



HRC2011

2nd - 5th October 2011

Hilton Birmingham Metropole Hotel, Birmingham, UK

Education
Technology
Diversity

Exercising with an arrhythmia

Arrhythmia Alliance Patient Day

Dr Andreas Wolff

Westcliffe Cardiology Service



Q: Doctor, I've heard that cardiovascular exercise can prolong life. Is this true?

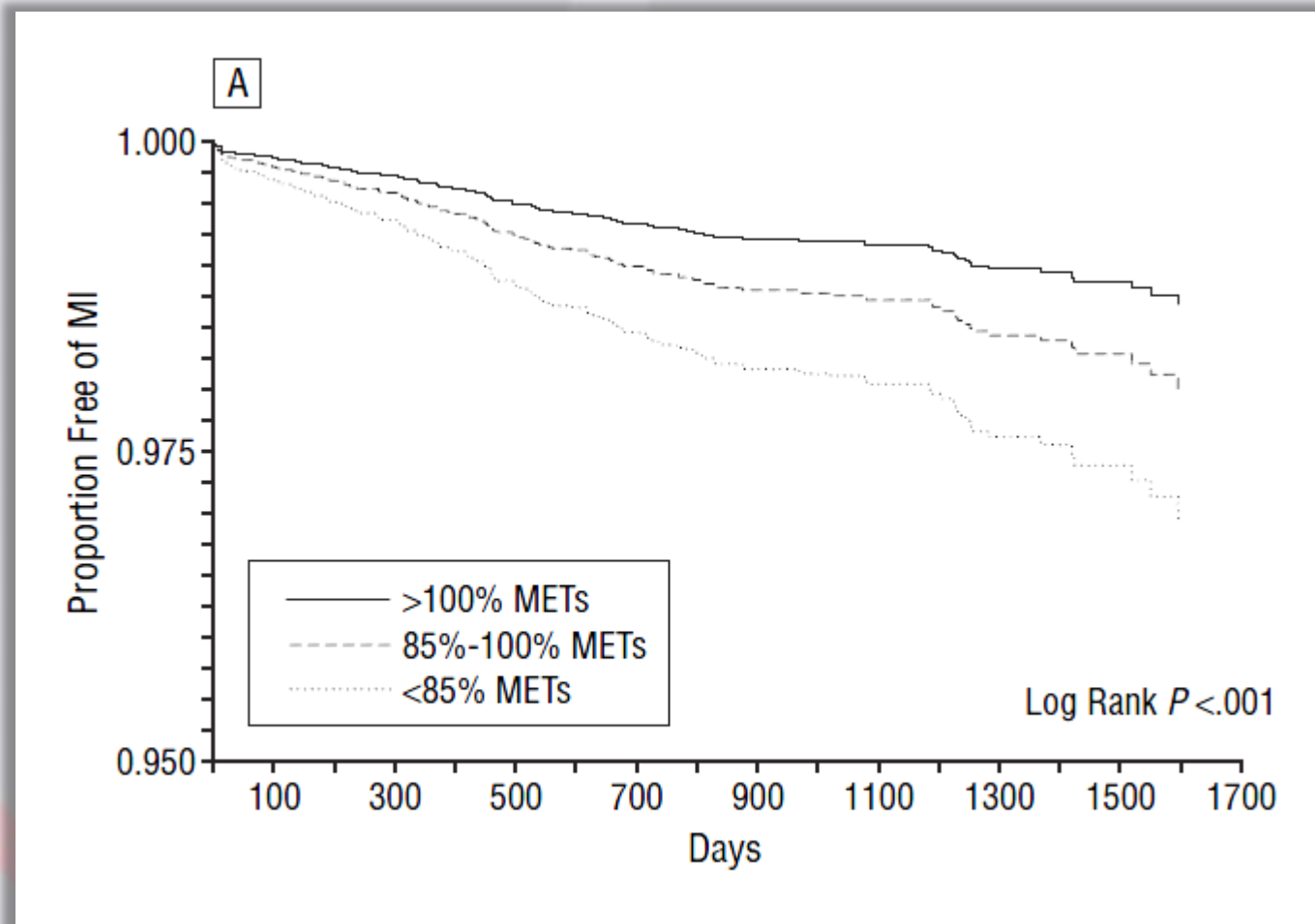
A: Your heart only good for so many beats, and that it... don't waste on exercise. Everything wear out eventually.. Speeding up heart not make you live longer; it like saying you extend life of car by driving faster. Want to live longer? Take nap.

Don't believe him!

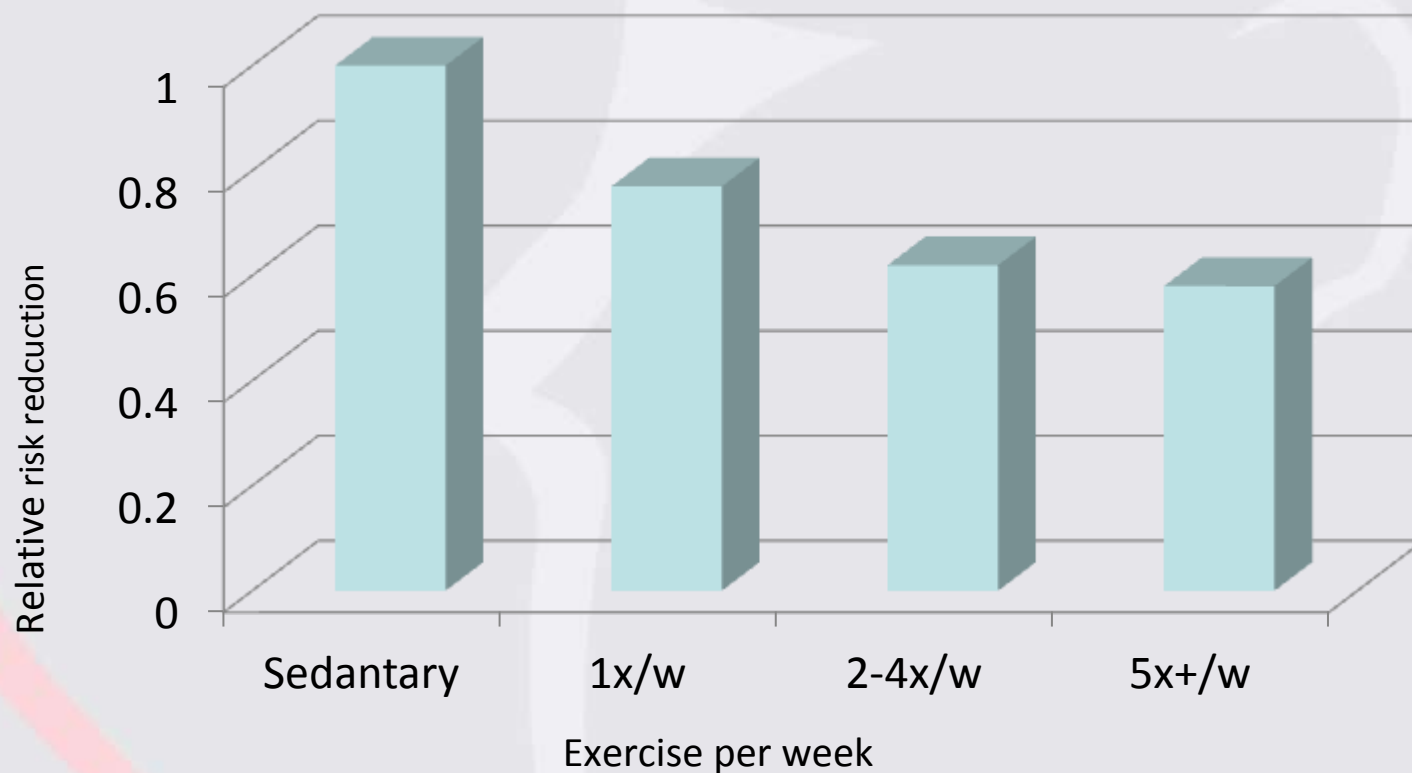
Exercise is good for you

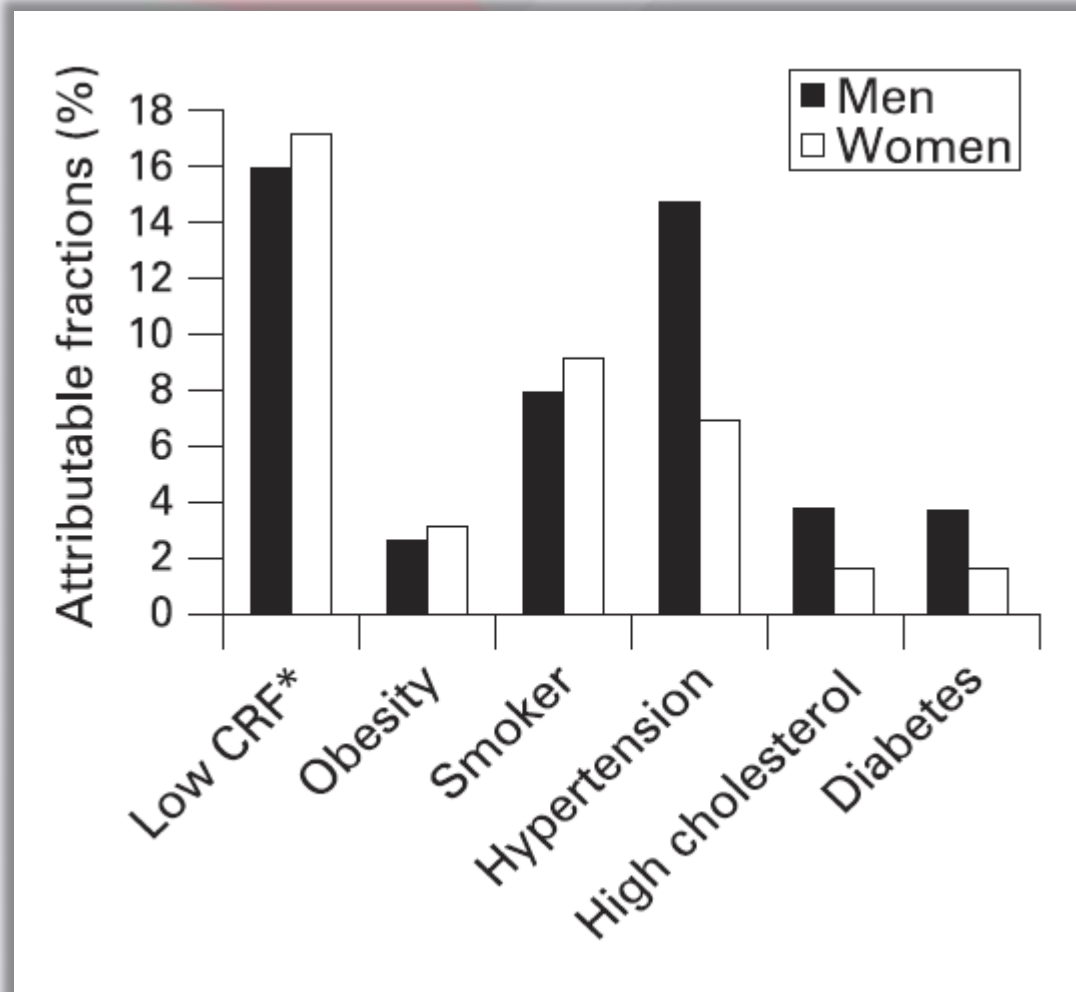
- Increase in exercises tolerance
- Weight reduction
- Reduction in bad cholesterol (LDL)
- Increase in good cholesterol (HDL)
- Reduction in blood pressure
- Reduction in diabetes risk
- Reduced risk of coronary heart disease
- Increase in quality of life

Association of exercise capacity on the treadmill with future cardiac events



A prospective study of exercise and incidence of diabetes among US male physicians





Attributable fractions (%) for all cause deaths in 40 842 (3333 deaths) men and 12 943 (491 deaths) women in the **Aerobics Center Longitudinal Study**. The attributable fractions are adjusted for age and each other item in the figure.

*Cardiorespiratory fitness determined by a maximal exercise test on a treadmill.

Exercising with an arrhythmia

Your questions...

- What exercise can I do?
- How much/often can I exercise?
- Should I monitor my heart rate?
- Exercising with an ICD
- Why and how to warm up?

What exercise can I do depends on...

- Type and cause of the arrhythmia
- Severity and frequency of symptoms
- Investigation results - risk stratification
- Treatment
- Intensity of exercise

Needs to be assessed on an individual basis!

Meet Debbie, 34.

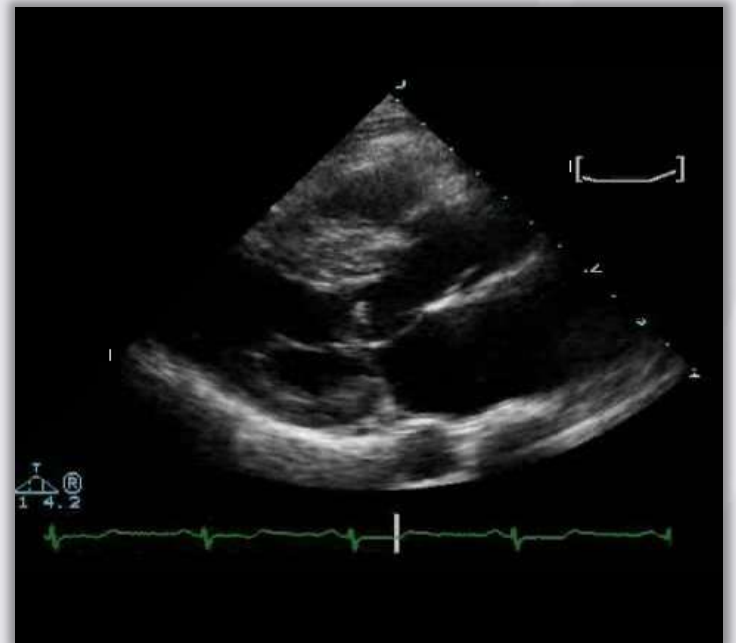
- Palpitations on average twice per year
- Duration 10min to 200min
- No association with exercise
- No history of blackouts
- No medication
- Other investigations normal

- Cyclist
- Moderate intensity
- No competition
- 5hrs / week



This is Jack, 41

- Passionate climber
- Intensity: “ as ‘ard as possible”
- 4 episodes of dizzy spells associated with chest tightness
- Diagnosed with hypertrophic cardiomyopathy
- Non-sustained ventricular tachycardia on ambulatory ECG



Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart
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Recommendations for Physical Activity and Recreational Sports Participation for Young Patients With Genetic Cardiovascular Diseases

Barry J. Maron, Bernard R. Chaitman, Michael J. Ackerman, Antonio Bayés de Luna, Domenico Corrado, Jane E. Crosson, Barbara J. Deal, David J. Driscoll, N.A. Mark Estes III, Claudio Gil S. Araújo, David H. Liang, Matthew J. Mitten, Robert J. Myerburg, Antonio Pelliccia, Paul D. Thompson, Jeffrey A. Towbin and Steven P. Van Camp

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Recommendations for the Acceptability of Recreational (Noncompetitive) Sports Activities and Exercise in Patients With GCVDs*

Intensity Level	HCM†	LQTS†	Marfan Syndrome‡	ARVC	Brugada Syndrome
High					
Basketball					
Full court	0	0	2	1	2
Half court	0	0	2	1	2
Body building§	1	1	0	1	1
Ice hockey§	0	0	1	0	0
Racquetball/squash	0	2	2	0	2
Rock climbing§	1	1	1	1	1
Running (sprinting)	0	0	2	0	2
Skiing (downhill)§	2	2	2	1	1
Skiing (cross-country)	2	3	2	1	4
Soccer	0	0	2	0	2
Tennis (singles)	0	0	3	0	2
Touch (flag) football	1	1	3	1	3
Windsurfing	1	0	1	1	1

*Recreational sports are categorized with regard to high, moderate, and low levels of exercise and graded on a relative scale (from 0 to 5) for eligibility with 0 to 1 indicating generally not advised or strongly discouraged; 4 to 5 indicating probably permitted; and 2 to 3 indicating intermediate and to be assessed clinically on an individual basis. The designations of high, moderate, and low levels of exercise are equivalent to an estimated 6, 4 to 6, and 4 metabolic equivalents, respectively.

Recommendations for the Acceptability of Recreational (Noncompetitive) Sports Activities and Exercise in Patients With GCVDs*

Intensity Level	HCM†	LQTS†	Marfan Syndrome‡	ARVC	Brugada Syndrome
Moderate					
Baseball/softball	2	2	2	2	4
Biking	4	4	3	2	5
Modest hiking	4	5	5	2	4
Motorcycling§	3	1	2	2	2
Jogging	3	3	3	2	5
Sailing	3	3	2	2	4
Surfing	2	0	1	1	1
Swimming (lap)	5	0	3	3	4
Tennis (doubles)	4	4	4	3	4
Treadmill/stationary bicycle	5	5	4	3	5
Weightlifting (free weights)§¶	1	1	0	1	1
Hiking	3	3	3	2	4

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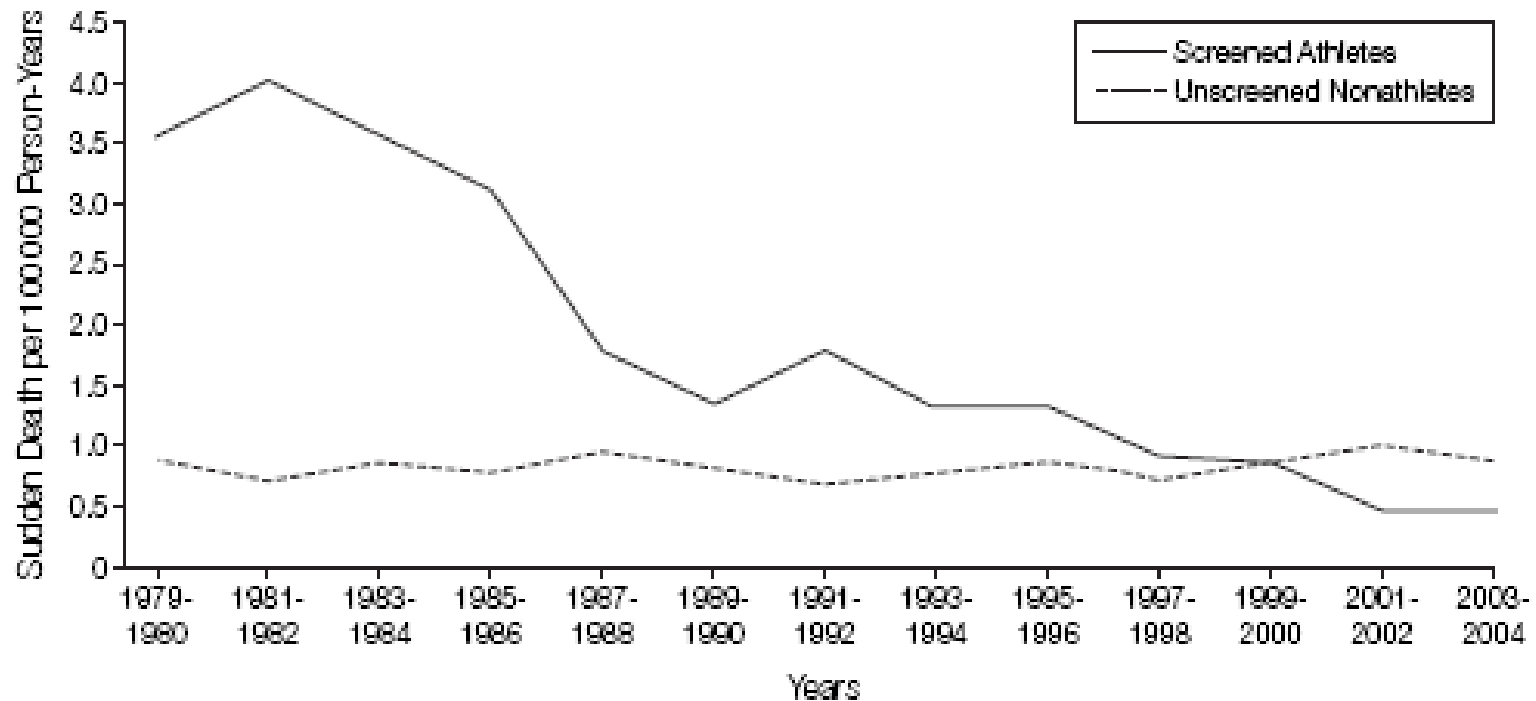
Intensity Level	HCM†	LQTS†	Marfan Syndrome‡	ARVC	Brugada Syndrome
Low					
Bowling	5	5	5	4	5
Golf	5	5	5	4	5
Horseback riding§	3	3	3	3	3
Scuba diving	0	0	0	0	0
Skating#	5	5	5	4	5
Snorkeling	5	0	5	4	4
Weights (non-free weights)	4	4	0	4	4
Brisk walking	5	5	5	5	5

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Activity	METs	Calories / hr
Walking 2.0 mph	2.5	175
Walking 3.0 mph	3.5	245
Golf (without cart)	4.9	450
Gardening	4.4	310
Cycling (leisurely)	4.0	380
Cycling (moderately)	5.7	400
Swimming (slowly)	4.5	315
Swimming (fast)	7.0	490
Climbing hills (no load)	6.9	480
Climbing hills (with 5 kg load)	7.5	525
Tennis (singles)	7.5	525
Running (10 min mile)	10.2	710
Running (7.5 min/mile)	13.2	930

One **MET** is the amount of energy required at rest, equal to approximately 70 calories per hour; 3 METs represents an exercise intensity equivalent to 3 times the metabolic rate at rest.

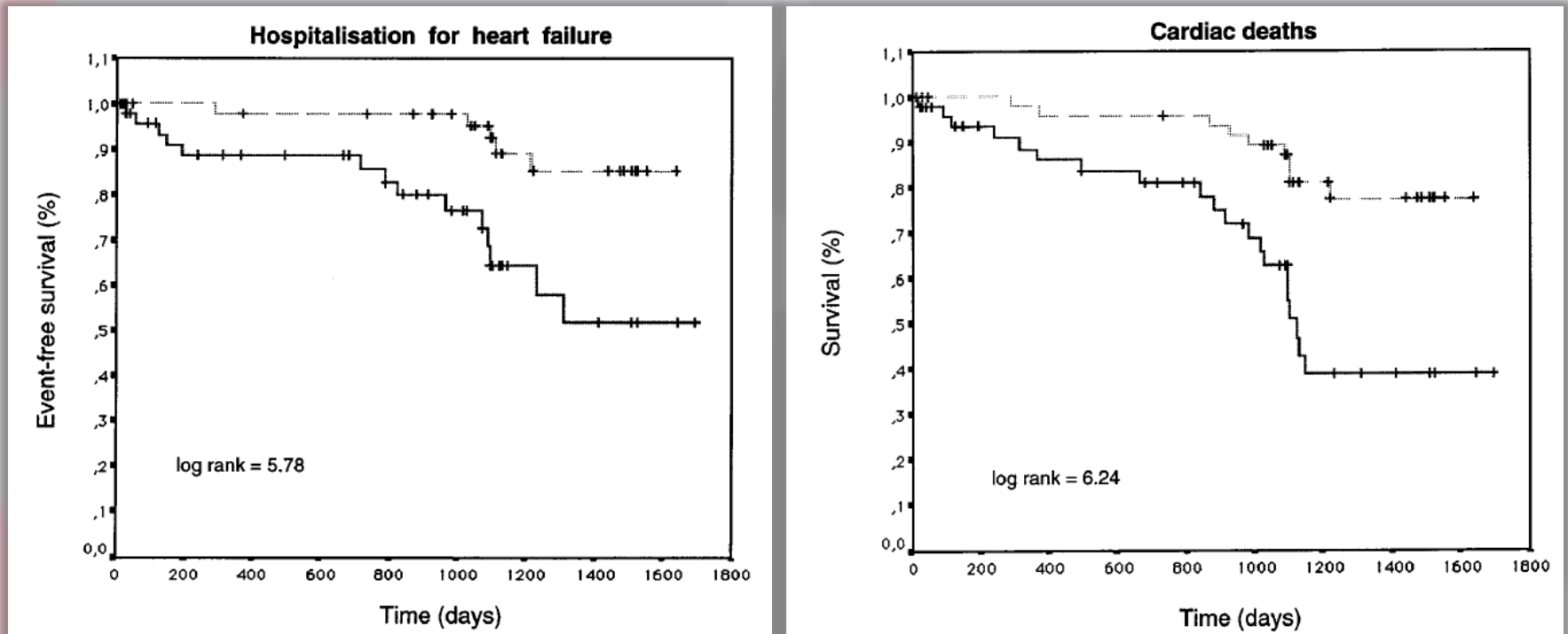
Figure. Annual Incidence Rates of Sudden Cardiovascular Death in Screened Competitive Athletes and Unscreened Nonathletes Aged 12 to 35 Years in the Veneto Region of Italy (1979-2004)



During the study period, the annual incidence of sudden cardiovascular death decreased by 89% in screened athletes (P for trend $<.001$). In contrast, the incidence rate of sudden cardiovascular death did not demonstrate consistent changes over time in unscreened nonathletes.

Cardiac rehabilitation plays an important role for patients with established heart disease

Randomized, controlled trial of long-term moderate exercise training in Chronic Heart Failure : effects on functional capacity and clinical outcome



- 3 times a week for 8 weeks at 60% of peak $V\dot{O}_2$
- 12-month maintenance of 2 sessions per week
- 40min of cycling on ergometer
- Supervised in hospital gymnasium

Effect of physical training on ventricular repolarization in type 1 long QT syndrome asymptomatic carriers

Table 1 Physiological variables and QT interval characteristics at rest before and after training in asymptomatic LQT1 gene carriers and control subjects

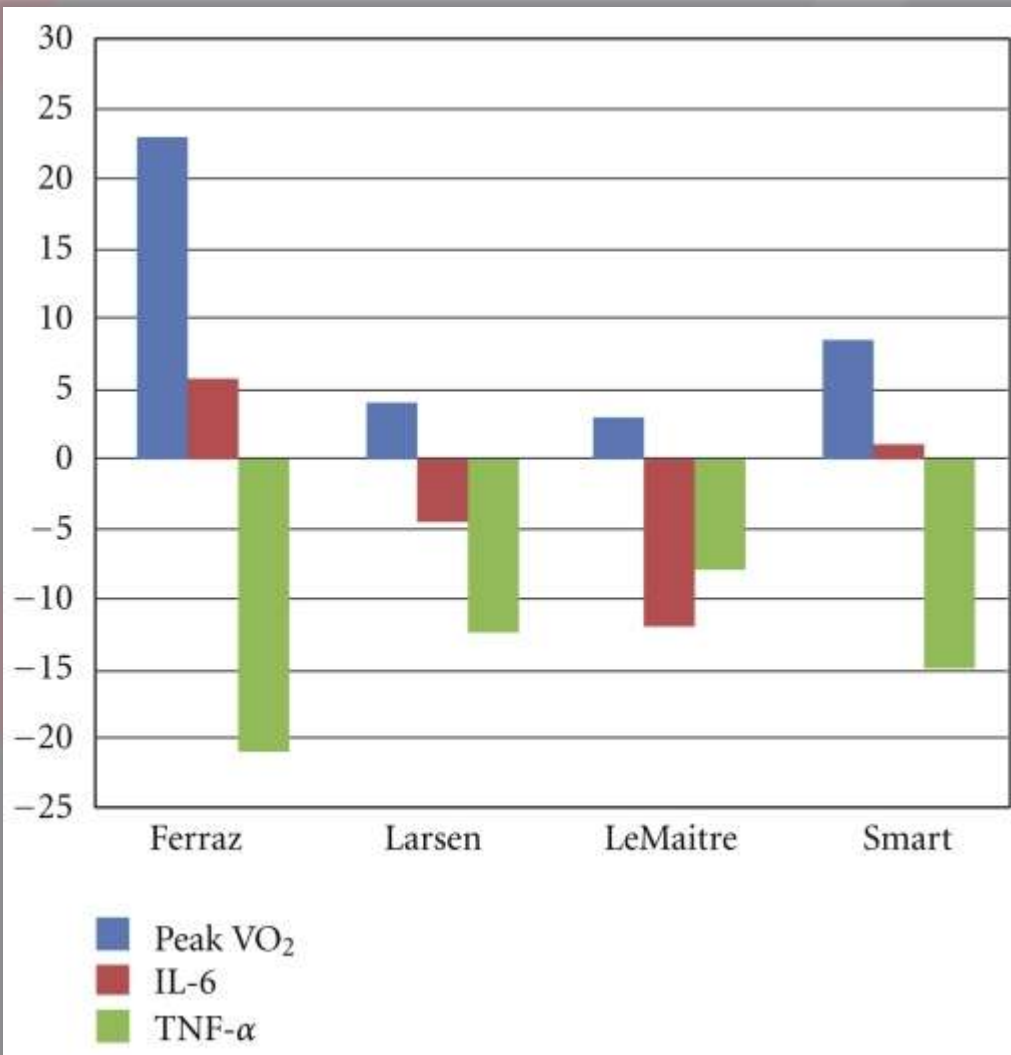
	LQT1		Controls	
	Before	After	Before	After
Body weight (kg)	77 ± 5	76 ± 5	70 ± 6	69 ± 6
Resting HR (bpm)	64 ± 2	64 ± 2	65 ± 4	63 ± 3
Maximal HR (bpm)	160 ± 3	160 ± 4	180 ± 2	180 ± 3
Maximal workload (W)	211 ± 8	221 ± 9*	198 ± 4	225 ± 5*
LV mass (g)	97 ± 2	105 ± 2*	97 ± 4	104 ± 3*
LV EF (%)	60 ± 2	64 ± 2	64 ± 2	68 ± 3*
RR-interval (ms)	949 ± 30	949 ± 30	948 ± 40	950 ± 50
QTc (ms)	415 ± 16	373 ± 14	397 ± 21	368 ± 14
QT end (ms)	428 ± 13	386 ± 15	405 ± 13	381 ± 9
QTpeak (ms)	346 ± 13	318 ± 17	311 ± 9	294 ± 16
QT end – QTpeak (ms)	76 ± 1	73 ± 3	83 ± 4	83 ± 7
QTd	88 ± 13	75 ± 15*	93 ± 20	90 ± 22

EF, ejection fraction, QTd, QT dispersion. Values are mean ± SE.

* $P < 0.05$, comparison between before and after training.

- G589D KCNQ1 mutation n = 15
- exercised on a bicycle ergometer
- 3–4 times a week
- 30 min a day at 60–75% of maximal heart rate (HR)
- 3 months duration

Change in cytokines and peak VO₂ as a result of exercise training in ischaemic cardiomyopathy across four studies



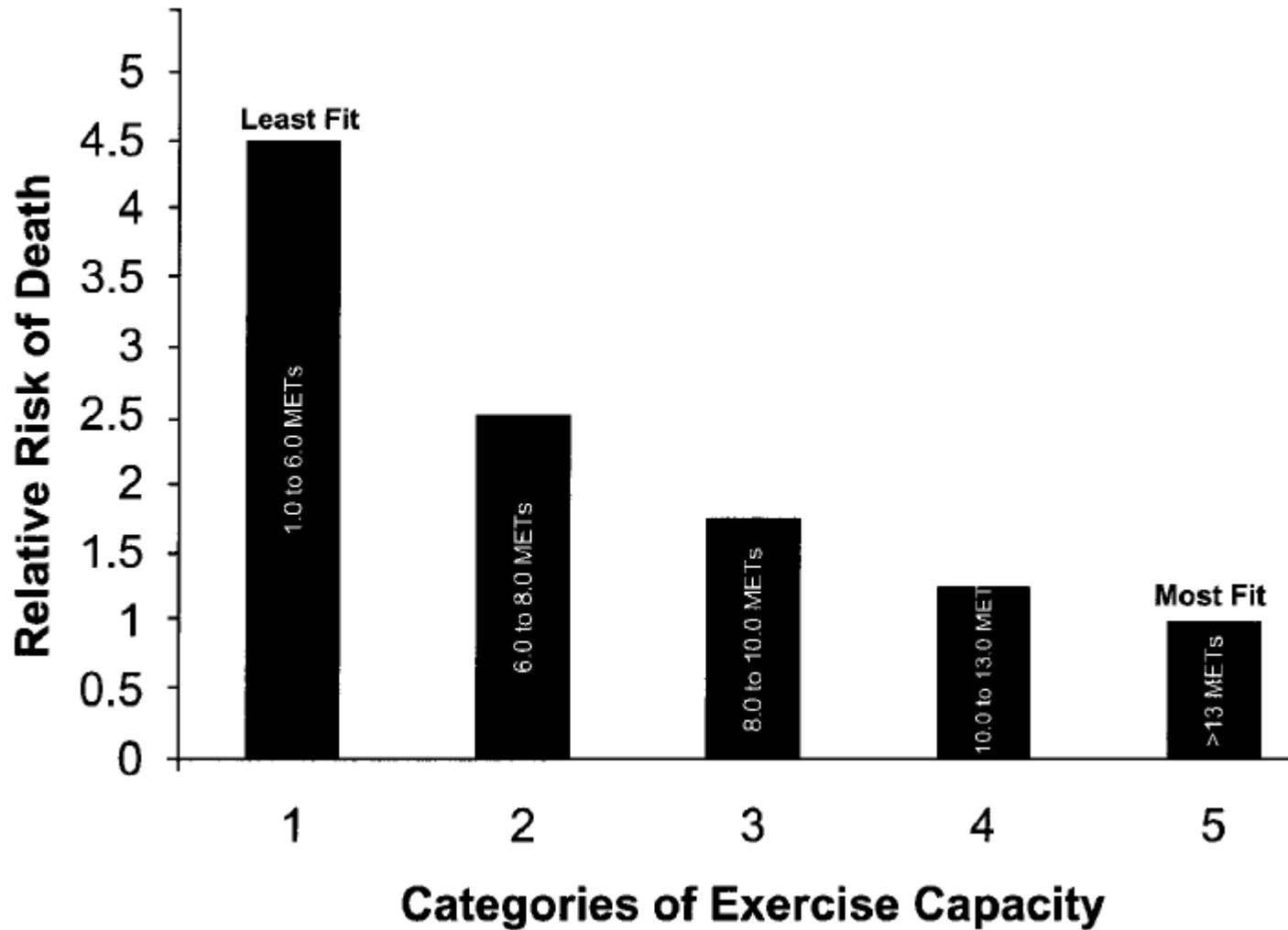
	Ferraz	Larsen	LeMaitre	Smart
Weeks	24	12	6	16
Minutes/Wk	135	90	150	90
Freq. sessions/Wk	3	3	5	3
Intensity (% max)	67	80	70	70
Total hours	54	54	15	48

Don't do this at home...

Cardiac rehabilitation specialists

- Understand your condition
- Evaluate your situation before exercise commences
- Perform cardio-respiratory exercise testing
Eg. establish maximal heart rate and VO_2 max.
- Individualise and supervise your exercise programme

How much exercise can I do?



Age-adjusted mortality rates in healthy men categorized by level of fitness. The range of values for exercise capacity (METs) for each category are represented within each bar

The National Runner's Health Study

Comparing runners averaging > 80km/ week
with runners completing < 16km / week

- 85% risk reduction of HDL < 0.9 mmol/l
- 2.5 x more likely to have HDL > 1.55 mmol/l
- 50% reduced risk of hypertension
- 10 year estimated cardiovascular risk 30% lower

Meta-analysis of the risk to develop atrial fibrillation comparing athletes with the general population

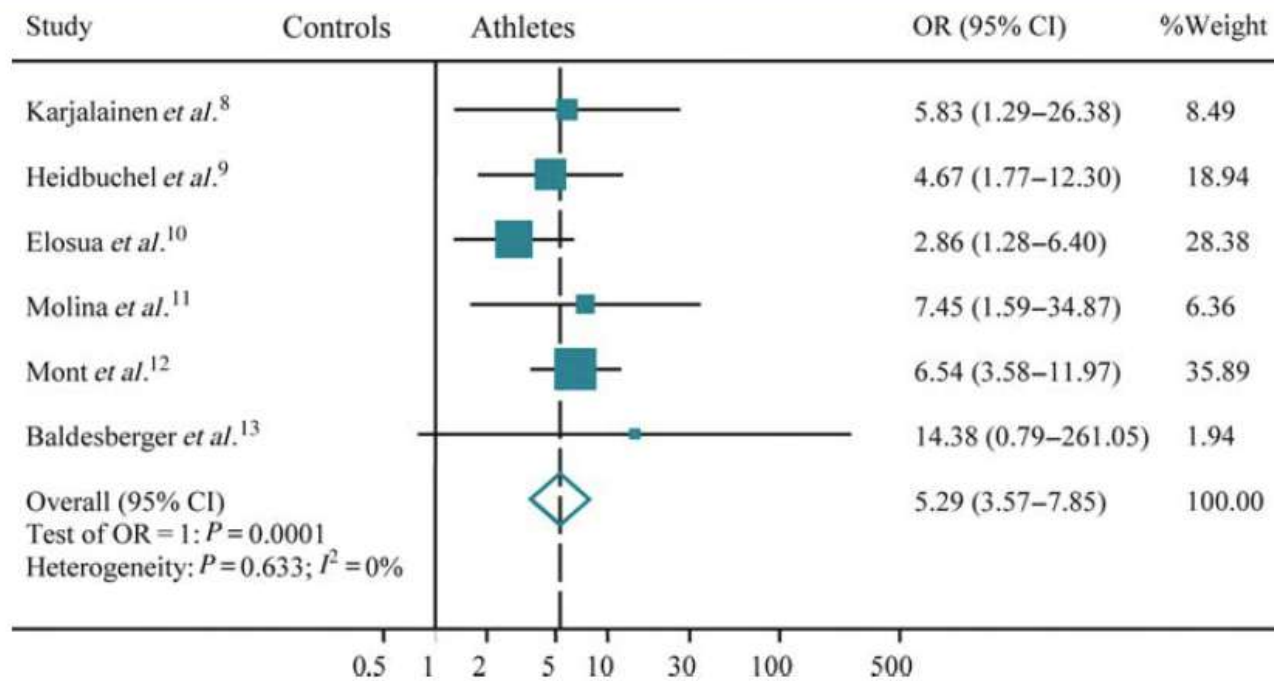
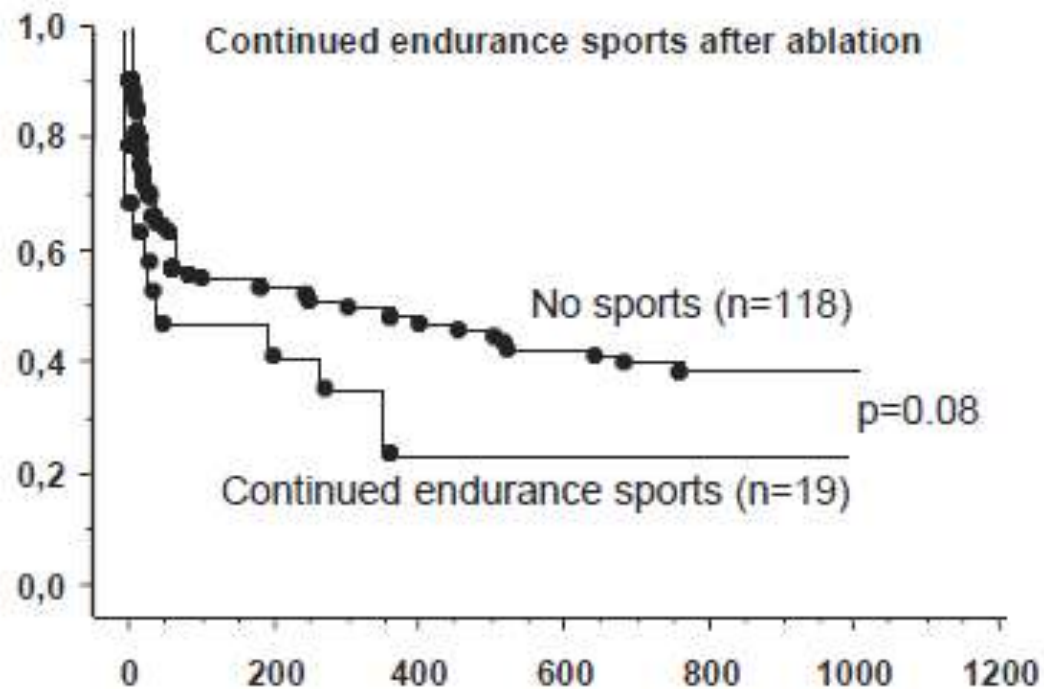


Figure 2 Meta-analysis of AF risk in athletes compared with controls.



At risk	d0	d360	d720	Time (days)
No sports	118	49	29	
Cont'd Endurance	19	6	3	

Fig. 2. Kaplan-Meier curves showing development of AF in 19 patients who continued endurance sports after ablation, vs. 118 patients who did not.

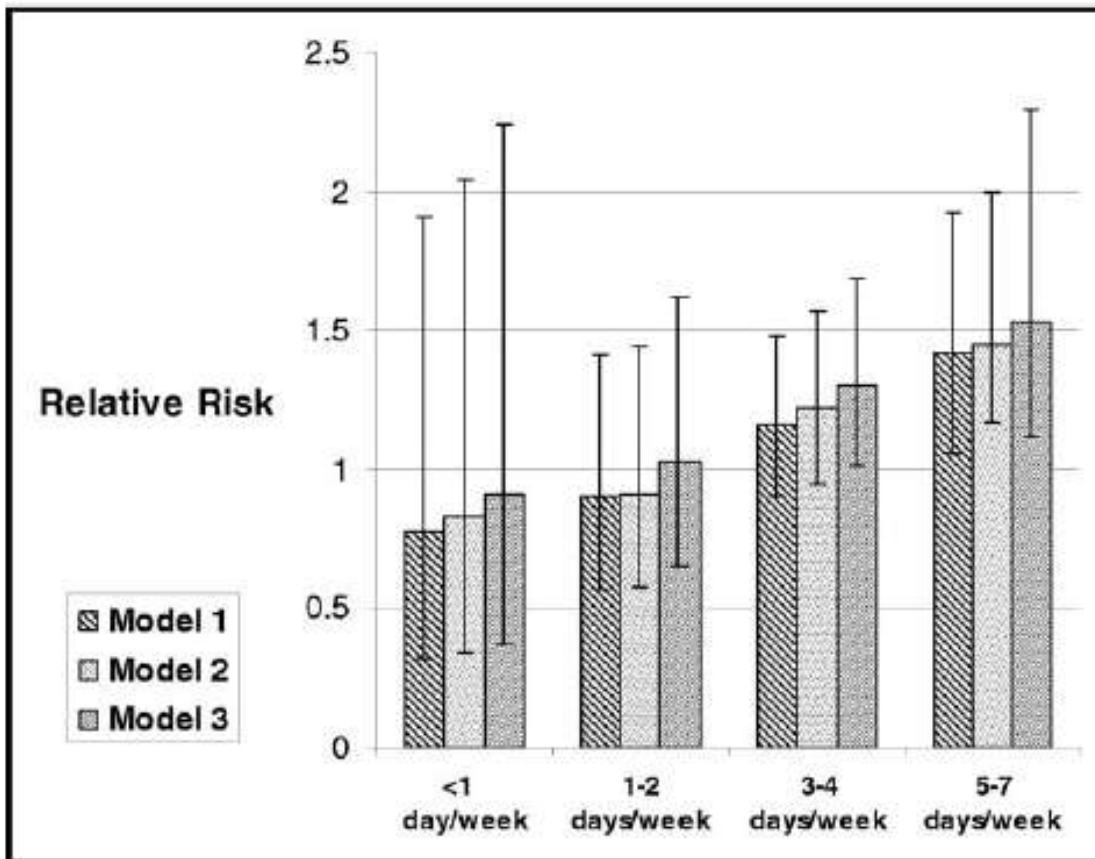


Figure 3. RR of AF according to jogging frequency at 3 years.

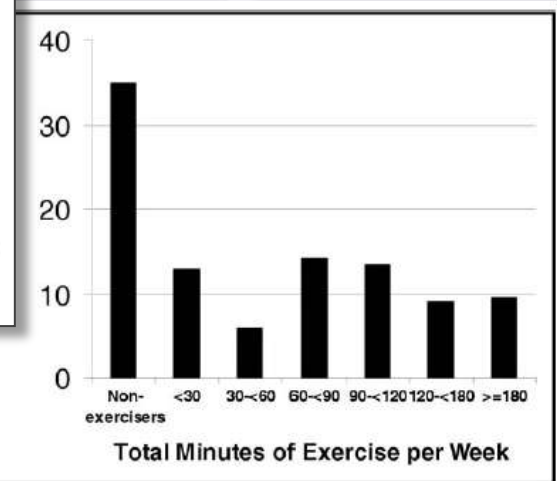


Figure 1. Distribution of total exercise time per week (minutes).

Exercising with an ICD?

Limited data on effectiveness of ICDs in sport

- No competitive sports (unless low CV demand)
- No sports with bodily contact
- Avoid sports with repetitive and forceful arm movements ie volleyball, tennis etc
- Resume exercise after 6 weeks of implantation or after discharge – evaluation +/-exercise test
- Match ICD settings and exercise



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Aerobic Exercise Improves Fitness and Heart Rate Variability After an Implantable Cardioverter Defibrillator

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Position Paper

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

Part II: Ventricular arrhythmias, channelopathies and implantable defibrillators

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Warm up and cool down

Why warm up and cool down?

- Allows blood vessel to dilate
- Allows slow adjustment of autonomic nervous system
- Allows slow adjustment to hormonal changes
- Increases blood temperature
- Helps muscle elasticity and contraction

How to?

- Match warm up with planned intensity and type of exercise
 - Duration: higher intensity sport – longer warm up / cool down
- Start with cardiovascular warm up
- Increase intensity slowly
- Calisthenics and stretches should include sport specific regimes



“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”

Thank you

Questions?

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