

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY

Europrevent 2010 Prague
Exercise recommendations in athletes

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EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY

THE PAOMNNEHAL PWEOR
OF THE HMUAN MNID



Recommendations for competitive sports participation in athletes with cardiovascular disease

A consensus document from the Study Group of Sports Cardiology of the Working Group of Cardiac Rehabilitation and Exercise Physiology and the Working Group of Myocardial and Pericardial Diseases of the European Society of Cardiology

Antonio Pelliccia^{1*}, Robert Fagard², Hans Halvor Bjørnstad³, Aris Anastassakis⁴, Eloisa Arbustini⁵, Deodato Assanelli⁶, Alessandro Biffi¹, Mats Borjesson⁷, François Carré⁸, Domenico Corrado⁹, Pietro Delise¹⁰, Uwe Dorwarth¹¹, Asle Hirth³, Hein Heidbuchel¹², Ellen Hoffmann¹¹, Klaus P. Mellwig¹³, Nicole Panhuyzen-Goedkoop¹⁴, Angela Pisani¹⁵, Erik E. Solberg¹⁵, Frank van-Buuren¹³, and Luc Vanhees²

Experts who contributed to and revised parts of these recommendations:

Carina Blomstrom-Lundqvist¹⁶, Asterios Deligiannis¹⁷, Dorian Dugmore¹⁸, Michael Glikson¹⁹, Per Ivar Hoff³, Andreas Hoffmann²⁰, Erik Hoffmann²¹, Dieter Horstkotte¹⁴, Jan Erik Nordrehaug³, Jan Oudhof²², William J. McKenna²³, Maria Penco²⁴, Silvia Priori²⁵, Tony Reybrouck², Jeff Senden²⁶, Antonio Spataro¹, and Gaetano Thiene⁹



Advise

- follow guidelines for specific cardiac problems
- invasive treatment aiming at cure before eligibility

Based on

- clinical perception that athletes with underlying CVD are at risk for X-induced cardiac events
- expert opinion
- large experience in Italy



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Qs

erroneously non-eligible

cardiac rehabilitation after cardiac surgery

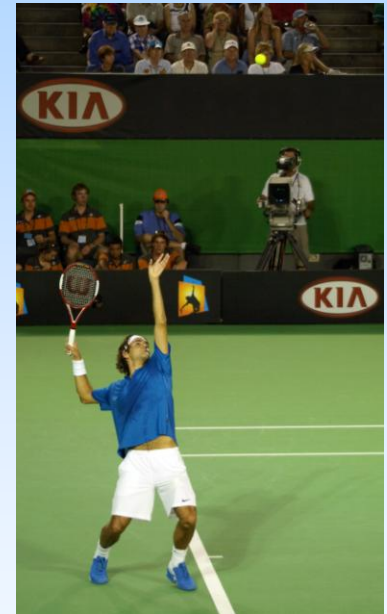
return to play

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY

erroneously non-eligible

cardiac rehabilitation after cardiac surgery

return to play



EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “RETURN TO PLAY”

RETURN TO PLAY in sportscardiology

process of deciding when an athlete identified with CVD at risk for exercise related CV events may safely return to practice or competition

- treatment
- rehabilitation plan
- psychosocial issues
- prognosis for “return to play”
- pre-participation CV screening



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The team physician and return-to-play issues. Consensus statement. ACSM 2002 0195-9131/02/3301-1212/0

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “RETURN TO PLAY” TREATMENT

Treatment promotes safe and timely return to practice
or competition

Recommendations sportscardiology
invasive treatment aiming at cure before eligibility

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Pellicci EHJ 2005

Heidbuchel SVTEJ CPR 2006

Heidbuchel VT EJCPR 2006

Borjesson EJCPR 2006

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “RETURN TO PLAY” TREATMENT

CVD	Return to play	Recommendation for sport
PCI/CABG	3-6 mo	Low-moderate (IA-IIB)
Valve surgery	12 mo	Low-moderate (IA-IIB)
AVNRT, AVRT ablation	1-3 mo	All sports
WPW ablation (mandatory)	1-3 mo	All sports
Non-sustained VT ablation of automatic focus of LV fascicular VT	6-12 wk	All sports
Re-entrant VT ablation	6-12 wk	Low-moderate leisure time (IA-IIB)
VT + correction of transient cause	3-6 mo	All sports (but caution)

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EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “RETURN TO PLAY”

RETURN TO PLAY *in sportscardiology*

process of deciding when an athlete identified with CVD at risk for exercise related CV events may safely return to practice or competition

- *treatment*
- **rehabilitation plan**
- *psychosocial issues*
- *prognosis for “return to play”*
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EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”

CARDIAC REHABILITATION in sportscardiology
optimizes safe and timely return to practice or
competition

Rehabilitation plan

- restore and promote CV function and overall well-being of athlete
- sport-specific assessment and training, a basis for sport-specific condition

The team physician and return-to-play issues. Consensus statement. ACSM 2002 0195-9131/02/3301-1212/0

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”

Cardiac rehabilitation

- ❖ Ischaemic syndromes
- ❖ Revascularisation (PCI, CABG)
- ❖ Valve surgery
- ❖ Heart failure
- ❖ ICD / ablation of arrhythmia
- ❖ Congenital HD
- ❖ Risk factors / life style



EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”

Exercise intensity

Methods to increase cardio respiratory fitness

- % HR max
- Rate Percieved Exertion (Borg scale)
- % VO₂ max
- % lactate threshold
- HR recovery



Table 2:

The relationship between % of HR max, rate of perceived exertion (RPE) and % VO2 max for defining physical activity intensity

(adapted from [91])

Intensity	%HR max	RPE	% VO2max
Very light	<50	<10	<20
Light	50-63	10-11	20-39
Moderate	64-76	12-13	40-59
Hard	77-93	14-16	60-84
Very hard	>94	17-19	>85
Maximal	100	20	100

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”

	ACSM 2000	AHA 1995
Static exercise	2-3 x/wk	2-3 x/wk
	1 series	1 series
	10-15 repetitions	10-15 repetitions
		8-10 drills
	Large muscle groups	Large muscle groups
Dynamic exercise(endurance)	3-5 x/wk	≥ 3 x/wk
	20-60min	≥ 20 min
	55-90% HR max	
	or 40-80% VO2 max	50-75% VO2 max

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”



Week no	Fitness/ball game (min)	Dynamic exercise (min)	Intensity (% watt)
1	2 x 30	0	low
2	2 x 30	0	low
3	3 x 45	3 x 45	80
	BORGE SCALE	EVALUATION	
4	3 x 45	3 x 45	90
5	3 x 45	3 x 45	90
	BORGE SCALE	EVALUATION	
6	2 x 45	2 x 45	100
7	3 x 45	3 x 45	100
8	3 x 45	3 x 45	100

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”

Cardiac rehabilitation program
usually for sedentary people



EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”



Athletes

different goals of achievement

competitive sports participation

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”

- restore and promote CV function and overall well-being of athlete
- sport-specific assessment and training, a basis for sport-specific condition



The team physician and return-to-play issues. Consensus statement. ACSM 2002 0195-9131/02/3301-1212/0

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “REHABILITATION PLAN”

PRESCRIPTION OF EXERCISE

- tailored to each athlete in terms of their physical condition, (an)aerobic fitness and local muscular condition.....
- athletes who have not undertaken training for 3-6 month must physically condition themselves before practicing more rigorous physical activity....
- adequate pre- and post- medical evaluations (follow up)are essential

Borjesson EJ CPR 2007

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “Papendal NL protocol”



- Tailored
- Individual
- Sport-specific
- Follow-up
- Return to play

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “Papendal NL protocol”

Dec 2005-july 2008		
n	21	
M	19	
Age (yr)	14-67	Mean 43.6
≤ 35 yr	6	
Competitive sports	14	
Top-level	3	

Panhuyzen (unpublished data)

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “Papendal NL protocol”

Competitive sports	n
long distance running	5
cycling	3
soccer	2
tennis	1
triathlon	1
beach volleyball	1
basketball	1



EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “Papendal NL protocol”

reason for rehabilitation		n
Coronary revascularisation	PCI	4
	CABG	4 (1+AVR)
Valve surgery	AVR	2
ICD		3 (1+ VT ablation)
ablation of arrhythmia	WPW	1
	Maze	2
	AVNRT	2
	VT	1
Congenital disease	pectus excavatum	1
Risk factors / life style	post radiotherapy	1

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “Papendal NL protocol”

XECG + VO₂ max

bicycle 4 min 75 watt (F 50 watt)

Increment 50 watt/2 min

HR at R=Q (anaerobic threshold)

6-8 wk training program



EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY “Papendal NL protocol”

exercise		x/wk		
Static	wk 1-6 (8)	3	8-10 drills	10-15 repetitions
Dynamic (endurance)	wk 1-4 (8)	2-3	zone D1-D2	
	wk 4-6 (8)	2-3	zone D1-D2	
		1-2	zone D3	

Training zone	intensity	% HR at R=Q (ventilatory threshold)
D I	low	76-85
D II	Moderate	85-95
D III	High	95-100
D IV	interval training	> 100

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY

“Papendal NL protocol”
training zone’s (% HR at R=Q)

	M running	F beachvolley	M triathlon
HR max	175	187	166
VO2 max HR at R=Q	35 142	36 145	45 138
(ACSM 2000) 55-90% HRmax	96-157	102-168	91-149
“Papendal NL	Protocol”		
HR at % R=Q			
D I: 76-85%	108-120	110-123	105-117
D II: 85-95%	120-135	123-138	117-131
D III: 95-100%	135-142	138-145	131-138
D IV: >100%	>142	>145	>138

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY

surgery	n	Follow up 1 yr NYHA	Follow up 1 yr return to play
PCI	4	I	+
CABG	4 (1+AVR)	I	+
AVR	2	I II	+ Leisure time
ICD	3 (1+ VT ablation)	II-III	no
WPW	1	I	+
Maze	2	I II	+ Leisure time
AVNRT	2	I	+
VT	1	I	Leisure time
pectus excavatum	1	I	+
post radiotherapy	1	I	+

EXERCISE GUIDELINES IN ATHLETES FOLLOWING CARDIAC SURGERY

proposal for

RECOMMENDATIONS FOR
CARDIAC REHABILITATION AND RETURN TO PLAY
IN ATHLETES FOLLOWING CARDIAC SURGERY

Cardiac surgery = with thoracotomy or catheter guided

RECOMMENDATIONS FOR CARDIAC REHABILITATION AND RETURN TO PLAY IN ATHLETES FOLLOWING CARDIAC SURGERY

- Tailored program
 - (% ventilatory threshold)
- Individual
- Sport-specific
- Multi-disciplinary approach (incl trainer, coach)
- Follow-up
- Pre-participation CV screening
- Return to play
 - (competition, leisure-time)

Training zone	intensity	% HR at R=Q
D I	low	76-85
D II	Moderate	85-95
D III	High	95-100
D IV	interval training	> 100

RECOMMENDATIONS FOR CARDIAC REHABILITATION AND RETURN TO PLAY IN ATHLETES FOLLOWING CARDIAC SURGERY

Recommendations need to be defined

Research is necessary

RETURN TO PLAY following cardiac surgery is POSSIBLE

REHABILITATION AND RETURN TO PLAY IN ATHLETES

Maarten vd Weijden (NL)

2001 leukaemia

2008 gold medal Beijing

10km swimming



AMZANIGHUH ?

REHABILITATION AND RETURN TO PLAY IN ATHLETES FOLLOWING CARDIAC SURGERY

Shaun White (USA)

1986 Fallot tetralogy

2x cardiac surgery

2006 Torino OS gold

2010 Vancouver OS gold

halfpipe snowboard



AMZANIGHUH ?



SPORTS CARDIOLOGY & CV REHABILITATION

Exercise intensity

In IHD

- not > ventilatory threshold (85% HR max)
- 10 bpm below HR corresponding with threshold



Classification of sports

	A. Low dynamic	B. Moderate dynamic	C. High dynamic
I. Low static	Bowling Cricket Golf Riflery	Fencing Table tennis Tennis (doubles) Volleyball Baseball ^a /softball ^a Field events (jumping) Figure skating ^a Lacrosse ^a Running (sprint)	Badminton Race walking Running (marathon) Cross-country skiing (classic) Squash ^a Basketball ^a Biathlon Ice hockey ^a Field hockey ^a Rugby ^a Soccer ^a Cross-country skiing (skating) Running (mid/long) Swimming Tennis (single) Team handball ^a Boxing ^a Canoeing, Kayaking Cycling ^{a,b} Decathlon Rowing Speed skating Triathlon ^{a,b}
II. Moderate static	Auto racing ^{a,b} Diving ^b Equestrian ^{a,b} Motorcycling ^{a,b} Gymnastics ^a Karate/Judo ^a Sailing Archery		
III. High static	Bobsledding ^{a,b} Field events (throwing) Luge ^{a,b} Rock climbing ^{a,b} Waterskiing ^{a,b} Weight lifting ^a Windsurfing ^{a,b}	Body building ^a Downhill skiing ^{a,b} Wrestling ^a Snow boarding ^{a,b}	

Adapted and modified after Mitchell et al.⁵

^aDanger of bodily collision.

^bIncreased risk if syncope occurs.