internal training load' can be observed within a squad submitted to similar external training loads[62.] the quantification of individual physiological and perceptual demands is highly advisable. In this sense, heart rate-derived training impulses[63] and session rating of perceived exertion[64] methods have been spread among athletes and teams. The observation of these useful concepts may contribute greatly to the development of better and more applied strategies for training elite athletes.

LOOKING FOR THE OPTIMUM TRAINING ZONES

In traditional modes of strength training, loading intensity is commonly based on different percentages of one repetition maximum (1RM)[65-67]. For instance, at the start of a training cycle, the athlete usually performs resistance exercises using lower percentages of 1RM (40 to 60% 1RM), gradually increasing these ratios as the macrocycle advances and the competition gets closer (70 to 95% 1RM). Although this sequence of loading has been recognised as a classic 'periodisation methodology' for more than 5 decades68, little is known about the exact importance/role of this temporal training pattern in the subsequent fitness improvements. In fact, previous studies have already reported that distinct temporal organisations of the strength-power exercises[69,70] promote equivalent enhancements in numerous neuromechanical capacities such as maximum strength, muscle power and sprinting speed. In addition and perhaps more importantly, the determination of 1RM values is very time consuming and it has been suggested that this measurement may expose those being assessed to increased risk of injury[71-73]. With these limitations in mind, coaches and sport scientists have been trying to find more practical and effective methods to train and optimise the neuromuscular abilities of their athletes. In this regard, it was reported that training at the 'optimum power zone' produces similar performance improvements to traditional strength training in moderately trained subjects[74] and can reduce the decrements in speed and power capacities that commonly occur in elite soccer players during the short pre-seasons[44]. Importantly, in a recent study, it was observed that this training regime is superior to a classic strength training model in increasing the neuromuscular performance of top-level soccer players throughout an in-season training period75. Of note, for training at this optimum zone (i.e. range of loads capable of maximising muscle power production) the athlete does not have to perform any 1RM tests[44,54,60.] which greatly simplifies strengthpower training prescription and control. Importantly, it seems that this training regime may provoke positive adaptations at both ends of the force-velocity curve (high-velocity/low-force portion and lowvelocity/ high-force portion)[34,74,76,77], without compromising the athletes' ability to apply force at any velocity. In addition, it has been reported that the power outputs collected at these zones – and even the magnitude of the optimum power loads – are highly associated with performance in a wide range of sport-specific movements[57,60,61,78-80], which possibly increases the importance of training in these zones. However, since this load varies according to the exercise performed (e.g. squat or bench-press), it is essential to carry out further analysis to identify the best training zones for each specific movement. Moreover, detection of optimal loads depends on the specific kinematic devices (accelerometers or linear encoders), which could be a problem for practical field measurements. Indeed, it is clear that the optimum power zone method calls for effectiveness trials[81] to further confirm its usefulness in various sports settings, especially application in the long-term and in athletes of different ages and competition levels. Even with these limitations, the optimum power zone may be an applied and efficient alternative to traditional modes of strength training periodisation.

TAPERING STRATEGIES

Tapering is probably one of the few constructs in the periodisation methodology which is widely supported in the literature[82]. Periodisation theorists state that 'performance supercompensation' is the final outcome of this method, purporting that it is accumulated across different training phases, through the summation of expected and predictable delayed effects. In fact, there is strong evidence demonstrating physiological and performance enhancements after planned reductions in training volume and increases in training intensity[35,82,83] and this strategy is commonly used by coaches as a 'pre-contest' approach. Importantly, similar effects are also observed both during active and complete training cessation during the transition phases (i.e. the off-season periods)[84,85]. Therefore, it appears that improvements in athletes' performance can be observed independent of the strategy adopted to diminish the training loads, occurring even after short periods of 'detraining'. It is very plausible that improved sport form after periods of reduced training take place because the concurrent (and sometimes detrimental) effects of general (non-specific) and specific (fatiguing) training are partially withdrawn. Thereafter, athletes are able to present greater improvements in their competitiveness, since it is expected that this 'unloading training strategy' potentially allows full expression of their non-fatigued physical, technical and tactical capabilities.

CONCLUSION AND PRACTICAL APPLICATIONS ZONES

It is evident that this article will not resolve the controversies and debates which surround the conceptual basis of training periodisation. However, it highlights a clear need to develop more applied, effective and realistic methods of training (and developing) professional athletes, who compete several times per year and need to maintain near peak performance throughout the macrocycle. Even for athletes and teams with a low number of competitions/matches during a given period, the periodisation concept should be revised, since its rate of effectiveness to control and attain the athletes' peak performance is very low. From a practical standpoint, monitoring athletes using tests which best correlate to actual sports performance is much more important than following theoretical concepts, which subjectively state that form might be predictable and controlled. With this simple and applied thought, strength and conditioning coaches may select better ways to control fluctuations in the competitiveness of individuals and teams, besides the already well-established variations in traditional training components (i.e. volume and intensity). It will help coaches to detect unexpected adaptations in the athletes' fitness traits and adjust training loads according to these measured responses. In this regard, the use of validated methods for daily assessment of the internal training loads might be a useful strategy to quantify/modulate training intensity and its respective dose-response relationship with the specific changes in physical qualities[64,86]. Further studies are necessary to develop more effective and applied methods to train and develop high-level athletes for long-term success, in order to better enhance their form, according to their specific athletic requirements. Finally, coaches are strongly encouraged to seek more accurate and practical methods to control peak performance on a daily basis, guided by feedback from simple measures, since the subjective and empirical concepts of training periodisation are not able to predict this crucial 'point' of athletes' training cycles.

References available at www.aspetar.com/journal

THERAPEUTIC TREATMENT PROPOSAL

How to use training periodisation to win Olympic gold?

The Olympics in Rio de Janeiro are the main event for many athletes. Training starts the minute the last summer Olympics finish. As it is impossible to improve for four years straight, it is important to train and detrain the athlete's body in a way that they can perform at their best at the Olympics. But what is the best way to accomplish this? You make a periodisation plan.

The classical periodisation model is a model that describes different training phases in order to be at your best when you need to compete. The first phase is the general preparation phase, where you work on your aerobic endurance condition and your high-volume/low velocity strength. In the second phase you are shifting your training more to the sport you are competing in, the specific preparation. Next you are ready to compete and thereafter there is a transition period in which you detrain your body.

Loturco and Nakamura describe some studies on the classical periodisation model and found that the effectiveness of this model is not as high as we would expect. One of the factors relating to this result is that the general training is not specific enough and even can have detrimental effects. The high-volume/low velocity strength training is not specific for most sports which are far more explosive in nature. The training leads to a loss of high velocity movements, which is an unwanted adaptation.

They state:
'From a practical standpoint, monitoring athletes using tests which best correlate to actual sports performance is much more important than following theoretical concepts'
The therapist plays an important role in recovery and injury prevention as well as in improving performance. Training in the wrong way can lead to overtraining which can lead to injuries and decrease in performance. Advising on monitoring athletes, training principles, recovery and evaluating athletes is a task of the therapist, knowing more about training periodisation will maximize your efforts.

Tim Laagland

MAGAZINE BOARD MEMBER

PHOTOCREDIT:
DAVID J. PHILLIP

MONITORING

First of all you have to know what state the athlete is in. There are a lot of physical and psychological markers which can indicate overtraining such as a loss of appetite, slow recovery, and high blood pressure. You can monitor the athlete and measure these physical indicators as blood pressure with medical instruments and psychological indicators as well- being with questionnaires as the Profile Of Mood States (POMS)[1]. If there are no signs of overtraining, you can start training.

TESTING

Learning the strength and weakness of the athlete at the start of the first training session is crucial. Specific tests are required to determine the athletes current level of performance and the requirements for the specific sport discipline. In the end you will only be as strong as your weakest link so it's essential to find those weaknesses from the start. The findings and adapted exercises can be integrated into a specific training program. Retesting should be done on a regular basis until all physical requirements for the specific sport are mastered.

TRAINING

Second you have to find the right training stimulus. For strength training, the 1 RM test is used. In the article it is stated that the 1 RM test is time consuming and those being assessed have an increased risk of injury. Training in the 'optimum power zone' is preferred as it is as effective as the normal training and can even reduce decrements in speed and power capacities. Power consists of two components, force and velocity. Training with the power zone means that in the training the force and velocity vary. In this way, not only the high-volume/low velocity aspect is trained, but also the low-volume/high velocity. For most sports in the Olympics, both the high-volume/low velocity and the low-volume/high velocity strength are important. Training both will give a broad basis for the specific preparation.

RM TEST

% of 1 RM	Repetitions	Training type
60	*17*	*Endurance*
65	*14*	
70	*12*	*Power (muscle size and strength)*
75	*10*	
80	*8*	
85	*6*	*Maximal strength*
90	*5*	
95	*3*	
100	*1*	*1 RM*

The 1 RM test is a test to determine the maximal weight an athlete can lift once (1 repetition maximum). Based on the maximal weight an athlete can determine their strength training type zones. For strength endurance training a weight of 60% of the 1 RM test is chosen, for maximal strength training a weight of 90% of the 1 RM test is chosen. See table for more information.

RECOVERY

After every training the body has to recover so supercompensation can occur. Starting or ending the training without an active recovery will lead to overtraining and eventually injuries and loss of performance. In the recovery phase the athlete has to hydrate, feed, rest and start active recovery such as low impact exercises and stretching. Next to that the athlete can receive additional treatment from the physical therapist.

MASSAGE TREATMENT

One of the treatments is the massage treatment. When for example an athlete races on the weekends and trains during the week, massage treatment can help the muscles recover faster and better. On race days, massage treatment can be applied right before the race, directly after the race and later that day[3]. On resting days like Monday and Friday the massage treatment has as goal to relax the muscles. On heavy training days in the middle of the week the massage treatment can best be applied in the evening after the training for maximal recovery. Use the NAQI® Massage Lotion as massage appliance, since it will reduce friction and additionally will help to recover the skin. Athletes themselves can use the NAQI Recovery Gel.

AN OVERVIEW OF MASSAGE TREATMENT ON RACE DAYS, CREDITS TO PAUL VAN LOON

Massage treatment on race days	Before	Directly after	Evening
Duration	*10-20 min*	*5-10 min*	*45-90 min*
Depth	*Deep*	*Superficial*	*Deep*
Techniques	*Superficial effleurages* *Deep effleurages* *Rocking and shaking Petrissages*	*Superficial effleurages* *Deep effleurages Rocking and shaking Petrissages*	*Superficial effleurages* *Deep effleurages* *Rocking and shaking Petrissages Tapotement Frictions*
Goal	*Stimulation*	*Recuperation*	*Recovery*
Products	*cold weather :* *NAQI® Warming Up Competition* *warm weather :* *NAQI® Warming Up* *NAQI® Start Oil* *injuries :* *NAQI®Therapeutic Gels (injuries)*	*NAQI® Recovery Gel* *NAQI® Cool Down* *NAQI® Therapeutic Gel in case of injuries*	*NAQI® Massage Lotion Relax* *NAQI® Massage Lotions* *NAQI® Therapeutic Gels* *NAQI® Recovery Gel*

EVALUATING

After that the results of the training have to be evaluated. How is your sport performance influenced by your training? Physical tests that reflect key elements of your sport are desired. Tests as the vertical and horizontal jump tests are examples of tests that are strongly associated with competitive performance in the 100 meter sprint. So don't use the standard tests but find the right tests to assess your athlete.

TAPERING

The last phase before the Olympics is called tapering and in this phase an athlete mainly rests, eats and makes sure that his/her body will fully supercompensate. All the systems will maximally recover in order to peak at the highest level. In this phase the focus will mainly be on training technique, no high-volume training is needed since the body will not benefit from this training anymore.

CONCLUSION

The main focus for the therapist is to make sure that athletes can train in a way that they will not injure themselves and the can perform at their best. To make sure that they do, monitor the athletes with physical tests and psychological tests to indicate overtraining. Then train smart and functional, use the optimum power zone instead of classical strength training. Make sure the athlete recovers from their efforts and give additional treatment. Assess the outcomes of training with sport-specific tests that represent key elements of the sport. Last, let the athletes body fully recover in the tapering period. Then there is a chance of Olympic gold.

TREATMENT SCHEDULE

Monitoring	*Measure physical indicators of overtraining* *Measure psychological indicators of overtraining*	*Not extensive, for example:* *Blood pressure* *Weight loss Diet* *Sleeping* *Profile Of Mood States Questionnaire (POMS)*
Testing	*Find your strengths and weaknesses*	*Train your weaknesses*
Training	*Train in the optimum power zone*	*Instead of a % of 1 RM, use different weights and different velocities*
Recovery	*Recover*	*Hydrate, feed, rest, active recovery, stretching*
Massage treatment	*Recover*	*Massage treatment with NAQI® Sport Lotion, NAQI® Recovery Gel. On race days before, directly after and later that day. On rest days to relax the muscles, on heavy training days in the evening for recovery*
Evaluating	*Evaluate with sport-specific tests*	*Vertical and horizontal jump tests are strongly associated with competitive performance in the 100 meter sprint*
Tapering	*Fully recover*	*Rest, eat, sleep, train technique, mental training*

[1]The Profile of Mood States questionnaire is a standard validated psychological test formulated by McNair et al. (1971). The questionnaire contains 65 words/statements that describe feelings people have. The test requires the athlete to indicate for each word or statement how they have been feeling in the past week including today. The test scores on the feelings anger, confusion, depression, fatigue, tension and vigour.

TRAINING & COACHING PERCEPTION

The idea behind periodisation models is to provide athletes a step by step information and execution plan of what to do to achieve peak performance at a certain time frame in the future. In theory this is an excellent tool and guideline but in reality periodisation models lack the ability to predict peak performance as there has not been enough conclusive scientific proof.

In the gym athletes can improve their muscle and cardiovascular endurance and one can determine if the physical performance improves. Eg athletes can lift more weight, do multiple repetitions, increase intensity and duration, jump higher, run faster, but how does it correlate to peak performance? You can assume that you perform better when you get in a better shape but studies (see article) have showed that only 17-25% of athletes performed better than their absolute best using a periodisation model. This proves that these models are not the optimal choice for peak performance.

Steve Vandebos

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There are many external and unpredictable factors that influence the athlete's results. They can be physical, psychological or environmental. Examples are reactions to jetlag or long travel in airplane/bus, weather or local temperature, food poisoning, periods for women, social media pressure, emotional state, etc… Therefor new studies have to be elaborated that takes this into account when measuring peak performance.

Implementing a periodisation model into the schedule of the athletes is sometimes daunting, especially if the athletes compete all through the year. Multiple competitions and qualifications make it harder to maintain peak performance through the whole period so therefor simpler models are required.

The best way to test the athletes performance and training is doing sports specific tests. If VO2 max plays an important role for your endurance sport, then it is required to perform VO2 max tests. Other sport disciplines that require a lot of explosivity (sprinters, gymnastics, etc) will have no benefit to do these type of tests. They require other tests that are easy to measure and are perfectly predictable parameters toward peak performance like the horizontal and vertical jumps for example. It's the job of the sport coaches to monitor progress daily and adjust/ improve the training program depending on the test results.

In my personal 10 years of experience as a golf fitness professional I achieved the best results by knowing the strengths and weaknesses of my athletes at the beginning of the training program. You have to know how to test them to find out what their compensations are and the physical imbalances that can lead to possible injuries. You're only as strong as your weakest link so the first step is to limit your physical restrictions to a minimum. Easy sport specific tests can be implemented regularly and don't take too much time to measure the progress of your athlete. If you're not testing, you're just guessing.

The second step is to have a training and nutrition program that fulfils the physical requirements of your athlete. Whether it's a repetitive circulation motion like cyclists or running or just jump as far as you can. It's no use to perform a horizontal jump test for cyclists so there is no reason to give them a program that improves the jump muscles.

The third step is tapering to achieve peak performance. Scientific studies prove that tapering has a positive effect on athletes and it's commonly used by nearly all athletes. It is the maximum recovery through nourishment and rest and is an absolute necessity to achieve peak performance. It depends on whether athletes like sprinters need peak performance once or twice per year during world championships or during a whole season like golfers. Golfers have a big schedule full of travel and will use multiple tapering techniques together with a training program during the whole season. This is important so they don't lose all benefits from during the off season training.

SAVE YOUR SKIN:

THE SKIN CARE AND PEAK PERFORMANCE

— Interview by Wesley Muyldermans, sports journalist & writer—

Peak performance requires physical and mental preparations adapted to meet this level, but the skin - a large part of the body - also requires specialist care. What are the most critical factors that can harm the skin in high-level sports?

Elite athletes exercise intensively, which causes them to perspire a lot. All sorts of microorganisms thrive in a moist atmosphere, so the more someone sweats, the bigger the chances are of developing an infection in a fold of skin. Athletes also shower several times a day. Each time they shower, they not only remove dirt, but the good bacteria and skin lipids as well. This results in dry, itchy, and irritated skin. That dry skin also facilitates the penetration of external substances and provides less protection from friction. This means the skin is already weakened from the normal routine and frequent washing. It is crucial to have a good barrier against external ravages, especially for athletes who already suffer more barrier damage.

How can an athlete prepare / strengthen the skin?

When athletes are heading to a different climate, it is important that they take some time to adjust to this. The body can then acclimate, which reduces sweating. Another possibility is to use products that reduce sweating, but those can only effectively be applied to armpits and feet, since sweating is part of the process of regulating body temperature.

Greet Claes

MAGAZINE BOARD MEMBER

They also have to use mild products to cleanse the skin and always apply a nourishing protective product to replenish the skin afterwards. This neutralises any possible irritations and maintains a healthy skin barrier. This routine is not only important during peak performance periods. An athlete must start beforehand to avoid any deficiencies. Good skin care is important all year long, and can be intensified during peak performance periods. The skin cells are constantly rebuilding themselves - in a process of cellular division - so they're constantly in action. It is a very dynamic process that needs to run smoothly and optimally. It takes a long time to repair any damage.

Can a physiotherapist contribute to maintaining a healthy skin?

Certainly. By using as few irritating products as possible to keep the skin in good condition and by avoiding known allergens as much as possible. The key is to avoid irritating the skin, and if this is already the case, not to aggravate it further.

What are the possible results of bad skin care for an athlete?

Bad skin care must be avoided at all times. The athlete will not get sick, but itchy, irritated skin can make him or her lose sleep, which results in fatigue, stress, and irritation, which is vexing for an athlete and can impact performance. Friction can cause blisters or calluses, which can divert an athlete's attention from his or her performance or even directly influence the performance. This can make a big difference for elite athletes.

During the Olympic games in Rio, pathologist Paula Saldiva stated that more people die from air pollution than from water pollution. What effect does air pollution have on the skin?

Air pollution causes damage that is similar to smoking and UV radiation. It releases free radicals that will aggravate the oxidation process. This causes the skin to age faster, and some pollutants can even cause cancer. Therefore, it is crucial to thoroughly cleanse the skin. Exhaust fumes and air conditioning can clog pores and can lead to acne. The same rule applies here: good hydration creates a solid barrier, resulting in better protection of the skin. Any negative influences will have less effect on the skin. The negative effects from air pollution can be lessened by antioxidants, vitamins, and minerals. A healthy diet is a perfect start. By applying skin care products that contain lots of antioxidants, you can neutralise and reduce the negative effects of air pollution.

ATHLETES IN THE FIELD

Every issue we share athletes' stories with our readers. People we admire for what they do and whose training, competitions and experiences can be followed on social media.

JOLIEN D'HOORE
BRONZE MEDAL WINNER AT THE OLYMPICS RIO
TWITTER @JOLIENDHOORE

Cyclist Jolien D'Hoore did at the Olympic Games in Rio what she – and the whole of Belgium in fact – had never dreamed was possible. She took a bronze medal in the Track Cycling Omnium. It was an extraordinary performance! Of course, very thorough and specific preparation is required for such an accomplishment, both in physical and mental terms. Not to mention all the other factors that make up the difference between eternal fame or a fourth place. And who better to answer all these questions than Jolien herself? She also received a bachelor in physiotherapy and rehabilitation techniques about 3 years ago, so is certainly able to speak with great authority.

JOLIEN D'HOORE AT BIKE VALLEY
PHOTOCREDIT: RIDLEY

PHOTOCREDIT: JOLIENDHOORE.EU

Jolien, how did you prepare yourself in physical terms for the Olympic Games? There is surely quite a specific build-up, given that track cycling requires both intensive and long-lasting effort.

I start by focusing on the road, and do this mainly by long-distance training or by participating in road events. In this respect it is also important that I complete each event, depending on the track. We also have training sessions on the track, which lasts a maximum of two hours. If I need to start from scratch then I spend the first 3 to 4 weeks doing mainly long-distance road training, at a low intensity. After that I combine this with training on the track, so long-distance training interspersed with shorter, more intensive training. I adopt a period of tapering before the competition – a period of less activity – lasting about two weeks. I then ride for a maximum of two hours on the road at a low intensity and on the track for very short periods of quite considerable intensity.

Who actually plans your physical preparation and how is this done? How are the tasks divided up between yourself and others, such as the sports doctor, the physiotherapist, and the coach?

I have considerable input. I determine which competitions to take part in and decide on the extent and the intensity of my training. My coaching team makes certain recommendations, like when I should do a certain type of training, but quite often you need to assess the situation for yourself as well. On one occasion four hours can be enough, and on another you may feel that you need another hour or so.

Which performance indicators do you use – for example, heart rate, lactate values, max VO2, … - and how do you measure them?

We take lots of lactate measurements on the track. In that case I go round the block on the track and when I come off they measure my lactate. The value is quite often over 20. I then need to warm up on the rollers, until my lactate value decreases to between 5 and 6, or even lower. When I train on the road it's mainly about wattage. Some cyclists also train on the basis of heart rate, but I'm not a big fan. Personally, mine fluctuates quite a bit and is often linked to fatigue. I find wattage measurements more reliable, because they are less variable and therefore more precise.

In addition to the physical preparation there is of course also the mental aspect. How do you approach this? After all, the 'pressure' from the press, the environment, the fans etc. must be enormous.

In the past I have often consulted Bert De Cuyper, a sports psychologist. In the meantime I am older and have much more experience, and that makes a real difference. Also, I am now just more relaxed than before. There is always pressure of course, and it comes from all angles, but it doesn't really bother me. In fact, I even need it to be able to perform at my best. Two weeks before the competition began in Rio I did turn off my mobile phone and left the internet and social media well alone. In this way I cut myself off from the outside world, which allowed me to remain focused. This isn't necessary over a long period of time, but is ideal in the two weeks running up to a competition such as the Olympic Games.

PHOTOCREDIT: JOLIENDHOORE.EU

Of course, there are lots of other factors that play a part during both the preparation period and the actual competition. How do you manage endogenous factors, such as the right bike, the correct clothing, etc.?

As far as tracksuits are concerned we made our selection together with Bioracer, because they are the cycling association's clothes sponsor. We simulated the speeds in the various parts of the Omnium in a wind tunnel at the Flanders Bike Valley in Beringen and this is how we tested the suits. The most appropriate suit was chosen for each part. In fact, we did the same for the bikes, but this time in collaboration with Ridley. They then created a customised bike in terms of length, sitting height, wheels and so on.

Good skin is of course also a factor and aspect that should certainly not be forgotten. One of the products you use is the NAQI® Body Screen. Is there anything else that you do in terms of skin care?

The evening before the competition I also use the NAQI® Recovery Gel. This is a product that I discovered this year and I think it's very pleasant. It gives both a cold and warm sensation simultaneously, and you can feel how it improves the circulation. During the competition I use the NAQI® Body Screen as a chamois cream to prevent rubbing. After my Omnium races in Rio I used NAQI® Cool Gel. It was very hot in Brazil and this gel was extremely refreshing and helped me to make a good recovery.

How do you cope with exogenous factors, such as jetlag, sleeping at night, flight times etc.?

Obviously there's a time difference in Rio and I followed a kind of jetlag protocol prior to my departure. We were given special jetlag glasses and before going to bed at home I had to wear the glasses with a blue light for one hour. In the morning I had to wear the glasses with a red light. This routine lasted for five days. As far as the flights to Rio were concerned, we didn't have much of a say, as they were organised by the BOIC. They wanted the majority of Belgian athletes to leave on the same flight.

Do you find it difficult to choose between the road and the track?

I have been cycling on the track ever since I was twelve, so it's something very close to my heart. I will never be able to stop. In the future I am going to try and focus more on the road. But I will never stop the track entirely. This winter I plan to concentrate more on the points race or the madison. I will not be doing the Omnium again, as the preparation is very specific and is very difficult to combine with road cycling.

You achieved a fantastic result in Rio. What message would you give to young athletes?

You should always believe in yourself and work hard, even if you think you will never get as far as the Olympic Games. If you had told me five years ago that I would win a bronze medal in Rio I would have just laughed. We need to try and abandon that typical Belgian mentality. Too often we say: 'We are only little Belgians, so we have no chance!' Anyone can achieve something by working really hard.

WHY IS THE USE OF PROFESSIONAL MASSAGE LOTIONS IMPORTANT FOR ATHLETES?

The skin of athletes must be kept in top shape. Massage Lotions prevent the negative side effects of the mechanical handling of the skin during a massage. Any stress on the skin can damage the skin, especially when confronted with sensitive skin or skin that already has endured long term pressure from sports, extreme weather conditions.

When choosing a massage lotion, you want the best possible skin protection combined with an excellent glide effect. The NAQI® massage lotions are hypo-allergenic and easy to rinse off using water. NAQI® Massage Lotions are special liquid crystal emulsions and the same pH-level as the skin. They moisturize the skin and stimulate the natural healing of the skin, allowing the skin to breathe as the lotions do not block the pores.

The neutral NAQI® Massage lotions are dermatologically tested and are suitable for sensitive skin, people with eczema. They are suitable for various applications and have specially-adapted gliding properties offering the therapist the perfect tool for his treatment.

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