

The Changing Epidemiology of Valvular Heart Disease: Implications for Interventional Treatment Alternatives

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TVT Epidemiology

Roadmap for this lecture

- What is the ***prevalence of moderate/severe valvular heart disease***, now and in the future? ...changing epidemiology?
- Is there an ***“unmet clinical need”*** in patients with moderate/severe valvular heart, such that ***interventional therapies (if successful) can expand the treatment armamentarium*** beyond medical Rx and surgery?



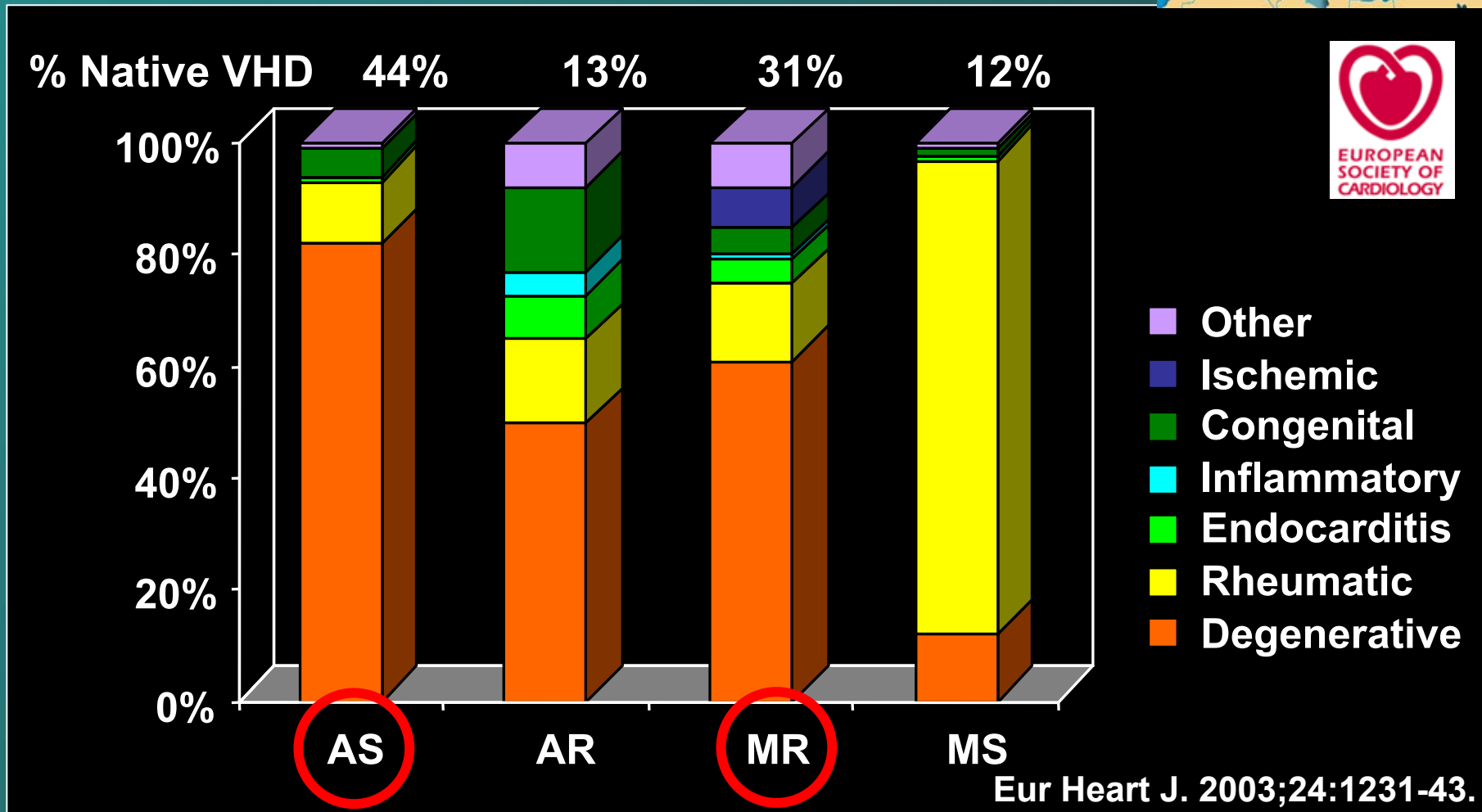
Euro Heart Survey on Valvular Heart Disease



- 92 hospitals from 25 countries
- 5,001 patients enrolled from April-July, 2001

Euro Heart Survey on VHD

Single Native Valve Disease



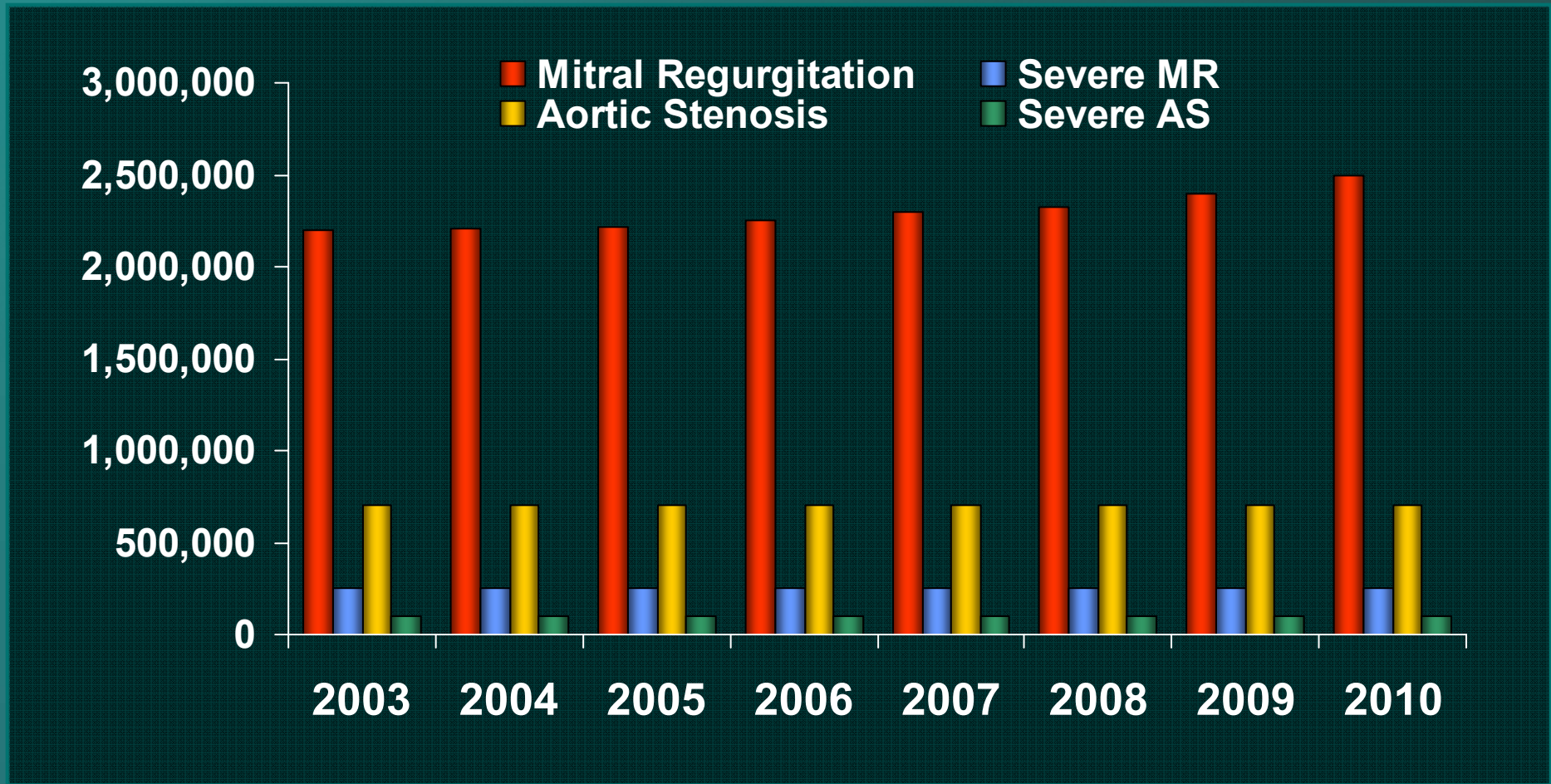
Euro Heart VHD Survey

30-Day Surgical Mortality

	STS 2001	UKCSR 99-2000	<i>EHS</i> 2001
Aortic valve replacement no CABG	3.7	3.1	2.7
Aortic valve replacement + CABG	6.3	7	4.3
Mitral valve repair no CABG	2.2	2.8	0
Mitral valve replacement no CABG	5.8	6.2	1.7
Mitral valve repair or replacement + CABG	10.1	8.6	8.2
Multiple valve replacement (with or without CABG)	7.2	11.4	6.5

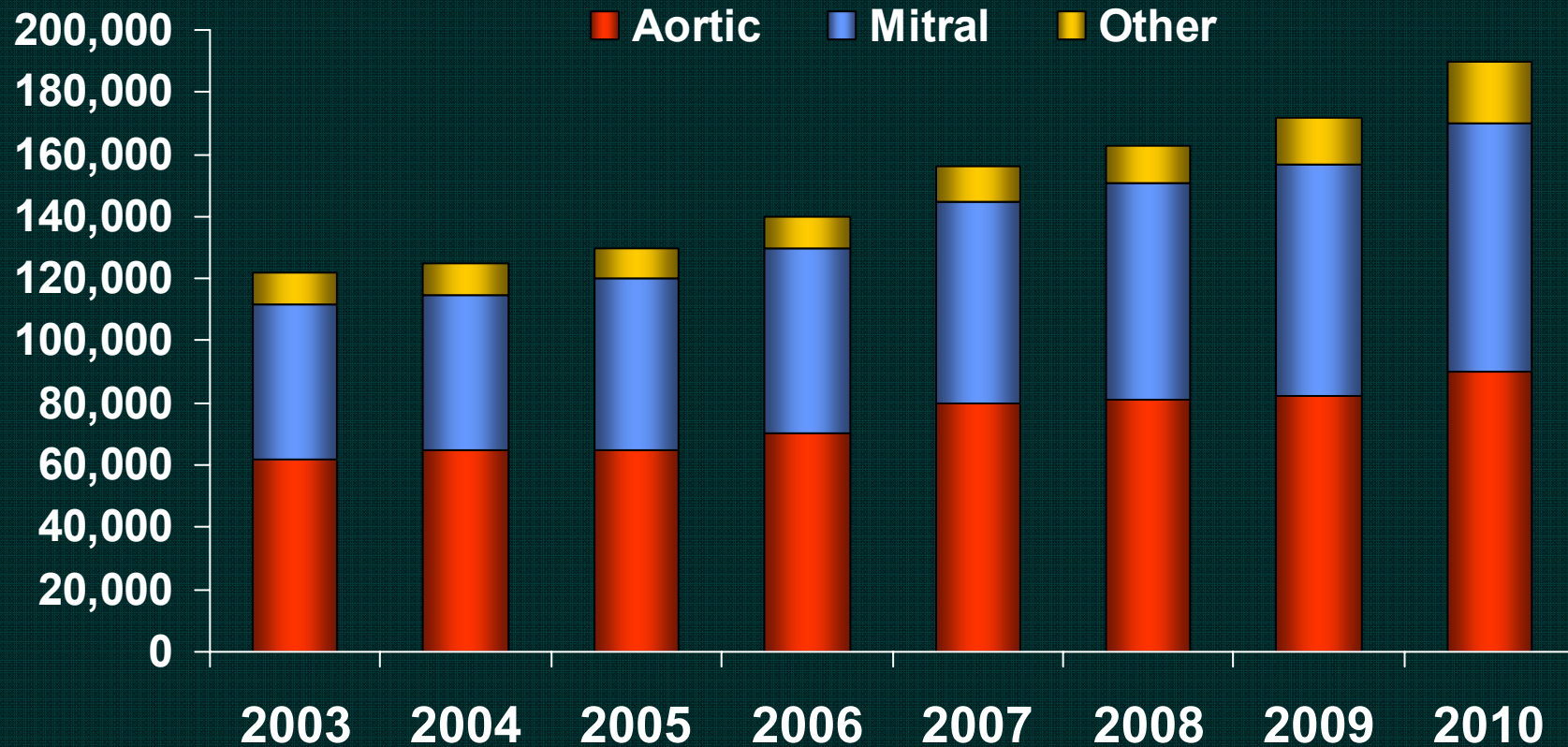


Prevalence of Valvular Heart Diseases 2003-2010

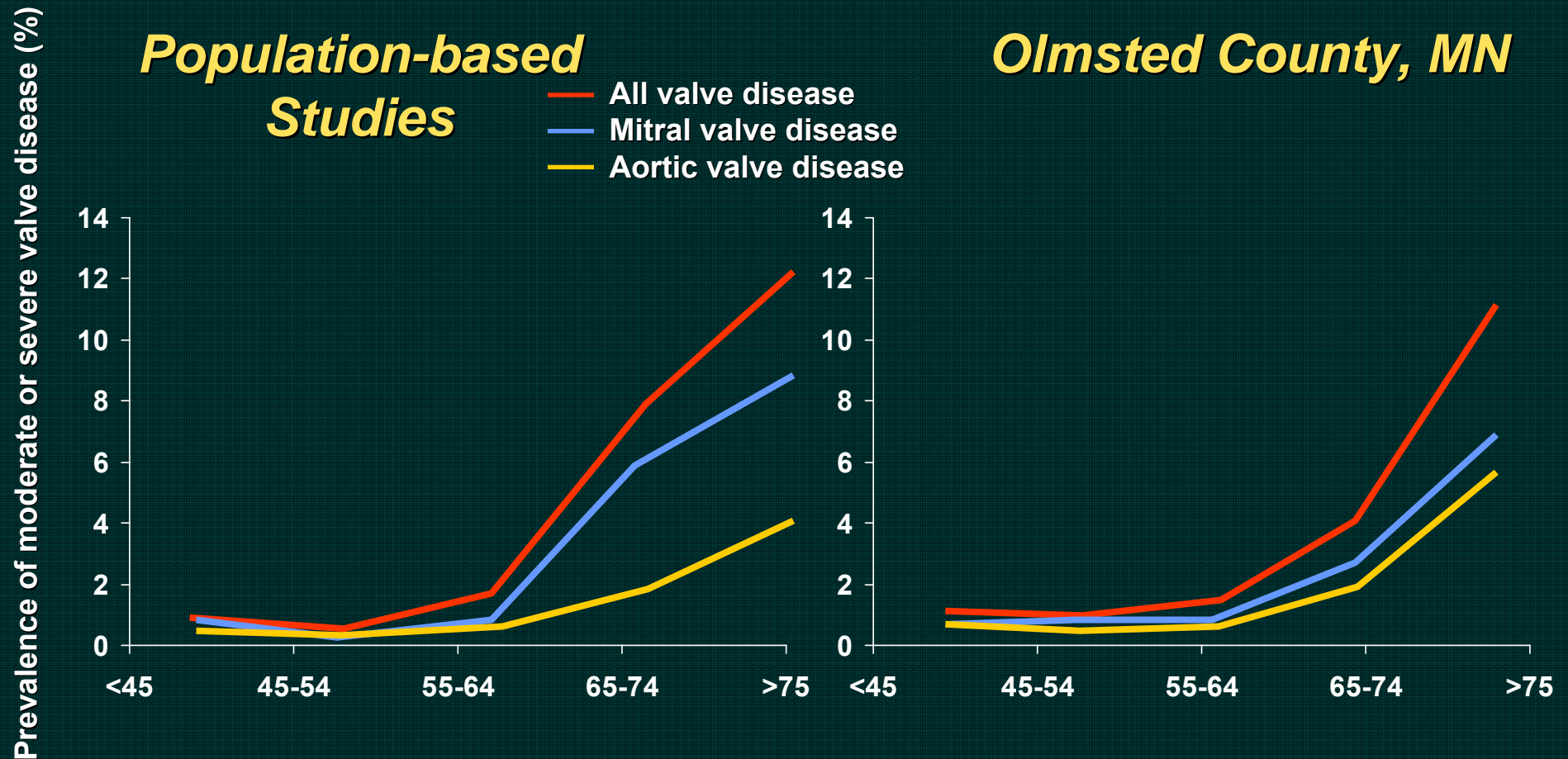


Note: CAGR is for 2004-2010;
Source: Health Research International

Valve Procedures by Location 2003-2010

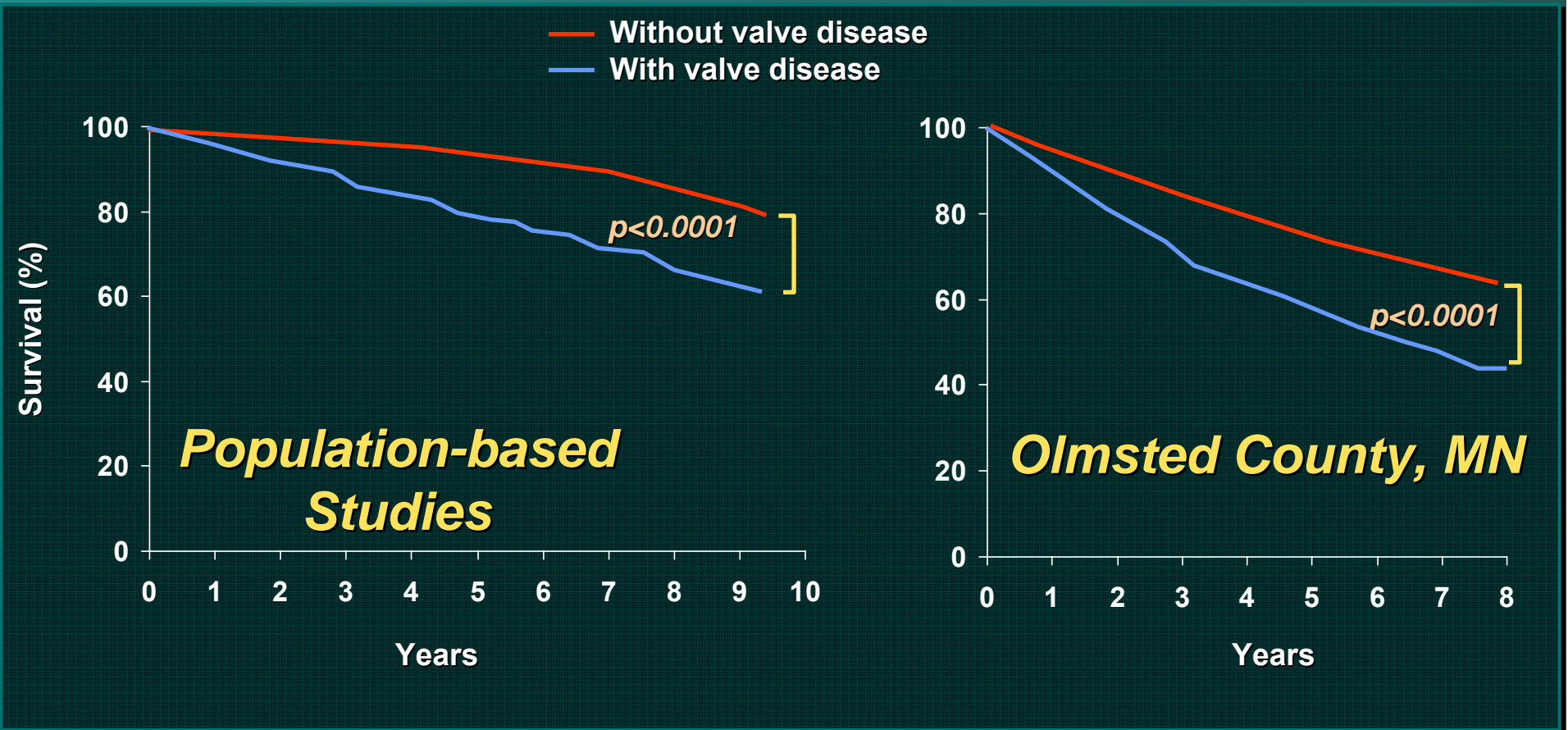


Increasing Prevalence of Valvular Heart Disease in the Elderly



Nkomo VT et al. Lancet 2006;368:1005-1011

Survival After Detection of Moderate or Severe Valvular Heart Disease



Nkomo VT et al. Lancet 2006;368:1005-1011

The Potential Population of AS Pts Requiring Treatment

	2004 Population	AS Prevalence	Severe AS	Severe AS 50% with Sx
18-44	125,841,694	0.10%	41,947	20,974
45-54	41,618,805	0.20%	27,746	13,873
55-64	29,078,924	0.60%	58,158	29,079
65-74	18,463,472	1.40%	86,163	43,081
>75	17,830,513	4.60%	273,401	136,701
Total	232,833,408	—	487,415	243,708

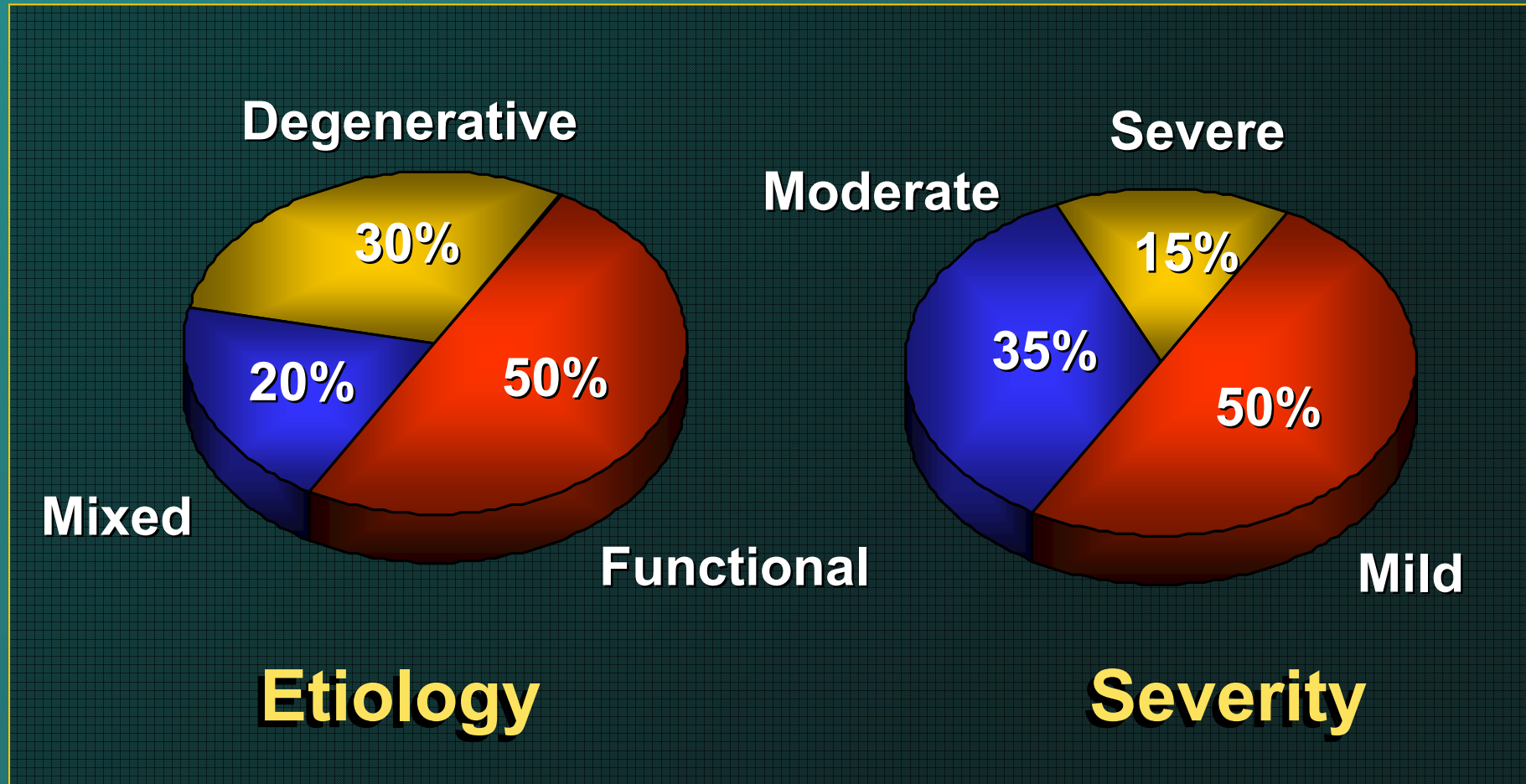
Based upon the Olmsted County AS prevalence data and US population statistics, the potential AS treatment cohort could exceed 250,000 patients!



Projected AVR Procedures (US)



MR Demographics: Disease Etiology and Severity

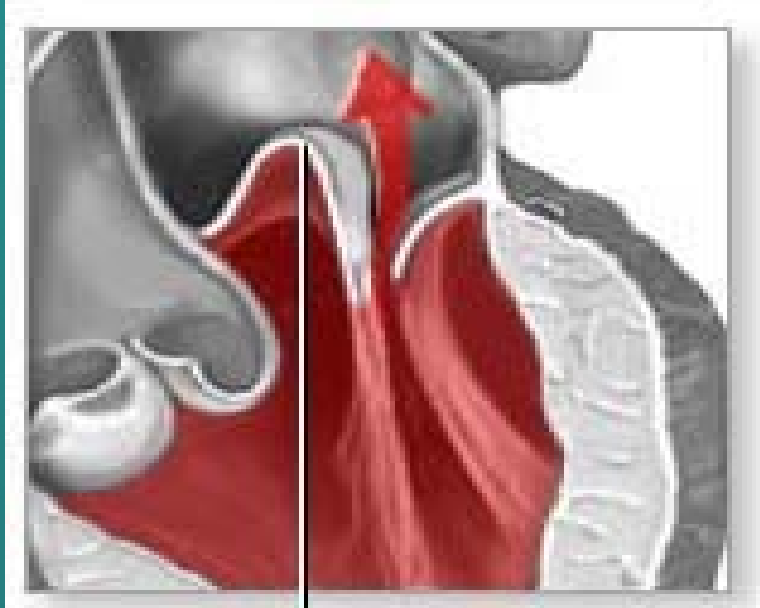


The presence of moderate or severe ***Mitral Regurgitation*** is an independent predictor of poor peri-procedural and late clinical outcomes!!!

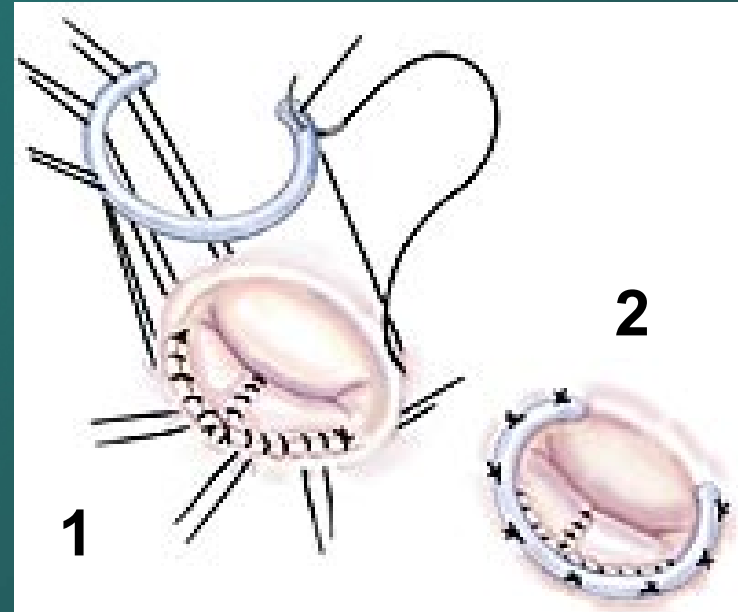
In every patient population studied...

- Pts with CHF
- Pts with CAD
- Pts undergoing PCI
- Pts undergoing CABG

Degenerative Mitral Valve Disease



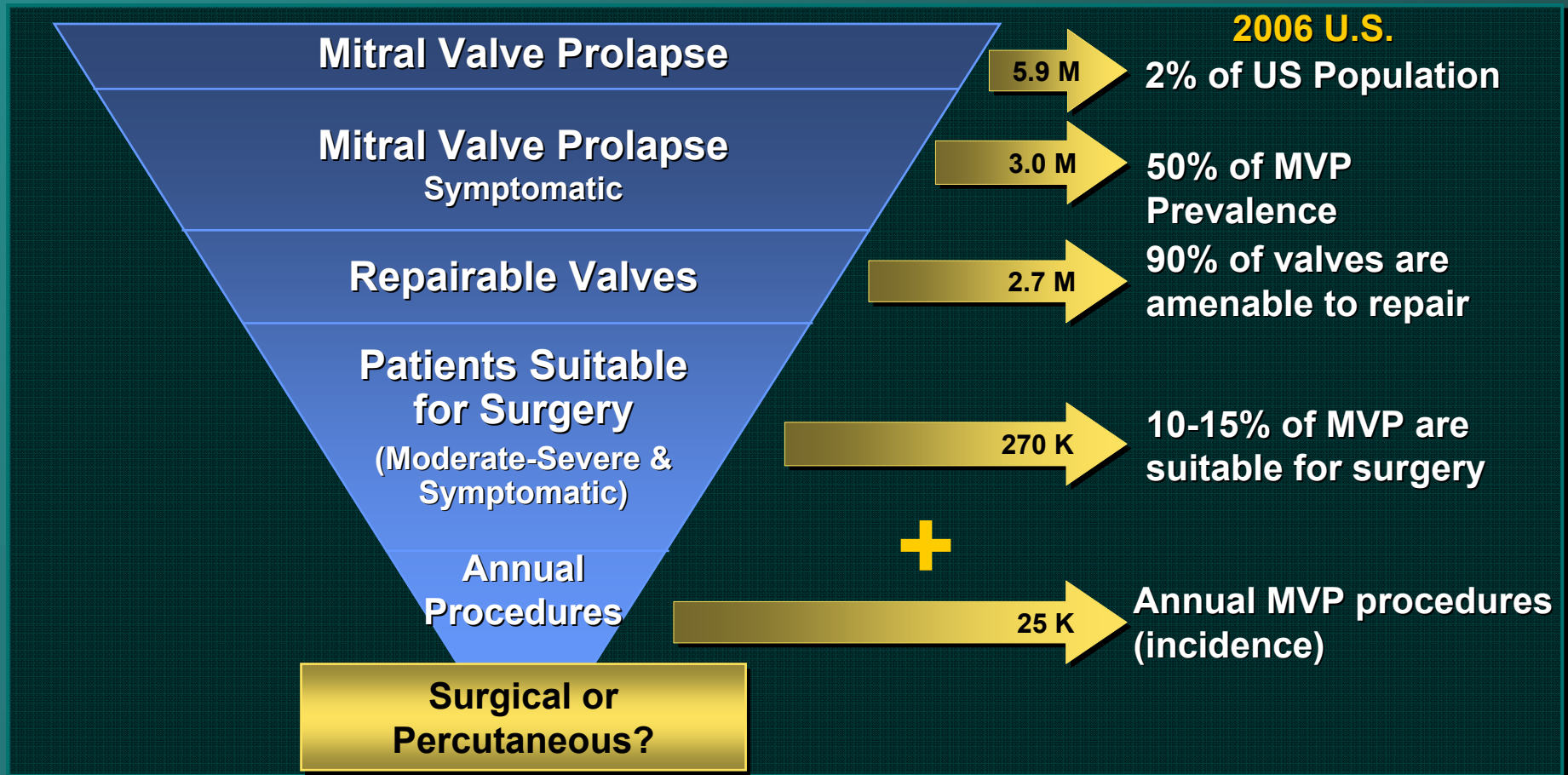
Mis-aligned and thickened leaflets allows backflow of blood into the left atrium



**Surgical Leaflet Repair:
Excellent Outcomes
Limited to Centers of
Excellence**

Patients are typically referred for surgery when MR grade reaches 3-4+, the ventricle size has increased, functional status has been impaired and they have an acceptable surgical risk.

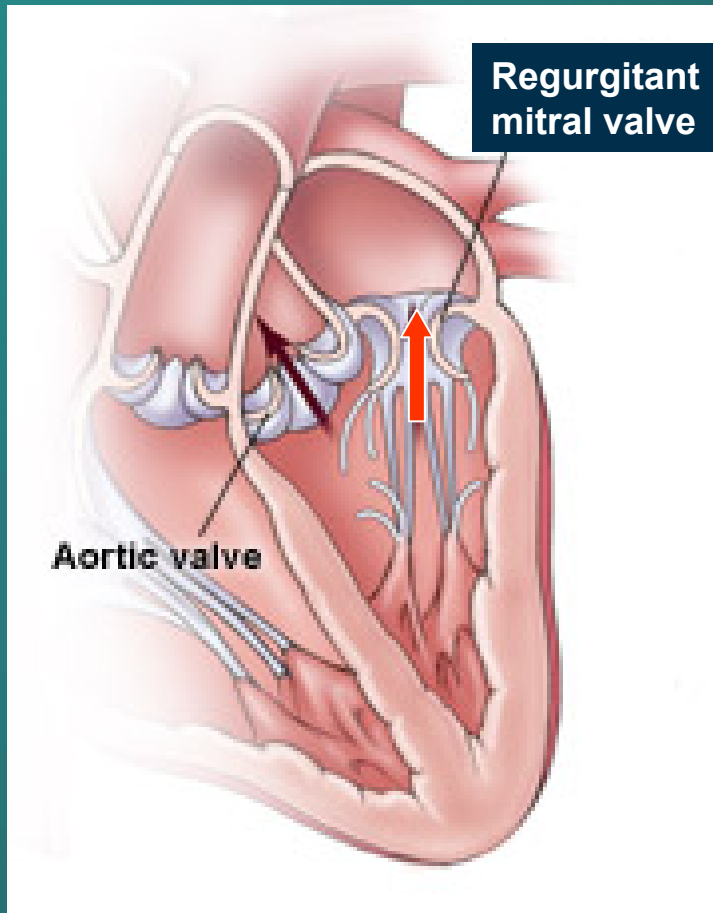
Degenerative Mitral Valve Disease *? an underserved population*



Would a lesser-invasive transcatheter approach make a difference?

Functional Mitral Valve Disease

MR caused by ischemic disease or cardiomyopathy



“MR begets MR”

Enlargement of the left ventricle leads to dilation of the mitral annulus and MR

Left atrial enlargement



Left ventricular dysfunction



Reduced efficiency of the heart

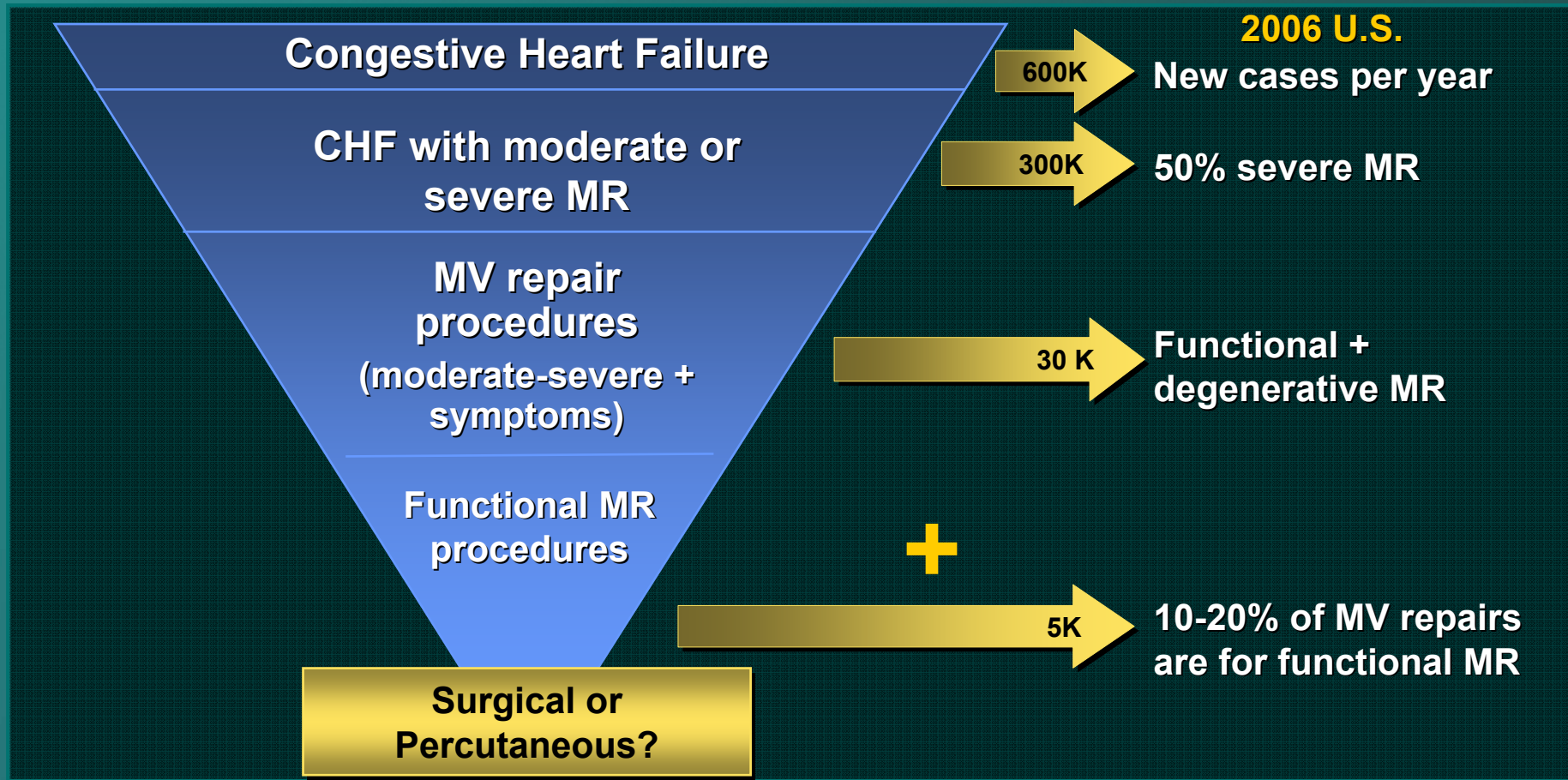


Increase in ventricle size

Patients are generally not considered for surgery and maintained on medical therapy for control of symptoms

Functional MR

? *the tip of the iceberg*



Would a lesser-invasive transcatheter approach make a difference?

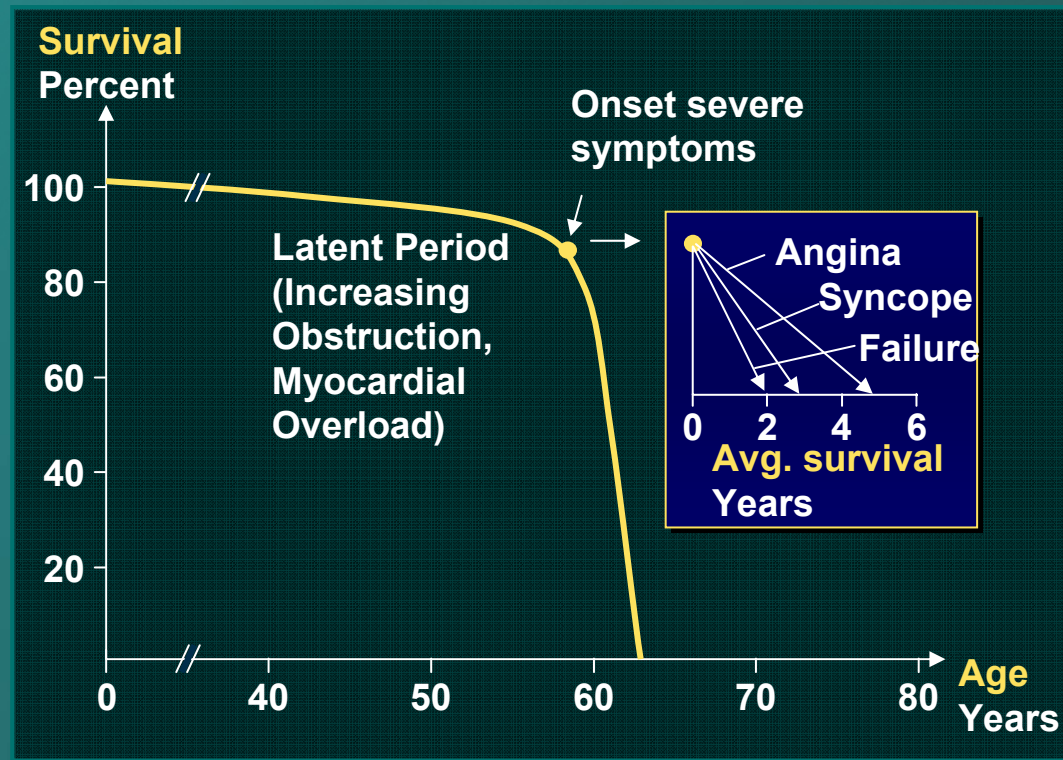
TVT Epidemiology

**Is there really a large
pool of patients with
mod/severe VHD who
are “untreated”?**



Severely Symptomatic Patients Require Urgent Attention

Valvular Aortic Stenosis In Adults (Average Course)



**“Surgical
intervention
should be
performed
promptly
once even
... minor
symptoms
occur”**

Sources: Ross J Jr, Braunwald E. Aortic stenosis. *Circulation* 1968;38 (Suppl 1)
C.M. Otto. Valve Disease: Timing of Aortic Valve Surgery. *Heart* 2000.

Do patients with valvular heart disease receive treatment according to established guidelines?



ELSEVIER

A prospective survey of patients with valvular heart disease in Europe: The Euro Heart Survey on Valvular Heart Disease

31.8% did not undergo intervention, despite NYHA class III/IV symptoms

lung^{a*}, Gabriel Baron^b, Eric G. Butchart^c, François Delahaye^d,
Hilke-Bärwolf^e, Olaf W. Levang^f, Pilar Tornos^g,
Vanoverschelde^h, Frank Vermeerⁱ, Eric Boersma^j,
Lavaud^b, Alec Vahanian^a

Aims To identify the characteristics, treatment, and outcomes of contemporary patients with valvular heart disease (VHD) in Europe, and to examine adherence to guidelines.
Methods and results The Euro Heart Survey on VHD was conducted from April to July 2001 in 92 centres from 25 countries; it included prospectively 5001 adults with moderate to severe native VHD, infective endocarditis, or previous valve intervention. VHD was native in 71.9% of patients and 28.1% had had a previous intervention. Mean age was 64±14 years. Degenerative aetiologies were the most frequent in aortic VHD and mitral regurgitation while most cases of mitral stenosis were of rheumatic origin.

Coronary angiography was used in 85.2% of patients before intervention. Of the 1269 patients who underwent intervention, prosthetic replacement was performed in 99.0% of aortic VHD, percutaneous dilatation in 33.9% of mitral stenosis, and valve repair in 46.5% of mitral regurgitation; 31.7% of patients had ≥1 associated procedure. Of patients with severe, symptomatic, single VHD, 31.8% did not undergo intervention, most frequently because of comorbidities. In asymptomatic patients, accordance with guidelines ranged between 66.0 and 78.5%. Operative mortality was <5% for single VHD.
Conclusions This survey provides unique contemporary data on characteristics and management of patients with VHD. Adherence to guidelines is globally satisfying as regards investigations and interventions.

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Euro Heart Survey: Factors Associated with the Absence of Intervention

- Multivariate Analysis -

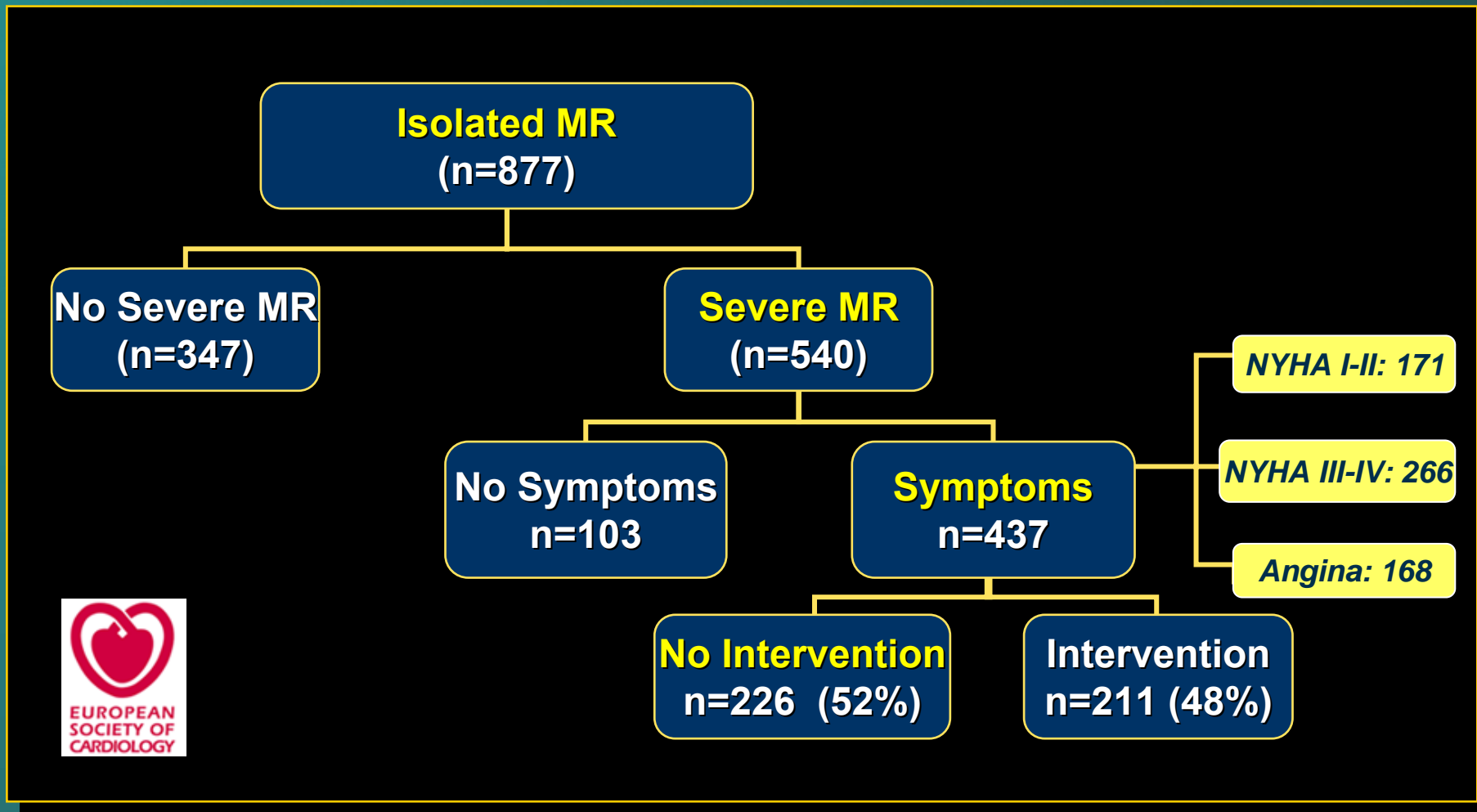


	χ^2	p	OR [95% CI]
Age >70 years	26.0	0.0001	3.4 [2.1-5.5]
LVEF <60%	14.1	0.0002	2.5 [1.6-4.2]
CHF at admission	11.6	0.0007	2.8 [1.6-5.1]
NYHA class I-II vs. III-IV	6.4	0.01	2.2 [1.2-3.9]
>1 comorbidity	6.2	0.01	1.8 [1.1-3.0]

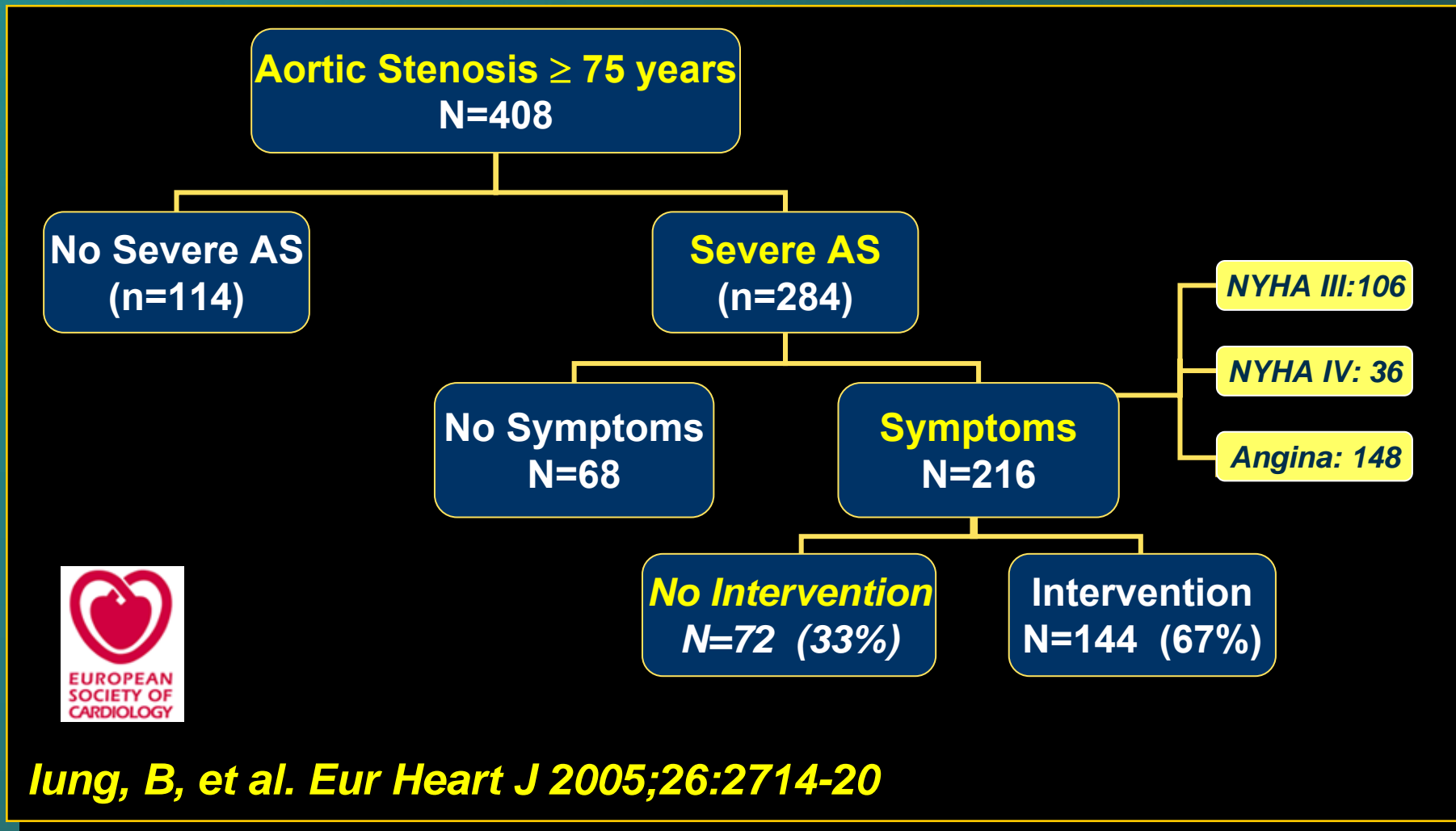
Hosmer-Lemeshow Goodness-of-fit $\chi^2=3.2$ (df=8), p=0.92. c-index: 0.75

Eur Heart J. 2003;24:1231-43.

Euro Heart Survey Symptomatic MR

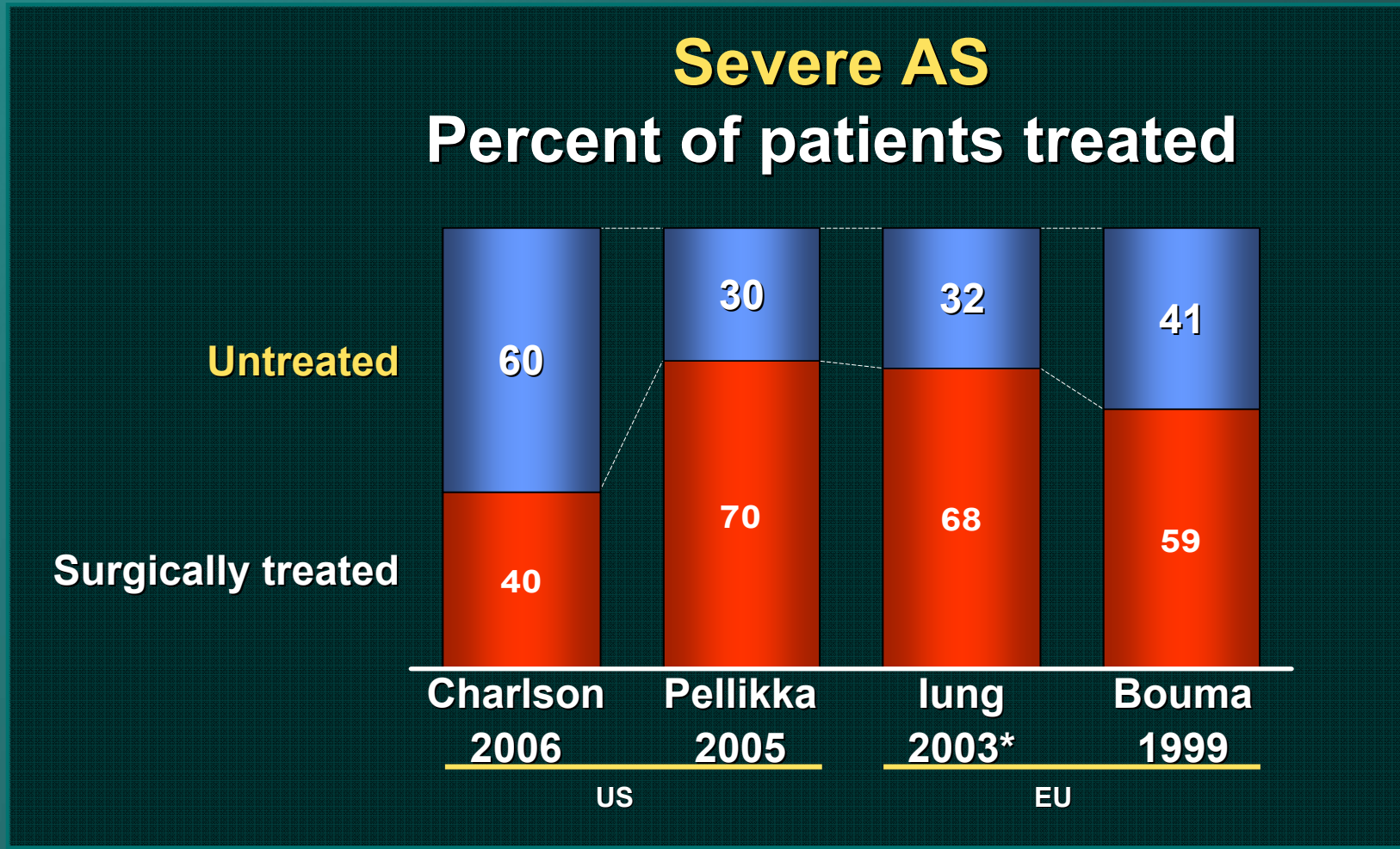


Euro Heart Survey Symptomatic AS (elderly)



lung, B, et al. Eur Heart J 2005;26:2714-20

Many Severe AS Patients are Not Surgically Treated



TVT Epidemiology

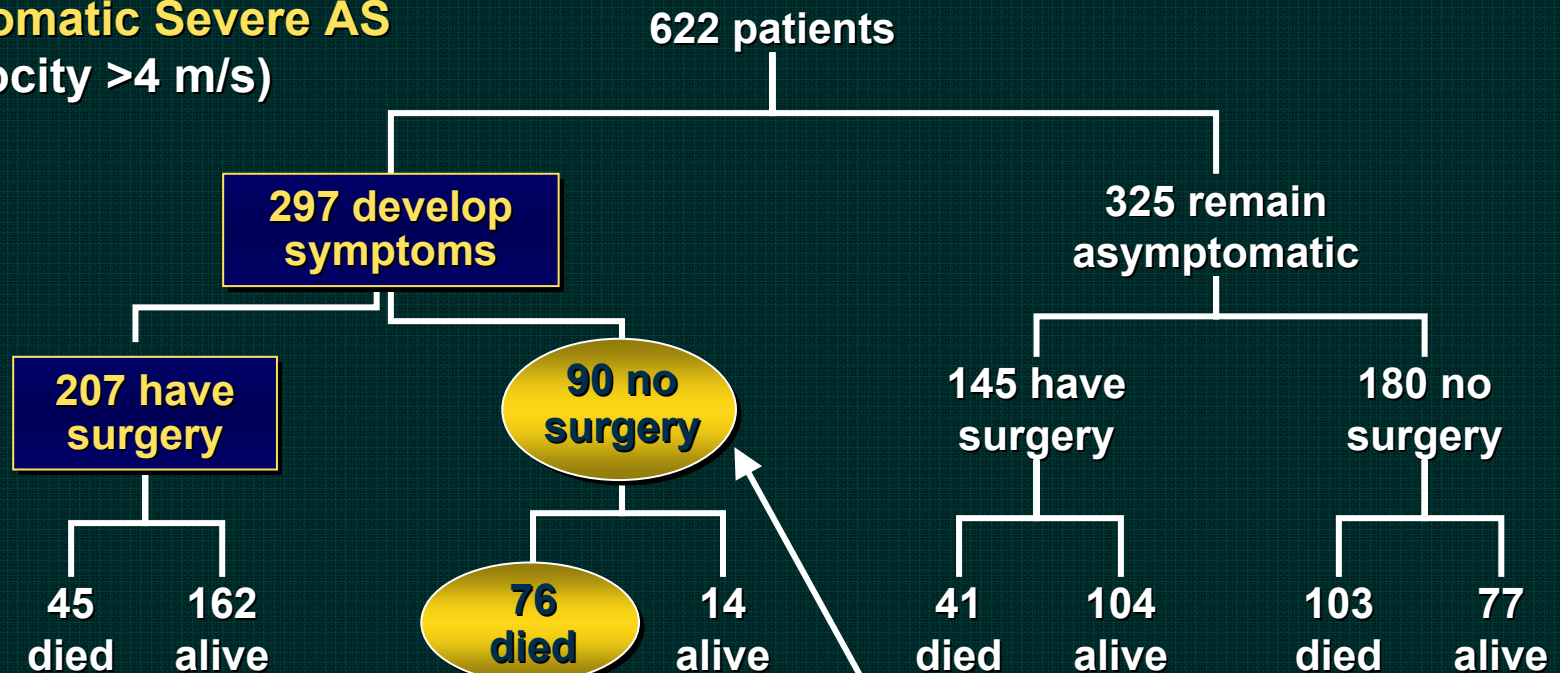
**Are there other
important unanswered
questions or “in need”
niche VHD populations?**



Asymptomatic Severe AS

Natural History

Asymptomatic Severe AS
(Jet Velocity >4 m/s)

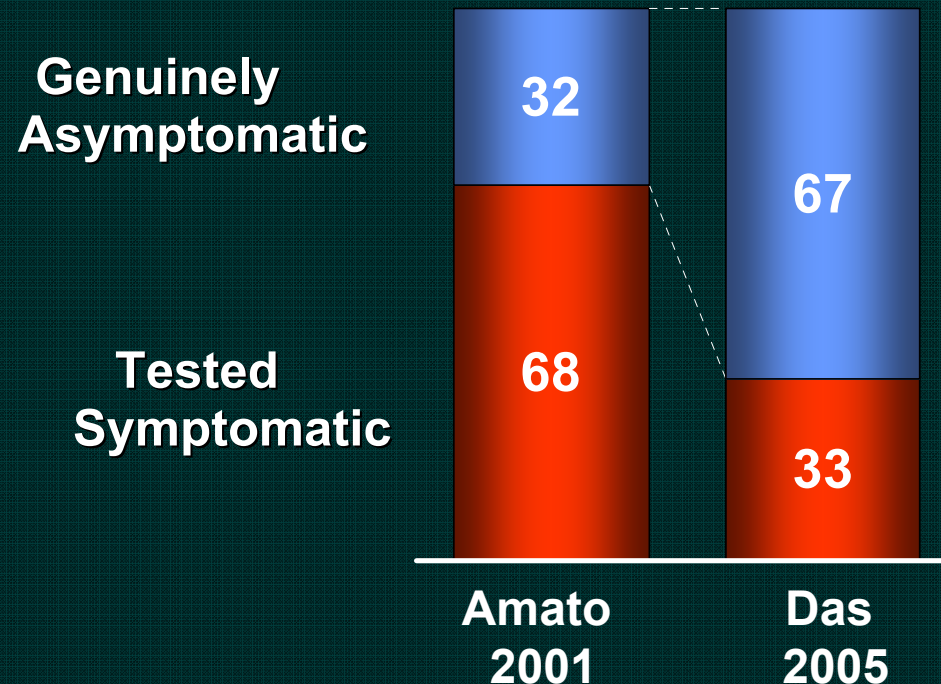


**30% untreated
and 84% die vs. 78%
of treated alive**

Pellikka PA, Sarano ME, Nishimura RA, et al.
***Circulation*. 2005;111:3290-3295.**

Many Presumed “Asymptomatic” Patients May Not Be

Percent of Asymptomatic Patients with Positive Exercise Test



Amato MCM et al. *Heart* 2001;86:381-386;
Das P et al. *European Heart Journal* 2005;26:1309-1313.



ACC/AHA 2006 Valvular Heart Disease Guidelines: **Class I Recommendations for MV Surgery for Chronic MR**

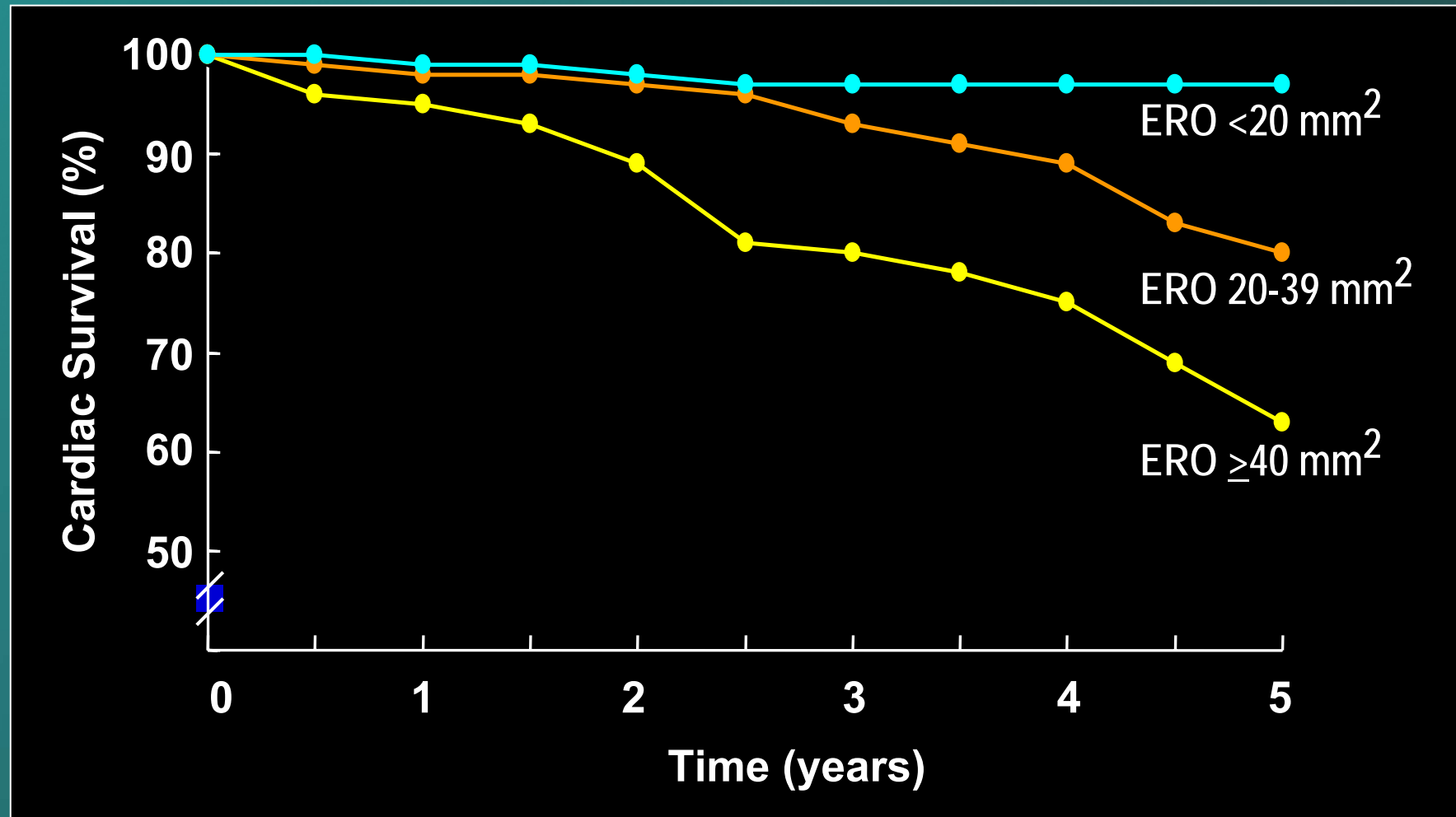
1. MV surgery is beneficial for pts with **chronic severe MR** and NYHA functional class III, or IV symptoms in the absence of aortic stenosis (LVEF <0.30) and/or LV dysfunction (LVEF <0.50) (Level of Evidence: **A**)
2. MV surgery is recommended for pts with **chronic severe MR** and LV dysfunction (LVEF <0.50) (Level of Evidence: **B**)
3. MV repair is recommended for pts with **chronic severe MR** in the majority of pts who require surgery (Level of Evidence: **C**)

Class III:
Isolated MV surgery is not indicated for pts with mild or moderate MR and LVSD ≥ 40 mm. (Level of Evidence: **B**)



Mitral Regurgitation

Natural History of Asymptomatic Chronic MR



Sarano et al. *N Engl J Med* 2005;352:875-883



What are some of the unknowns regarding “fringe” MR populations?

Specific compelling questions...

- High risk pt (usually low LVEF or CHF Sx) with functional MR - surgery vs. med Rx?
- Low risk pt with degenerative or functional MR (mild or moderate) and no Sx, to alter natural Hx - reduction annuloplasty or leaflet repair vs. med Rx?

Why are surgeons so hesitant to operate upon patients with CHF symptoms and moderate or severe functional MR?

- ***Increased operative mortality***
- ***Efficacy (and symptom benefit) + durability of reduction annuloplasty controversial***
- ***Severity underestimated in the OR (influences of anesthesia and loading conditions)***



TVT Epidemiology

Final Thoughts...

- **The population of patients with significant VHD will continue to increase in the future.**
- **There is an important group of patients with significant VHD who are currently not being treated with standard surgical therapies for a variety of reasons.**
- **There are many “untested” patient cohorts who might also benefit from earlier VHD therapy (ie. asymp severe AS, early MR...)**



TVT Epidemiology

Final Thoughts...

- **Undoubtedly, if transcatheter VHD therapy proves to be safe and effective, there are many provocative clinical trial opportunities which can be explored to determine the incremental benefit of a more widely applied lesser-invasive strategy to the treatment of VHD.**