




Priming for Performance and Recovery

Peter John L Thompson - www.newintervaltraining.com








Priming for Performance and Recovery

- What to do
- When to do it




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Innovation in Coaching

"The human body is centuries ahead of the physiologist"

Roger Bannister 1955




Roger Bannister wins Penn Relays Mile 1951

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Experiences of Repetition Training

Think about when you do a repetition session on the track

- How does the first rep feel compared to the second?
- How does the third rep feel compared to the first two?
- If the repetitions feel easier after one or two repetitions then why not 'prime' by doing these first?

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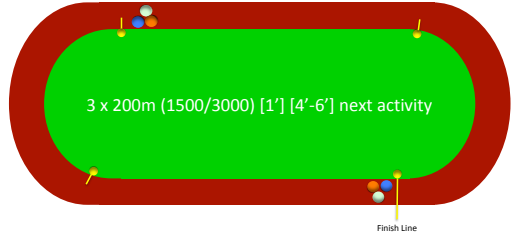
Priming VO_2 Kinetics – Activators

VO_2 kinetic warm up - Activators

- 3 x 200 or 2 x 300 (1500/3000) [1 minute]
- takes approximately 4 minutes duration
- then an optimal window of [4-8 minutes] before commencing the session or competition

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Activators - Priming VO_2 Kinetics for Activity



3 x 200m (1500/3000) [1'] [4'-6'] next activity

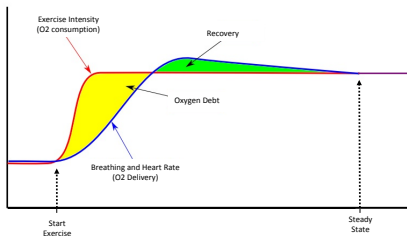
Finish Line

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What happens when you start exercising?

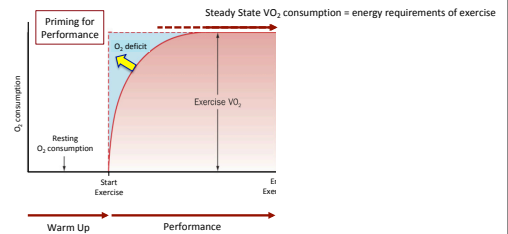


Breathing and Heart Rate are initially 'behind' the demands of exercise

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Oxygen Deficit



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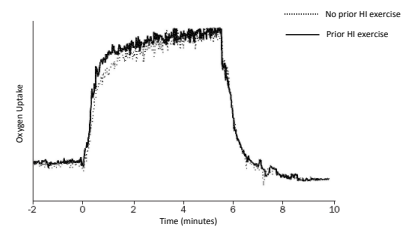
Jargon Busters

- O₂ deficit
 - The amount of energy which has to be supplied by anaerobic metabolic processes in the early minutes following the start of exercise due to the slow increase in O₂ uptake
- VO₂ kinetics
 - The dynamic behavior of oxygen uptake - O₂ uptake in the transition from rest to exercise.

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What Research Confirms

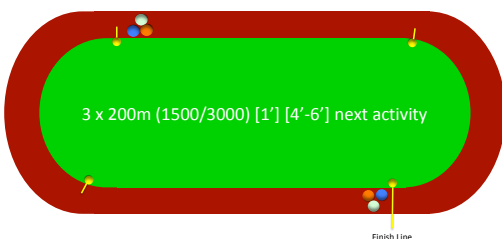


Influence of prior high-intensity exercise on VO₂ kinetics

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Priming VO₂ Kinetics for Activity – Activators

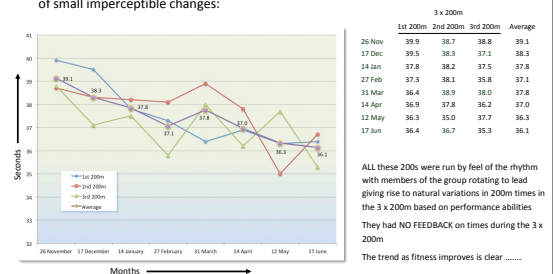


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VO₂ Kinetics Activators Through the Training Year

Training frequently progresses through the training year by the natural accretion of small imperceptible changes:



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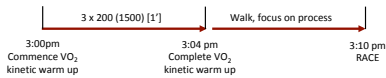
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Activators in Competition

- In training it is very easy to program activators
- But what about competition?
- 3 x 200 (1500/3000) [1 minute]
- takes approximately 4 minutes duration
- then an optimal window of [4-8 minutes] before commencing the session or competition



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Activators in Competition

- Adjustments may be required
 - delayed start e.g. cross country races
 - call room
- 1 x 200 (1500/3000) will re-activate the priming of the VO_2 kinetics

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What to Prime in the Warm Up

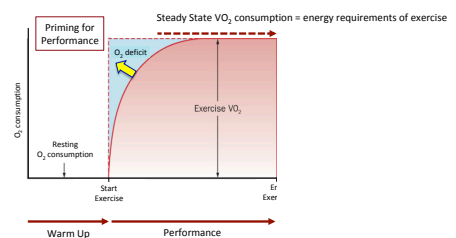
Priming activities for:

- The metabolic energy systems
 - priming the Aerobic System
 - priming the Lactate System
 - priming the synergistic combination of aerobic and lactate systems
 - priming the ATP-CP system
- The biokinetic energy system
 - priming the kinetic chain
 - priming 'stiffness'.

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But What About Priming for Recovery?



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"You want me to do what!"

Acidosis clearance

- As soon as possible after the training or competition
- 5 x 200 (10,000) [1 minute]
- takes approximately 7 minutes duration
- then aerobic cool down.

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Can we Prime Biokinetic Energy Production?

Priming Biokinetics in the warm up:

- running on surfaces of varying compliance on the continuum from effectively non-compliant solid surfaces such as cement to hyper-compliant particulate surfaces such as sand
- running in shoes with midsoles of varying cushion and including barefoot running for the very small minority of runners whose lower kinetic chain flexibility and function permits.

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Summary

Consider Priming

- Before training or competition – 3 x 200 (1500/3000) [1']
 - VO₂ Kinetics warm up
- After competition – 5 x 200 (10,000) [1']
 - To clear acidosis
- After training which emphasizes the lactate system and has accumulated significant acidosis – 5 x 200 (10,000) [1']
 - To clear acidosis and
 - Train the body to utilize lactate as a fuel.

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Thank you for your attention and contributions

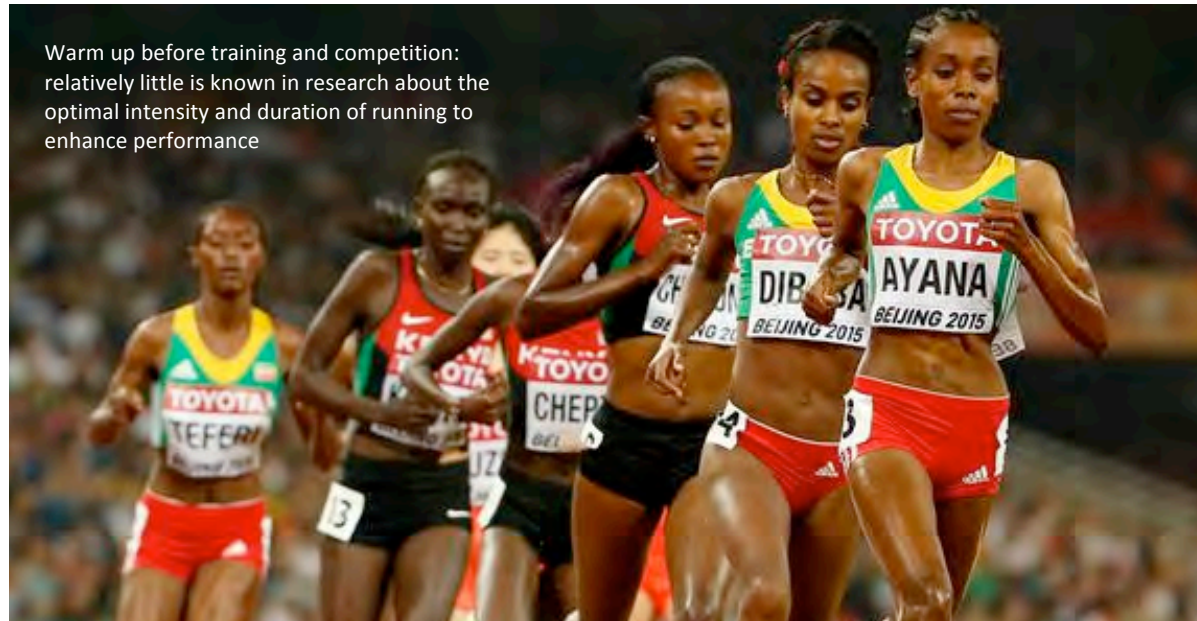


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Priming for action and recovery

International coach Peter Thompson describes how performing appropriate running in your warm up and cool down can significantly enhance your performance and recovery



Warm up before training and competition: relatively little is known in research about the optimal intensity and duration of running to enhance performance

Warm up before training and competition: relatively little is known in research about the optimal intensity and duration of running to enhance performance

The scene: a recent World Championships with the athletes mingling close to the start-line in preparation for the impending final of the men's 1500m. Most of the finalists are performing their last minute rituals and runs. For almost all of these athletes these last minute runs consist of repeated, almost maximal sprints over a distance of about 25 to 40 metres. In between each sprint they walk back trying to avoid contact with the officials who are intent, for some reason, on preventing them from running on the track before the race. Some perform as many as six or seven of these sprints and several become very agitated by the officials' attentions.

One athlete is noticeably different, standing alone from the rest. I recognise him as the world-renowned Moroccan athlete Hicham el Gourouj, who seems to be in a place of his own making, in quiet contemplation and apparently oblivious of the presence of the officials and their petty actions. Instead of the frantic, short, strong sprints of the other athletes, he performs a couple of languid, seemingly effortless, strides at around his planned race pace. These see him flow down the back straight and around the bend for almost 200m. In between these he runs back at a relaxed, easy rhythm, completing his preparations some five or six minutes before the starter's commands and his subsequent, expected victory.

As I sat in the stadium, this scene unfolding before me, my mind was transported back many years; to when I had first started to coach. From England's shores I had travelled to live and coach in Eugene, Oregon and from

the mid-70s to the late 80s had been privy to being involved in, and watching at first hand, some truly amazing track and field performances. Most times these were acted out on the University of Oregon's famed Hayward Field track in Eugene, the self-proclaimed 'Track Capital of the United States'. At that time I had watched the middle and long distance athletes prepare for their races with the same sort of almost maximal 'short, sharp sprints' that I was to witness the majority of athletes still performing at the World Championships years later. In Eugene I had thought about this pre-race preparation and decided that it was not the best in preparing for the metabolic response and emphasis in the race that was to follow. At that time I knew nothing of things like 'VO2 kinetics', it just seemed that what the athletes were doing in preparation was unconnected to the following race.

Move forward again to recent times and another scene: 'club-night' at any club in the UK where the endurance athletes are doing repetition training. The athletes have finished the session and are talking with their coach who floats a general question to the assembled group. "What were you aware of during the reps tonight?" "Well," said Lucy, "I was aware that I was tired throughout the session and also aware that when you had us change places it felt easier to be following others. It was almost like keying off the energy of the others." "OK" responded the coach, "Now, what about the rest of you - did you feel fatigued at all?" "On the first repetition," offered Grant. "It's always the first one or two reps that feel hard and then it's like you're into

the session and it becomes easier.” As you read this, for any of you who have ever run repetitions, Grant’s statement must sound like *déjà vu* but its implications, perhaps, have been largely ignored.

The athletes I had coached in the UK, and then Eugene, had all reported the same sensation in training that Grant spoke of: that repetition training seemed easier after the first one or two repetitions. From this consistent training observation and from what I had seen runners doing before races I decided that, since a warm up was to prepare for what was to follow, a better preparation for the race might be for athletes to run two to three ‘extended strides’. So, rather than the 25 to 40 metre sprints they had been performing, they would now run two to three times up to 300 metres distance at 1500/3000 pace, regardless of race distance.

These extended strides would then ‘prime’ the body’s ability to accommodate and adapt to the demands on the metabolic energy pathways and oxygen delivery systems once the start gun was sounded. This would reflect the distance of the race, whether it was 800m or 10,000m. From the mid-70s, ‘extended strides’ became a part of the pre-race warm up for the athletes I coached, who were usually able to complete these strides between three and eight minutes before the starter’s pistol. All reported that they felt their subsequent performance was better when they were able to do the extended strides.

It has been said many times that the practice of coaching is always ahead of research in exercise physiology, or in any of the sport sciences for that matter. This is because coaches are always innovating in the field and are concerned with producing direct, visible performance benefits. These so-called ‘empirical means’ of evaluating the effectiveness of doing ‘something’ are variously respected by physiologists who for their researches, quite rightly, need concrete data to prove whether something ‘works’, or not.

In recent times research in exercise physiology has taken an increasing interest in the athlete’s warm up. In 2003, the team working with Paula Radcliffe’s respected physiologist Dr Andrew Jones reported, “‘Warm-up’ activity is almost universally performed by athletes prior to their participation in training or competition. However, relatively little is known about the optimal intensity and duration for such exercise, or about the potential mechanisms primed by warm-up that might enhance performance.”

Previous research, however, by Jones and his colleagues had concentrated in the area of VO₂ kinetics, how the body takes up oxygen to be used for energy production. They had already revealed that ‘priming exercise’, similar in format to the ‘extended strides’, could

improve subsequent cycling performance by 2-3 per cent. They reported that mild accumulations of lactate, residual from the priming exercise, were detected and did not appear to be a negative factor. The state of knowledge of what might be happening in the body following the priming exercise was reflected by their statement that, “The physiological mechanism(s) that limit the rate and the extent to which muscle oxygen uptake increases following the onset of exercise, and which are apparently altered by the performance of prior heavy exercise, are debated.” As early as 2001 Jones A, et al had written of their research showing that the benefits of deliberate priming exercise persisted for at least 12 minutes following the conclusion of this exercise.

Whether it’s field-based or research-based, the evidence is gathering that the type of running you do in the warm up before a race can have significant and very beneficial effects on performance. Perhaps you have already tried something similar to the extended strides before races? If not, why not give them a try with your athletes or yourself. Then, having benefited from their effect in racing, why not move the extended strides back into your training so that you are better prepared to meet the demands of the session from the outset and, in addition, the extended strides become additional ‘training’ for how quickly your body responds to action. Your body becomes ‘primed for action’ and, in races, will adapt more quickly and effectively to the VO₂ and metabolic demands.



Hicham el Gourouj utilised extended strides at 1500m pace to prepare for his races

Having looked at the ‘front end’ of the race, and what we can beneficially do in the warm up; let’s now turn our attention briefly to the ‘back end’, how you cool down and what you can do to improve recovery.

Traditionally, the cool down has featured easy running as a key component and this should always be retained as a closing activity. At the current time of the training year, however, when most athletes are in their late specific preparation or pre-competition phase they frequently perform sessions which accumulate high levels of lactate and acidosis. Now, something more is needed to assist the athlete's recovery. The lactate and acidosis produced during a maximal or near-maximal effort require time to metabolise to a base level. If this does not occur, performance in a repeat effort may be impaired. Thus, techniques to enhance and accelerate lactate and acidosis clearance are of potential benefit to any athlete.

From early in my coaching career, back to the mid-70s, I started using what are now referred to as 'extensive repetitions', immediately after any speed endurance session. An example of such a speed endurance session for a senior athlete might be: three sets of four repetitions of 200m, where the 200s are run at increasing speed to a maximum effort on the fourth repetition. There is 30 seconds between the repetitions and 5 to 7 minutes between the sets. Having completed these repetitions, the athletes have built up a large accumulation of lactate and acidosis. The 'extensive repetitions' now come in, as soon as they are ready and able. An example of these extensive repetitions might be: 4 to 6 runs over 200m at approximately 10 km pace, with one minute recovery. The first request from the coach and the thought of doing these runs is, unsurprisingly, initially unappealing to the athlete - "You want me to do what? But I'm shattered, on my knees."

Once an athlete has performed extensive repetitions a number of times and felt and learned how much quicker the recovery is for the next session, they initiate the extensive reps themselves and perform them willingly. They all agree, however, that the first two of these 'extensive repetitions' continue to be "an effort" but all are surprised how, after 4 to 6 of these 200s, they really have accelerated their recovery and begun the process of adaptation to what they have done in the session. Remember that the improvements in fitness and performance come from the quality of the adaptation to the training, not the training itself.

Let's now take this principal of accelerated lactate and acidosis clearance and apply it to the championship setting. The quality of the performance in each subsequent round in a championship is directly related to the quality of the cool down from the previous round. This is as true a statement whether it is for several events on a single day, or a single event repeated over a number of days. If we accept the statement about preparing for the next round we had better ensure that lactate and acidosis clearance have been

optimised in the cool down. Enter again, the extensive repetitions to provide this service. It may be harder to find the appropriate place at a championship since the track is being used for competition. But it doesn't matter where you do the extensive repetitions, as long as they are done as soon after the event as practical, and are at the appropriate duration and intensity, 10 km pace.

Research has focussed on the 'cool down' for longer than on 'VO2 kinetics', and the results from various sports since the late-80s have supported this concept of the benefits of a more active cool down, particularly after maximal or near-maximal efforts. In swimming, for example, Dr W. McMaster, et al in 1989 demonstrated that "swimming at 65 per cent of maximum velocity significantly improved lactate clearance over passive resting." The results confirmed that active cool down swimming returned lactate values to near resting levels. In correspondence, Dr Jones has confirmed this with regard to lactate clearance, with the literature suggesting that recovery can be accelerated if the cool down is just below the level of lactate accumulation: "The intensity required of approximately 80 per cent VO2max is higher than most athletes would normally do in a cool down (and matches what has been described in the extensive repetitions). Again, your observations here fit nicely with the available science."

Good research is usable research and good practice by coaches in the field innovates ahead of research but



At the finish: the recovery from training and racing should begin as soon as possible in the cool down utilizing 'extensive repetitions'

perhaps can point the way towards future and better cooperation between coaches and researchers. In this article we have looked at athletes' pre-race preparations and also at enhancing the adaptation and recovery from racing and training, with the terms and practice of 'extended strides' and 'extensive repetitions' being introduced. Try them, if you haven't already, and really see the benefits to performance and recovery.