LISTEN TO YOUR HEART

Can a medical-grade pulse oximeter prevent overtraining, illness and worry?

By T.J. Murphy

"Listen to your body" is the best advice you can give a triathlete. Best in that tuning in to how your body is adapting is vital to hitting the sweet spot of training. You want gobs of smart, hard work, a precursor to a top performance, without getting tangled up in overdoing it, a precursor to illness and injury.

"Listen to your body" is also the worst advice. It's counter to the focus of hard training. It's virtually impossible to execute while trying to sustain distance from fatigue and discomfort. An exercise beginner tries to ignore discomfort through distraction, like the guy I once saw on a Lifecycle going back and forth between a movie on his iPad and a newspaper. To the competitive athlete, discomfort pain carries vital bits of information. It's data that informs pace management, and the more pain you can handle without blowing up, the better. This is an entirely different frequency than the "listen to your body" channel, so any feedback suggesting you're getting torched is typically dismissed as a nuisance.

Think back to a time in your training when, halfway through a prescribed tempo run, you felt a series of intermittent sharp knee pains. It wasn't a recovery run but a target workout considered a stepping stone toward a season goal. Did you listen to the pain? Or did you pretend you didn't feel it in hopes that it would vanish on its own and not even be worth a mention in the logbook?

It's the hard workouts that can suck you into trouble. Knocking out a hard workout in mighty fashion can psyche you into a state of heedless invincibility. Planned recovery days get supplanted by additional epic workouts.

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Sometimes you get away with it, or think you're getting away with it. Other times it leads to season-burning consequences. One of the hardest workers in the history of triathlon was Germany's Thomas "Hell on Wheels" Hellriegel. He could outwork and drop everyone, except the virus infection known as shingles.

Dotsie Bausch, a seven-time USA Cycling National champ and Olympic silver medalist had little difficulty with hard work during her racing career. In fact, too much of it was the problem. "I was always on the cusp of being overtrained," she says. "My intention was to get as close to that cusp as possible."

A considerable amount of mental duress is a byproduct of trying to stay exactly on the red line. Second-guessing and uncertainty burn fuel too, it seems. Bausch recalls that one of the potent benefits of using a pulse oximeter to gauge her recovery was the psychological relief. In accordance with communicating with her coach and altering the training plan when it needed to be altered, she began using a Masimo pulse oximeter each morning, getting a read on the oxygen saturation of the blood flowing through her arteries. A single number told her whether she was OK or needed an easy day, knowing that another hard day would be a waste and an easy day would allow her to capitalize on previous training stress.

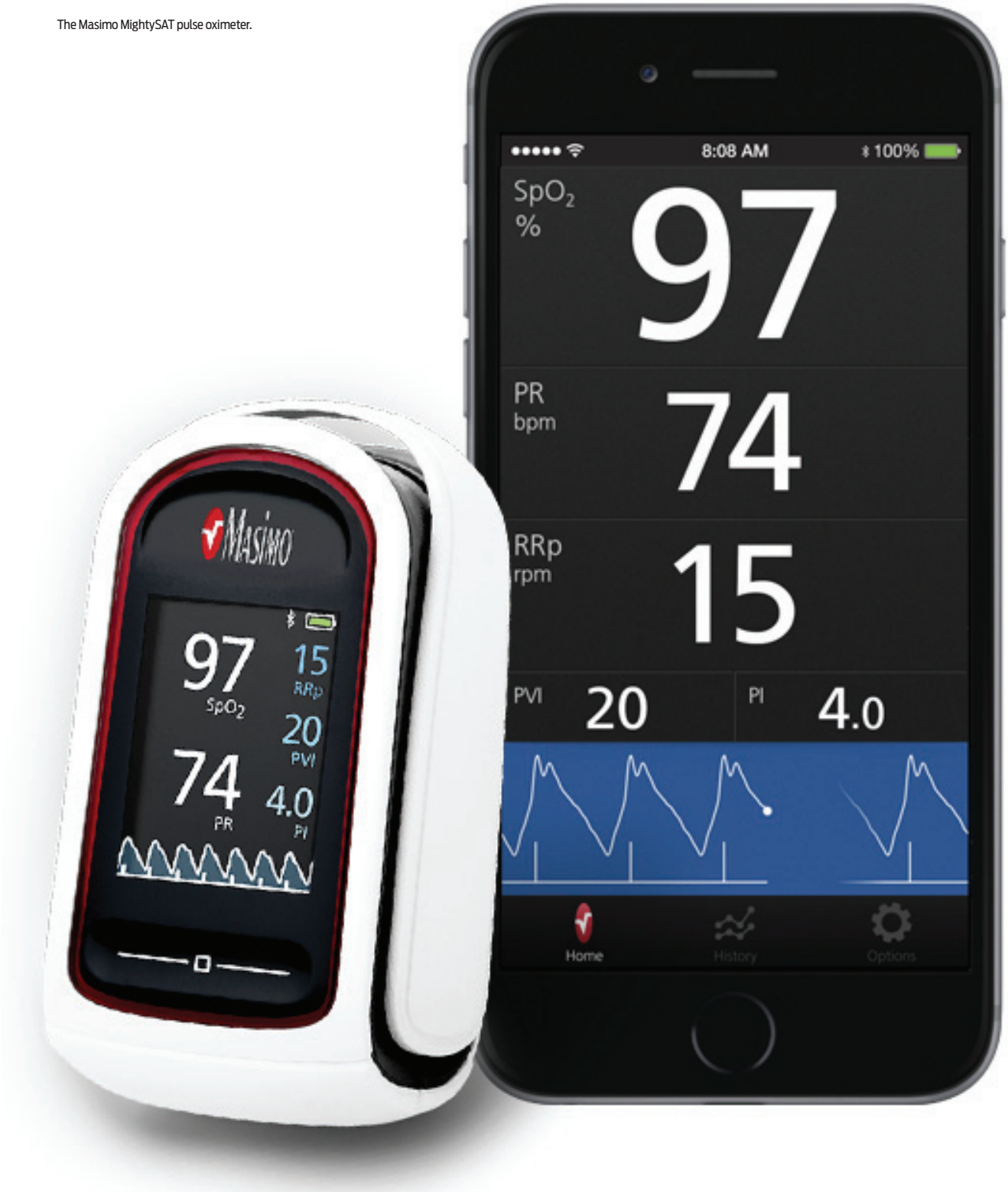
"It calmed me down," Bausch says, describing how during periods of high volume and intensity, as well as the race season, she let the marker tell her whether to back off or not. "I could trust it. I wouldn't get my panties in a bunch about whether I was making a mistake in doing two hard workouts in three days."

The language around pulse oximetry, even the phrase itself, can be a bit disorienting. Many triathletes, especially engineers who are triathletes, have a knack for acquiring every data-collecting gadget ever designed for the endurance crowd. Terms like pulse oximetry and acronyms with subscripts, like SpO2, have an aura about them for those who love Excel sheets, and the technology becomes part of their N = 1 test project.

Then there are those triathletes who are envious of the tech-geek triathletes and spend hundreds of dollars on the most high-end Garmin or Polar they can, in hopes of applying the "What gets measured gets managed" principle espoused by the late guru Peter Drucker. Variables surround the triathlete like biochemistry fireflies that are tough to get hold of.

That leads to the most pleasant surprise of the Masimo MightySat pulse oximeter: It's easy to use. There's no pricking your finger and trying to get a clean drop of blood onto a test strip. It's non-invasive and about as tricky as putting a clothes pin on your fingertip. In fact, that's exactly what it's like. In your first conscious moments, you pluck the MightySat off your night table and insert your finger. A red LED light and an infrared light send waves to a photo sensor through your finger. Heart rate, respiration and SpO2 are measured. A couple of moments later a series of readings dance across the screen.

The Masimo MightySAT pulse oximeter.



SpO2 is shorthand for the saturation of oxygen in your blood, which, if accurately measured, gives you a snapshot of how fatigued you are from the previous day of training. SpO2 shows the status of functional changes to hemoglobin in the adaptation phase of training. When you put yourself through a stressful workout or series of stressful workouts, HIF-1 (hypoxia-inducible factor) is increased and sends a message to the kidneys and liver to produce another agent of communication, erythropoietin, which signals to the bone marrow to manufacture blood. This is a good thing, of course, and when your body is on top of things, your circulatory system is chock-full of red blood cells.

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A healthy, recovered state like this will read a high SpO2 number, like 97, 98 or 99. The basic morning drill is to either record this info each morning from the MightySat, or even easier, link it to an app in your smartphone, to establish a baseline reading for what's good and normal for you.

Then, on those days you wake up and get a reading of 94 (assuming you've bought into the program) you know it's time to scratch any hard workouts for the day in favor of easy workouts, or to at least scale back what you had planned.

Bausch says it took her a while to completely trust what the SpO2 numbers were dictating to her, and at times she would countermand the signal and go out and try and blast a workout regardless. "I'd see the low number but say, 'I feel OK,' then override it."

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The Masimo MightySat is the weapons-grade pulse oximeter. You can buy a cheapie pulse oximeter from Walgreens, which may or may not give accurate readings, but Masimo is a global media company that specializes in patient-monitoring technologies. More than 100 million patients are hooked up to Masimo SET monitors, according to company data.

The robust casing and smartphone sync capacity are the features you immediately notice in the MightySat compared to generic models. The screen is also high definition, surprising me because the pulse oximeter I had previously owned had a low-def pixelated look. I'm not certain what difference it makes–probably none–but at the bottom of the screen of the MightySat, you can watch your pulse graphically displayed in a moving waveform. It's certainly cool to look at, if nothing else.

In addition to giving you quick reads on heart rate, oxygen saturation and respiration, it also submits a "perfusion index": the ratio between "pulsatile" blood versus nonpulsatile blood, i.e., the blood that's circulating versus the static blood in the tissues.

The perfusion index (PI) is the ratio of the pulsatile blood flow to the non-pulsatile or static blood in peripheral tissue. Perfusion Index thus represents a noninvasive measure of peripheral perfusion that can be continuously and non-invasively obtained from a pulse oximeter. While this index has plenty of applications in a hospital setting, it's unclear what information this may impart to a triathlete grinding out a week of training. From those I talked to, there might be, for instance, some insight on hydration levels. But whether this is so might be left to the meticulous and curious triathlete who likes to conduct mini-experiments. Monitoring and charting the data points, including perfusion index, may all prove valuable in evaluating training patterns, recovery, tapering and peaking.

For most, the Masimo is valuable because of the SpO2 and pulse-rate info, both because of the accuracy you get from medical-quality hardware and the simplicity of using it. You put a finger into the unit and in a few seconds, zap: the two largest numbers on the display are the SpO2 and the pulse rate, and if you have Bluetooth enabled, it's already transmitted into your phone or computer. In the old days, it was a matter of waking up, getting your watch out and pressing a finger onto the carotid artery to measure your morning heart rate. Then you would fumble with a pencil to scratch it down in a box in a training journal. If the morning pulse was high compared to whatever the norm was, it was a hint that you were on the edge. If making things easier means you're more likely to do them, this Masimo MightySat may be well worth the $399 I found it for on Masimopersonalhealth.com. I found lower prices at other places online, and the lower-cost pulse oximeter, the iSpO2 is currently $249 on Masimopersonalhealth.com.