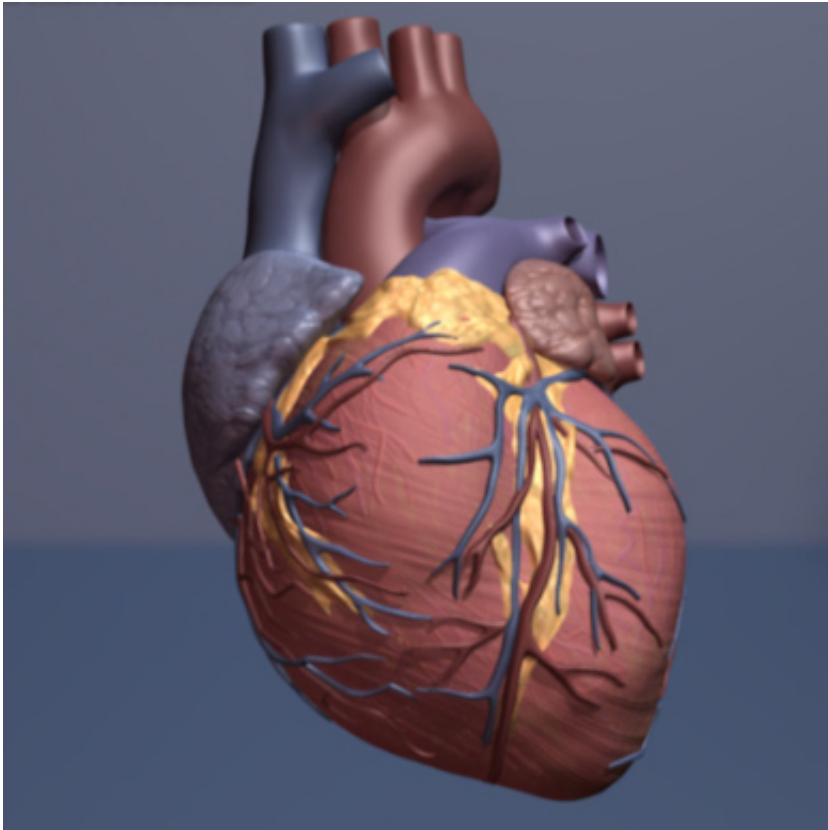


Is endurance training bad for you?

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Human heart. Credit: copyright American Heart Association

In 2012, Belgium scientists published a study that concluded that repeated bouts of intensive endurance exercise at the elite level may result in the pathological enlargement of the right ventricle, which, according to the article, is associated with potential health hazards including sudden cardiac death. The publication was the cause of considerable debate among experts in the medical and sports

communities. Sports medicine physicians at Saarland University have now tested the conclusions of the 2012 study by examining the hearts of elite master endurance athletes. Their findings refute the hypothesis proposed by their Belgian colleagues. The Saarland research team could find no evidence that years of elite-level endurance training causes any long-term damage to the right ventricle. The study has been published in the respected medical journal *Circulation*.

The media reports with depressing regularity the sudden cardiac death of endurance athletes. Just a few weeks ago, television channels, newspapers and the internet reported that Dutch professional cyclist Gijs Verdick had died in hospital a week after suffering a double heart attack during a race.

The potential hazards that [endurance exercise](#) poses to the heart have been the subject of discussion in the medical community for over a century. Although there is now general consensus that the enlarged heart of an athlete is a healthy reaction reflecting the adjustment of the organ to regular endurance training, a number of studies seem to suggest that high levels of endurance exercise can cause pathological changes to the structure of the heart. This was the conclusion reached by a team of Belgian cardiologists and sports medicine physicians in [a study published in 2012 that received considerable global attention](#). The researchers established a link between extreme endurance exercise training and the acute enlargement and functional impairment of the [right ventricle](#) immediately after exercise. More precisely, they observed enlargement and reduced functionality of the right ventricle in athletes who had taken part in several hours of competitive endurance sport. However, longitudinal studies have so far failed to confirm the hypothesis formulated by the authors that endurance exercise results in long-term damage to the right ventricle, now referred to as 'exercise-induced arrhythmogenic right ventricular cardiomyopathy' (ARVC). It was therefore not clear whether the acute enlargement of the right ventricle

after extreme endurance activity, which the Belgian group had identified and which had been frequently discussed among professionals, actually did lead to a potentially life-threatening chronic condition.

For the Saarbrücken research team led by cardiologist and sports medicine physician Prof. Dr. Jürgen Scharhag and Dr. Philipp Bohm, the hypothesis that endurance exercise leads to the pathological enlargement of the right ventricle was not immediately obvious. Scientists at the Saarbrücken Institute of Sports and Preventive Medicine have for years been examining elite athletes from a wide variety of disciplines, including triathletes, swimmers and professional footballers. In all that time, the Saarbrücken researchers never found any evidence underpinning the hypothesis posited by the Belgian team. They therefore decided to test the hypothesis explicitly.

They examined 33 elite master athletes (average age: 47) and compared them to a control group of 33 men who were similar in terms of age, size and weight but who had not done any kind of endurance exercise. The group of athletes, which included former Olympians as well as previous Ironman participants and champions, have been training at an elite level for around 30 years and still continue to train for an average of about 17 hours a week.

The Saarbrücken scientists were able to confirm that the hearts of these athletes, who have been engaged in elite level endurance activities for many years, were, as expected, significantly larger and stronger than those of members of the control group. 'But we found no evidence of lasting damage, pathological enlargement or functional impairment of either the right or left ventricle in the athletes who had been doing long-term intensive elite-level endurance exercise,' explains Philipp Bohm, who is now working at the Cardiology Centre at the University Hospital Zürich.

By focusing on highly trained and active elite master athletes, the Saarbrücken research team found a clever means of circumventing a problem faced by researchers interested in these questions. Although cardiovascular magnetic resonance imaging (cardiac MRI) is the best method of examining the heart and, in particular, the right ventricle, it has not been available for very long and it is not a routine technique for examining athletes. Systematic long-term MRI-based studies of athlete hearts will therefore not be available in the foreseeable future. Data from longitudinal studies, in which subjects have been monitored by MRI for years, potentially decades, simply does not exist. 'Our cohort of elite master [athletes](#) therefore represents our best means of investigating the long-term impact of years of competition-level endurance sport,' explains Jürgen Scharhag.

More information: Philipp Bohm et al, Right and Left Ventricular Function and Mass in Male Elite Master Athletes Clinical Perspective, *Circulation* (2016). [DOI: 10.1161/CIRCULATIONAHA.115.020975](https://doi.org/10.1161/CIRCULATIONAHA.115.020975)

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