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Five things athletes should know about their hearts.

Performance athletics—in fact, any form of intense exercise—increases the body's need for oxygen. Elite and endurance athletes, in particular, experience unique adaptations; for example, their leg and arm muscles increase in strength and size.

The heart responds, too. It's the engine that keeps oxygen-rich blood supplied to the muscles. With regular, vigorous aerobic activity, the athlete's heart begins to change over time, growing larger and stronger, with increased capacity.

As athletes exert energy, the heart rate must naturally increase in order to move more blood. Every athlete, however, has his or her own unique maximum heart rate that cannot be modified. It's a genetic preset: no matter how much or how hard you train, your heartbeat will never exceed its genetic limit.

But if an athlete's maximum heart rate has already been reached, how is it possible to increase blood flow and meet the demands of even more strenuous training? The heart itself makes it possible, literally by remodeling. In response to prolonged endurance training, the heart's four chambers dilate to accommodate the higher blood flow. Thus, at any given heart rate, the heart is able to pump more blood.

This remodeling has a positive effect on the resting heart rate as well, which tends to drop significantly. While resting beats-per-minute in the 70s or 80s are considered normal for most people, an athletic person's rate may dip as low as 30.

The heart becomes better equipped to transport oxygen and support the higher metabolic demands of the exercising muscles. The net result is an increase in VO_2 max—a true measure of cardiopulmonary capacity and an important determinant of endurance exercise performance. The VO_2 max can be objectively measured with a specialized exercise test.

1. "Athlete's Heart"...or something more concerning?

Athletes who pursue intense endurance exercise for five hours or more per week may develop *exercise-induced cardiac remodeling*—often referred to as *athlete's heart*—a physiologic response where the heart becomes larger and more efficient than average as a natural response to intensive exercise.

But is athlete's heart dangerous? In most cases, no.

It's important to distinguish between normal and abnormal enlargement of the heart muscle. For example, hypertrophic cardiomyopathy is an abnormal thickening of the heart that results from a genetic disorder, and may occur in as many as one in 200 people. An abnormally enlarged heart doesn't function as efficiently as a healthy one—so with advanced testing, we try to differentiate athlete's heart from a pathologic condition.

Sudden cardiac death in performance athletes sometimes does occur, even in a young athlete considered to be in his or her physical prime. In athletes under age 35, we often find genetic or congenital cardiovascular conditions, including coronary artery anomalies, hypertrophic cardiomyopathy, and inherited arrhythmia syndromes. With athletes 35+, the culprit tends to be a condition acquired over time, such as coronary artery disease.

2. Athletes can have high blood pressure

Intense exercise over decades certainly reduces the risk of cardiovascular disease. But it doesn't completely eliminate it.



Some components of cardiovascular disease are genetic—for example, hypertension (high blood pressure) and high cholesterol. Both can affect even the fittest athlete.

In one study, researchers found that as many as one-third of competitive athletes met criteria for elevated blood pressure based on the current U.S. hypertension guidelines. Male athletes—as well as athletes with a high body mass index (BMI)—showed a greater risk of elevated blood pressure, though it's not apparent whether the related BMI was high due to the athlete's musculature or excess fat.

Even in younger athletes, elevated blood pressure has been shown to alter the structure and function of the heart, an indicator that their elevated blood pressure had existed for some time.

Blood pressure for many athletes tends to be taken in a single visit; however, a diagnosis of hypertension requires measurement over at least two visits. Athletes who seem to be in a hypertension "gray area" should be monitored consistently to assure that they don't develop frank hypertension. Regular exams, bloodwork, and a detailed cardiovascular history can help identify possible issues that call for further investigation.

3. An athlete's age makes a difference in heart health

As athletes age, they're naturally more prone to developing cardiovascular disease, regardless of how strong their heart may be. Fitness and an active lifestyle can help to protect against this, but not entirely.

Again, vigilance is essential. Besides seeing a physician for annual checkups, regular screenings, and bloodwork, it's important that the older athlete seeks attention immediately if he or she experiences any of these warning signs:

- An abrupt performance decrease—for example, the cyclist who suddenly falls short of normal times or the runner who can't keep up as usual with other team members
- Feeling greater tiredness than usual
- Abnormal shortness of breath during or following a workout
- A burning sensation in the chest or upper abdomen, especially in athletes with no history of gastrointestinal problems or heartburn

The issue may be nothing more than indigestion, joint pain, dehydration, or a bit of over-training. But consulting a medical professional is much safer for the aging athlete than avoidance or denial.

4. Symptoms may not be present, and it's hard to screen for everything

Sudden cardiac arrest or death in the athlete is a rare but tragic event. These deaths are met with a sense of confusion as being an athlete is thought to be synonymous with health and immunity from cardiovascular disease. While routine exercise has consistently been shown to be beneficial for cardiovascular health and longevity, it does not provide complete immunity.

So, should we subject every performance athlete to intensive cardiac screenings? Probably not. But every athlete should have a healthcare provider who understands their sport and receive a regular check-up annually. Those with specific concerns or risks can benefit from seeing a cardiologist with an understanding of exercise physiology and the cardiac demands of sport.

Worthy of emphasis, though, is emergency preparedness for athletes, coaches, trainers, parents, and spectators. In the hands of just about anyone, an automated external defibrillator (AED) is simple to deploy and can have enormous life-saving potential. The AED delivers a controlled electrical shock that can correct arrhythmia and get the heart pumping again.

Getting more AEDs onto the athletic field and raising awareness of their usefulness is where we can and should focus. With more immediate attention, started even before qualified medical help arrives, more athletes can be saved.

5. COVID-19 may impact an athlete's heart

Most medical issues spurred by COVID-19 are caused by a severe inflammatory response. Evidence in hospitalized patients shows that as many as 30% of coronavirus patients will experience some type of impact to the heart, one of them being myocarditis or inflammation of the heart muscle.

Data on the prevalence and severity of myocarditis in athletes and active people after having COVID-19 are still limited and given this, we recommend vigilance for athletes who have contracted COVID-19. Whether or not the athlete has had cardiac testing after the illness and full recovery, the best approach to return to athletics is to start slow and rebuild endurance over days to weeks. If any unusual symptoms appear, athletes, trainers, and coaches should immediately stop the training and contact a medical professional.

We'll know more with time. Thousands of recovered athletes are now being monitored via cardiovascular testing, which will advance our knowledge of the effect of COVID-19 on athletes.

Effective and safe exercise for all

Although strenuous exercise can pose an element of heart risk for some, it's important to keep this in perspective.

Very reliable data compiled over many years has shown that regular exercise is truly one of the best things we can do for our health. It increases lifespan by reducing the risk of cardiovascular disease. We also know it can improve mental health and prevent cancer and other diseases.

The American Heart Association recommends at least 150 minutes of moderate exercise, or 75 minutes of vigorous exercise, each week. However, no matter how and when you are able to fit in your exercise, it's good for you.

Our MedStar Heart and Vascular Institute experts are fully equipped to deliver the best possible care to performance athletes. We work regularly with most of this region's professional and college sports teams—offering advanced capabilities such as VO₂ max testing, where we push an athlete to the limit on a stationary bike or treadmill as we monitor his or her oxygen uptake and other parameters.

Of course, we specialize in the cardiovascular caring for athletes at all levels, from recreational to Olympic. Our goal: working together with our patients to keep them active and safely enjoying their favorite forms of exercise.



Meet MedStar Health Sports Cardiologist, A.J. Grant, MD.

"The intricate relationship between intense physical exercise and cardiovascular health in athletes is a dynamic and multifaceted domain. As a sports cardiologist, I advocate for a balanced approach that emphasizes regular cardiovascular screening and vigilant monitoring, tailored exercise regimens, and a keen awareness of the unique cardiovascular risks and adaptations in performance athletes. Our goal at MedStar Health is to support athletes in achieving their peak performance while ensuring their cardiovascular health and safety, thereby fostering a holistic approach to the care of the athletic heart."

To learn more about MedStar Health or to find a location near you, visit [MedStarHealth.org](https://www.MedStarHealth.org).