

COMUNICAZIONI ORALI
CARDIAC PACING AND ELECTROPHYSIOLOGY

Mechanisms of cardiac maladaptation in Endurance Sport: Atrial Fibrillation

Sergey Bondarev

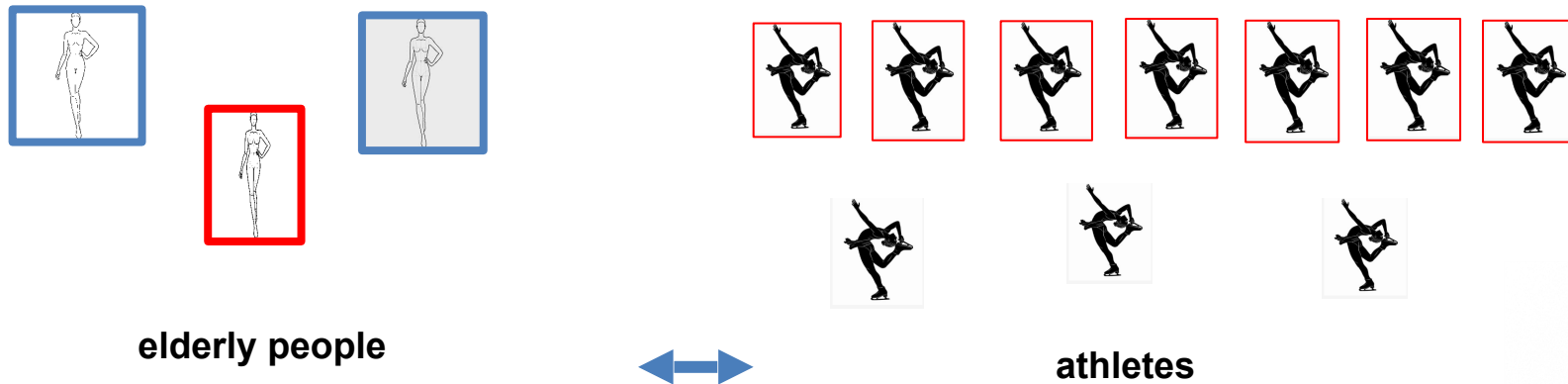
Department of Cardiac, Thoracic and Vascular Sciences and Public Health
University of Padova, Italy

sergei.bondarev@unipd.it



2024 ESC Guidelines for the management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS)

It should be noted that the incidence of AF appears to be increased among athletes, with a meta-analysis of observational studies showing a 2.5-fold increased risk of AF compared with non-athlete controls.



A systematic analysis of 29 studies



Journal of
*Cardiovascular
Development and Disease*



Review

Divergent Cardiac Adaptations in Endurance Sport: Atrial Fibrillation Markers in Marathon Versus Ultramarathon Athletes

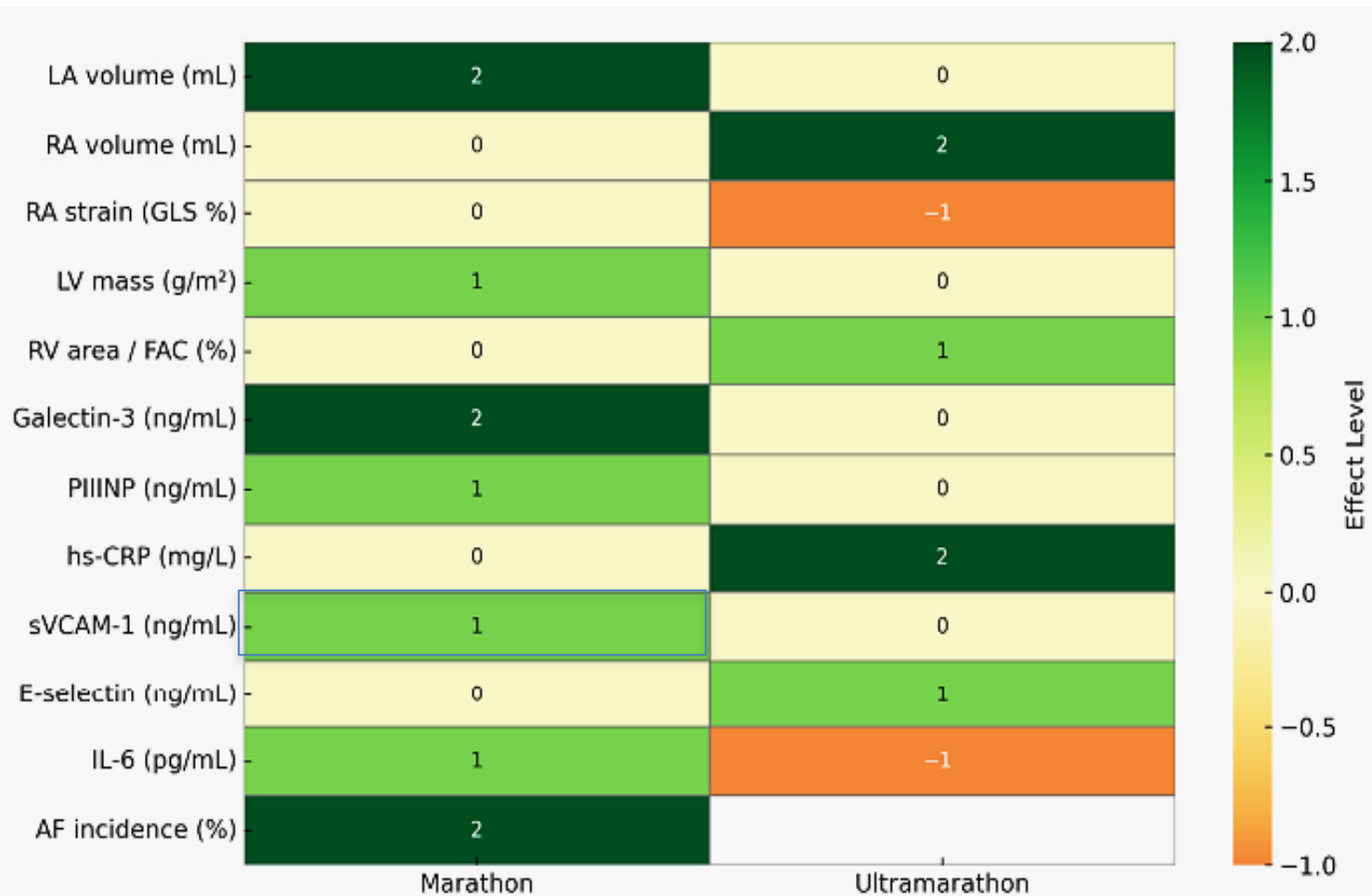
Zbigniew Waśkiewicz ^{1,*} , Eduard Bezuglov ² , Oleg Talibov ³ , Robert Gajda ^{4,5}, Zhassyn Mukhambetov ⁶ ,
Daulet Azerbaev ⁶ and Sergei Bondarev ⁷

The qualitative synthesis of 29 studies, athletes for Marathon and Ultramarathon

The study selection process inspired by the PRISMA.

These studies provided data on structural, electrophysiological, or biomolecular.

Among marathon runners, AF incidence ranged from 0.43 per 100 person-years to as high as 4.4%!



1 = reduction, 0 = no change or not reported, 1 = modest increase (1 study), and 2 = consistent increase (≥2 studies).

LA, left atrium; RA, right atrium; LV, left ventricle; RV, right ventricle; GLS, global longitudinal strain; FAC, fractional area change.

Personal research. Amateur marathon runners

- **75 male athletes**, aged 47+-10.8 hours
- Training duration: 6.5+-2.8 hours
- **48-hour ECG monitoring** with intervalogram evaluation was performed
- **registered arrhythmias**: 6 complex bevs, 1 triplet, 1 bigeminy, 4 TVNS
- **Urine was collected before and after the marathon** and analyzed for: cortisol, testosterone, creatinine, metanephrine, and normetanephrine

A De Antoni, L. Giobbi, M. Calligione, F. Graziano, S. Ungaro, M. Pizzolato, A. Gianni¹, G. Pivetta, L. Da Rin De Monego, G. Architetto, G. Antonelli, G. Tretti, F. Ceccato, A. Carandina, L. Furlan, G. Salafia, F. Magna, Th. da Silva, M. Montagnana, N. Montano, A. Zorzi, E. Tobaldini.

University of Padua; 35128 Padua, Italy;

Ospedale Maggiore Policlinico, Milan, Italy;

University of São Paulo, São Paulo, SP, Brazil.



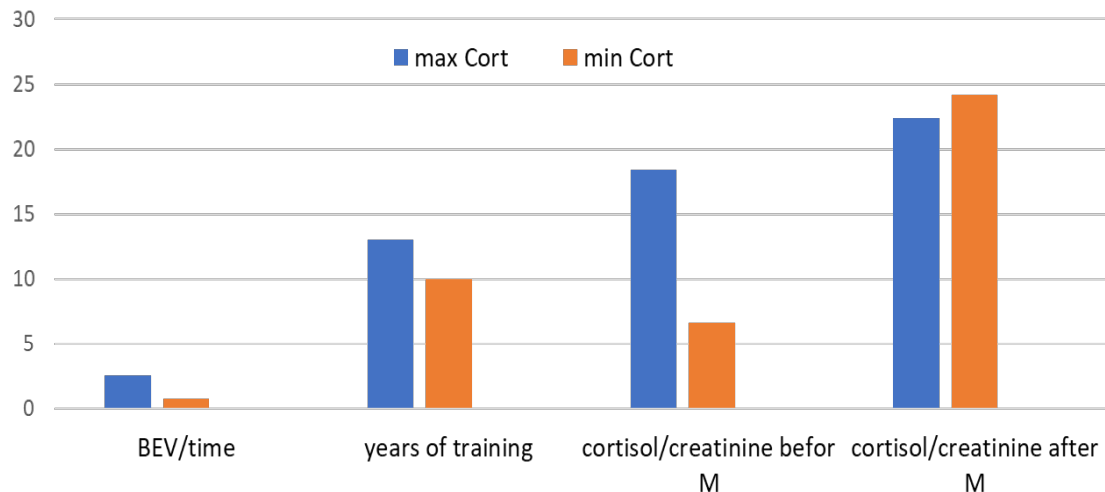
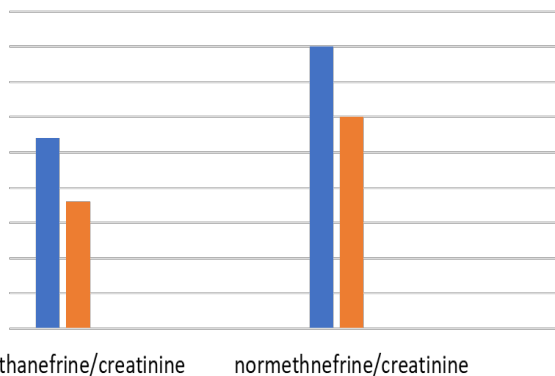
Cortisol (before the marathon) had a normal distribution; all cases were divided into two groups: less than and more than the average value, which was 15+/-14 mmol/l.

MIN

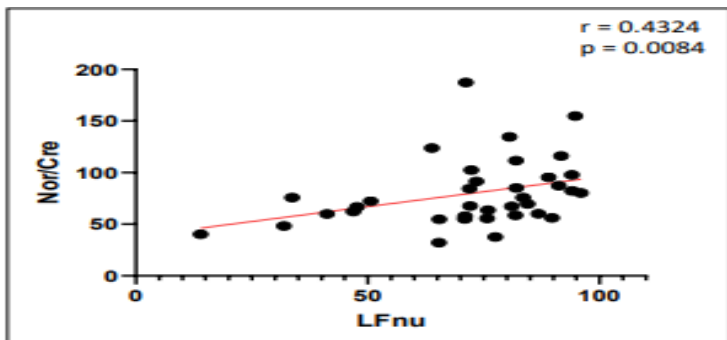
Max

15,4 mmol/l

Cortisol
normal distribution



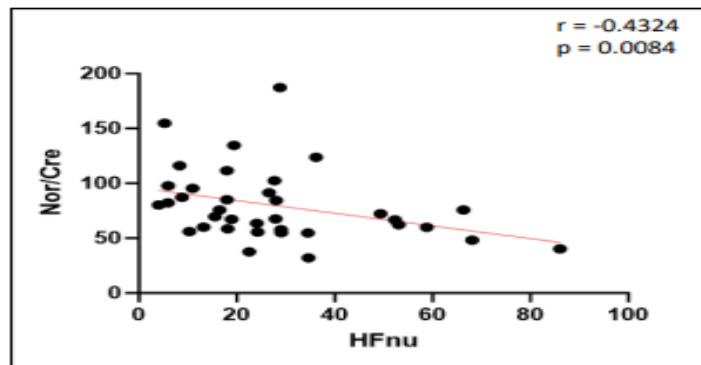
Correlation graphs between normal Low Frequency and normal High Frequency values given by HRV analysis in the frequency domain



Positive association



Greater sympathetic modulation is accompanied by a greater neuroendocrine response to stress



Negative association



Greater parasympathetic modulation is accompanied by a lower neuroendocrine response to stress.

Athletes with higher initial levels of cortisol, as a marker of stress, have poorer adaptation to exercise and a higher risk of arrhythmia.



Physical stress, as well as myocardial ischemia can be accompanied by autoantibodies:

- on the angiotensin II receptor type 1R-AA
- endothelin-1 receptor Type A.
- This stimulates endothelial dysfunction and direct fibrosis.

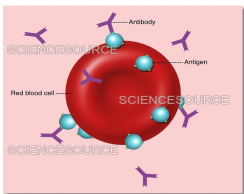
Journal of the American Heart Association

ORIGINAL RESEARCH

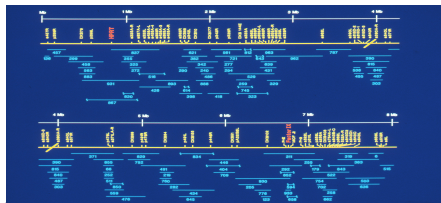
Association of Angiotensin II Receptor Type 1 and Endothelin-1 Receptor Type A Agonistic Autoantibodies With Adverse Remodeling and Cardiovascular Events After Acute Myocardial Infarction

Francesco Tona , MD, PhD*; Giovanni Civieri , MD*; Marta Vadori , PhD; Giulia Masiero , MD; Laura Iop , PhD; Martina Perazzolo Marra , MD, PhD; Valentina Perin, MD; Elisa Cuciz, MSc; Annagrazia Cecere , MD; Giacomo Bernava , BSc; Donatella Tansella, MD; Nataliia Naumova , PhD; Simran Grewal , DO; Emanuele Cozzi, MD, PhD†; Sabino Iliceto , MD†

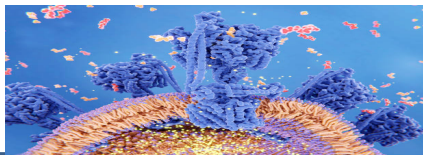




Antibodies:
receptor type 1, endothelin-1
angiotensin II receptor type 1R-AA



Genetic predisposition

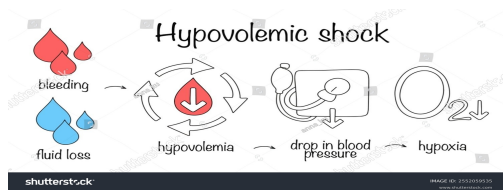


Impaired ATP synthesis,
impaired transmembrane transport

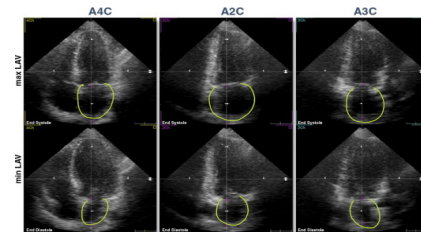
Mechanisms of AF development in athletes



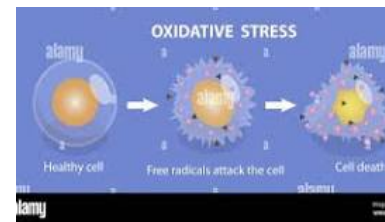
Endurance sports



Environmental exposure,
hypovolemia, electrolyte deficiency



Mechanical impact,
increase in atrial volume



Oxidative stress, adrenaline,
noradrenaline, and
testosterone
levelssympathetic-
parasympathetic balance



Thank you for your attention
sergei.bondarev@unipd.it

