

***Element 15-00AP***

**Feneley**

# Echo Localization

## *Cause of heart failure*

- Myocardial - *systolic*  
- *diastolic*
- Valvular
- Pericardial

# Echo and Systolic Function

- Global function
- Regional function
- Ventricular remodeling
- Contractile reserve / ischemia / viability
- Valve function (MR important)

# Causes of Systolic Myocardial Dysfunction

- Coronary artery disease
- Valvular heart disease
- Hypertension and aging
- Diabetes
- Dilated cardiomyopathy

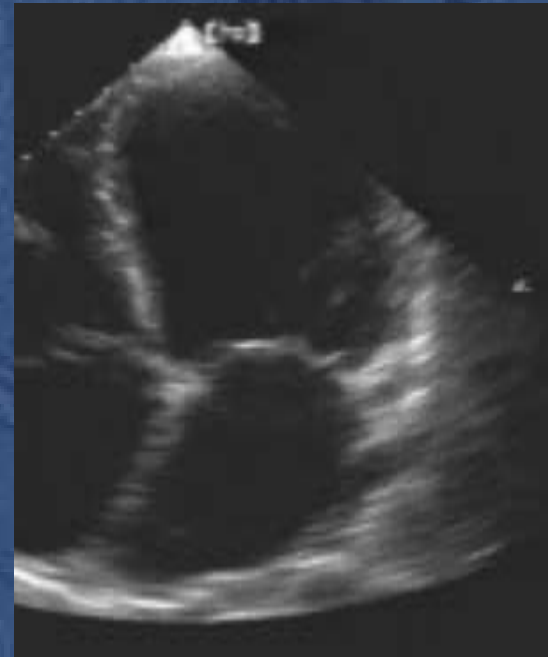
# MOVIES

## Echo Morphological Classification of Resting Systolic Dysfunction

Segmental



Global



# **Echo Morphological Classification**

## ***Resting systolic dysfunction***

- **Segmental dysfunction**

*Focal scarring/dyskinesia most likely ischemic origin*

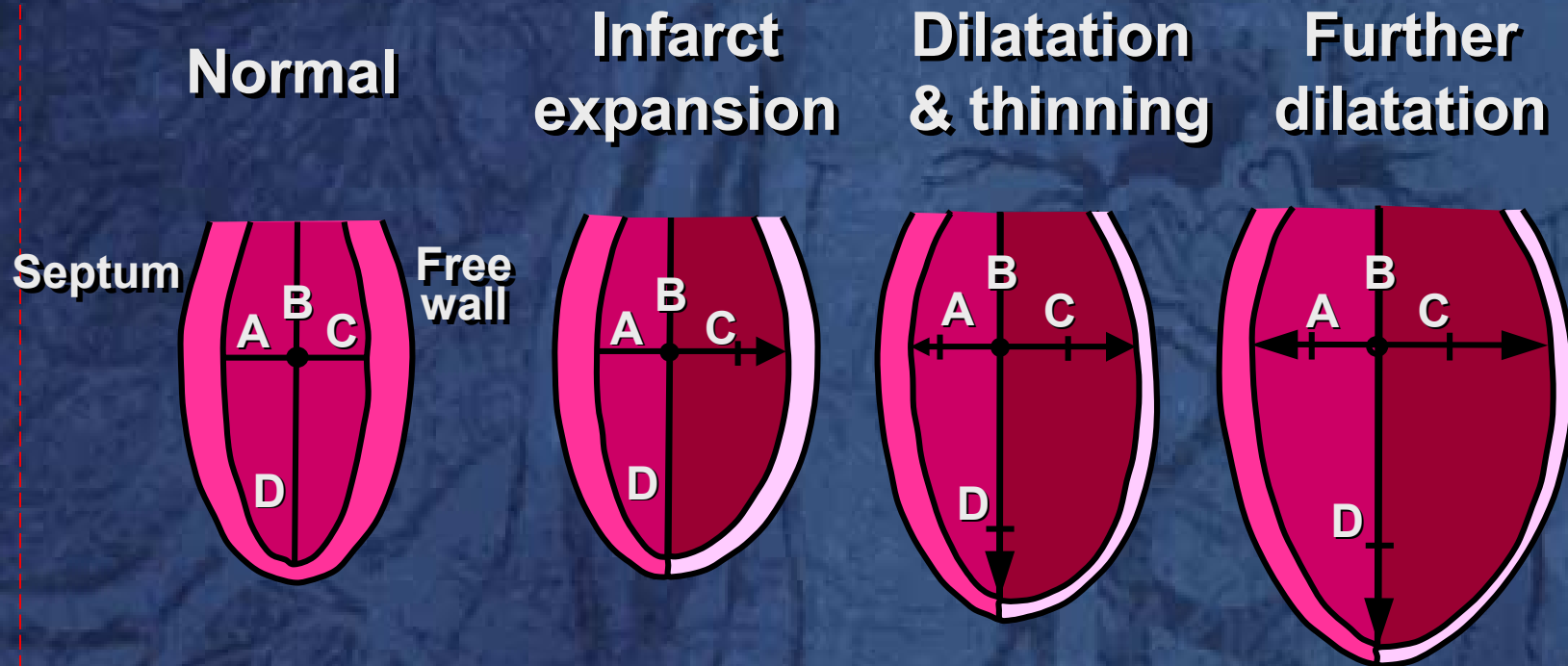
*but significant regional asymmetry (even without LBBB) often seen in DCM*

- **Global dysfunction**

*May be due to ANY of the causes of systolic dysfunction, including CAD*

***Always exclude CAD !***

# LV Remodeling Post-infarction



# What Can be Measured by Echo?

- LVIDd, LVIDs & fractioned shortening
- LVEDV, LVESV & EF (*which method?*)
- Vcf
- LV mass (*which method?*)
- Cardiac output by LVOT Doppler
- LV dP/dt derived from MR jet

# What Can be Measured by Echo?

- Load-independent indices based on PV loops

*ESPVR, PRSW (single-beat approaches)*

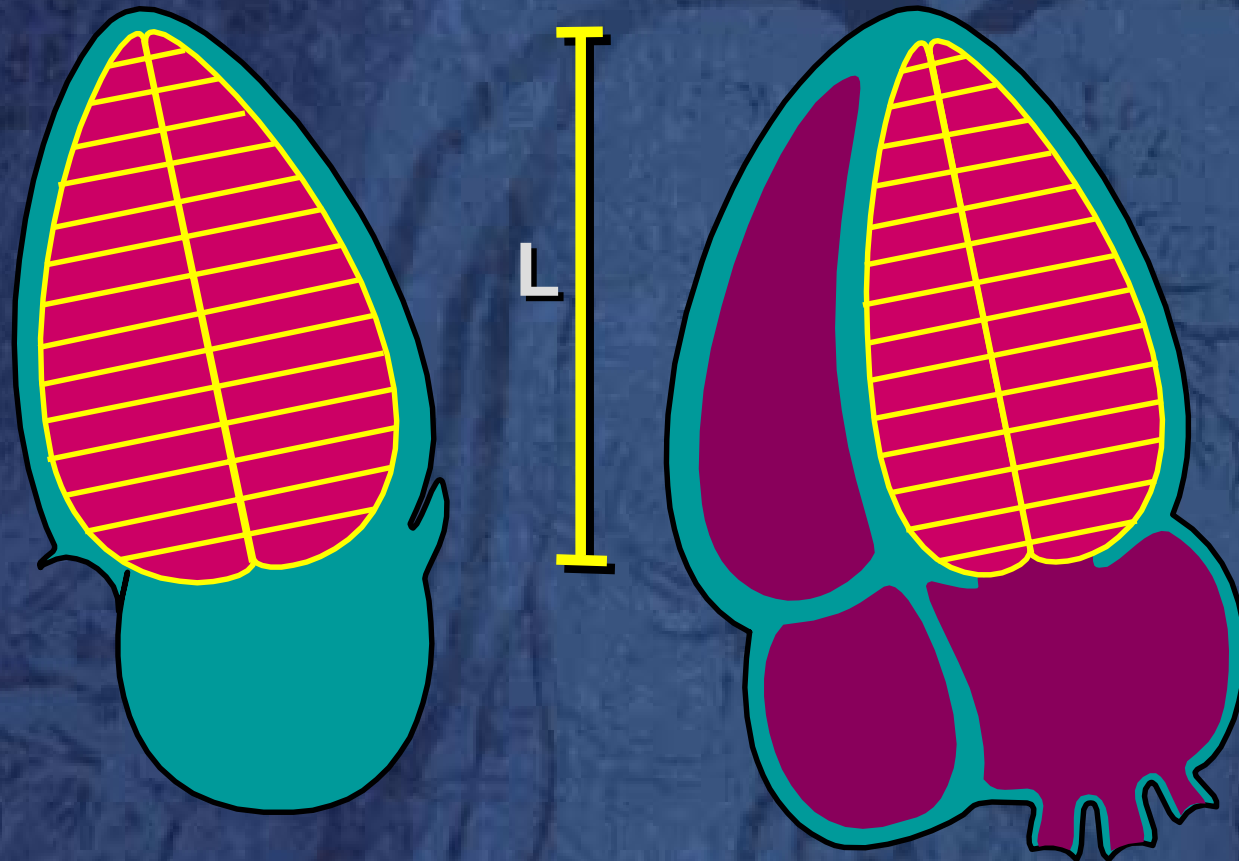
- Regional dysfunction (eg WMS)

*qualitative vs quantitative approaches*

- Newer methods Tissue Doppler & strain rate, 3D

X

# Biplane Simpson's Rule

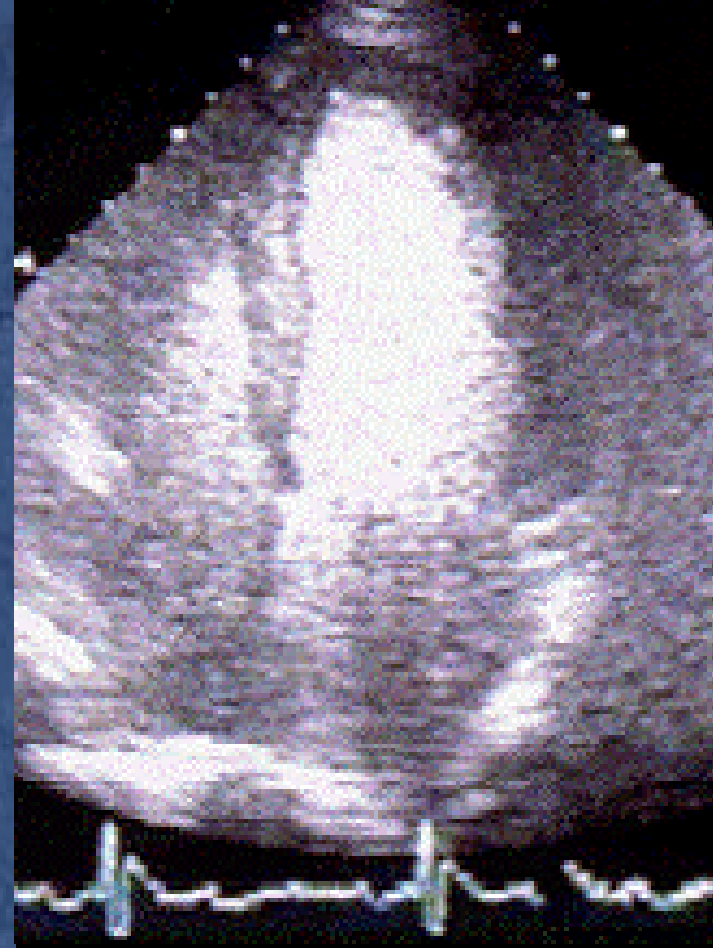


*Grayburn, P: Echo in Context*

# Limitations of Quantitation

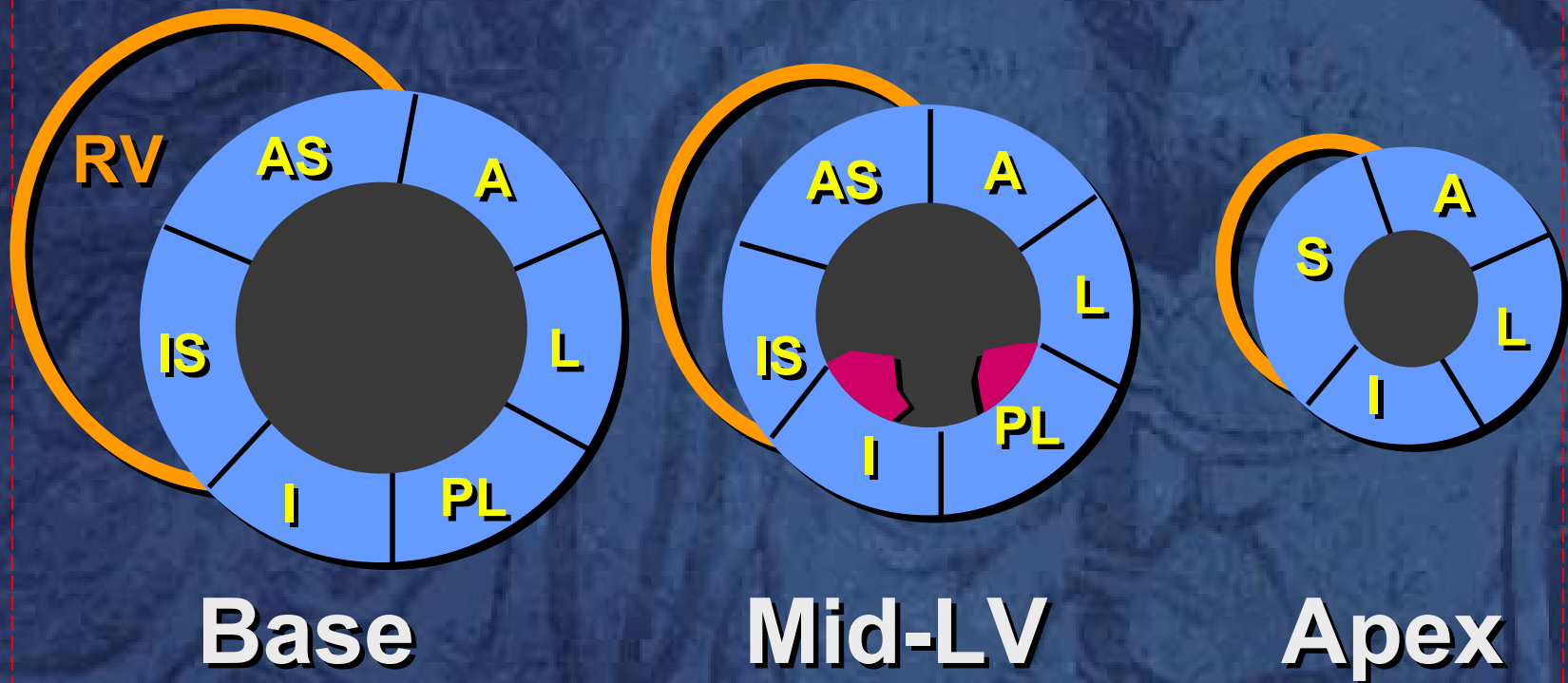
- Poor endocardial borders
- Geometric assumptions
- Reproducibility
- Complicated & time-consuming
- Limited evidence of incremental benefit
- Harmonics, contrast, automated border detection and TDI / strain rate may help

# Contrast Echo



# Regional Motion

## 16 Segment Model



*Grayburn, P: Echo in Context*

**X**

# **Regional Wall Motion Scoring**

**1 = Normal or hyperkinetic**

**2 = Hypokinetic**

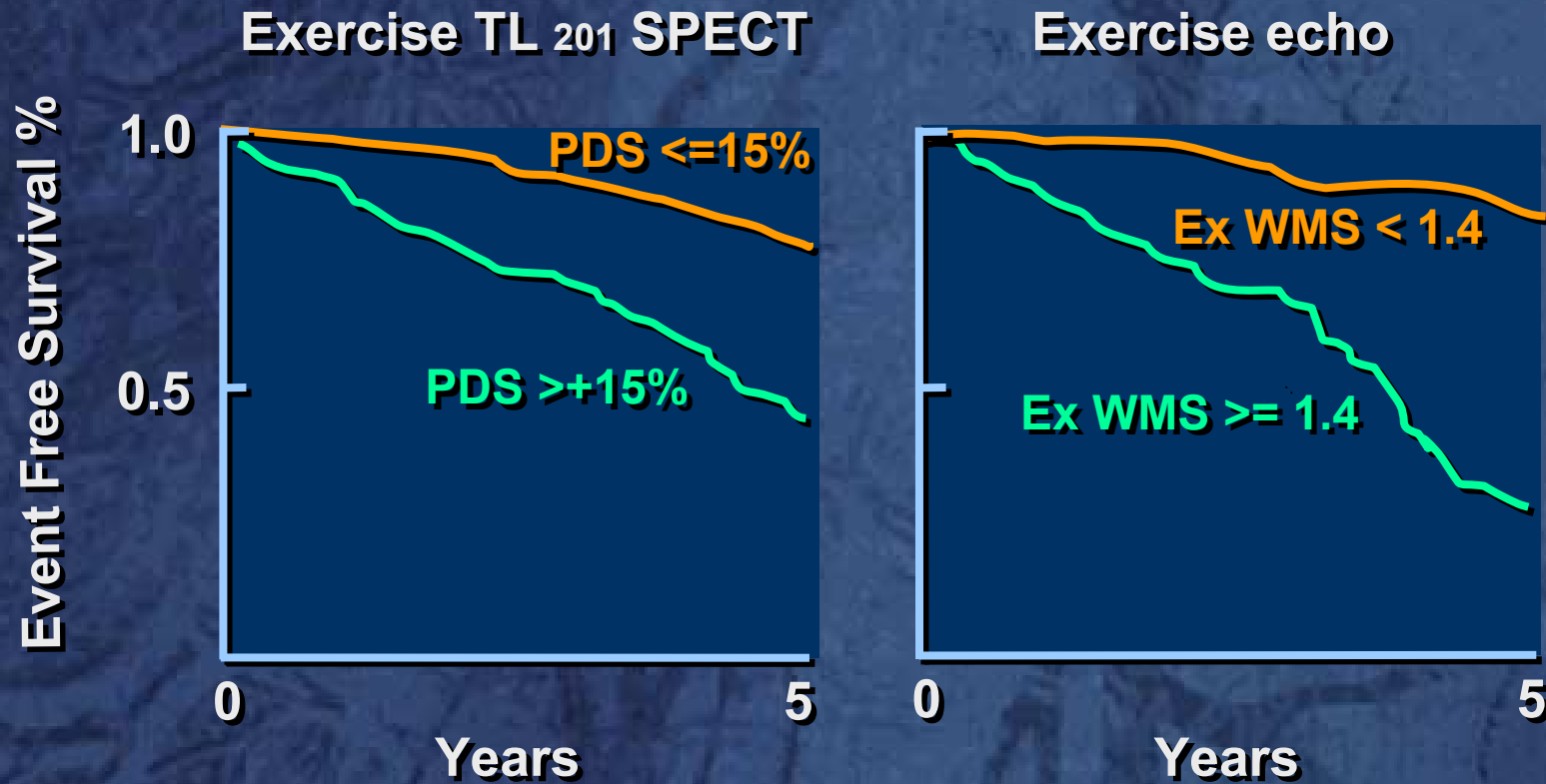
**3 = Akinetic**

**4 = Dyskinetic**

$$\text{Wall Motion Score Index} = \frac{\text{Sum of scores}}{\text{\# of segments}}$$

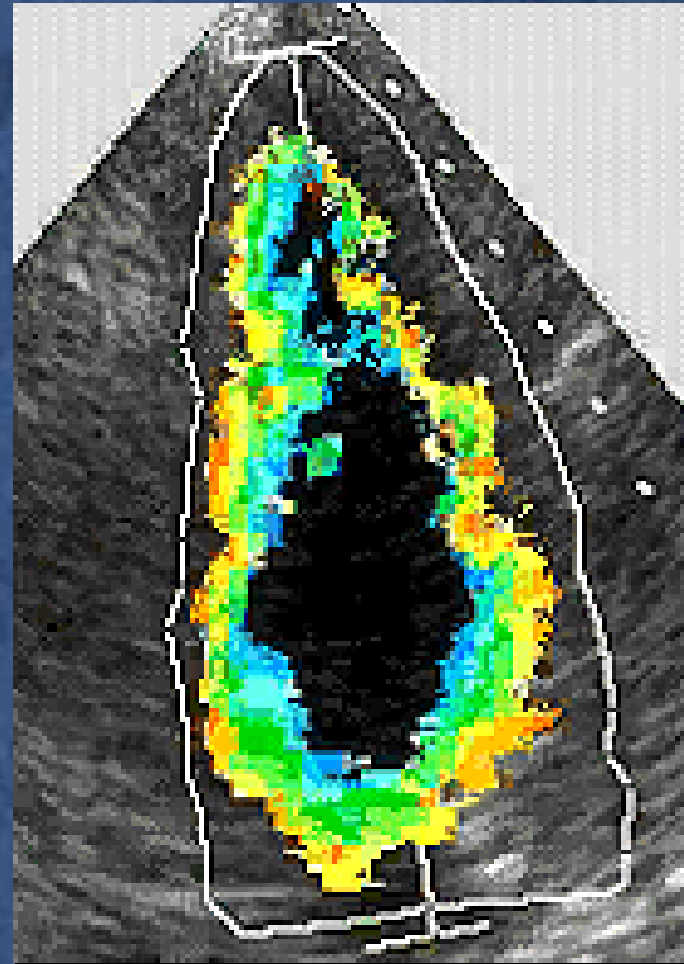
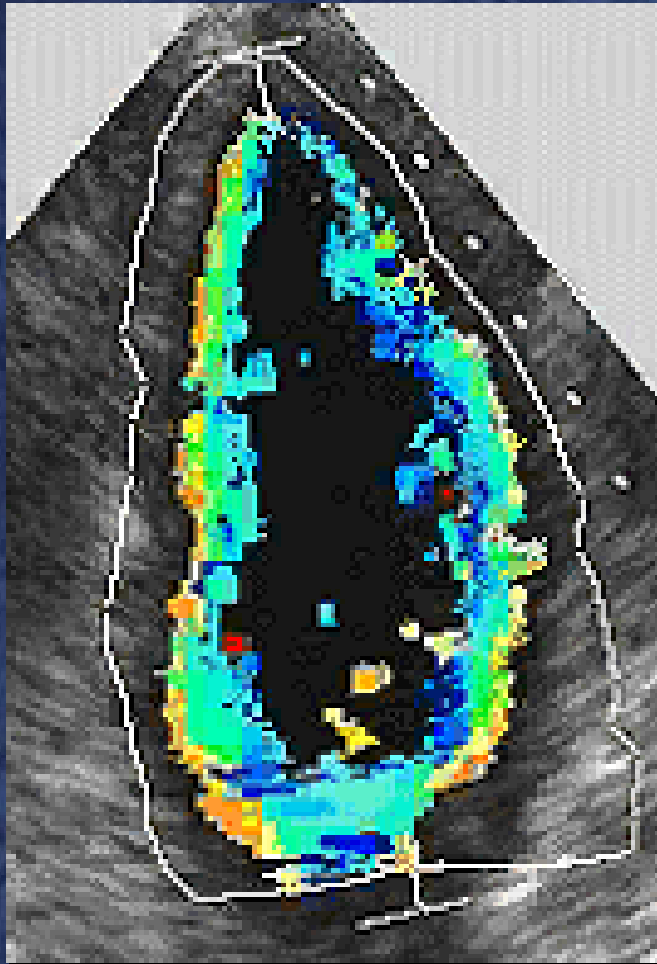
*Grayburn, P: Echo in Context*

# Prognostic Value Echo wall motion score

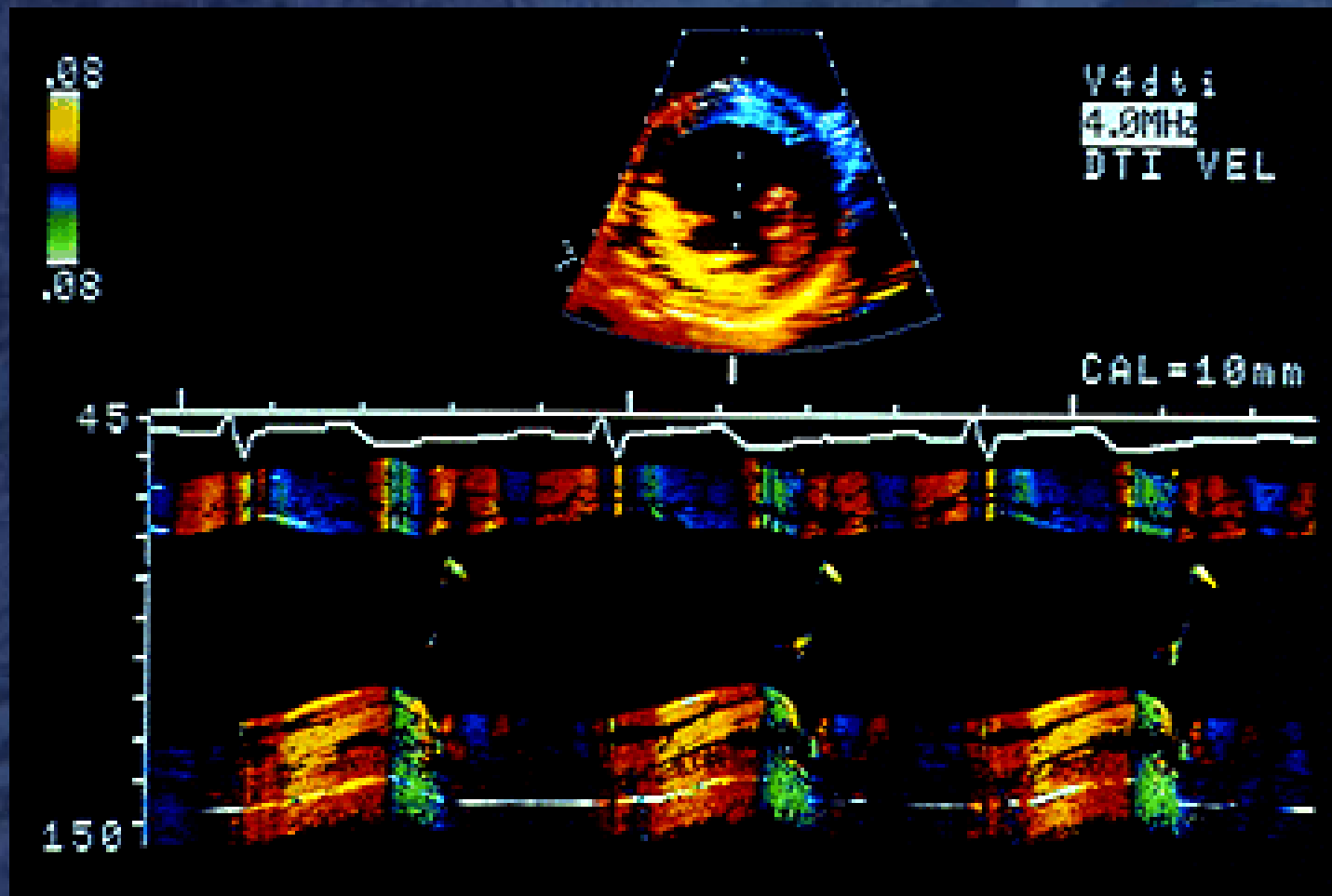


*Olmos et al, Circulation 98:2679, 1998*

# Color Kinesis

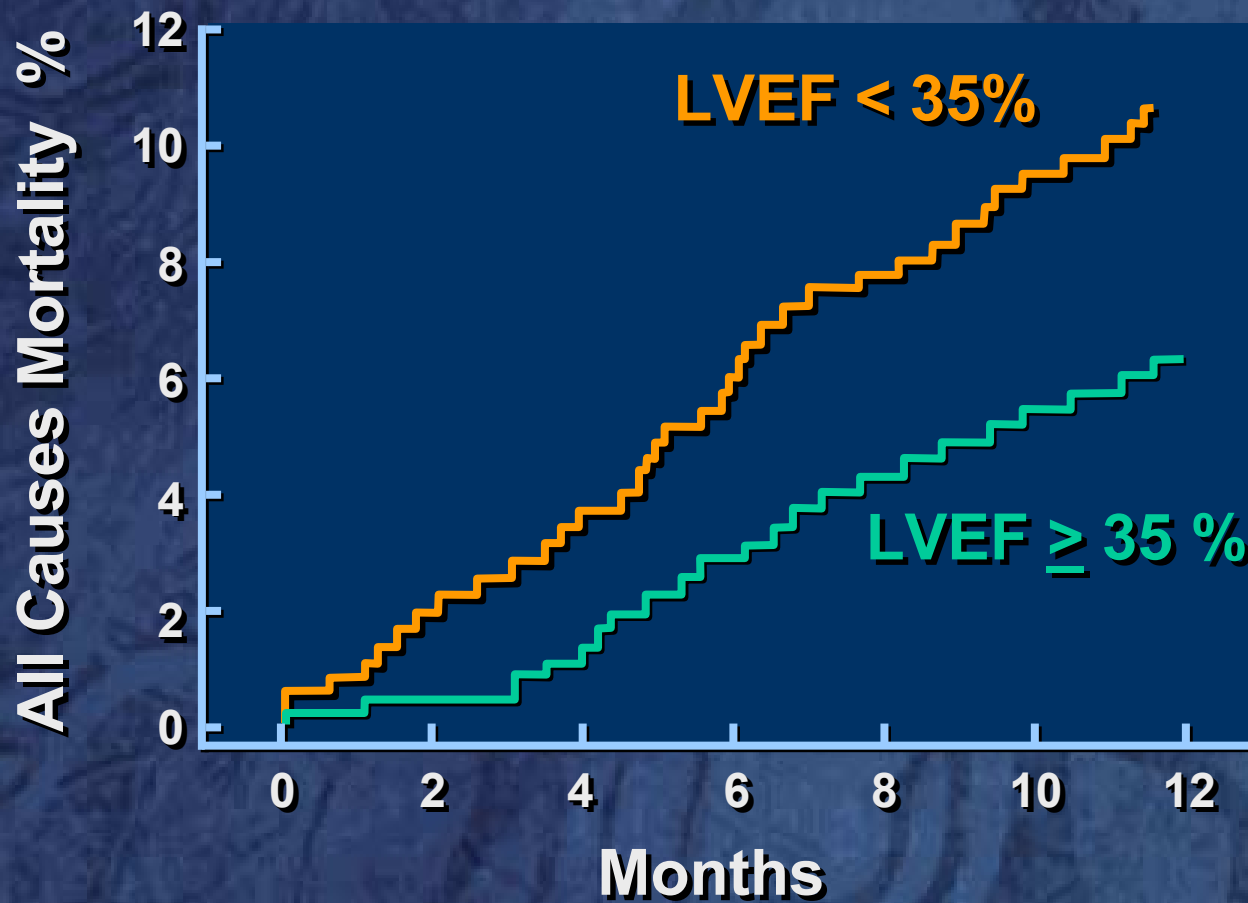


# Tissue Doppler Imaging



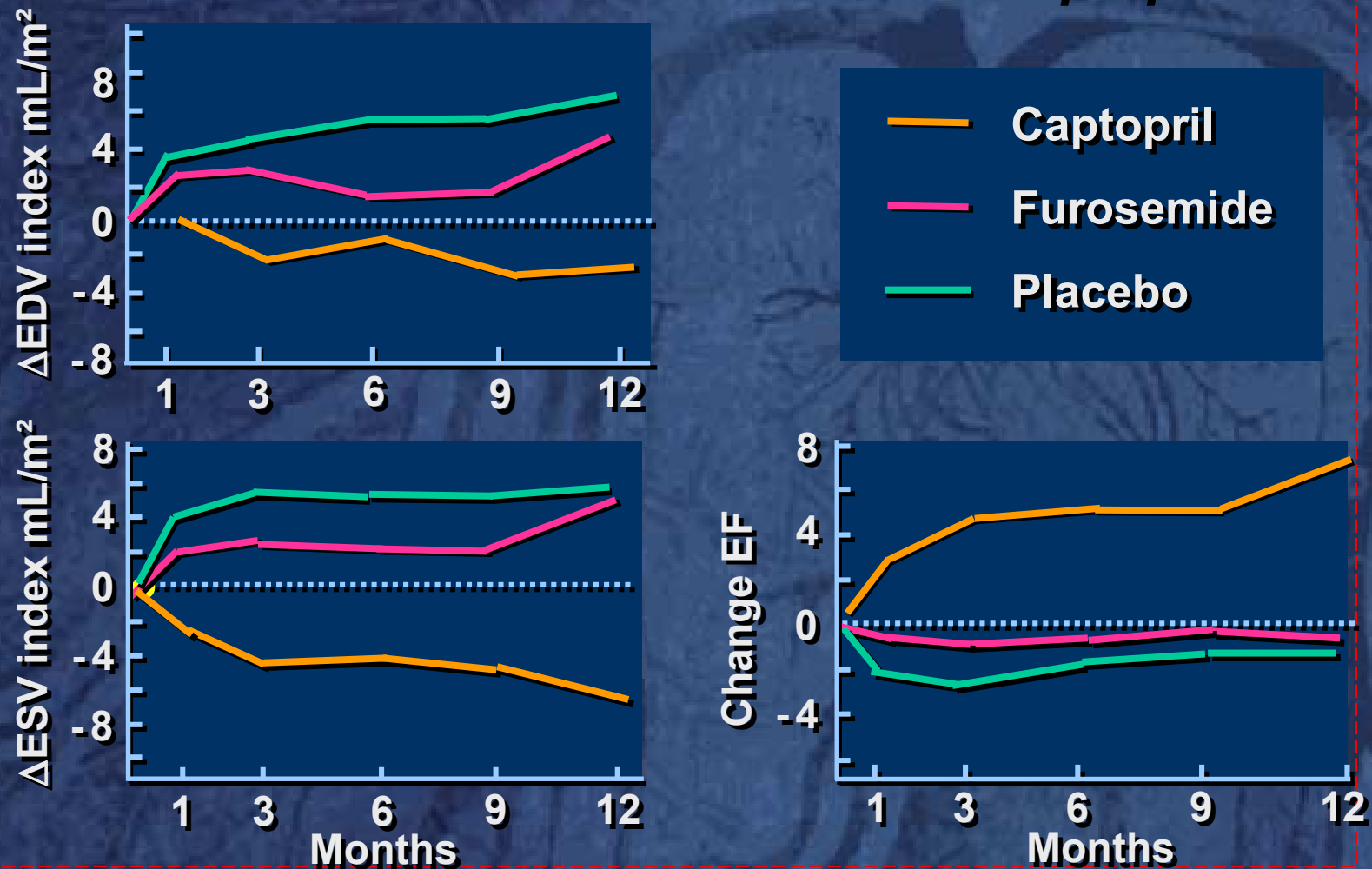
# SOLVD Registry Data

## Prognostic value of LVEF < 35%



# Echo EF and LV Failure Treatment

## Echo volume with Furosemide or Captopril

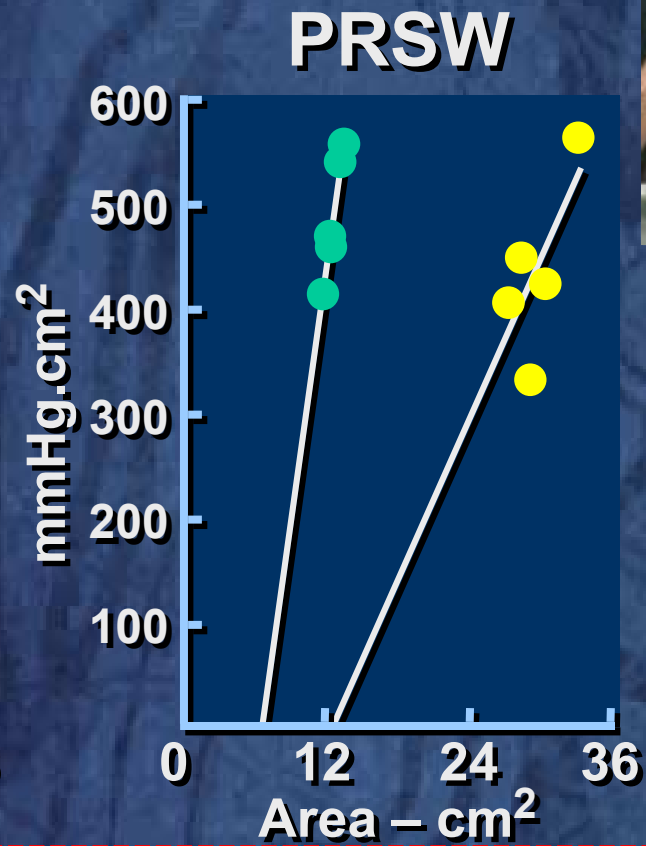
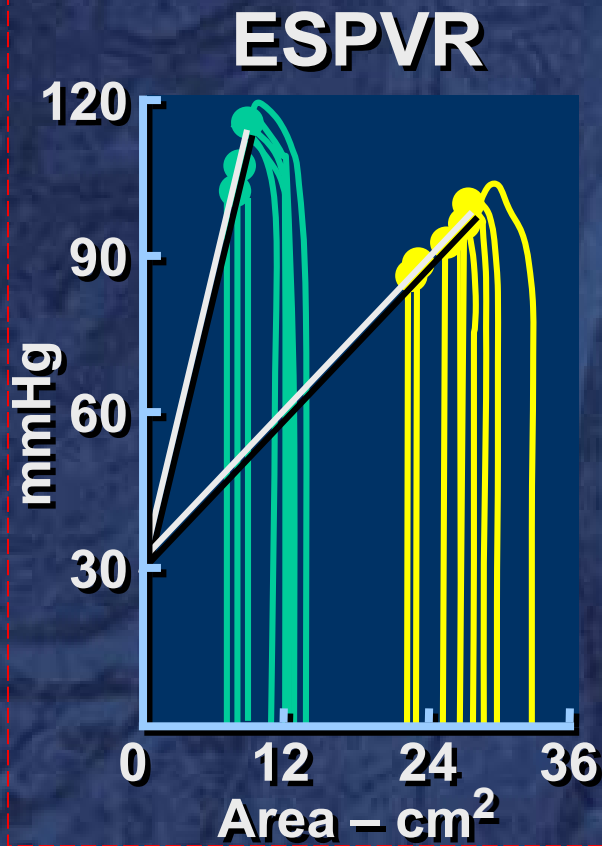


# **AHA/ACC Guidelines**

## ***Echo evaluation of pts with HF***

- **Symptomatic *initial assessment of LV systolic function (EF)***
- **Repeat EF *if clinical status changed or significant intervention***
- **Stress echo after angio to detect ischemia/viability *if known CAD & no angina in consideration of revascularization***
- **Asymptomatic *Strong FH / hx cardiotoxic***

# Load-insensitive Contractility Indexes



- DCM
- Normal

# Routine Echo Measures?

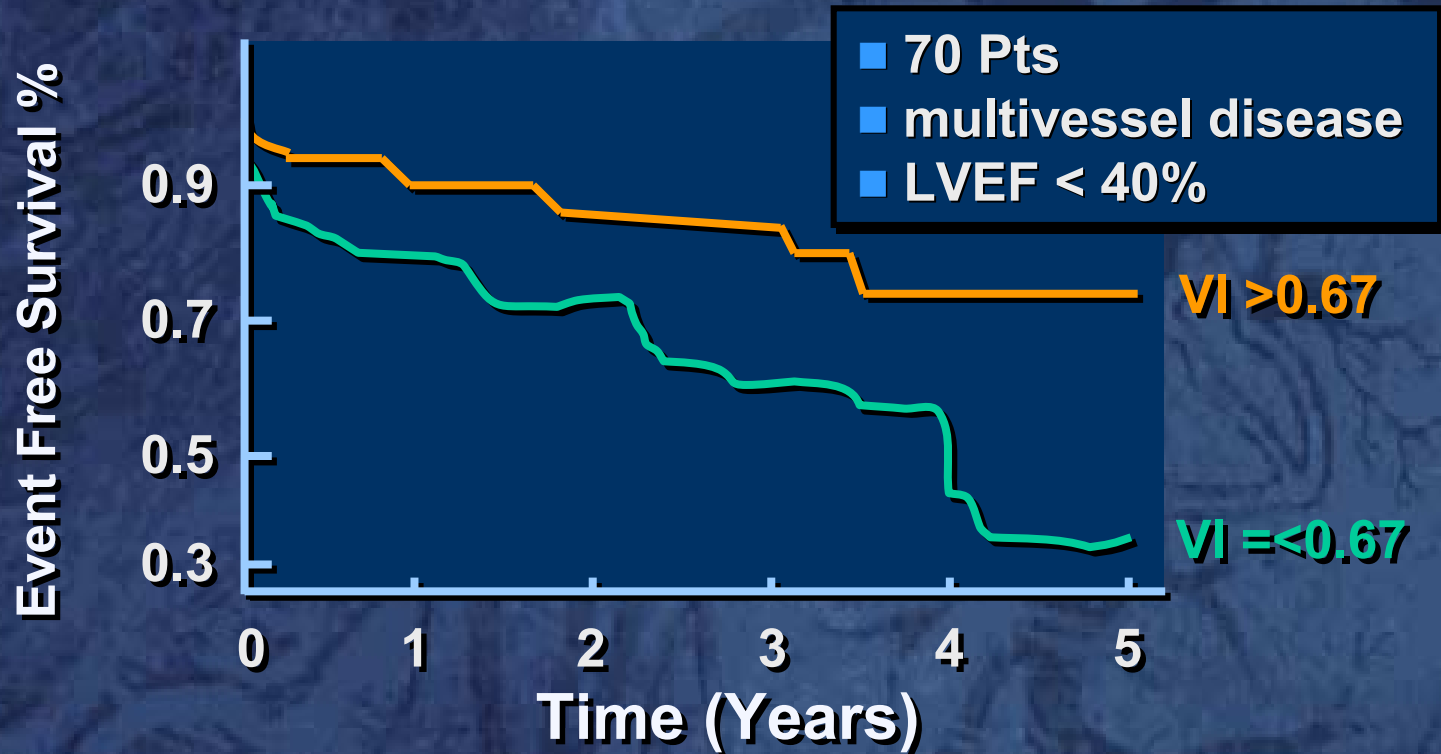
- **If reasonable LV symmetry**  
*2D-guided M-mode LV dimensions and wall thickness and derived FS%, volumes, EF and mass*
- **If not**  
*experienced qualitative assessment compares favorably with quantitative volumetric methods*

# Routine Echo Measures?

- **Single-beat load-insensitive indices**  
*that include non-invasive LV pressure and volume (eg PRSW) may become routine for global contractility assessment soon*
- **TDI / strain rate may add useful information to regional contractility assessment in some cases**

# Viability

## CABG outcome



Pre-op Thallium uptake in 15 segs  
0=no uptake, 1=50-75%, 2=75%

*Pagley et al Circulation:96 793, 1997*

# Role of Stress Echo

- Assessing ischemia/viability (DSE) if CAD established by angio
- Symptoms of failure with normal resting EF
- Contractile reserve in valve disease  
*timing surgical intervention*
- DD mild DCM vs “Athlete’s Heart”

# **Echo Tips**

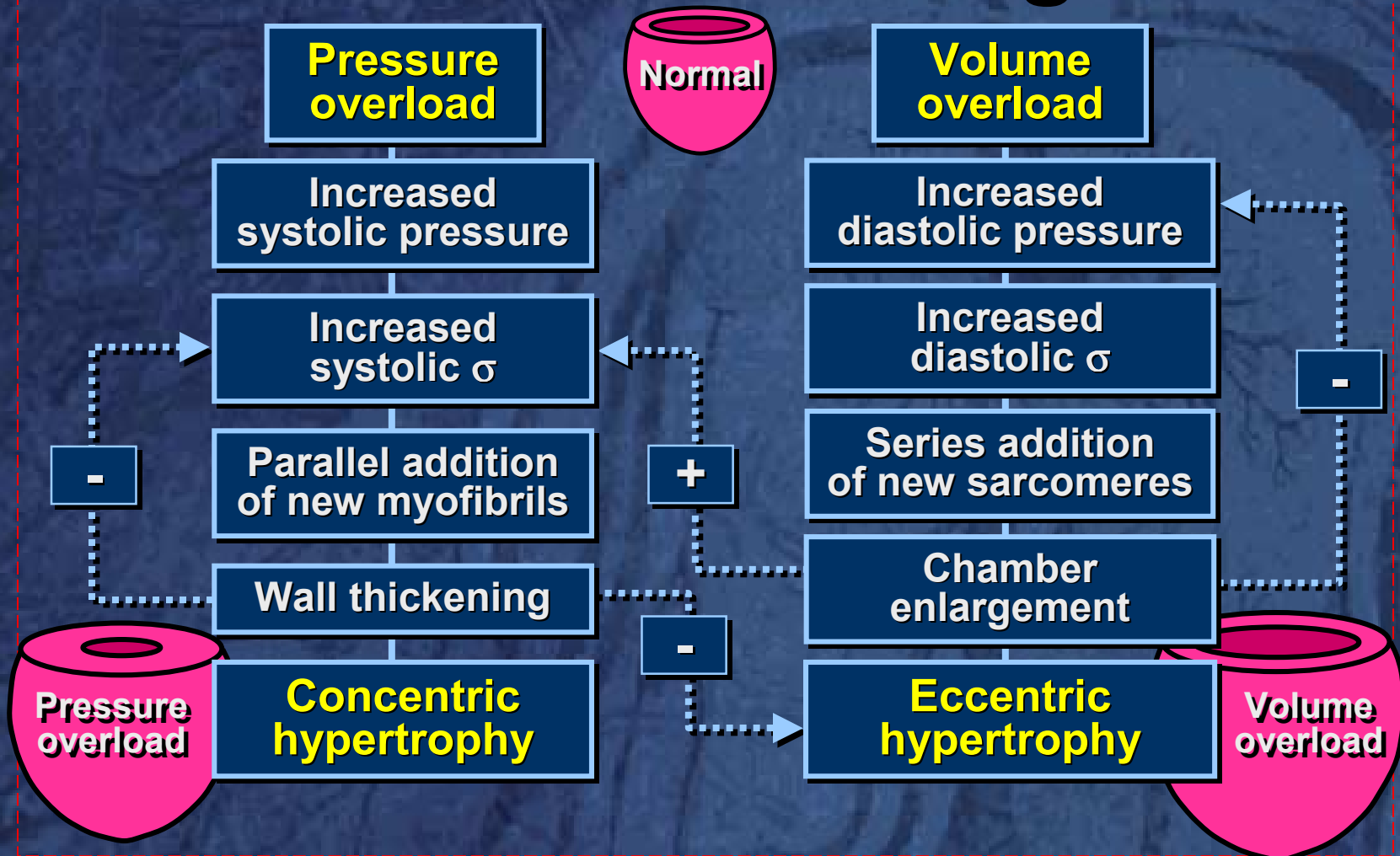
## ***Systolic dysfunction***

- **Normal RV size/contraction**  
*implies better prognosis in DCM*
- **Preserved LV mass/thickness**  
*implies better prognosis in DCM (eg mass/volume > 0.9)*
- **Beware of “functional” MR**  
*may be primary*  
*contributes to LV deterioration even when*  
*secondary*  
*may be reparable,*  
*masks severity of LV dysfunction*

# **Dilated Cardiomyopathy**

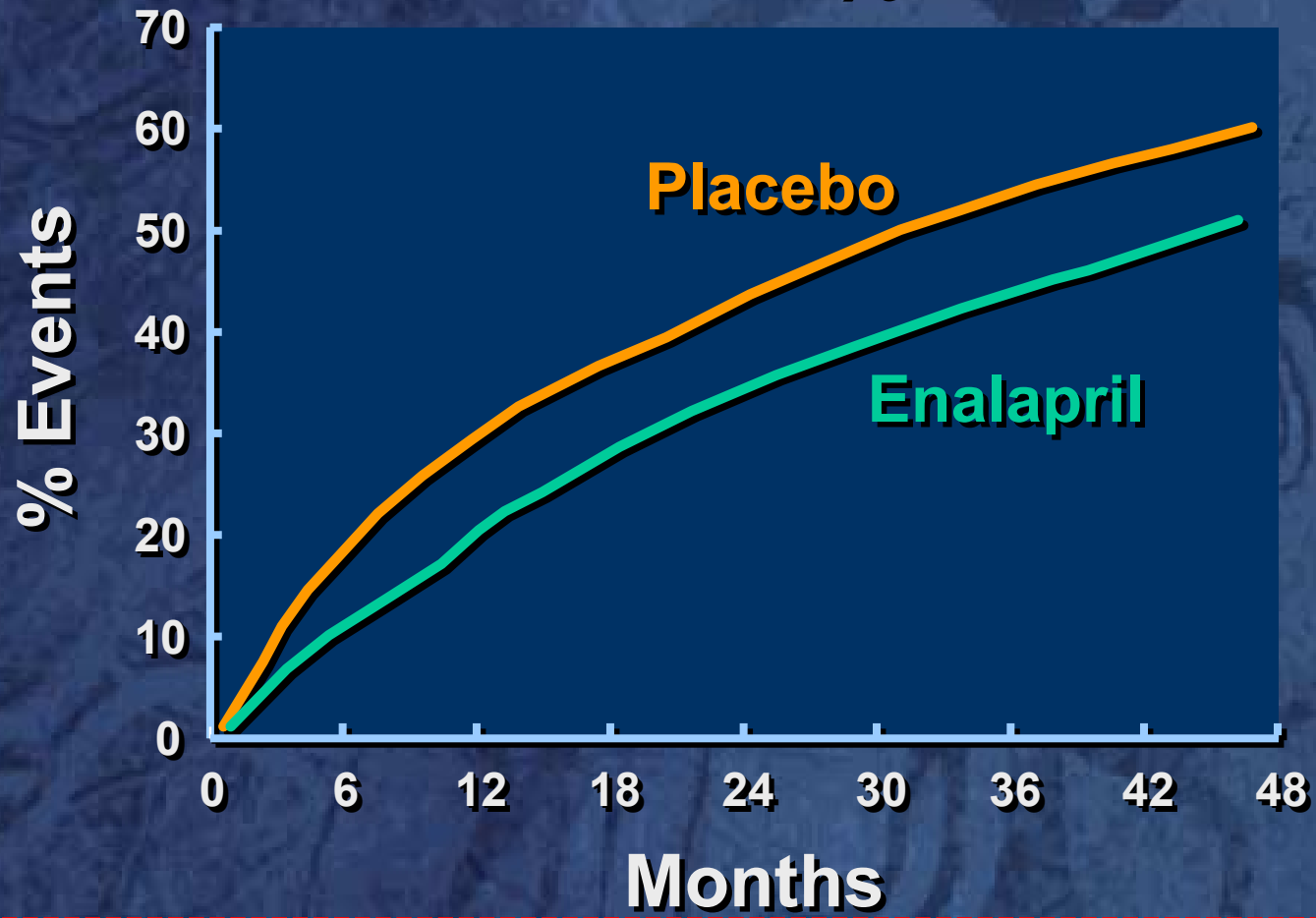
- **Idiopathic**
- **Alcohol/substance abuse**
- **Myocarditis**
- **Familial**
- **Peri-partum**
- **Others**

# LV Remodeling



# SOLVD Trial

*EF* < 35%



# Optional Slides

# Echo EF and LV Failure Treatment

## Echo volume with Furosemide or Captopril

