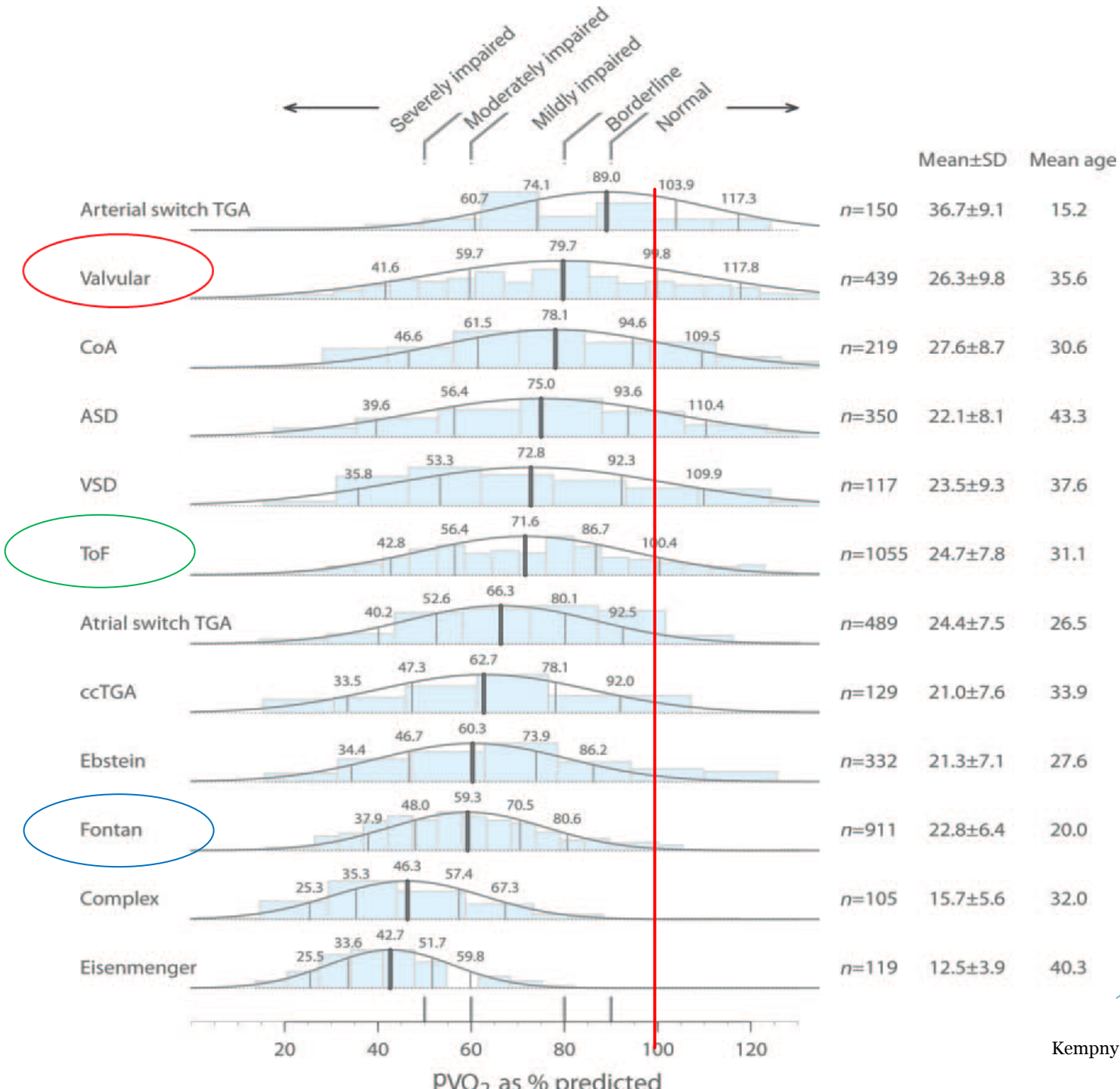


Fysisk träning vid medfödda hjärtfel

Camilla Sandberg, Specialistfysioterapeut, Umeå

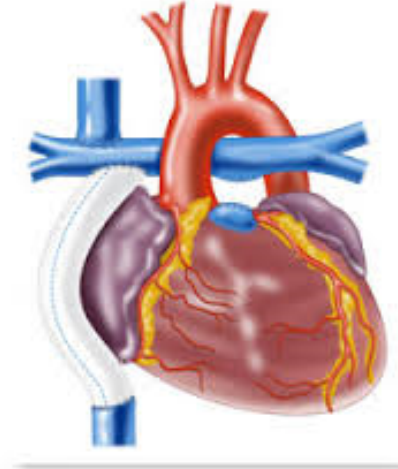
Anna-Klara Zetterström, Fysioterapeut, Göteborg



Vad är det som begränsar?

- ▶ Kammarfunktion -
Slagvolym
 - ▶ Hjärtfrekvens
- } **Hjärtminutvolym**
- ▶ Muskelfunktion
 - ▶ Lungfunktion
 - ▶ Lungblodflöde
 - ▶ Cyanos
 - ▶ Fysisk aktivitet??

- ▶ Kammarfunktion (Slagvolym)
 - ▶ Klaffstenos/insufficiens, shunt, hypertoni
 - ▶ Höger kammare som systemkammare (TGA)
 - ▶ Avsaknad av subpulmonell kammare (TCPC)



- ▶ Hjärtfrekvens
 - ▶ Kronotrop insufficiens
 - ▶ Komplexa hjärtfel
 - ▶ Ökad ålder
 - ▶ Sick-sinus, Betablockad, skada vid operation



Vad är det som begränsar?

- ▶ Kammarfunktion -
Slagvolym
 - ▶ Hjärtfrekvens
- } Hjärtminutvolym
- ▶ **Muskelfunktion**
 - ▶ Lungfunktion
 - ▶ Lungblodflöde
 - ▶ Cyanos
 - ▶ Fysisk aktivitet??

▶ Muskelfunktion

- ▶ Nedsatt muskulär uthållighet
- ▶ Nedsatt muskelstyrka
- ▶ Nedsatt muskelmetabolism
- ▶ Samband muskelstyrka- syreupptagningsförmåga



Sandberg C, European Journal of Preventive Cardiology. 2015;22(12):1523-30.

Kröönström LA, Int J Cardiol. 2014;170(3):358-63.

Cordina R, Heart. 2013;99(20):1530-4.

Greutmann M, Heart. 2011;97(14):1164-8.

Vad är det som begränsar?

- ▶ Kammarfunktion -
Slagvolym
- ▶ Hjärtfrekvens



Hjärtminutvolym

- ▶ Muskelfunktion
- ▶ Lungfunktion
- ▶ Lungblodflöde
- ▶ Cyanos
- ▶ Fysisk aktivitet??

▶ Lungfunktion

- ▶ Vanligare vid komplexa hjärtfel
- ▶ Hypoplasi
- ▶ Restriktivitet

▶ Lungblodföde

- ▶ Högersidigt utflödeshinder
- ▶ Passivt lungblodflöde
- ▶ Förhöjt lungblodtryck



Vad är det som begränsar?

- ▶ Kammarfunktion -
Slagvolym
- ▶ Hjärtfrekvens

Hjärtminutvolym

- ▶ Muskelfunktion
- ▶ Lungfunktion
- ▶ Lungblodflöde
- ▶ Cyanos
- ▶ Fysisk aktivitet??

Vad är det som begränsar?

- ▶ Kammarfunktion -
Slagvolym
- ▶ Hjärtfrekvens



Hjärtminutvolym

- ▶ Muskelfunktion
- ▶ Lungfunktion
- ▶ Lungblodflöde
- ▶ Cyanos
- ▶ Fysisk aktivitet??

Increasing static component ↑

III. High (>50% MVC)	Bobsledding/Luge*†, field events (throwing), gymnastics*†, martial arts*, sailing, sport climbing, water skiing*†, weight lifting*†, windsurfing*†	Body building *†, downhill skiing*†, skateboarding*†, snowboarding*†, wrestling*	Boxing*, canoeing/kayaking, cycling*†, decathlon, rowing, speed-skating*†, triathlon*†
II. Moderate (20-50% MVC)	Archery, auto racing*†, diving*†, equestrian*†, motorcycling*†	American football*, field events (jumping), figure skating*, rodeoing*†, rugby*, running (sprint), surfing*†, synchronized swimming†	Basketball*, ice hockey*, cross-country skiing (skating technique), lacrosse*, running (middle distance), swimming, team handball
I. Low (<20% MVC)	Billiards, bowling cricket, curling, golf, riflery	Baseball/softball*, fencing, table tennis, volleyball	Badminton, cross-country skiing (classic technique), field hockey*, orienteering, race walking, racquetball/squash, running (long distance), soccer*, tennis
	A. Low (<40% $\dot{V}O_{2max}$)	B. Moderate (40-70% $\dot{V}O_{2max}$)	C. High (>70% $\dot{V}O_{2max}$)
	Increasing dynamic component →		

Styrketräning

% 1RM	Antal repetitioner
100	1
95	2
92	3
87	5
80	8
75	10
70	12
60	ca15
50	ca 25
30	ca 50

Styrka



Uthållighet

1 RM = repetitions maximum
(Maximum voluntary contraction MVC)



European Heart Journal (2013) 34, 3669–3674
doi:10.1093/eurheartj/eht433

CURRENT OPINION

Physical activity in adolescents and adults with congenital heart defects: individualized exercise prescription[†]

Werner Budts^{1,2*}, Mats Börjesson³, Massimo Chessa⁴, Frank van Buuren⁵, Pedro Trigo Trindade⁶, Domenico Corrado⁷, Hein Heidbuchel^{1,2}, Gary Webb⁸, Johan Holm⁹, and Michael Papadakis¹⁰

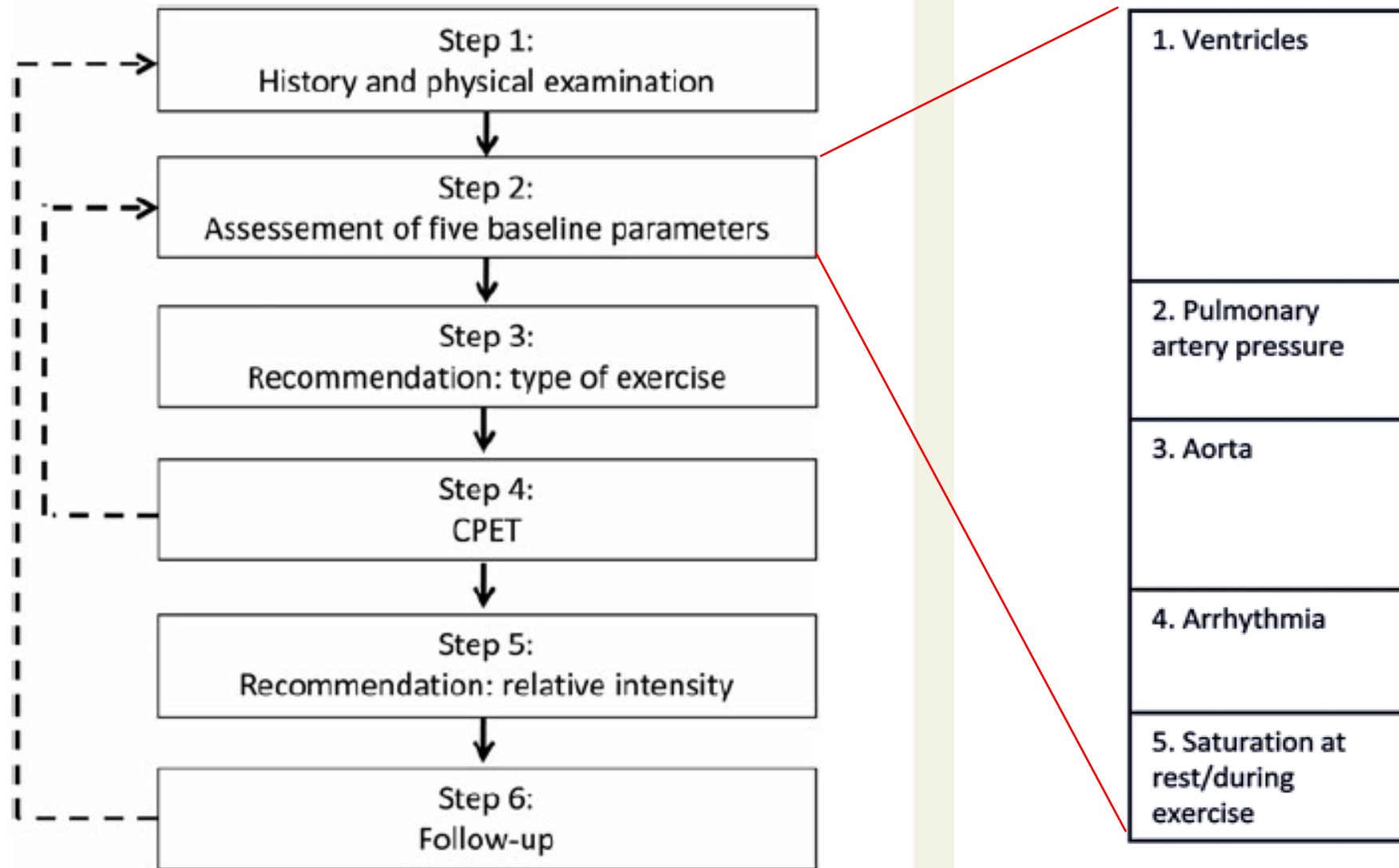
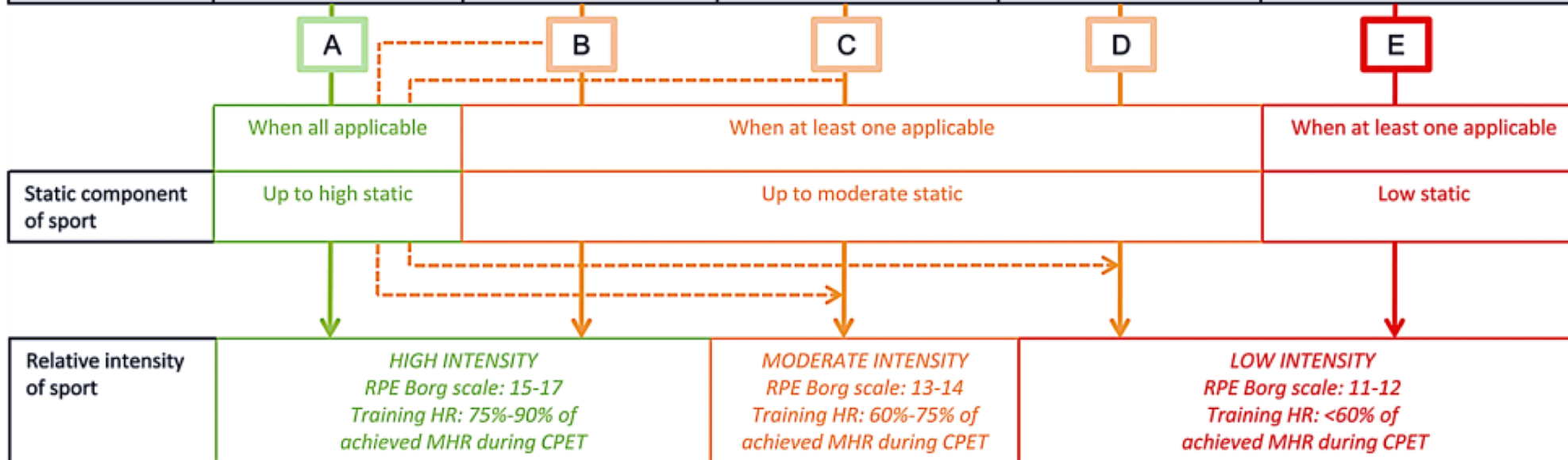
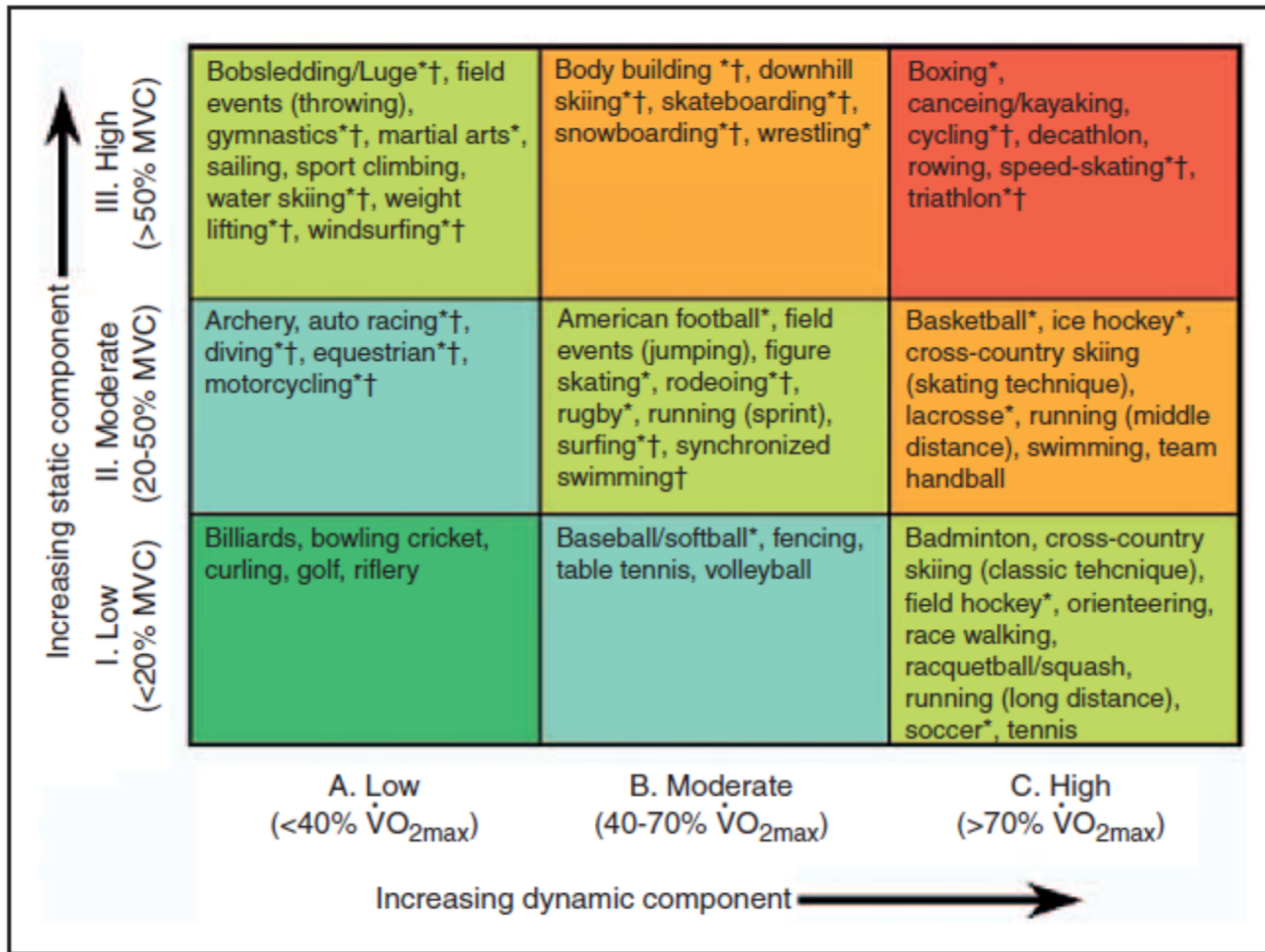


Figure 2 Flow chart depicting the six steps when evaluating adolescent and adult patients with congenital heart disease.

1. Ventricles	No systolic dysfunction No hypertrophy No pressure load No volume load	No systolic dysfunction No hypertrophy Mild pressure load Mild volume load	Mild systolic dysfunction Mild hypertrophy Single ventricle physiology Systemic right ventricle	Moderate systolic dysfunction Moderate hypertrophy Moderate pressure load	Severe systolic dysfunction Severe hypertrophy Severe pressure load Moderate/severe volume load
2. Pulmonary artery pressure	Low pulmonary artery pressure	Low pulmonary artery pressure	Mildly elevated pulmonary artery pressure		Moderately/severely elevated pulmonary artery pressure
3. Aorta	No/mild dilatation	Moderate dilatation	Severe dilatation	Dilatation approaching indication for repair	
4. Arrhythmia	No arrhythmia	No arrhythmia	Mild arrhythmic burden Non-malignant arrhythmia		Significant arrhythmic burden Malignant arrhythmia
5. Saturation at rest/during exercise	No central cyanosis	No central cyanosis	No central cyanosis	Central cyanosis	



Solid lines indicate recommendation ; if option for sports with high static component, reduce intensity (dotted lines)



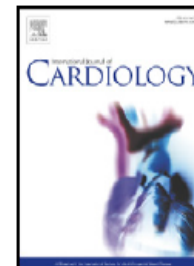


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Resistance training improves cardiac output, exercise capacity and tolerance to positive airway pressure in Fontan physiology[☆]

Rachael L. Cordina^{a,b}, Shamus O'Meagher^{a,b}, Alia Karmali^a, Caroline L. Rae^{c,d}, Carsten Liess^e,
Graham J. Kemp^f, Raj Puranik^{a,b}, Nalin Singh^{g,h}, David S. Celermajer^{a,b,*}

- ▶ Fontan/TCPC
- ▶ 6 träning, 5 kontroller
- ▶ Styrketräning 60 min 3g/v 20veckor
- ▶ Ökad styrka
- ▶ Ökad muskelmassa
- ▶ Ökad peak VO₂ (ökad slagvolym)

Home-based interval training increases endurance capacity in adults with complex congenital heart disease

Camilla Sandberg RPT, PhD^{1,2}  | Magnus Hedström MD¹ | Karin Wadell RPT, PhD² | Mikael Dellborg MD, PhD³ | Anders Ahnfelt MD³ | Anna-Klara Zetterström RPT⁴ | Amanda Öhrn RPT⁴ | Bengt Johansson MD, PhD¹

- ▶ 23 patienter (13 träning, 10 kontroller)
- ▶ Komplexa hjärtfel (ToF, Fontan/TCPC, dTGA, ccTGA, PA)
- ▶ 2 olika kardiopulmonella arbetsprov
- ▶ Hembaserad intervall träning på ergometercykel
- ▶ 3g/v, ca 40 min, THR_{75-80%} - 12 veckor

- ▶ Ökad peak prestationsförmåga (W)
- ▶ Ökad uthållighet