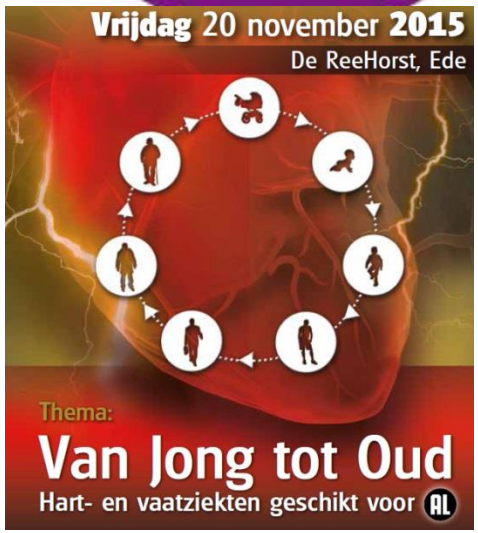
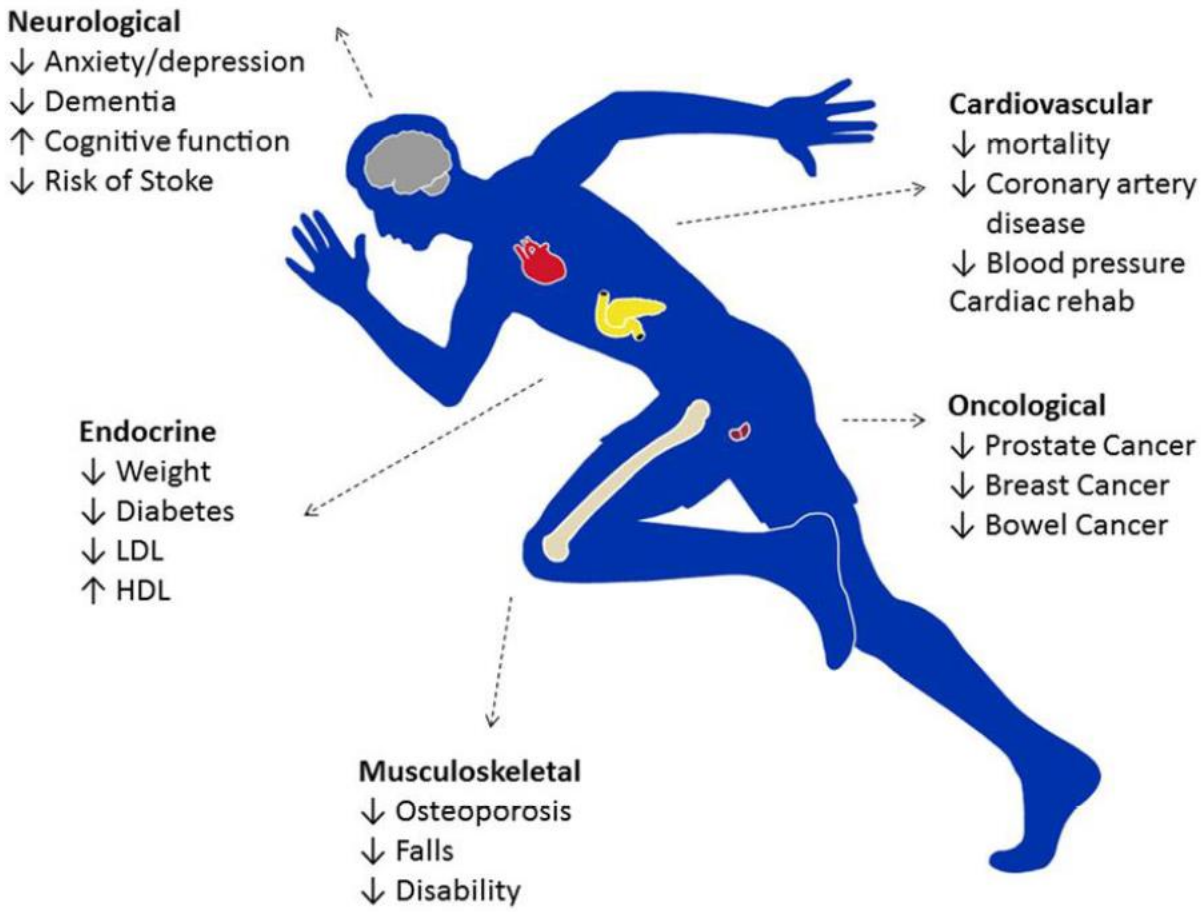
Nederlandse Vereniging
voor Hart en Vaat Verpleegkundigen



Atriumfibrilleren en Duursport

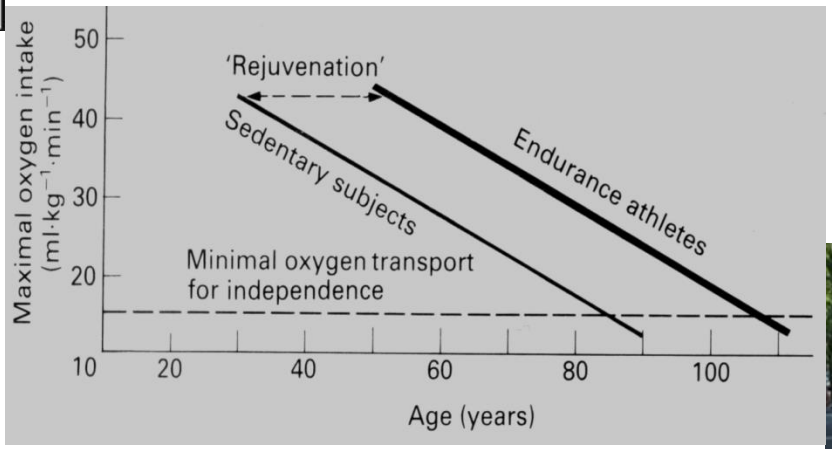
máxima medisch centrum
Jan Hoogsteen

Effecten van Duursport



European Heart Journal (2015) **36**, 1445–1453

RUN OF BIKE FOR YOUR LIFE …..



Minimal Amount of Exercise to Prolong Life

To Walk, to Run, or Just Mix It Up?*

Chi Pang Wen, MD, DrPH,†‡ Jackson Pui Man Wai, PhD,§ Min Kuang Tsai, MS,† Chien Hua Chen, MD, MPH‖¶

Guideline: 30min/day or 2.5 hours/week moderate intensity or 75min/week vigorous intensity exercise

Minimal running 5-10min/day

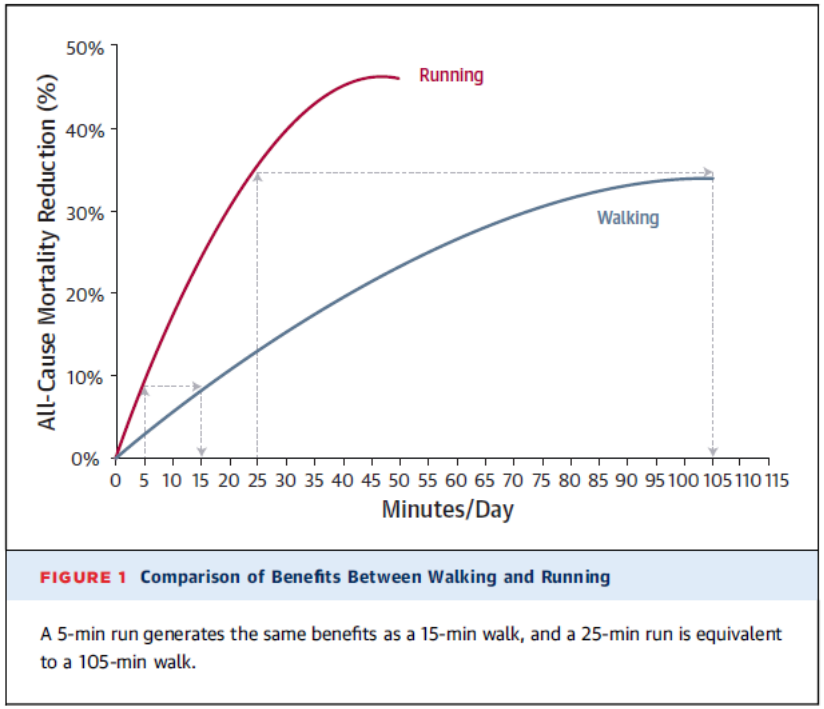


FIGURE 1 Comparison of Benefits Between Walking and Running

A 5-min run generates the same benefits as a 15-min walk, and a 25-min run is equivalent to a 105-min walk.

máxima
medisch centrum
MMC gewoon goed!

RUN OR BIKE FOR YOUR LIFE AT A COMFARTABLE SPEED

AND NOT TOO FAR

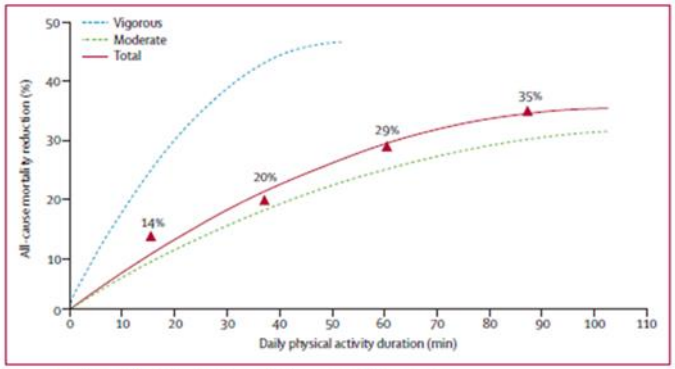


Figure 2: Daily physical activity duration and all-cause mortality reduction

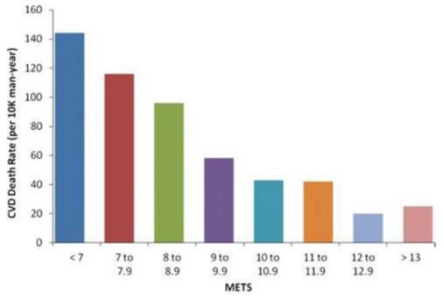


Figure 2 Death rates as a function of cardiovascular fitness as measured by metabolic equivalents achieved on maximal exercise treadmill testing.[8] CVD, cardiovascular disease.

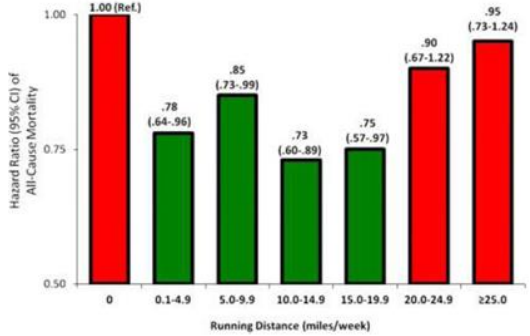


Figure 4 All-cause mortality by running distance per week.[16]

Remodelling

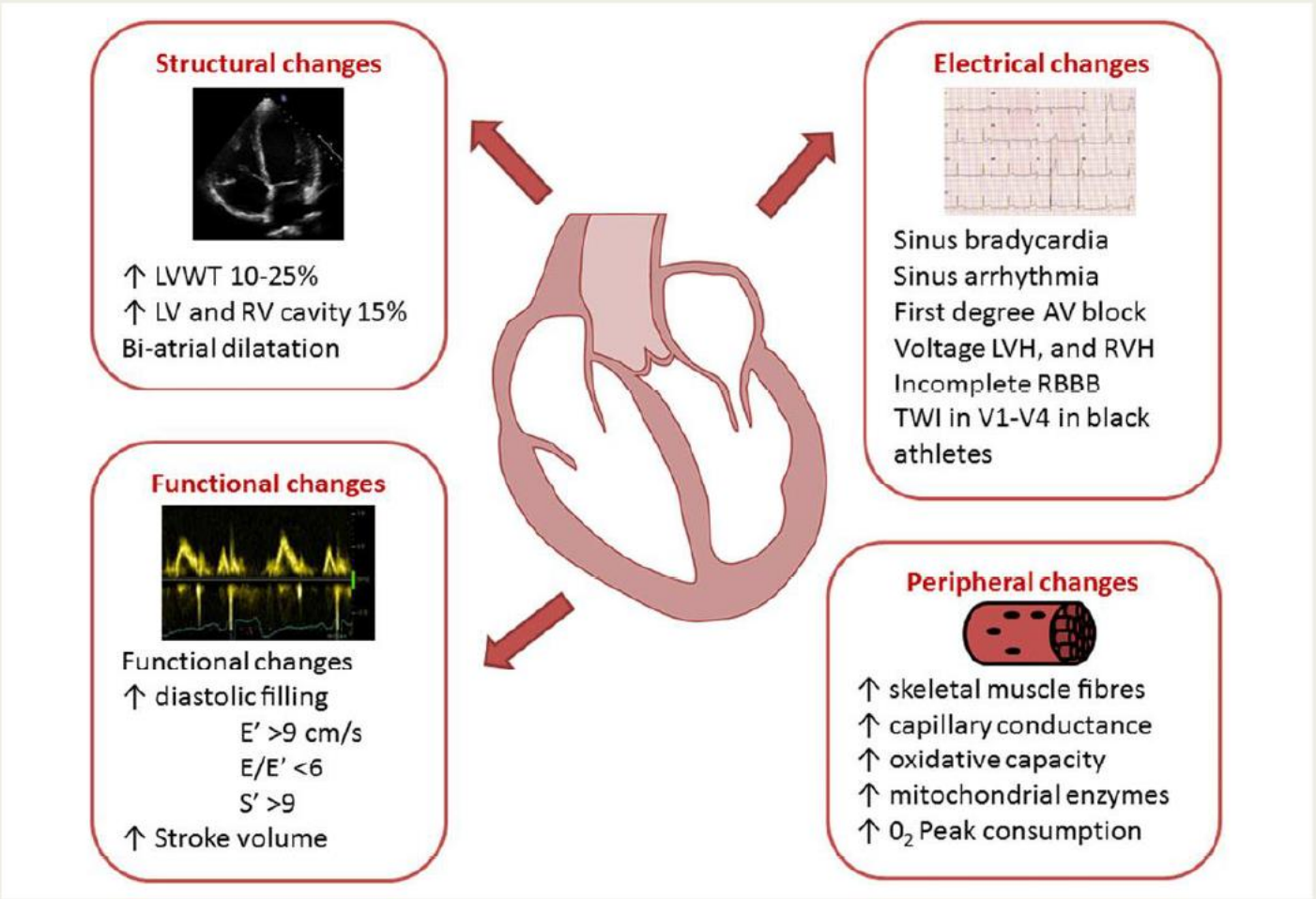


Figure 2 Cardiovascular and peripheral adaptation to exercise in athletes. AV, atrioventricular; LV, left ventricular; LVH, left ventricular hypertrophy; LVWT, left ventricular wall thickness; RV, right ventricle; RVH, right ventricular hypertrophy; TWI, T-wave inversion.

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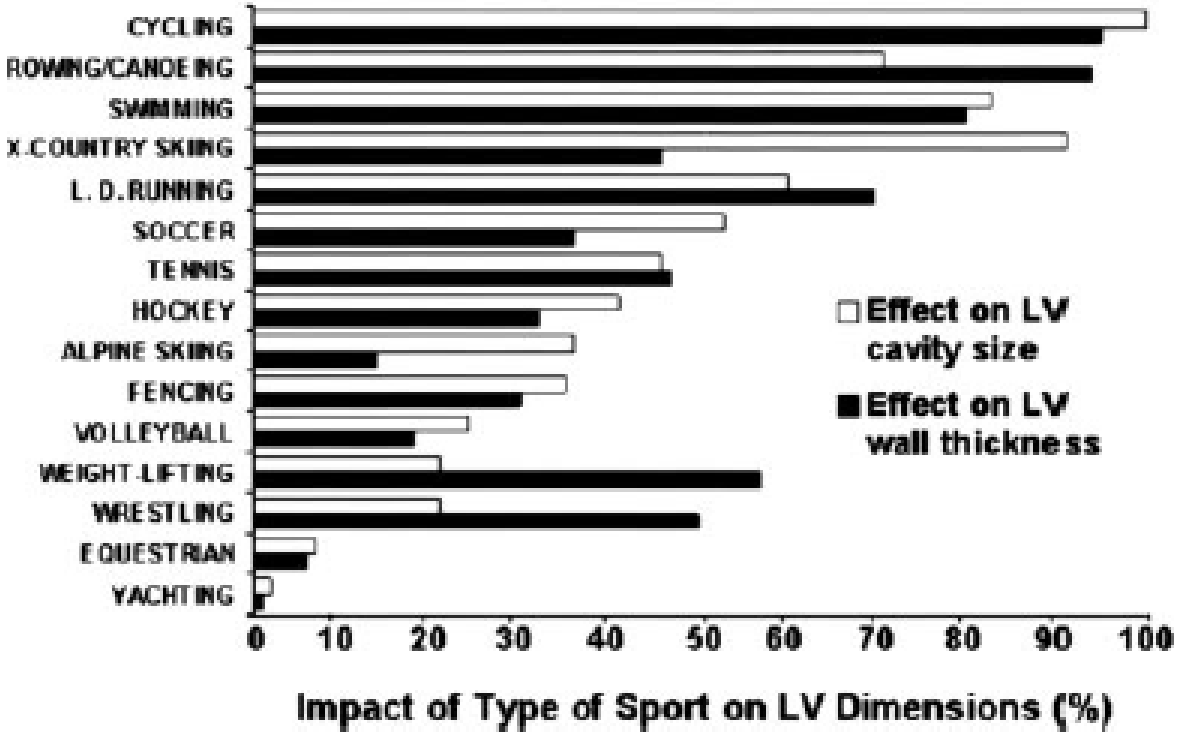
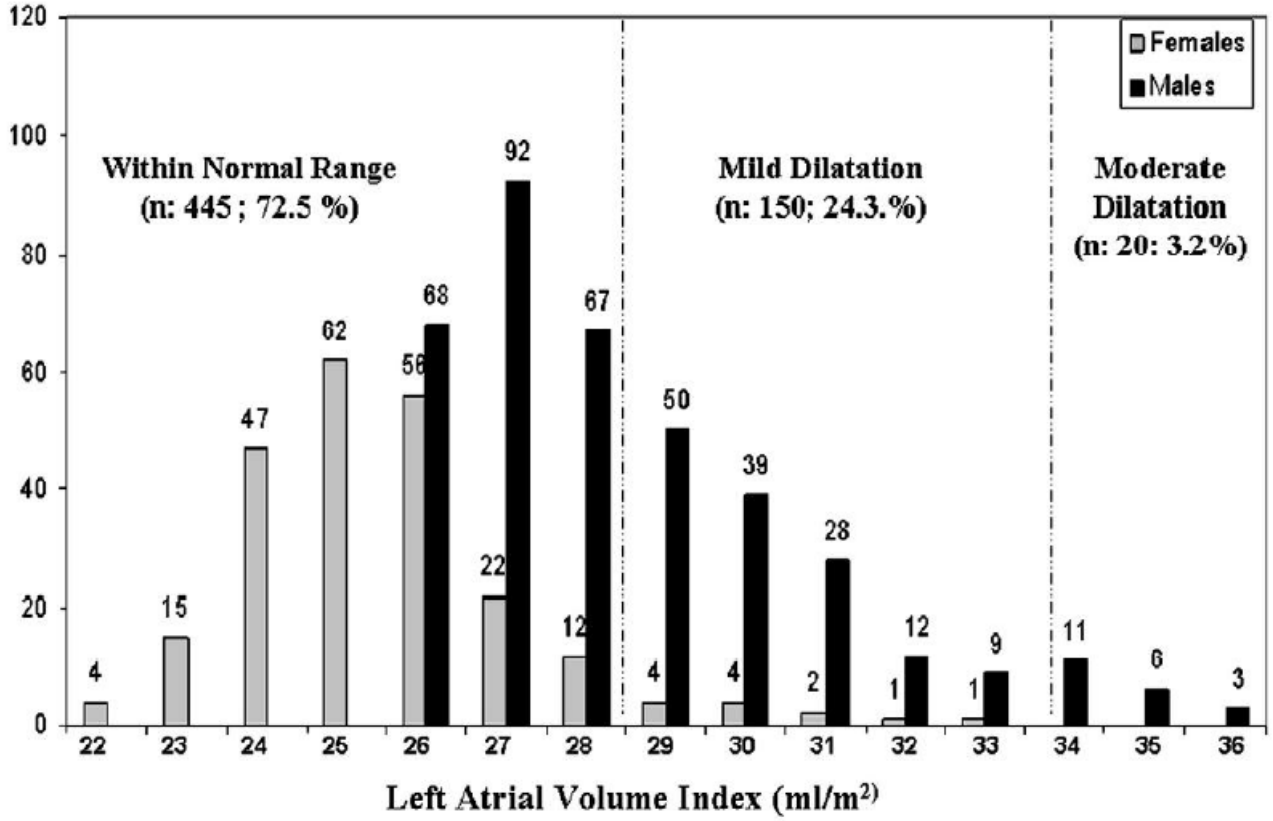


Figure 2. Effect of specific sports training on LV cavity dimension or wall thickness in elite athletes, representing 27 different sporting disciplines. X-Country indicates cross-country; L.D. Running, long-distance running.

Table IV. Left atrial dimensions in top-level athletes

Variable	Overall	Endurance	Strength	*P*
LA diameter (mm)	34.4 ± 5.5	35.3 ± 5.7	33.4 ± 4.5	<.05
LA volume index (mL/m^2)	27.8± 9.3	29.1± 9.1	26.4± 8.4	<.01

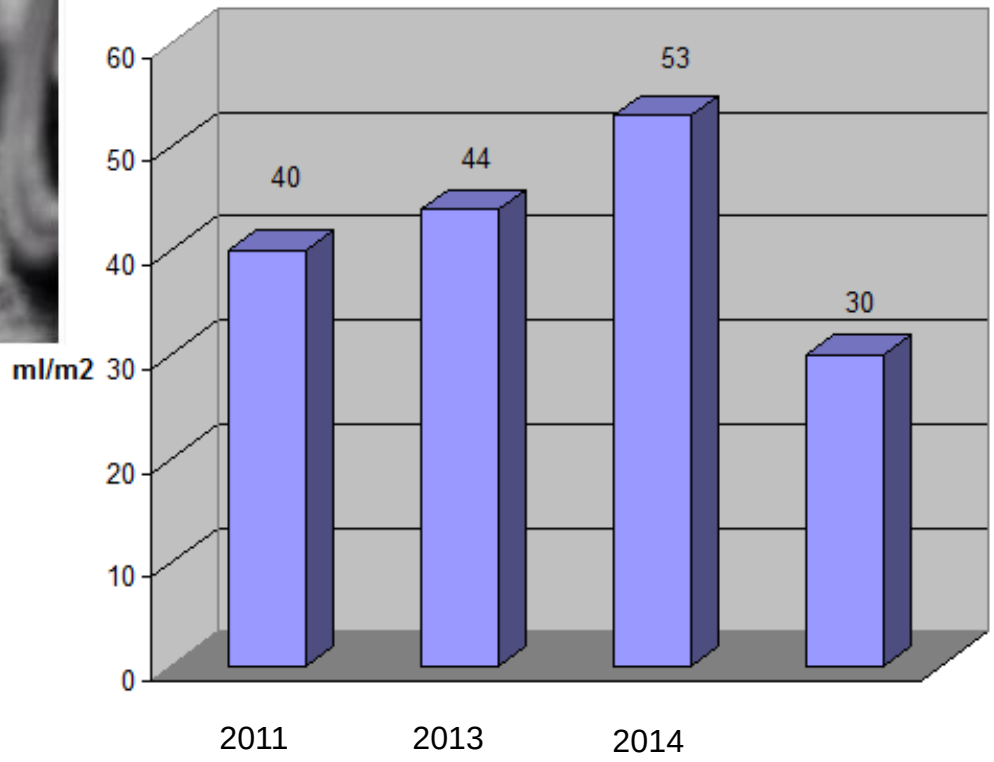
Figure 2

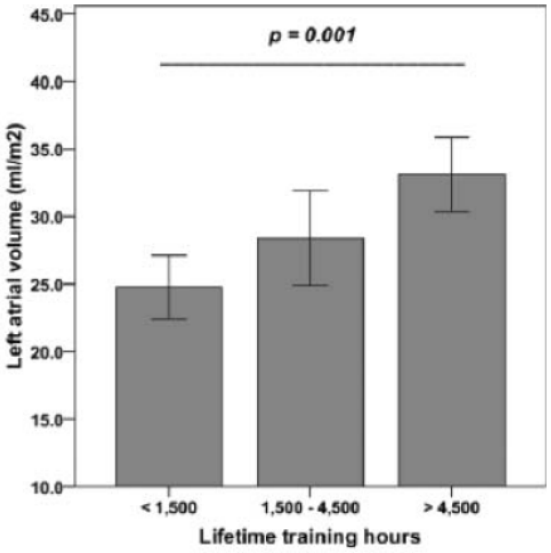


Distribution of LA volume index in the overall population of 615 athletes.


© Kris Claeyé 2013
Rabobank

LA grootte


ml/m2
60
50
40
30
20
10
0
40
44
53
30
2011
2013
2014


p = 0.001
Left atrial volume (ml/m2)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
< 1,500
1,500 - 4,500
> 4,500
Lifetime training hours

Phillipus Aureolus Theofratus
Bombastus von Hohenheim

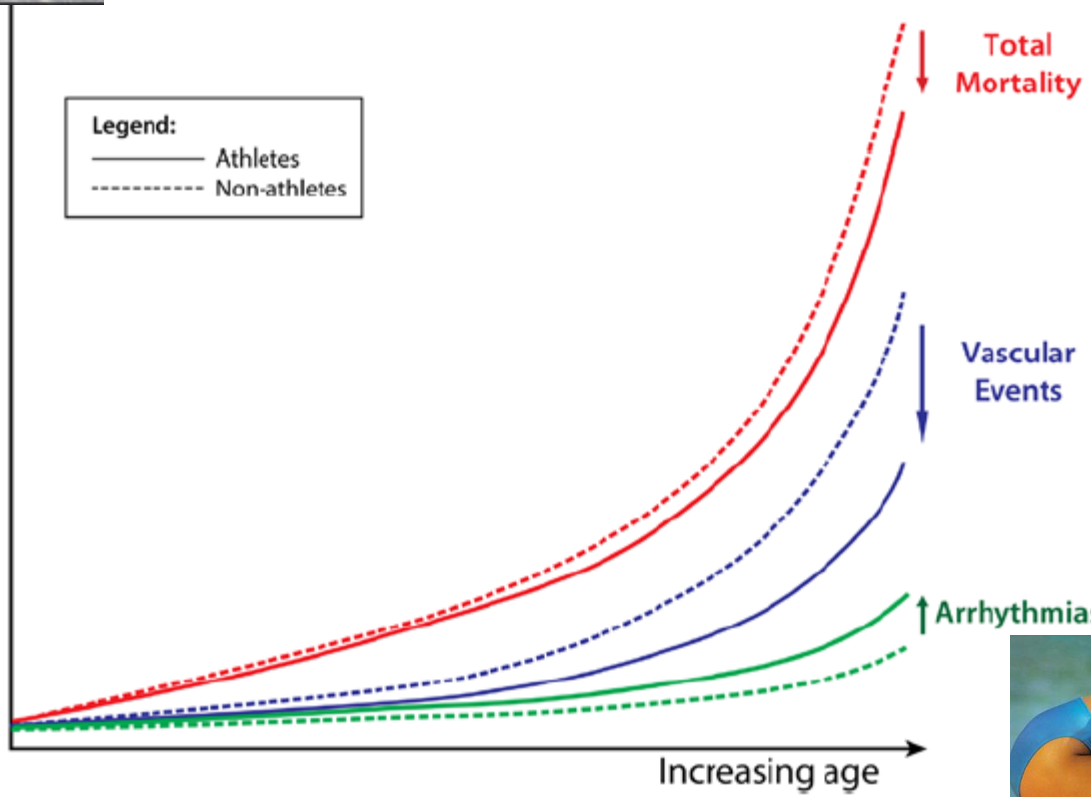
Oscar Wilde

“All things are poison and nothing is without poison,
Only the dose makes a thing not a poison”

“Moderation is a fatal thing.
Nothing succeeds like excess”

Athletically Right but could be Cardiologically Wrong

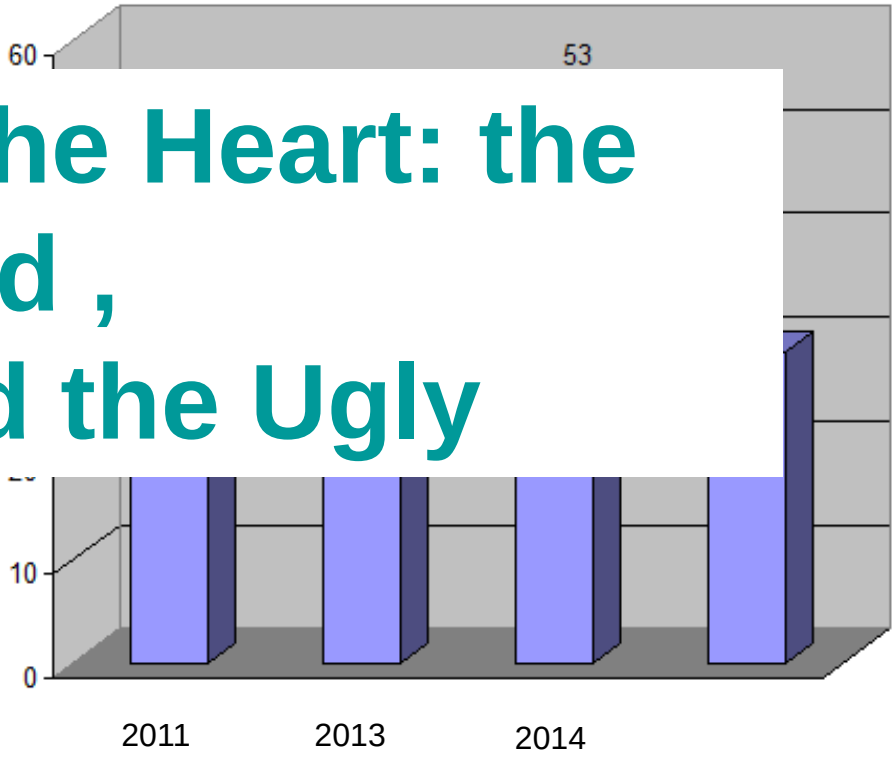
Where is the upper limit of healthy physical exercise
From which “dose” it might be harmful?

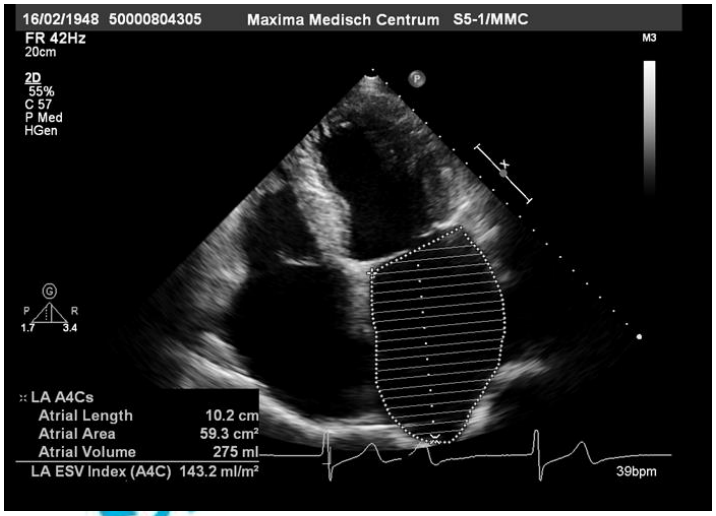


(*Circulation*. 2014;130:992-1002.)

Exercise and the Heart: the Good , the Bad and the Ugly

LA grootte





CONTROVERSIES IN CARDIOVASCULAR MEDICINE

Can Intensive Exercise Harm the Heart?

The Benefits of Competitive Endurance Training for Cardiovascular Structure and Function

Benjamin D. Levine, MD, FACC, FACSM, FAPS

(*Circulation*. 2014;130:987-991.)

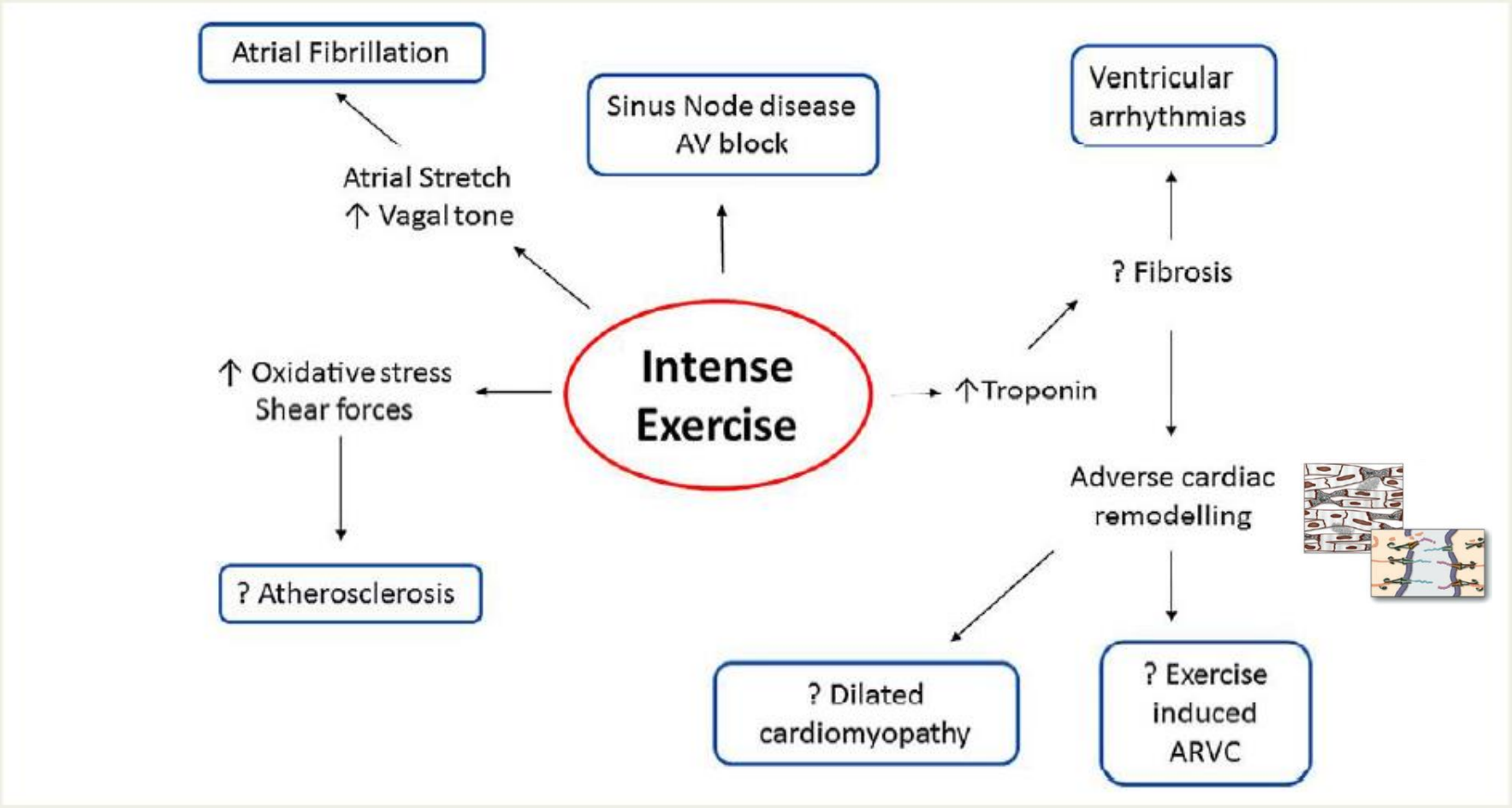


Figure 6 Speculated mechanisms for the detrimental effects of exercise. ARVC, arrhythmogenic right ventricular cardiomyopathy; AV, atrioventricular; DCM, dilated cardiomyopathy.

European Journal of Preventive Cardiology

EUROPEAN SOCIETY OF CARDIOLOGY®

Review

Atrial fibrillation in endurance athletes

Matthias Wilhelm

European Journal of Preventive Cardiology
0(00) 1–9

DOI: 10.1177/2047487313476414
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Table 1. The prevalence and risk of atrial fibrillation (AF) and atrial flutter (AFl) in different athletic populations and age groups

Study	Athletic population	Age (mean ± SD, years)	Males (%)	AF in athletes (%)	AFl in athletes (%)	Relative risk (95% CI) for athletes
Pelliccia et al.[19]	Elite athletes ($n = 1777$)	24 ± 6	71	0.2 (all male, i.e. 0.3 in males)	0	–
Molina et al.[7]	Non-elite marathon runners ($n = 183$)	39 ± 9	100	4.9	0	8.8 (1.3–61.3)
	Controls ($n = 290$)	50 ± 13	100	0.7	0	
Wilhelm et al.[23]	Non-elite runners ($n = 122$)	42 ± 7	50	3.3 all male (i.e. 6.6 in males)	0	–
Karjalainen et al.[12]	Veteran elite orienteers ($n = 262$)	47 ± 5	100	5.3	0	5.5 (1.3–24.4)
	Controls ($n = 373$)	49 ± 5	100	0.9	0	
Baldesberger et al.[6]	Veteran elite cyclists ($n = 62$)	67 ± 7	100	3.2	6.5	14.4 (0.8–261.1)
	Golfers ($n = 62$)	66 ± 6	100	0	0	
Grimsmo et al.[24]	Veteran cross-country skiers ($n = 78$)	69 ± 10	100	16.7	0	–

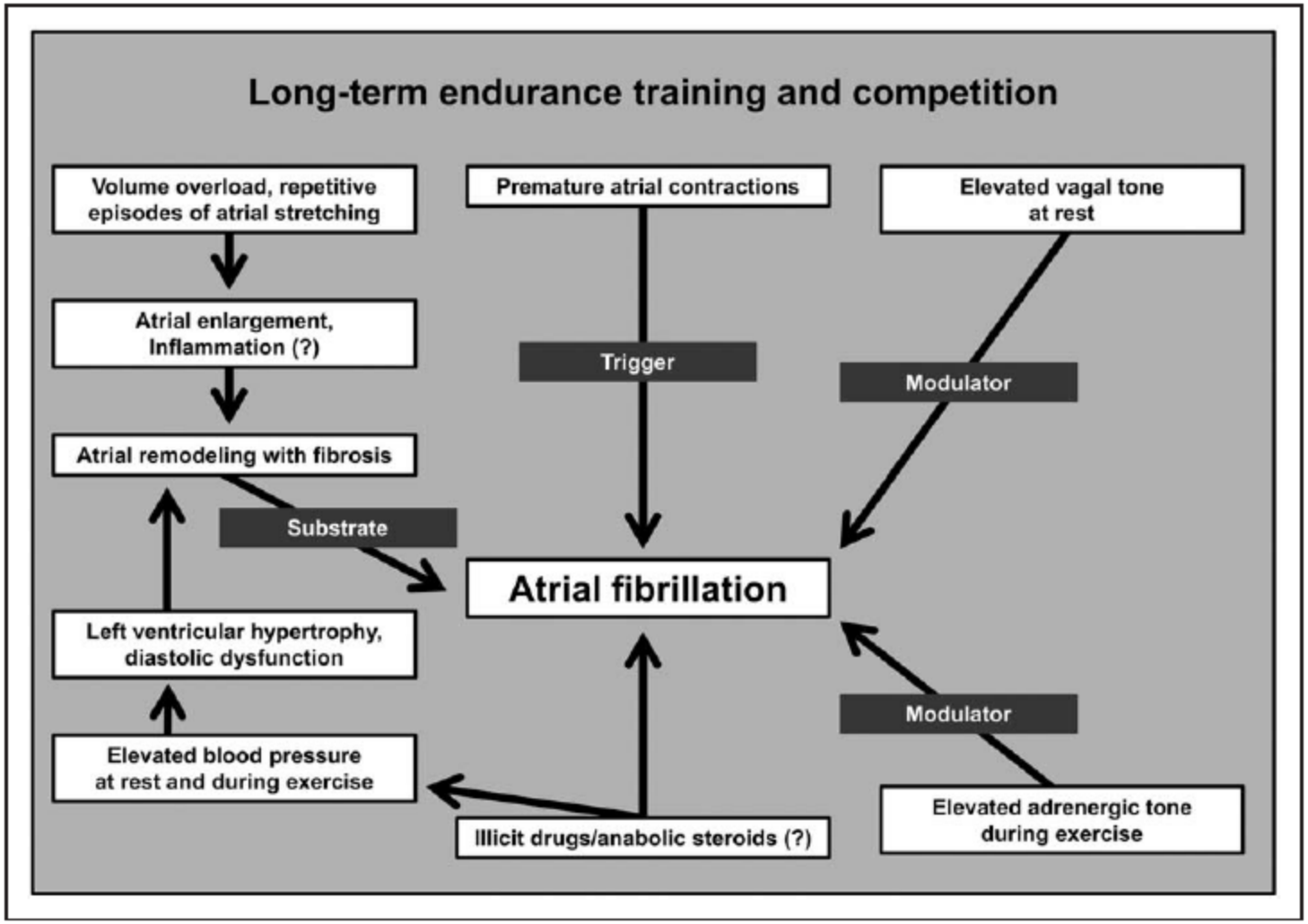


Figure 1. Synopsis of factors influencing the development of atrial fibrillation in athletes.

Cardiac Arrhythmogenic Remodeling in a Rat Model of Long-Term Intensive Exercise Training

Begoña Benito, MD*; Gemma Gay-Jordi, PhD*; Anna Serrano-Mollar, PhD; Eduard Guasch, MD; Yanfen Shi, MD; Jean-Claude Tardif, MD; Josep Brugada, MD, PhD; Stanley Nattel, MD†; Lluis Mont, MD, PhD†

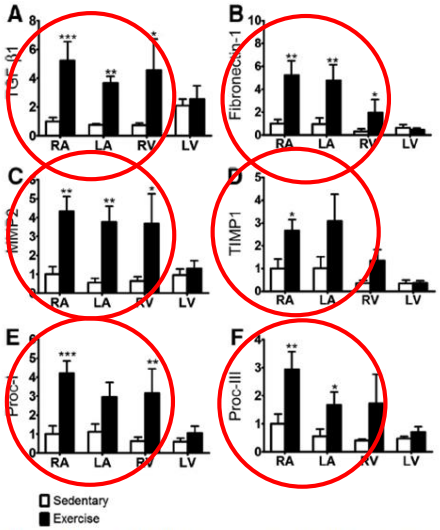


Figure 4. Mean±SEM mRNA-expression of fibrotic markers (A) TGF-β1, (B) fibronectin-1, (C) MMP-2, (D) TIMP1, (E) procollagen-I (Proc-1), and (F) procollagen-III (Proc-III) at 16 weeks in the Sed and Ex groups, quantified by real-time polymerase chain reaction and normalized to β-actin. n=6 (Sed) and n=8 (Ex); 2-way ANOVA, repeated measure=region. *$P<0.05$,**$P<0.01$,***$P<0.001$, Bonferroni-adjusted t test (correction factor=4), Ex vs Sed.

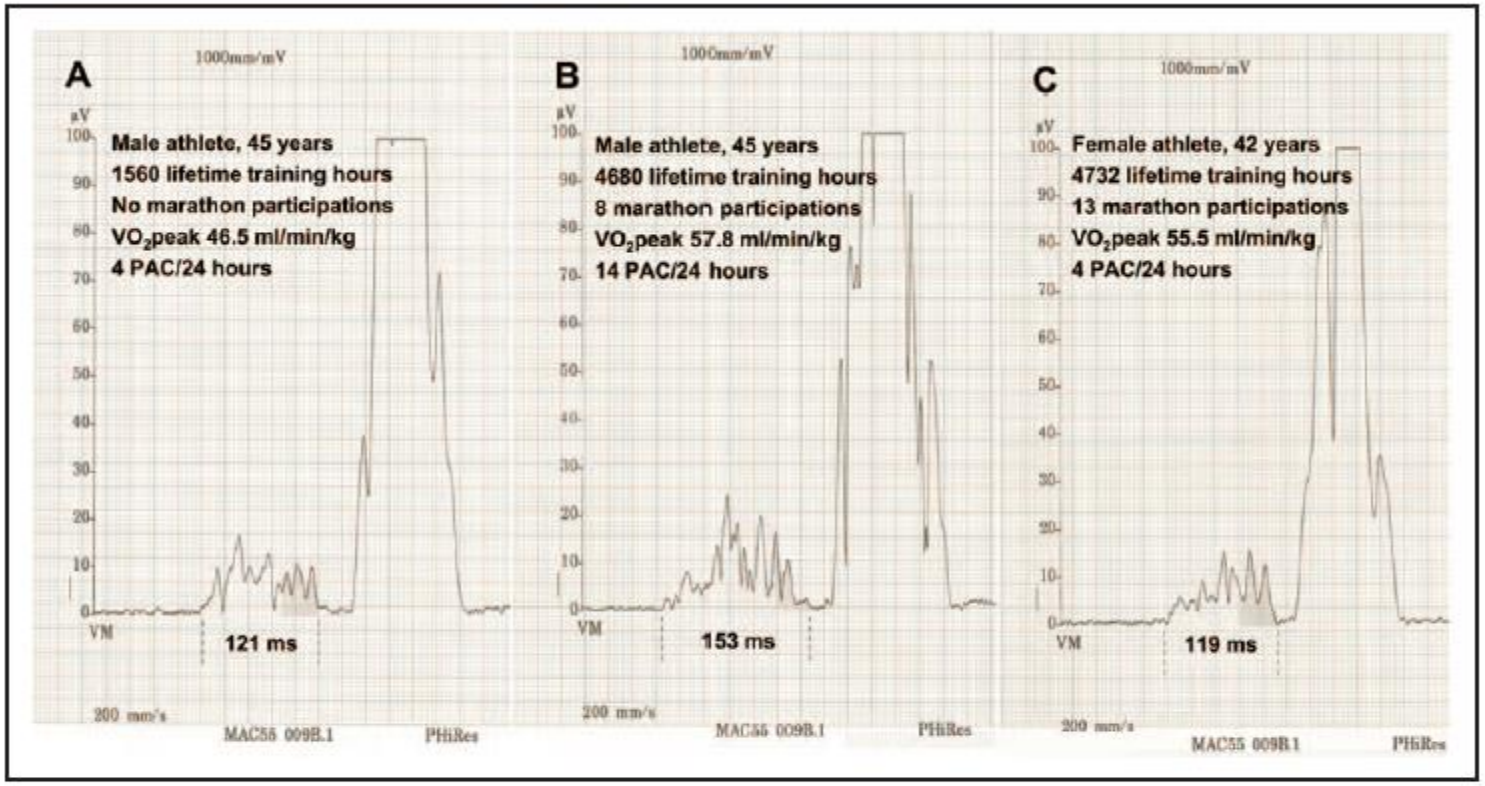
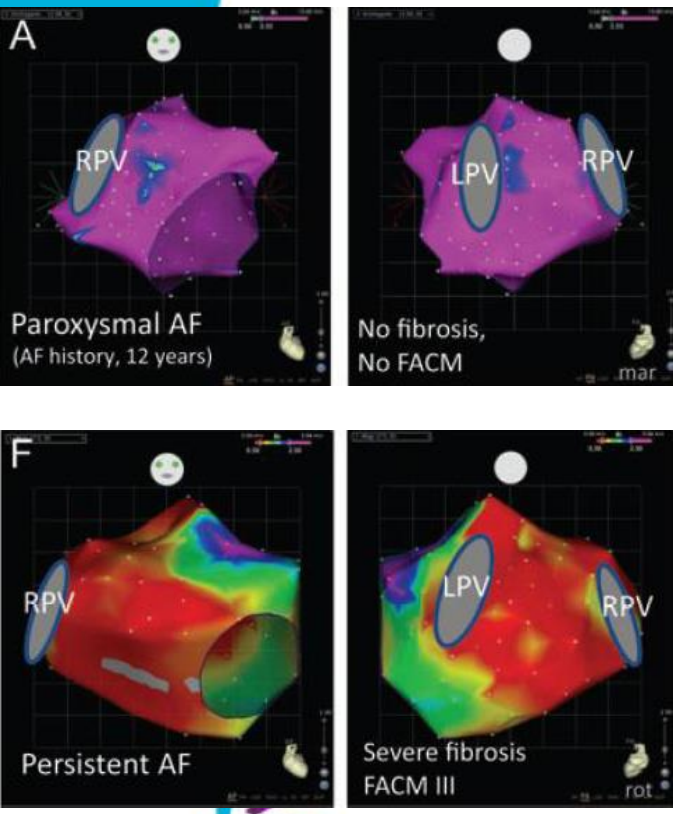


Figure 2. Signal-averaged P wave analysis from representative athletes of studies by Wilhelm et al.:[23,40] male leisure-time athlete (A); male competitive, non-elite athlete (B); and female competitive, non-elite athlete (C).
With increasing lifetime training hours and marathon participations, signal-averaged P wave duration increased (A vs. B). For a comparable amount of training volume and performance, male athletes exhibited a longer signal-averaged P wave duration compared to female athletes (B vs. C).

Structural and Electrical remodelling in AF



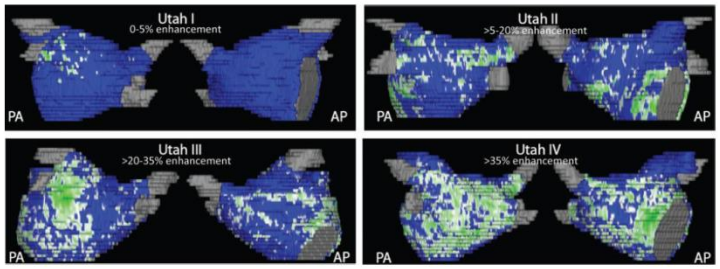
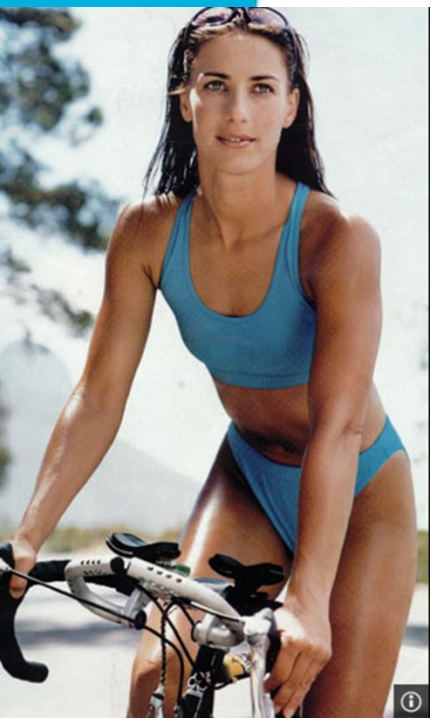


Figure 2 Quantification of left atrial structural remodelling with delayed enhancement magnetic resonance imaging ('Utah I–IV'). Posterior-anterior and anterior-posterior view of enhancement (green) vs. normal tissue (blue) in patients with 'lone' atrial fibrillation (Courtesy of Nassir F. Marrouche, M.D., CARMA Center, Salt Lake City).

European Heart Journal (2013) **34**, 2731–2738

Histopathological changes

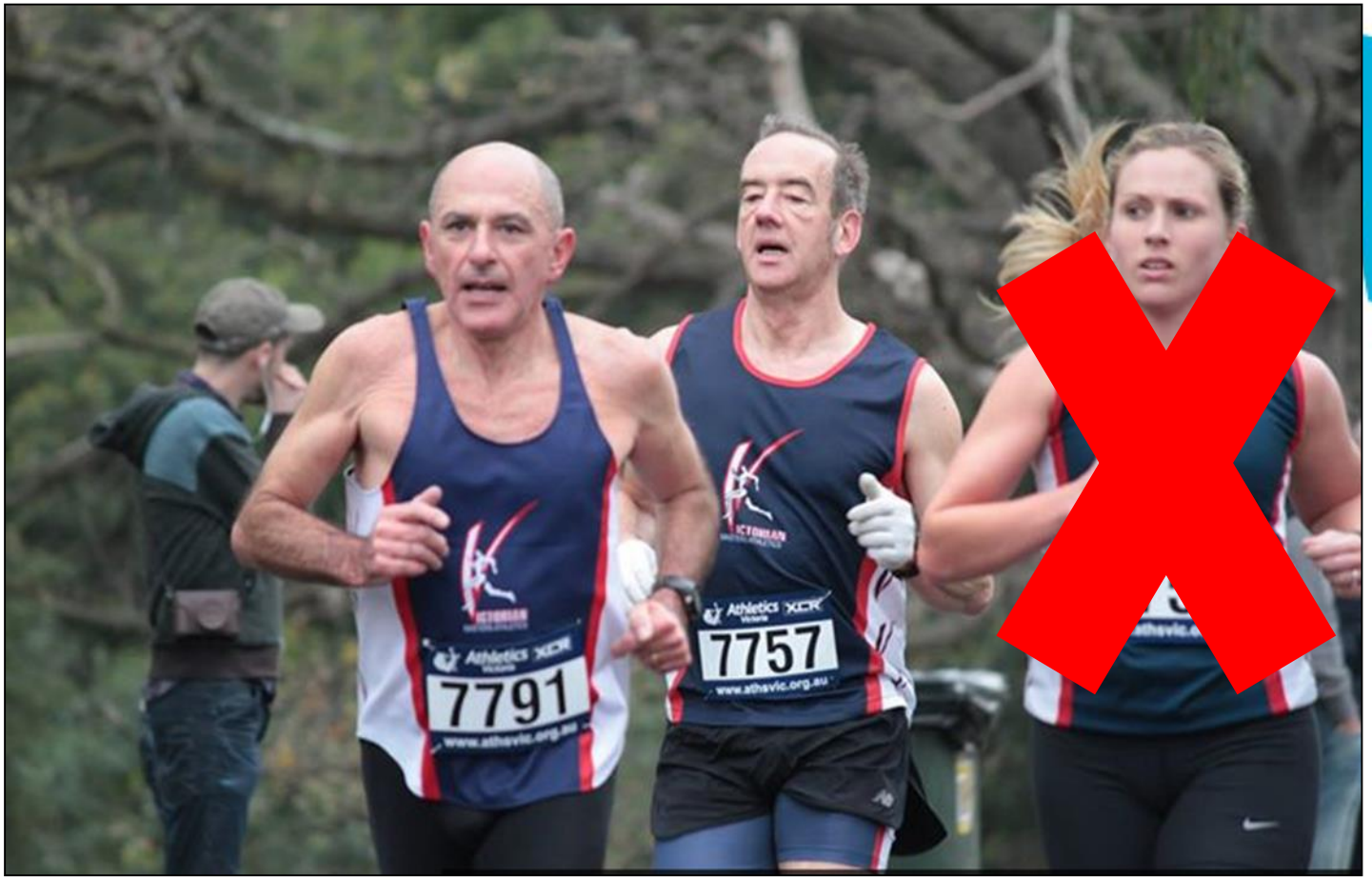


Atrial dilation

Atrial fibrosis

Profile Endurance Athlete prone to AF?

Profile Endurance Athlete prone to AF?



Casus Duursportatleet

Geboren 16-12-1948
Sport anamnese; Sinds 1964 duursport, competitief wielrennen en triatlon
Sport nu 50km/dag of 7 km hardlopen in het aerobegebied

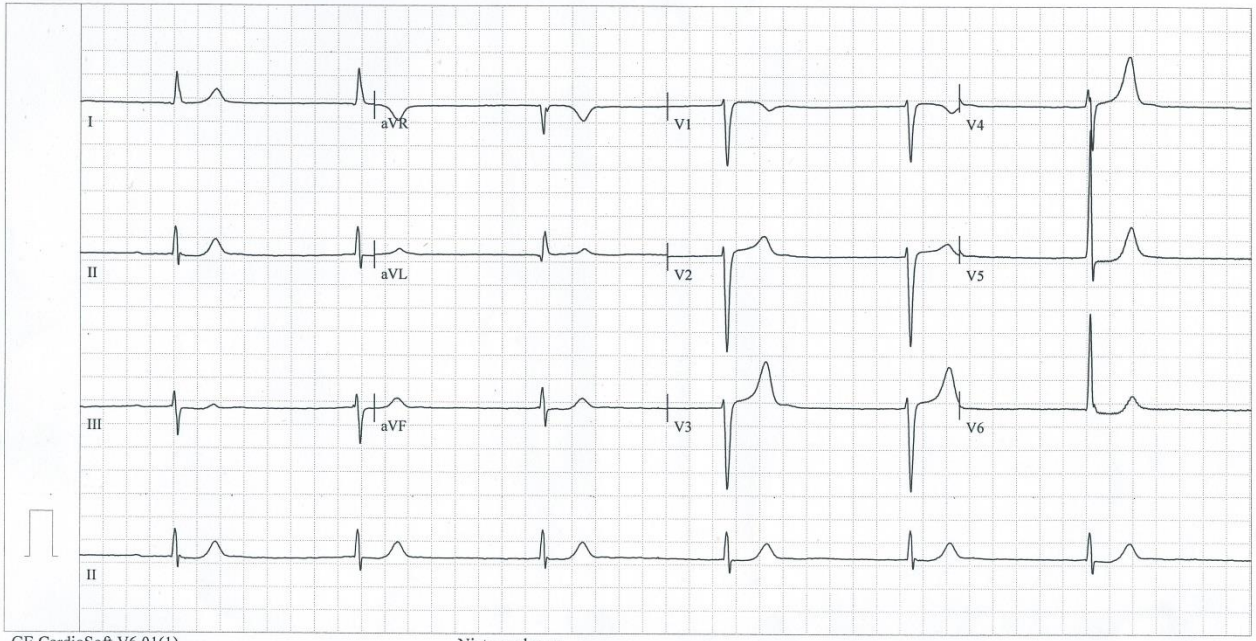
LO; L 180 G 73 (BMI 22,5)
RR 160/70
HR 34

Medicatie
Valsartan 160 1d, OAC
Theolair Retard 250mg 1d1

ECG

Patiënt ID: 160248
16.04.2009 61jr Man
15:32:47 180 cm 74.0 kg

Vent. frequentie	38spm
PR interval	ms
QRS duur	108ms
QT/QTC	500/397ms
P-R-T as	/-2/33°
P duur	ms
RR/PP interval	1566/2065ms



GE CardioSoft V6.01(1) Niet nagekenen
25mm/s 10mm/mV 100Hz 50Hz Spline 12SL 20.1 Behandelend arts: Pagina 1

Spiroergometrie

Reden donderdag 18 december 2014

periodieke controle Aanvrager: dr. J. Hoogsteen, cardioloog

Klachten en bijzonderheden

Gaat goed, traint regelmatig, geen klachten.

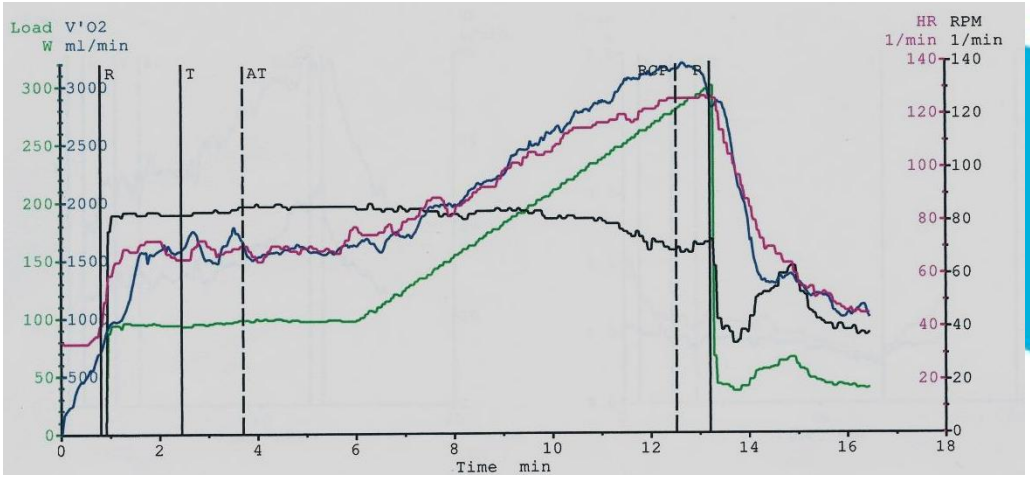
VG en medicatie

'07 Bradycardie en J-escape ritme
Linkszijdig traag atriumfibrilleren
Linker ventrikel hypertrofie
Analyse dyspnoe déffort

Inspanningstest protocol: ramp 279 watt Lengte 180 cm. Gewicht 72,6 kg

Verwachte belasting	218	watt
Verwachte maximale zuurstofopname	2646	l/min
Verwachte maximale zuurstofopname per kg	32,7	ml/min/kg
Maximaal vermogen	299	watt (=137%)
Stopreden: Uitputting Klachten: geen		
Maximale zuurstofopname	3118	ml/min
Maximale zuurstofopname /kg	42,9	ml/min/kg (=131%)
Hartfrequentie rust -> maximaal	68 >> 127	/min
HF Percentage t.o.v. verwacht	83	%
Hartfrequentie omslagpunt	120	/min
Zuurstofopname omslagpunt	40,4	ml/min/kg (=94 % van de VO2max)
Maximale zuurstofpols	24,6	ml/slag
Bloeddrukverloop	160/70 >> 180/80	mm/hg
FEV1	3000	#Fout
Ademreserve	8	n = 22-28%

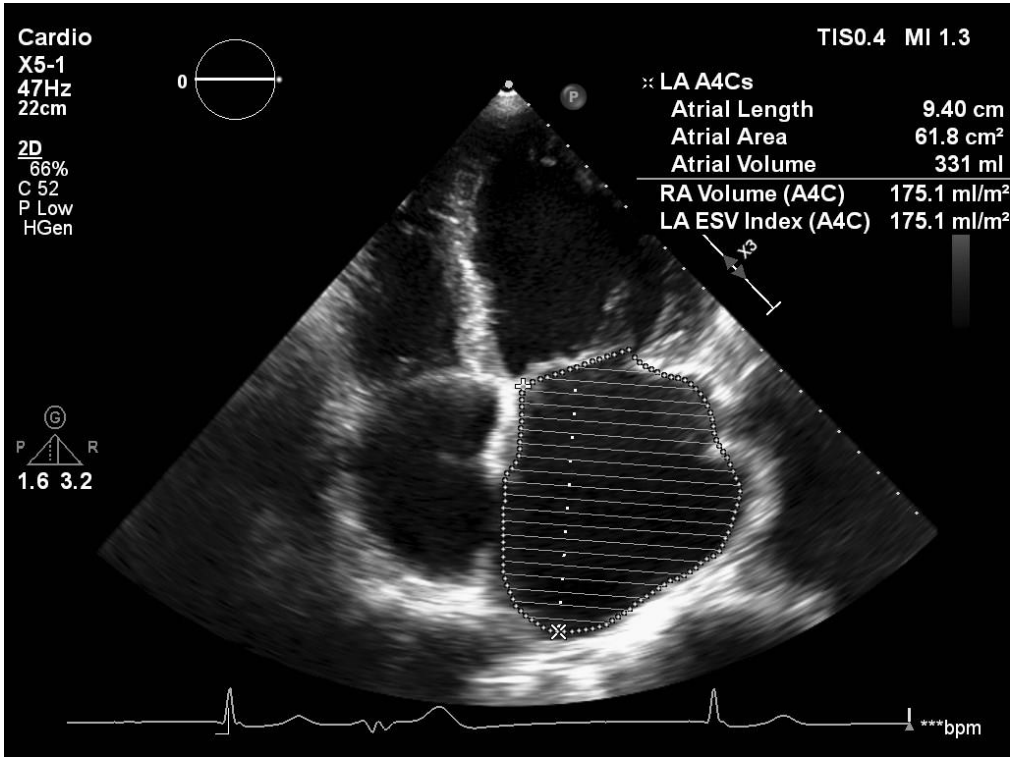
De dode ruimte ratio (Vd/Vt) bij maximale inspanning was 0,05. De Vd/Vt in rust was 0,06



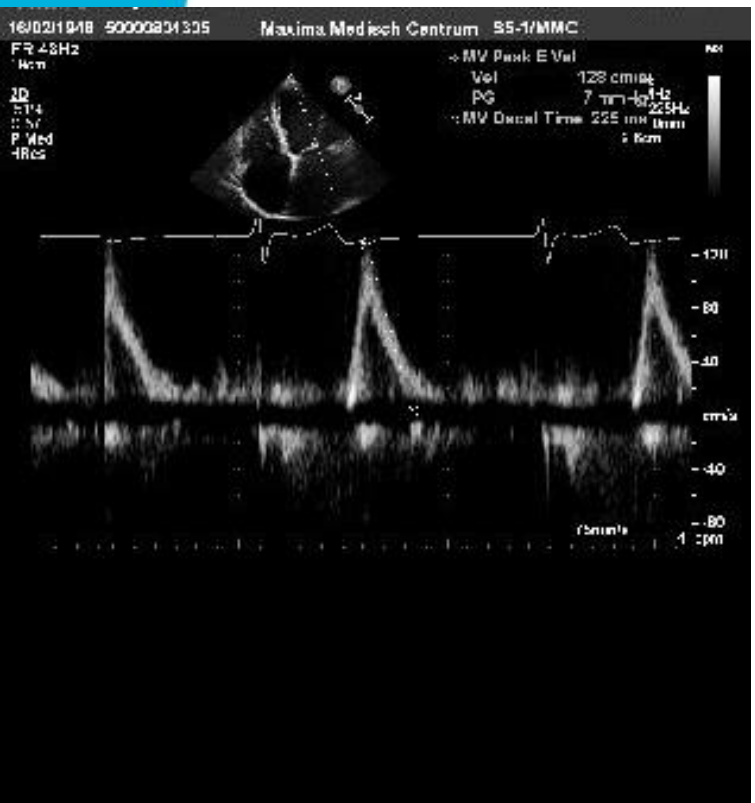
Eerdere resultaten

Naar	datum	lengte	gewic	vet%	Wmax	VO2max	HFmax	V/kg	VO2 AT	HFAT	prot	sysm	diasm	V1	AMV	AF	VDVT
St1	10-12-2013	175	74	13	288	3117	136	42,1	2766	129	2,4	190	90		109	46	0,07
St1	5-11-2012	175	75		263	2900	131	38,7			2,4	160	60		82	44	0,12
St1	25-6-2010	180	75		291	3710	136	49,5	3700	131	3	200	80		104	49	0,10
St1	16-4-2009	180	73		299	3330	144	45,6	3150	127	2,4	160	80		101	43	-0,06
St1	25-1-2008	180	72		290	3450	138	47,9	2990	128	2,4	170	80		101	44	0,03

ECHO


Cardio
X5-1
47Hz
22cm
2D
66%
C 52
P Low
HGen
1.6 3.2
TIS0.4 MI 1.3
LA A4Cs
Atrial Length 9.40 cm
Atrial Area 61.8 cm²
Atrial Volume 331 ml
RA Volume (A4C) 175.1 ml/m²
LA ESV Index (A4C) 175.1 ml/m²
***bpm

ECHO


Maxima Medisch Centrum S5-1/MMC
MV Peak E Vel
Vel 128 cm/s
PG 7 mmHg
MV Decel Time 225 ms


Maxima Medisch Centrum S5-1/MMC
Med E' Vel 8.14 cm/s
E/Med E' 20.8

Profile Endurance Athlete prone to AF?

Therapeutic options for Athletes with AF

Reduction of Exercise volume and intensity

Treatment of Elevated Bloodpressure

AAD

PVI

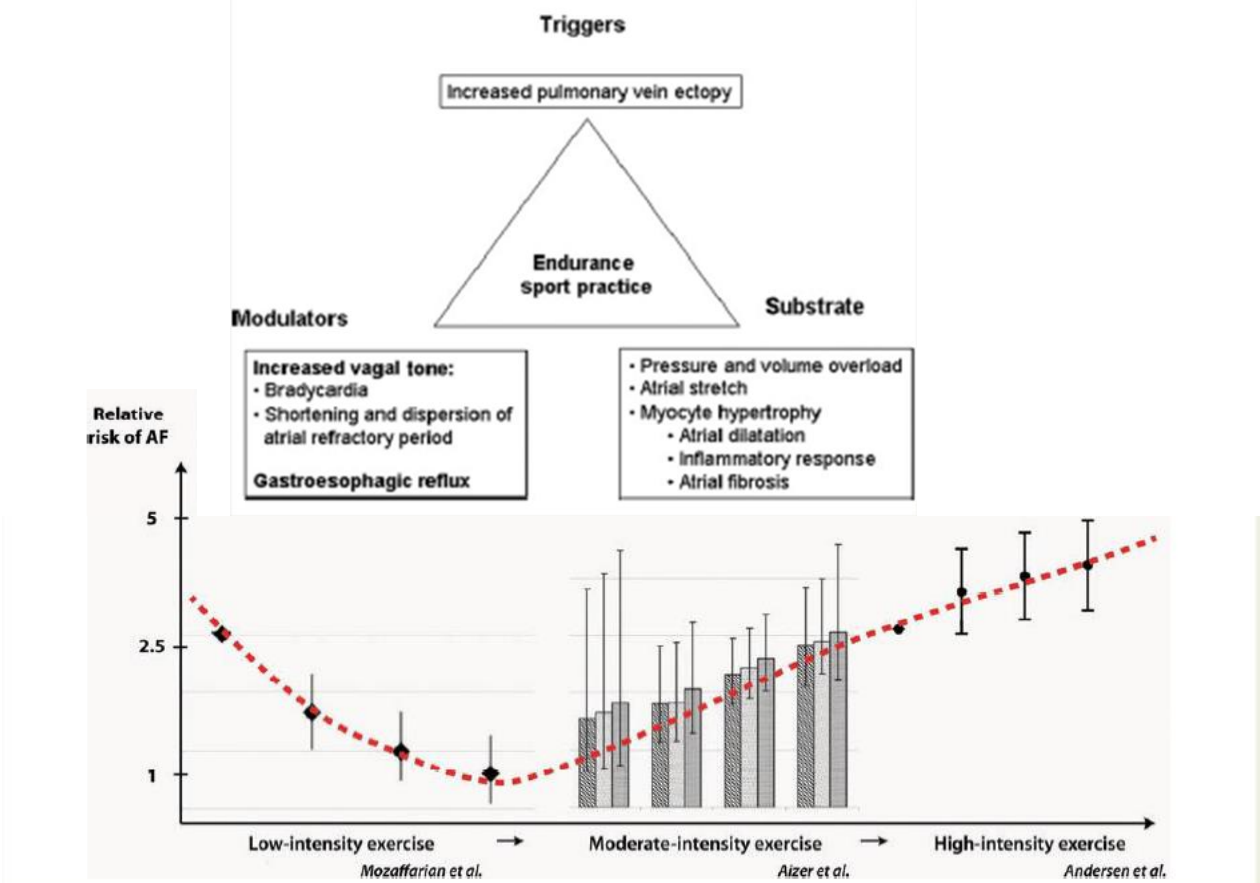


Figure 2 U-shaped relationship between the exercise dose and the relative risk of developing atrial fibrillation (AF). Composite data from three separate trials along the *x*-axis demonstrating an association between reducing prevalence of AF with increasing exercise of low intensity but then an increasing risk of AF with moderate and intense exercise. The echocardiogram examples above demonstrate the progressive cardiac remodelling from a typical sedentary subject (left), a leasure-time athlete (middle), and a professional cyclist (right). The 10 cm marker on the echocardiogram is highlighted with a red circle and the images have been scaled relative to this. The inference is that as exercise dose increases, the heart gets bigger and the risk of AF increases. Whether or not there is a causal relationship between cardiac enlargement and arrhythmias is still to be determined.

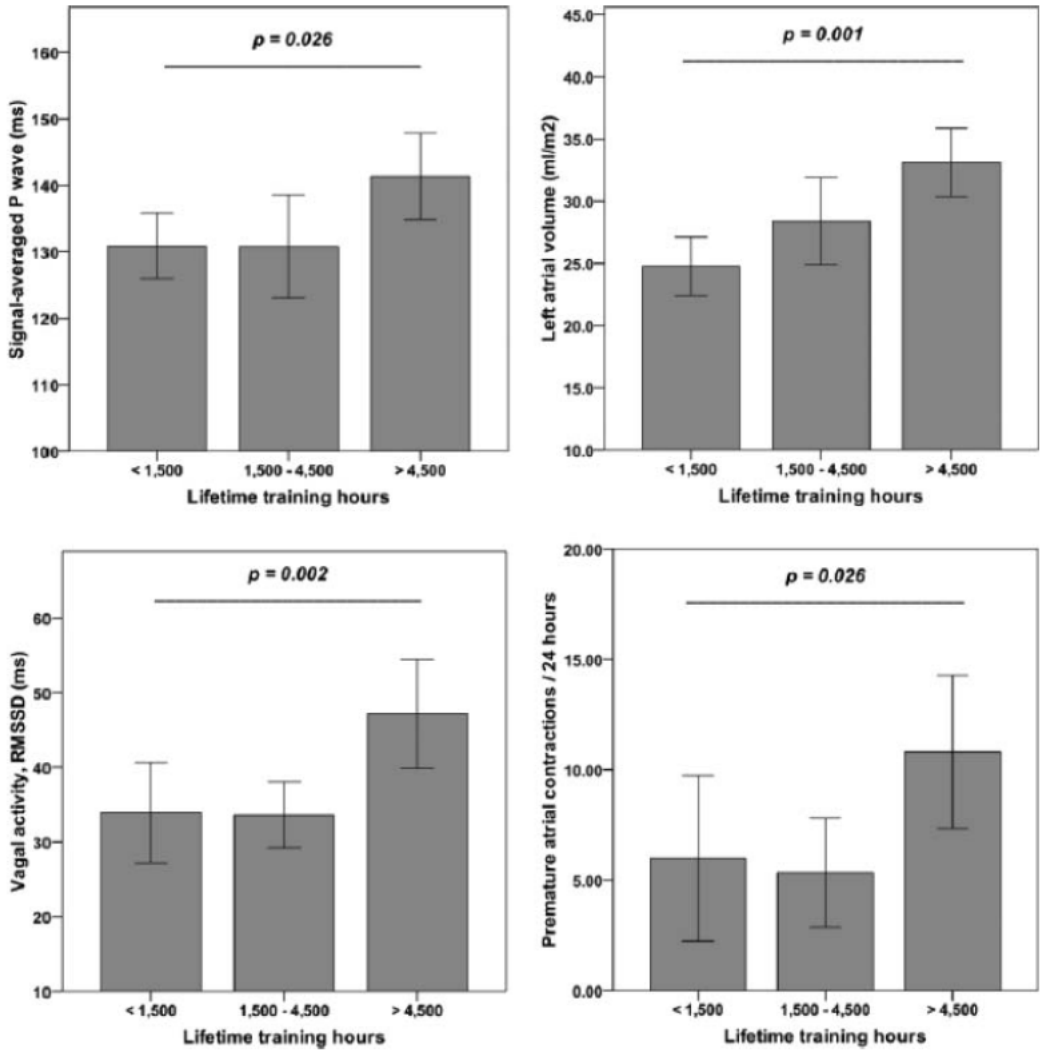


Figure 1 Signal-averaged P-wave duration, left atrial volume, vagal activity (expressed as root of mean squared differences of successive normal-to-normal intervals) and number of premature atrial contractions in 24 h stratified according to lifetime training hours (p values for analysis of variance). Reproduced with permission from Winhelm *et al*.[20]

Therapeutic options for Athletes with AF

Reduction of Exercise volume and intensity

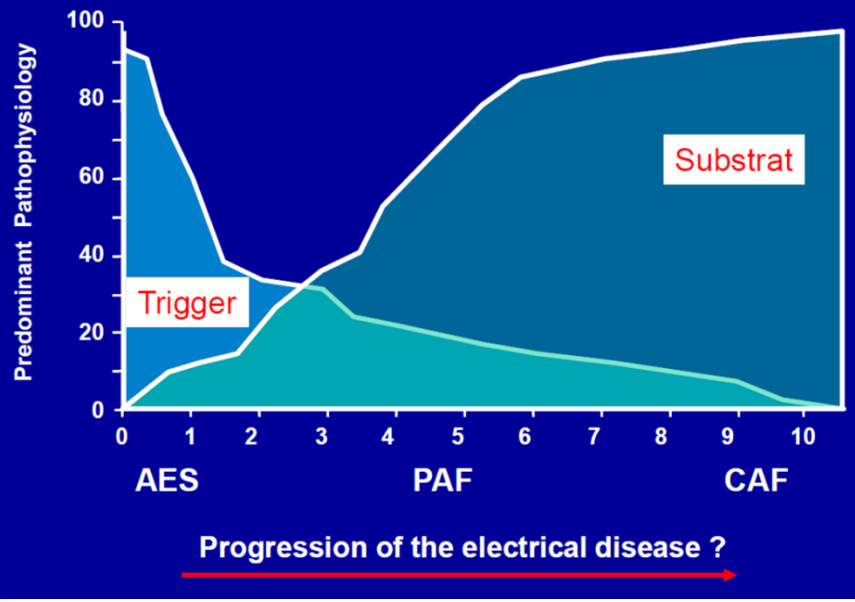
Treatment of Elevated Bloodpressure

AAD

PVI

ESC 2011

Atrial Fibrillation – clinical presentations



Piorkowski ESC 2011

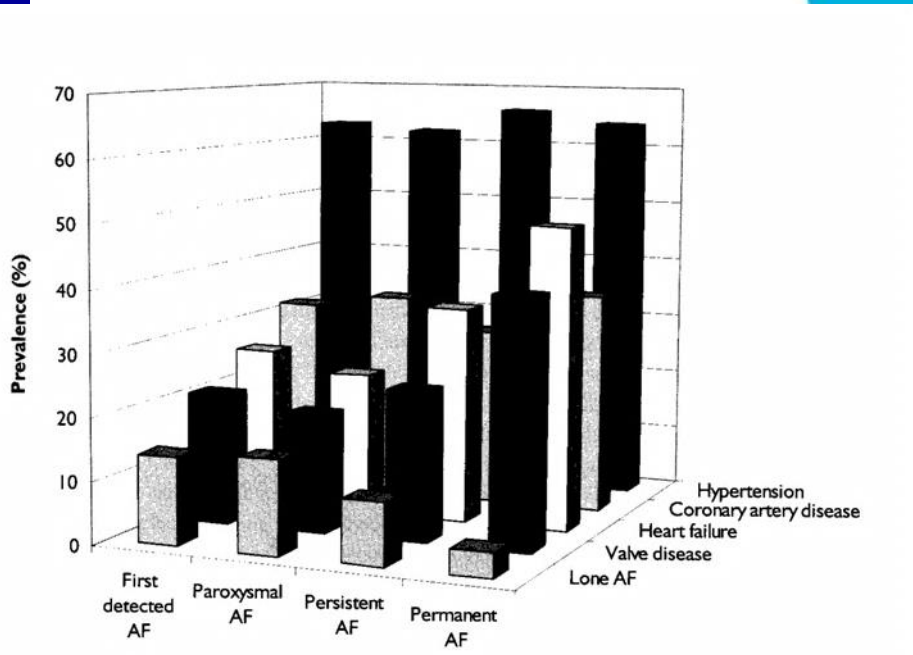


Figure 4. Distribution of underlying heart diseases in different types of atrial fibrillation among cardiology practices included in the Euro Heart Survey on Atrial Fibrillation.[11]

Take Home Message

Run or bike for your life at a comfortable speed and not too far

Regular long-term vigurous endurence sports increase the risk of AF

Atrial dilation, increased vagal tone and fibrosis proposed potential mechanisms for AF development in EA

Take Home Message

Regular long-term vigurous endurence sports increase the risk of AF
Atrial dilation, increased vagal tone and fibrosis proposed potential mechanisms for AF development in EA

Do endurance sports , enjoy Rejuvenation! and live a longer life

THANCX