Ohio-ACC Spring Summit at Ritz-Carlton, Cleveland
on Wednesday, April 19, 2017, 3:30-4:30 p.m.

Infective Endocarditis: Medical vs. Surgical Treatment The Surgeon's perspective

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No Disclosures

Medical Management or Surgery?

Infective Endocarditis is a
FATAL DISEASE
Notoriously Difficult to Treat

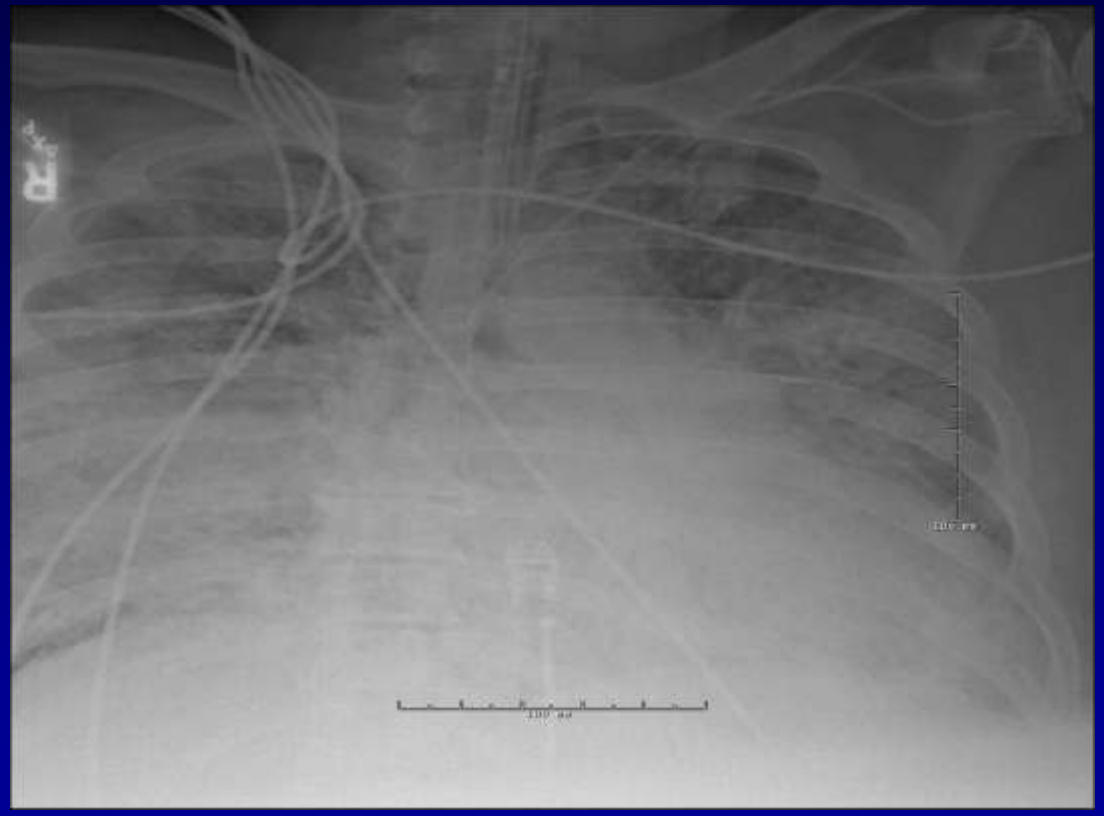
WHY?

IE is a FATAL DISEASE
CASE: 49 year old male

- Severe burn to > 20% of his body
- Respiratory failure - 3 weeks on vent
- Bacteremia: Serratia and MRSA
- Cardiogenic Shock, Hypoxemia, Pulmonary Edema, Systemic Pulmonary Artery Pressure
- 2nd degree heart block

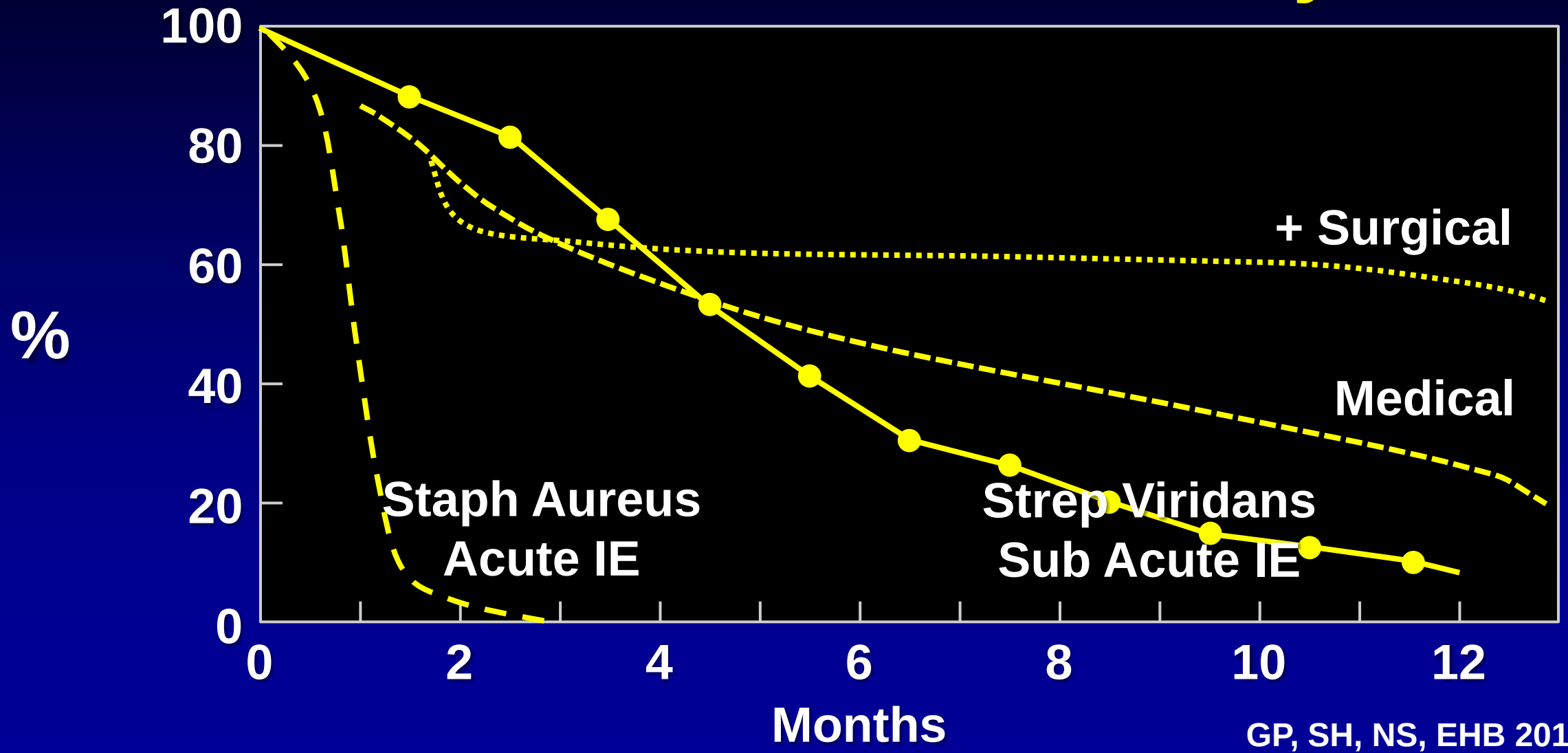
Medical Management or Surgery?

Native valve endocarditis
CASE: Chest X-ray 49 yo male, Serratia & MRSA



Medical Management or Surgery?

Endocarditis Survival
Natural and Modified History



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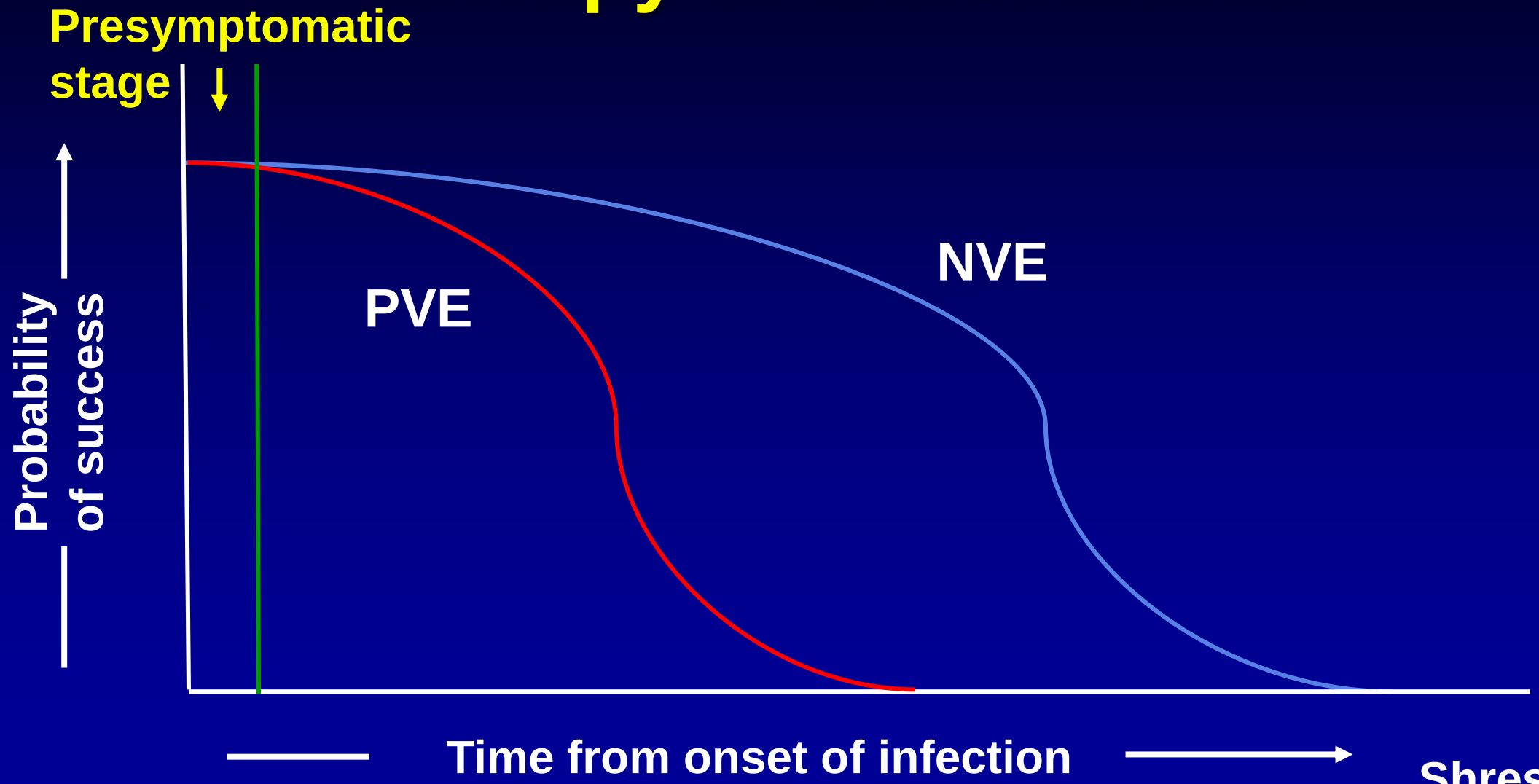
Probability of success with medical therapy in endocarditis



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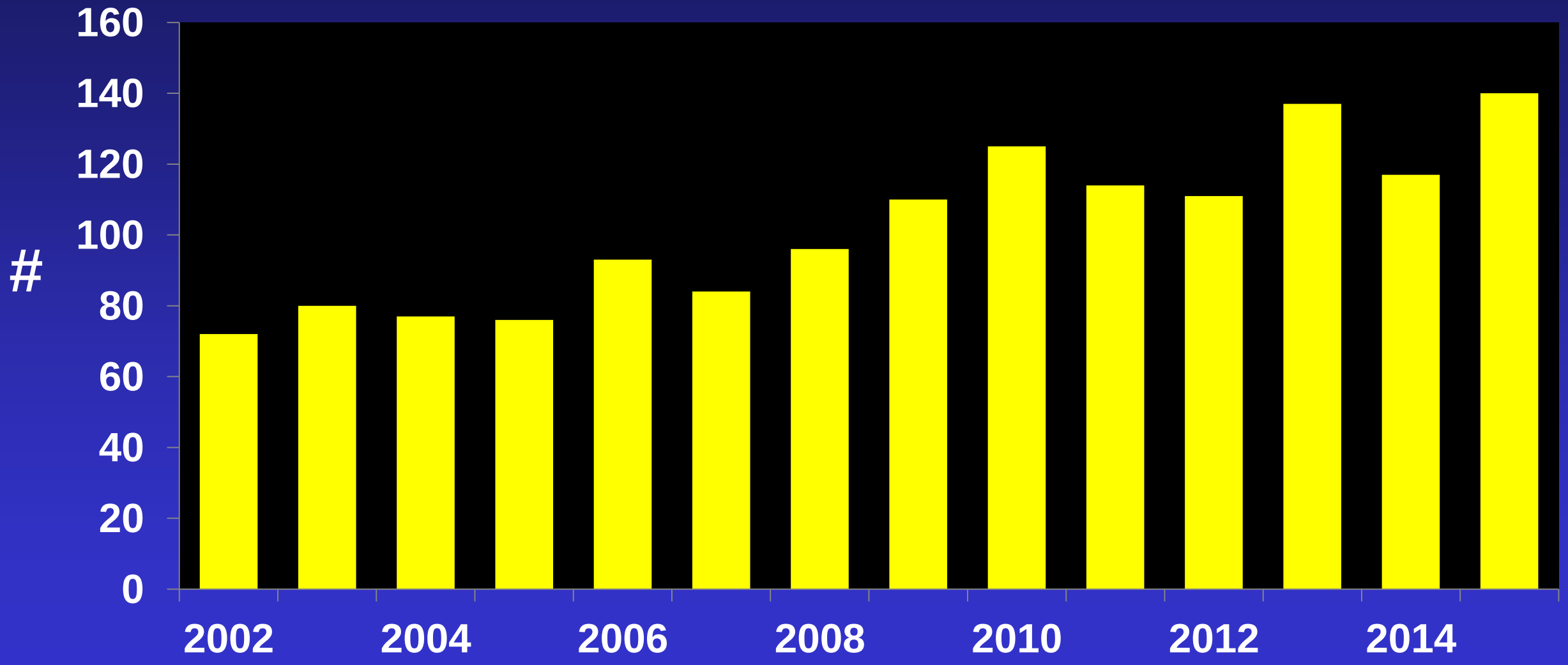
Medical Management or Surgery?

This is the Wrong Question when it is a matter of Operate or let die

and

Everyone gets Medical Treatment!

Cleveland Clinic Surgery for Active IE 2002-2015

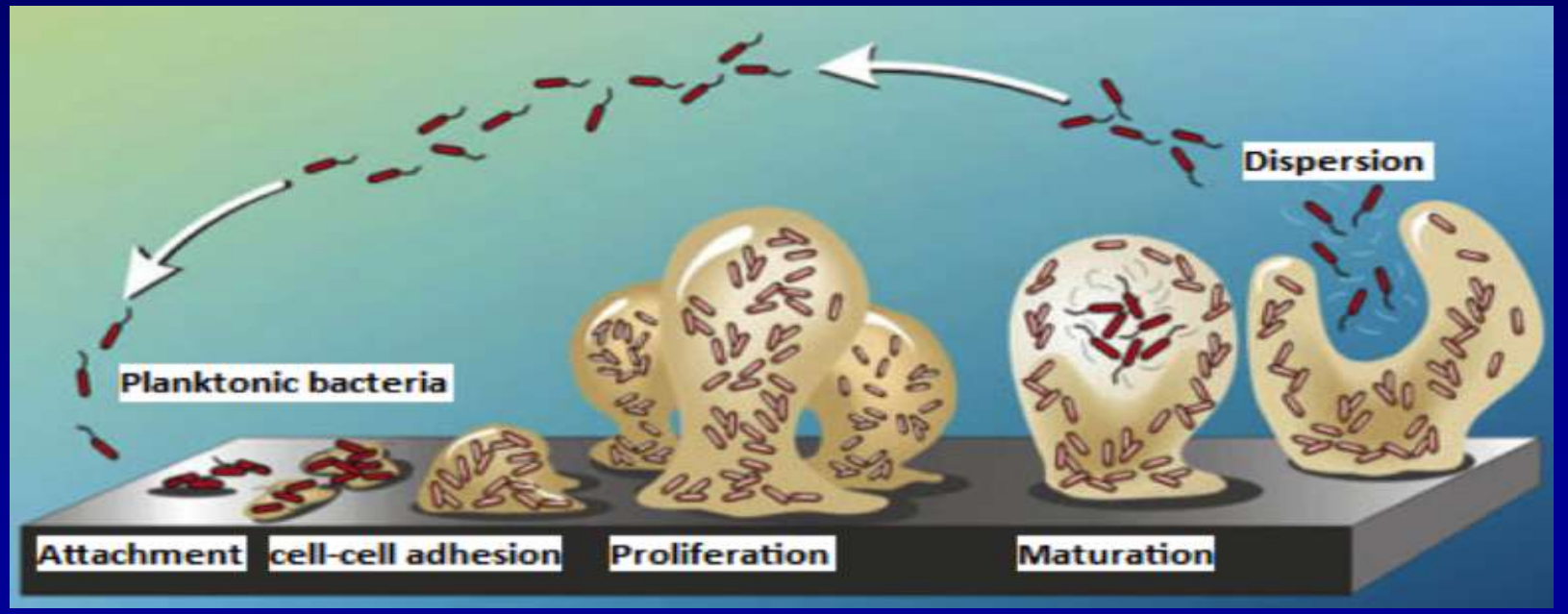


Infectious Endocarditis (IE)
Disease Stages

- Bacteremia & Endocardial damage (Valve Disease)
- Adherence
- Vegetations / Biofilm
- Embolism
- Release of Enzymes
- Tissue Disintegration
  - Cusps and Leaflets
  - Invasion & Destruction

Difficult to treat: Organisms Hide and Thrive in Vegetations / Biofilm

- Biofilm matrix protects organism
- Planktonic cells / Persister cells
- Quorum sensing / Resistance genes



Wozniak DJ, Parsek MR. F1000Prime Rep 2014

Native Valve Endocarditis

Prosthetic Valve Endocarditis

A-V block caused by RA Invasion and His bundle and A-V Node destruction!

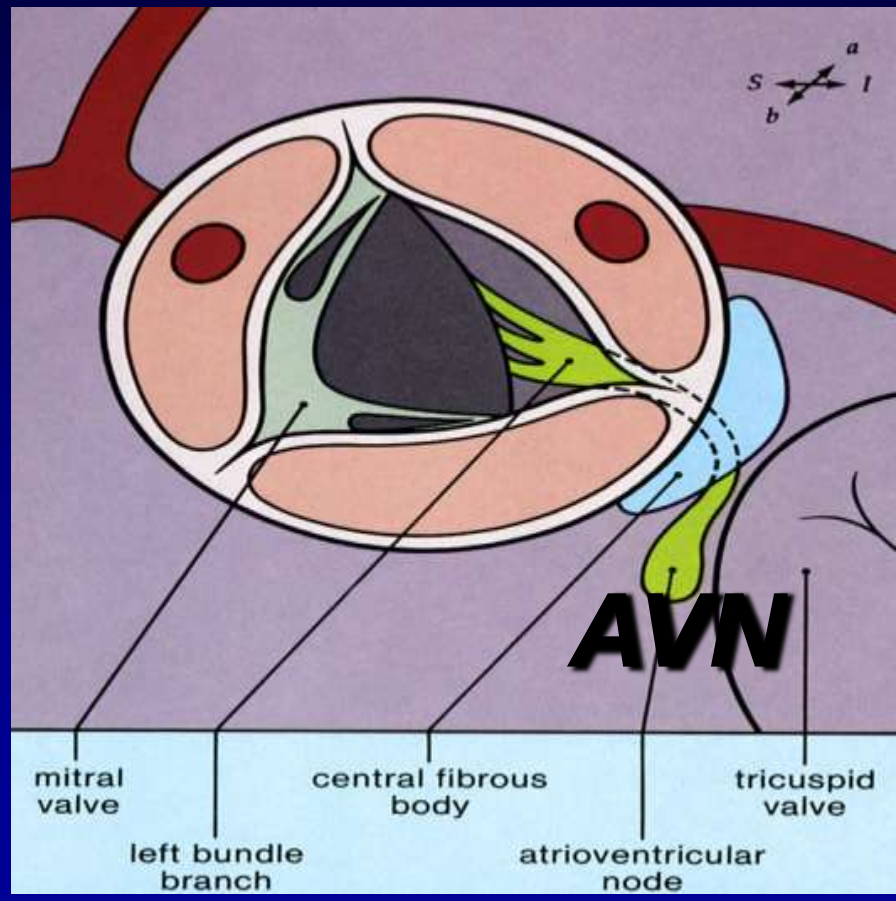
RCA

LVOT

LCA

AVN

CS



Medical treatment YES!
What can the Surgeon add?

- Remove infected necrotic tissue and foreign material
- Restore cardiac integrity
- Restore valve function

and thereby makes the patient and infection curable and…

- Removes a source of embolism

Current Indications for Surgery

- Heart failure / valve regurgitation
- Unresponsive sepsis
- Advanced invasive pathology
- Infected prosthetic valve
- Large mobile vegetations, >10-15mm
- Recurrent Sepsis/IE and Prosthetic Valve

Current Hesitations / Delays

- Neurological complication, Cerebral bleeding
- Patient is TOO old, TOO sick …
- Active local & systemic infection
- TOO difficult surgery, TOO high risk
  - Highest Mortality Valve Surgery
- Questionable benefit, Lack of RCTs:
  - Referral, Selection and Survival bias

2012 - Finally ONE randomized trial!

Kang et al. Early surgery versus conventional treatment for infective endocarditis. N Engl J Med 2012;366:2466-73

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N Engl J Med Editorial:

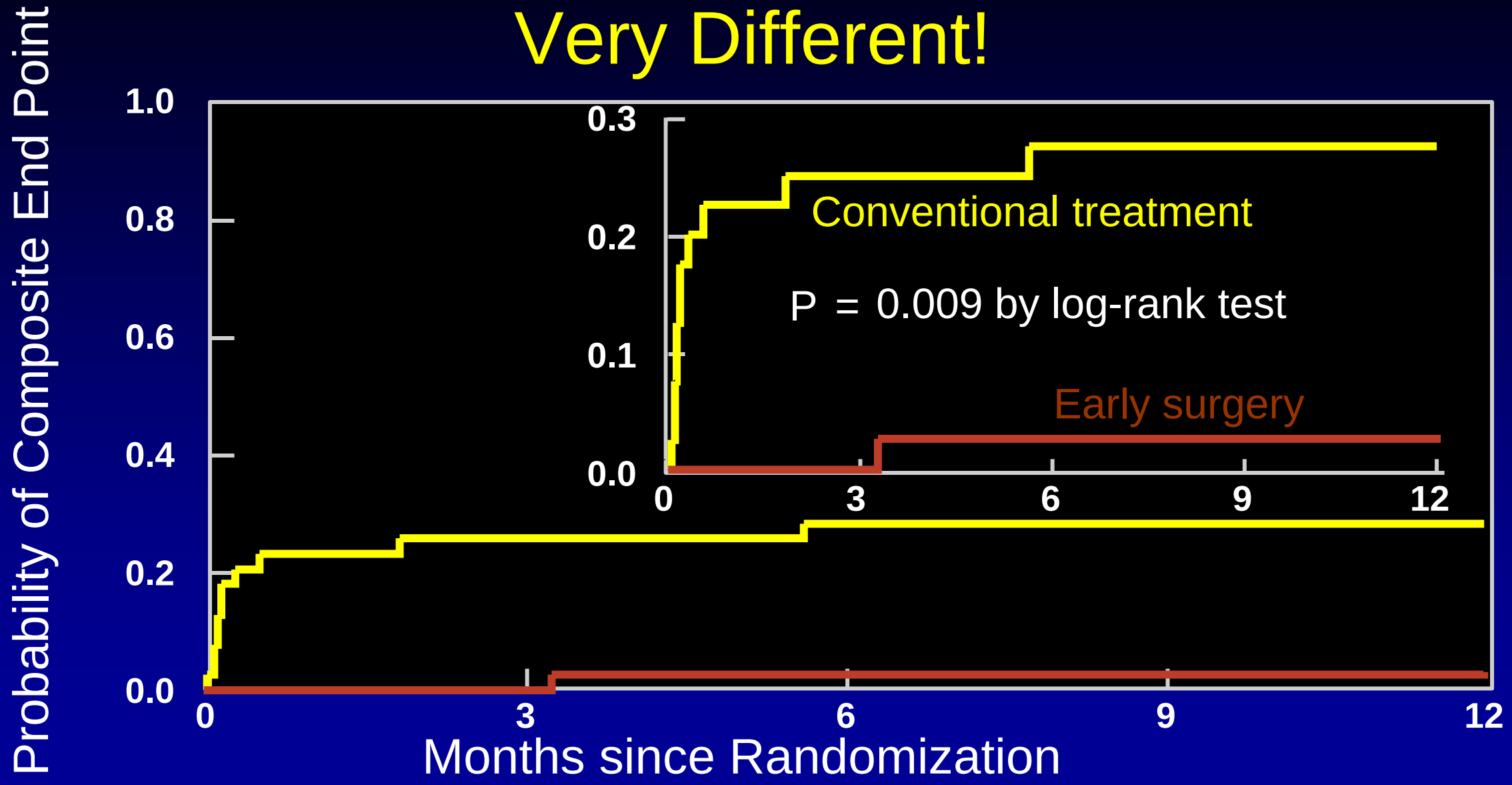
Gordon, Steven M, Pettersson, Gosta B. Infective Endocarditis - When Does It Require Surgery? N Engl J Med 2012; 366;2519-2521

N = 76

Valve involved	Conventional Treatment (N = 39) no. (%)	Early Surgery (N = 37) no. (%)
Mitral	23 (59)	22 (59)
Aortic	11 (28)	11 (30)
Aortic and mitral	5 (13)	4 (11)
Vegetation diameter	14.1±3.5	13.5±3.2
Valvular disease:		
Sev. stenosis	3 (8)	1 (3)
Sev. regurgitation	36 (92)	36 (97)

Kang et al, N ENGL MED 2012

Probability of Death, Embolism, or recurrent IE – Very Different!



Kang et al, N ENGL MED 366;26 June 2012

Outcomes after Conventional Treatment, N = 39

- Died 1
- Urgent surgery 27
- Discharged 11
  - Sudden death 1
  - Surgery 3
    - Recurrent IE 1
  - Symptomatic 4
  - Remained asymptomatic 3

Kang et al, N ENGL MED 2012

Implications of Kang's RCT:

- Validated current Class I Indications
- Large Vegetations and Severe Valve Dysfunction: Operate, don't wait!
- Well designed RCTs are possible

- …and DO impress and move the medical community!

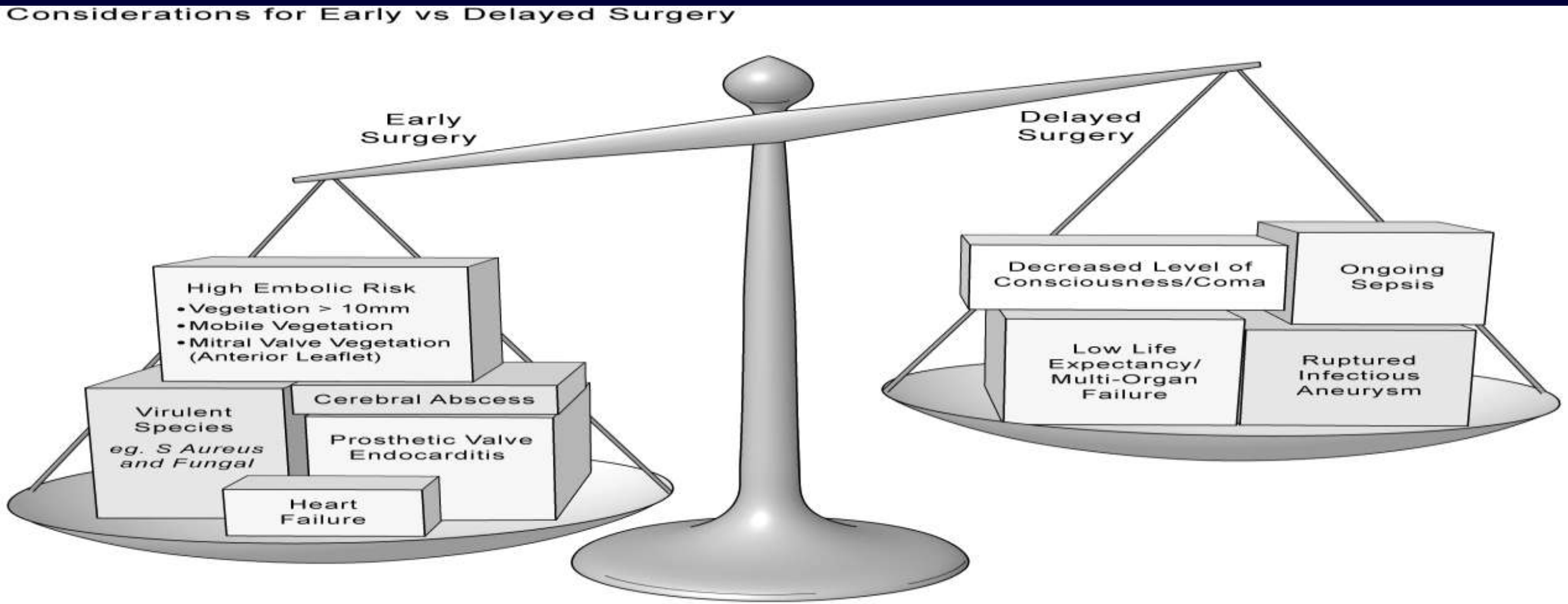
…and there seems to be minimal penalty to be paid for operating for IE in the active phase!

(…unless the Organism is Insensitive to given Anti Microbial Treatment!)

Residual Surgical Issues

- Neurological complications
- Other embolic complications
  - Spleen, spine, other
  - Mycotic aneurysms
- High early mortality
  - Highest risk valve surgery!

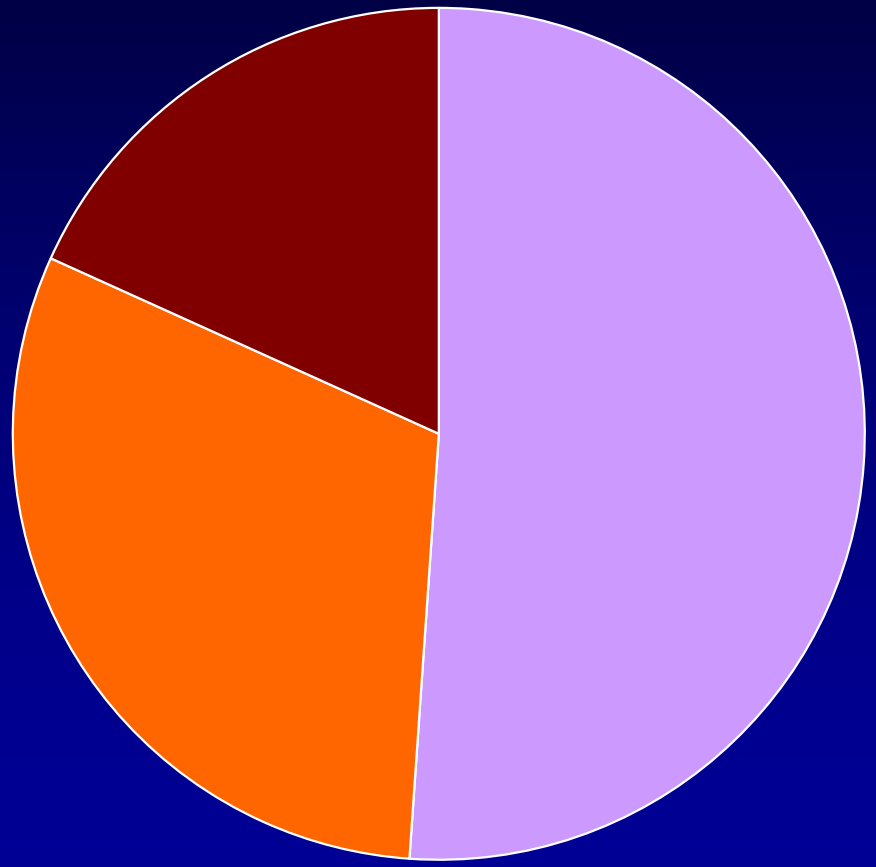
IE & STROKE: Early vs. Delayed Surger?
No Dogmas – risk vs. benefits!



YANAGAWA ET AL CIRCULATION 2016

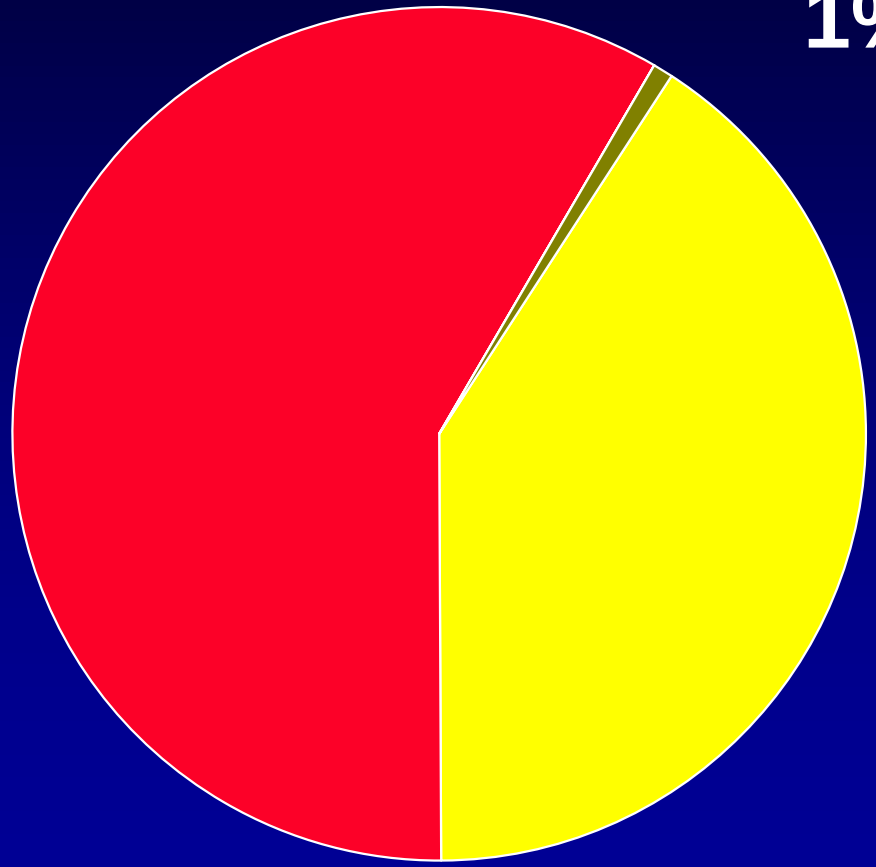
CCF Active Left-sided IE 2002-12

n = 773



Isolated Aortic Valve IE (AV)

n = 395



1% Previous Repair

58% PVE

41% NVE

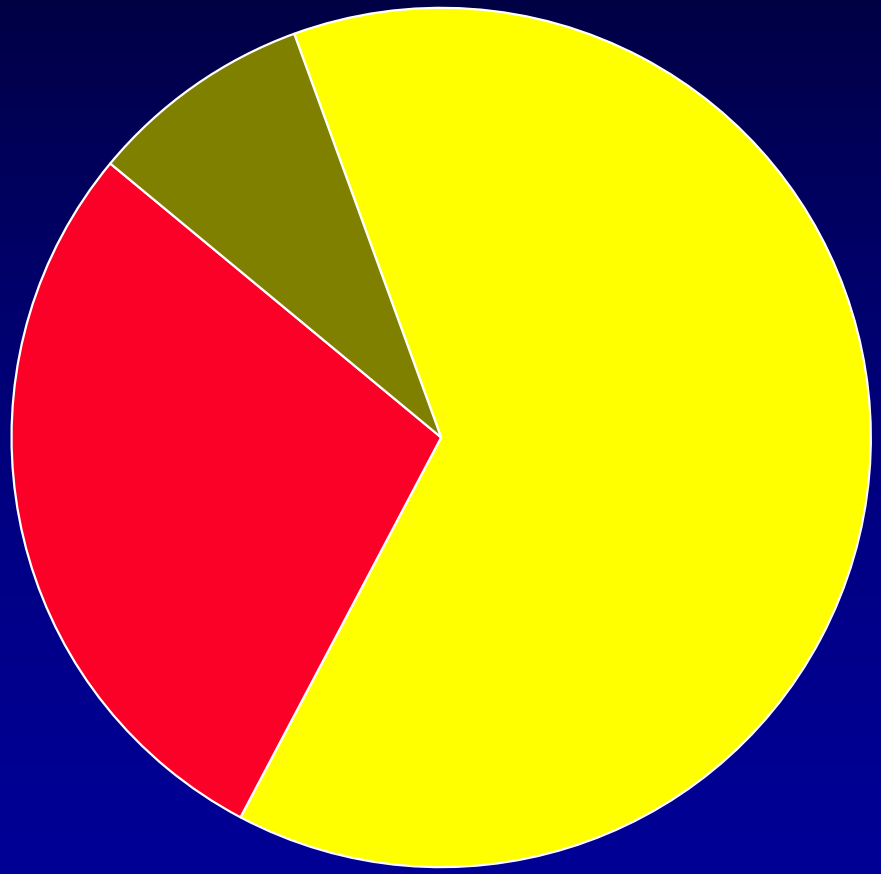
Isolated Mitral Valve IE (MV)

n = 237

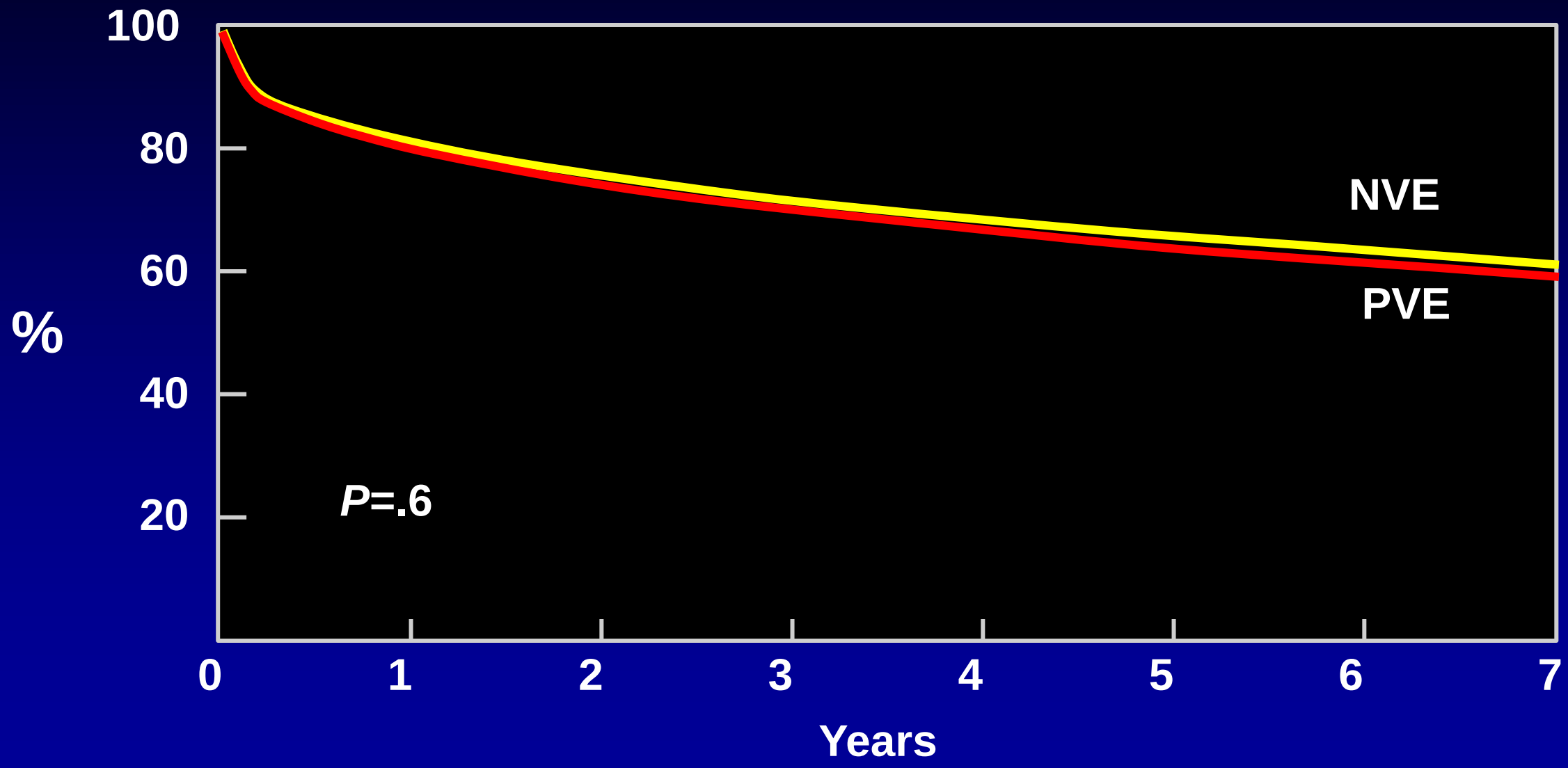
9% Previous Repair

28% PVE

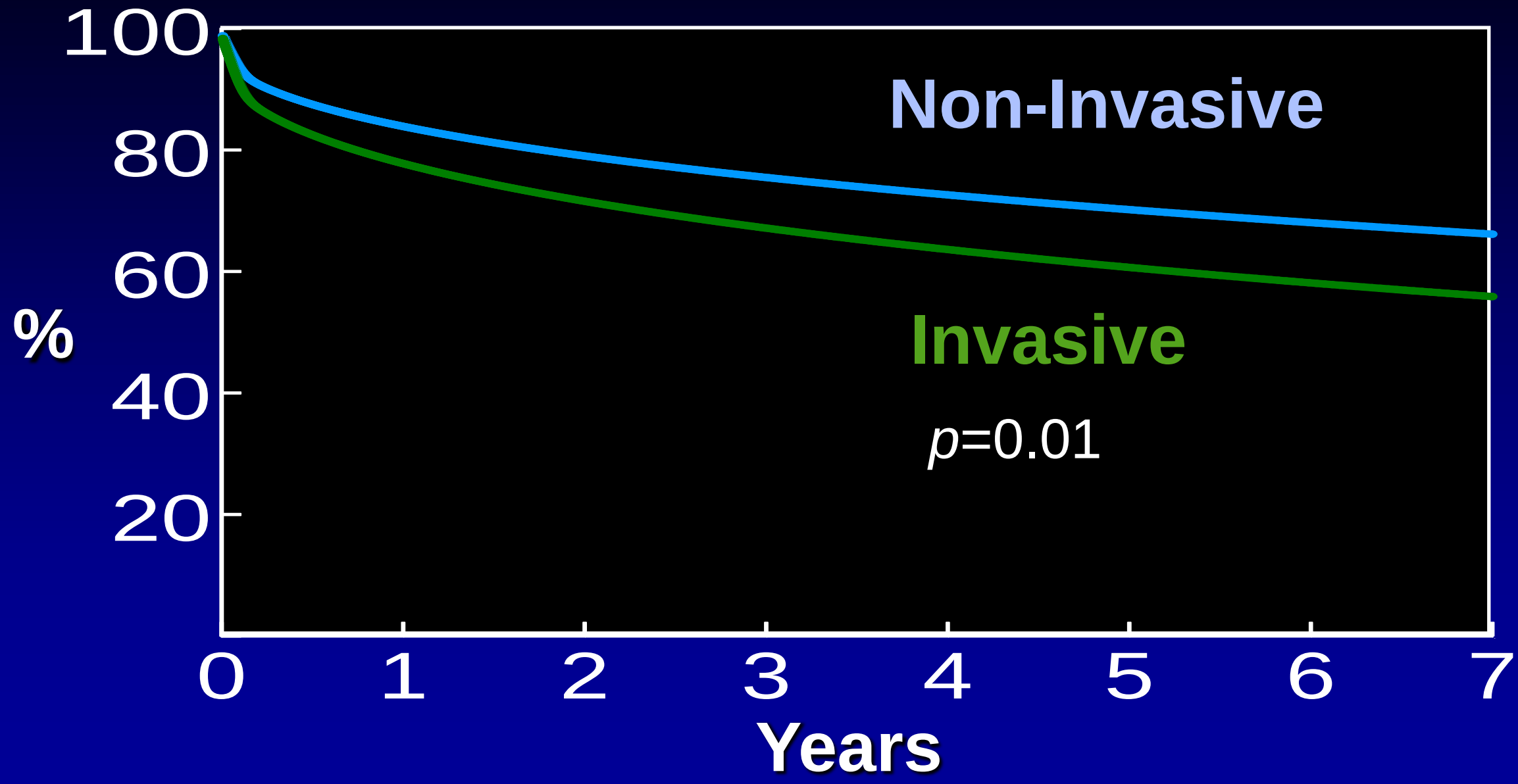
63% NVE



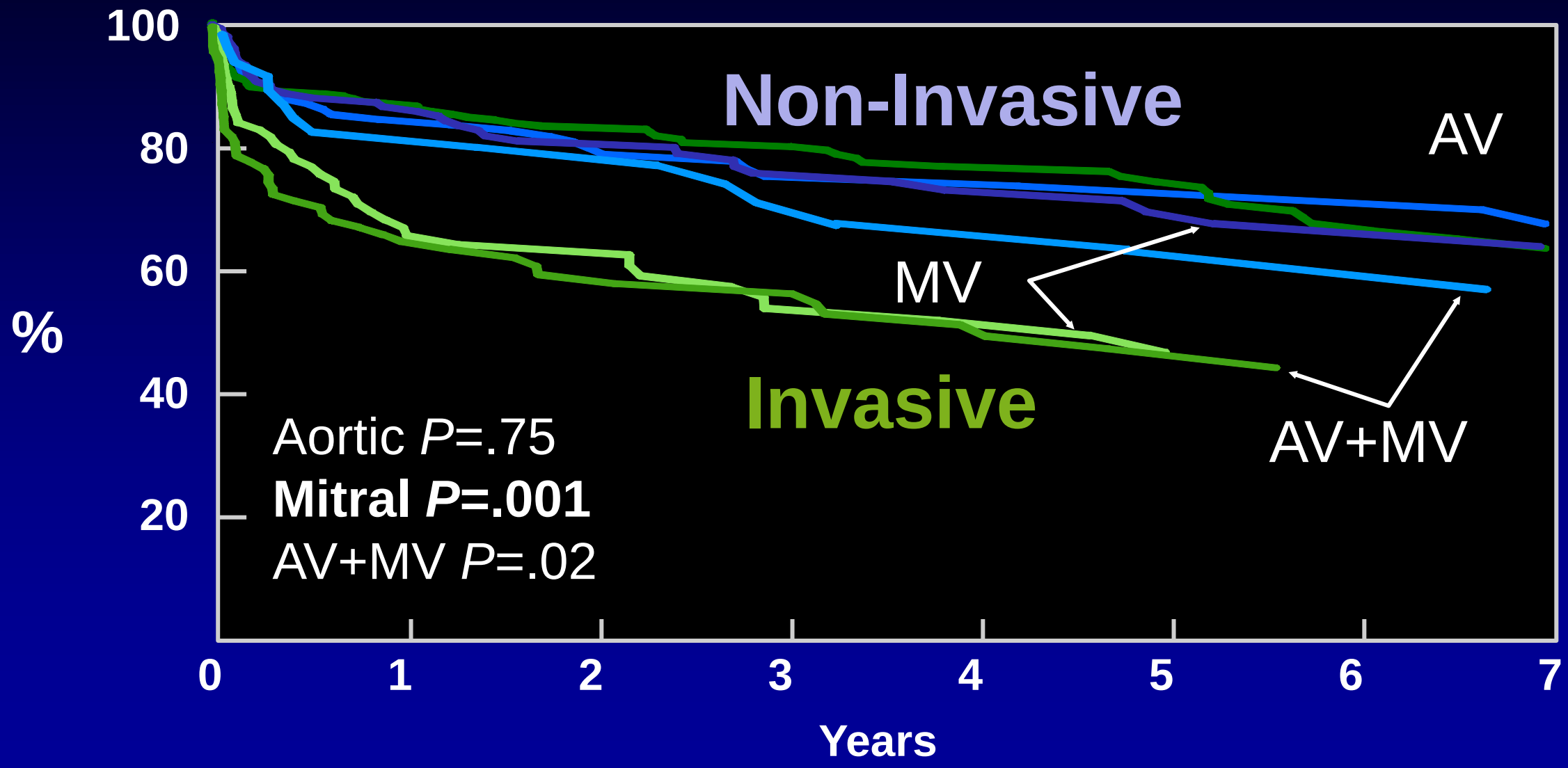
Survival: Native vs. Prosthetic Valve IE



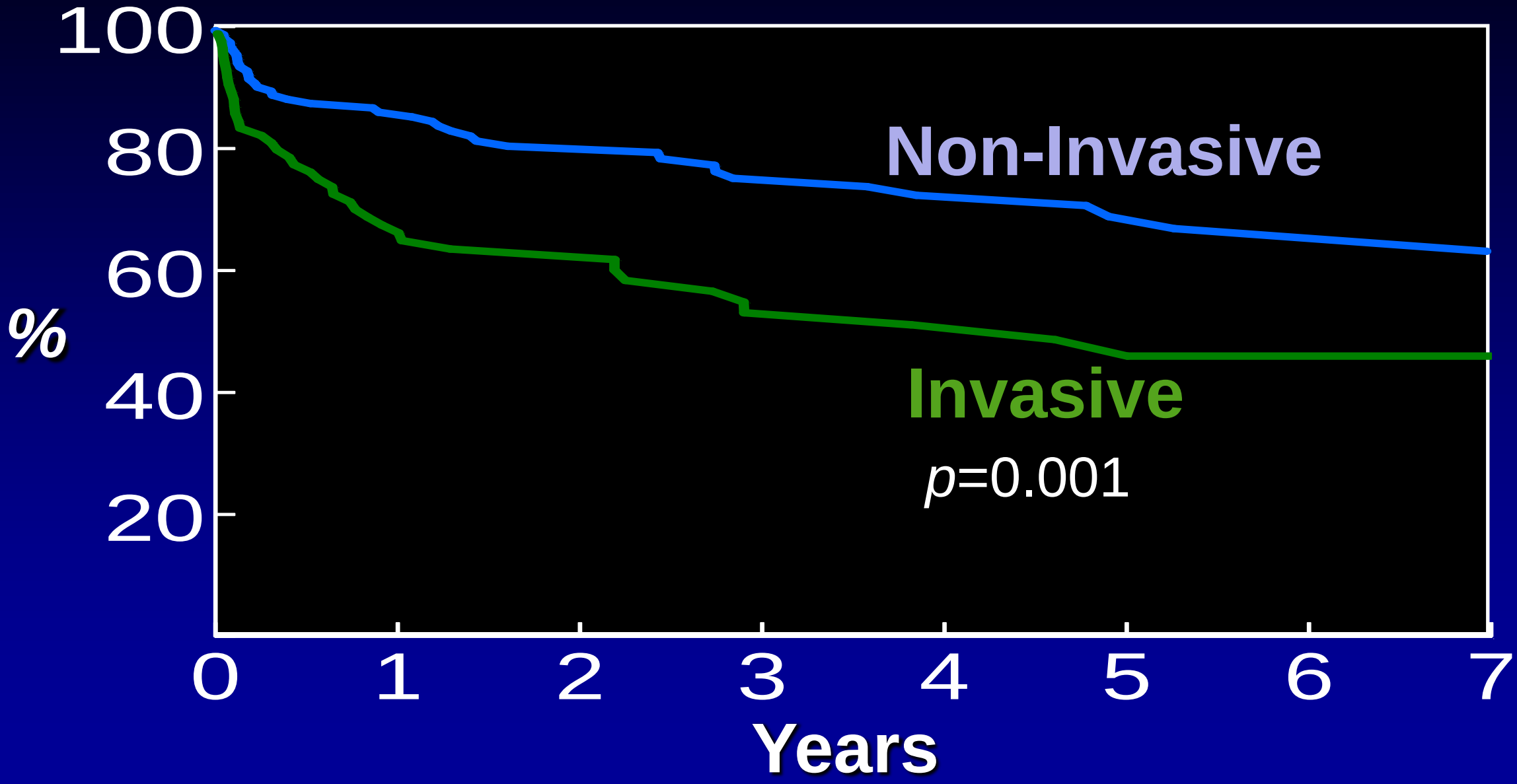
Survival: Non-Invasive vs. Invasive IE



Non-Invasive vs. Invasive IE by Valve

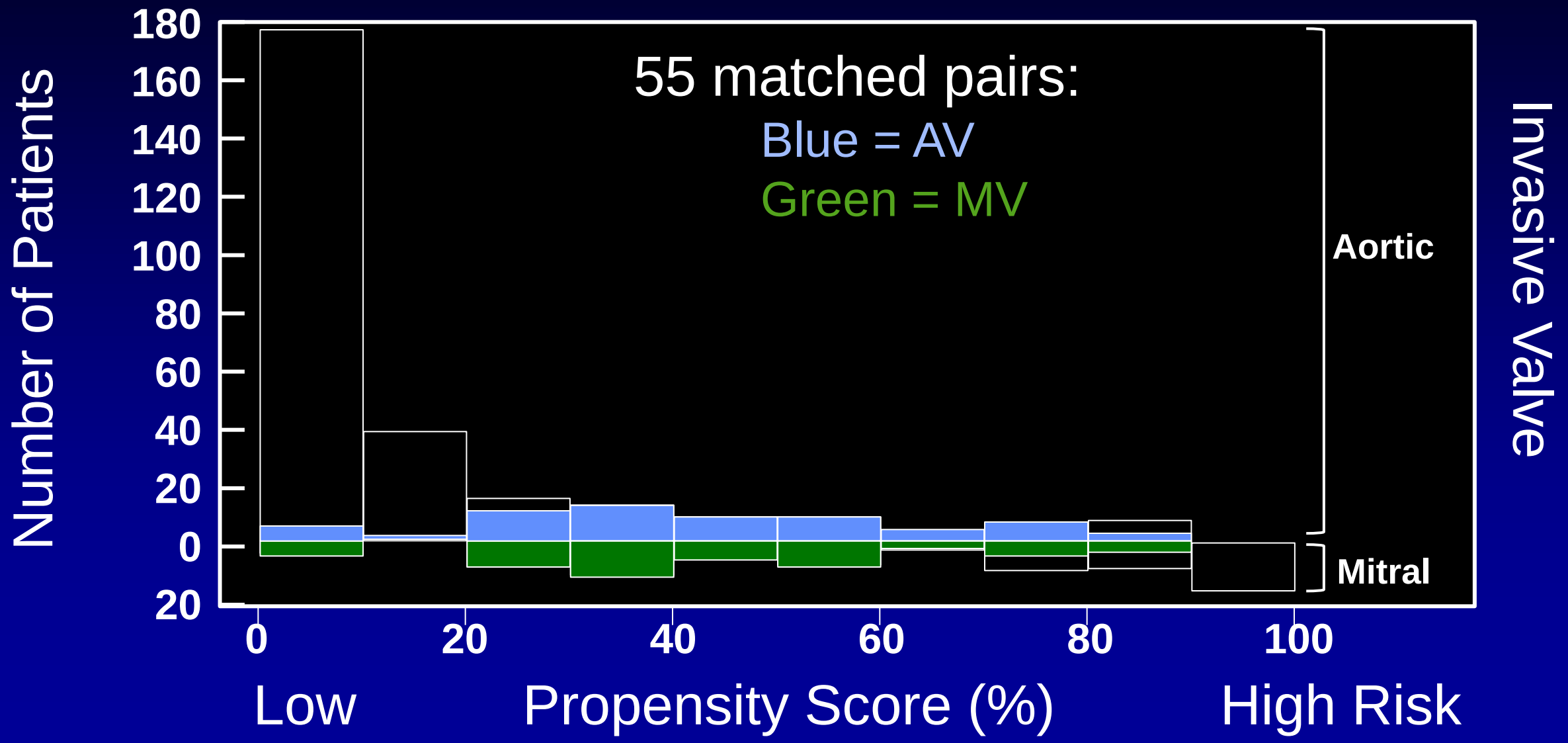


MV: Non-Invasive vs. Invasive IE

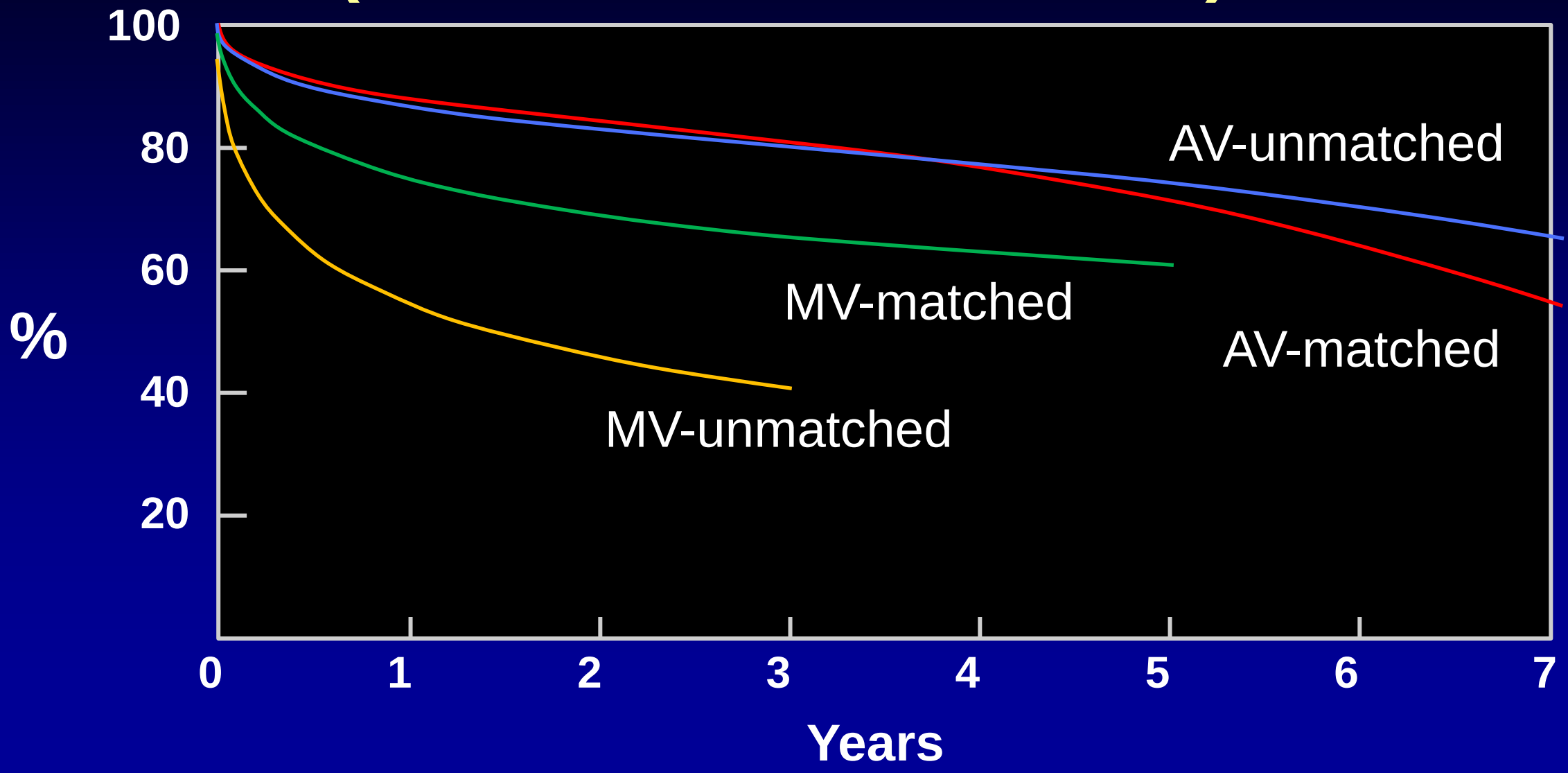


MV Patients' Propensity Scores

(55)



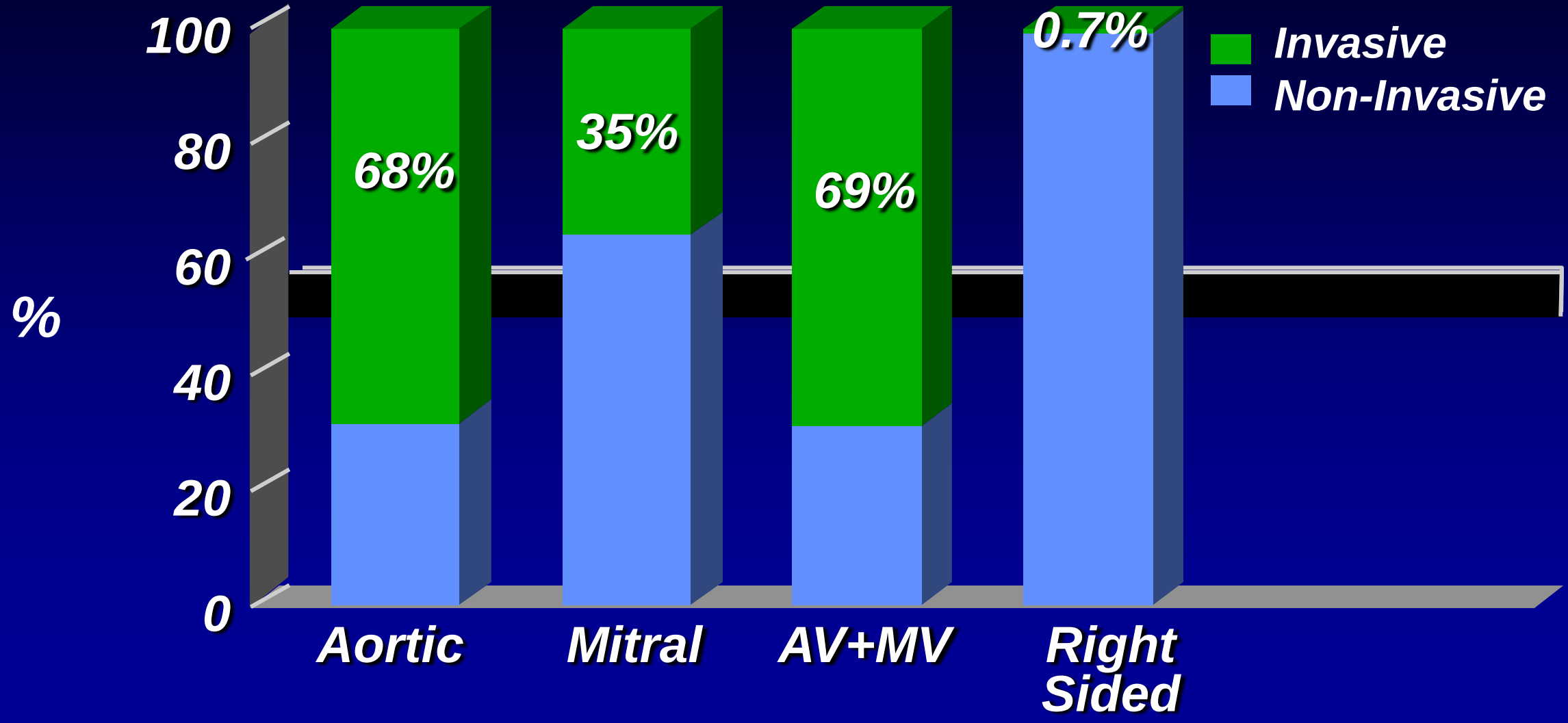
Non-Invasive vs. Invasive: AV vs. MV (Matched vs. Unmatched)



2. MV Pathology:
MV Invasion is to AV grove!

Invasive Disease by Involved Valve

Invasion only on left side!



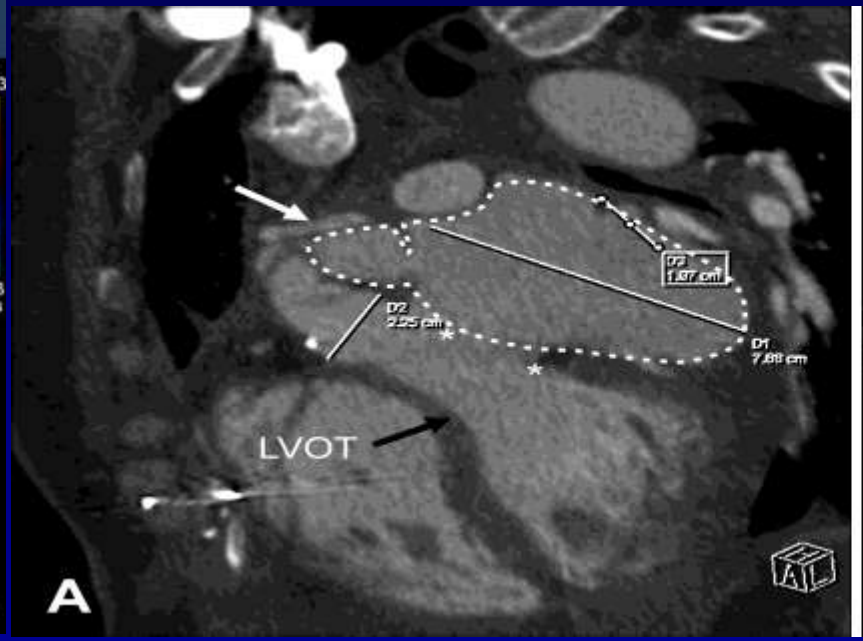
Right-Sided IE

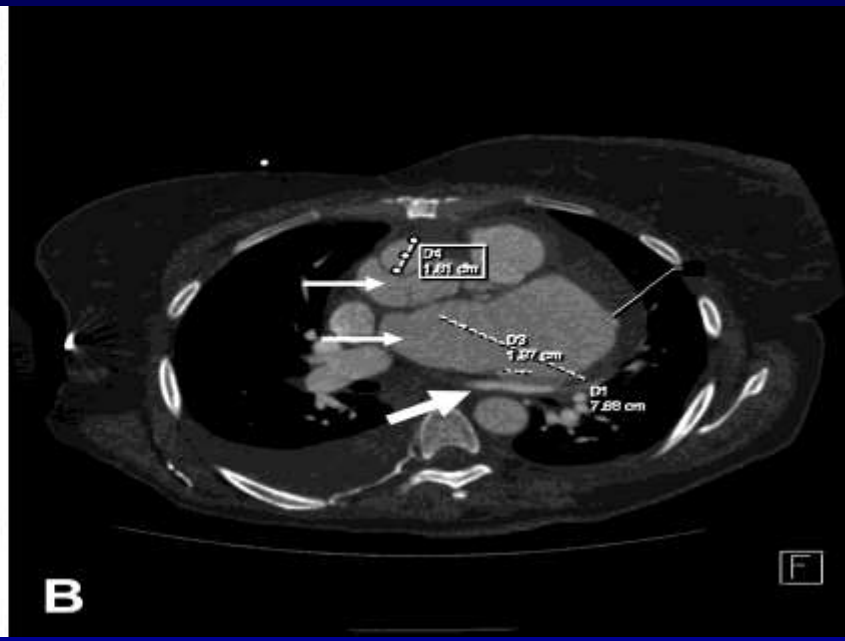
- More often I.V. Drug Use
- Septic Pulmonary Embolism
- Non-Invasive / Still *Staph. Aureus*
- Indications for surgery
  - Large Vegetations / Embolism Prevention
  - Severe TR with CHF and elevated PVR / low CO

IE SURGERY IS NOT EASY:

4 months post 2nd Homograft reoperation for endocarditis – dehisced homograft!

Reoperation or Hospice??





Pitfalls

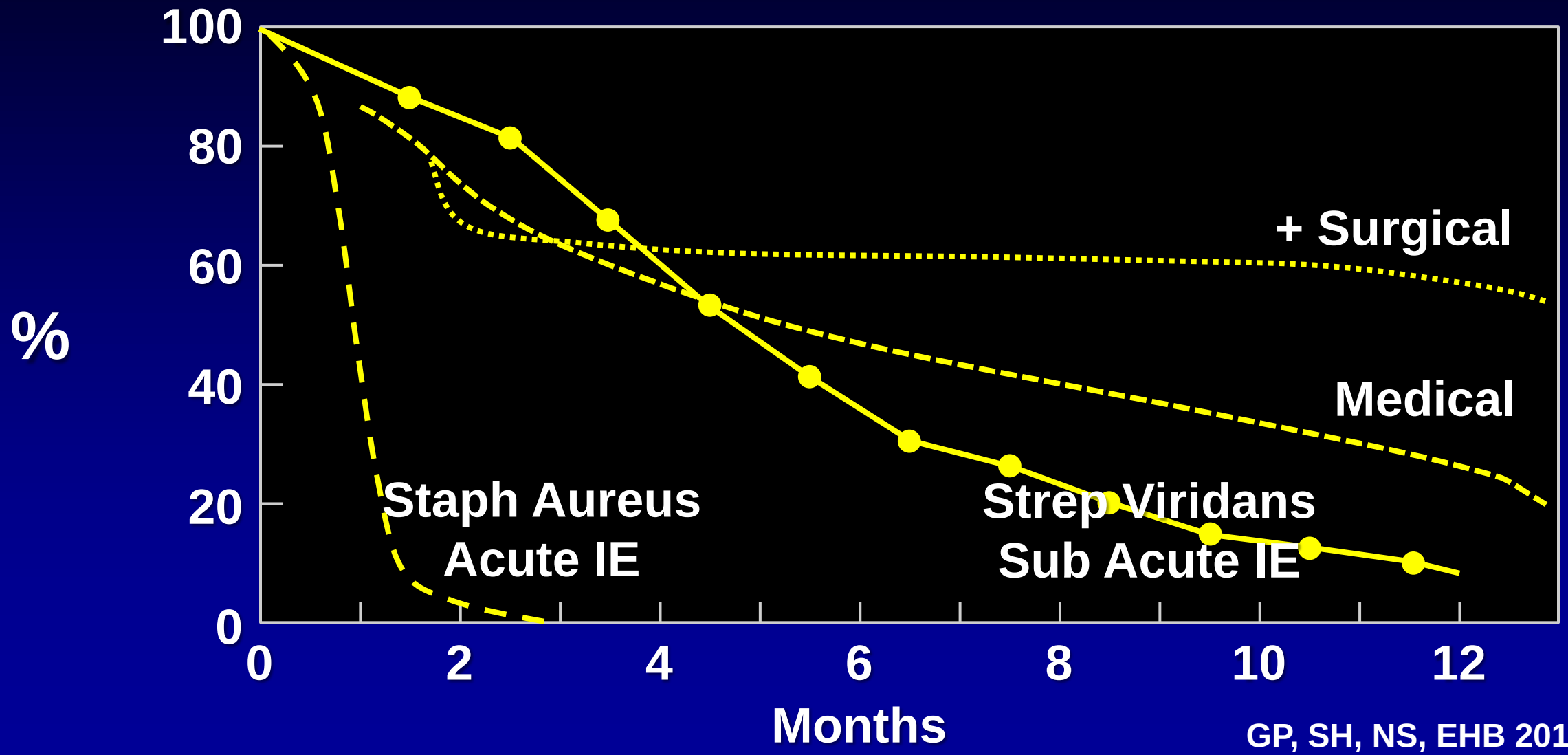
Pitfalls

- Too Late - Preoperative Stroke
- Too Early - Hemorrhagic stroke
- Organism insensitive to given antimicrobial
- Incomplete debridement
- Missed invasive lesions = Incomplete debridement
- Misinterpretation of Anatomy and Pathology

The Surgeons cannot avoid Referral and Survival Bias!

- Referral bias = Appropriate patient selection!
- Survival bias = Surgeons can only consider surgery on live patients!

Endocarditis Survival
Natural and Modified History



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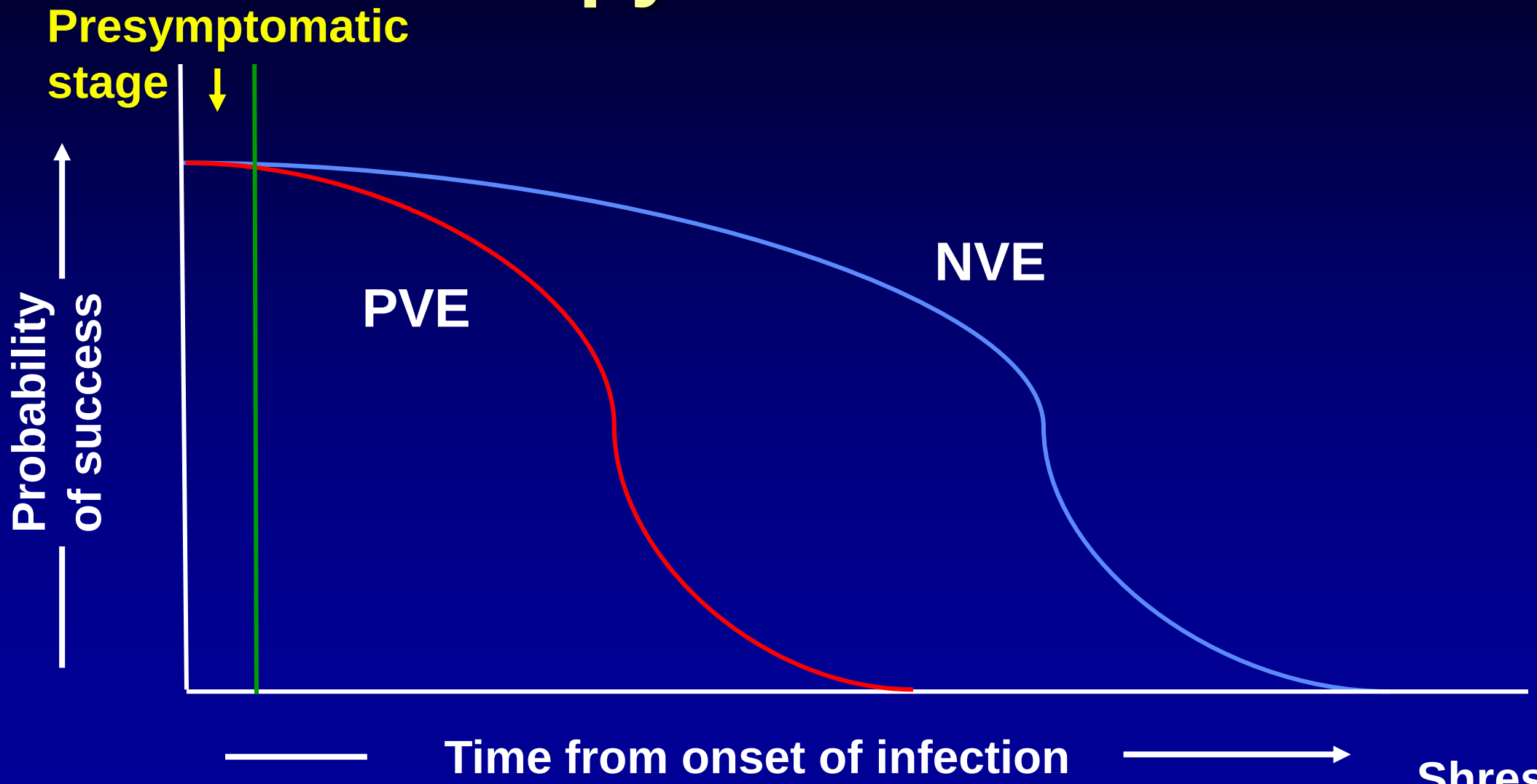

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Once there is an indication for surgery – OPERATE!

- Leaky valves won’t become competent!
- Disintegrated tissue will not regrow!

- Infective endocarditis is not a reason to postpone an operation otherwise indicated but the opposite!

Should all PVE be Treated Surgically?

Yes, unless

- very recent onset
- uncertain diagnosis and good valves
- …and minimal echo findings, bacteremia cleared, no further embolic events, and patient is well!
- prohibitively high surgical risk
  - Low expectation of success and close follow up

Success with endocarditis surgery requires experience, lots of experience!


Thank You!
Cleveland Clinic