



ACC Latin America
Conference 2017



MEXICO CITY
JUNE 22 – 24, 2017

GLOBAL EXPERTS, LOCAL LEARNING



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Evaluation of the Right Ventricle and Risk Stratification for Sudden Cardiac Death

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No disclosures



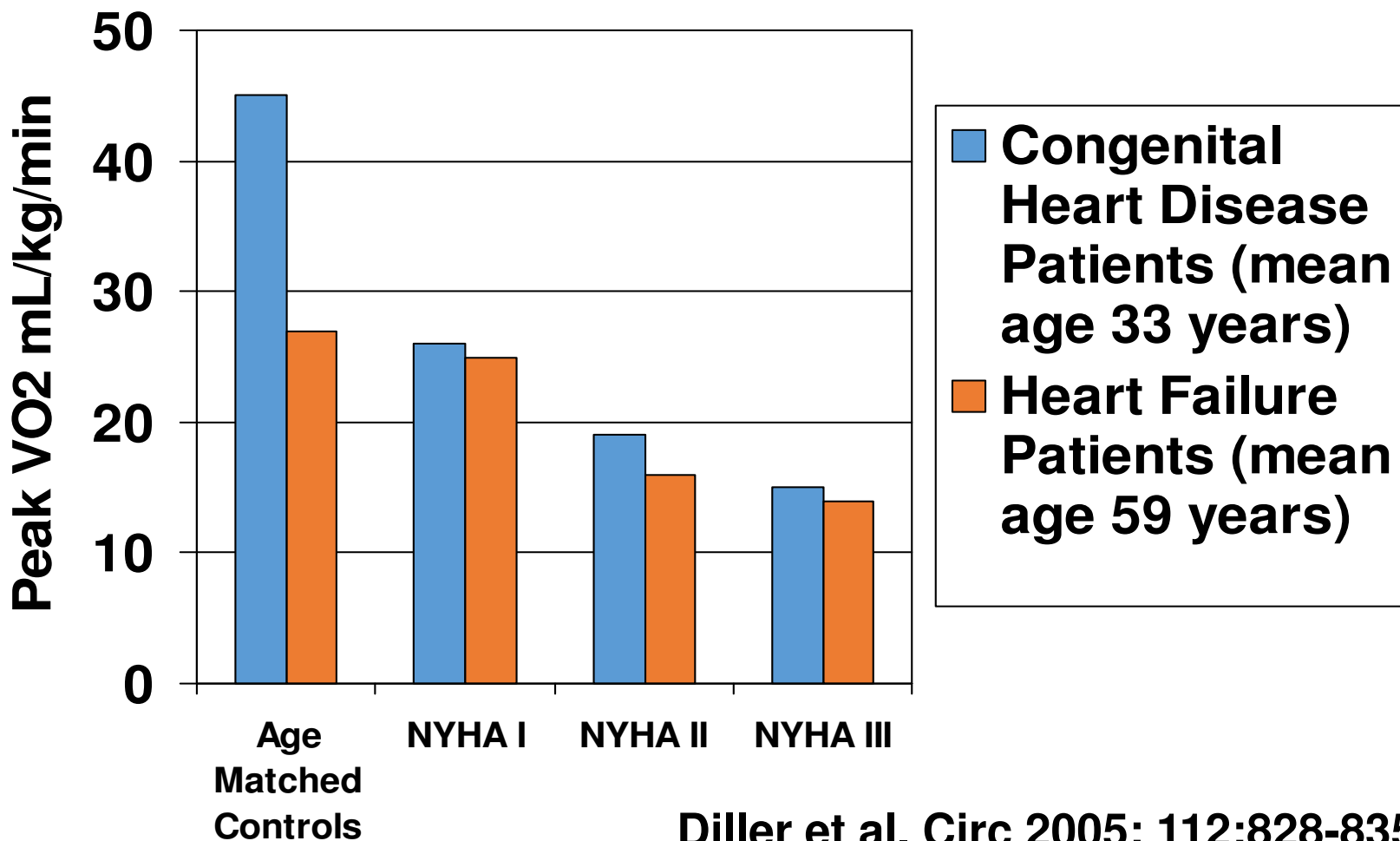
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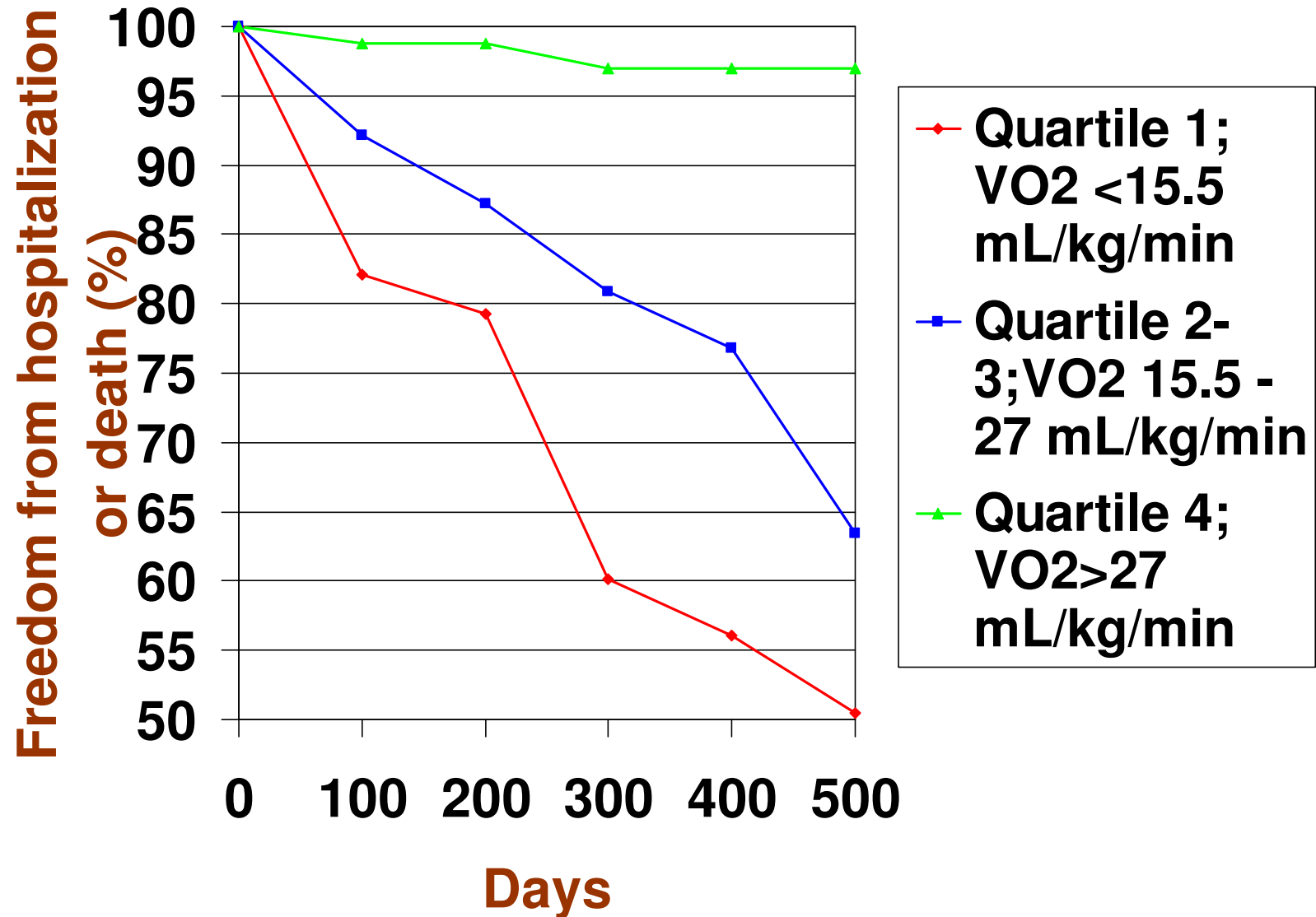
Unique Forms of Heart Failure in the Congenital Heart Disease Population

- Single ventricle status post Fontan
- Right ventricular failure
 - Systolic failure of the systemic right ventricle
 - Systolic failure of the sub-pulmonary right ventricle
 - Diastolic dysfunction
 - Secondary LV dysfunction

Peak VO₂ of Heart Failure Patients versus CHD Patients



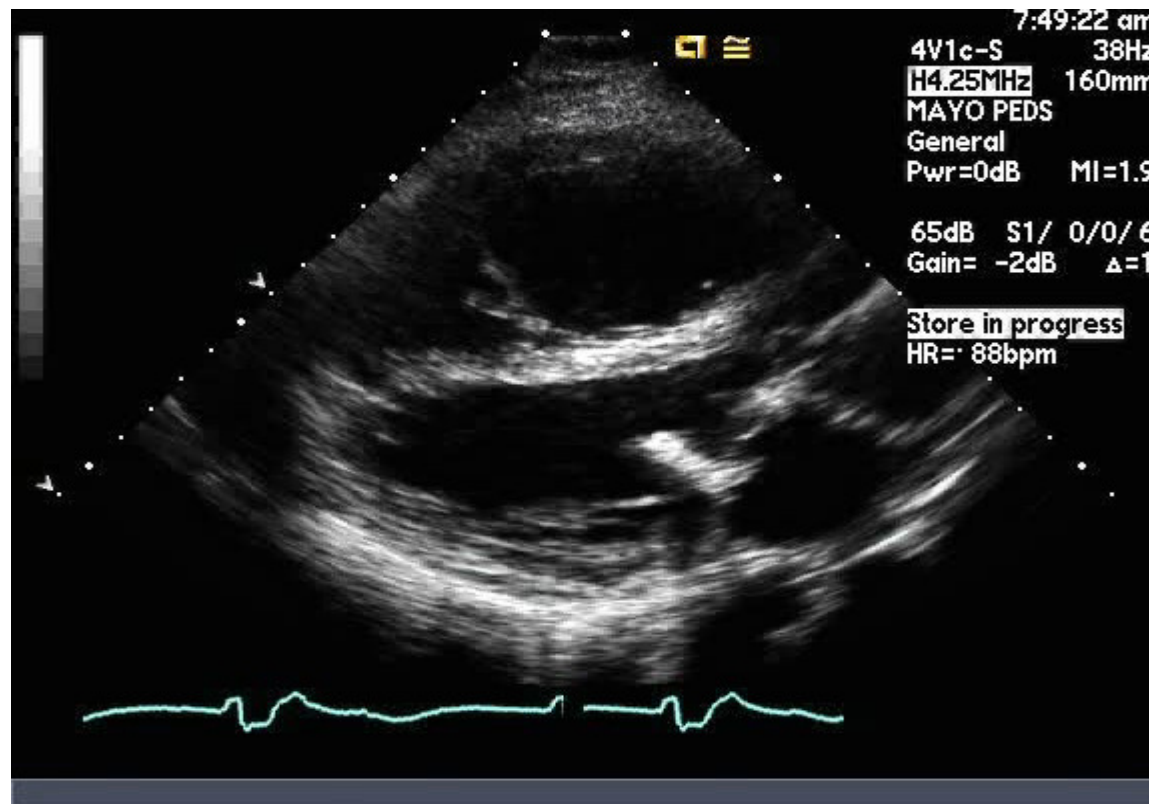
VO2 Predicts Clinical Outcome

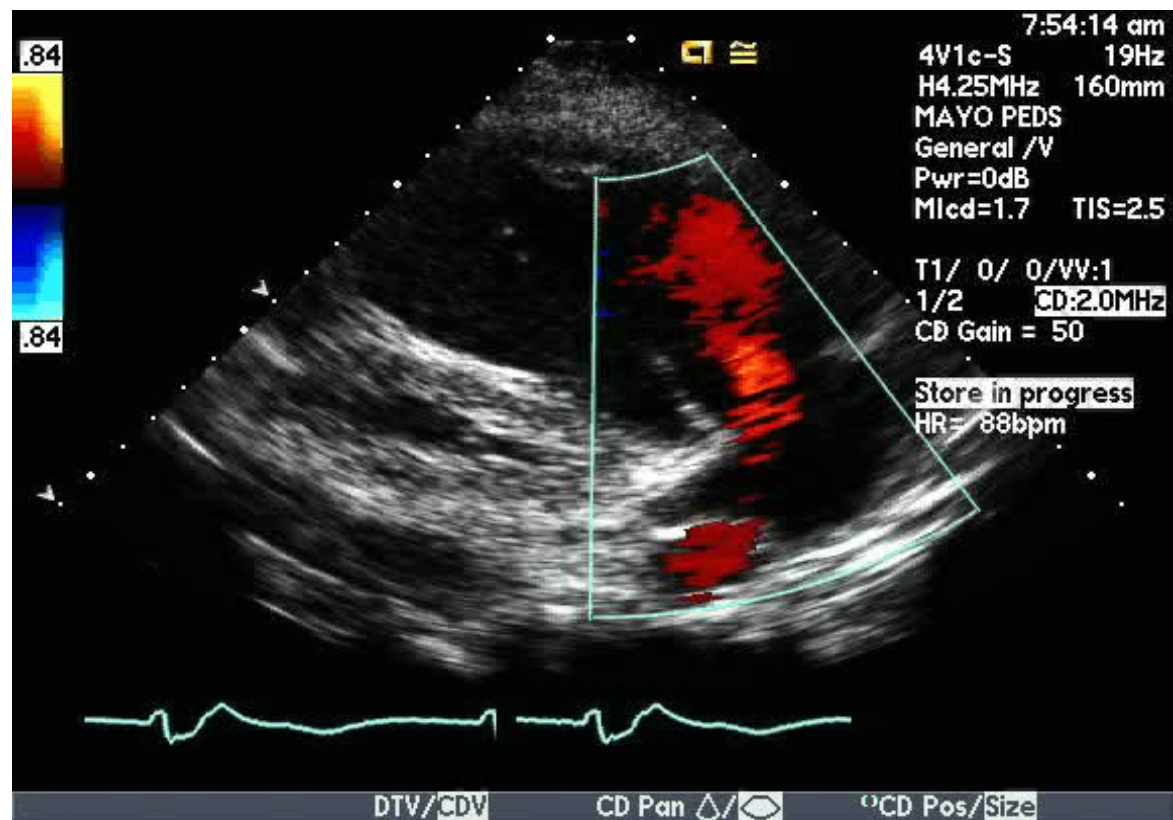


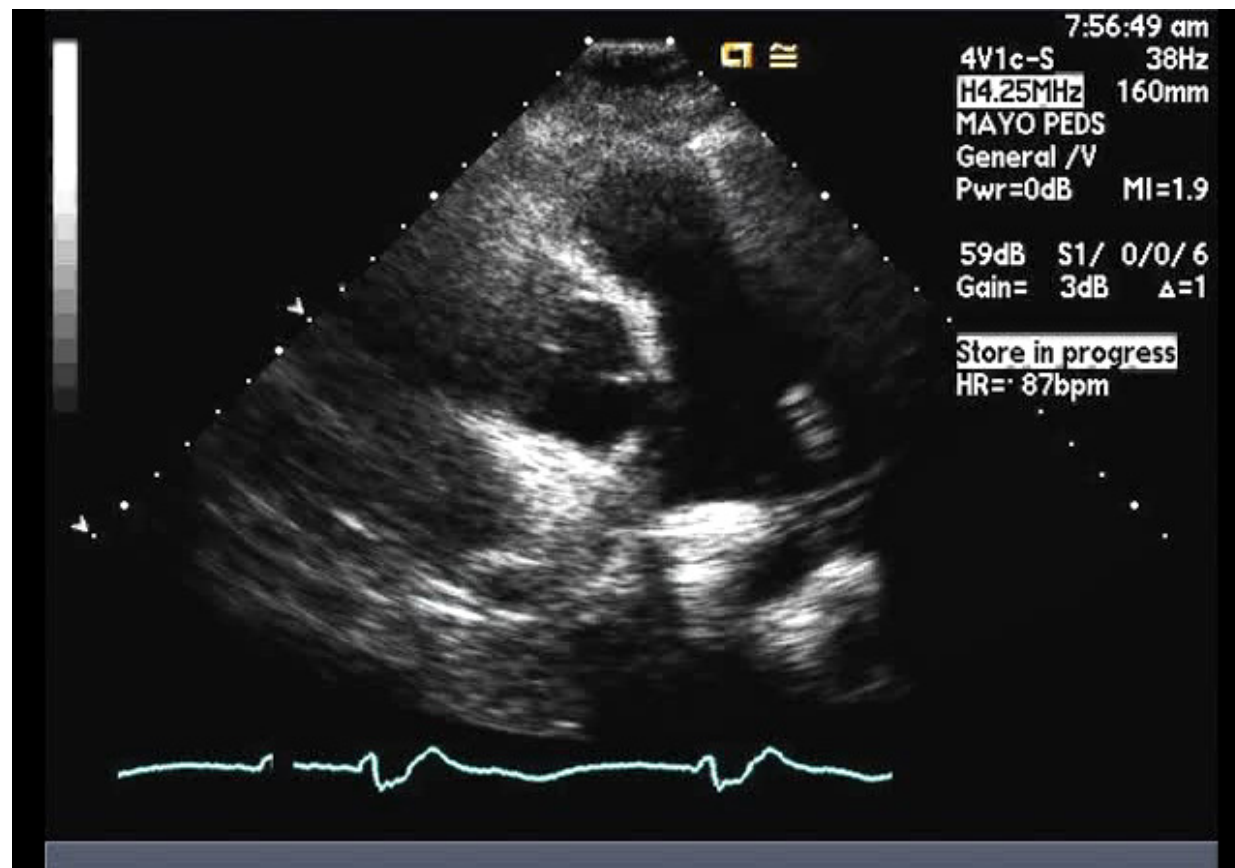
Diller et al. Circ 2005; 112:828-845

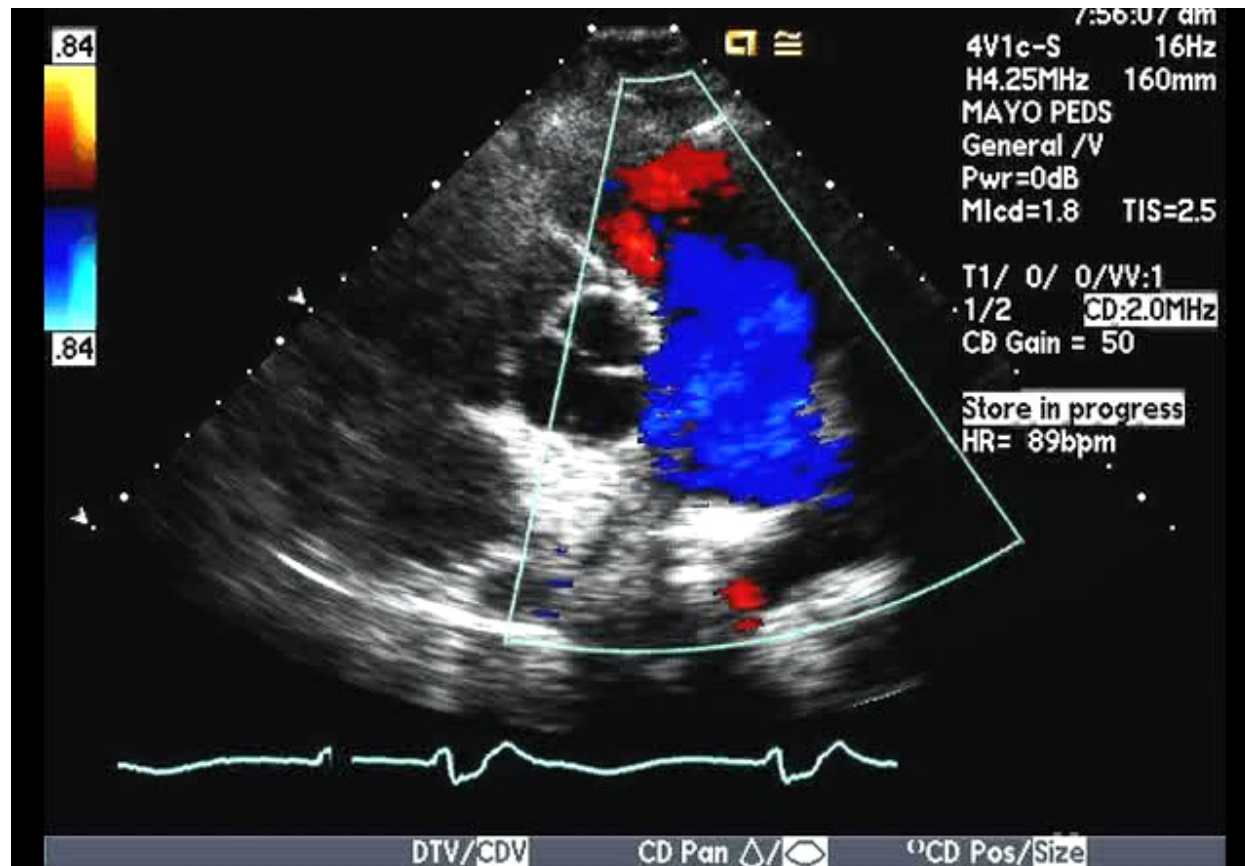
26 Year old Woman

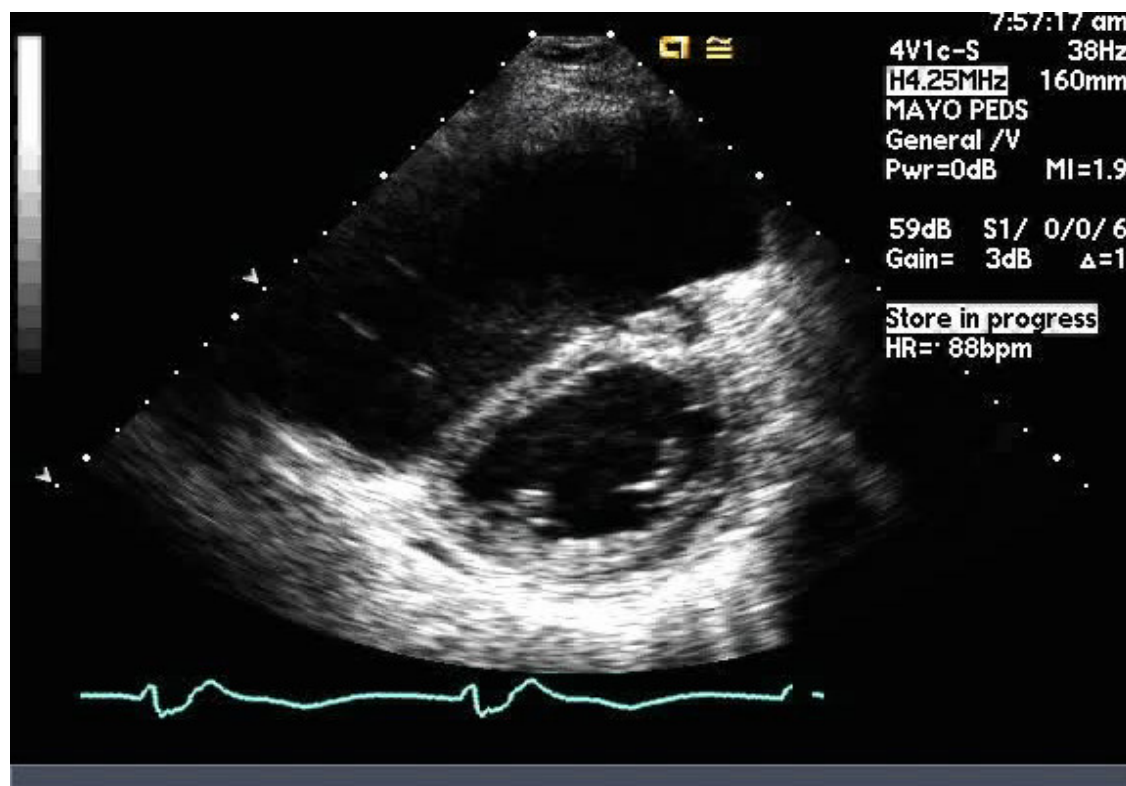
- Diagnosed with tetralogy of Fallot in the neonatal period
- Operative repair at age 2
- Sporadic follow up after age 12
- Presented with progressive decline in stamina
- Elsewhere underwent mitral valve replacement with a tissue prosthesis for “mitral valve prolapse” and regurgitation
- Presents 4 weeks after surgery with intractable pleural effusions, fatigue and high grade AV block



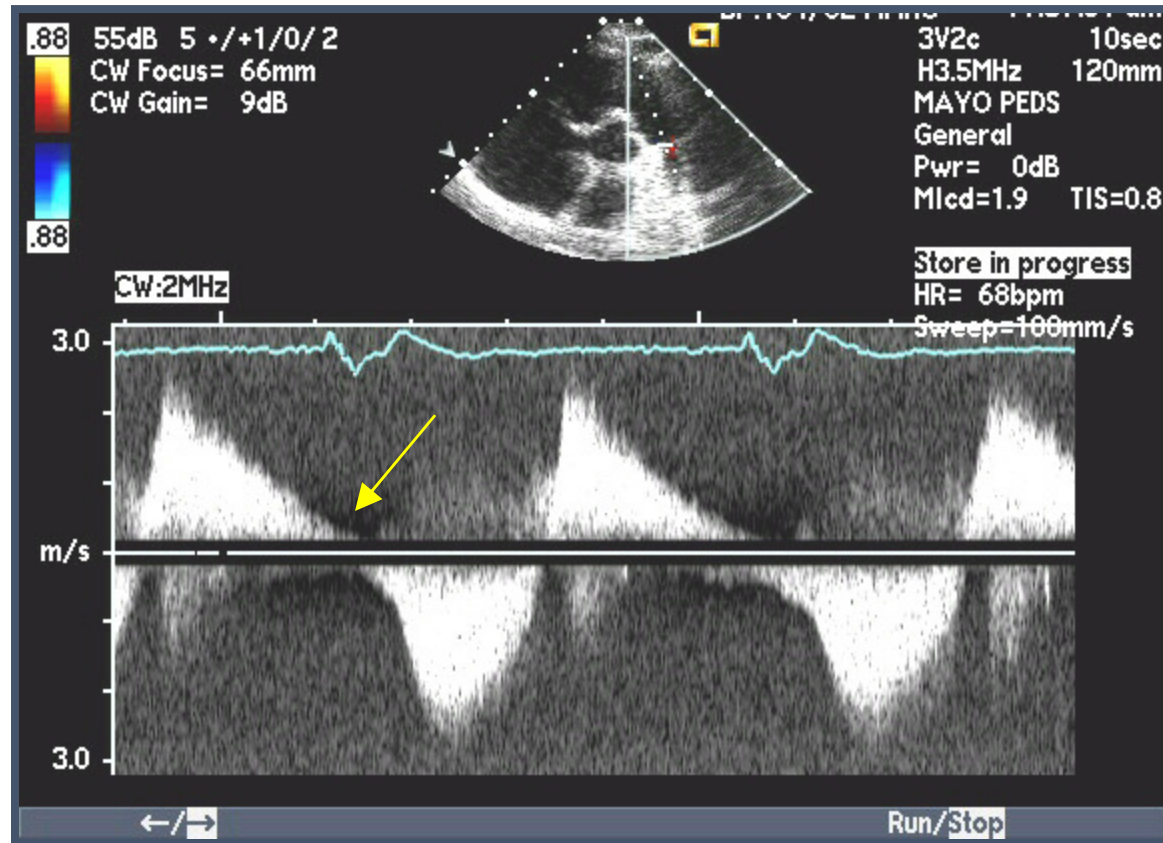








Doppler Recognition of Severe Pulmonary Valve Regurgitation



ECHO Report

- Severe RV enlargement, moderate-severe decrease in function, RVSP 39 mmHg.
- Severe (free) pulmonary regurgitation
- LV EF 30% - 35%
- Abnormal hepatic vein Doppler related to junction rhythm
- Normal mitral tissue prosthesis

Patient medically optimized then referred for PVR

Consequences of Pulmonary Valve Regurgitation

- Exercise intolerance
- Right ventricular dilatation
- Right ventricular dysfunction
- Increased risk of ventricular tachycardia
- Increased risk of atrial arrhythmia
- Left ventricular dysfunction

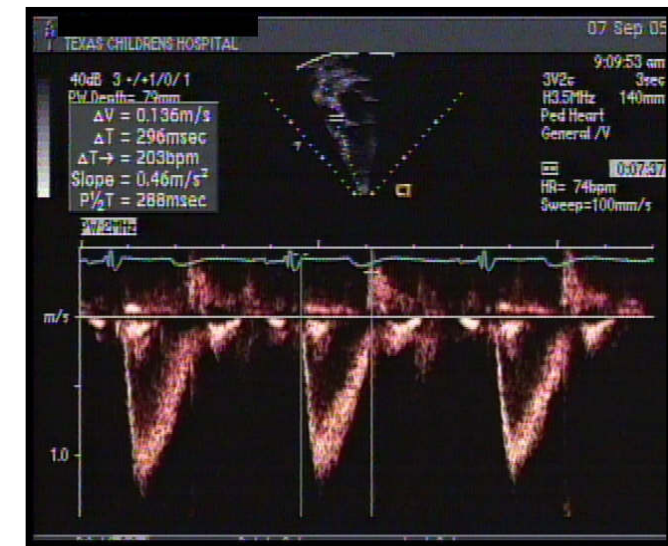
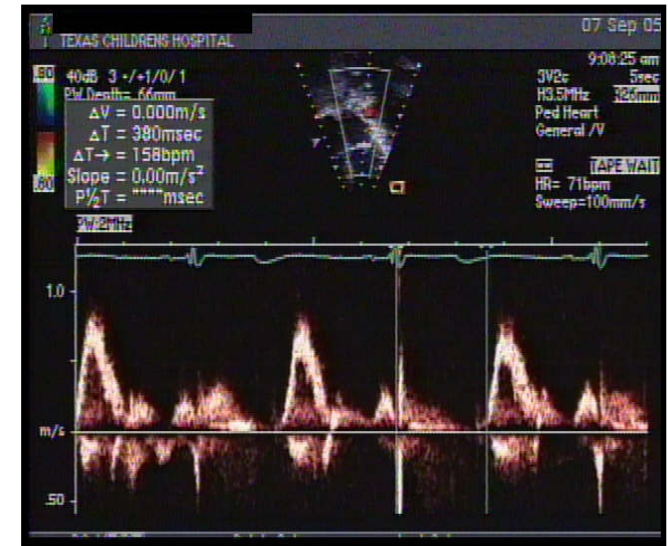
Assessment of Right Ventricular Function

- Quantitative M-mode & 2D Echo
 - RV EF %
 - RV FAC
 - TAPSE
- Doppler Echocardiography
 - TV dP / dt
 - RV MPI
 - TV TDI
 - RV strain

Assessment of RV Function

Myocardial Performance Index

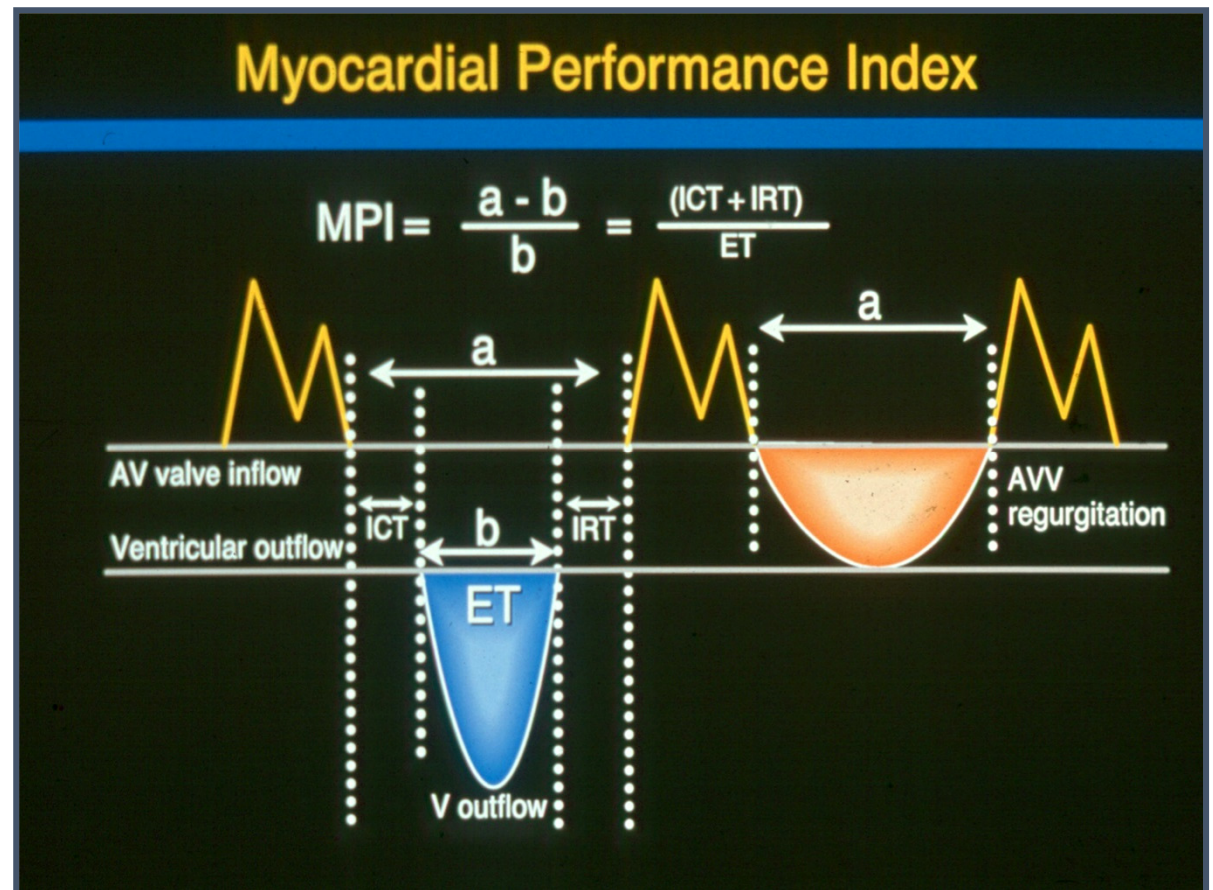
- Potential Advantages of MPI
 - Obtained by routine Doppler techniques
 - Non-geometric
 - LV function
 - RV function & single ventricle function
 - Quantitative
 - Global ventricular function
 - Systolic (ICT, ET) & diastolic (IRT) components



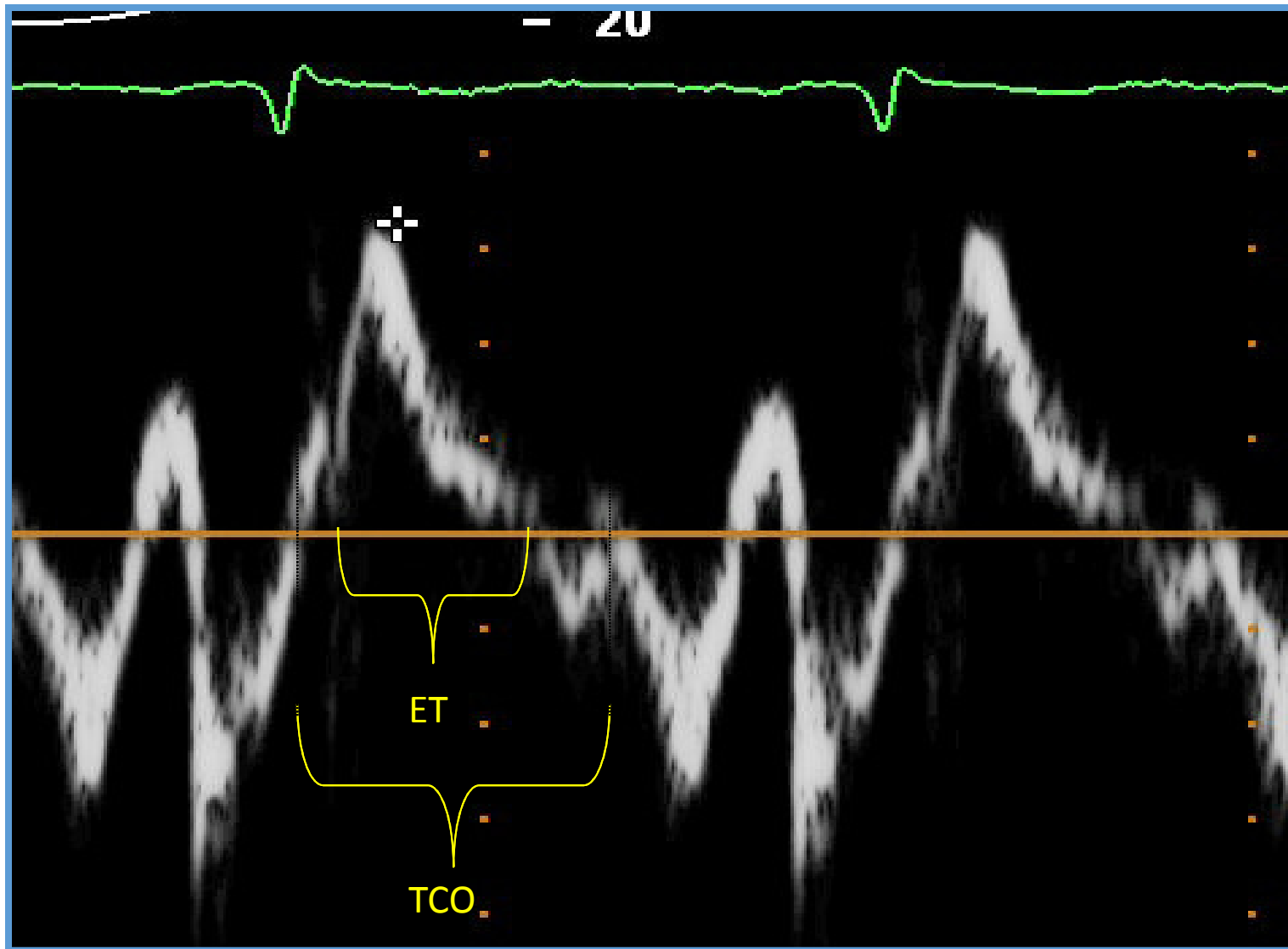
Myocardial Performance Index

Normal RV Values

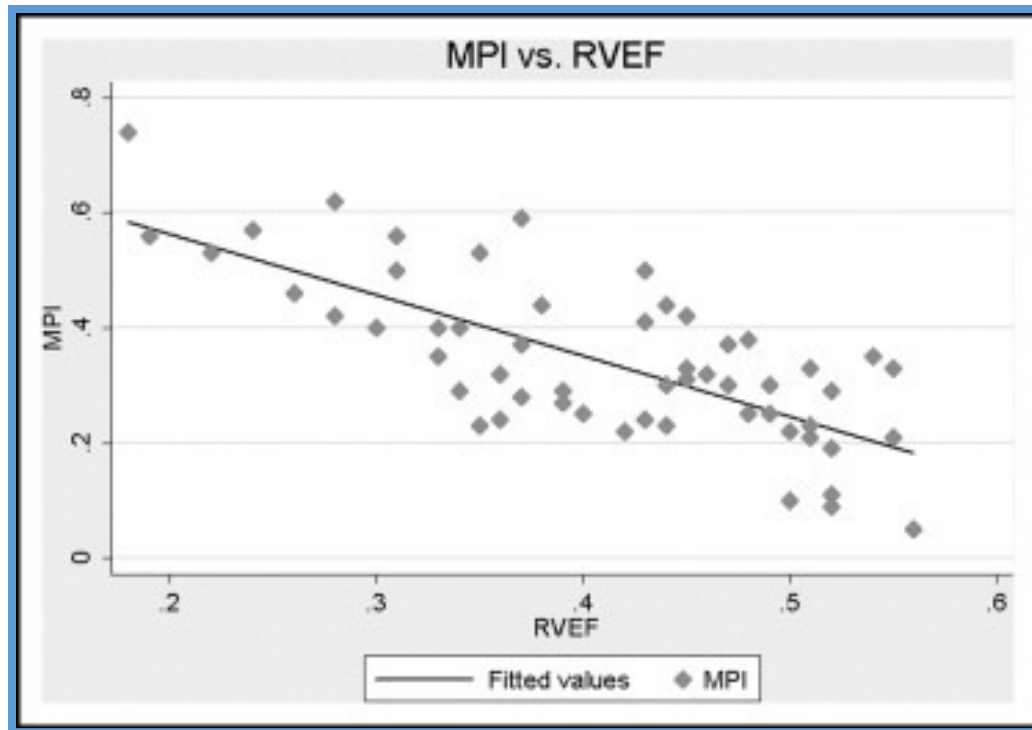
Fetal	0.35 +/-
0.05	
Peds	0.32 +/-
0.03	
Adult	0.28 +/-
0.04	



Assessment of RV Function Myocardial Performance Index by Doppler



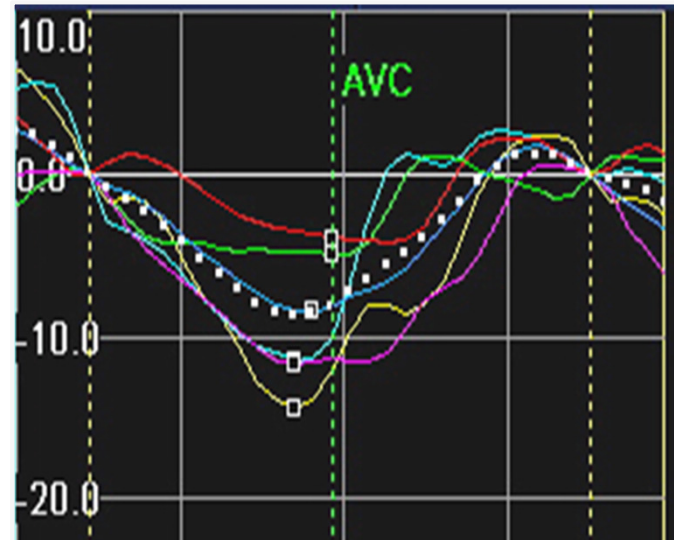
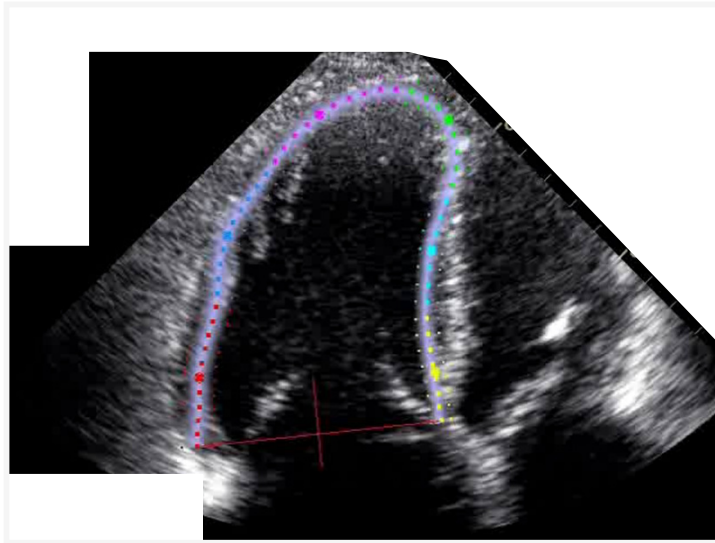
MPI Correlates to MRI RVEF



Schwerzmann M et al. Comparison of Echocardiographic and Cardiac Magnetic Resonance Imaging for Assessing Right Ventricular Function in Adults with Repaired Tetralogy of Fallot. AJC 2007

RV Free Wall Longitudinal Peak Systolic Strain

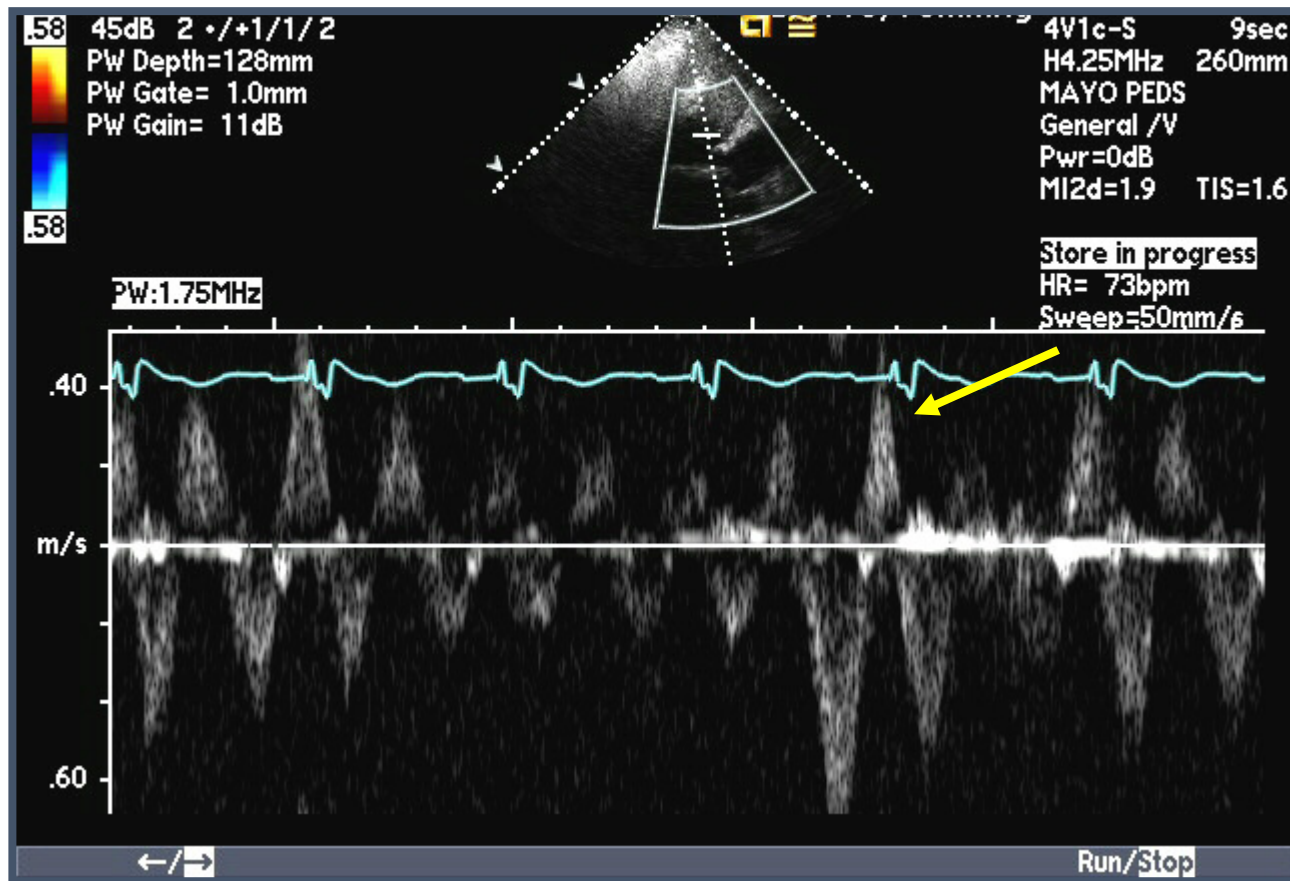
Abnormal: Less Negative than -25%



- Angle independent
- Not prone to translational motion

Assessment of RV Diastolic Function

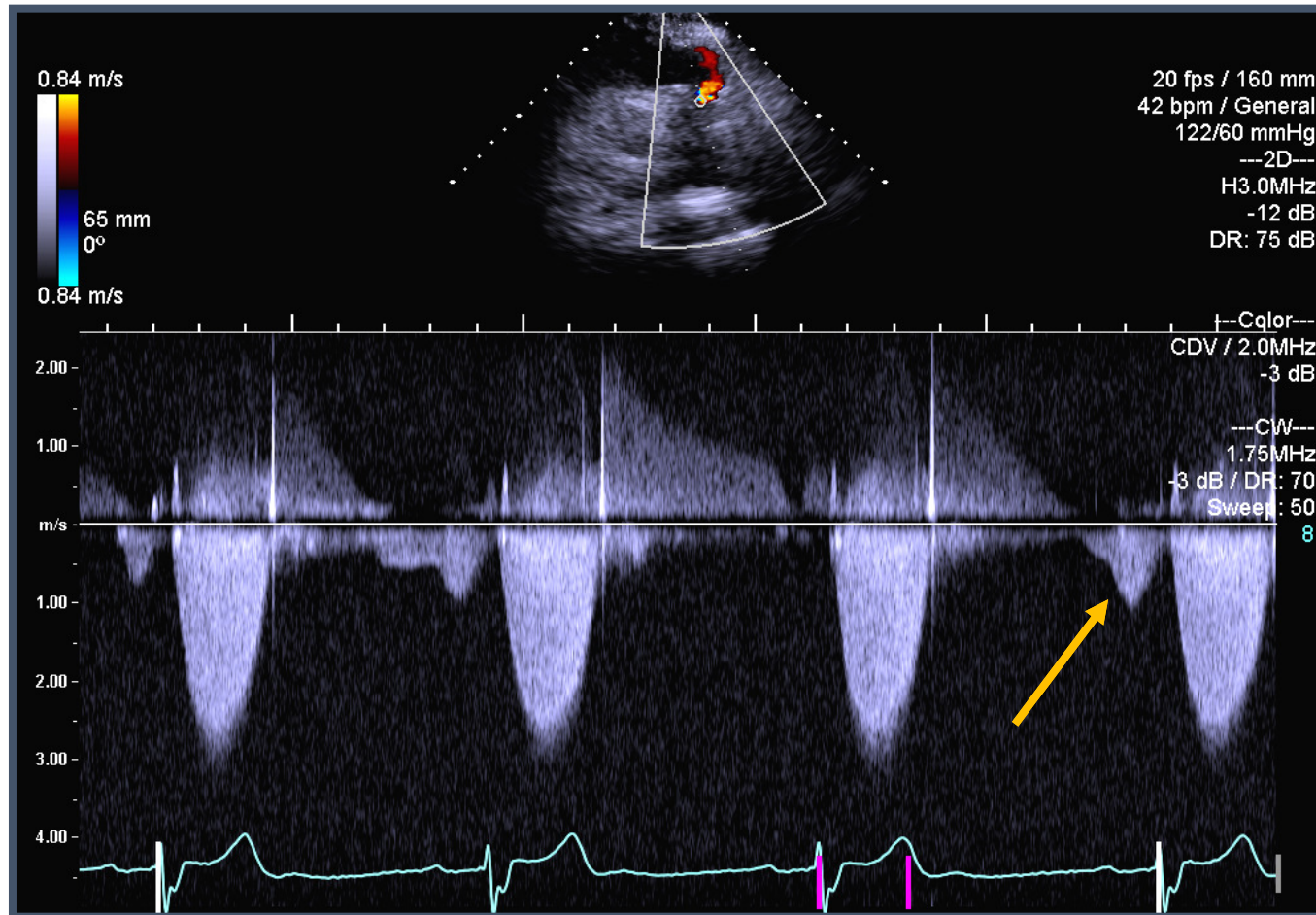
Hepatic Vein Doppler



Prominent
atrial reversals
indicate RV
non-
compliance

Assessment of RV Diastolic Function

RVOT Doppler



Forward flow with atrial systole indicates poor RV compliance

Which Ventricles Normalize?

- RV end-systolic volume < 100 mL/m²
- Corrected RV ejection fraction > 20%

Henkens et al. Predicting Outcome of Pulmonary Valve Replacement in Adult Tetralogy of Fallot Patients. Ann Thorac Surg 2006;83:907-11

- RV end-diastolic volume < 160 ml/m²
- RV end-systolic volume < 82 mL/m²

Oosterhof et al. Preoperative Thresholds for Pulmonary Valve Replacement in Patients with Corrected Tetralogy of Fallot Using Cardiovascular Magnetic Resonance. Circ 2007; 116:545-551

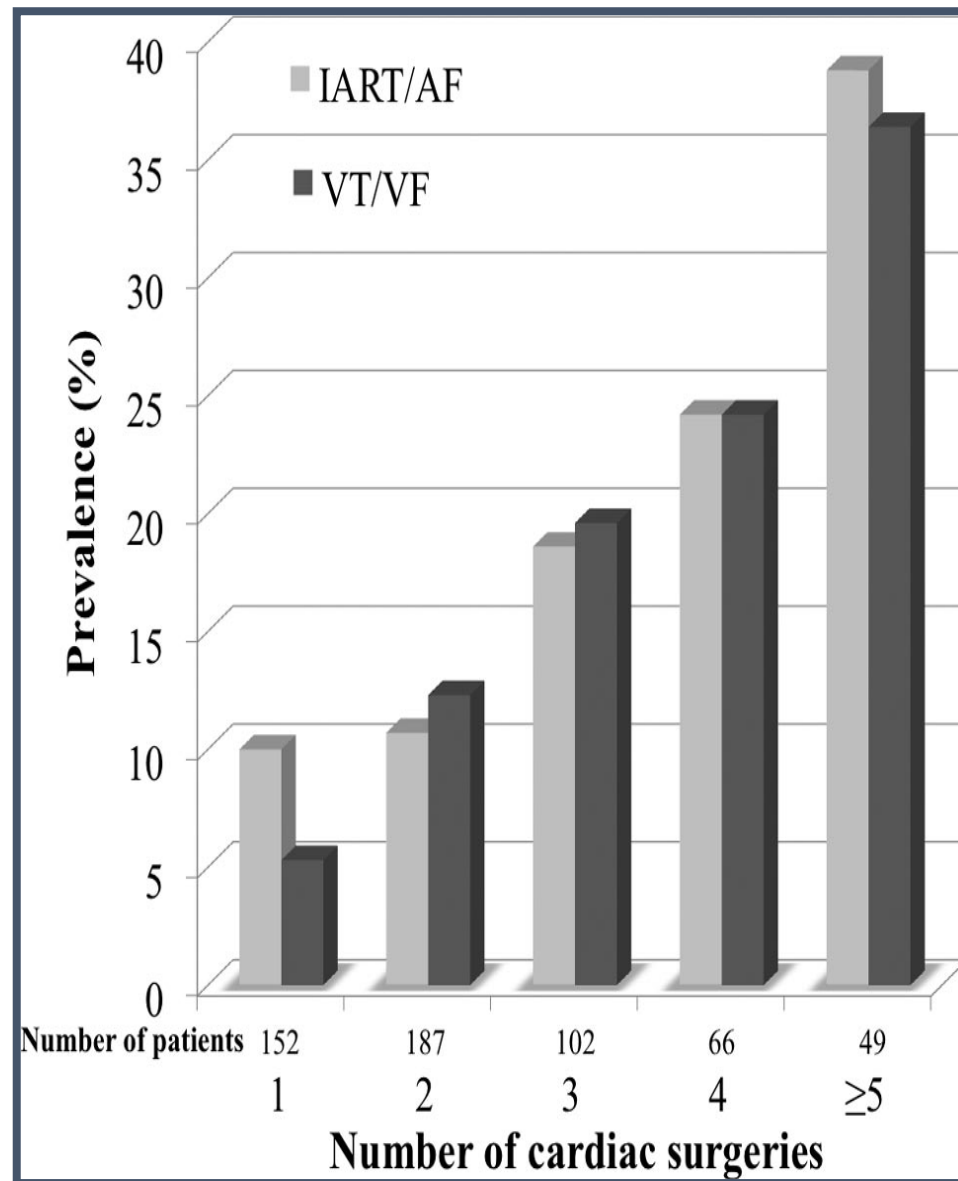
Arrhythmias in Adults with Repaired TOF

- Sustained tachyarrhythmia: 29.9%
- VT: 14.2%
- IART: 11.5%
- AF: 7.4%
- Other: 6.7%
- VF: 0.5%

Khairy et al. Arrhythmia Burden in Adults with Surgically Repaired Tetralogy of Fallot. Circ. 2010; 122:868-875

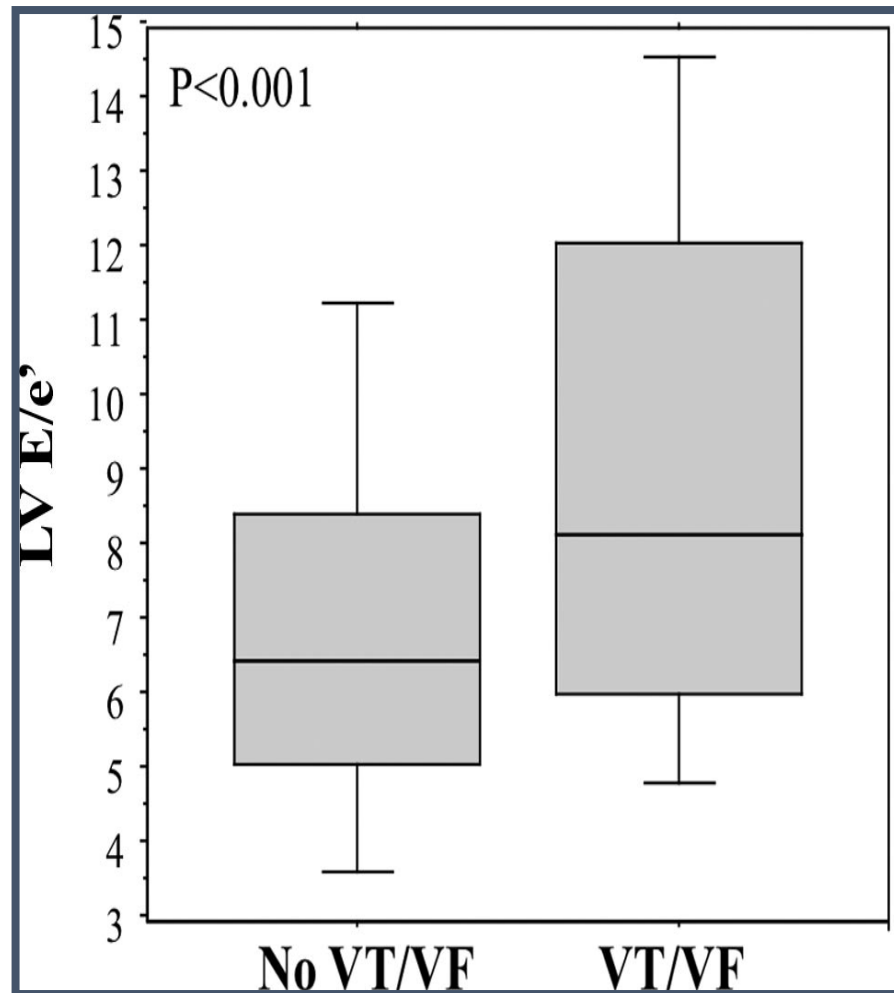
Risk Factors for Ventricular Tachycardia

- Inducible sustained ventricular tachycardia
- Non-sustained ventricular tachycardia
- Ventriculotomy incision
- LV systolic dysfunction
- LV diastolic dysfunction
- RV dysfunction
- QRS duration ≥ 180 ms



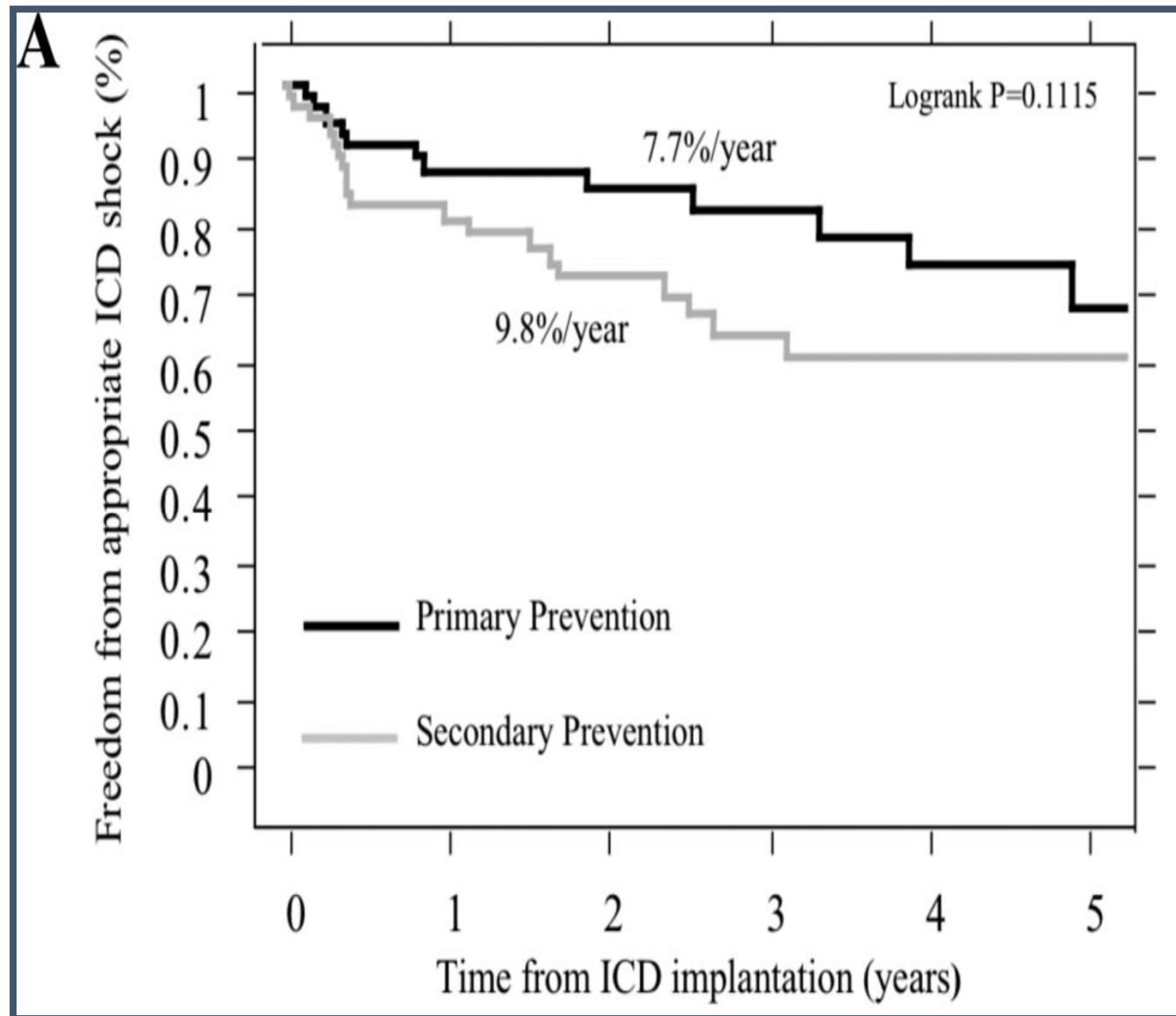
Khairy et al. Arrhythmia Burden in Adults with Surgically Repaired Tetralogy of Fallot. *Circ.* 2010; 122:868-875

Risk of VT/VF Related to LV Filling Pressure

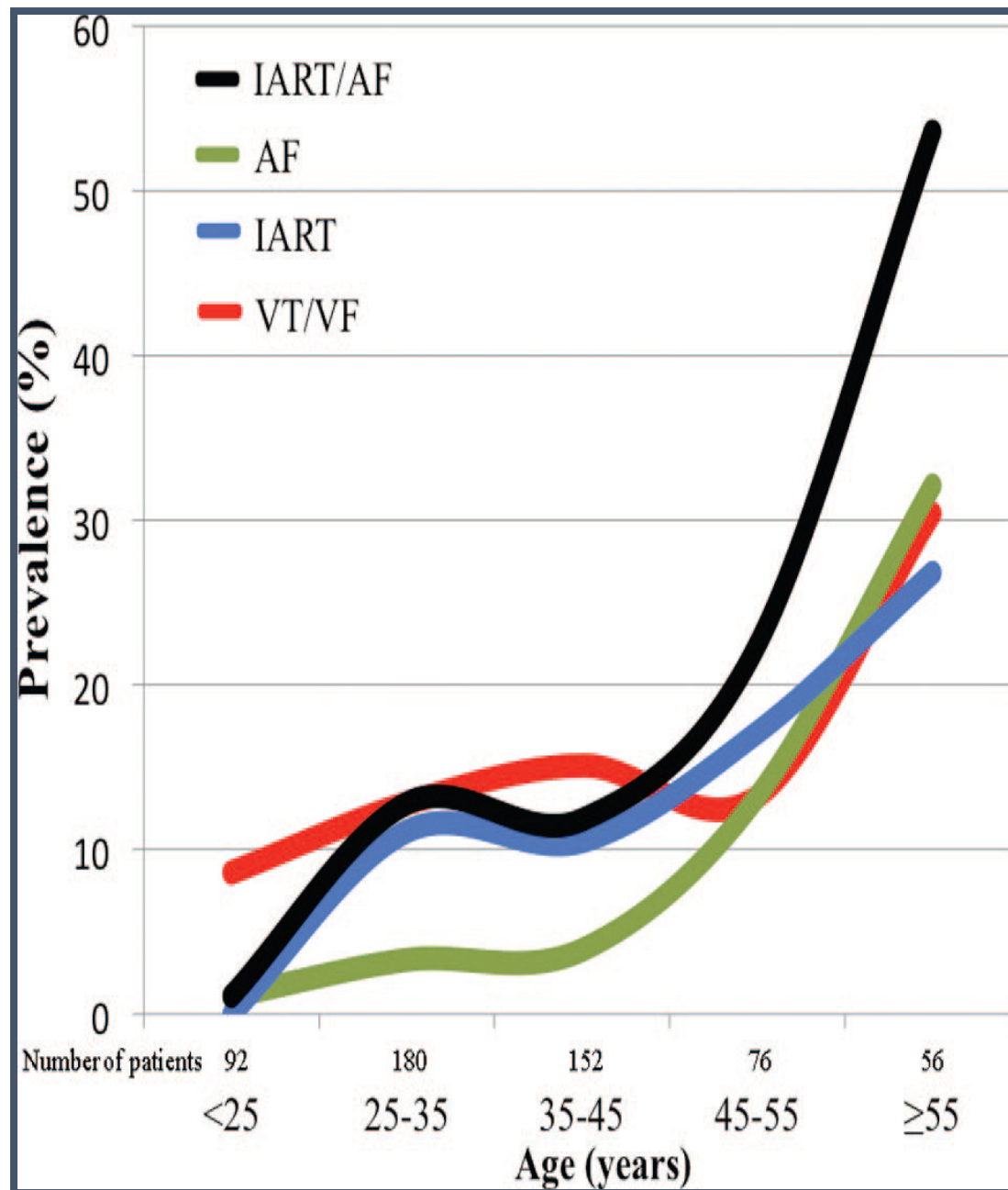


Khairy et al. Arrhythmia Burden in Adults with Surgically Repaired Tetralogy of Fallot. Circ. 2010; 122:868-875

ICD Therapies in Patients with TOF



Khairy et al. Implantable Cardioverter-Defibrillators in Tetralogy of Fallot. Circ 2008; 117:363-370





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Questions?

