
# Primary vs Secondary Mitral Regurgitation: Tailoring Treatment to the Patient and Setting

**Robert O. Bonow, MD, MS**

**Northwestern University Feinberg School of Medicine**
**Bluhm Cardiovascular Institute**
**Northwestern Memorial Hospital**

**Editor-in-Chief, JAMA Cardiology**

No Relationships to Disclose

# Stages of Valvular Heart Disease

AMERICAN COLLEGE of CARDIOLOGY

American Heart Association.

| Stage | Definition |
|---|---|
| A | Risk of valve disease → RHD, MVP, HF, post MI |
| B | Mild - moderate asymptomatic disease |
| C | Severe valve disease but asymptomatic<br>C1: Normal LV function<br>C2: Depressed LV function |
| D | Severe, symptomatic valve disease |

# *Mitral regurgitation*

**Primary MR: primary valve disease**

**Degenerative**

**Secondary MR: primary myocardial disease**

**Functional**

## *Mitral regurgitation*

**Primary MR: primary valve disease**

**Secondary MR: primary myocardial disease**

# Mitral regurgitation

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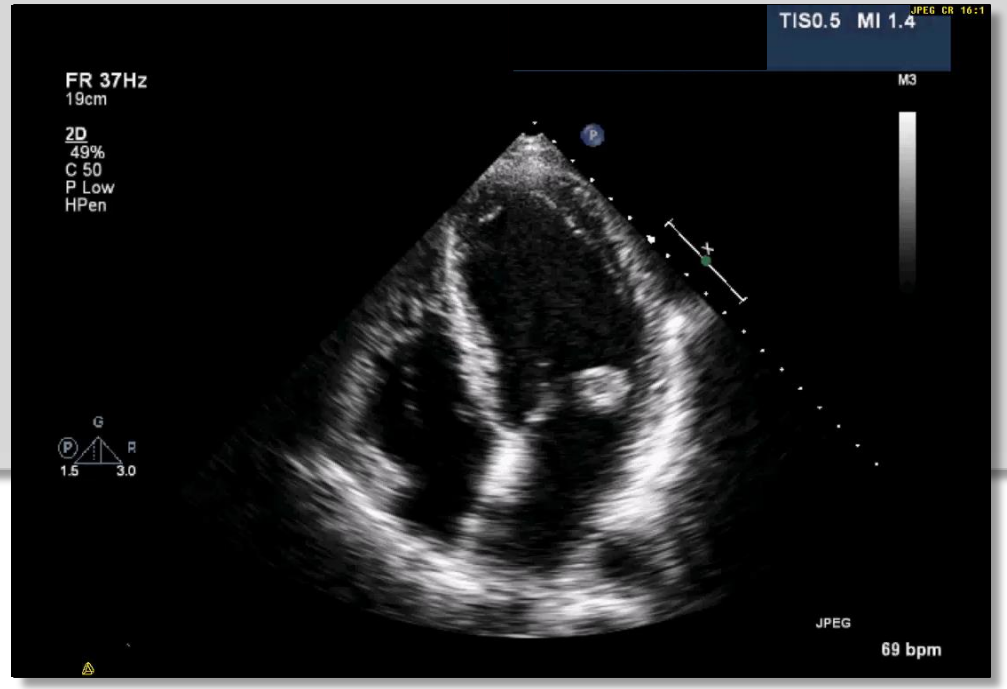
## Indications for mitral valve surgery for degenerative MR?

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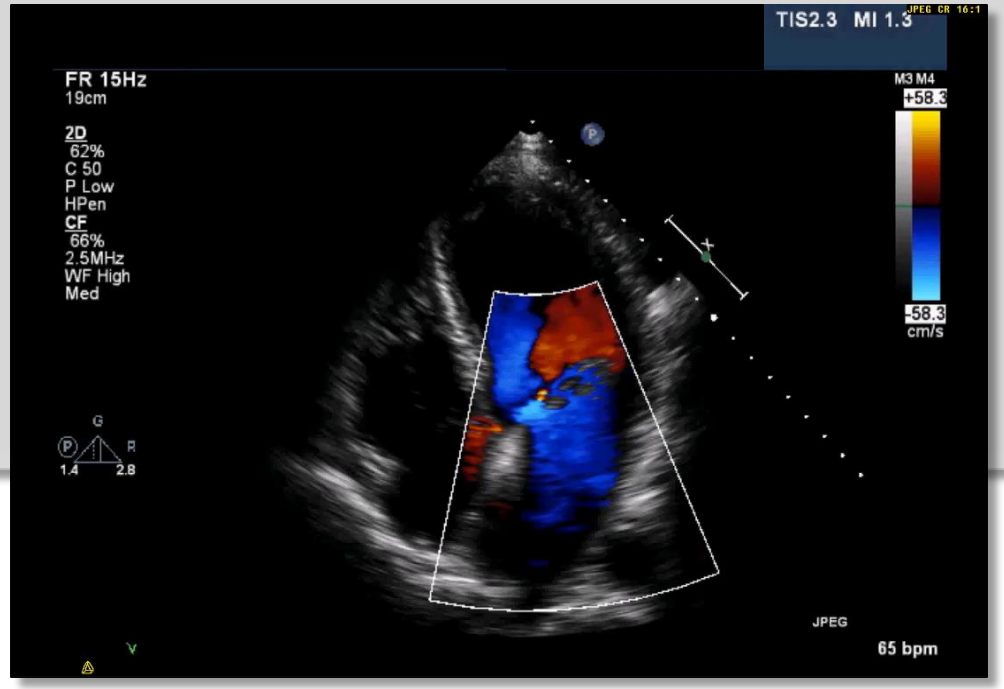


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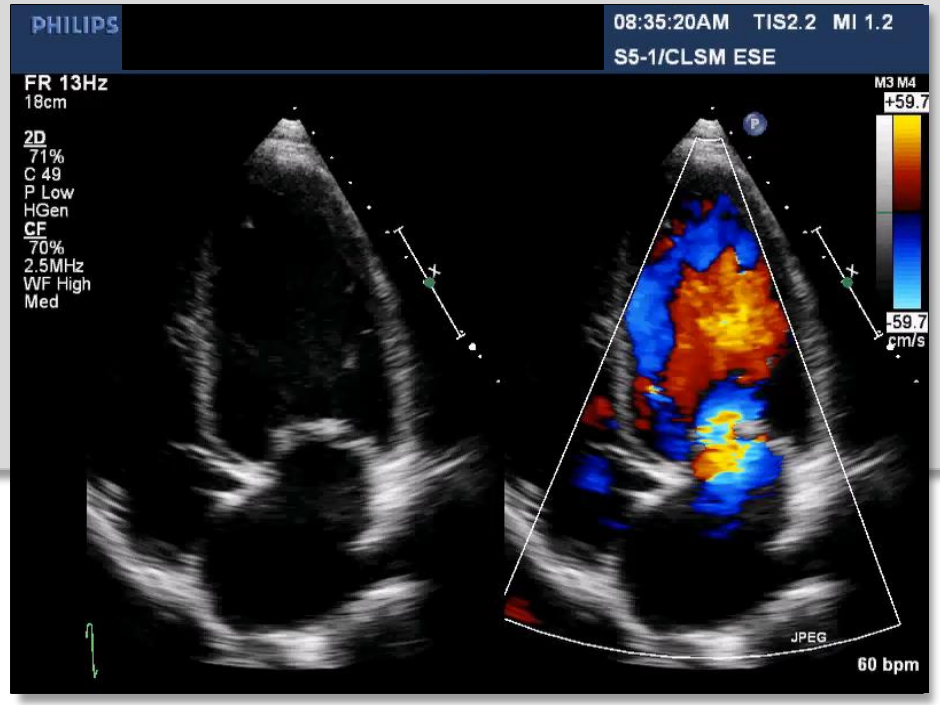


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## Indications for mitral valve surgery for degenerative MR?

- Symptomatic patients — **class I**

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## Indications for mitral valve surgery for degenerative MR?

- **Symptomatic patients** — **class I**
- **Asymptomatic patients** — **class I**
  - LV systolic dysfunction

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## Indications for mitral valve surgery for degenerative MR?

- **Symptomatic patients** — **class I**
- **Asymptomatic patients** — **class I**
  - LV systolic dysfunction
    - LVEF <60%

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## Indications for mitral valve surgery for degenerative MR?

- **Symptomatic patients** — **class I**
- **Asymptomatic patients** — **class I**
  - LV systolic dysfunction
    - LVEF <60%
    - LVSD >40mm

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## Indications for mitral valve surgery for degenerative MR?

- **Symptomatic patients** — **class I**
- **Asymptomatic patients** — **class I**
  - LV systolic dysfunction
  - Pulmonary hypertension — **class IIa**

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# *Mitral regurgitation*

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## Indications for mitral valve surgery for degenerative MR?

- **Symptomatic patients** — **class I**
- **Asymptomatic patients**
  - LV systolic dysfunction — **class I**
  - Pulmonary hypertension — **class IIa**

PASP >50 mmHg at rest

# Mitral regurgitation

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  - Atrial fibrillation

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  - ***Normal LV function, repair feasible?*** — **?**

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  - ***Normal LV function, repair feasible?*** — **?**

***MV repair to improve survival?***

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  - ***Normal LV function, repair feasible?*** — **?**

***MV repair to improve survival?***
***What is the natural history?***

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# *Mitral regurgitation*

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  - Pulmonary hypertension — **class IIa**
  - Atrial fibrillation — **class IIa**
  - ***Normal LV function, repair feasible?***

***Asymptomatic severe primary MR:***

**66% come to surgery in 5 years because of symptoms, LV dysfunction, pulmonary hypertension or AF**

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# *Mitral regurgitation*

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  - Pulmonary hypertension — **class IIa**
  - Atrial fibrillation — **class IIa**
  - ***Normal LV function, repair feasible?***

***Severe primary MR:***

**Long-term postoperative survival is worse if surgery is performed after patients become symptomatic**

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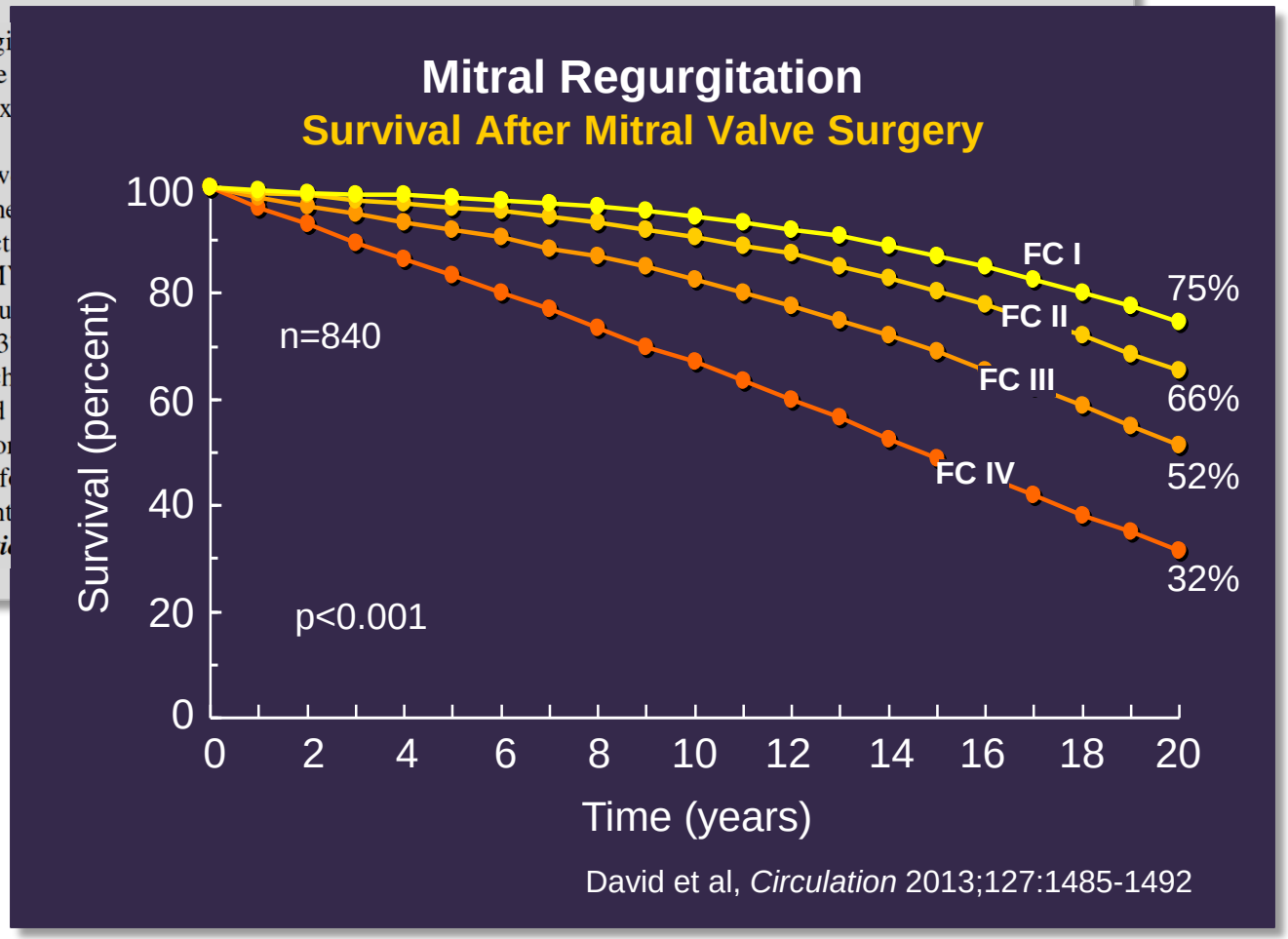
# Late Outcomes of Mitral Valve Repair for Mitral Regurgitation Due to Degenerative Disease

Tirone E. David, MD; Susan Armstrong, MSc; Brian W. McCrindle MD; Cedric Manlhiot, BSc

***Background***—The pathologi
(MR) is broad, and there
pathologies. This study ex
***Methods and Results***—All
were prospectively follow
of 10.4 years. Clinical, he
Age, left ventricular eject
multivariable analysis. M
patients had repeat MV su
severe MR developed in 3
degree of myxomatous ch
associated with increased
freedom from moderate o
***Conclusions***—MV repair f
rest and impaired left vent
recurrent MR. (*Circulati*




David et al, *Circulation* 2013;127:1485-1492

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# *Mitral regurgitation*

## Indications for MV repair for asymptomatic primary MR:

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American Heart Association.

- Chronic severe MR
- Preserved LV function
- Experienced surgical center
- Likelihood of durable repair without residual MR > 95%

**class IIa**

# Mitral regurgitation

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- Chronic severe MR
- Preserved LV function
- Experienced surgical center
- Likelihood of durable repair without residual MR > 95%

**class IIa**

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- Preserved LV function
- Likelihood of durable repair and low risk for surgery, ***and***
- LA dilatation >60 ml/m2

**-- *or* --**

Exercise PAP >60 mmHg

**class IIb**

# Mitral regurgitation

## Indications for MV repair for asymptomatic primary MR:

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American Heart Association.

- Chronic severe MR
- Preserved LV function
- Experienced surgical center
- Likelihood of durable repair without residual MR > 95%.

**class IIa**

!

- Repair better than mitral valve replacement
- Patients should be referred to centers experienced in repair

**class I**

**INTERVENTIONAL CARDIOLOGY AND SURGERY**

# Mitral repair best practice: proposed standards

B Bridgewater, T Hooper, C Munsch, S Hunter, U von Oppell, S Livesty, B Keogh, F Wells, M Patrick, J Kneeshaw, J Chambers, N Masani, S Ray

*Heart* 2006;92:939-944

***19 criteria for best practice:***

- Surgical training
- Intraoperative echocardiograph
- Volume thresholds
- Audit
- Cardiology and imaging

**Rigorous criteria**

**Surgeon: >25/yr**
**Hospital: >50/yr**

**Operative mortality <1%**
**5 year reoperation <5%**

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EDITORIAL COMMENT

# The Time Has Come to Define Centers of Excellence in Mitral Valve Repair

Robert O. Bonow, MD, MS, David H. Adams, MD

J Am Coll Cardiol 2016;67:499-501

**Centers of Excellence in Mitral Valve Repair**

***Criteria:***

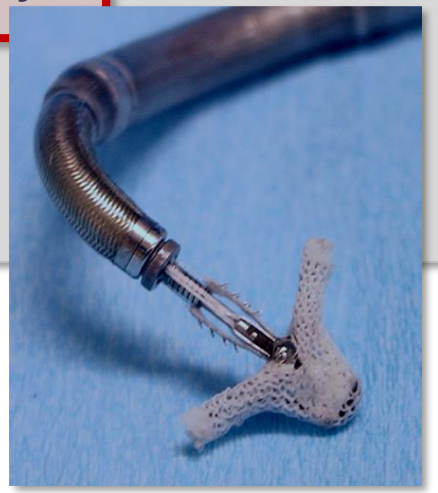
- **MV surgery volume requirement (center and surgeon)**
- **Expert periprocedural imaging capabilities**
- **Access to transcatheter technology**
- **Transparency regarding outcomes including: repair rates, mortality rates, stroke rates, repair durability**

# Mitral regurgitation

## Indications for transcatheter MV repair for severe degenerative MR:

- Chronic severe MR
- Severely symptomatic
- Prohibited surgical risk
- Reasonable life expectancy

**class IIb**



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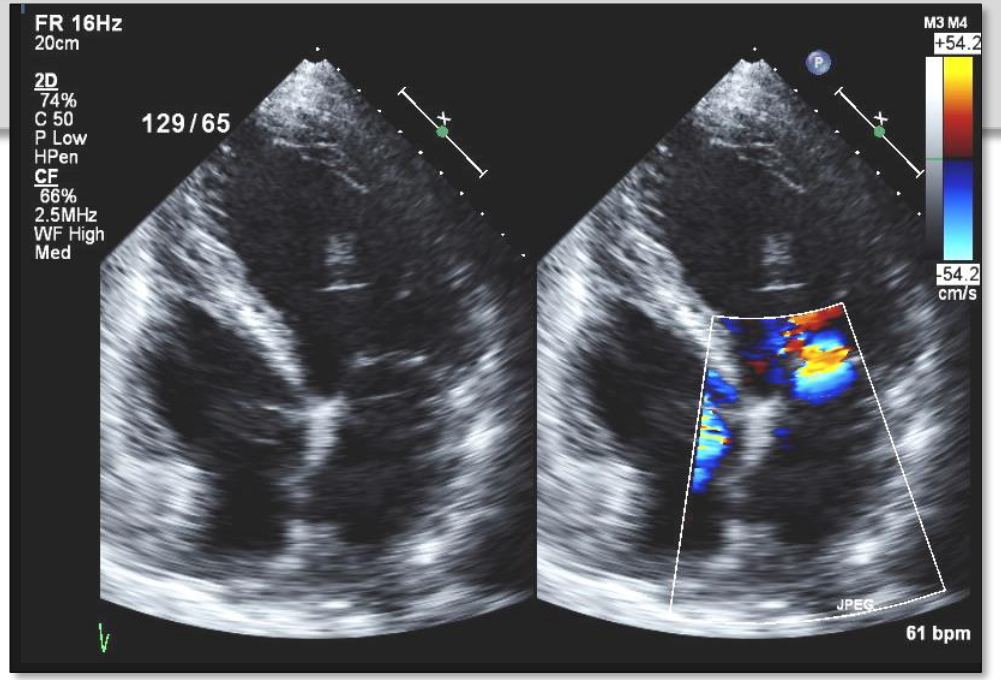
# *Mitral regurgitation*

Primary MR: primary valve disease

**Secondary MR: primary myocardial disease**

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## *Mitral regurgitation*

Primary MR: primary valve disease

**Secondary MR: primary myocardial disease**

- Diagnostic dilemmas
- Therapeutic dilemmas

# Imprecision in grading severity of secondary MR



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http://dx.doi.org/10.1016/j.jacc.2014.10.016

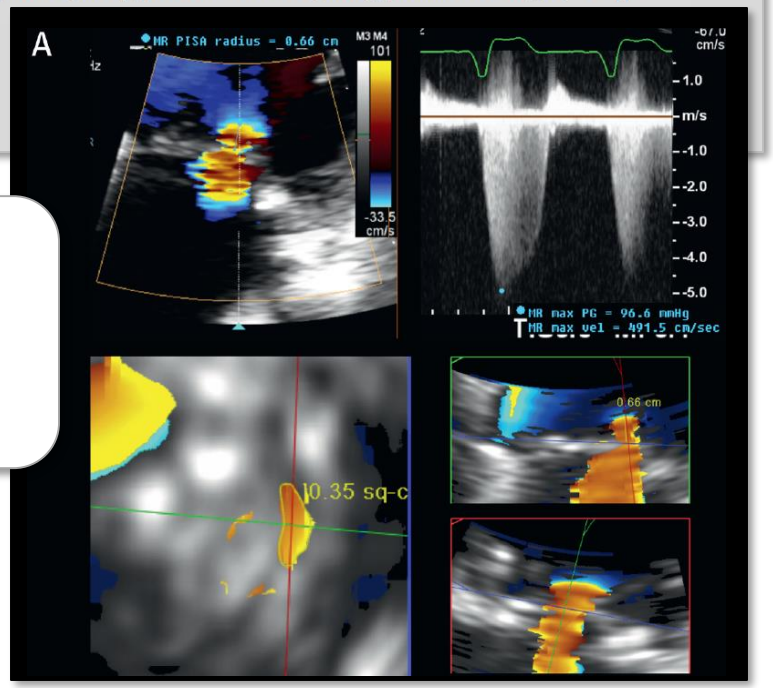
REVIEW TOPIC OF THE WEEK

## Defining "Severe" Secondary Mitral Regurgitation

### Emphasizing an Integrated Approach

Paul A. Grayburn, MD,*† Blasé Carabello, MD,‡ Judy Hung, MD,§ Linda D. Gillam, MD,‖ David Liang, MD,¶
Michael J. Mack, MD,# Patrick M. McCarthy, MD,** D. Craig Miller, MD,†† Alfredo Trento, MD,‡‡ Robert J. Siegel, MD‡‡

J Am Coll Cardiol 2014;54:2792-2801




**What is "severe" secondary MR?**

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**Secondary mitral regurgitation:**

**…a marker of a sicker LV**

**- or -**

**…a contributor to a sicker LV?**

**Secondary mitral regurgitation:**

**…a marker of a sicker LV**

**- or -**

**…a therapeutic target?**

**Functional mitral regurgitation can be repaired.**

**But should it be repaired?**

**Functional mitral regurgitation can be repaired.**

**But should it be repaired?**

***… or replaced?***

# *Secondary mitral regurgitation*

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**Guideline-directed medical therapy for heart failure, including CRT**

**class I**

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# *Secondary mitral regurgitation*





**Guideline-directed medical therapy for heart failure, including CRT** — **class I**

**Indications for mitral valve surgery:**

- **Patients with severe MR undergoing CABG or AVR** — **class IIa**

# Secondary mitral regurgitation





**Guideline-directed medical therapy for heart failure, including CRT** — **class I**

**Indications for mitral valve surgery:**

- **Patients with severe MR undergoing CABG or AVR** — **class IIa**
- **Severe MR, persistent symptoms despite optimal medical therapy, including CRT** — **class IIb**

# *Secondary mitral regurgitation*

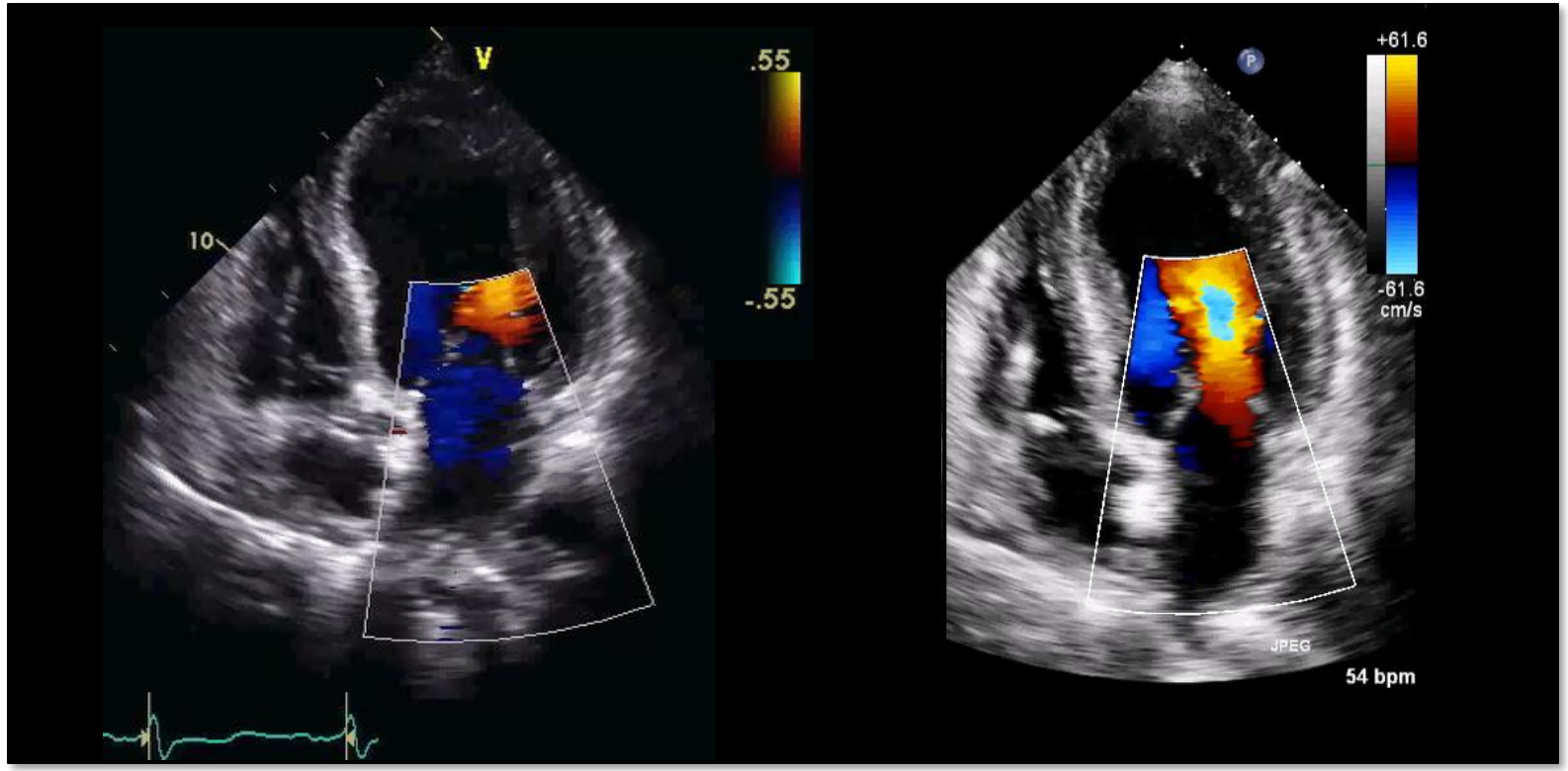




**Guideline-directed medical therapy for heart failure, including CRT** — **class I**

**Indications for mitral valve surgery:**

- **Patients with severe MR undergoing CABG or AVR** — **class IIa**
- **Severe MR, persistent symptoms despite optimal medical therapy, including CRT** — **class IIb**
- **Patients with moderate MR undergoing CABG or AVR** — **class IIb**




**Baseline**

**Optimized Medical Therapy and Biventricular Pacing**

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doi:10.1016/j.jacc.2011.06.061

FOCUS ISSUE: STRUCTURAL HEART DISEASE

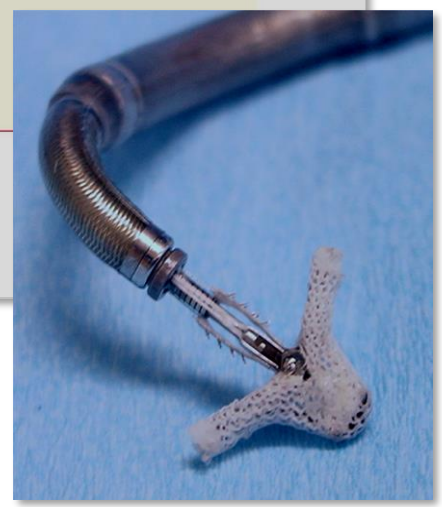
Clinical Research

# Correction of Mitral Regurgitation in Nonresponders to Cardiac Resynchronization Therapy by MitraClip Improves Symptoms and Promotes Reverse Remodeling

Angelo Auricchio, MD, PHD,* Wolfgang Schillinger, MD,† Sven Meyer, MD,‡
Francesco Maisano, MD,§ Rainer Hoffmann, MD,‖ Gian Paolo Ussia, MD,¶
Giovanni B. Pedrazzini, MD,* Jan van der Heyden, MD,# Simona Fratini, MD, PHD,**
Catherine Klersy, MD, MSC,†† Jan Komtebedde, DVM,* Olaf Franzen, MD,‡
on behalf of the PERMIT-CARE Investigators

*Lugano, Switzerland; Göttingen, Hamburg, and Aachen, Germany;*
*Milan, Catania, L'Aquila, and Pavia, Italy; and Nieuwegein, the Netherlands*

J Am Coll Cardiol 2011;58:2183–9



# *Secondary mitral regurgitation*

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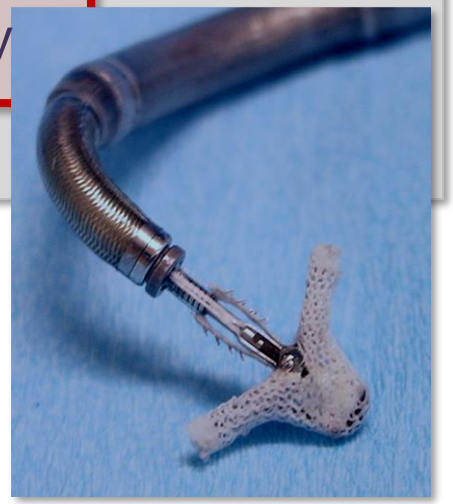
- Reasonable life expectancy

**class IIb**



# Prevalence of MR in Patients with LV Dysfunction

| | | N | Prevalence MR |
|---|---|---|---|
| Yiu et al | *Circulation* 2000 | 128 | 63% |
| Grigioni et al | *Circulation* 2001 | 303 | 64% |
| Koelling et al | *Am Heart J* 2002 | 1436 | 49% * |
| Trichon et al | *Am J Cardiol* 2003 | 2057 | 56% |
| Robbins et al | *Am J Cardiol* 2003 | 221 | 59% |
| Cleland et al | *N Engl J Med* 2004 | 605 | 50% * |
| Grayburn et al | *J Am Coll Cardiol* 2005 | 336 | 77% |
| Bursi et al | *Circulation* 2005 | 303 | 50% |
| Acker et al | *J Thorac CV Surg* 2006 | 300 | 66% |
| Di Mauro et al | *Ann Thorac Surg* 2006 | 239 | 75% |
| Rossi et al | *Heart* 2011 | 1300 | 74% |
| Deja et al | *Circulation* 2012 | 599 | 63% |
| Onishi et al | *Circ Heart Fail* 2013 | 277 | 48% * |

*Patients with moderate to severe MR

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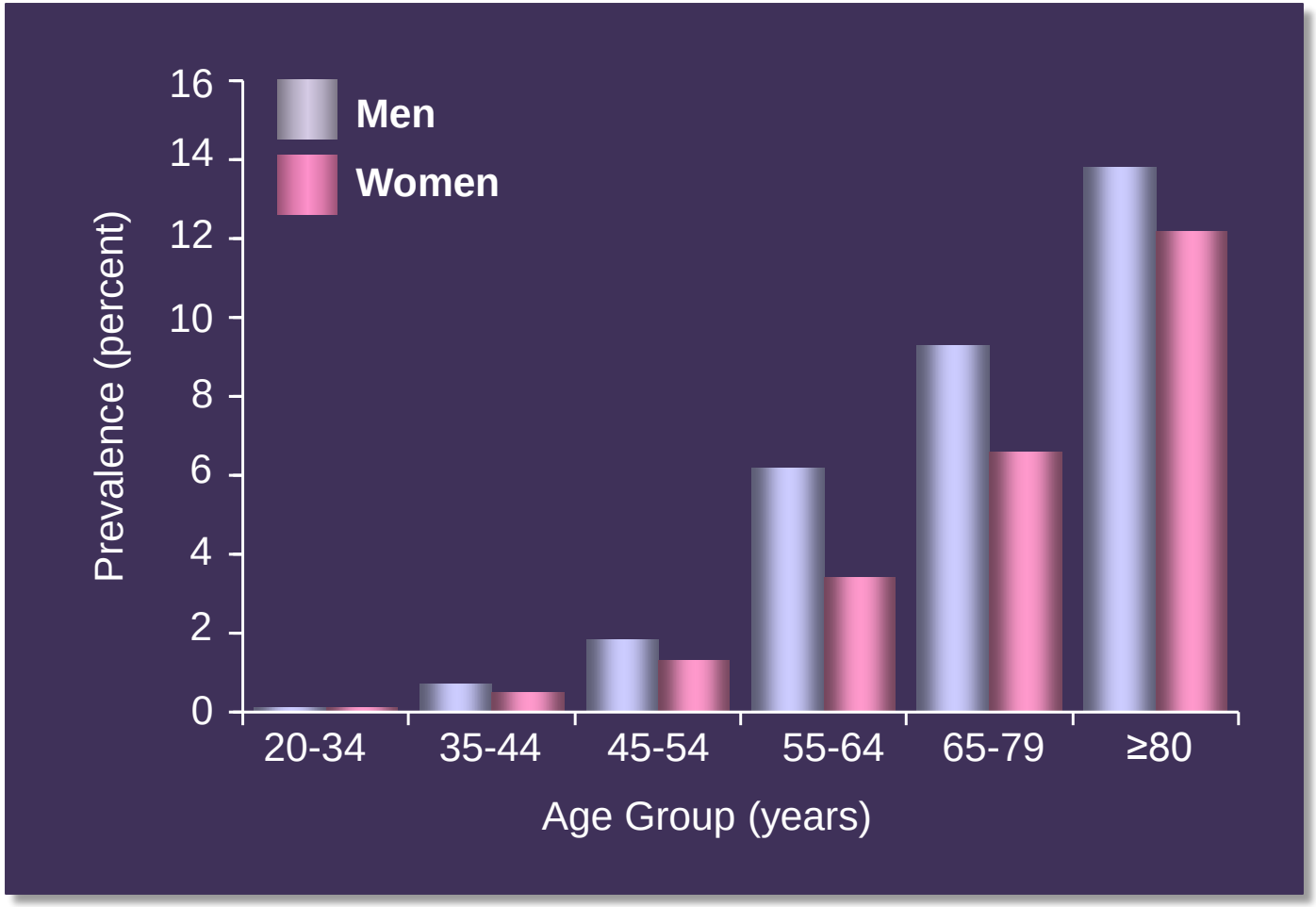
# Prevalence of Heart Failure

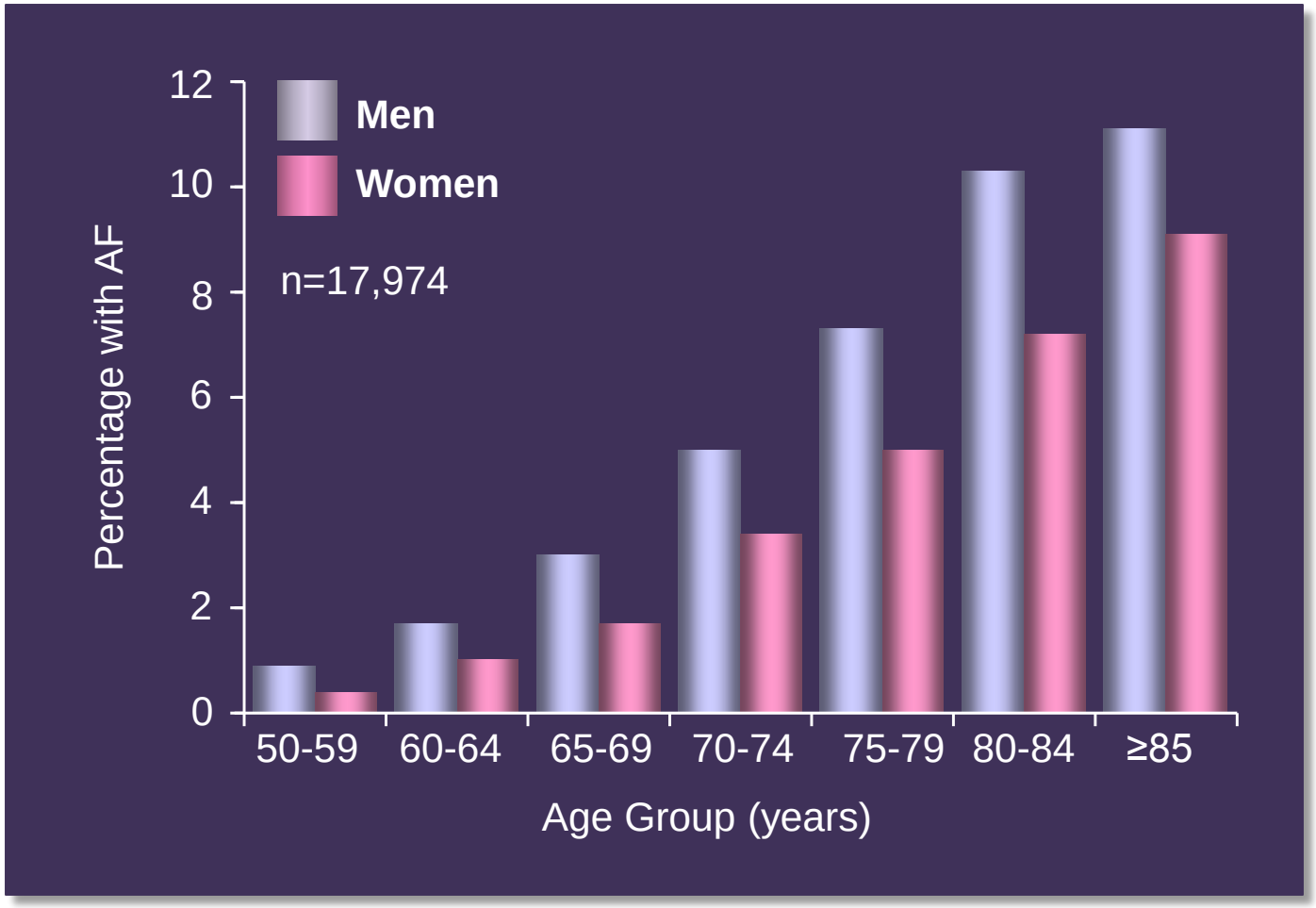
## United States




*Source: NHANES, CDC, and American Heart Association*

# Prevalence of Atrial Fibrillation

## The ATRIA Study

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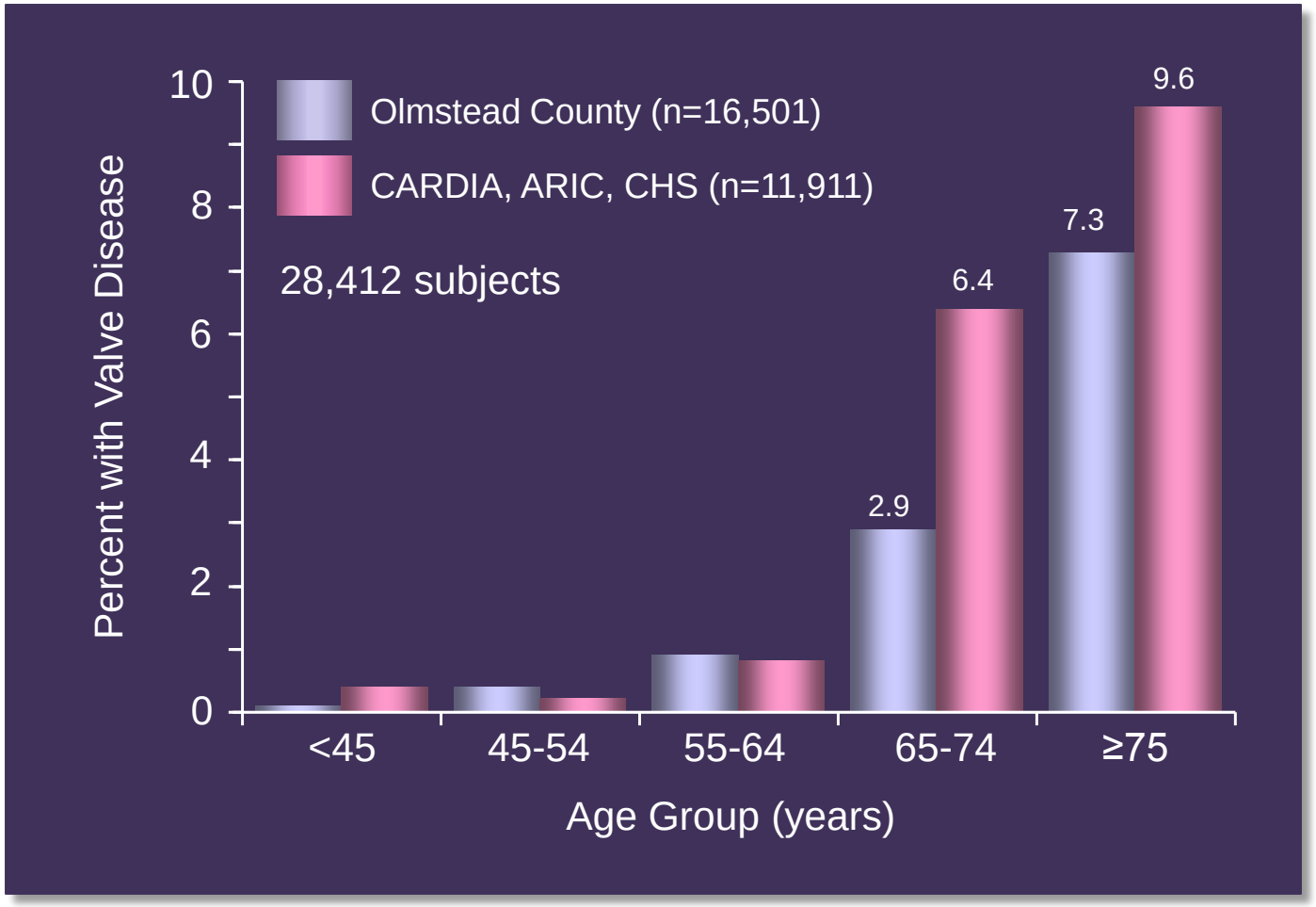
Go et al, *JAMA* 2001;285:2370-2375

# Prevalence of Mitral Valve Disease




Nkomo et al, *Lancet* 2006;368:1005-1011