

Comment on: Athlete's Heart: Is the Morganroth Hypothesis Obsolete?



Keywords

Sports cardiology • Athlete's Heart • Cardiomyopathy • Hypertrophy • Left ventricle • Anabolic steroids • Doping

To the Editor,

We read with interest the brief review by Haykowsky et al. [1], who re-evaluated the Morganroth hypothesis [2] and provide useful information in addition to an earlier important review on this issue by Naylor et al. [3], which unfortunately has not been cited. Among others, the authors contradict the assumption of Morganroth et al. that resistance training leads to concentric left ventricular hypertrophy as a consequence of pressure overload. Similarly, Utomi et al. [4] concluded, based on their findings, that the hypothesis of left ventricular concentric hypertrophy should be revised. We agree that the most common pattern in strength athletes is a normal geometry of the left ventricle. Unfortunately, the impact of misuse of anabolic steroids is not discussed, but only marginally addressed with one sentence to explain a possible reason for an abnormal left ventricular geometry.

In the past and based on Morganroth's hypothesis, a special type of the athlete's heart has been discussed in strength athletes, most common in bodybuilders and weightlifters. In the publications, however, there was mostly no note on a possible misuse of illicit drugs, in particular on widespread anabolic steroids. We would like to point out that we have questioned a disproportionate increase in wall thickness in strength athletes already in 1989 [5] and 1999 [6]. We could demonstrate that clean resistance-trained athletes (weightlifters and bodybuilders) and combined resistance- and endurance-trained athletes (rowers) do not develop a concentric hypertrophy of the left ventricle, given that there is no pathological pressure load or hypertrophic cardiomyopathy. On the other side, the left ventricular wall thickness correlates with the extent of misuse of anabolic steroids [7]. The generally accepted limit of relative wall thickness (cut-off 42%) is rarely

exceeded in clean athletes. Only strength athletes misusing anabolic steroids exhibited distinctly a higher relative wall thickness, together with reduced diastolic and systolic left ventricular function, compared to all other athletes [6,8].

Consequently, anabolic-induced cardiac structural changes, in particular concentric left ventricular hypertrophy, should be paid more attention than in the past

Wilfried Kindermann, MD
Institute for Sports and Preventive Medicine, Saarland University, Saarbrücken, Germany

Axel Urhausen, MD ^{a,b}
^a*Sports Clinic, Centre Hospitalier Luxembourg, Luxembourg*
^b*Sports Medicine Research Laboratory, Luxembourg Institute of Health, Luxembourg*

Jürgen Scharhag, MD *
Centre for Prevention and Sports Medicine, Technical University Munich, Germany
*Corresponding author at: Centre for Prevention and Sports Medicine, Technical University Munich, Georg-Brauchle-Ring 56, 80992 Munich, Germany. Tel. +49 089-289 244 41
Email: juergen.scharhag@mri.tum.de (J. Scharhag).

Received 30 May 2018

References

- [1] Haykowsky MJ, Samuel TK, Nelson MD, La Gerche A. Athlete's heart: is the Morganroth hypothesis obsolete? *Heart Lung Circ* 2018;27:1037–41.

-
- [2] Morganroth J, Maron BJ, Henry WL, Epstein SE. Comparative left ventricular dimensions in trained athletes. *Ann Intern Med* 1975;82:521–4.
 - [3] Naylor LH, George K, O'Driscoll G, Green DJ. The athlete's heart: a contemporary appraisal of the 'Morganroth hypothesis'. *Sports Med* 2008;38:69–90.
 - [4] Utomi V, Oxborough D, Ashley E, Lord R, Fletcher S, Stembridge M, et al. Predominance of normal left ventricular geometry in the male "athletes heart". *Heart* 2014;100:1264–71.
 - [5] Urhausen A, Hölpes R, Kindermann W. One- and two-dimensional echocardiography in bodybuilders using anabolic steroids. *Eur J Appl Physiol Occup Physiol* 1989;58:633–40.
 - [6] Urhausen A, Kindermann W. Sports-specific adaptations and differentiation of the athlete's heart. *Sports Med* 1999;28:237–44.
 - [7] Urhausen A, Albers T, Kindermann W. Are the cardiac effects of anabolic steroid abuse in strength athletes reversible? *Heart* 2004;90:496–501.
 - [8] Baggish AL, Weiner RB, Kanayama G, Hudson JI, Lu MT, Hoffmann U, et al. Cardiovascular toxicity of illicit anabolic-androgenic steroid use. *Circulation* 2017;135:1991–2002.