

Atrial fibrillation in athletes

Vassil Traykov, MD

*Dept. of Invasive Electrophysiology and Pacing
Clinic of Cardiology,
Tokuda Hospital - Sofia*

Disclosures: none

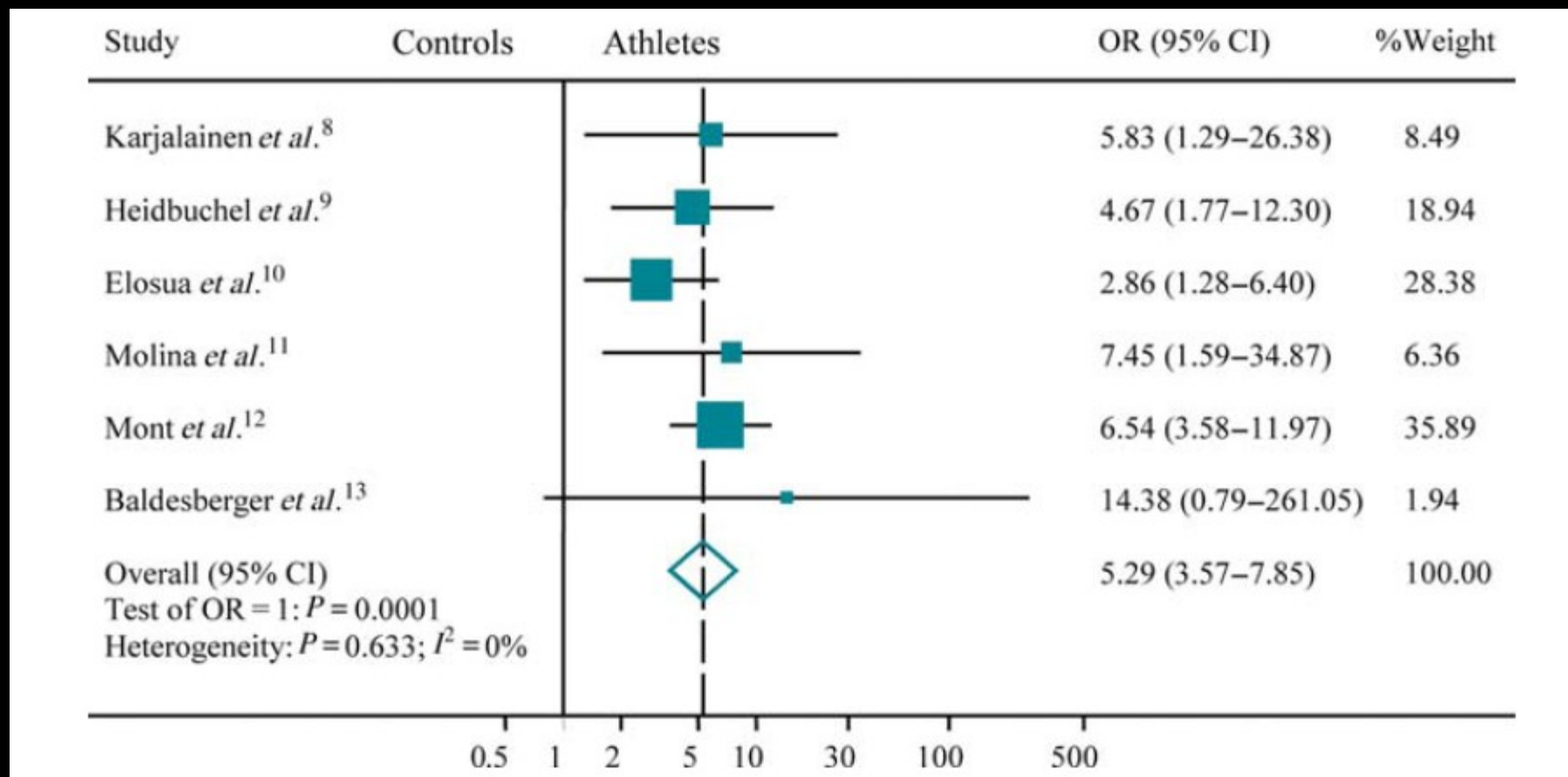
- Evidence for increased incidence of atrial fibrillation in athletes
- Pathophysiology of atrial fibrillation in endurance athletes
- Clinical presentation of atrial fibrillation in athletes and treatment options
- Assessment of eligibility

- Evidence for increased incidence of lone atrial fibrillation in athletes
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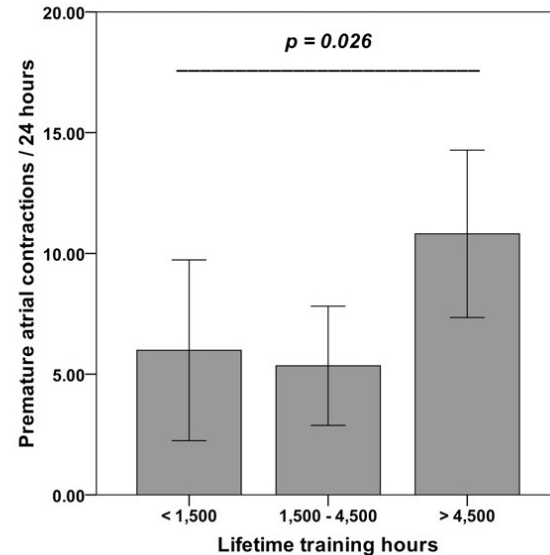
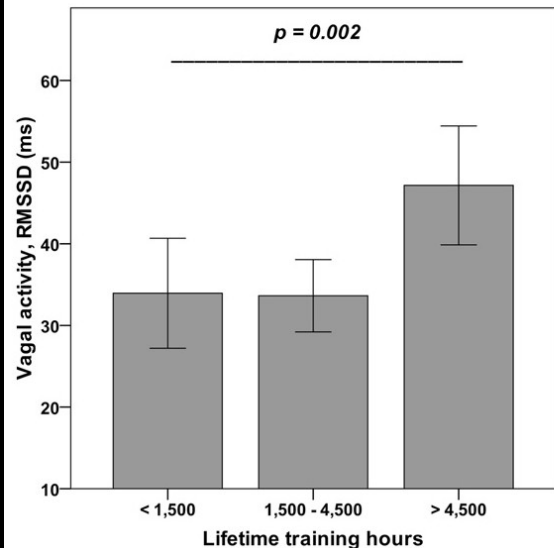
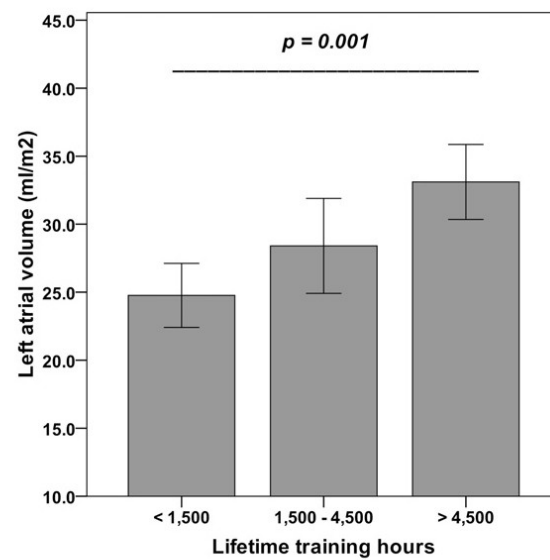
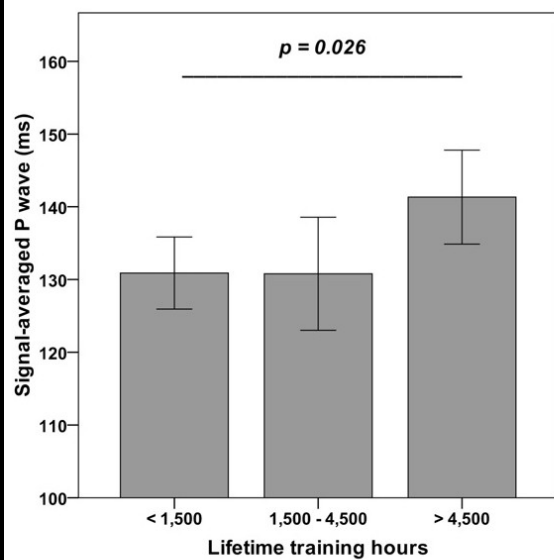
Evidence for increased lone AF incidence in athletes

Studies	Age	Type of sports	No. of patients	Prevalence or OR for AF
Karjalainen et al, 1998	47±5 vs. 49±5	Orienteering	262/373	5.5 (95% CI 1.3-24.4, p=0.012)
Mont et al, 2002	44±13 vs. 49±11	Endurance sports > 3h/week for at least 2 years	70 of 1160 screened	63% vs 15% in non-sportsmen, p=0.05
Elosua et al, 2005	41±13 vs. 44±11	Endurance sports > 1500 lifetime hours	51/109	2.87 (95% CI 1.20-6.91)
Molina et al, 2008	39±9 vs. 50±13	Marathon running	252/305	8.8 (95% CI 1.2-61.2)
Baldesberger et al., 2008	67±7 vs. 66±6	Cycling vs. Golf	134/62	10% in cyclists vs. 0% in golfers, p=0.028
Mont et al., 2008	48±11	Endurance sports	107/107	7.31 (95% CI 2.33-22.9)
Wilhelm et al, 2011	42±7	Running	70	6.7%
Pelliccia	24±6	Various training programs	1777	0.2%

Evidence for increased lone AF incidence in athletes



Evidence for increased lone AF incidence in athletes



How much is enough?

N=70 nonelite athletes

Evidence for increased lone AF incidence in athletes

How much is enough?



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Physical activity, height, and left atrial size are independent risk factors for lone atrial fibrillation in middle-aged healthy individuals

Lluís Mont^{1*}, David Tamborero¹, Roberto Elosua³, Irma Molina¹, Blanca Coll-Vinent², Marta Sitges¹, Bárbara Vidal¹, Andrea Scalise¹, Alejandro Tejeira¹, Antonio Berrueto¹, and Josep Brugada¹ on behalf of the GIRAFA (Grup Integrat de Recerca en Fibril·lació Auricular) Investigators

N=107

Cumulated physical activity	OR (95% CI) for lone AF
0-2077 h	1
2078 – 9318 h	5.6 (1.59-19.75), p=0.0075
≥ 9319 h	15.11 (3.75-60.83), p=0.0001

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Pathophysiology of AF in endurance athletes

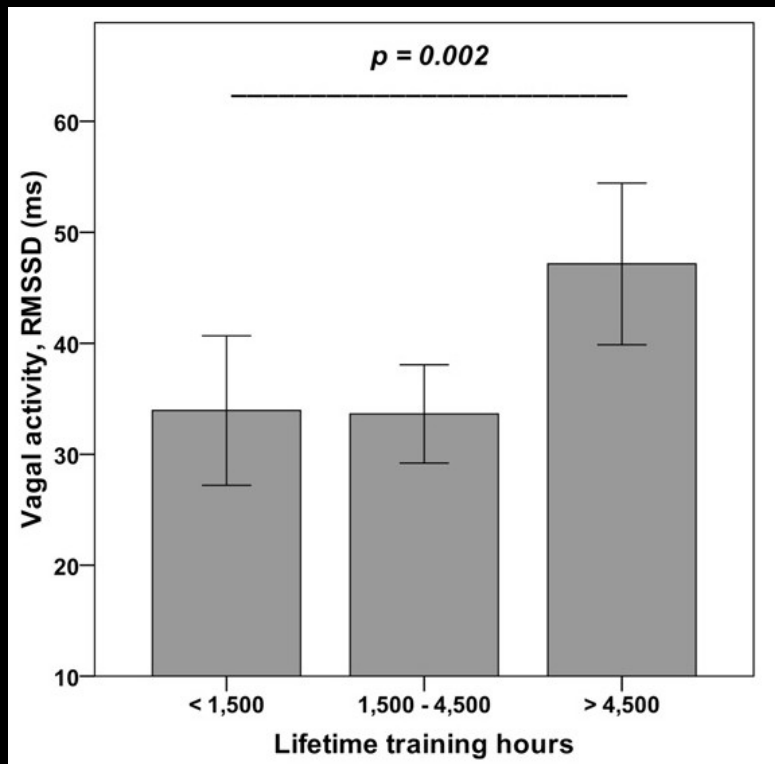
Enhanced vagal tone

Concept of vagus mediated AF

- Predominantly affects males between 30 and 50 years
 - Usually occurs at night and during meals
 - Rarely occurs during exercise
 - Often is preceded by bradycardia

Pathophysiology of AF in endurance athletes

Enhanced vagal tone



	FAs (n = 62)	Controls (n = 62)	P-value
Heart rate, mean, b.p.m.	66 ± 9	70 ± 8	0.004
Heart rate, minimal, b.p.m.	49 ± 8	51 ± 6	0.05
Heart rate, maximal, b.p.m.	124 ± 26	124 ± 17	0.97
Heart rate < 50 b.p.m. during the day, n (%)	20 (32)	6 (10)	0.004
Heart rate < 40 b.p.m. Ever, n (%)	6 (10)	1 (2)	0.11
During the day, n (%)	2 (3)	0	0.49
During the night, n (%)	6 (10)	1 (2)	0.11
Maximal RR interval, ms (mean)	1761 ± 702	1499 ± 223	0.007
median (range)	1565 (1031– 5300)	1500 (1100– 2160)	
Maximal RR interval > 2.5 s	4 (6%)	0	0.12

Pathophysiology of AF in endurance athletes

Exercise-induced structural atrial changes

Fibrosis

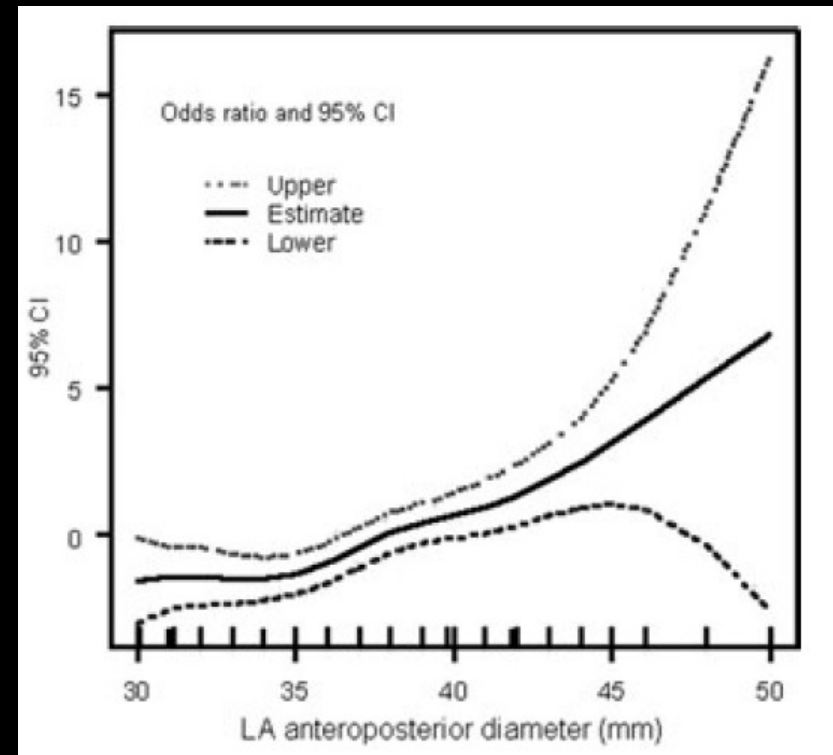
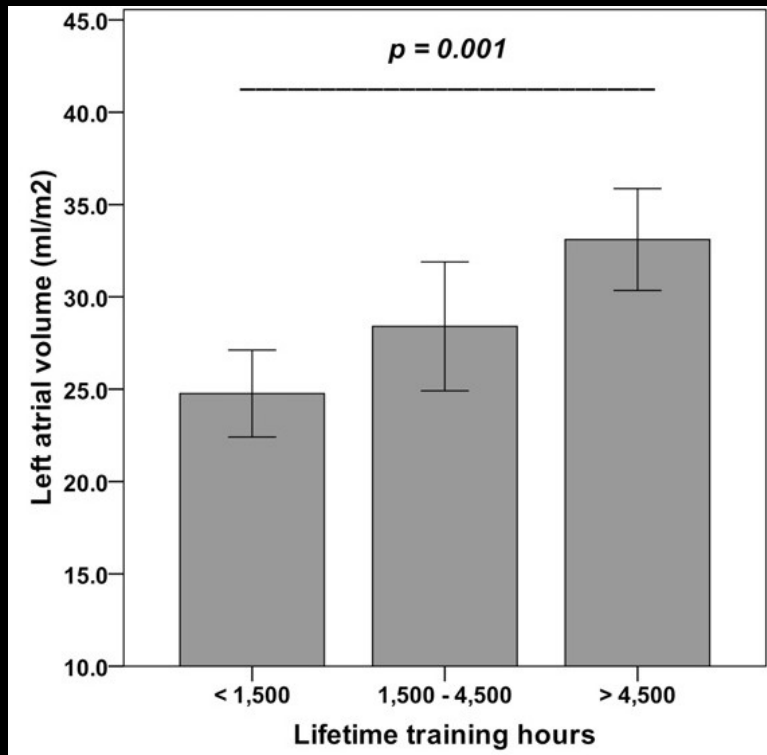
- Elevated markers of myocardial fibrosis (*Lindsay and Dunn, Br J Sports Medicine 2007; 41: 447*)
- Zones of delayed myocardial enhancement assessed by MRI (*Breukmann et al., Radiology 2009; 251:50-7*)

Inflammation

- C-reactive protein elevation (*Circulation 2001; 104: 2886-91*)
- IL-6 elevation (*Am J Cardiol 2005; 95:764–7*)

Pathophysiology of AF in endurance athletes

Atrial remodelling



Wilhelm et al, Am J Cardiol 2011

Mont et al, Europace 2008

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Clinical presentation and treatment options

Typical clinical profile of AF in athletes

- Middle-aged male involved previously and currently in regular, high-endurance sports practice
- Usually paroxysmal occurring at night or after meals
- Progression to persistent AF not uncommon

Clinical presentation and treatment options

Management

Sport activity reduction

Rate control:
Beta blockers
*Target HR difficult
to reach*

Rhythm control:
Class IC
*Caution with IC flutter and
1:1 AV conduction*

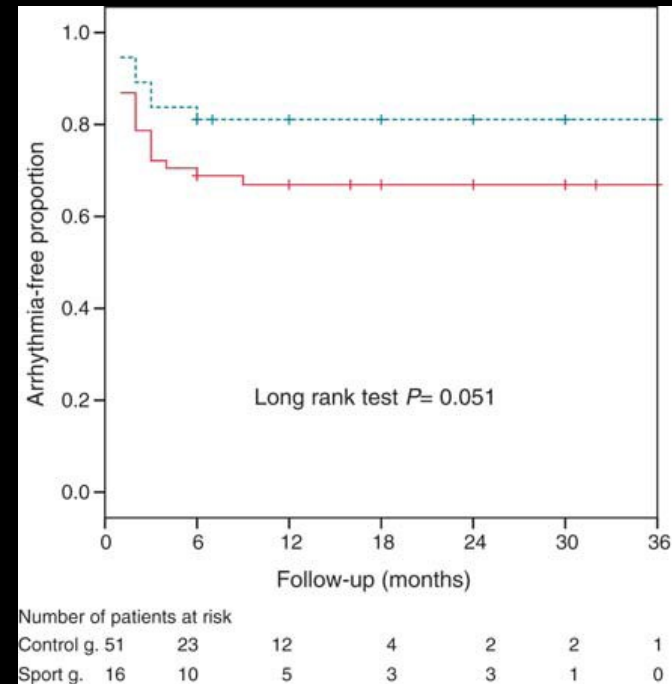
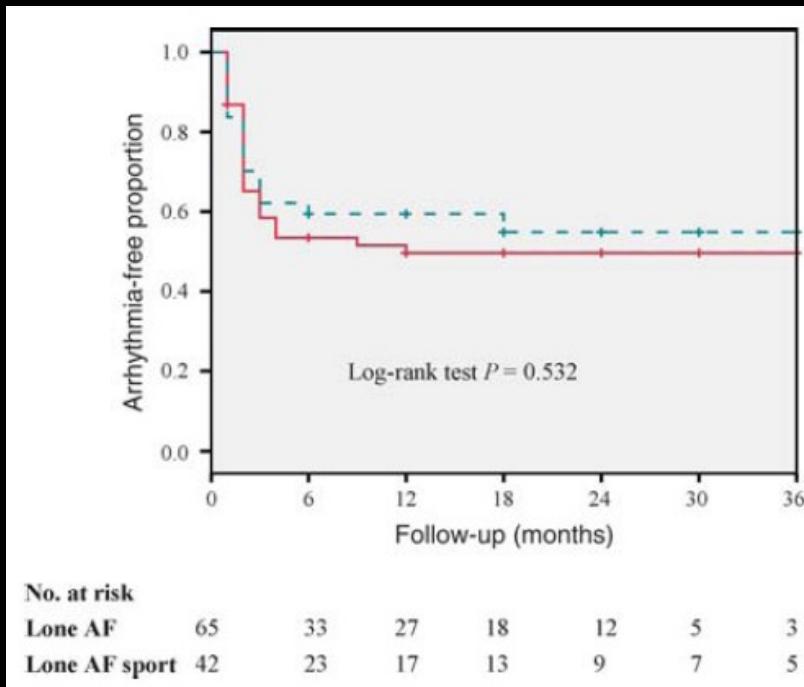
**Pill-in-the-pocket
approach**

Catheter ablation

Clinical presentation and treatment options

Management

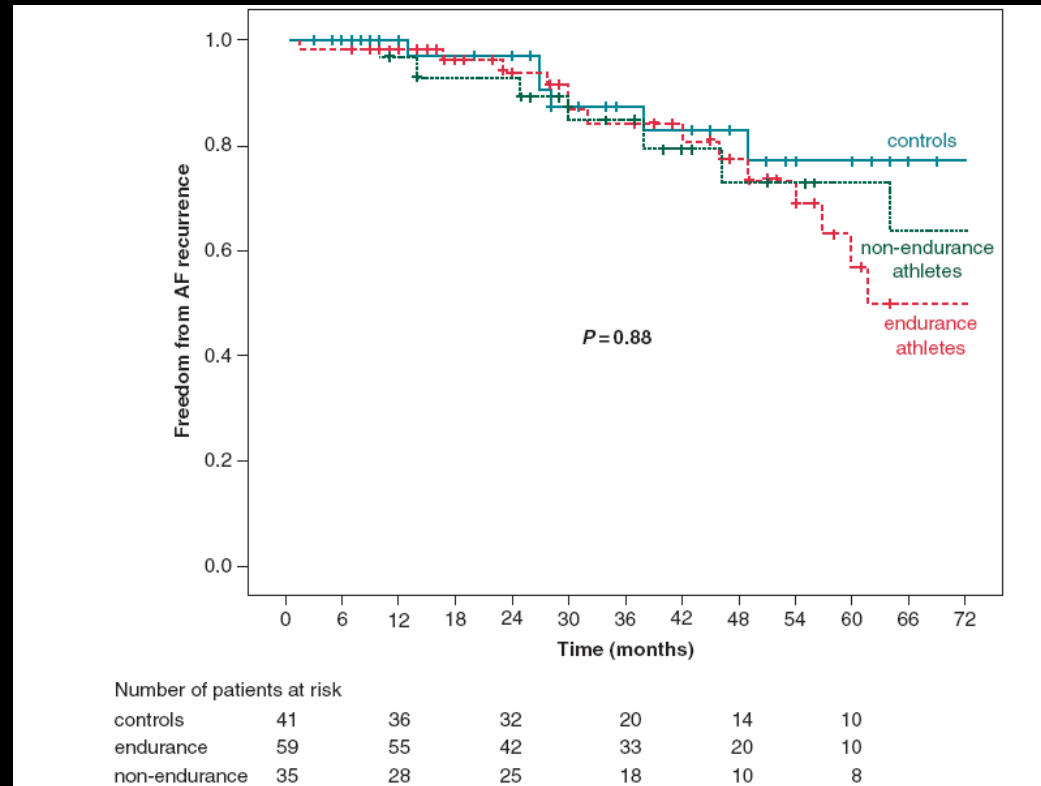
- Catheter ablation



Clinical presentation and treatment options

Management

- Catheter ablation



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Assessment of eligibility

BETHESDA CONFERENCE REPORT



JACC

JOURNAL of the AMERICAN COLLEGE of CARDIOLOGY

36th Bethesda Conference: Eligibility Recommendations for Competitive Athletes With Cardiovascular Abnormalities

Barry J. Maron, MD, FACC, *Conference Co-Chair*

Douglas P. Zipes, MD, MACC, *Conference Co-Chair*

Assessment of eligibility

1. Athletes with asymptomatic atrial fibrillation **in the absence of structural heart disease** who maintain a ventricular rate that increases and slows appropriately and is comparable to that of a normal sinus response in relation to the level of activity, while receiving **no therapy or therapy with AV nodal blocking drugs**, can participate in all competitive sports. **Note that the use of beta-blockers is prohibited in some competitive sports.**
2. Athletes who have atrial fibrillation **in the presence of structural heart disease** who maintain a ventricular rate comparable to that of an appropriate sinus tachycardia during physical activity while receiving no therapy or therapy with AV nodal-blocking drugs can participate in sports consistent with the limitations of the structural heart disease.
3. Athletes who require anticoagulation **should not participate in sports with danger of bodily collision** .
4. Athletes without structural heart disease who have elimination of atrial fibrillation by **an ablation technique**, including surgery, **may participate in all competitive sports after four to six weeks** without a recurrence or after an electrophysiologic study has confirmed non-inducibility.

Assessment of eligibility



Position Paper

Recommendations for participation in leisure-time physical activity and competitive sports in patients with arrhythmias and potentially arrhythmogenic conditions

Part I: Supraventricular arrhythmias and pacemakers

Hein Heidbüchel^a, Nicole Panhuyzen-Goedkoop^{b,c}, Domenico Corrado^d, Ellen Hoffmann^e, Alessandro Biffi^f, Pietro Delise^g, Carina Blomstrom-Lundqvist^h, Luc Vanheesⁱ, Per Ivar Hoff^j, Uwe Dorwarth^e and Antonio Pelliccia^f on behalf of the Study Group on Sports Cardiology of the European Association for Cardiovascular Prevention and Rehabilitation

Assessment of eligibility

AF secondary to reversible cause	Eligible for all sports when cause corrected and stable sinus rhythm for > 3 months
First onset or very sporadic paroxysms	All sports when in stable sinus rhythm for more than 3 months. Pill-in-the-pocket appropriate for some. Ablation is still investigative in athletes - all sports if asymptomatic for > 3 months
Paroxysmal or permanent, without major cardiac disease	All sports when proven rate control with absence of haemodynamic impairment

Conclusion

1. Atrial fibrillation is **more common among endurance athletes** and people who exercise regularly in comparison to the general population.
2. **Enhanced vagal tone** is the mechanism that can best explain the increased AF incidence in this population.
3. AF in endurance athletes is **most frequently paroxysmal**.
4. **Medical therapy is quite limited** due to side effects, contraindications or regulations.
5. **Catheter ablation provides a viable treatment option** with efficacy similar to that in the general population.



Thank you!

