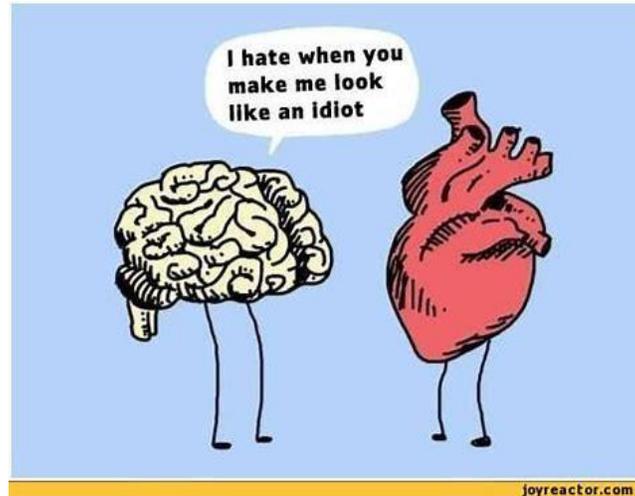


TTIPS VOL. 38/22 – INSIGHTS - Impact of Heavy Exercise on Heart Health -



Introduction

When I'm riding I wear a heart monitor that displays my real-time heart rate in "beats per minute (bpm)" on my Garmin dashboard. Many cyclists do the same. When a cyclist is training it is the best way to monitor their performance within their prescribed training regimen.

But you certainly don't need to be on a training plan to be curious about your heart's performance while you are riding. In fact, I'll bet that most of us in KABC have more than a casual interest in our heart health. Though presumably we all enjoy riding our bikes because it's fun, it's almost certain that all of us ride also because we recognize the undeniable health benefits of doing so. Does that sound like you?

I've been an endurance athlete for all of my adult life. Lately my curiosity about cardiac performance has turned to concern. No, I'm not having any problems. But routinely when I ride, my heart rate exceeds the rule-of-thumb that specifies what your maximum heart rate should be at any given age. You probably have heard of the rule-of-thumb formula: your maximum heart rate is the difference between the number 220 and your age. So, for example, if you are 67 years old, your max rate (according to the rule of thumb) is 153 bpm ($220 - 67 = 153$).

Now of course I realize that this is a generalized rule and not an inflexible medical certainty. But still, I wonder.....how closely should I pay attention? I need to ask my doctor and perhaps have a

cardiac-focused exam to be sure. In the meantime, I've been doing some reading on the topic, and looking for the latest credible research pertaining to endurance athletes.

You may also be curious. If so, the next two TTIPS volumes will deal briefly will cover recent research on how much exercise is too much for your heart, and then how to know if you are overdoing your exercise regimen.

How Much Exercise Is Too Much for Your Heart?

The Six Minute Mile

October 19, 2022

Saying that endurance sports can cause problems for your heart is like saying that smiling can be bad for your mood. It's just too counterintuitive to take seriously. But there is long-established research showing that it could be as serious as a heart attack. Many long-time runners have an abnormally high coronary artery calcium (CAC) score, which is scary news because high CAC scores reliably predict an elevated risk of serious (and potentially fatal) heart problems in the general population. A recent analysis of this data, however, will warm the hearts of our readers: "Two Promising Updates on Heart Health in Endurance Athletes." [[Note from the editor: this article appears below in this volume.]] The key finding is that not all calcium is equal. Runners' plaque build-ups are often smooth, hard, and unlikely to rupture. That means even if they score high on a CAC test, they're not necessarily at risk in the same way that inactive people can be. Experts feel that a "bad" CAC result doesn't mean you should stop exercising, but it's one factor to consider. Another one is the "reverse J curve" of mortality rates in response to exercise. What this means is that as you work out more, your mortality risk drops. Studies have uncovered a turning point in some athletes, where they start coming back toward increased risk as they push beyond their threshold. Here, there's debate as well on whether or not the studies' methodologies were flawed, but it's something to keep in mind. If you're worried about exercising too much, keep an eye out for these "Warning Signs That You're Pushing Yourself Too Hard In the Gym." [[Note from the editor: This last article will appear in next week's volume. Though this article is not cycling specific, I thought it is relevant to our sport.]]

Two Promising Updates on Heart Health in Endurance Athletes

Alex Hutchinson/Outdoor Magazine

August 18, 2022

Reporting on emerging science can sometimes feel like watching live coverage of an ultramarathon. Sure, there's the occasional dramatic move, but for long stretches of time it feels like nothing is happening. Beneath the surface, though, the action continues. Fatigue mounts, blisters begin to form, an aid station is missed... the evidence gradually accumulates, and only later do we realize when the outcome was settled.

In that spirit, I have a couple of mid-race updates on a topic of longstanding interest: the potential deleterious effects of too much endurance exercise. I've been reporting on this controversy for more than a decade now and summed up the current state of evidence most recently last summer. It would be nice, of course, if we now had final evidence about whether training for marathons or ultramarathons might damage the heart. Instead, it's become clear that the perfect study is almost impossible to design, because you simply can't randomize people to spend a few decades either running marathons or lying on the couch. Still, the steady drip of incremental evidence continues, and two new studies fill in some important gaps.

Stiff Arteries

The first one, published in the *British Journal of Sports Medicine*, explores the links between exercise and atherosclerosis, the build-up of plaques that narrow and stiffen your arteries. One way to test for atherosclerosis is to get a coronary artery calcium (CAC) score, which uses a CT scan to assess how much calcium is present in your heart's arteries. Recent evidence suggests that masters endurance athletes tend to have higher CAC scores than non-athletes, perhaps because of wear and tear from years of pumping all that blood during exercise. That's not good, because high CAC scores reliably predict an elevated risk of serious and potentially fatal heart problems in the general population.

The good news is that endurance athletes tend to have different plaques compared to non-athletes. The athletes have plaques that are smooth, hard, and unlikely to rupture; the non-athletes have softer plaques that are more likely to break off from the artery wall and block the flow of blood. So there's a theoretical argument that high CAC scores shouldn't be considered as much of a problem in athletes as they are in others. But no one has demonstrated that this is how it pans out in the real world.

This is where the new study comes in. A group led by Pin-Ming Liu of Sun Yat-sen University in China analyzed data from a long-running study whose subjects got a baseline CAC test back in 2000 or 2001, a follow-up CAC test five or ten years later, and filled out questionnaires on their exercise habits on at least three different occasions during the study. These repeated measures are crucial, because it can distinguish between those whose CAC scores are high (perhaps simply because of genetic bad luck) and those whose scores are increasing (presumably due to some lifestyle factor such as exercise).

They looked at three groups with a total of about 2,500 subjects: those who consistently did less than the recommended amount of exercise; those who consistently hit or slightly exceeded the recommendations; and those who averaged at least three times the recommendations. In this case, the recommended amount of exercise, based on public health advice, is 150 minutes

a week of moderate exercise or 75 minutes a week of vigorous exercise, with activities like running counting as vigorous.

There were two key conclusions. First, the group doing the most exercise was indeed more likely to have an increase in CAC score on their second test, consistent with previous studies. Second, despite their increased CAC scores, the high-exercise group was not more likely to suffer adverse cardiac events during the study's follow-up. This, too, is consistent with the idea that exercise promotes the formation of plaques, but those plaques don't carry the same risks as plaques in sedentary people.

This is far from the final word on this topic, in part because only a handful of subjects had exercise levels comparable to those of an elite endurance athlete. But it's an encouraging sign that CAC scores mean something different in exercisers than they do in non-exercisers.

The J-Curve

Debates about CAC scores and other risk factors sometimes feel a bit abstract. The study many of us crave is much simpler: take a bunch of people, find out how much they exercise, and wait to see who dies first. Many such studies have been done, but their results are difficult to interpret because there are so many other differences, beyond exercise habits, between those who choose to run 100 miles a week and those who choose not to run at all.

Despite those caveats, there were two such studies, and one from the Cooper Clinic in Texas and the other from Copenhagen, that claimed to see a "reverse J-curve" in the relationship between exercise amount and mortality risk. Doing a little exercise produced a dramatic decrease in your chances of dying early; doing more produced a modest further increase; but doing too much bent the curve back upward and began increasing your risk again.

Numerous other studies have tested the same idea and failed to find evidence that more exercise, beyond a certain point, raises your risk of premature death. But given the imprecisions inherent in this kind of observational data, it's hard to know which study to trust (especially when you really want a particular conclusion), so I normally wouldn't report on yet another study finding that too much exercise isn't bad for you after all.

This one has an interesting twist, though. It's published in *Circulation*, by a group led by Dong Hoon Lee of Harvard's T.H. Chan School of Public Health, and it follows 116,221 adults from the Nurses' Health Study and the Health Professionals Follow-up Study, beginning in the 1980s. Over the course of 30 years, there were more than 47,000 deaths among the subjects, which means you're not drawing conclusions on the basis of small numbers. (The Copenhagen study I mentioned above famously suggested that "strenuous" running raises your risk of premature death on the basis of just two deaths in that group.)

The crucial detail is that subjects in the new study were asked about their exercise habits every two years, instead of just once at the beginning of the study. This allowed the researchers to divide subjects into groups based on their average exercise levels over the course of the study,

rather than relying on a single snapshot of exercise habits to deduce someone's health as much as 30 years later.

The headline result is that those doing 150 to 300 minutes a week of vigorous exercise such as running (or, somewhat equivalently, 300 to 600 minutes a week of moderate exercise such as walking) were about half as likely to die during the study. Even after adjusting for other secondary benefits of exercise like lower body mass index, their risk was still about a quarter less. Note that 300 minutes a week is five hours of running--not a heavy-duty ultramarathon training program, but still a substantial amount of exercise.

As for those doing more than five hours a week, the benefits stayed about the same. At least, they did if you use the average physical activity levels over the course of the study. When the researchers reran the analysis using just the first exercise questionnaire from the 1980s, the reverse J-curve reappeared. There are several problems with relying on a single measure of exercise habits, the researchers point out, including the risk of reverse causation: declining health before the baseline assessment might spur you to do more exercise, leading to the false impression that exercise causes bad health. This is the way nearly all the previous studies of exercise and mortality have been conducted, so the new results may finally explain why a few studies have observed that reverse J.

It's still too early to declare that years of serious endurance training have no effect on the heart. In fact, it's clear that training does change the heart--that's kind of the point--and it wouldn't be surprising if those changes sometimes end up having negative effects. But the epidemiological evidence continues to accumulate that the overall effects on longevity are either positive or, at worst, neutral. And that doesn't even take into account how much fun it is.

Again, next week we feature an article that discusses how to know when you might be overworking your body with excessive exercise.

Okay riders, see you next time. Until then,

Make Every Ride Epic,

Darryl