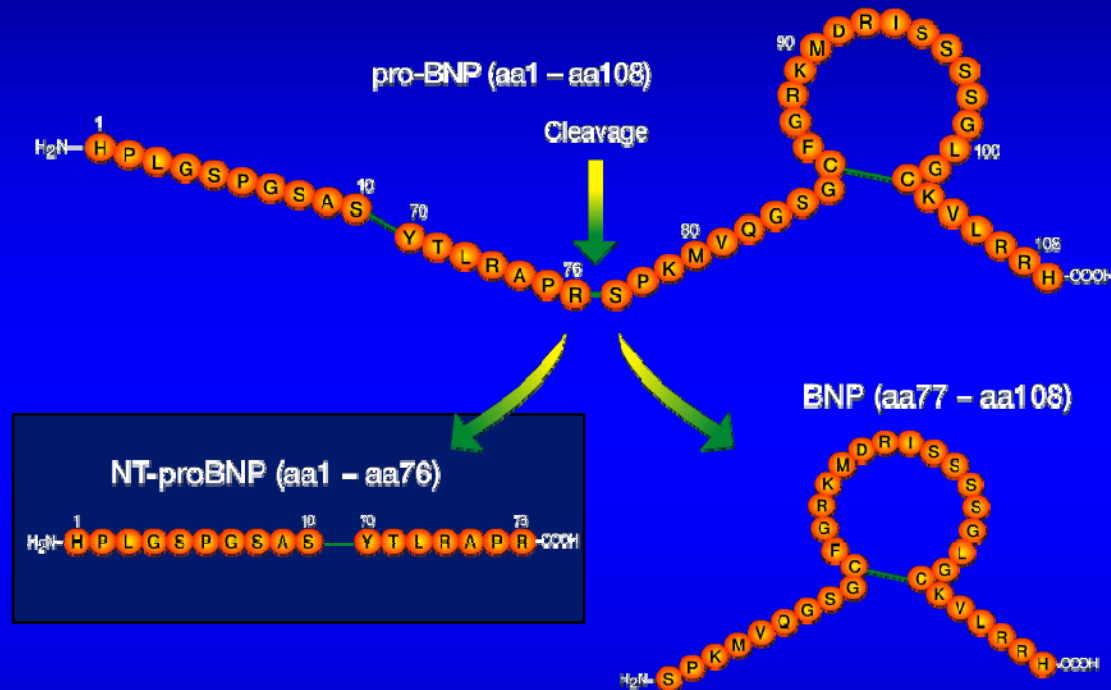


# The Prognostic Value of NT-proBNP



**James L. Januzzi, M.D., FACC**

**Cardiology Division, Massachusetts General Hospital**

**Harvard Medical School, Boston, MA, USA**

# NT-proBNP and Prognosis

Independent predictors of mortality and heart failure events across the HF spectrum

## Stage A

Populations

PEACE

HOPE

## Stage B

GUSTO IV

FRISC-II

Cohort studies

## Stage C

Val-HEFT

ICON

PRIDE

## Stage D

COPERNICUS

Cohort studies

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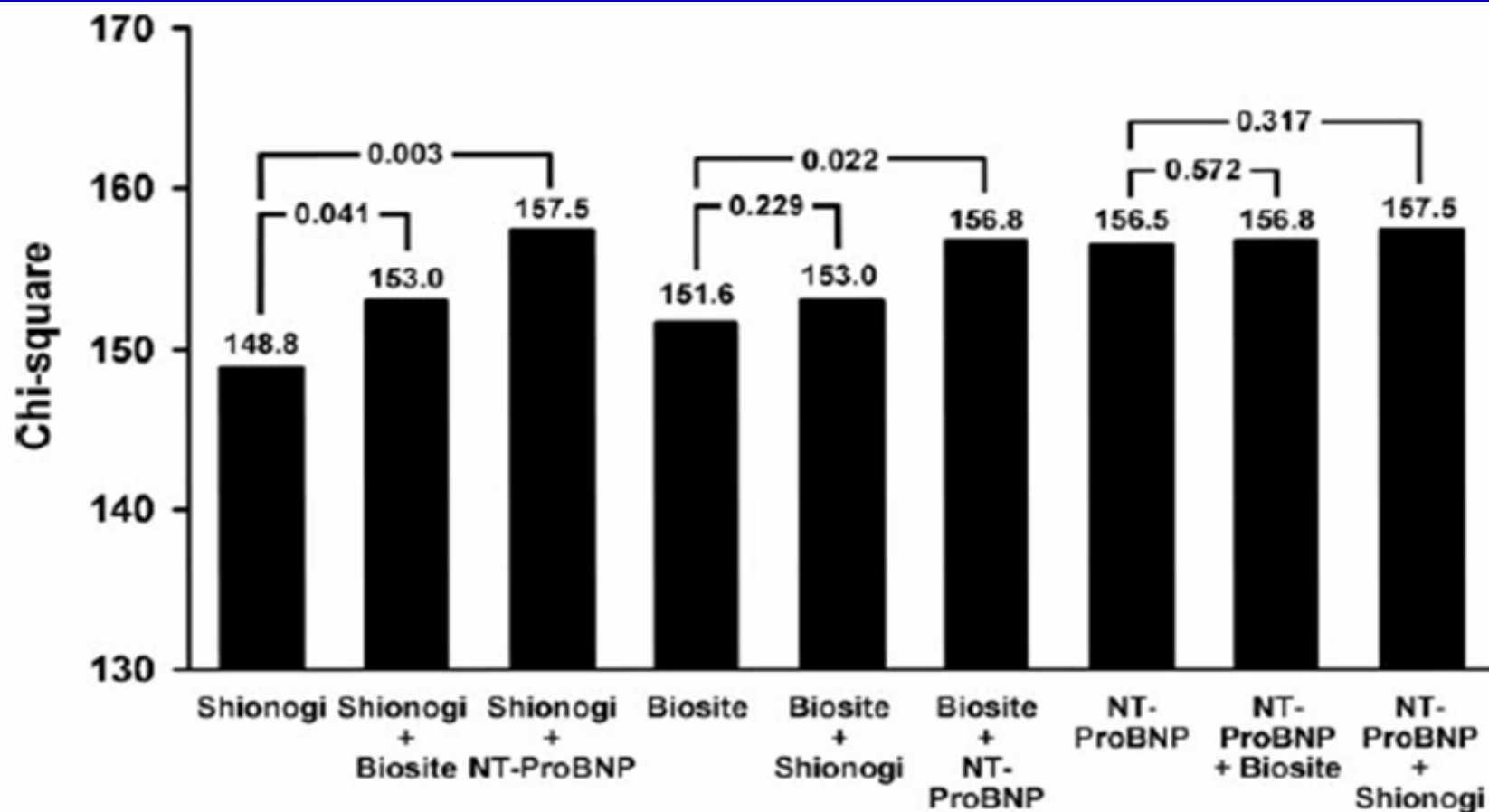
COPERNICUS

Cohort studies

# Amino-Terminal Pro-B-Type Natriuretic Peptide and B-Type Natriuretic Peptide: Biomarkers for Mortality in a Large Community-Based Cohort Free of Heart Failure

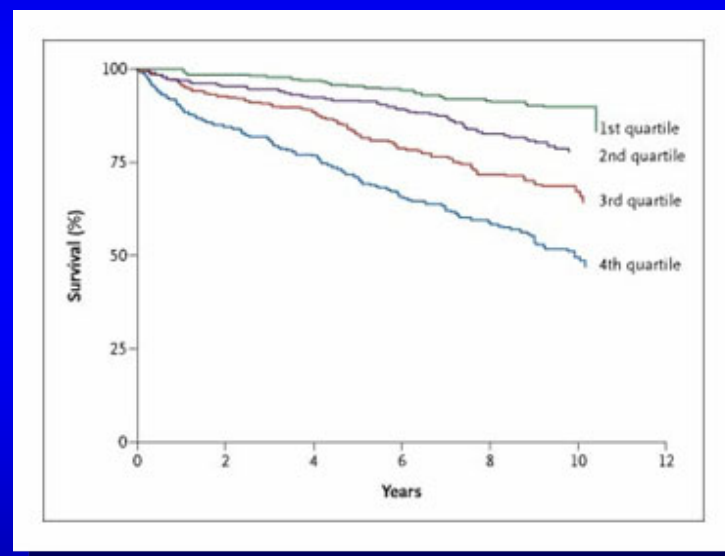
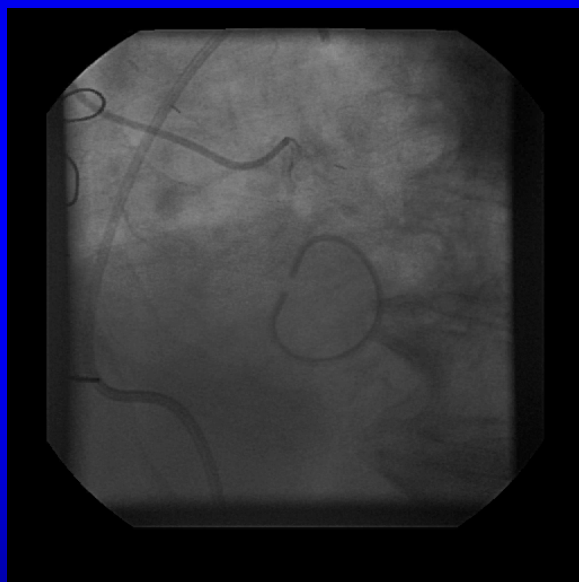
Paul M. McKie, Richard J. Rodeheffer, Alessandro Cataliotti, Fernando L. Martin, Lynn H. Urban, Douglas W. Mahoney, Steven J. Jacobsen, Margaret M. Redfield and John C. Burnett, Jr

*Hypertension* 2006;47:874-880; originally published online Apr 3, 2006;



# NT-proBNP in Stable CAD

- Stable ischemic heart disease



- NT-proBNP strongly prognostic in patients with stable angina pectoris\*

# N-Terminal Fragment of the Prohormone Brain-Type Natriuretic Peptide (NT-proBNP), Cardiovascular Events, and Mortality in Patients With Stable Coronary Heart Disease

Kirsten Bibbins-Domingo, PhD, MD

Reena Gupta, MD

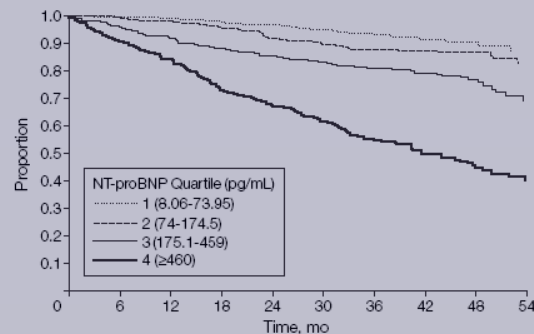
Beeya Na, MPH

Alan H. B. Wu, PhD

Nelson B. Schiller, MD

Mary A. Whooley, MD

Figure. Survival Free of Cardiovascular Events or Death by NT-proBNP Quartile



Quartile	0	6	12	18	24	30	36	42	48	54
1	247	246	245	242	239	235	230	227	226	224
2	247	246	242	236	227	221	217	216	215	210
3	247	237	227	218	211	206	200	197	193	185
4	246	225	210	182	168	154	138	128	120	113

– NT-proBNP strongly prognostic in patients with stable angina pectoris\*

# Prognostic Value of B-Type Natriuretic Peptides in Patients With Stable Coronary Artery Disease: The PEACE Trial

Torbjørn Omland, Marc S. Sabatine, Kathleen A. Jablonski, Madeline Murguia Rice, Judith Hsia, Ragnhild Wergeland, Sverre Landaas, Jean L. Rouleau, Michael J. Domanski, Christian Hall, Marc A. Pfeffer, Eugene Braunwald, for the PEACE Investigators

*J. Am. Coll. Cardiol.* published online Jun 28, 2007;

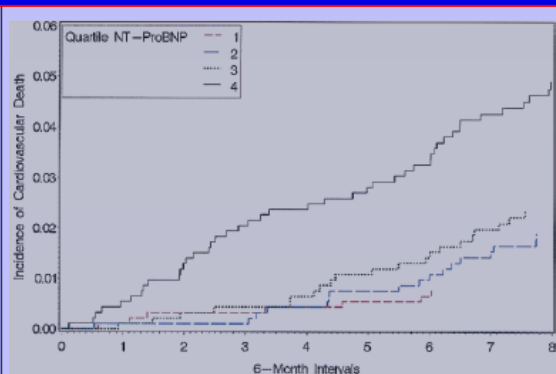


Figure 1 NT-ProBNP and Cardiovascular Death

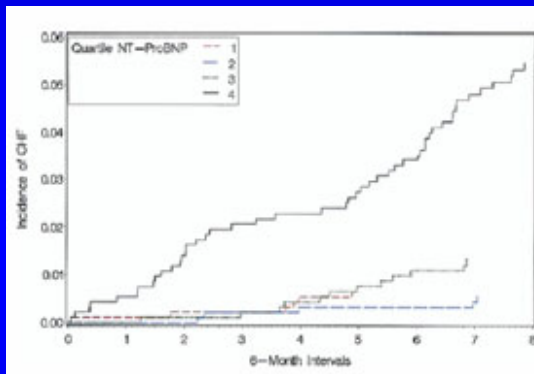


Figure 2 NT-ProBNP and Heart Failure

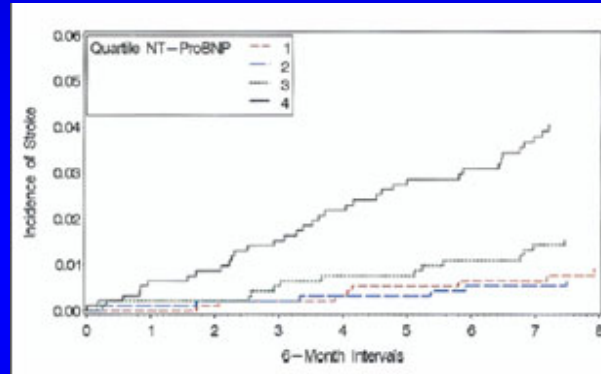


Figure 3 NT-ProBNP and Stroke

**Table 4** Multivariable\* Analysis of the Association Between BNP as Continuous Variables and Cardiovascular Outcomes

Outcome	BNP		NT-ProBNP	
	HR (95% CI)†	p Value	HR (95% CI)†	p Value
Cardiovascular mortality	1.06 (0.87-1.28)	0.57	1.69 (1.38-2.07)	<0.001
Fatal/nonfatal MI	0.91 (0.77-1.07)	0.24	1.02 (0.87-1.19)	0.84
Fatal/nonfatal CHF	1.62 (1.32-1.97)	<0.001	2.35 (1.86-2.98)	<0.001
Fatal/nonfatal stroke	1.15 (0.91-1.45)	0.24	1.63 (1.26-2.12)	<0.001

# NT-proBNP and Prognosis

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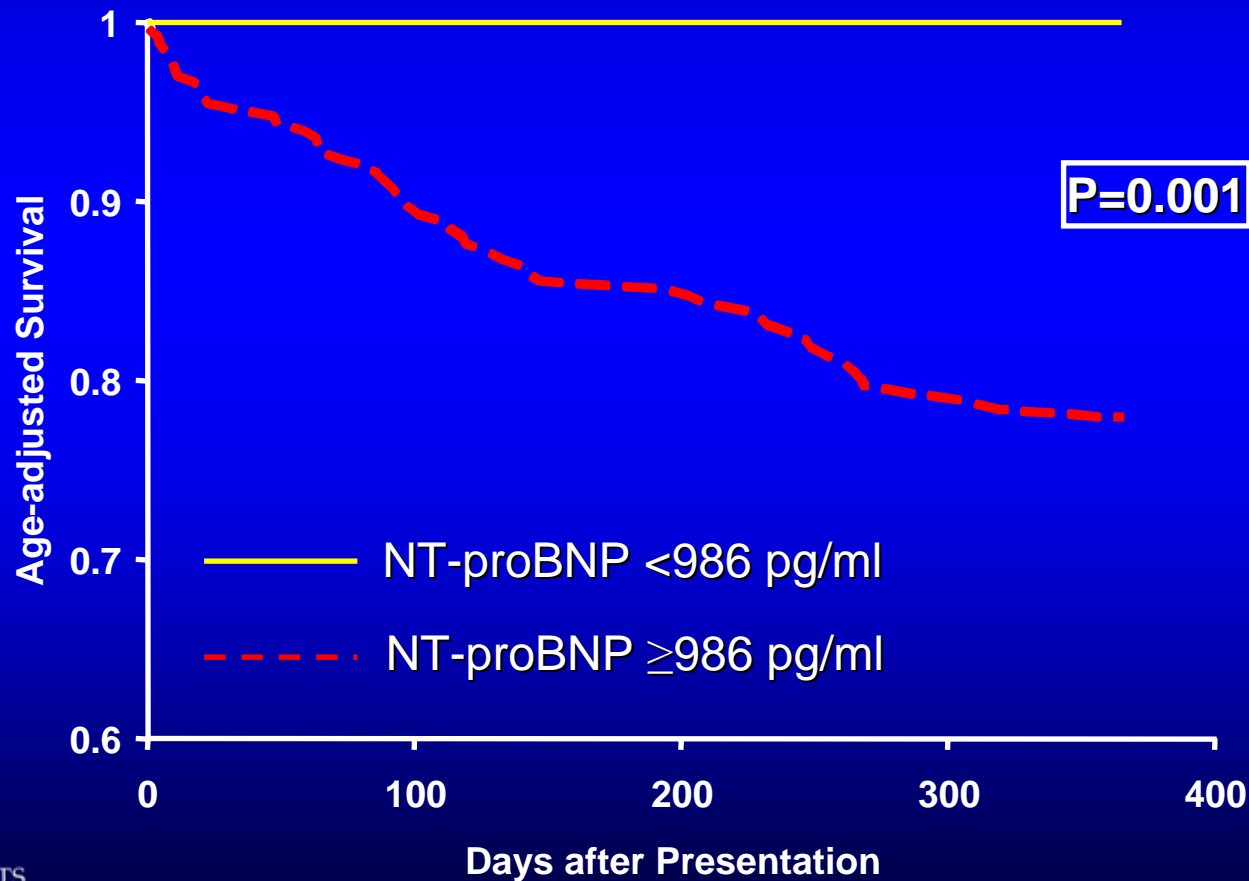
# NT-proBNP in **acute** HF

## Prognosis and Management



# Natriuretic Peptides and Long Term Outcomes in Patients with Destabilized Stage C HF

*NT-proBNP measured on presentation with acute HF*

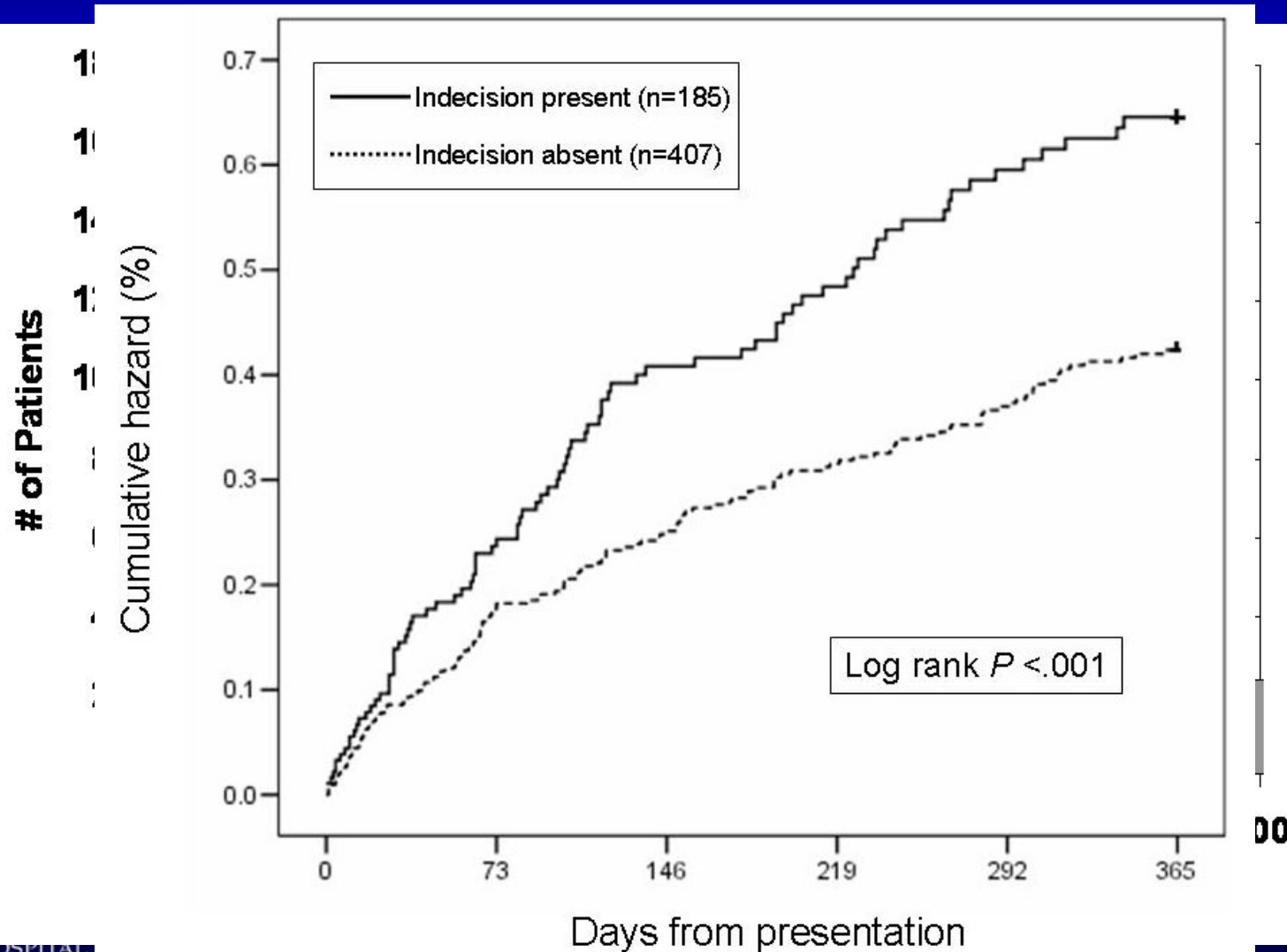


# Why might natriuretic peptide testing assist with INPATIENT heart failure management?

- Earlier diagnosis
- Better triage
- As a guide to adequacy of therapy?



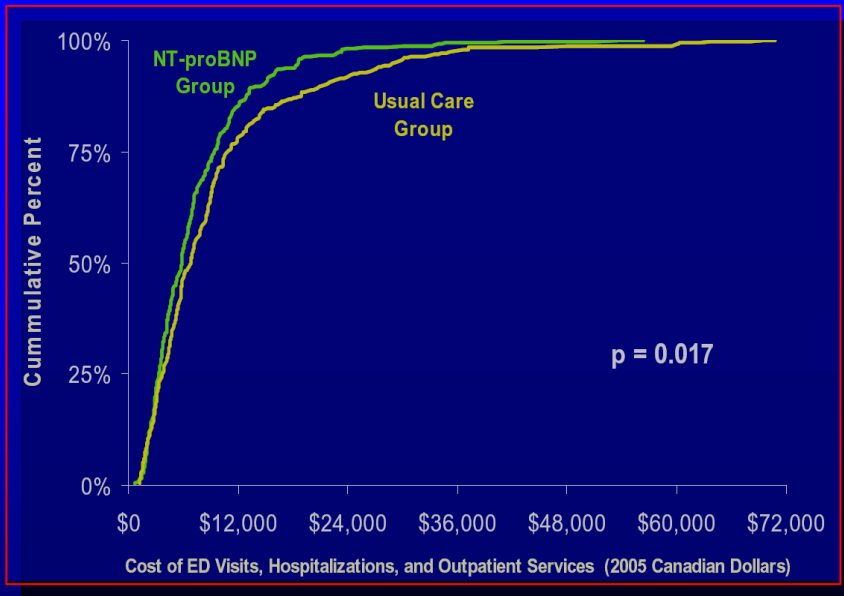
# Frequency and Effect of Diagnostic Uncertainty on Heart Failure Outcomes



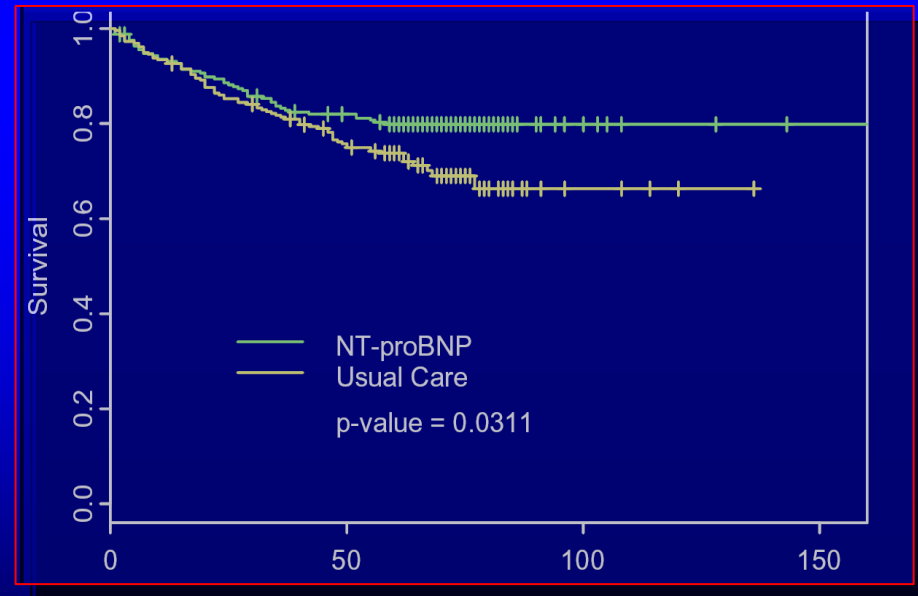
# Effect of Selective NT-proBNP Testing On Costs/Outcomes:

## *Results of the Randomized IMPROVE-CHF Trial*

### Effect of Selective NT-proBNP Testing on Utilization/Costs



### Effect of Selective NT-proBNP Testing on Outcomes



# Why might natriuretic peptide testing assist with INPATIENT heart failure management?

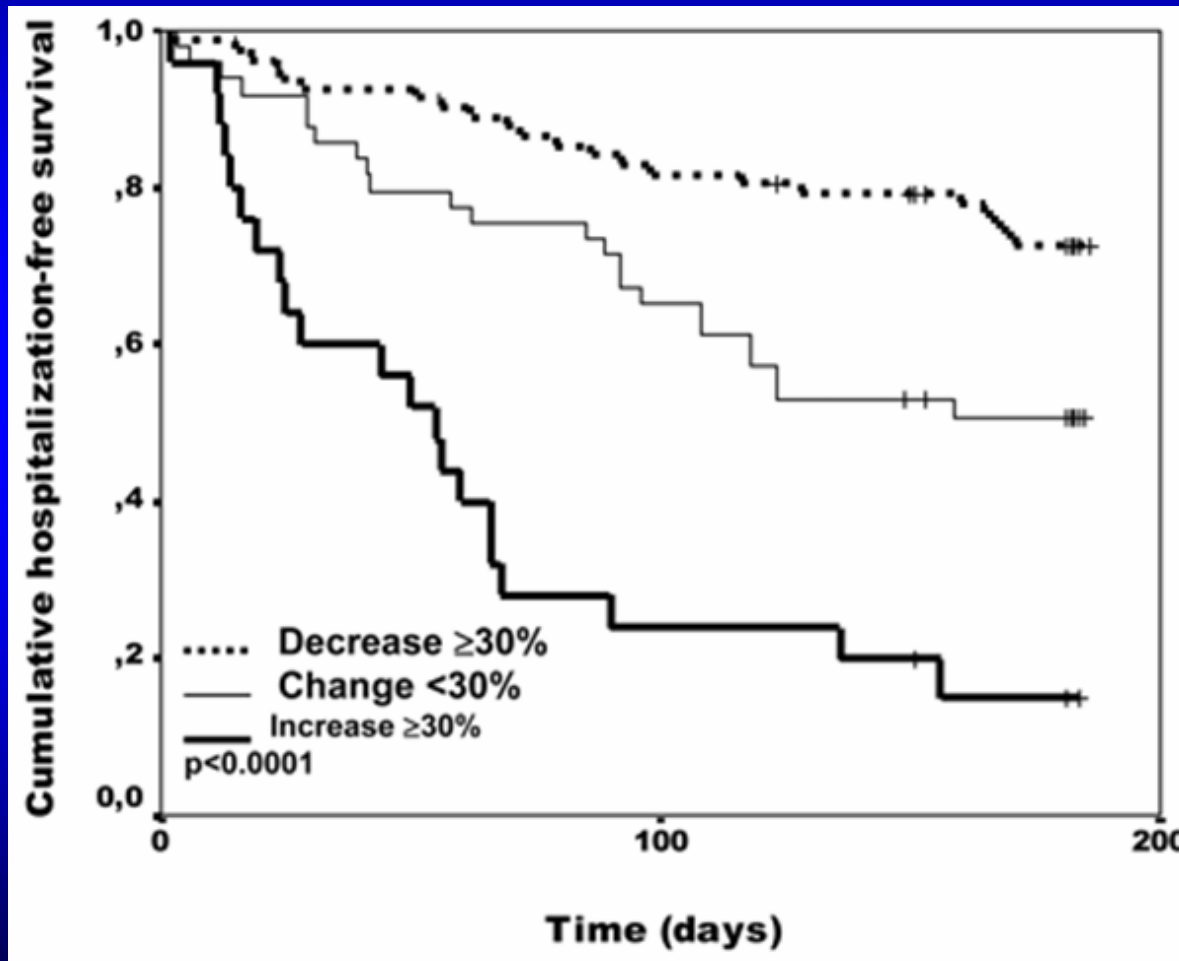
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- Earlier diagnosis
- Better triage
- As a guide to adequacy of therapy?

# Therapies with Effects on B-Type Natriuretic Peptide Levels (and outcomes)

Therapy	Effect on B type NP Levels
Diuresis	↓
ACE-I	↓
ARB	↓
Beta blockers	↓
Aldactone	↓
BNP	↓ N-BNP, ↑ BNP
BiV pacing	↓
Exercise	↓

# Changes in NT-proBNP and Outcomes Following ADHF

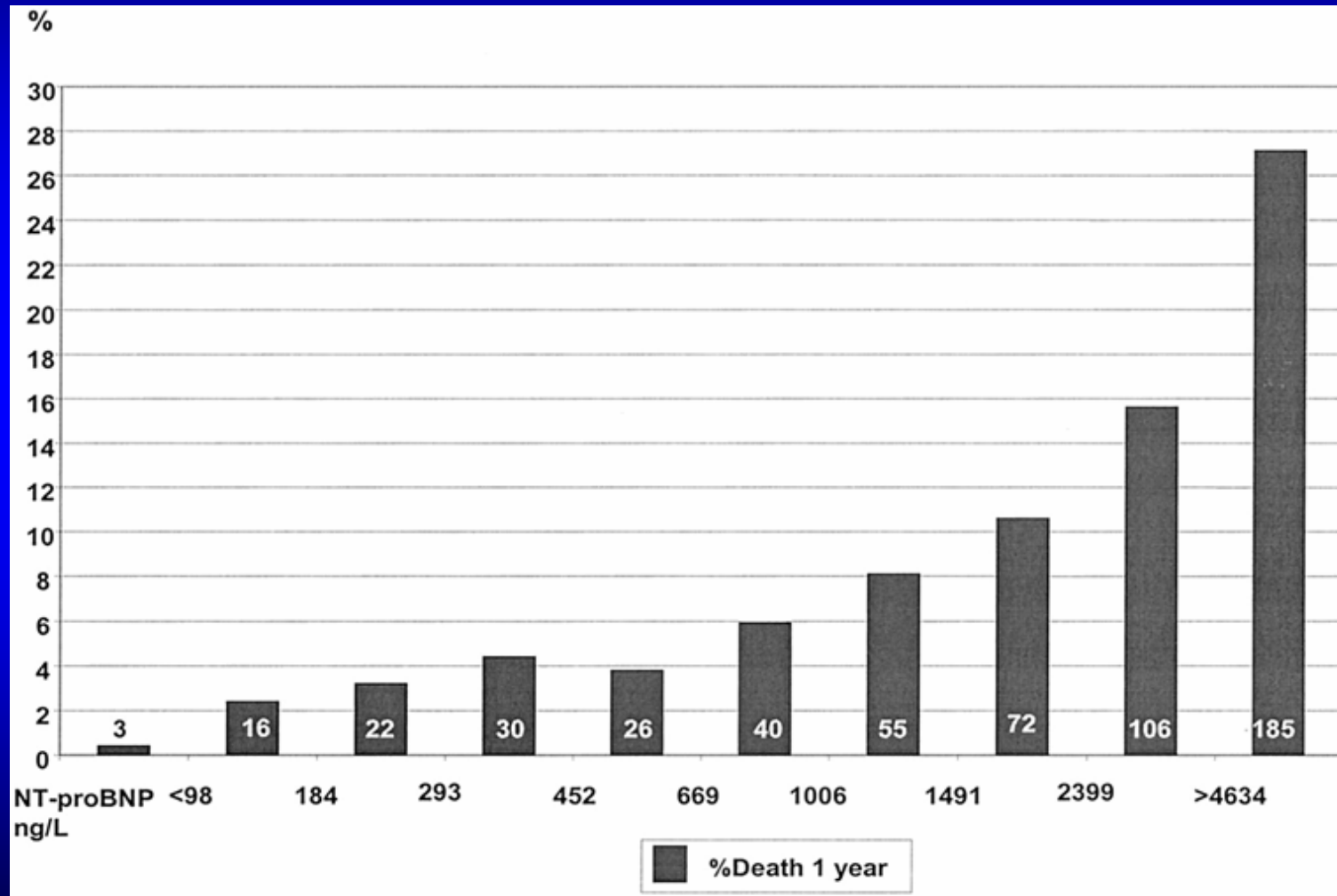


# Protocol for NT-proBNP Testing in Acute HF

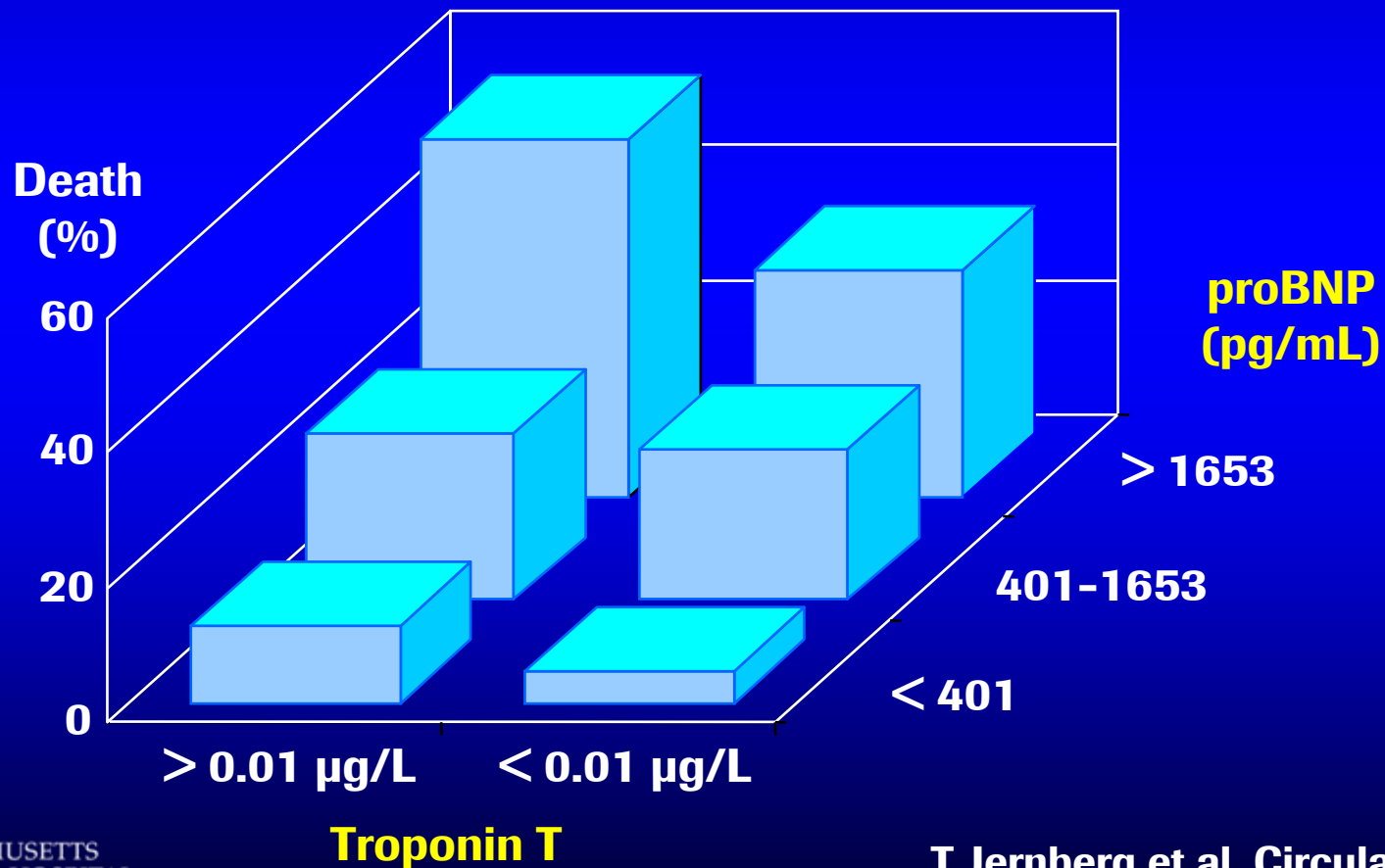
- Baseline measurement for diagnosis
- Pre-discharge measurement for both 'dry' NT-proBNP estimation and to assess for treatment response:
  - If rise  $>30\%$ : discharge delayed,  $\uparrow$ Rx
  - If change  $<30\%$ : possible discharge delay
  - If fall  $>30\%$ : discharge authorized

# Prognostic value of NT-proBNP in other “acute” situations...

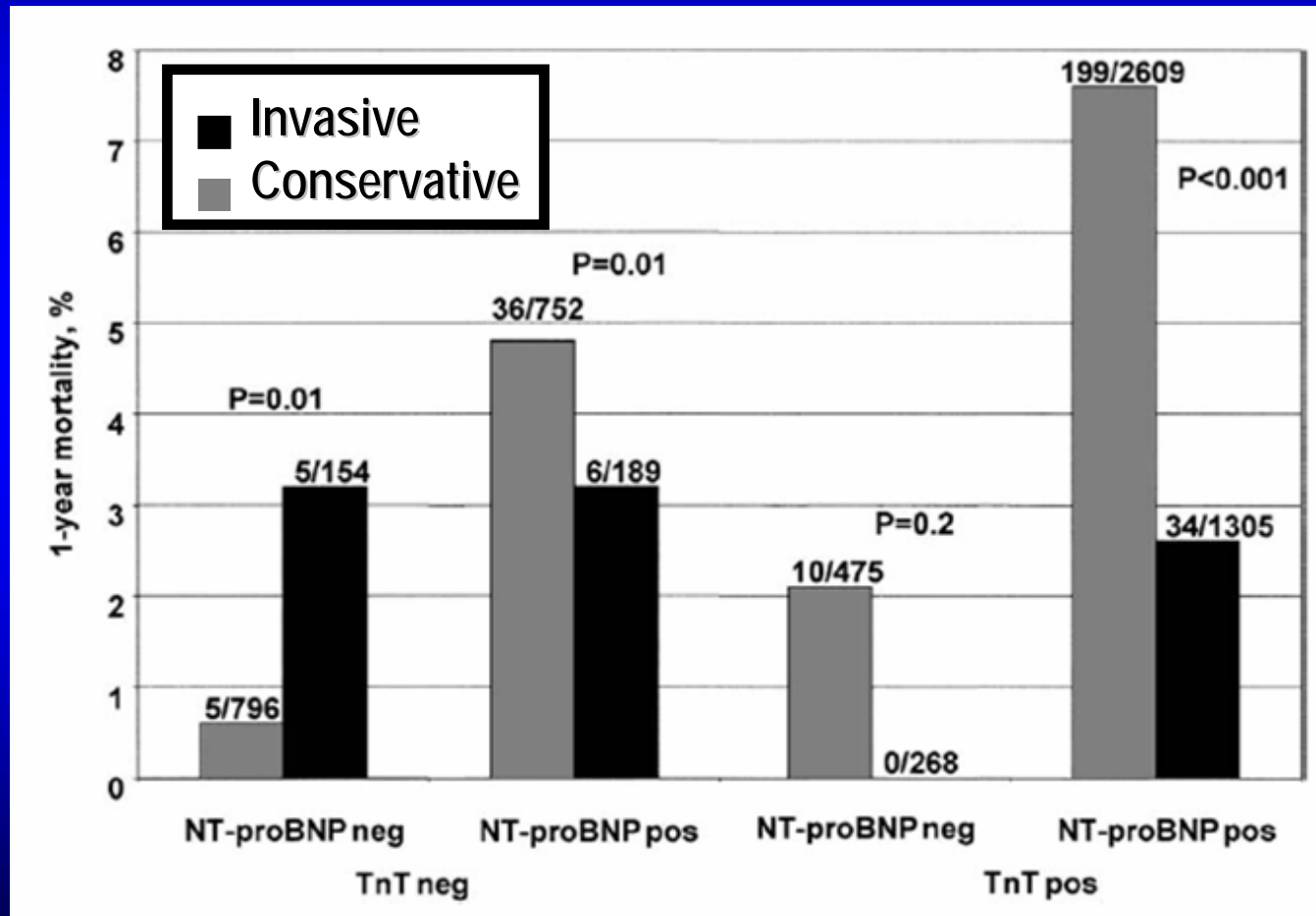
# NT-proBNP and ACS Outcomes



# Combination of NT-proBNP and Troponin T identifies a very high risk group



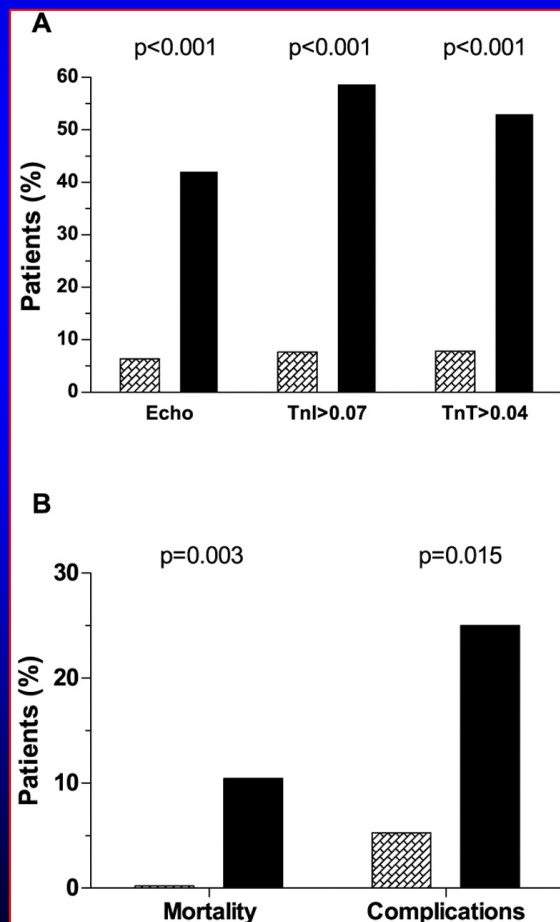
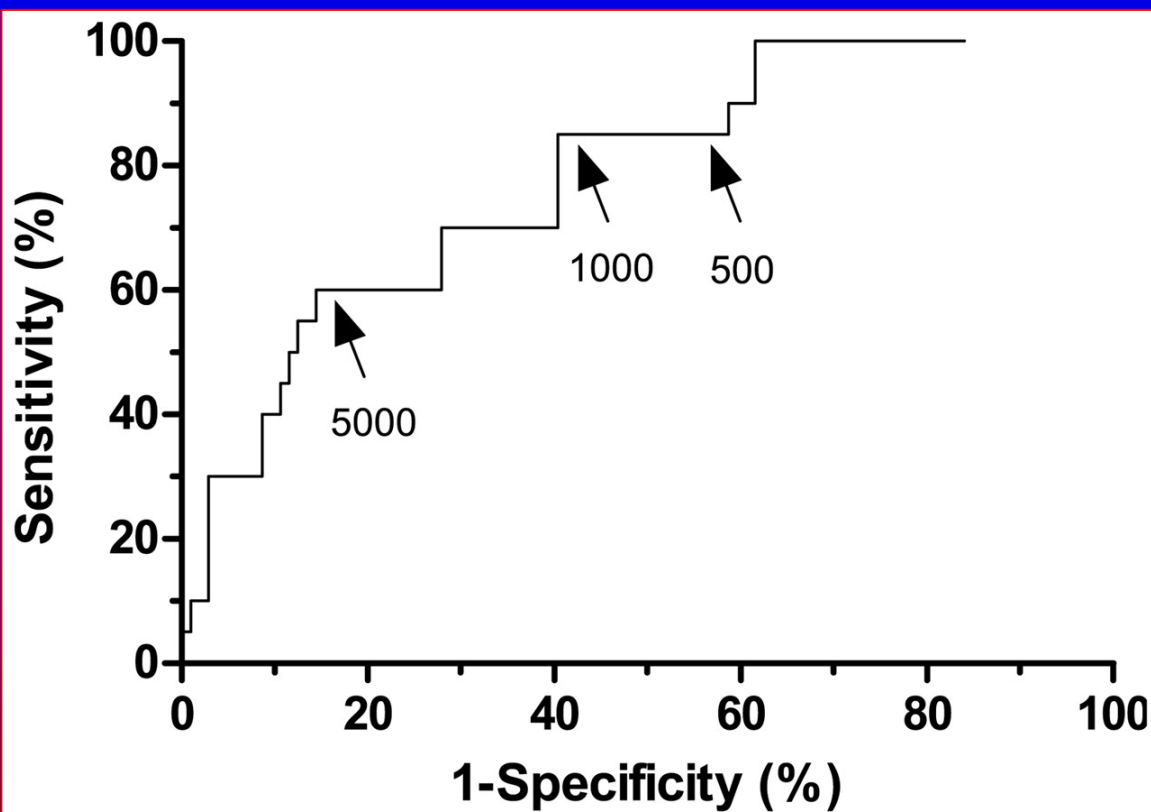
# Natriuretic Peptides and Troponins May Predict Benefit of Early Invasive ACS Therapy





# N-Terminal Pro-Brain Natriuretic Peptide or Troponin Testing Followed by Echocardiography for Risk Stratification of Acute Pulmonary Embolism

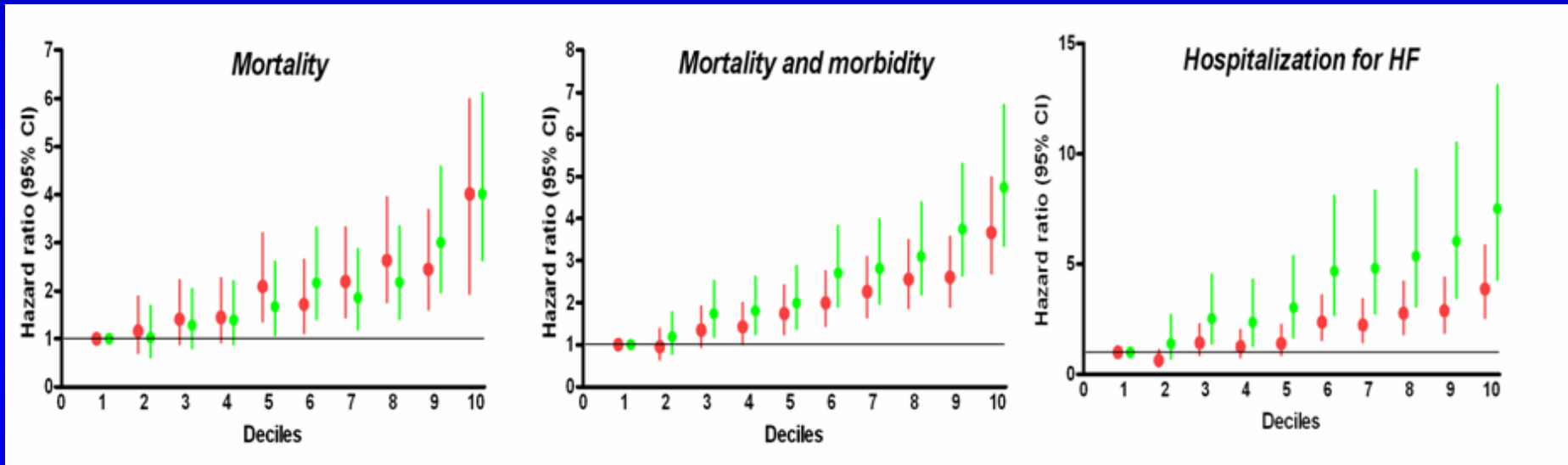
Lutz Binder, MD; Burkert Pieske, MD; Manfred Olschewski, PhD; Annette Geibel, MD; Beate Klostermann, MD; Christian Reiner, MD; Stavros Konstantinides, MD



# NT-proBNP in **chronic** HF

## Prognosis and Management

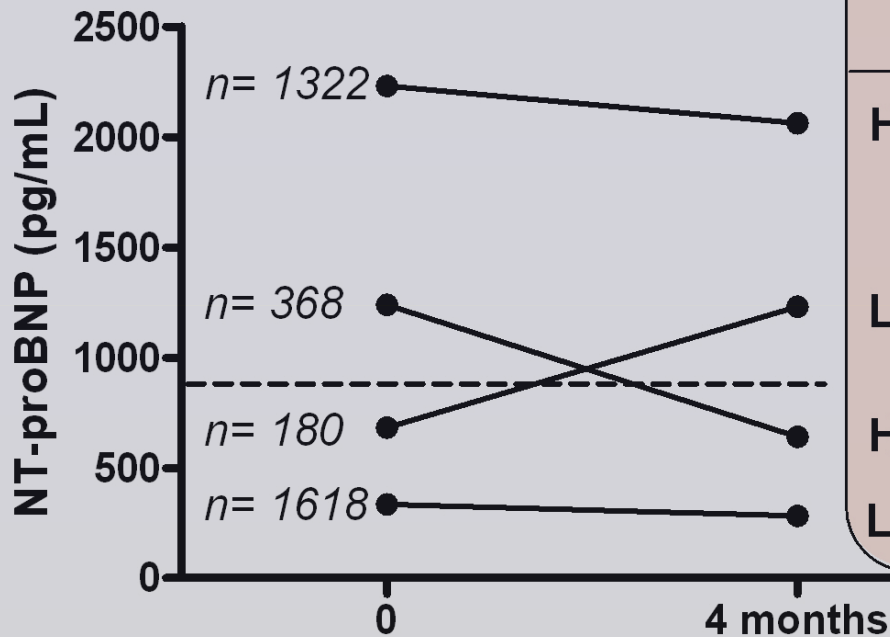
# Comparative value of BNP vs NT-proBNP for Prognostication in Advanced HF



— BNP — NT-proBNP

*Covariates for adjustment: age, gender, NYHA class, ischemic etiology, LVEF, LVIDd, serum creatinine and bilirubin, randomized treatment, prescription of beta-blockers, digitalis and diuretics, presence of AF or diabetes at study entry.*

# The Importance of Serial NT-proBNP Measurements for Prognostication in Chronic HF

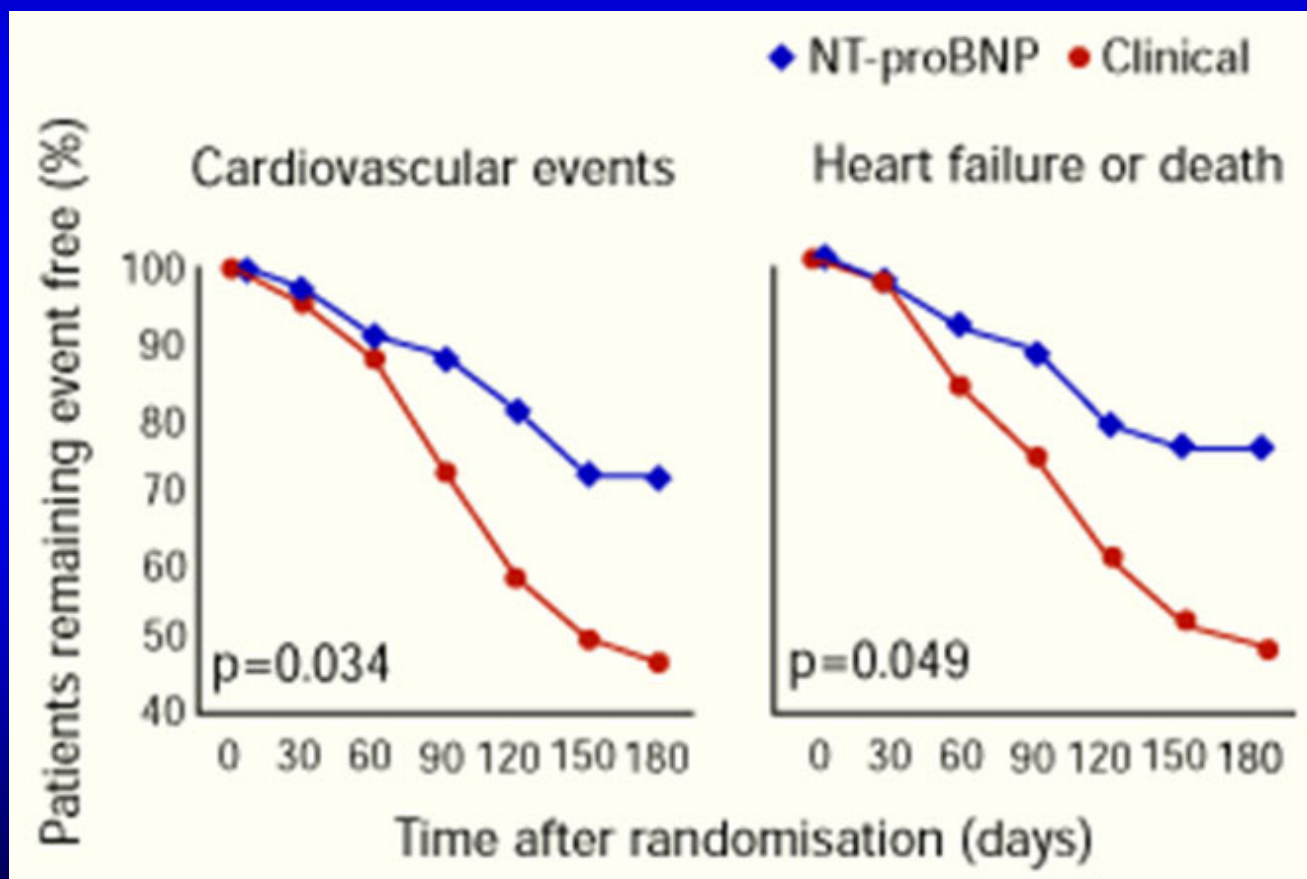


	Mortality (%)	Hospitalization for HF (%)
High → High	25.6	26.8
Low → High	17.2	21.1
High → Low	13.6	10.1
Low → Low	8.6	6.7

# Therapies with Effects on B-Type Natriuretic Peptide Levels (and outcomes)

Therapy	Effect on B type NP Levels
Diuresis	↓
ACE-I	↓
ARB	↓
Beta blockers	↓
Aldactone	↓
BNP	↓ N-BNP, ↑ BNP
BiV pacing	↓
Exercise	↓

# NT-proBNP Assists in the Guidance of HF Treatment



# NT-proBNP Guided HF Trials

- BATTLESCARRED (completed)
- TIME-CHF
- PRIMA
- NORTHSTAR
- PROTECT



# The ProBNP Outpatient Tailored CHF Therapy Study

Principal Investigator: JL Januzzi, Jr, MD

Patients with recent destabilized HF, EF<40%

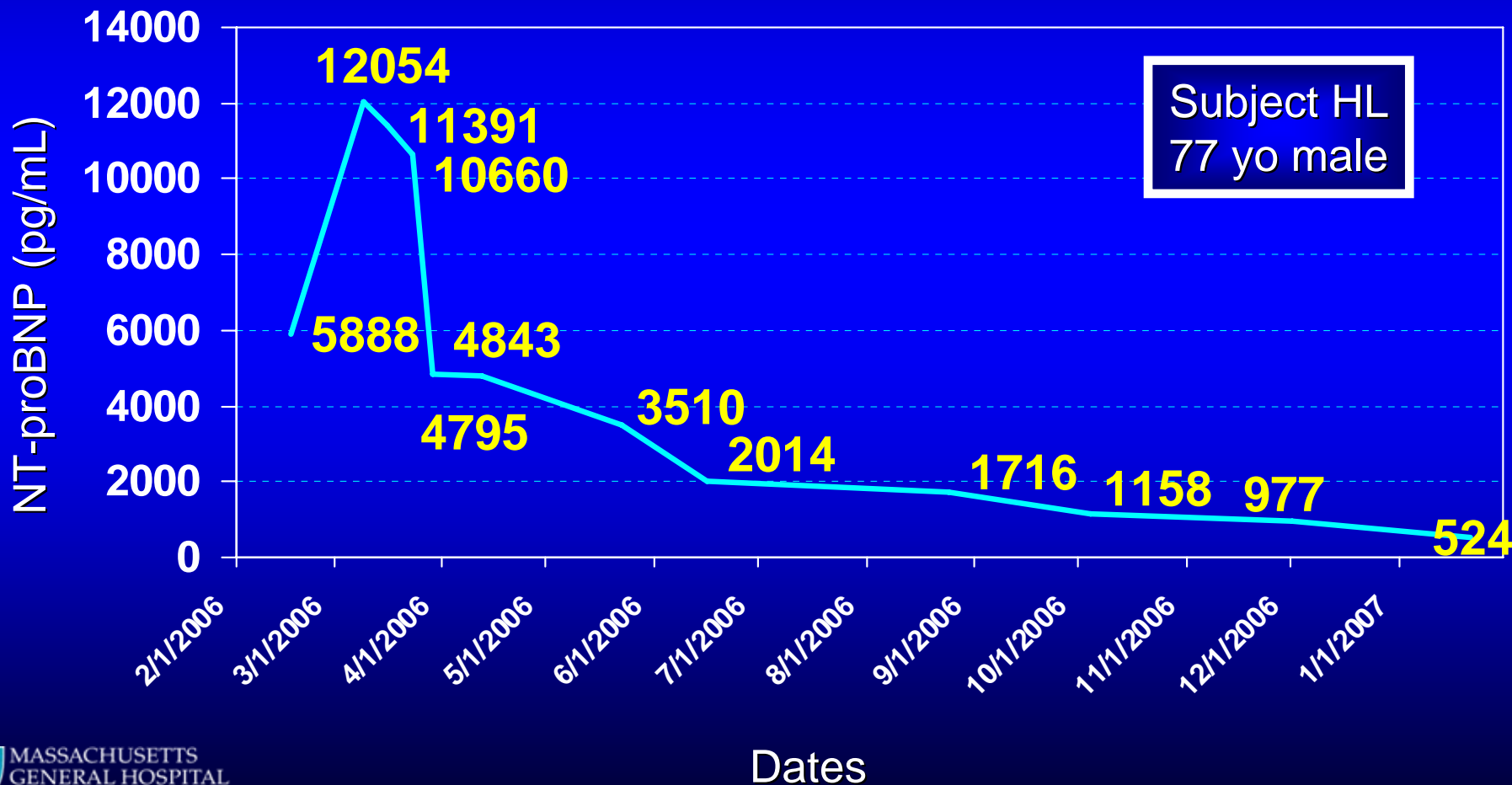
## *Randomization*

Standard of Care  
Treatment

Standard of Care  
plus NT-proBNP  
Guided Treatment

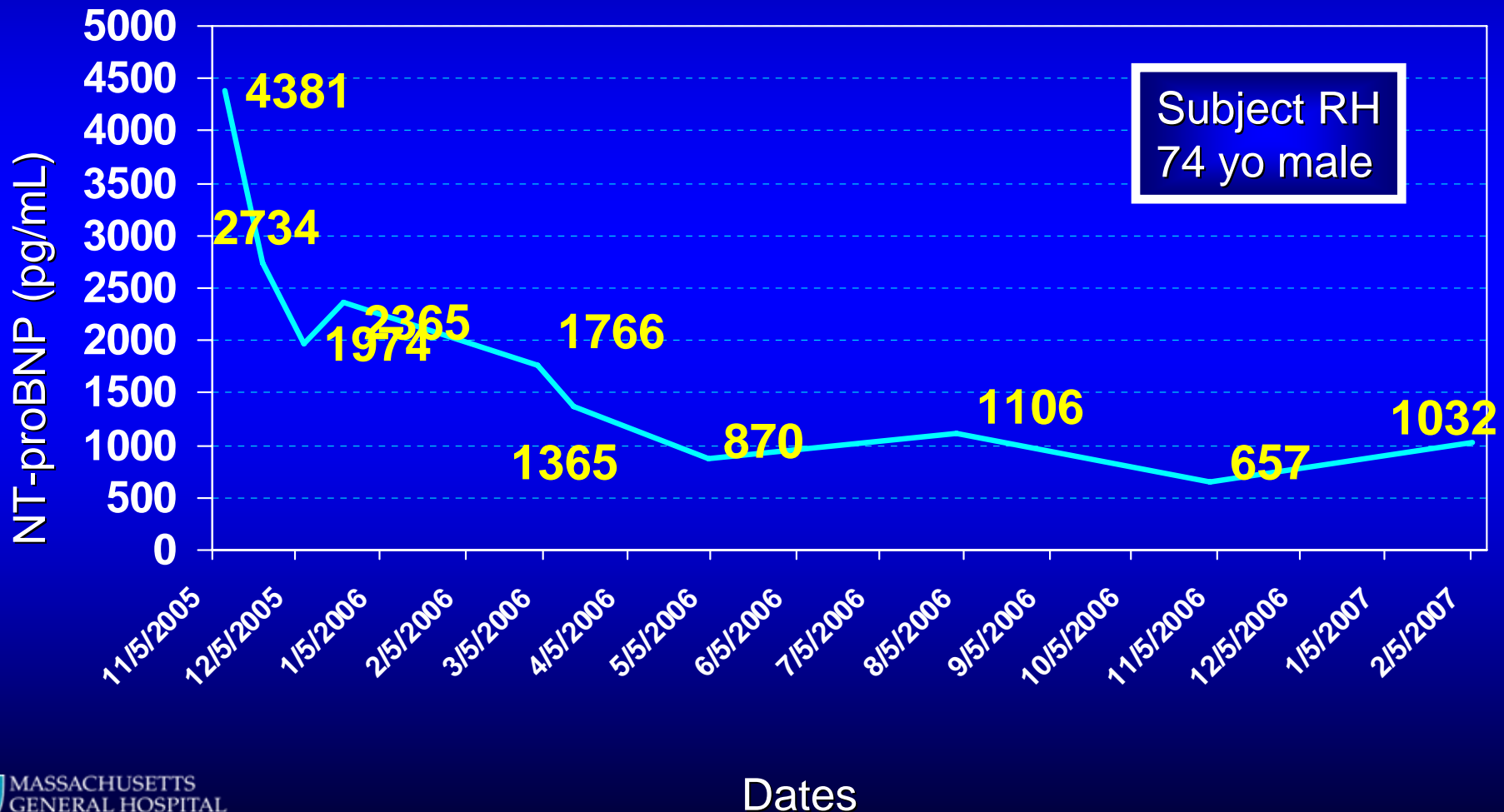


# Don't try this at home (yet)



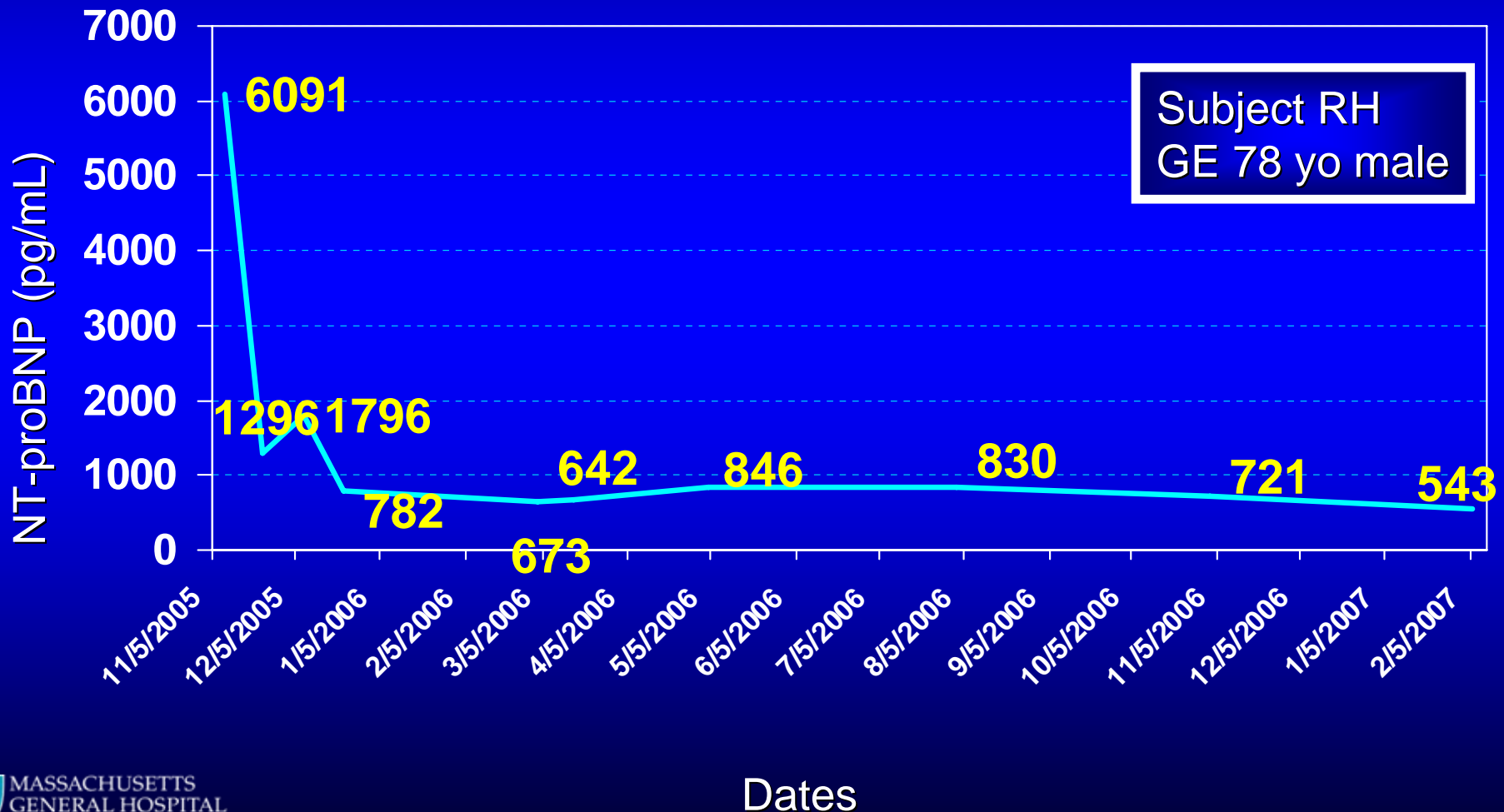


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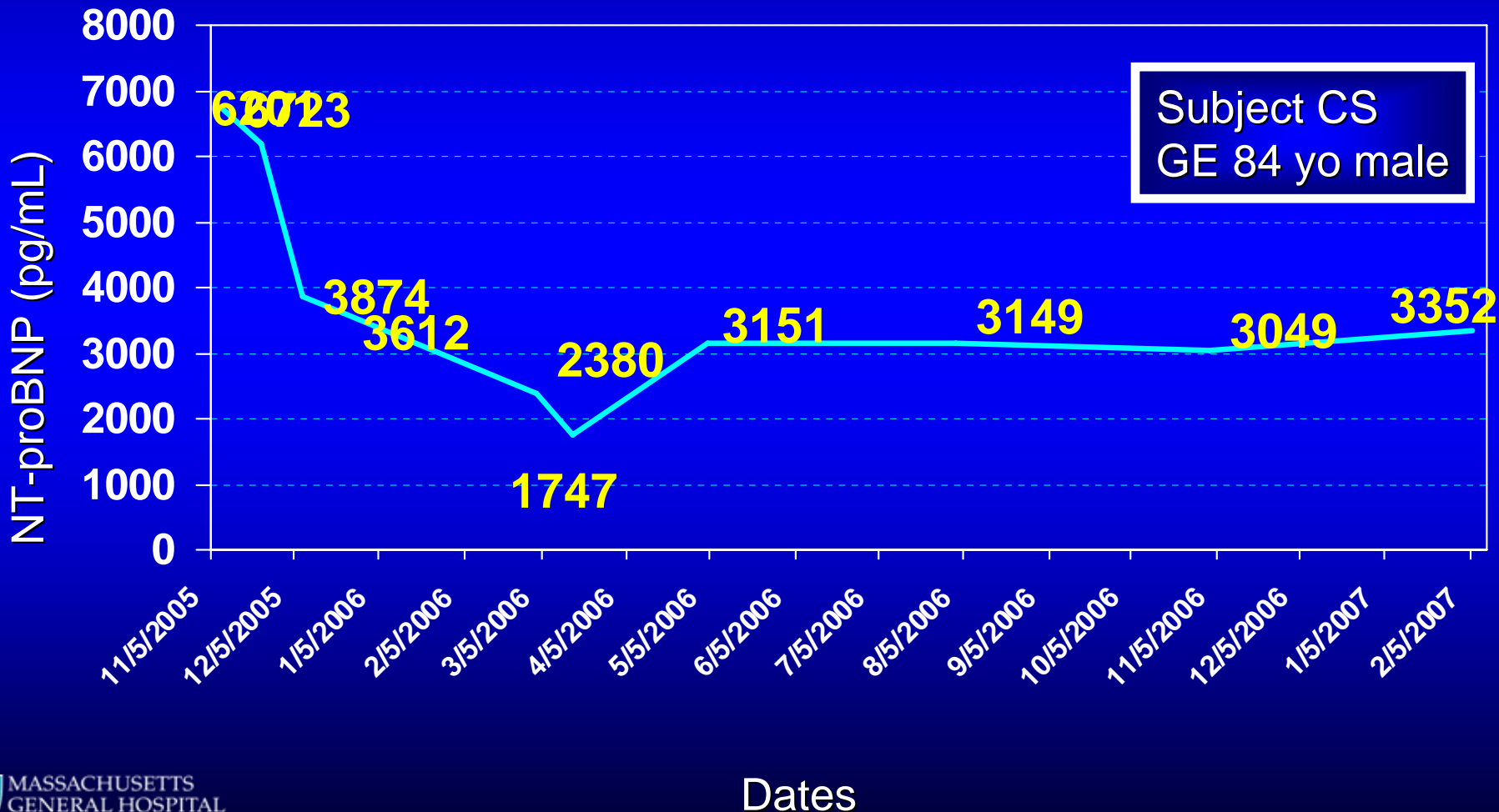


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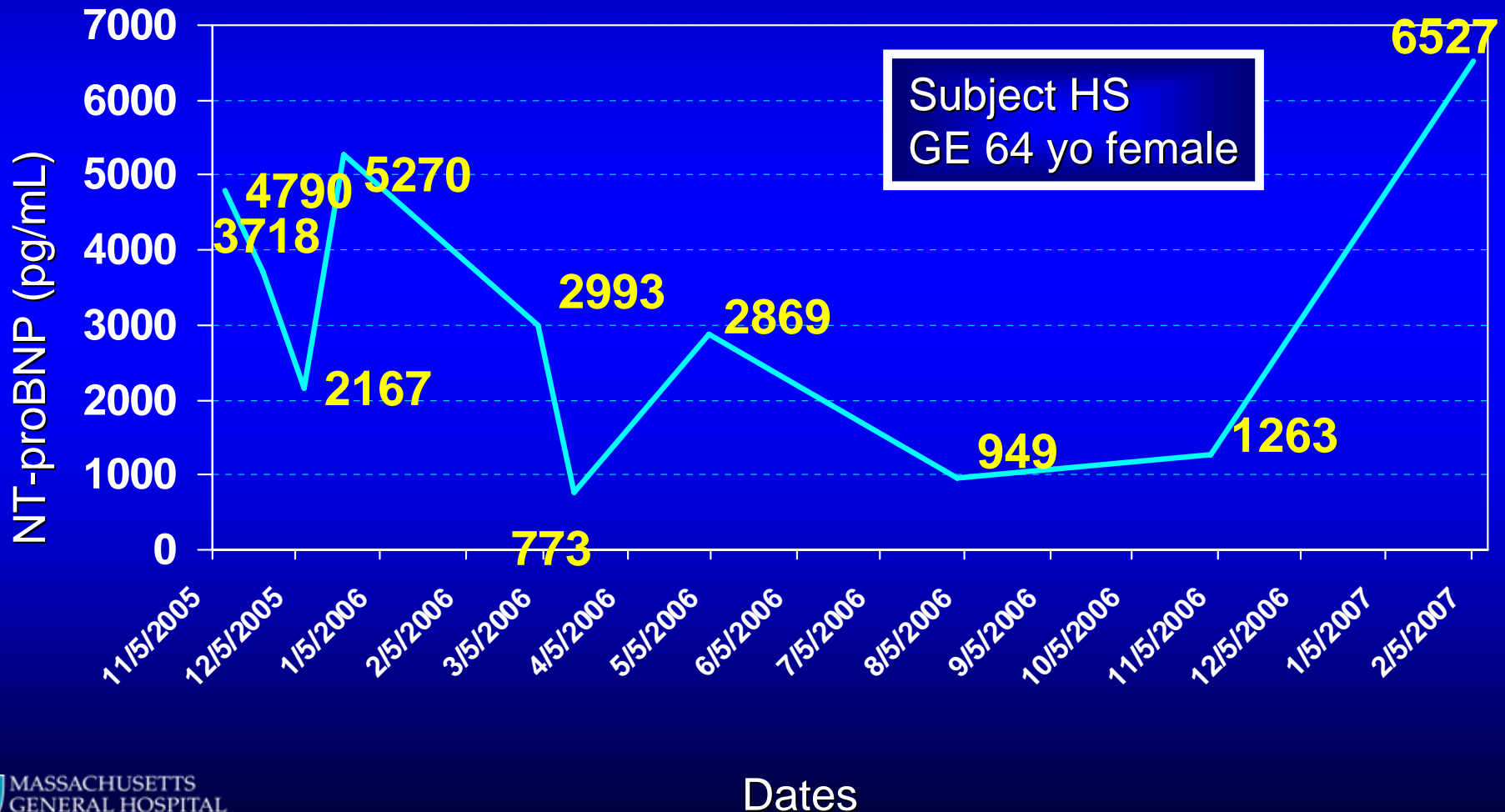


# Not everyone can be shut down

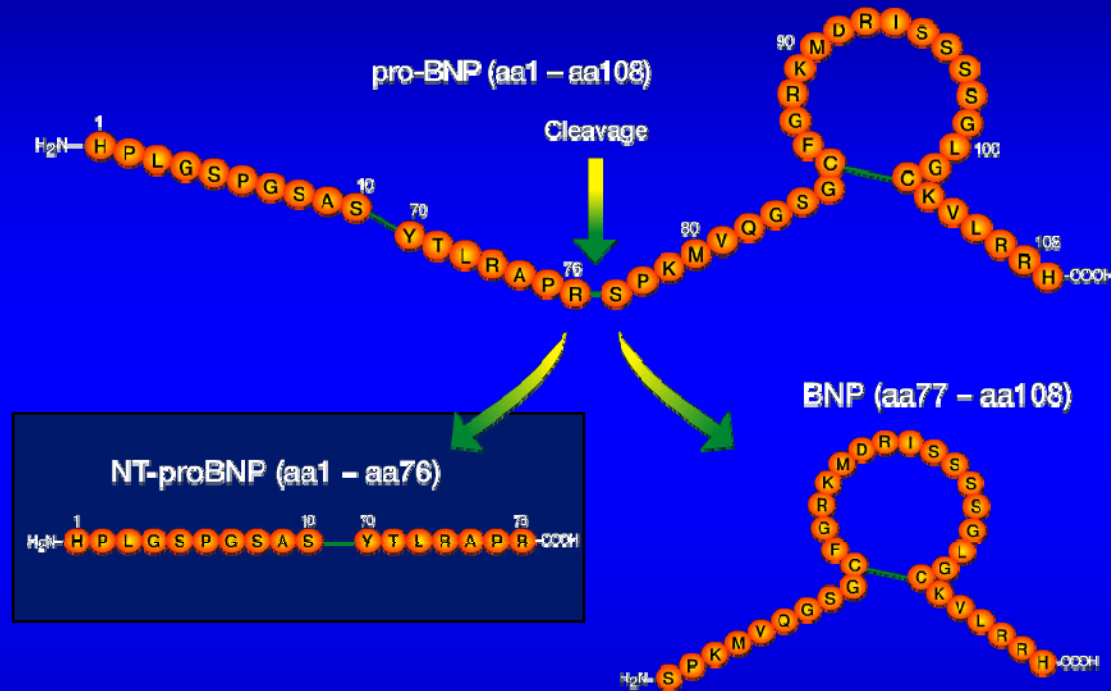




# Some are downright frustrating



# The Prognostic Value of NT-proBNP



**James L. Januzzi, M.D., FACC**

**Cardiology Division, Massachusetts General Hospital  
Harvard Medical School, Boston, MA, USA**