

How to use biofeedback to improve your heart rate recovery times - and, ultimately, your performance

For all endurance athletes operating near or at their peak, the difference between the winners and the also-rans is in the mind. This article will discuss mental techniques that anyone can use to ensure they are more often in the first category rather than the second.

Biofeedback (BF) has been used for many years in the treatment of athletes suffering from anxiety and for injury rehabilitation. It also offers a technique for amplifying psycho-physiological responses and for training the appropriate patterns of response for optimal performance ((Zaichkowsky & Fuchs, 1988). It is this latter aspect that I want to focus on. Using heart-rate biofeedback, Goldstein and colleagues (1977) demonstrated that changes in heart rate could be induced while subjects exercised on a treadmill. Heart rate (HR) decreased as well as systolic blood pressure (SBP) and rate pressure product (HR x SBP) compared to the same subjects in a control condition, who were simply instructed to decrease heart rate. Results were maintained during five weeks of post-training.

I am going to show you how you can use BF yourself to improve your HR recovery times, and, ultimately, your performance.

What you need: a skipping rope, a stopwatch, and an HR monitor (basic models can be bought for the relatively inexpensive price of f60); pen and paper.

Also: calculate your approximate maximum HR using the formula $220 - \text{age}$ (or, if you're a stickler for accuracy, the formula is, $217 - (0.85 \times \text{age})$). Your training zone will be roughly 65-90% of this figure.

What you do First: Hydrate thoroughly with a copious amount of water or a suitable sports drink (the homemade versions are, in my humble opinion, just as good as the commercial varieties). This should be done from about two hours beforehand.

Warm-up: Skip gently with the HR monitor for 5-10 minutes, preferably on a cushioned surface (heel-toe, alternate legs, is recommended in order to warm up the dorsiflexors at the front of your shins). Your heart rate should reach your training zone for at least the last minute of the warm-up.

Stretch: Ensure that you stretch your quads, hamstrings, calves, gluteals and shoulders thoroughly.

Workout: Proceed as in the warm-up for 2-3 minutes until you are constantly in your training zone for one minute. This is where the fun (?) starts. You should aim to elevate your HR up to approximately 85-95% of its maximum; this may coincide with your lactate threshold (see LT in PP issue 100). This can be achieved by increasing the revolutions or skip height, using more strenuous techniques such as skipping with high knees, for example, or crossing over your arms with each skip. Maintain this HR for about one minute, after which you should put aside the rope and note down your HR.

For the next minute, your attention should be focused on the reading on your HR monitor. During this time you should march slowly on the spot, not lifting your feet too high off the ground. You must also repeat a verbal cue, with a frequency approximating that of your resting heart rate (RHR), ie, if your RHR is 70 bpm, you will recite this cue 70 times in a minute. This cue could take the form of a word, such as boomboom-boom, etc, or maybe a sound such as the ticking of a clock (particularly useful if your RHR is 60 bpm!). Concentrate on aligning your HR with this cue for the ensuing minute, while breathing deeply.

The use of concentration cues has been widely advocated in the elite sports arena (Bull, Albinson & Shambrook, 1996), although they usually pertain to what Nideffer (1976) termed a narrow external focus. In this case, you are switching your focus from the insane stimuli you are receiving from your body, and concentrating on an 'ideal' state of affairs, ie, a lower HR (narrow-internal focus). Your breathing should be rhythmical, smooth and originating from the abdomen; your belly should swell with each inhalation. Abdominal breathing is a useful technique, sometimes known as centering, to practise for general relaxation strategies as well as performance improvement (see PP issue 85 for more detail).

Record your HR at the end of the minute, and then return to skipping for a further minute, reaching 90% of your max HR once again. You should repeat the procedure a number of times, the exact number depending on your current fitness level and general fatigue. Be sure to record your HR at the beginning and end of each rest minute.

What does this all mean?

What you will find, almost immediately, is that your ability to control your HR heightens. This will be exemplified by an increase in the difference between your pre- and post-recovery heart rates. By utilizing this procedure once or twice a week, you can improve your heart rate recovery times immensely: get to know the feelings that pervade your body as you lower your heartbeat. It is vitally important to use a cue word. Why? Because increased arousal has consistently been shown to boost performance up to a point, but after that it is detrimental. This is known as the inverted-U hypothesis, first proposed by Yerkes & Dodson in 1908! If you are concentrating too heavily upon the thumping pulse in your chest, head, whatever, you are likely to become hyper-aroused, thereby contributing to an elevated HR. Put more succinctly, the cue word serves as a 'distraction' from the somatic feedback from your body.

There will come a time, and you will know, when you no longer require a HR monitor; you will be able to manipulate your recovery times on your own. I don't need to stress the value of this little technique for the endurance athlete. However, I can hear you complaining, 'But I don't skip, I (insert your activity here).' The reason I advocate skipping is that it provides a stable, static base for learning about the sensations arising from the process, with a pen and paper at the ready for recording data. To make it more sport-specific, you can, for example, carry across the same procedure into an interval session, The key to this method is to focus on your breathing, which leads me on to a technique that can be used in conjunction with the verbal clues.

PADA

PADA is a strategy proposed by Sime (1980). It stands for Pace-Assisted Dissociation/Association, and it goes as follows. You may have heard the terms association and dissociation before in connection with endurance activities, predominantly running. Basically, association is the focusing of one's attention on internal physiological stimuli arising from the exercise experience (eg, breathing rate, body position, etc.), while dissociation is the focusing on either internal or external 'distracting' cues, such as thinking about building a house or looking at the surrounding environment.

PADA combines the two, in that the athlete focuses on one internal stimulus in order to divert attention from another, possibly more debilitating stimulus, such as the prospect of climbing a steep hill near the end of a half- marathon. The athlete (sadly, not swimmers) should aim to synchronize respiration rate and depth with the frequency of leg movements by adjusting length of stride/cadence; synchrony is maintained by counting. Sime suggests that PADA may a) help the respiratory system to ward off fatigue, and b) serve as a self-hypnotic diversion from the rigours of training/competing. This may result in more relaxed training, higher- quality training sessions and, ultimately, improved performance.