

Exercise and Sports for Children with Congenital Heart Disease

FRANK ZIMMERMAN, MD

NOVEMBER 2024



Physical Activity and Exercise

- ✓ Benefits of physical activity and exercise
- ✓ General activity recommendations
- ✓ Challenges to exercise in CHD
- ✓ Exercise prescription for CHD
- ✓ Sports participation for CHD

Definition

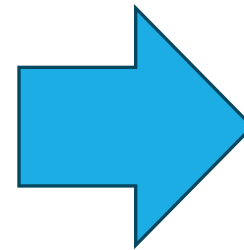
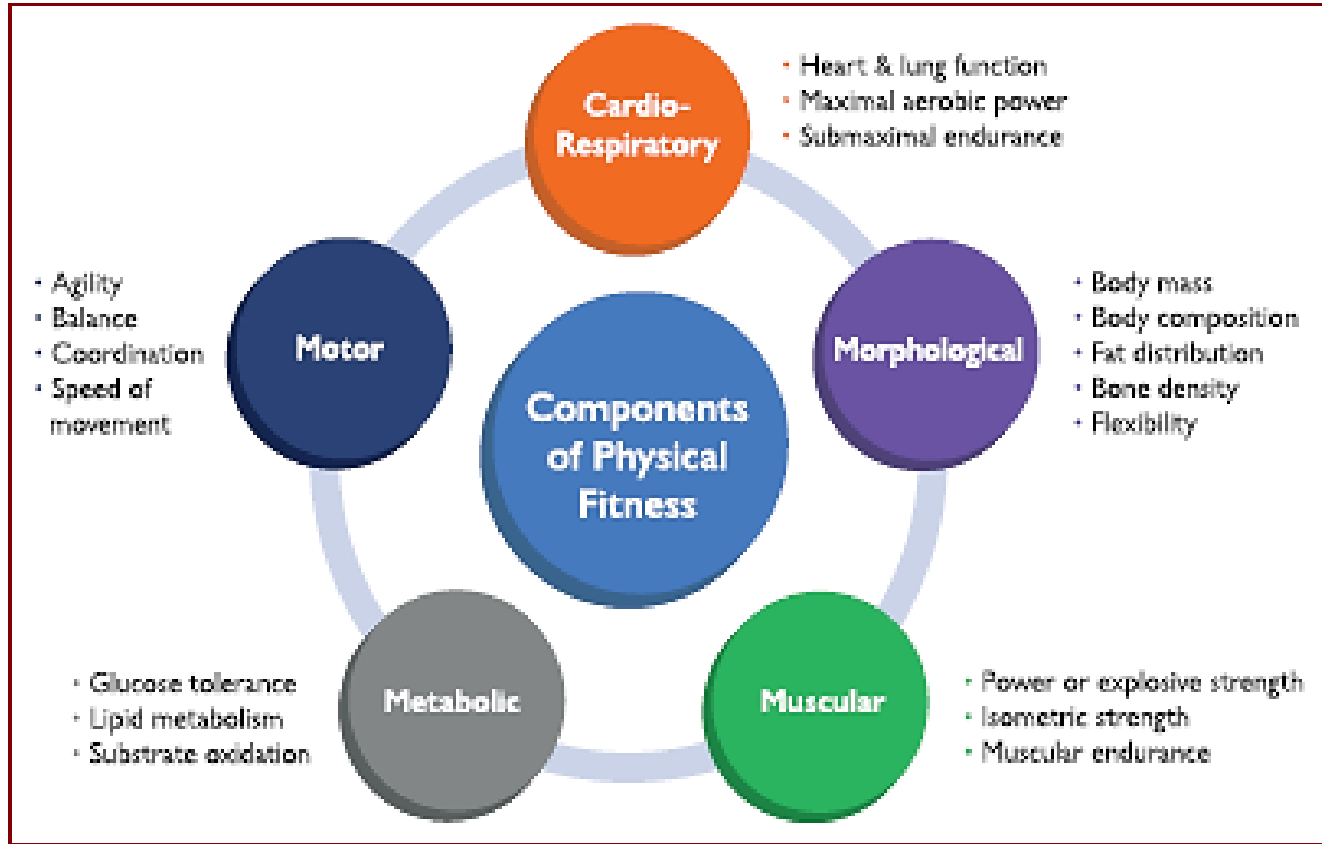
PHYSICAL ACTIVITY:

- Any form of activity, motion, movement
- Can include games, daily activities, chores

EXERCISE:

- A form of physical activity that is planned, structured and repetitive

Benefits of Physical Activity/Exercise



Promotes
Cardiac health

Reduces risk for
CAD

Enhances
Self-Esteem

Improves
Quality of Life

AHA Guidelines for Physical Activity

“60 minutes of moderate to vigorous physical activity per day (3-6 MET-hour)”

MET=Metabolic Equivalent task



= 1 MET

Metabolic Equivalent Tasks

Washing dishes



2.5 METS

Mowing the lawn



5.5 METS

Wii Bowling



3 METS

Light Salsa or Swing Dancing



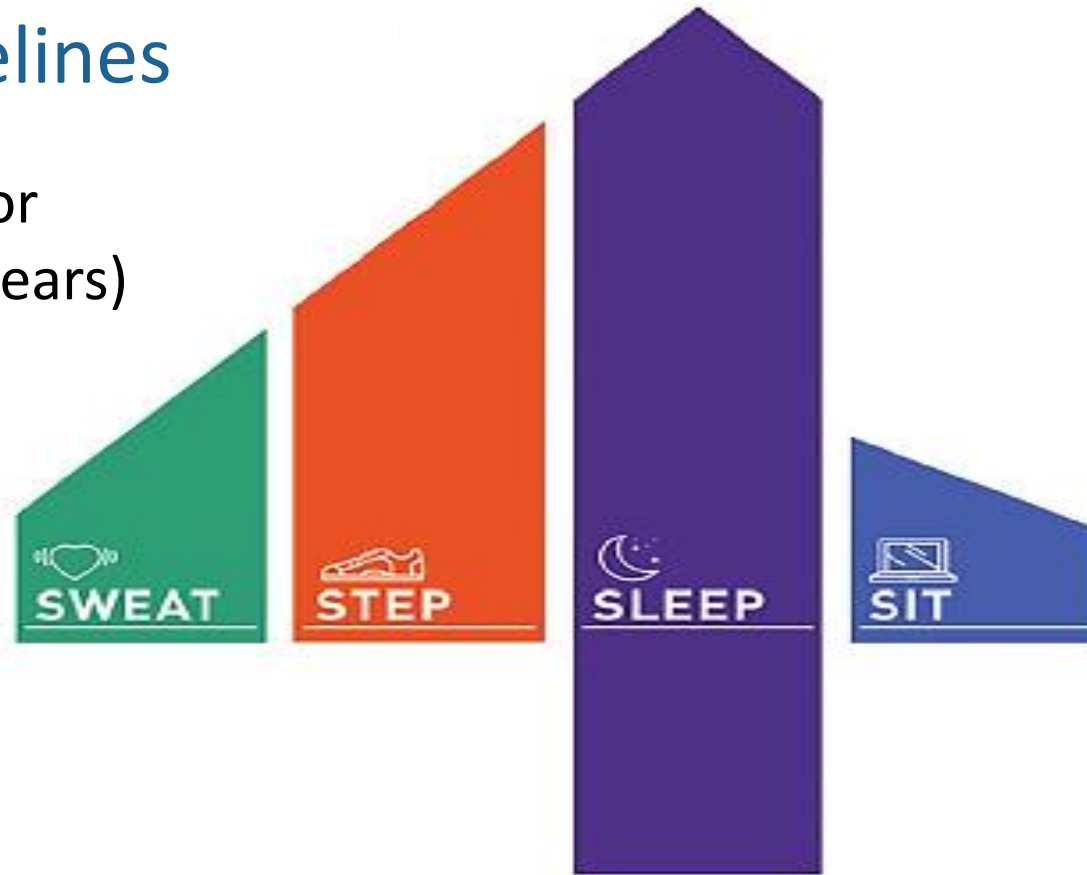
4.5 METS

**METs
associated with
common types
of endurance
exercise**

METs	Examples of METs associated with endurance exercise
16	Competitive cycling
15	Cross-country ski racing (>8.0 mph)
12	Canoeing, rowing, crew in competition
10	Soccer, competitive
9.8	Running—8 mph (10 minutes/mile)
8	Basketball game
7	Racquetball
5.8	Swimming laps, freestyle—light-moderate effort
5.3	Downhill skiing—moderate effort
5	Walking for exercise—4 mph (very brisk pace, level, firm surface)
4.8	Golf
3.5	Walking for pleasure or transportation
3.3	Sailing (boat and board sailing, windsurfing, ice sailing)
3	Canoeing/rowing for pleasure
2.5	Yoga

Canadian Guidelines

A healthy 24 hours for children (ages 5-17 years)



SWEAT

60 minutes of moderate to vigorous physical activity

STEP

Several hours of light physical activity

SLEEP

8-10 hours of sleep per night

SIT

No more than 2 hours sedentary behavior

How Many Children Meet Guideline Recommended Level of Physical Activity?

NO CONGENITAL HEART DISEASE

A. 25%

B. 35%

C. 55%

D. 75%

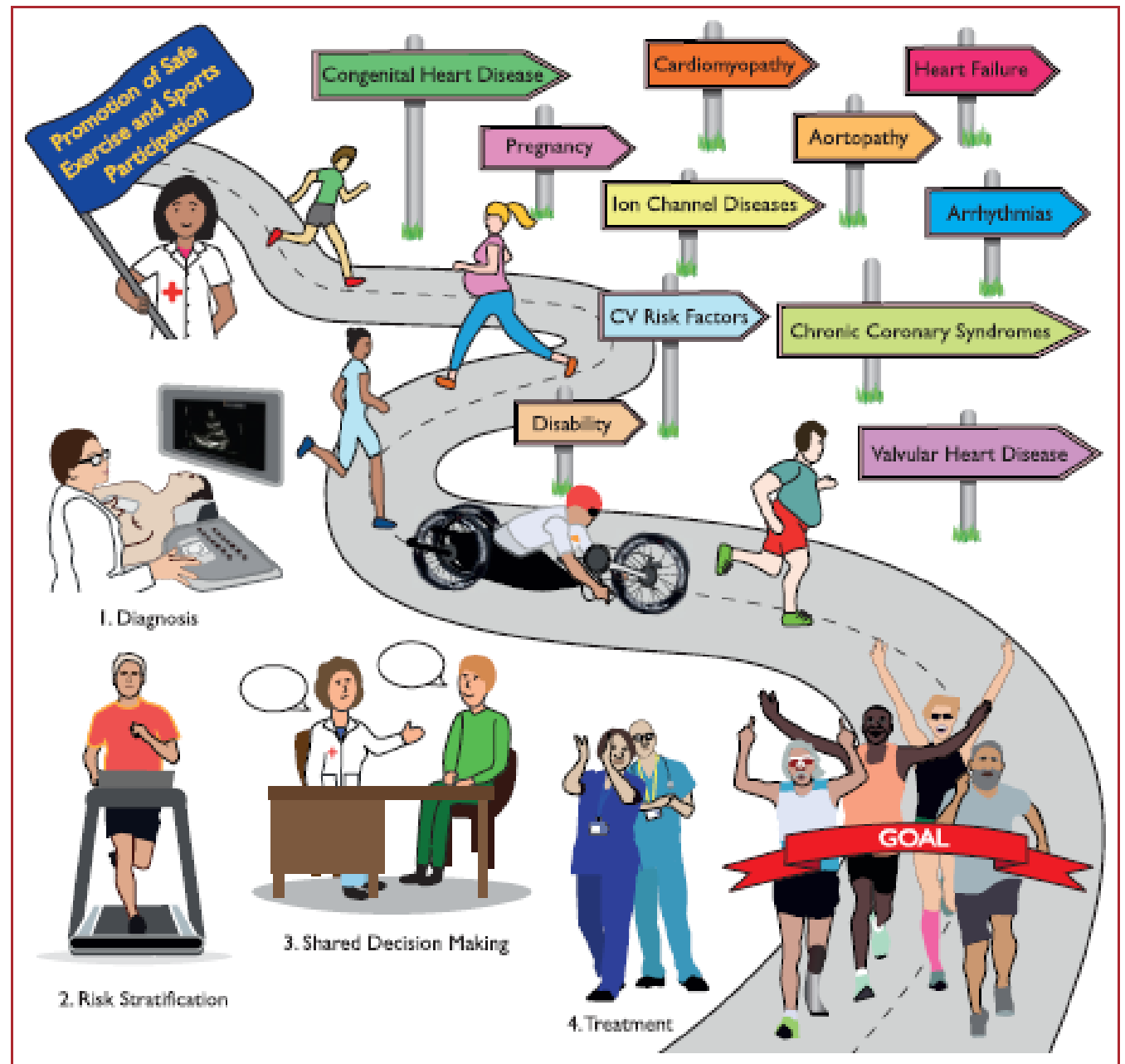
CONGENITAL HEART DISEASE

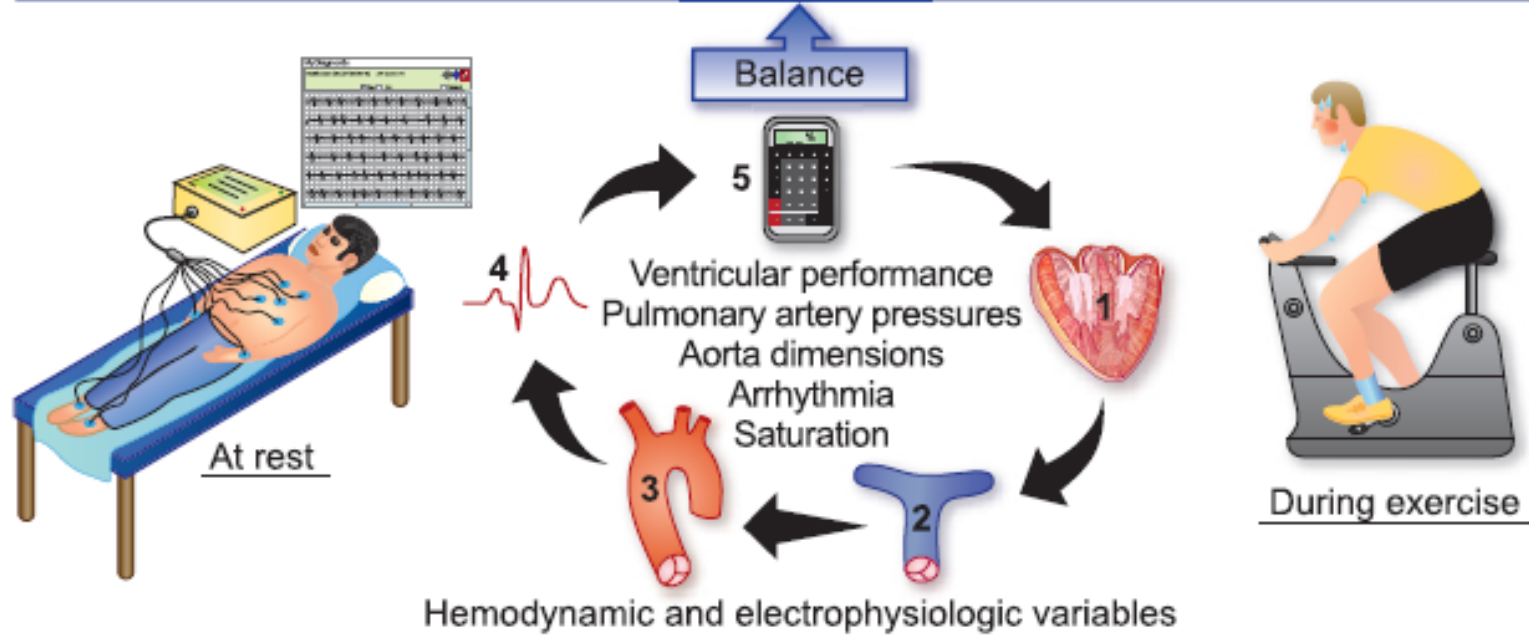
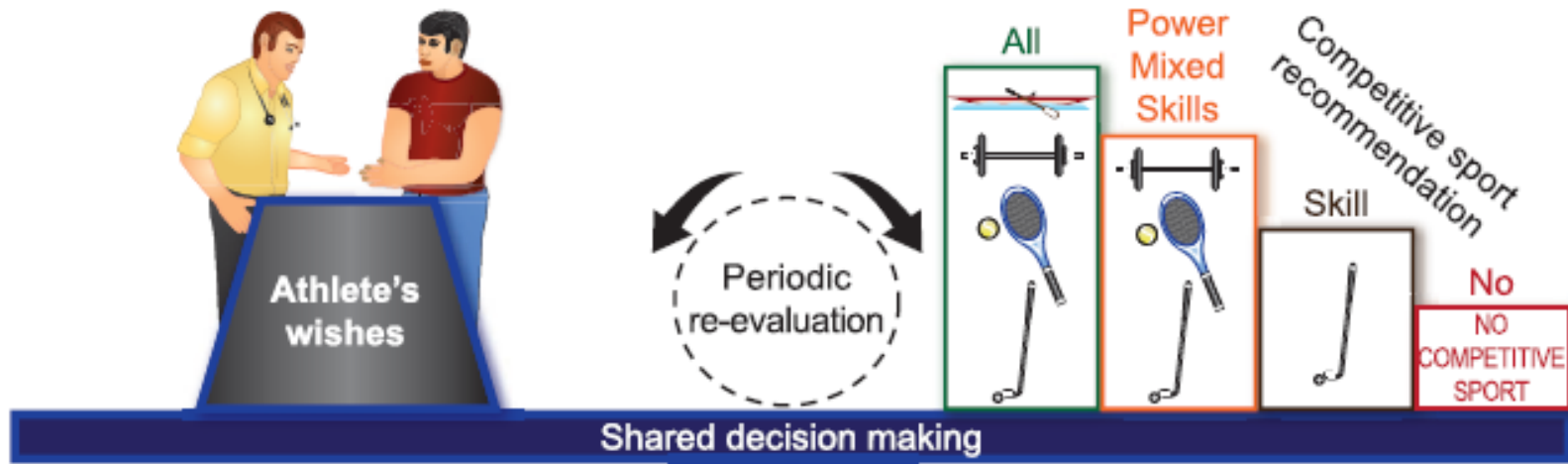
9-24%

Challenges to achieving healthy and safe physical activity levels for children with CHD

- Physician's recommendation for restriction of activity
 - Physicians were found to restrict activity in 49% complex CHD, 31% moderate CHD, and 13% simple CHD
- Parent's concerns and desire for protection/safety
- Child's perceived self-efficacy
 - Children with CHD often have lower perception of ability to do activity compared to actual cardiac function

Promotion of Safe Exercise and Sports Participation in Children with CHD

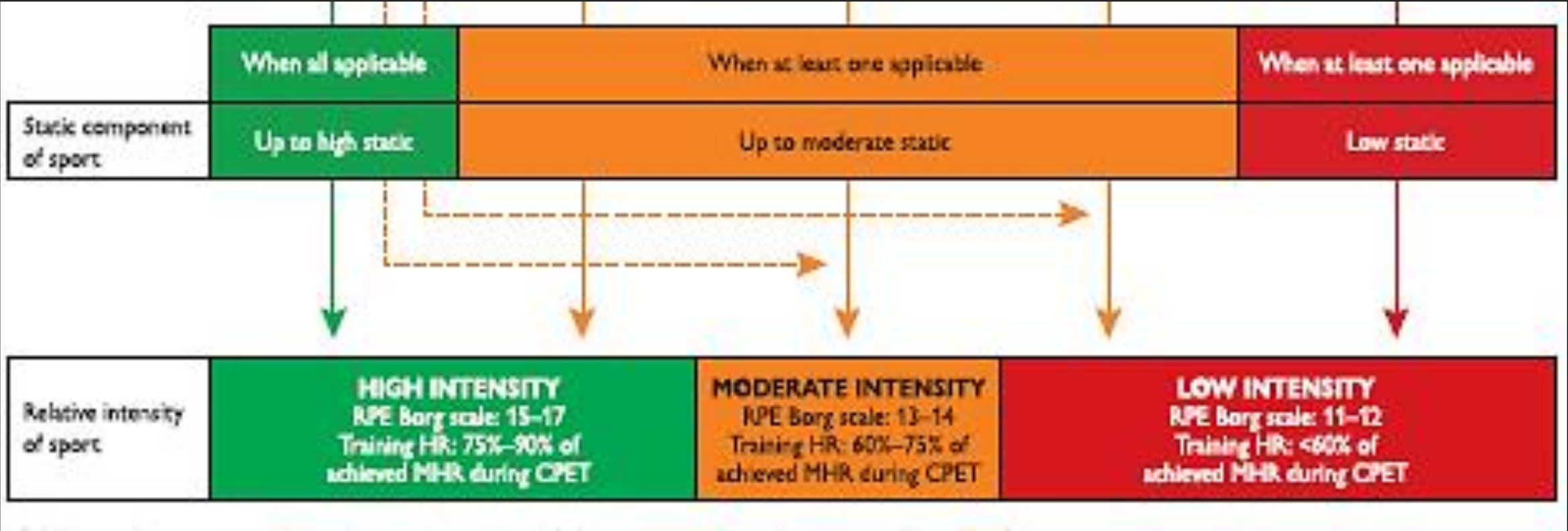




5 Components of Cardiac Evaluation

1. Ventricles	No systolic dysfunction No hypertrophy No pressure load No volume load	No systolic dysfunction No hypertrophy Mild pressure load Mild volume I	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	

Level of exercise intensity



Aerobic Exercise Intensity

Intensity	HRR %	HR Max %	RPE
Light	29-46	54-65	<5
Moderate	47-64	66-76	5-7
Vigorous	65-86	77-90	>7

Resistance Training Intensity



F.I.T.T. Principle

Frequency: Sessions per week

Intensity: Level

Time: Total time per session

Type: Type of activity

Progression

Increase Duration

Increase Frequency
+
Increase Intensity

Monitor for adverse
effects

Name _____ Date _____

R_x

AEROBIC EXERCISE

F: 5-7 days per week

I: Moderate (HRR % , HRmax
% or RPE 5-7)

T: 60 minutes

T: Swimming, biking, jogging

Restrictions: activities with
high dynamic and static
component.

Name _____ Date _____

R_x

RESISTANCE EXERCISE

F: 3 days per week

I: Light to moderate load
(upper body >10, lower body
>15)

T: 30 minutes

T: Body weight exercises (sit-
ups, push-ups, squats, yoga)

MD _____

Signature _____

	Skill	Power	Mixed	Endurance
				
LOW	Golf (buggy)	Shot putting	Soccer (adapted)	Jogging
	Golf (18 holes walking)	(recreational)	Basketball (adapted)	Long distance walking
	Table tennis (double)	Discus (recreational)	Handball (adapted)	Swimming (recreational)
	Table tennis (single)	Alpine skiing	Volleyball	Speed walking
MEDIUM	Shooting	(recreational)	Tennis (double)	Mid/long distance running
	Curling	Short distance running	Ice-Hockey	Style dancing
	Bowling	Shot putting	Hockey	Cycling (road)
	Sailing	Discus	Rugby	Mid/long distance swimming
	Yachting	Alpine skiing	Fencing	Long distance skating
	Equestrian	Judo/karate	Tennis (single)	Pentathlon
HIGH		Weight lifting	Waterpolo	Rowing
		Wrestling	Soccer (competitive)	Canoeing
		Boxing	Basketball (competitive)	X-country skiing
			Handball (competitive)	Biathlon
				Triathlon

 Low intensity

 Medium intensity

 High intensity

1. Ventricles	No systolic dysfunction No/mild hypertrophy No/mild pressure load No volume load	Mild systolic dysfunction Volume load without remodelling	Moderate systolic dysfunction Moderate hypertrophy Moderate pressure load Volume load with mild remodelling Single ventricle physiology Systemic right ventricle	Severe systolic dysfunction Severe hypertrophy Severe pressure load Volume load with severe remodelling
2. Pulmonary artery pressure	Low probability of pulmonary hypertension	PH without RV dilatation or dysfunction		PH with RV dilatation or dysfunction
3. Aorta	No/mild dilatation	Moderate dilatation	Severe dilatation	Dilatation approaching indication for repair
4. Arrhythmia at rest/during exercise	No arrhythmia	Mild arrhythmic burden Non-malignant arrhythmia		Significant arrhythmic burden Malignant arrhythmia
5. Saturation at rest/during exercise	No central cyanosis		Mild central cyanosis	Severe central cyanosis

A

B

C

D

	When all applicable	When ≥ 1 parameters applicable AND no parameter falls within columns C or D	When ≥ 1 parameters applicable AND no parameter falls within column D	When ≥ 1 parameters applicable
Choice of competitive sport	All sports	Skill, Power, or Mixed sports	Skill sports only	NO COMPETITIVE SPORT

SUMMARY

- ✓ Physical activity or regular exercise has positive physical and emotional benefits for children with congenital heart disease
- ✓ The past practice of restriction from sports is being replaced with promotion of regular physical activity and exercise
- ✓ A safe, personalized plan for exercise and sports participation can be created for every child with congenital heart disease

Thank You

