

Exercise and Congenital Heart Disease



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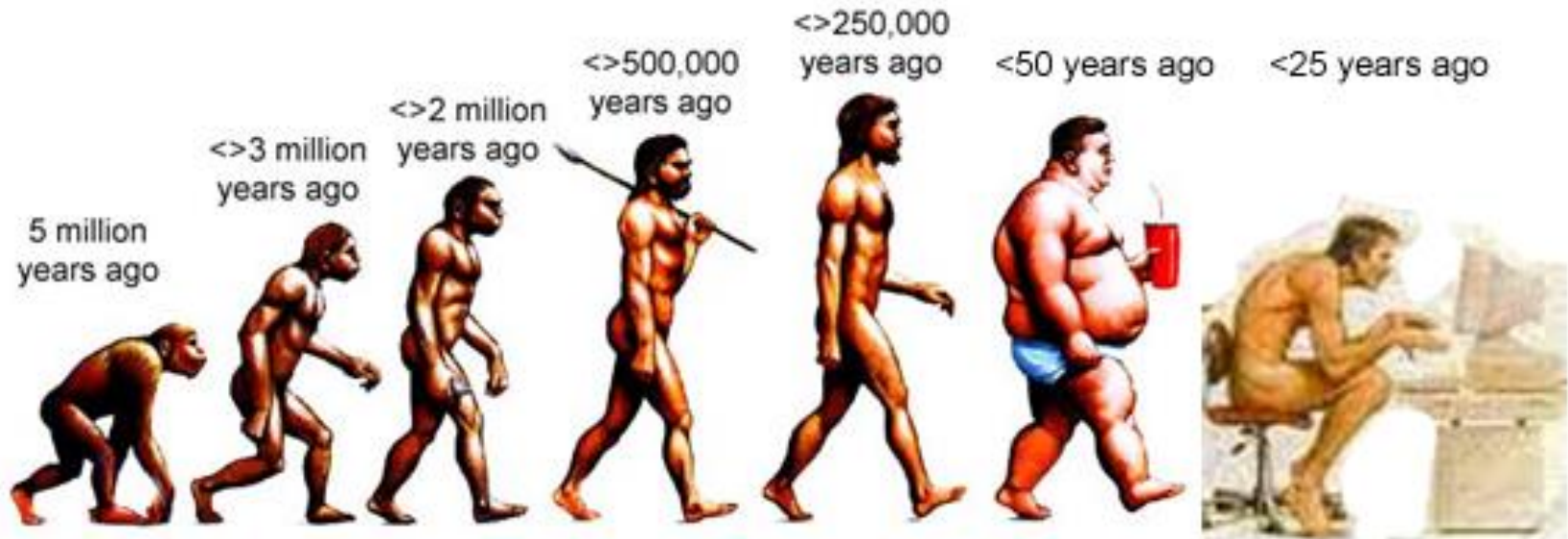
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Evolutionary perspective



Beneficial Effects of Exercise by...

- Strengthening the heart muscle
- Improving skeletal and diaphragmatic muscle strength
- Restoring/improving endothelial function
- Lowering heart rate
- Lowering blood pressure
- Controlling stress
- Improving sleep
- Reducing systemic level inflammatory effects
- Attenuating aging-related autonomic dysfunction
- Reducing thrombotic events
- Helping weight loss by decreasing % of body fat cells
- Improving blood lipid and serum glucose profile

How this relates to congenital heart defects?

Respiration

Lower SaO₂% =
Reduced ventilatory efficiency =
Reduced max minute ventilation +
Reduced pulmonary function +
Reduced gas exchange +

Central circulation

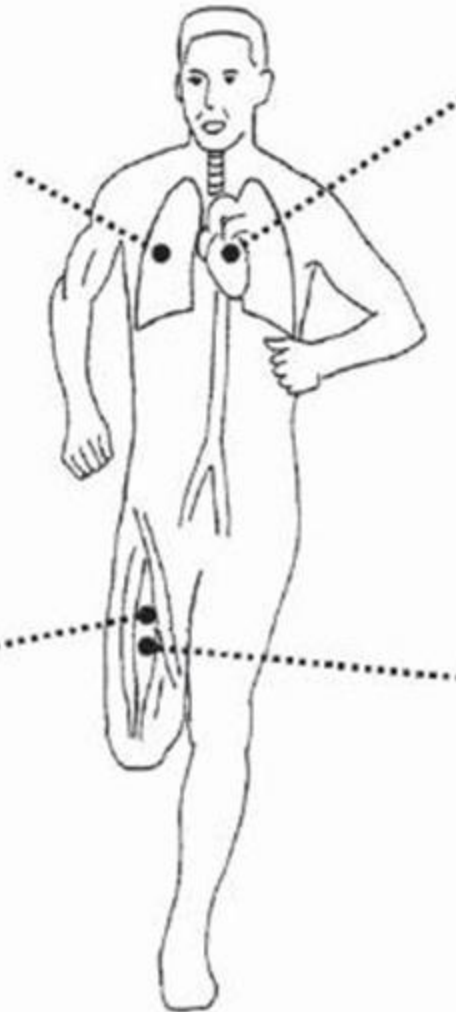
Reduced HR_{max} =
Higher HR_{submax} +
Lower stroke volume +
Reduced cardiac output +
Lower peak blood pressure +

Regional blood flow

Endothelial dysfunction ?

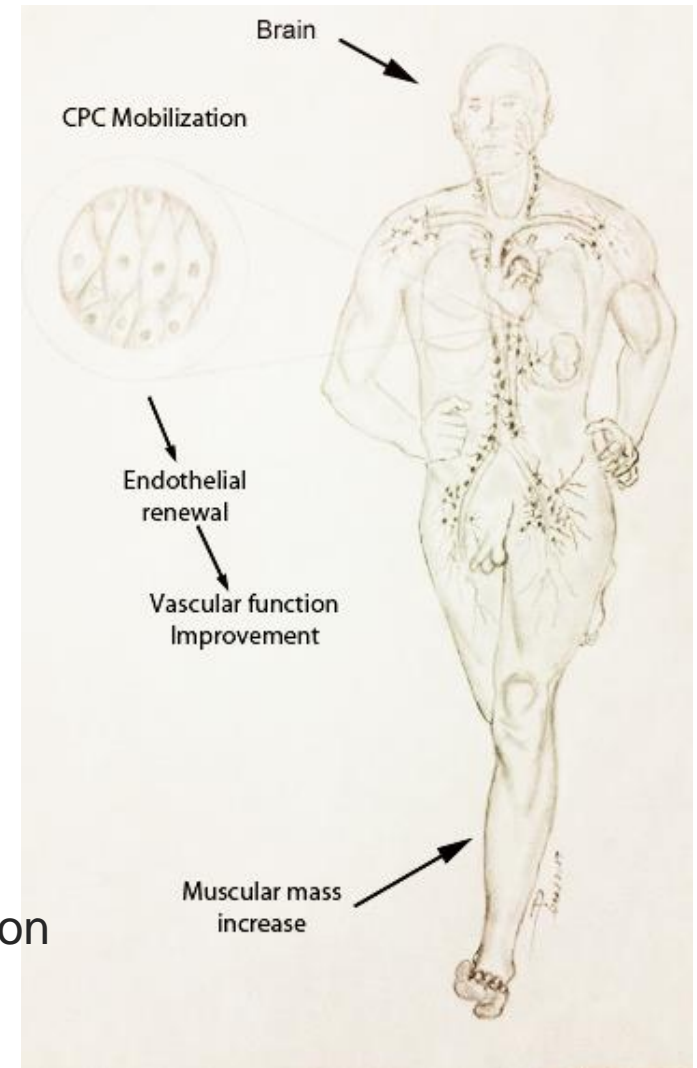
Muscle

Reduced O₂ delivery +
Slower O₂ uptake kinetics ?
Reduced muscle mass ?



Specific Benefits for CHD

- Strengthening the heart muscle
- Improving systemic venous return
- Improving lymphatic return
- Restoring/improving endothelial function
- Lowering heart rate
- Lowering diastolic blood pressure
- Improving executive function
- Reducing systemic level inflammatory effects
- Attenuating aging-related autonomic dysfunction
- Reducing thrombotic events



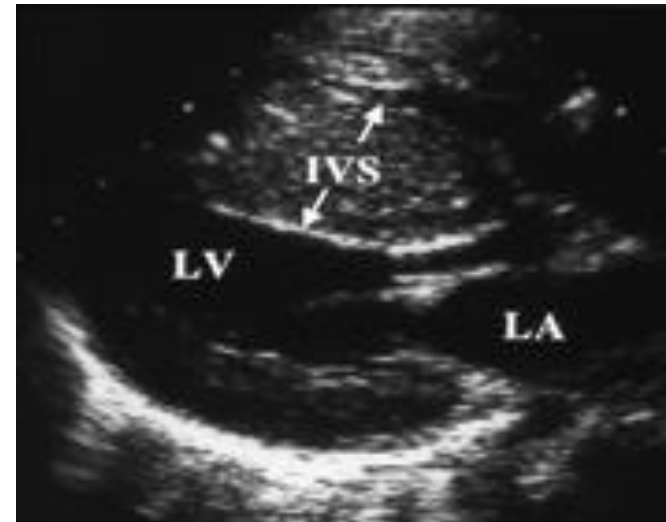
When we can and should exercise

- Single ventricle – Fontan physiology
- Tetralogy of Fallot
- Lesions with RV to pulmonary artery Conduits
- L-transposed great arteries
- Many other lesions except the following...

When do we need to exercise ...caution

Hypertrophic cardiomyopathy

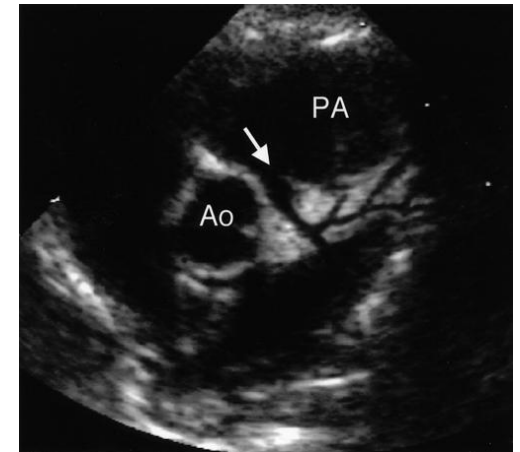
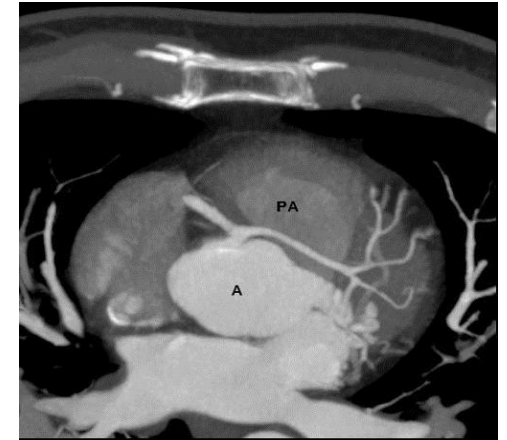
- arrhythmias
- acute outflow obstruction
- sudden cardiac death



Coronary artery abnormalities

Anomalous origin or narrowing:

- risk for myocardial ischemia
- arrhythmias
- sudden cardiac death



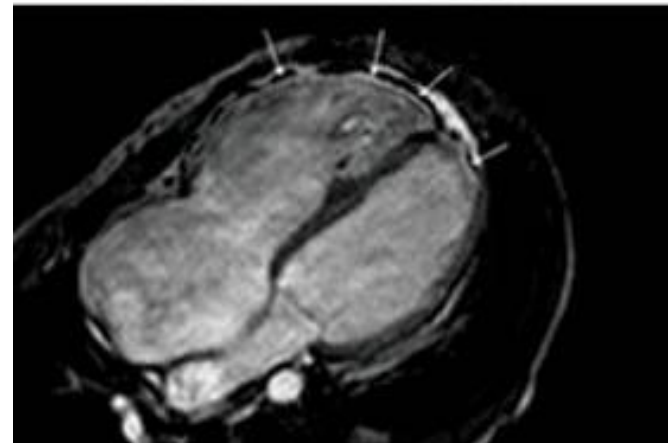
Aortic Valve abnormalities: stenosis, regurgitation

- risk for myocardial ischemia
- Acute LVOT obstruction
- arrhythmias
- sudden cardiac death



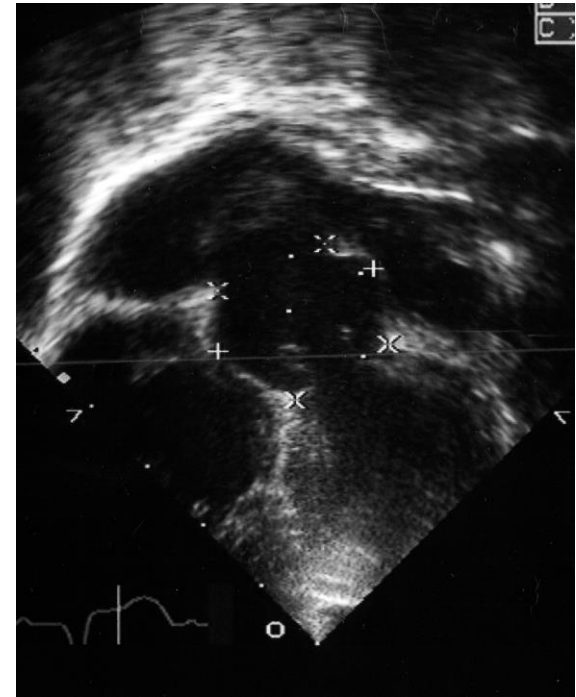
Arrhythmogenic Right Ventricle

Risk for arrhythmias and sudden cardiac death



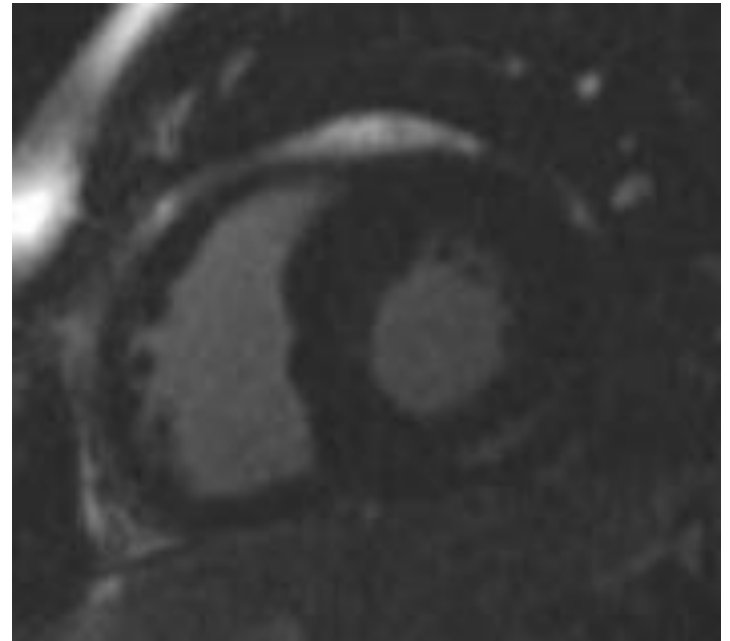
Marfan's syndrome and Dilated Aortic Root

Risk for dissection and
rupture of aortic aneurysms



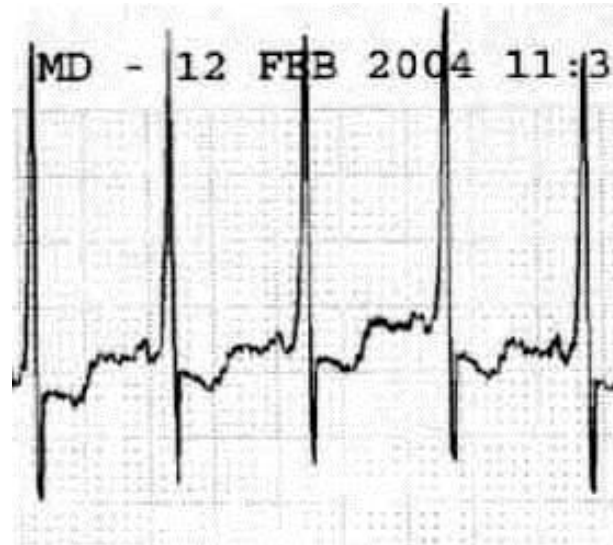
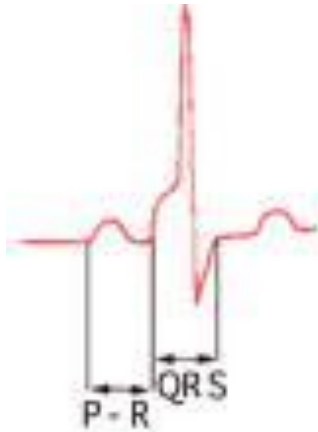
Myocarditis and Cardiomyopathy

Risk for arrhythmias and
sudden cardiac death



Arrhythmias

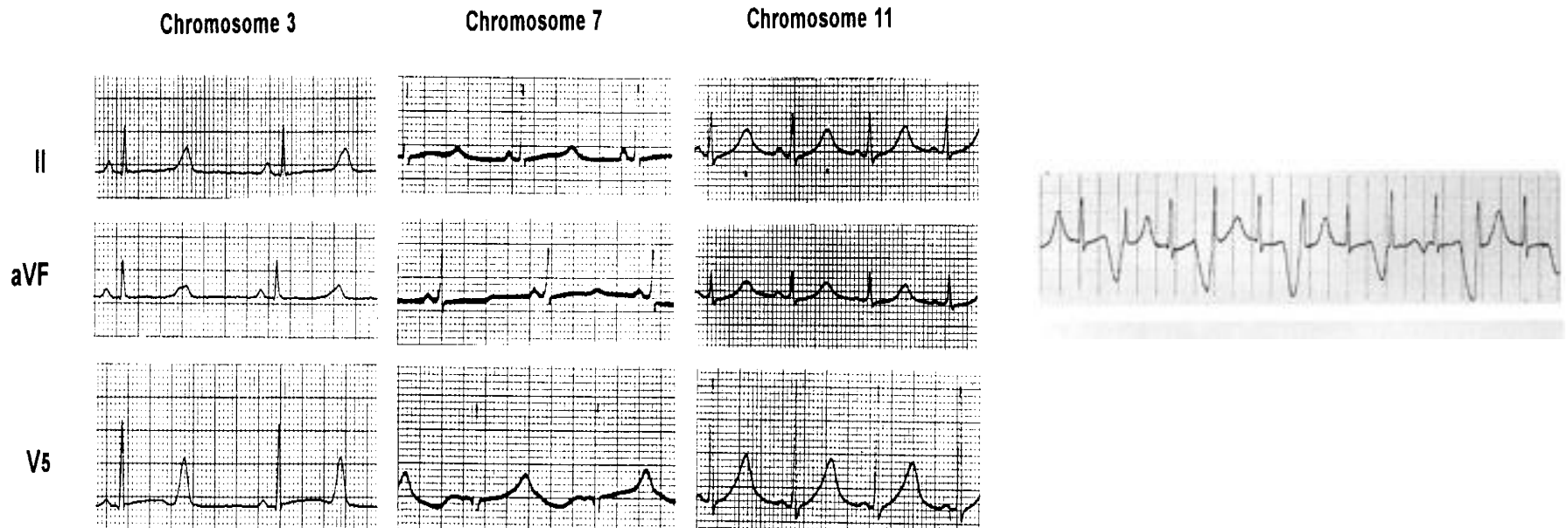
- ♥ Paroxysmal supraventricular tachycardias (WPW)



Arrhythmias

Ventricular tachycardias

♥ Ion channel abnormalities (Long QT Syndrome / Brugada syndrome)



Summary

- Conditions with exercise-risk exist but are relatively rare and can be easily diagnosed and excluded from physical activities at risk
- For all other cases exercise has generally beneficial effects on patients with CHD as on everybody else...



- It is time to start prescribing instead of restricting exercise for CHD

