
RSNA Press Release

Combining Resistance and Endurance Training Best for Heart Health

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OAK BROOK, Ill. — A study of triathletes published in the online edition and October issue of *Radiology* reveals that the heart adapts to triathlon training by working more efficiently.

"To our knowledge, this is the first study using MRI to investigate effects of triathlon training on cardiac adaptations," said lead researcher Michael M. Lell, M.D., associate professor at the University of Erlangen-Nuremberg in Erlangen, Germany.

Dr. Lell and colleagues conducted cardiac MRI on 26 professional male triathletes (mean age 27.9) and 27 male controls (mean age 27.3), who were recreationally active no more than three hours per week. Triathletes in the study were top national and international competitors with six or more years of continuous training. Triathlons are multi-sport events consisting of swimming, cycling and running various distances in succession.

The cardiac MR images revealed that, compared to the recreational athletes, the triathletes had larger left atria and larger right and left ventricles. The triathletes' left and right ventricles also had greater muscle mass and wall thickness.

"In competitive athletes, it is important to distinguish physiological adaptations as a result of training from pathological conditions such as cardiomyopathy, the most common cause of sudden cardiac death," Dr. Lell said.

In cardiomyopathy, the size of the heart's four chambers and the thickness of the heart wall become asymmetrical, and the heart muscle is unable to pump effectively.

"The cardiac adaptations in the elite triathletes we studied were characterized by a balanced increase in left and right ventricular muscle mass, wall thickness, dilation and diastolic function," Dr. Lell said. "These adaptations reflect the nature of triathlon training, which has

At A Glance

- Cardiac MRI shows that triathletes' hearts have a balanced increase in left and right ventricular muscle mass and wall thickness.
- Triathletes also have a lower resting heart rate than non-triathletes.
- A training regimen consisting of both endurance and resistance training strengthens the heart and decreases risk of sudden cardiac death.

both endurance and resistance components."

Dynamic or endurance training includes activities such as running and swimming. Weightlifting is an example of static or resistance training, and cycling is a combination of both forms of exercise. Excessive training in either resistance or endurance disciplines leads to specific heart adaptations, and extreme endurance training is thought to be associated with a predisposition to sudden cardiac events.

"Cardiac adaptations in elite triathletes in our study were not associated with sudden cardiac death," Dr. Lell said.

The triathletes' resting heart rates were also 17 percent lower than those of the control group, which leads to greater cardiac blood supply and more economized heart function.

"The hearts of the triathletes in our study are stronger and able to manage the same workload with less effort," said Dr. Lell.

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"Atrial and Ventricular Functional and Structural Adaptations of the Heart in Elite Triathletes Assessed with Cardiac MR Imaging." Collaborating with Dr. Lell were Michael Scharf, M.D., Matthias H. Brem, M.D., Matthias Wilhelm, M.D., U. Joseph Schoepf, M.D., and Michael Uder, M.D.

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