

***Element 36.00***

**Vanoverschelde**

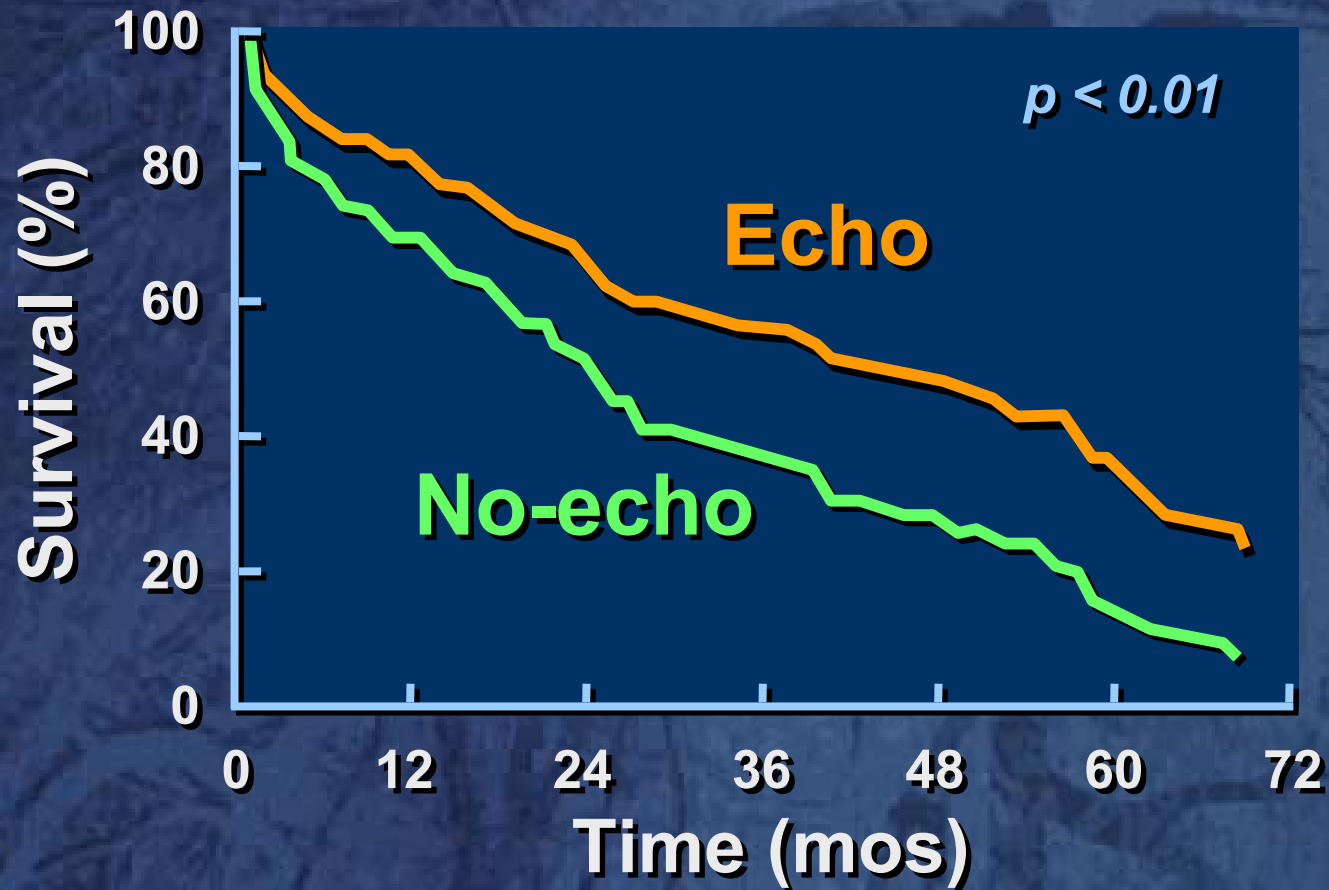
# Echo in Heart Failure

- Single most useful diagnostic test

- Allows

*whether 1<sup>o</sup> abnormality is pericardial, myocardial, or valvular if myocardial, whether dysfunction systolic or diastolic*

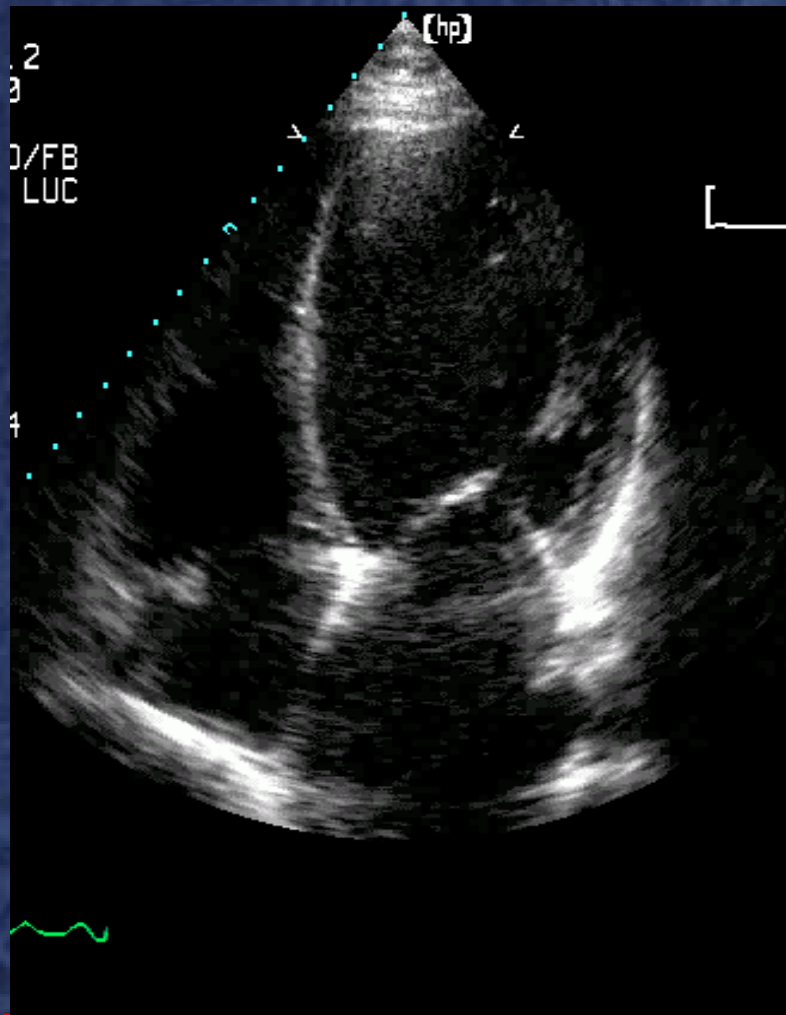
# Echo Influences Prognosis



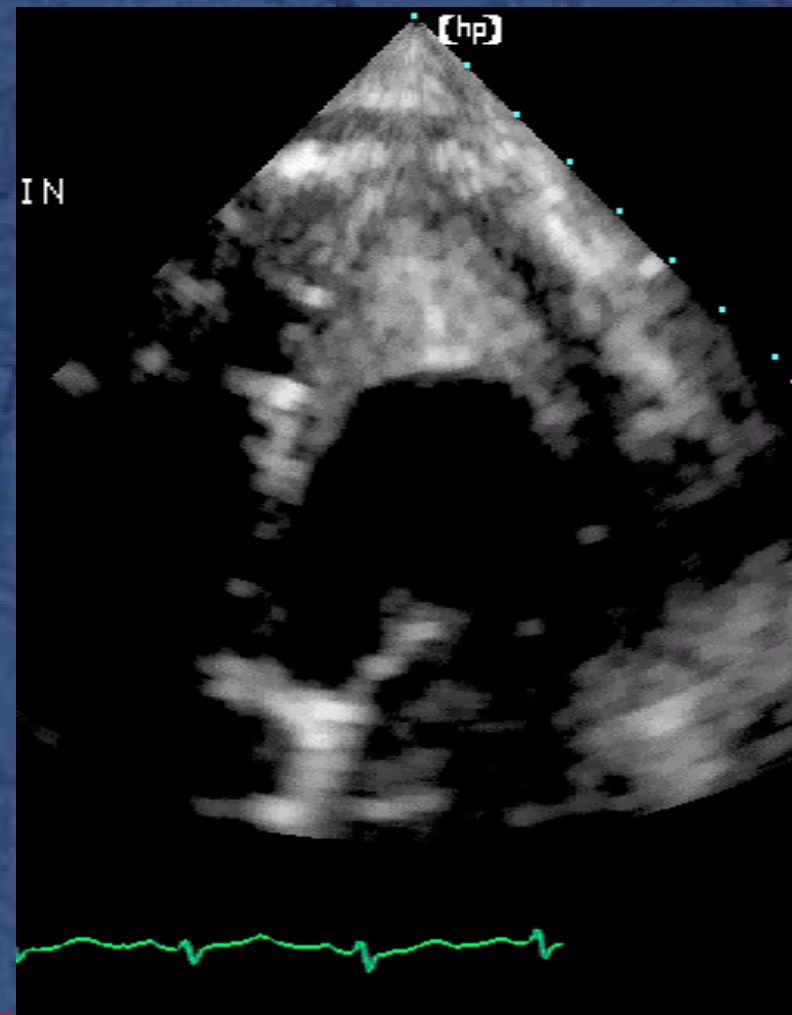
*Senni et al., J Am Coll Cardiol 1999, 33:164*

# MOVIES

## Dilated CM



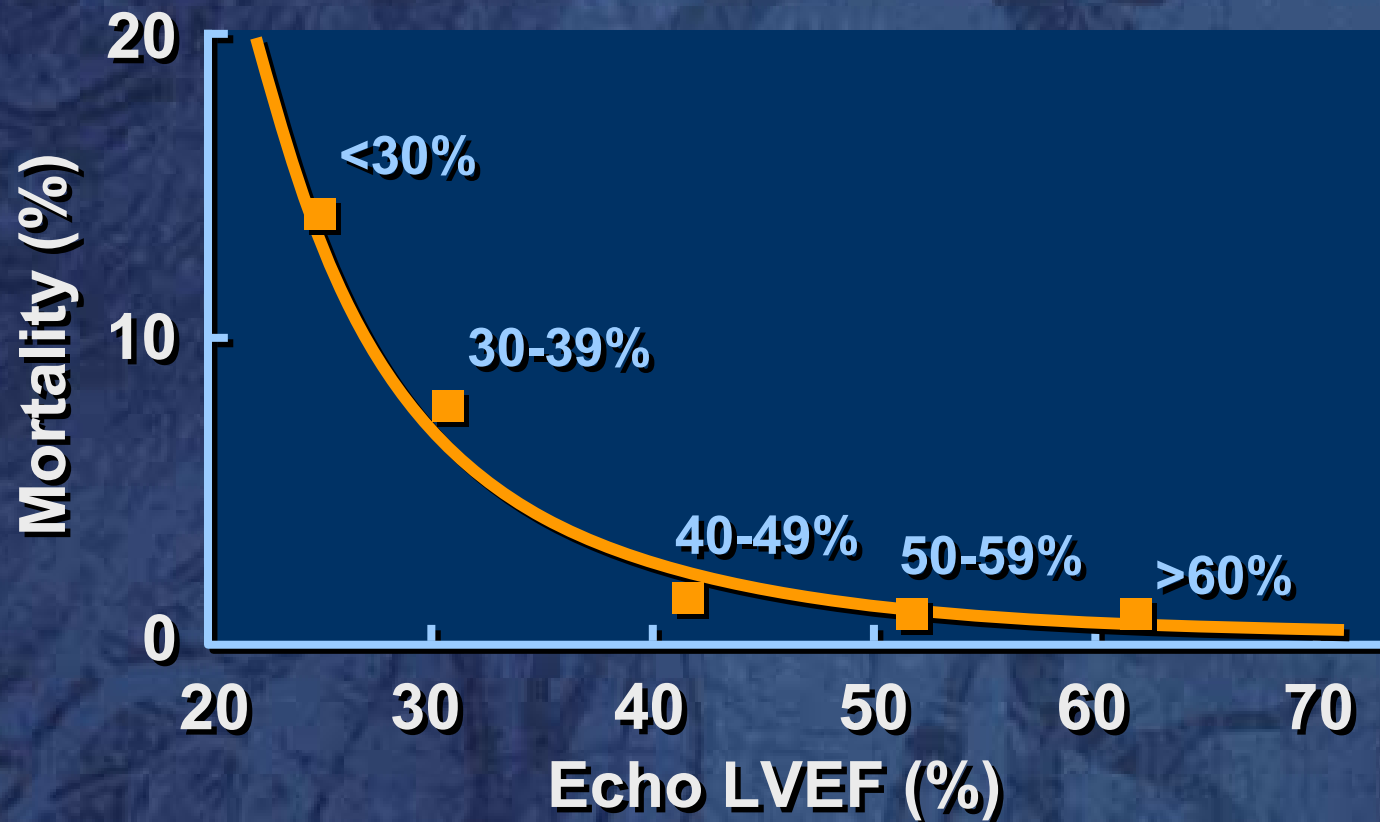
## Loeffler's



# What is important?

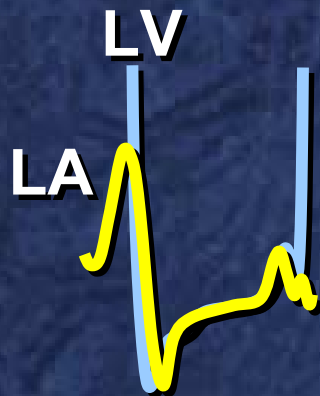
- LV morphology
- LV EF, volumes, geometry
- LV filling pressures
  - mitral inflow, pulmonary venous flow, systolic pulmonary artery flow, inferior vena cava...*
- Mitral regurgitation
- Inducible ischemia and myocardial viability

# LV Ejection Fraction

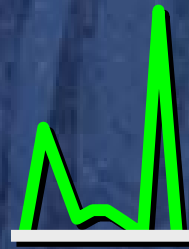
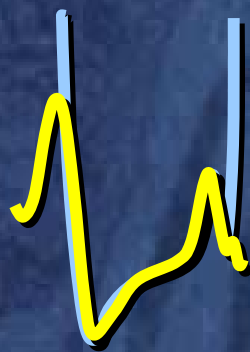


*Volpi A et al. Circulation 1993;88:416*

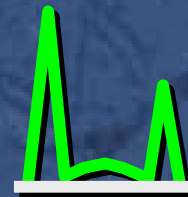
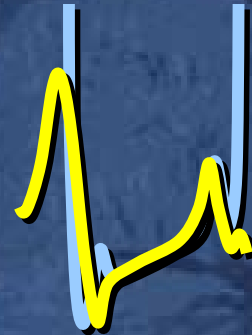
# LV Filling



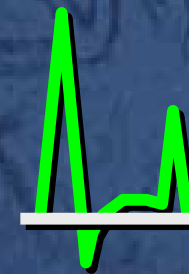
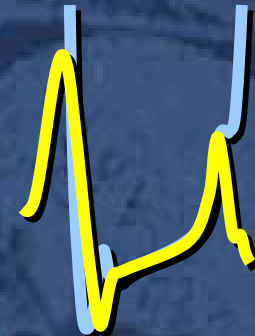
**Normal**



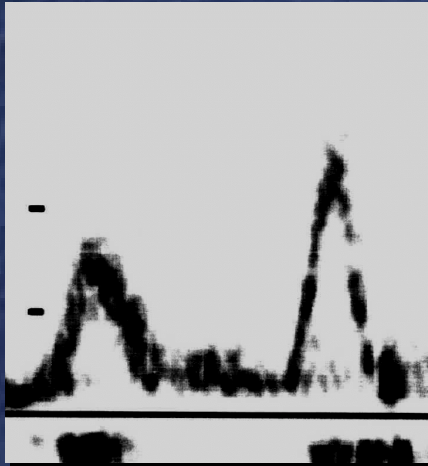
**Impaired  
relaxation**



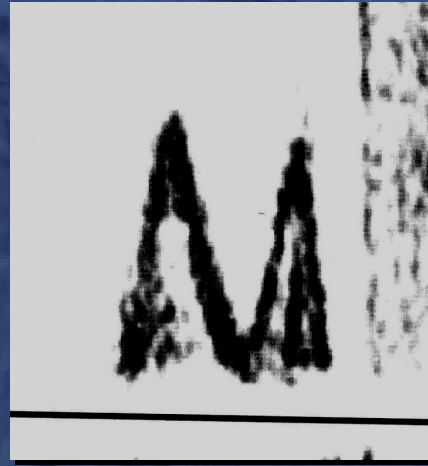
**Pseudo  
normal**



**Restrictive**



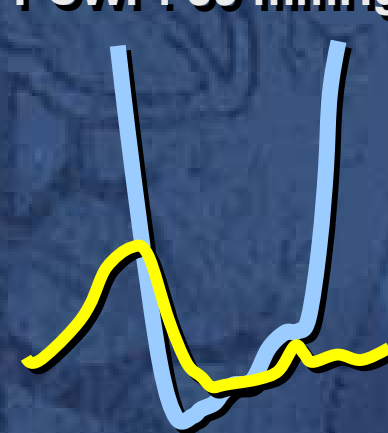
**E/A: 0.71**  
**PCWP: 11 mmHg**



**E/A: 1.07**  
**PCWP: 19 mmHg**



**E/A: 3.89**  
**PCWP: 39 mmHg**



*Vanoverschelde et al., Am J Cardiol 1995,75:383*

# LV Filling Pressures

	n	KT	Doppler	r value
Pozzoli	139	PCWP	E/A	0.69
Nagueh	100	PCWP	E/A	0.46
			E/Ea	0.86
Gianuzzi	140	PCWP	E/A	0.65
			DT	0.90
Tenebaum	44	PCWP	E/A	0.59
			DT A wave	0.74
Yamamoto	83	LVEDP	multi	0.69
Mulvagh	90	LVEDP	multi	0.90
Rossvoll and Hatle	50	LVEDP	E/A	0.23
			$\Delta A$	0.68

# Normal or Pseudonormal?

- Underlying LV abnormality ?
- Pulmonary vein flow (PW Doppler)
  - duration of  $A_{pv} > A_{mi}$*
  - $S/D < 1$*
- Mitral annulus (TDI):
  - $Ea < 8 \text{ cm/s}; E/Ea > 15; Ea/Aa < 1$*
- Inflow propagation (color m-mode):
  - $Vp < 45 \text{ cm/s}$*

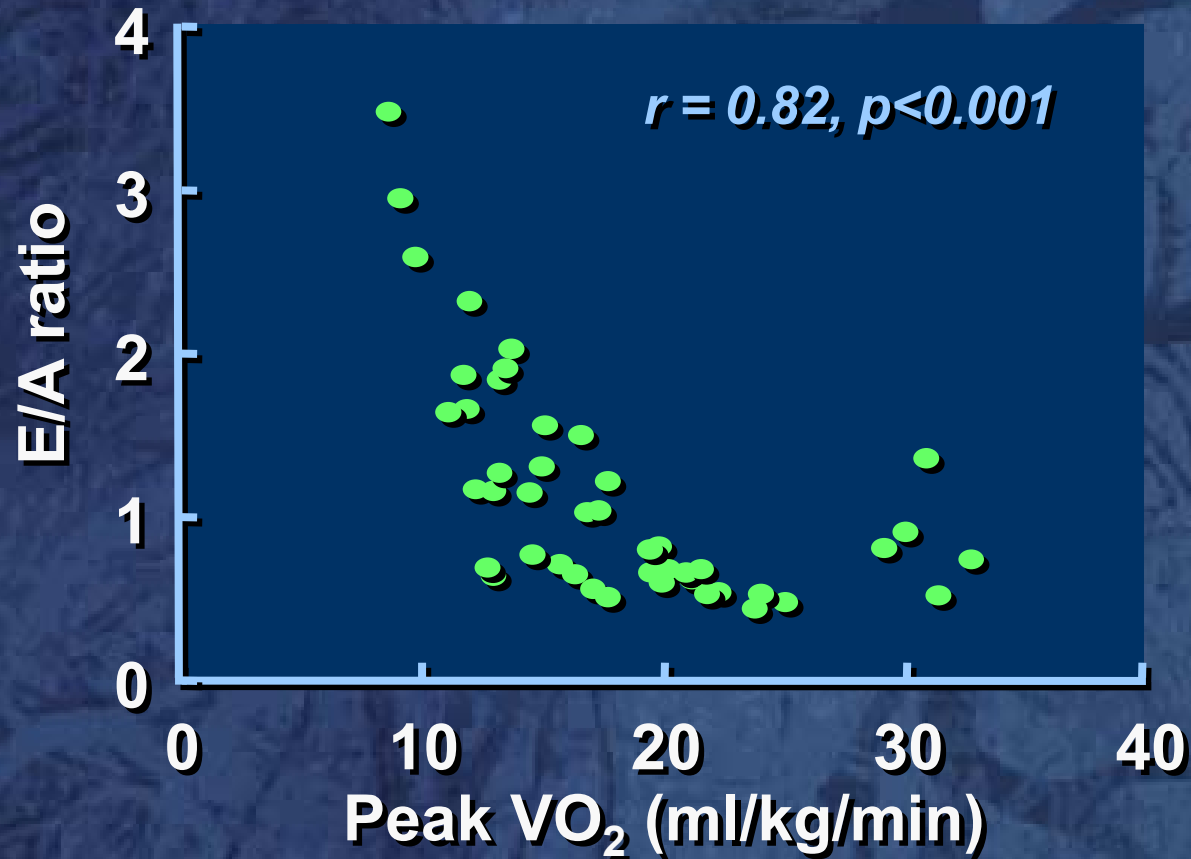
# Normal or Pseudonormal?

Delayed relaxation      Pseudo-normal      Restrictive

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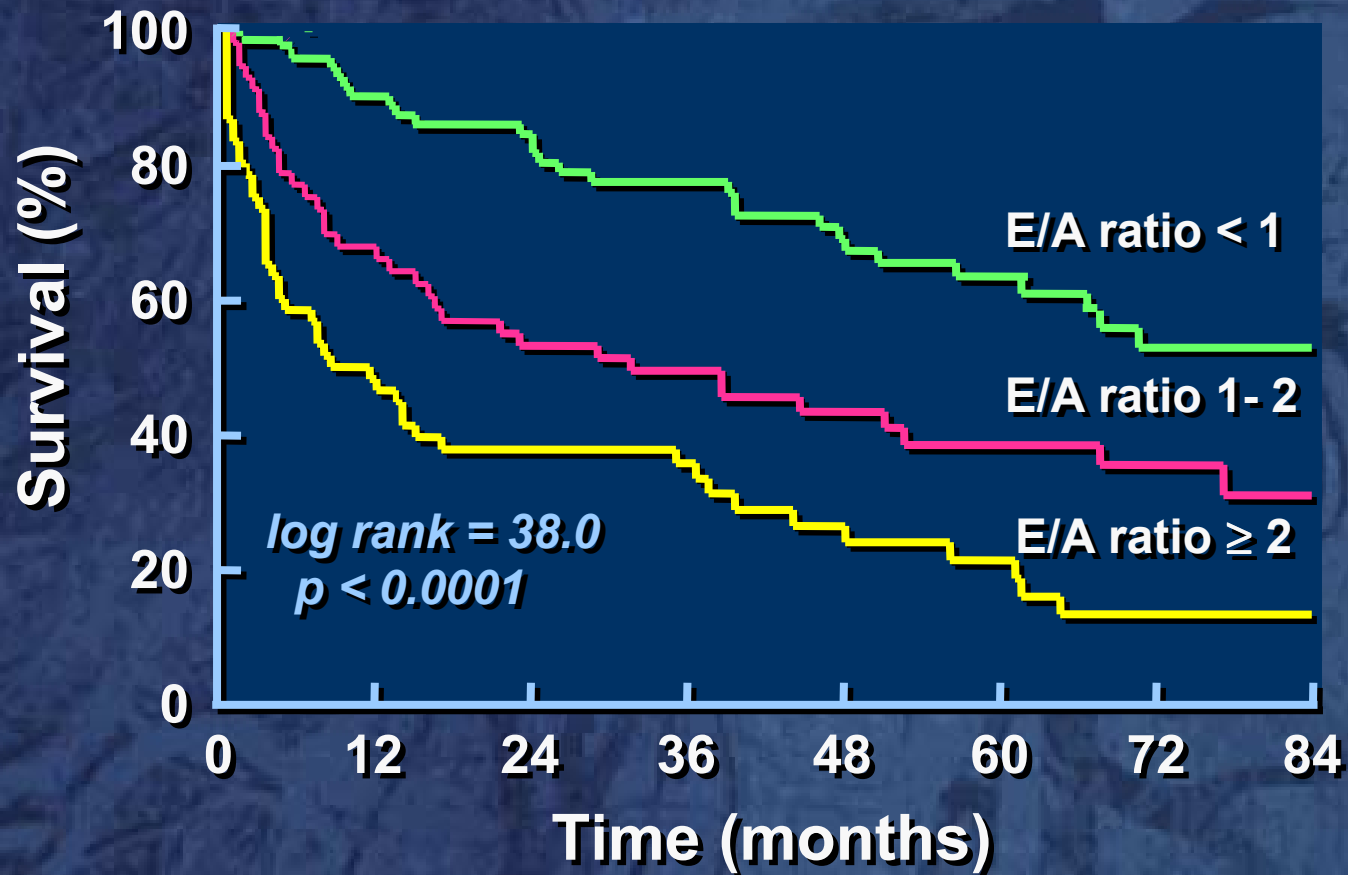
<b>E/A</b> (cm/s)	<b>&lt; 1</b>	<b>1 - 2</b>	<b>&gt; 2</b>
<b>DT</b> (ms)	<b>&gt; 220</b>	<b>150 - 200</b>	<b>&lt; 200</b>
<b>S/D</b>	<b>≥ 1</b>	<b>&lt; 1</b>	<b>&lt; 1</b>
<b>V<sub>p</sub></b> (cm/s)	<b>&gt; 45</b>	<b>&lt; 45</b>	<b>&lt; 45</b>
<b>E'</b> (cm/s)	<b>&gt; 8</b>	<b>&lt; 8</b>	<b>&lt; 8</b>
<b>E/E'</b>	<b>&lt; 8</b>	<b>8 - 15</b>	<b>&gt; 15</b>

# Mitral Inflow vs. $\text{VO}_2$ max



*Lapu-Bula et al., Am J Cardiol 1999,83:728*

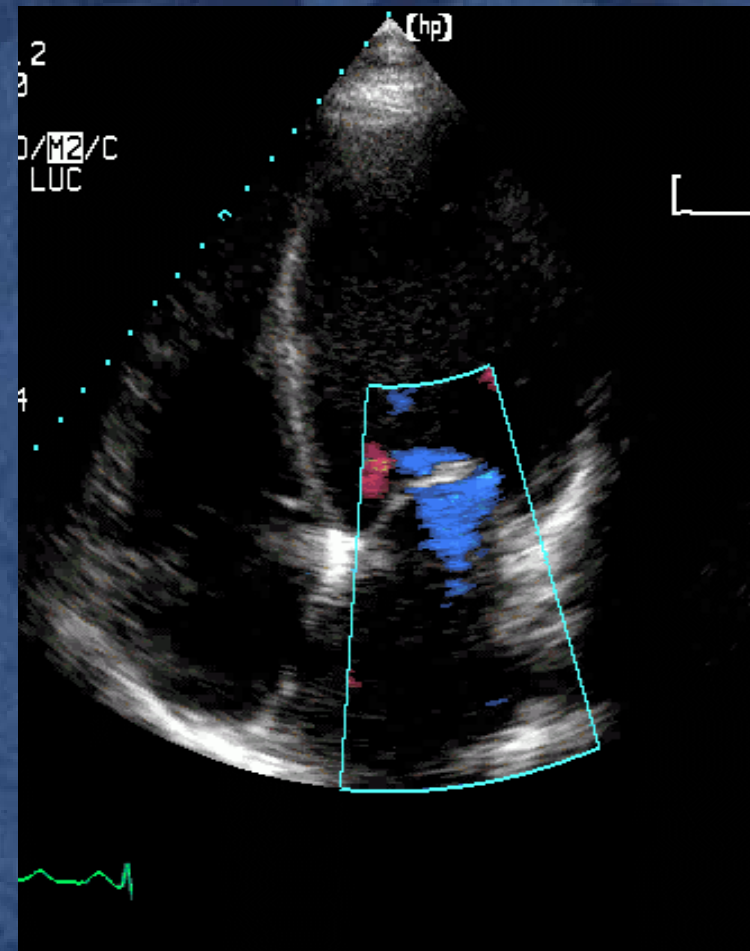
# Mitral Inflow Predicts Prognosis



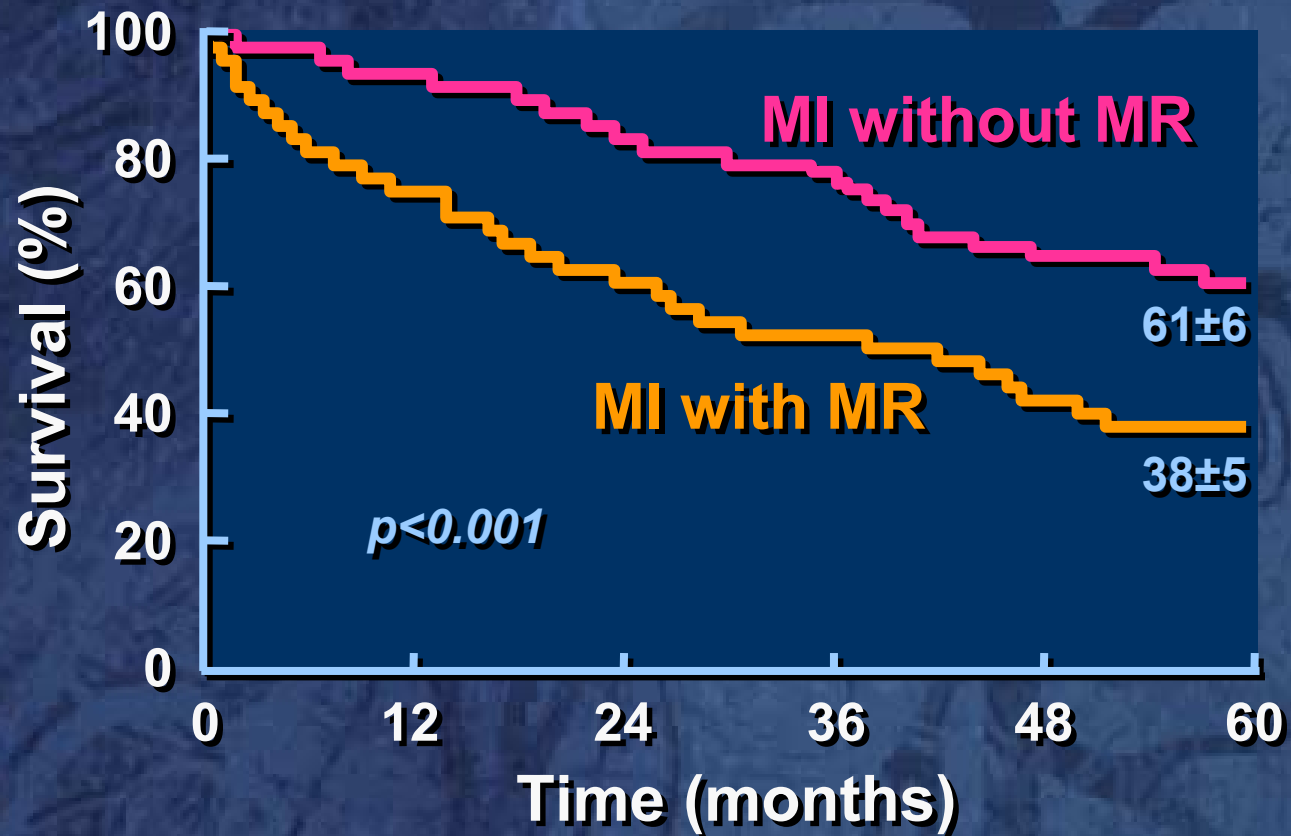
*Lapu-Bula et al., Am J Cardiol 1998,82:772*

## Mitral Regurgitation

- **Almost invariably accompanies DCM**
- **Due to apical displacement of sub-valvular apparatus and annular dilation *both restrict leaflet motion and disrupt normal coaptation***



# Mitral Regurgitation Influences Outcome



*Grigioni et al., Circulation. 2001;103:1759*

# Mitral Regurgitation

**ERO  $>$  20 mm<sup>2</sup>**

**and/or**

**RV  $>$  30 mL**

**adjusted RR: 2.01 - 2.38**

# Myocardial Viability

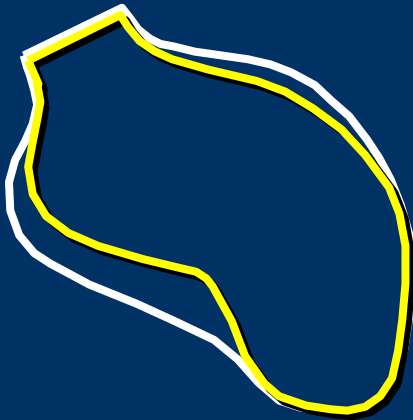
**Pre-op**

Single vessel disease - Occluded LAD

**CONTROL**

LVEDV = 128

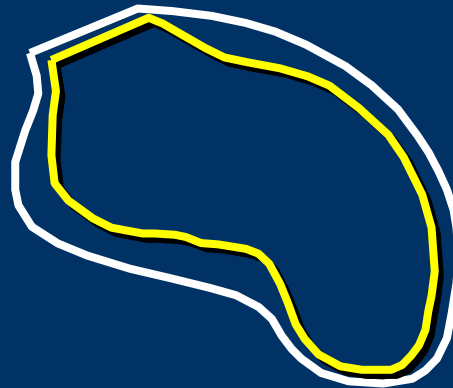
EF = 0.37



**POST NTG**

LVEDV = 101

EF = 0.51

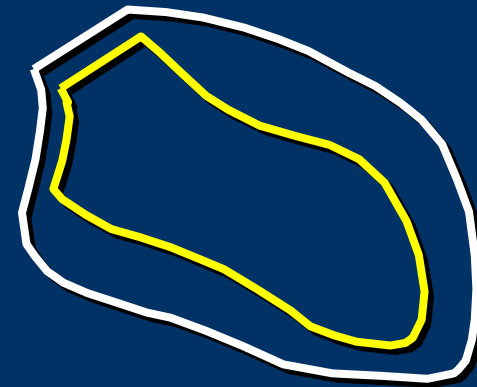


**8 mos post-op**

Patent graft LAD

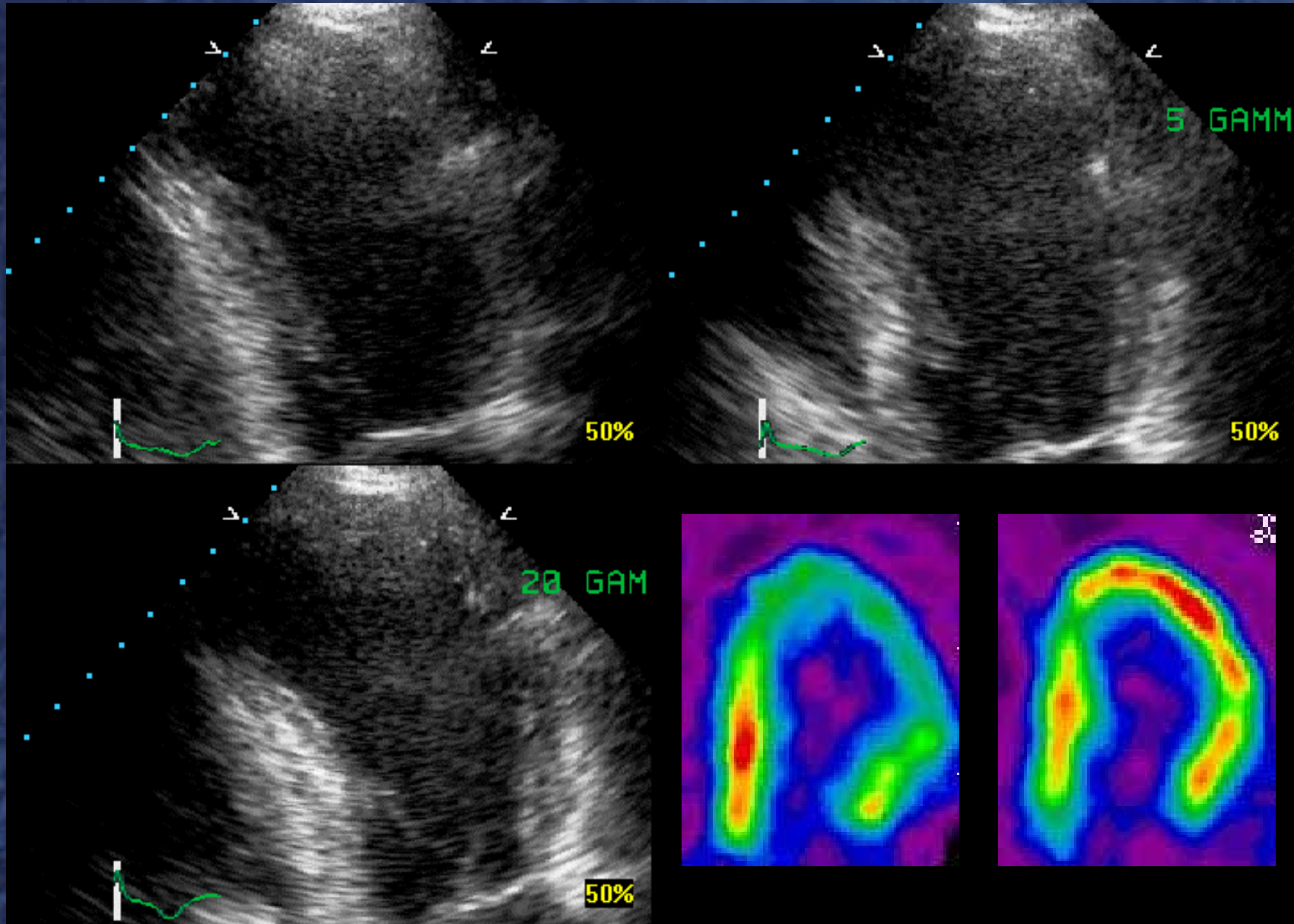
LVEDV = 104

EF = 0.75

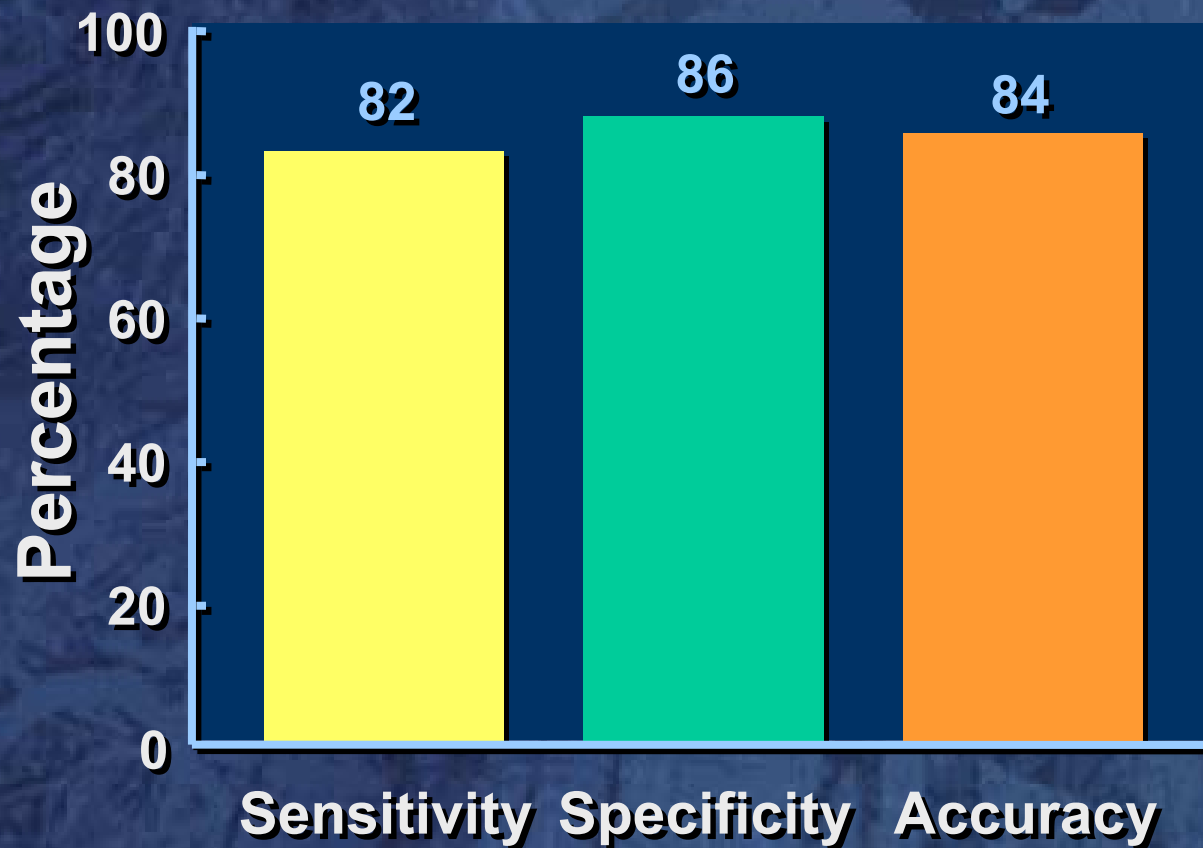


*Rahimtoola et al. Circulation 1985;72:123*

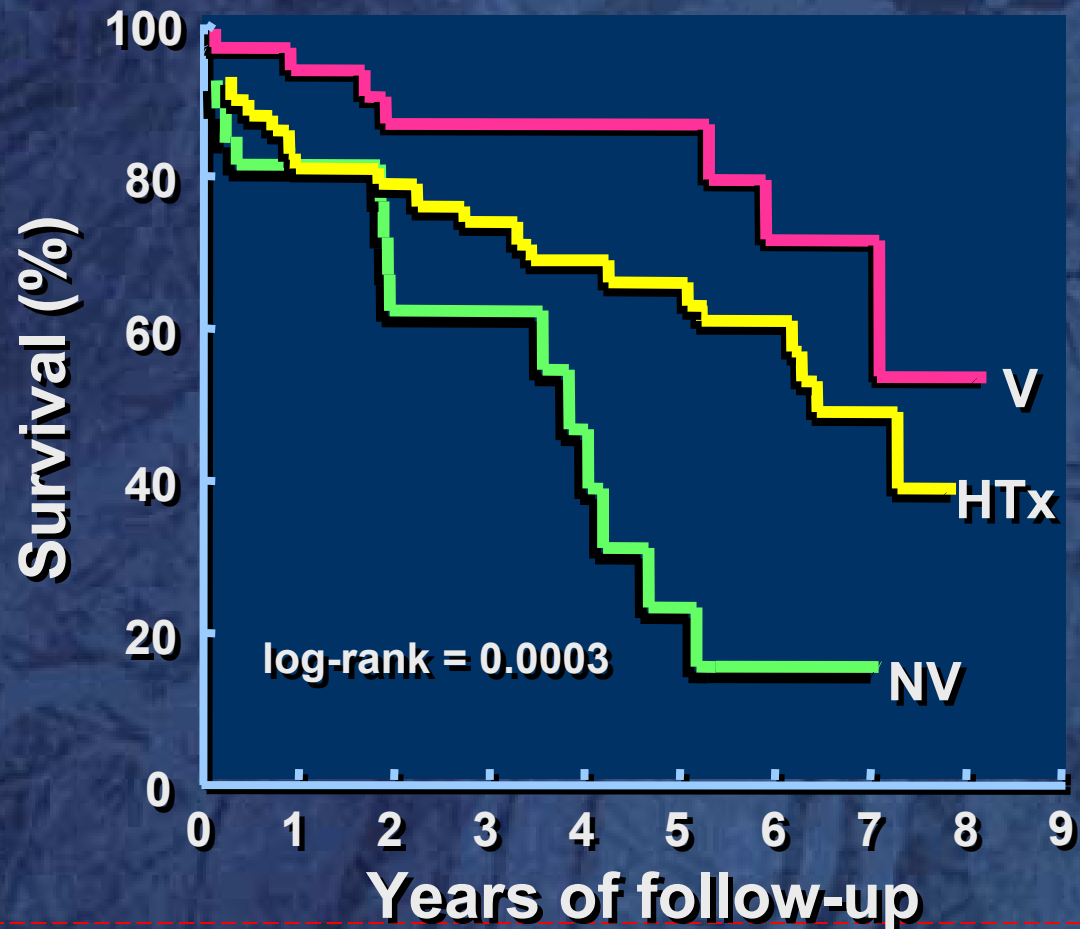
# MOVIE



# Dobu Echo Predicts Viability



# Dobu Echo and Prognosis in EFs < 25%



# What is important?

- LV morphology
- LV EF, volumes, geometry
- LV filling pressures
  - mitral inflow, pulmonary venous flow, systolic pulmonary artery flow, inferior vena cava ...*
- Mitral regurgitation
- Inducible ischemia and myocardial viability