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ACC Middle East Conference 2017

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Beta-Blocker Post Myocardial Infarction: Adjunctive Therapy

Professor Mohamed Sobhy, MD, FACC, FESC

Professor of Cardiology Department, Alexandria University - Egypt
Past President of the Egyptian Society of Cardiology

President of CVREP Foundation

Governor of ACC Chapter in Egypt

Assembly of International Governors of ACC in Middle east & Africa

Stent Save a life Regional Africa Board

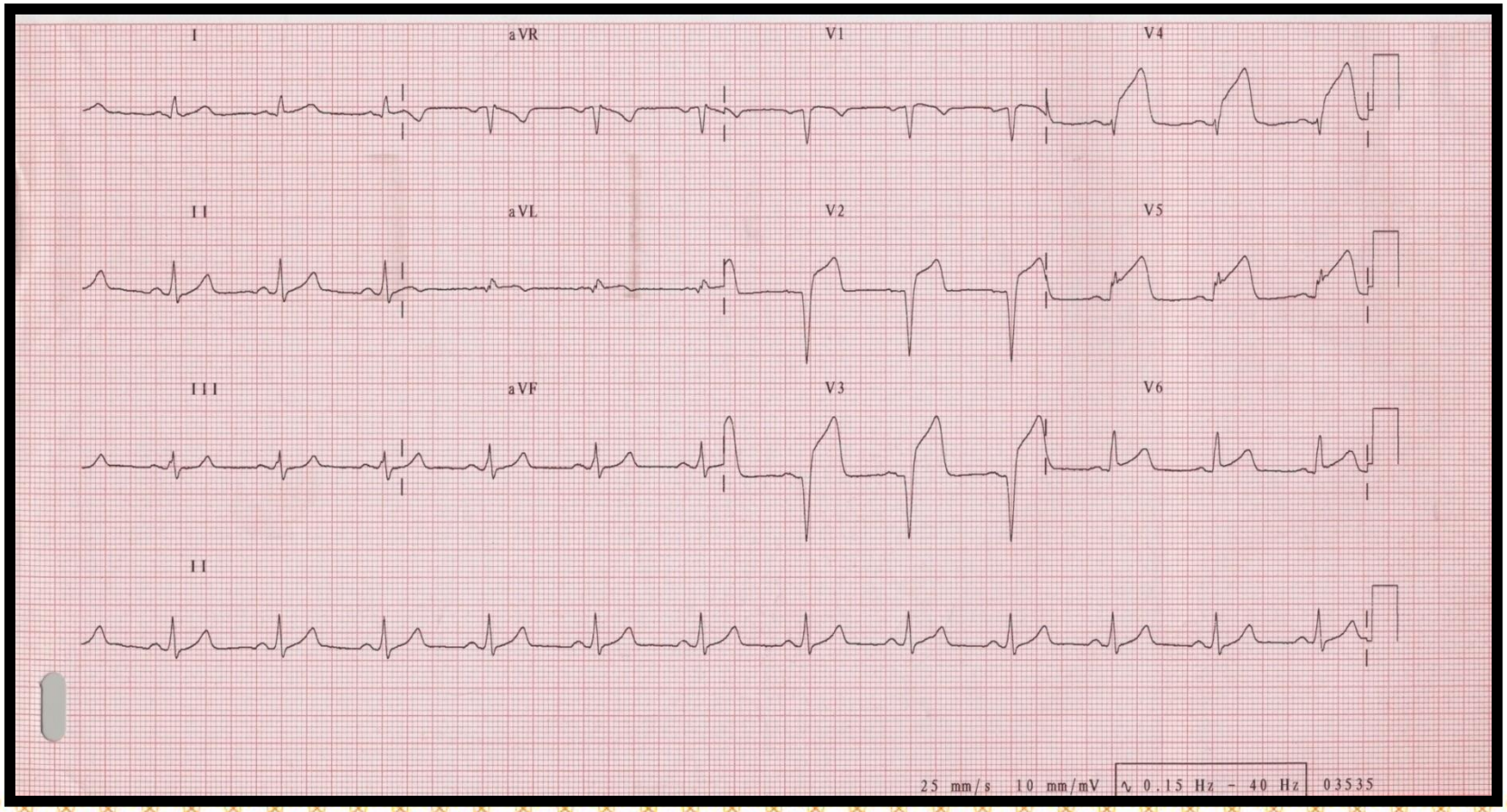
Chairman of ICC Hospital, Alexandria

ACC Middle East Conference 2017

Case

- M: 52yrs
- With anterior STEMI
- PPCI of IRA (LAD) & PCI of RCA in index hospitalization
- Ticagrelor 90mg (1x2)
- Aspirin (100mg) , Bisoprolol (5mg)
- Atorvastatin (80mg)
- Echo Cardiogram: EF = 45%, No mural thrombus
- The patient is stable and discharged after 4 days

ECG


I
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V1
V4
II
aVL
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III
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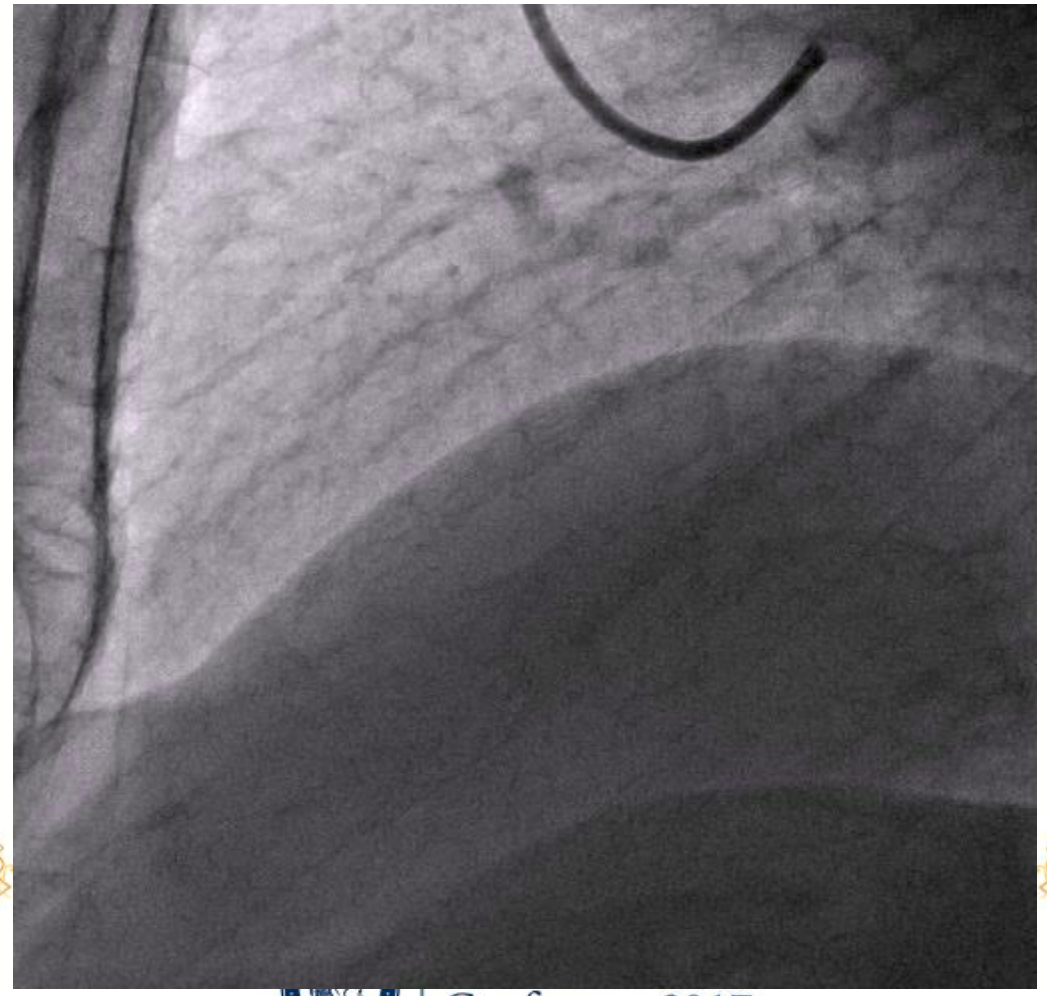
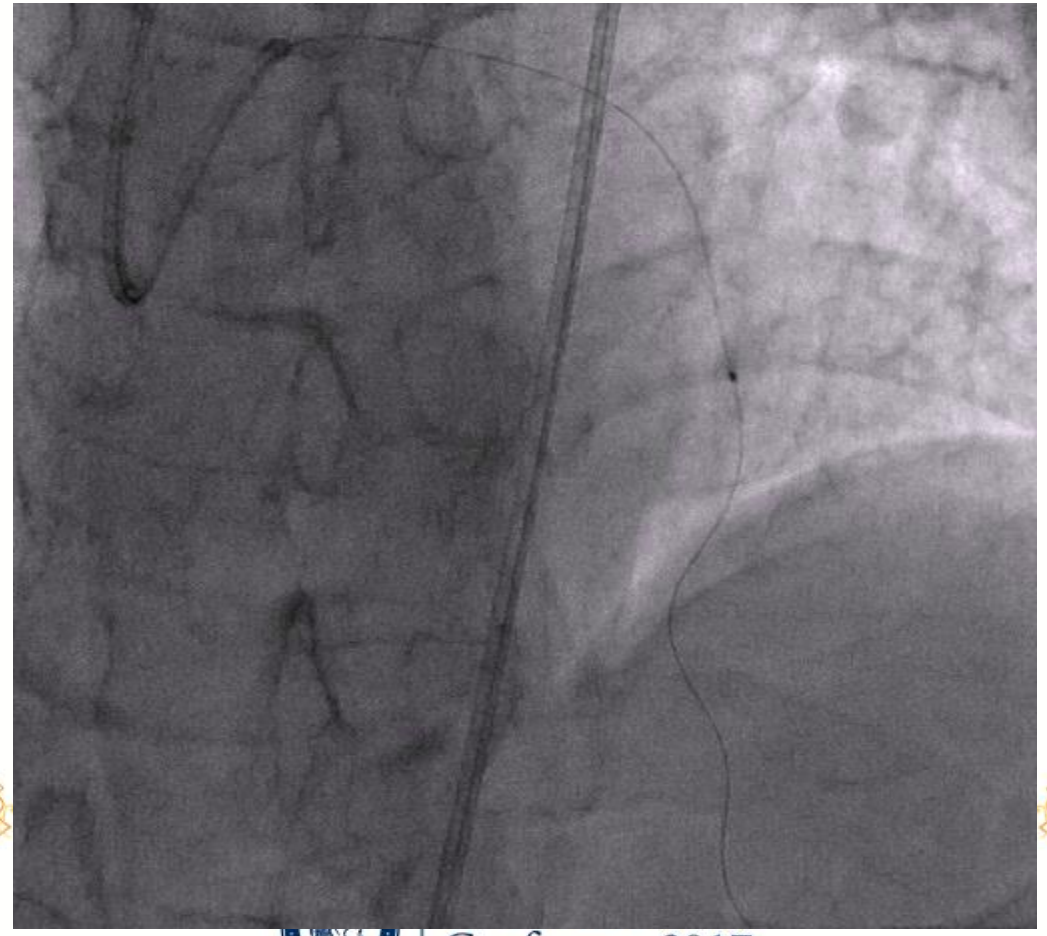
V3
V6
II
25 mm/s 10 mm/mV 0.15 Hz - 40 Hz 03535

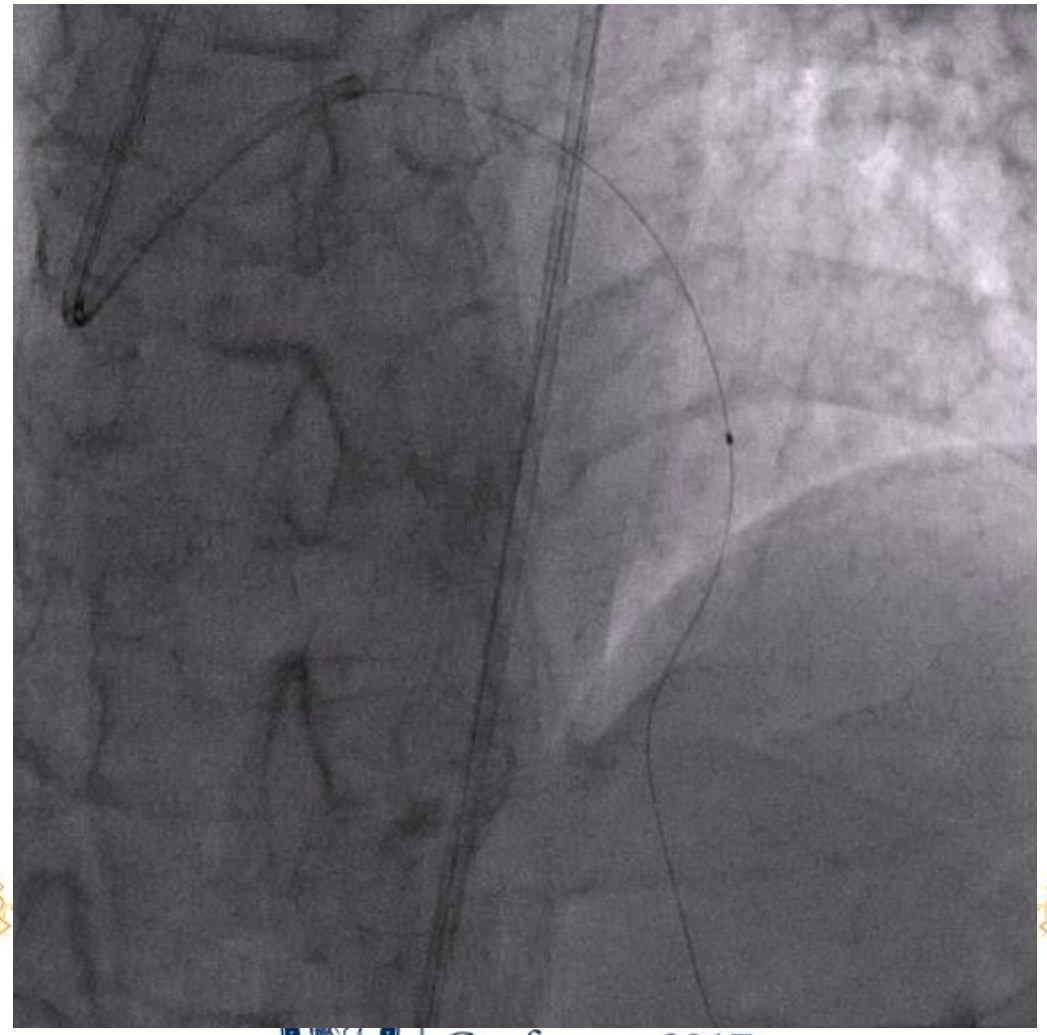
Total occlusion of LAD with big thrombus



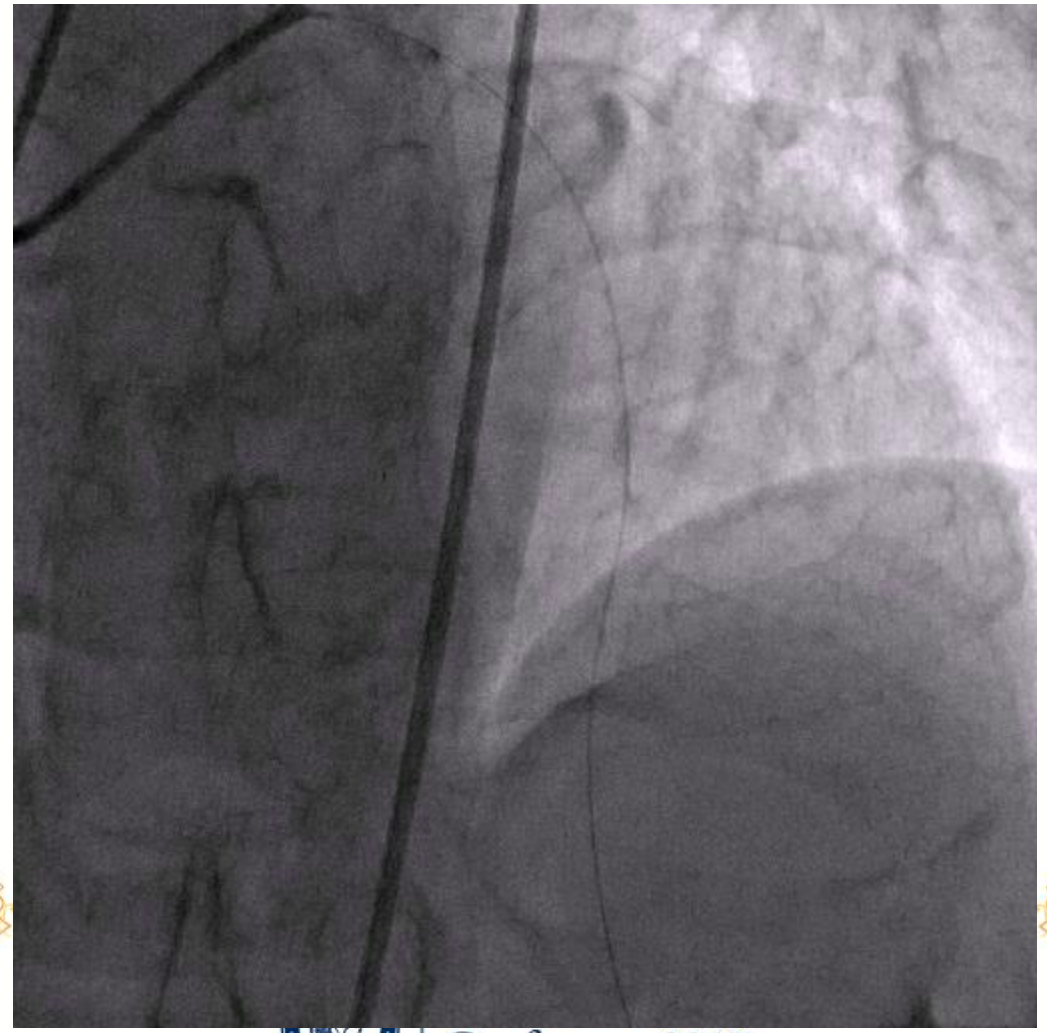
Export cath. for aspiration thrombectomy



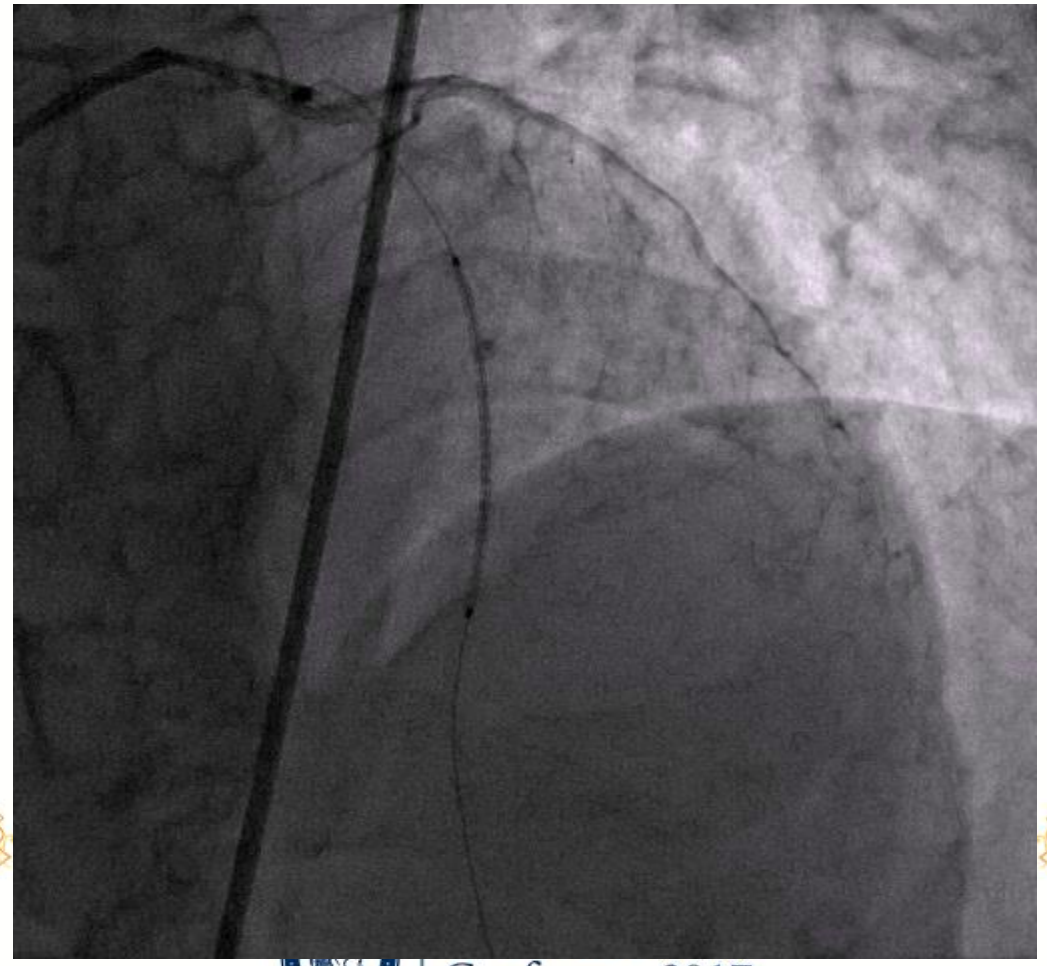
Aspiration again

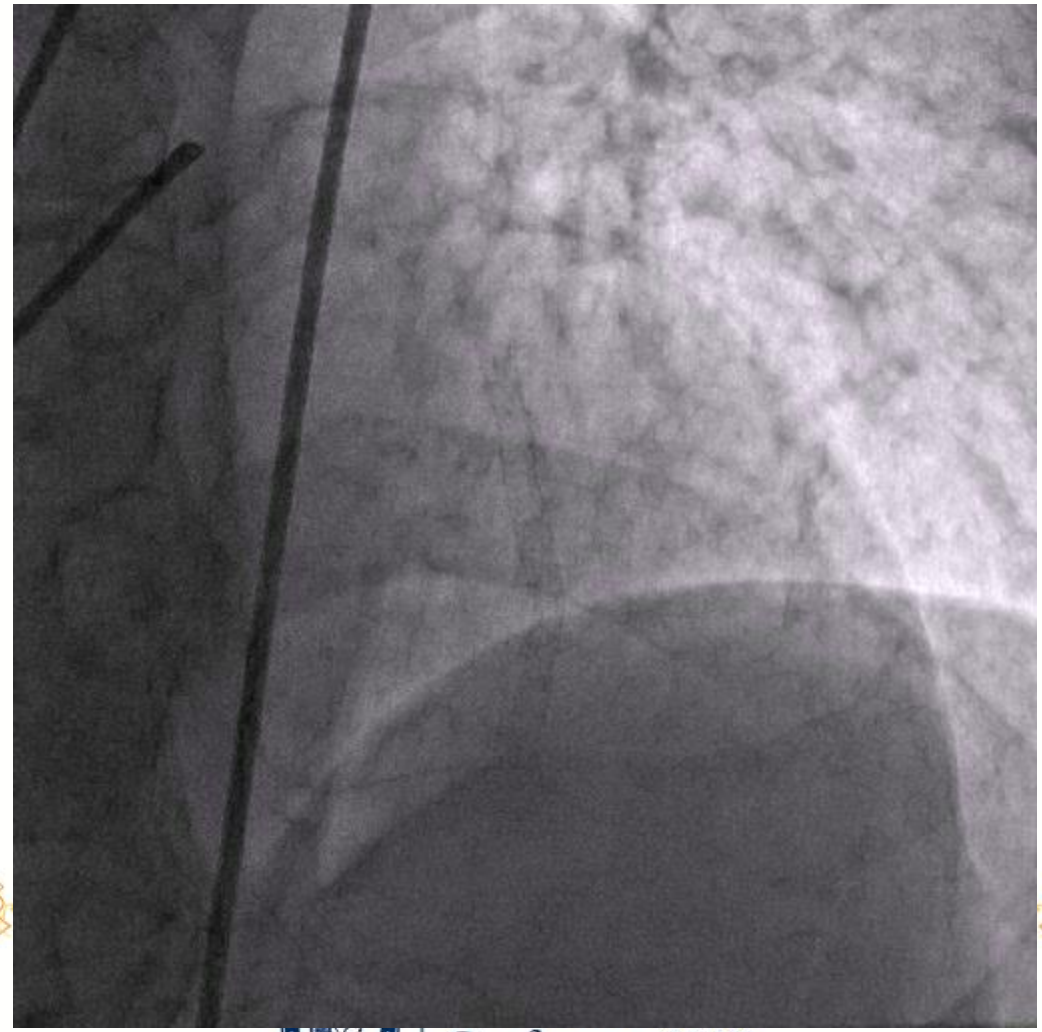


After final aspiration



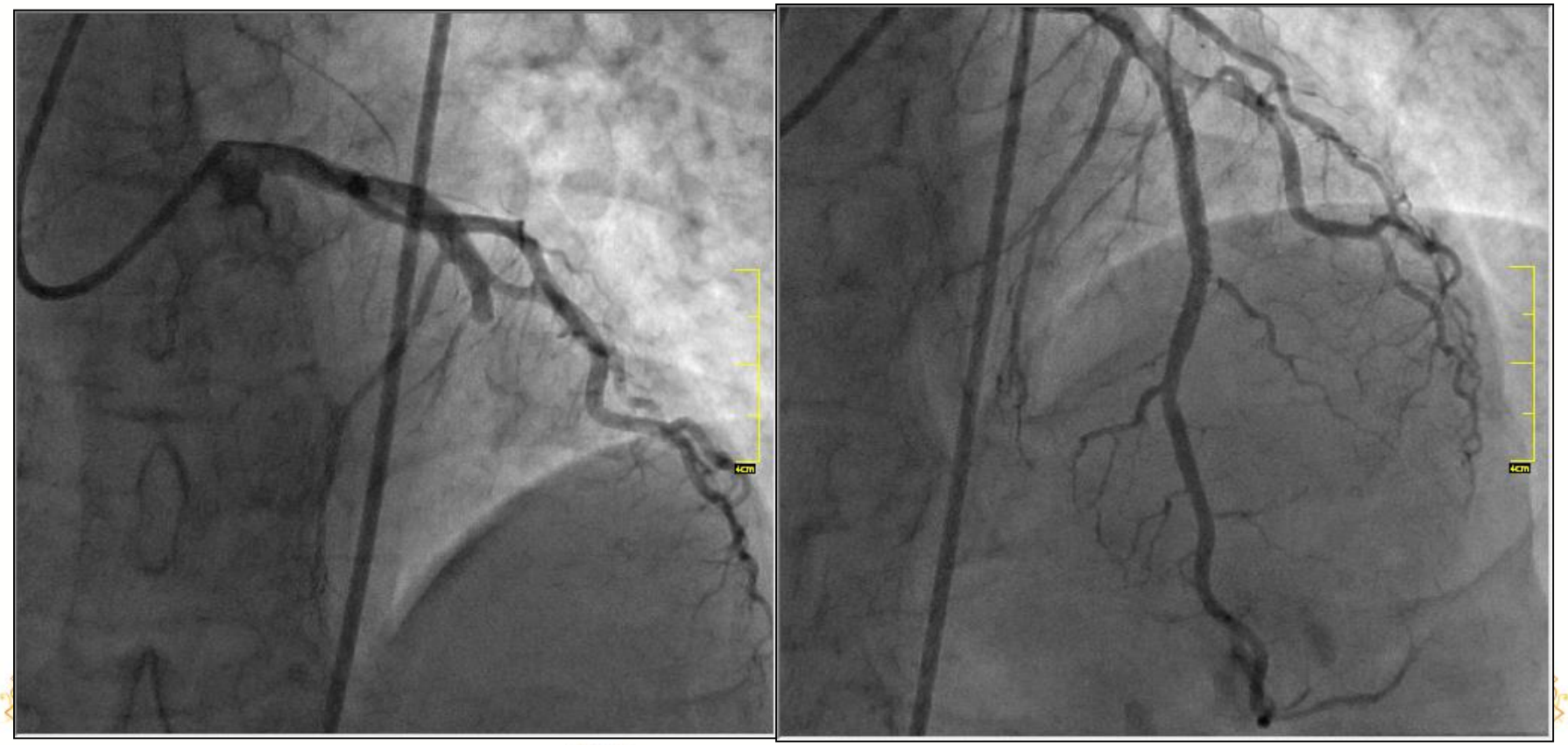
DES
3/38mm



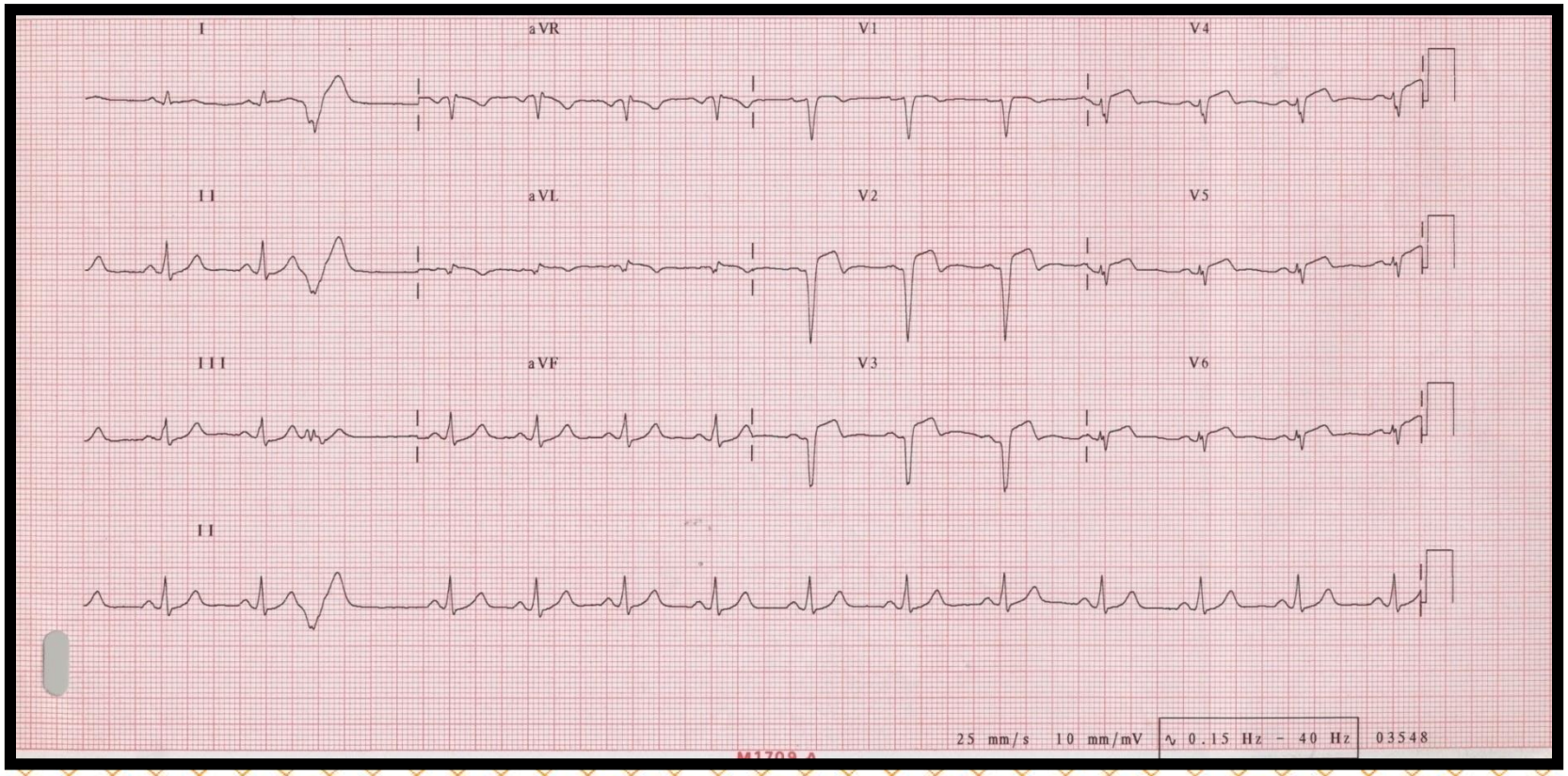


Before

After



ECG post PCI


I
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V5
III
aVF
V3
V6
II
25 mm/s 10 mm/mV
0.15 Hz - 40 Hz
03548

Management of cardiogenic shock in ST-elevation myocardial infarction *(continued)*

ESC European Society of Cardiology

Recommendations	Class	Level
Fibrinolysis should be considered in patients presenting with cardiogenic shock if a primary PCI strategy is not available within 120 min from STEMI diagnosis and mechanical complications have been ruled out.	IIa	C
Complete revascularization during the index procedure should be considered in patients presenting with cardiogenic shock.	IIa	C
Intra-aortic balloon pumping should be considered in patients with haemodynamic instability/cardiogenic shock due to mechanical complications.	IIa	C
Haemodynamic assessment with pulmonary artery catheter may be considered for confirming diagnosis or guiding therapy.	IIb	B

www.escardio.org/guidelines 2017 ESC Guidelines for the Management of AMI-STEMI (European Heart Journal 2017 - doi:10.1093/eurheartj/ehx095)

Before hospital discharge

PCI RCA was done

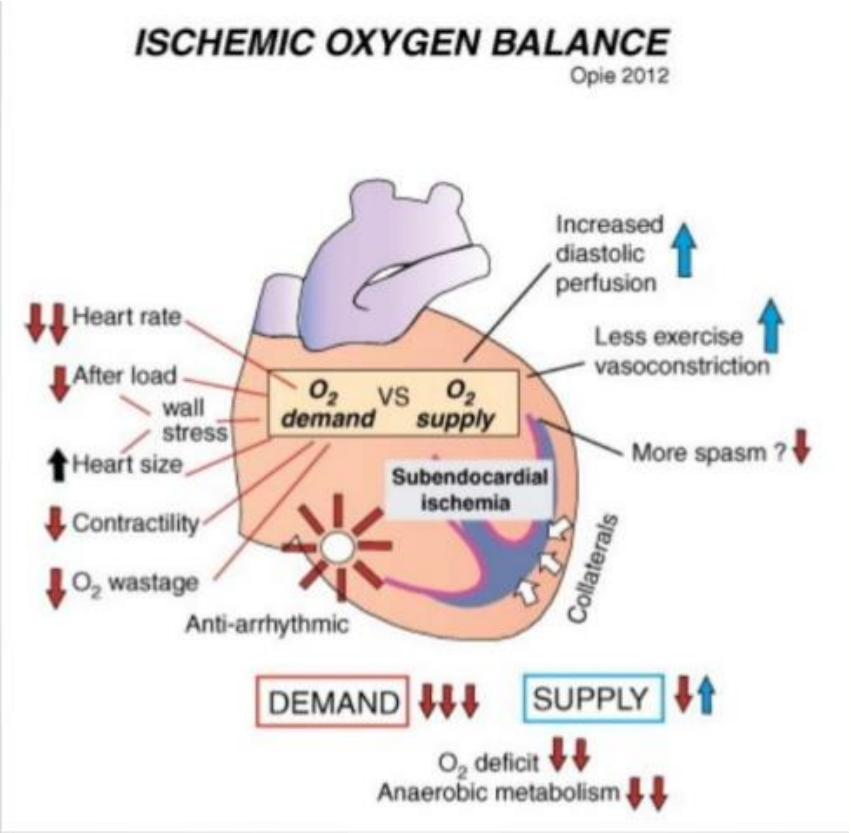
PCI RCA (DES)

Agenda

- Protective Effect of Beta-blockers
- Role of Beta-blockers in different eras
- What did the AHA recommend ?
- Choice of Beta-blockers
- Long-term therapy
- Recent Guidelines of Beta-blockers in STEMI

Protective effects of beta blockers

- ↓ HR and contractility
- ↓ VO_2
- ↓ apoptosis signalling
- Anti-ischemic and anti-arrhythmic effects - ↓ VF
- Anti-inflammatory
- Increase synthesis of myocardial proteins
- Shift from FFA to glucose metabolism
- Peripheral antioxidant effect
- Reduce catecholamine release



Protective effects of beta blockers in ischemia

- Reduce the myocardial oxygen demand via
  - negative inotropic action
  - reduction of heart rate
  - blood pressure decrease
- Increase coronary blood flow via
  - increase in diastolic perfusion time by reducing heart rate
  - augmentation of collateral blood flow and
  - redistribution of blood flow to ischemic areas
- Alter the myocardial substrate utilization
- Decrease the microvascular damage
- Stabilize the cell and lysosomal membranes

Types of Beta Blockers

- Non Cardioselective – Acebutolol, Propranolol
- Partially Cardioselective – Atenolol, Metoprolol
- Highly Cardioselective – Nebivolol, Bisoprolol

Role In STEMI: Thrombolytic Era

- TIMI – IIB[1]
  - Assessed the effects of immediate versus deferred β blockers therapy in patients receiving i.v rTPA.
  - Immediate beta-blockade produced no improvement in LVEF, nor reduced mortality (in both invasive and non-invasive treatment arms) at hospital discharge.
  - However, reduced re-infarction rate and recurrent chest pain noted
- Gusto I Post Hoc analysis[2]
  - Oral atenolol conferred a 5-fold lower mortality risk
  - Associated with decreased stroke, shock and arrhythmias
  - Increased recurrent ischemia and re-infarction

1. *Roberts R, Rogers WJ, Mueller HS, et al. Immediate versus deferred beta-blockade following thrombolytic therapy in patients with acute myocardial infarction. Results of the Thrombolysis in Myocardial Infarction [TIMI] II-B Study. Circulation. 1991;83(2):422–37.*
2. *Pfisterer M, Cox JL, Granger CB, et al. Atenolol use and clinical outcomes after thrombolysis for acute myocardial infarction: the GUSTO-I experience. Global Utilization of Streptokinase and TPA [alteplase] for Occluded Coronary Arteries. J Am Coll Cardiol. 1998;32(3):634–40.*

Role In STEMI: Thrombolytic Era

- 2004 STEMI guidelines (AHA/ACC) recommended the use of early IV β blockers in those undergoing fibrinolytic treatment
- Doubt was raised from a review of the GUSTO – I trial (atenolol)
- 2007 issued new guidelines, took into account the COMMIT study of metoprolol

COMMIT/CCS-2 Study

- Conclusions
  - Metoprolol (15 mg IV, then 200 mg oral daily) in acute MI patients did not significantly reduce in-hospital mortality.
  - It reduced the absolute risks of re-infarction by 5 per 1000 ($P = .001$) and of VF by 5 per 1000 ($P < .001$) from Day 2.
  - Overall, metoprolol increased the risk of cardiogenic shock by 11 per 1000 ($P < .00001$), chiefly during the first day of hospitalization.
  - **In acute MI, it may be better to start beta-blocker therapy when the patient is stable (and then continue long-term therapy).**

So what did the AHA recommend?

- Administer iv β blockers on Day 0 -1 if –
  - There is hypertension
  - Sinus tachycardia or AF (provided bedside echo shows normal LV function)
- Avoid early oral β blockers if –
  - Signs of heart failure +
  - Increased risk of Cardiogenic Shock
  - Relative contraindications are present
    - 1st degree AV block (or any other block)
    - Active asthma
- If early contraindications are present, then re-evaluate suitability after 24 hours.

So what did the AHA recommend?

- From Day 2, benefit is seen on re-infarction and VF reduction rate
- Start with Metoprolol 50 mg 6 hourly (can go up to 200 mg/day)
- Long term use strongly recommended

Antman, Elliott M., et al. "2007 focused update of the ACC/AHA 2004 guidelines for the management of patients with ST-elevation myocardial infarction." Journal of the American College of Cardiology 51.2 (2008): 210-247.

METOCARD CNIC Trial – Conclusions

- Pre – PCI iv β blockers reduce infarct size (by ~20%)
- Lesser infarct size means better LV function post MI/PCI
- However, it only studied anterior infarcts, not others
- The authors say –

  'although important and encouraging, the results of the METOCARD-CNIC trial are probably not strong enough to warrant a change in the clinical practice of the use of β-blockade in patients with STEMI'

Post PCI Role

- BEAT AMI Trial
  - Single blinded
  - Enrolled only patients within 6 hours of symptom onset who had Killip class I or II STEMI
  - Randomly allocated to receive heart rate control with IV esmolol for 24 hours (target of 60 bpm) or placebo.
- Result
  - Lesser troponin rise
  - Lesser CK rise
  - Lesser NT pro-BNP rise
- Infarct size not assessed with CMR

Post STEMI Role

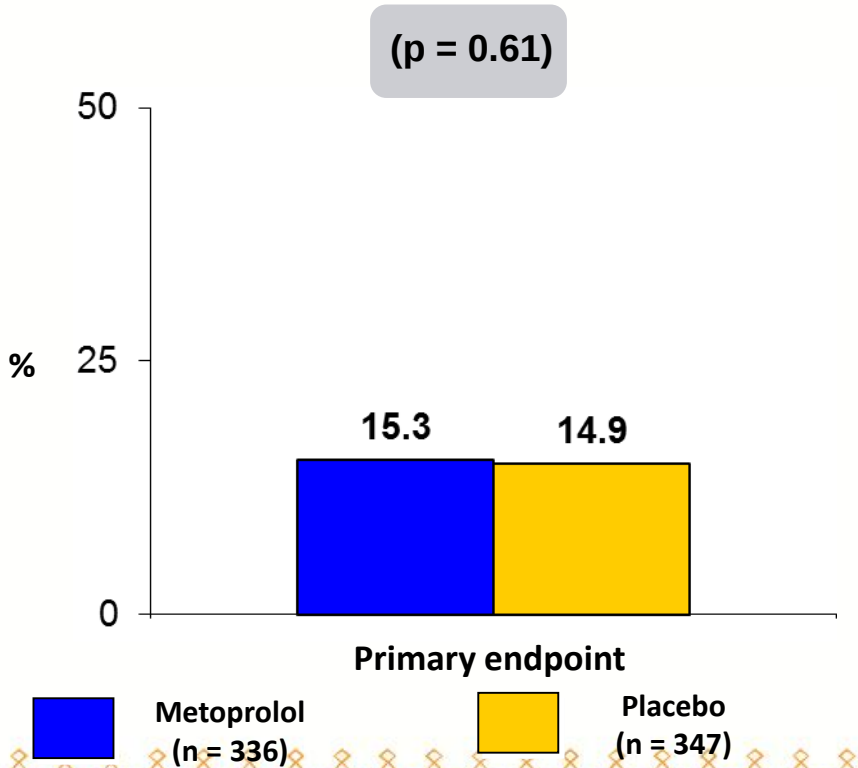
- Well established for oral β blockers
- CAPRICORN – Carvedilol in post MI patients with LVSD

Choice of beta blocker

- Use a cardioselective one – either metoprolol (preferred) or atenolol
- Start low, go slow
- If ongoing ischemia before PPCI, some groups recommend iv metoprolol, atenolol or esmolol.
- Watch for bradycardia or hypotension
- If hypertension present, better to use iv NTG instead to reduce BP.

EARLY-BAMI

Trial design: Patients presenting with STEMI with a plan for primary PCI, and without evidence of cardiogenic shock, were randomized to either intravenous bolus metoprolol 5 mg x 2 or matching placebo. They were followed for 30 days.



Results

- Primary endpoint, infarct size on delayed enhancement CMR at 30 days, for metoprolol vs. placebo: 15.3% vs. 14.9%, p = 0.61
- LVEF on CMR: 51% vs. 51.7%, p = 0.68
- Severe bradycardia: 1.5% vs. 0.6%, p = 0.28; cardiogenic shock: 0.6% vs. 0.3%, p = 0.62; ventricular arrhythmia: 3.6% vs. 6.9%, p = 0.05

Conclusions

- Early routine administration of intravenous metoprolol is not beneficial in reducing infarct size in patients presenting with STEMI and undergoing primary PCI, similar to what has been observed in other trials
- Small study, but no clear safety signal with early administration of intravenous beta-blockers

Roolvink V, et al. J Am Coll Cardiol 2016;67:2705-15

Relevance to My Daily Practice

- Early intravenous metoprolol dosing appears safe among patients with STEMI without acute pulmonary edema or shock.
- Potential benefit in reduction of infarct size in anterior STEMI (especially with higher metoprolol dosing).
- Reduction in malignant arrhythmias during hospitalization (3.6% vs. 6.9%).
- Most important aspect is long term secondary risk reduction.

Long term therapy – How long?

- The optimal duration of treatment is not very clear.
- Evidence supports total duration of treatment of 3 years; not much for longer than that
- When stopping, taper the dose
- REACH registry data showed no difference in benefit between beta blocker and no beta blocker groups at 2 years.
- Maybe better for those with higher risk of LVSD and chronic kidney disease
- In high risk patients, longer duration of treatment is acceptable

Long term therapy – How much

- Clinical trials suggest doses of 200 mg/day of metoprolol
- Not practical, not used in clinical practice
- Best policy – Start Low, Go Slow
- Better to use longer acting preparation

Targets

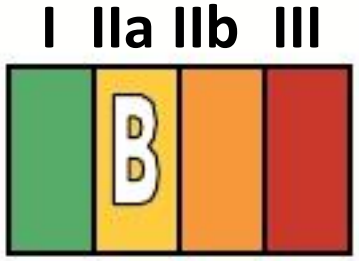
- Recommendation
  - Heart Rate < 70 bpm
  - SBP > 90 mmHg
- Avoid if
  - SBP low / shock
  - Severe bronchospasm
  - Bradycardia / heart block
  - Acute heart failure
- Can be given in
  - Controlled COPD – mortality benefit seen
  - Controlled heart failure – carvedilol
  - Peripheral vascular disease

Closing Remarks

- The role of ‘very early’ β blockers in managing STEMI is not clearly defined.
- However, its role in preventing arrhythmias post MI is established.
- Careful assessment of patients must be before starting β blockers – follow AHA guidelines
- Start β blockers within 24 hours if patient stable and no contraindication present
- Beta blockers after STEMI reduce overall mortality, non fatal MI and SCD
- As always, we need more data.

Recommendations of Beta-Blockers in STEMI

ESC guideline (*Eur Heart J*. 2012;33, 2569-2619)



Oral treatment of beta-blockers should be considered during hospital stay and continued thereafter in all STEMI patients without contraindications.

ACC/AHA guideline (*Circulation*. 2013;127:529-555)

Beta blockers should be continued during and after hospitalization for all patients with STEMI and with no contraindications to their use.

Beta-blockers in patients with preserved left ventricular systolic function after AMI did not improve clinical outcomes

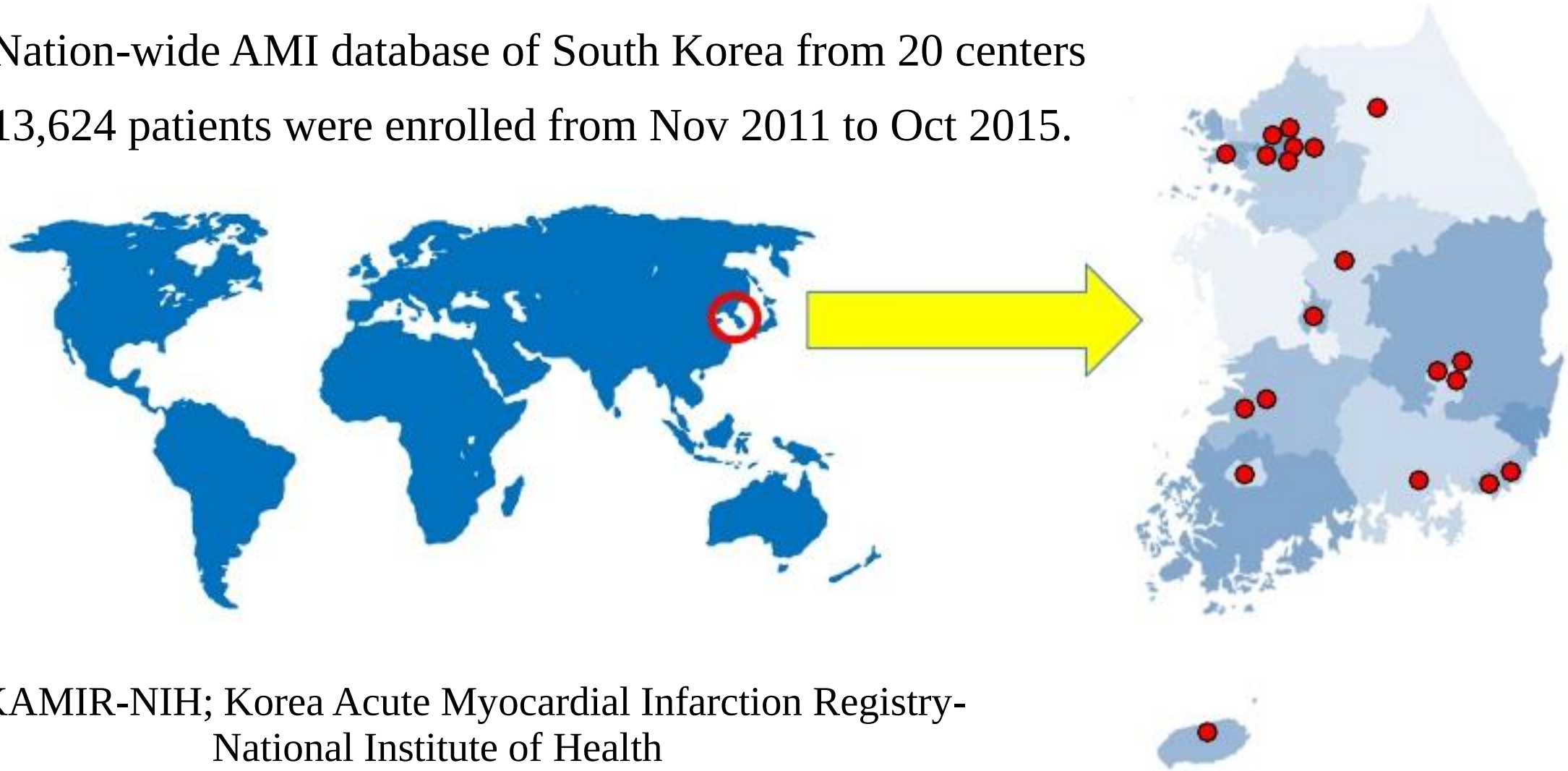
Seung-Jae Joo[1], Jae-Geun Lee[1], Hyung-Yoon Kim[1], Joon-Hyouk Choi[1], Song-Yi Kim[1], Ki-Seok Kim[1], Seung Woon Rha[2], Jin-Ok Jeong[3], Shung Chull Chae[4], Dong-Ju Choi[5], Young Jo Kim[6], Kwon-Bae Kim[7], Jei Keon Chae[8], Myung Ho Jeong[9] and other KAMIR-NIH investigators

[1]Department of Cardiology, Jeju National University Hospital, [2]Department of Cardiology, Korea University Guro Hospital, Seoul, [3]Department of Cardiology, Chungnam National University Hospital, Daejeon, [4]Department of Cardiology, Kyungpook National University Hospital, Daegu, [5]Department of Cardiology, Seoul National University Bundang Hospital, Seongnam, [6]Department of Cardiology, Yeungnam University Hospital, Daegu, [7]Department of Cardiology, Keimyung University Hospital Dongsan Medical Center, Daegu, [8]Department of Cardiology, Chonbuk National University Hospital, Jeonju, [9]Department of Cardiology, Chonnam National University Hospital, Gwangju, Korea, Republic of

The KAMIR-NIH Registry

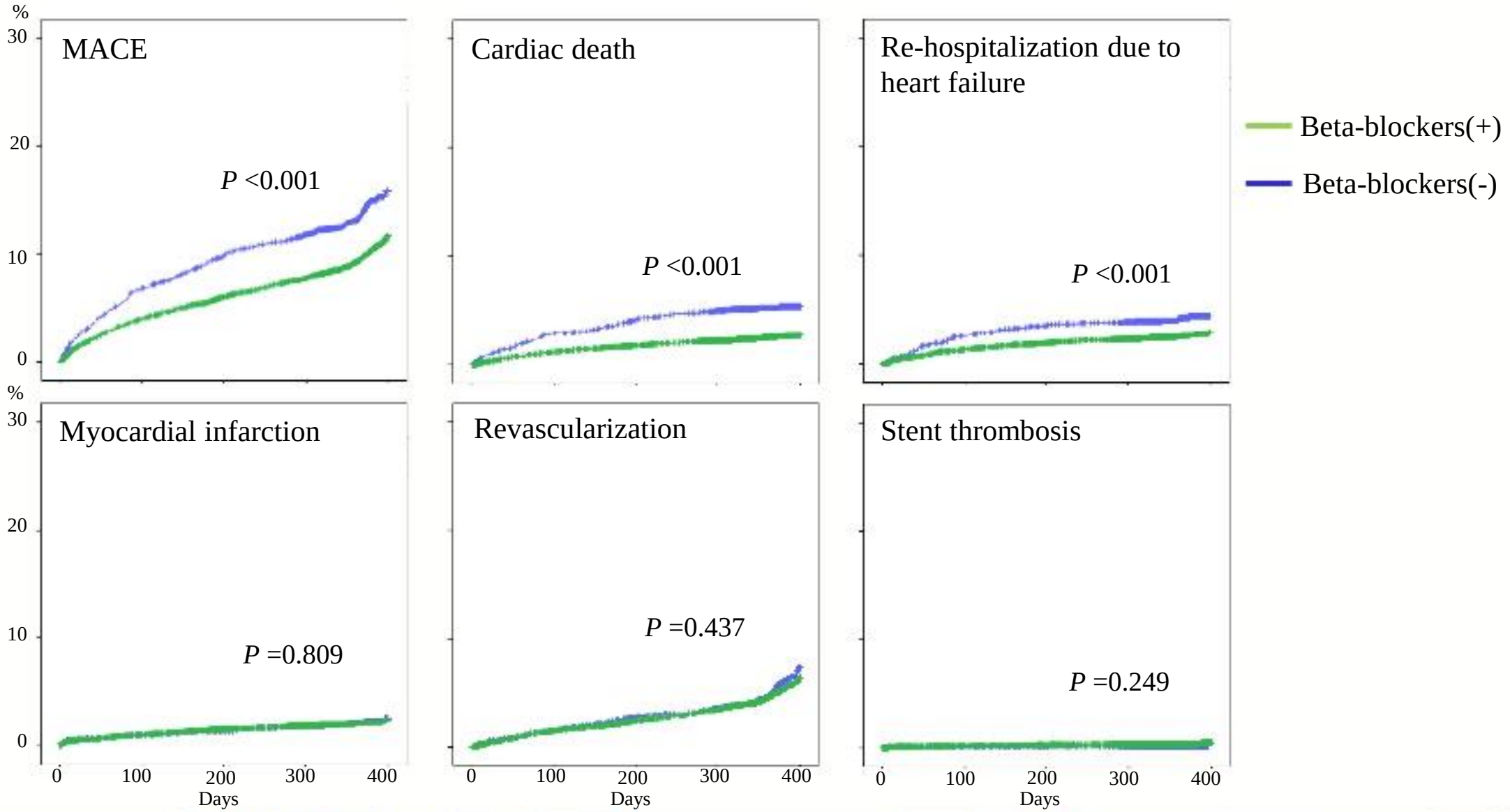
§ Nation-wide AMI database of South Korea from 20 centers

§ 13,624 patients were enrolled from Nov 2011 to Oct 2015.

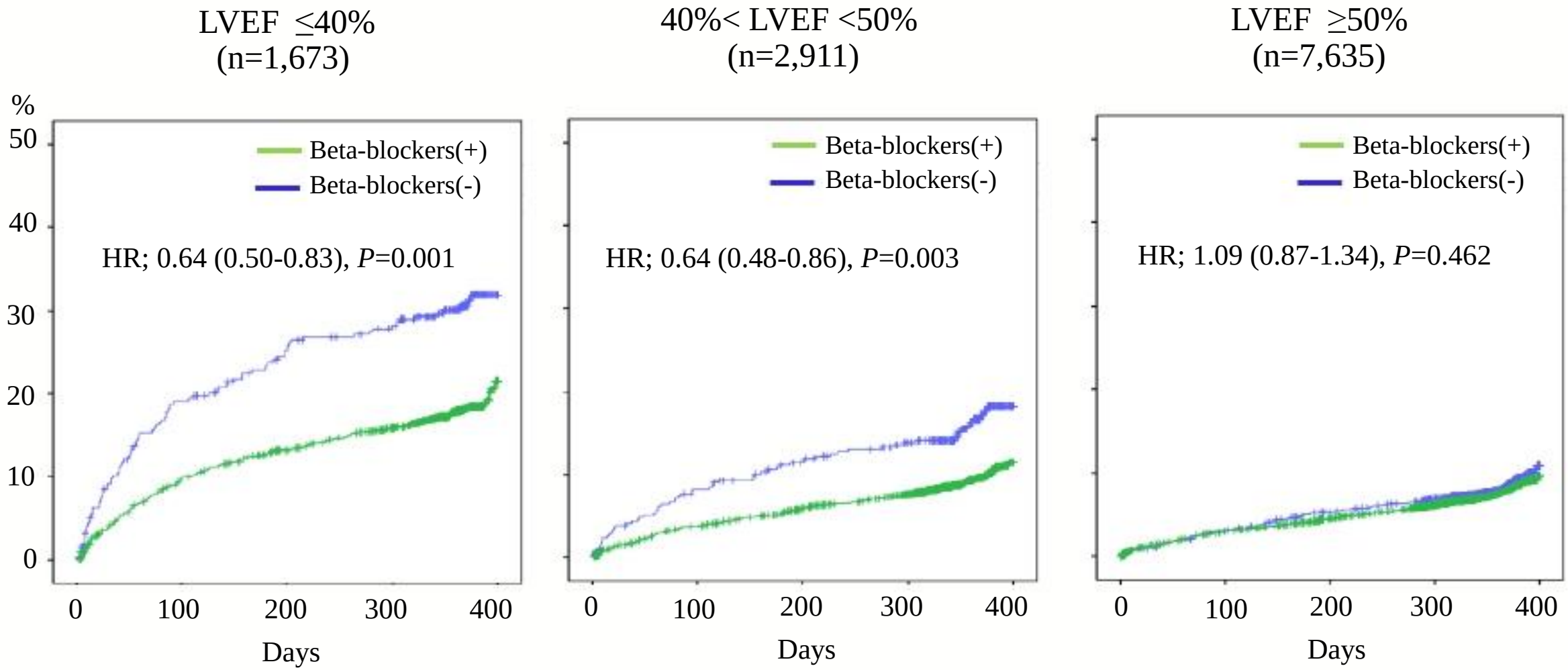


*KAMIR-NIH; Korea Acute Myocardial Infarction Registry-National Institute of Health

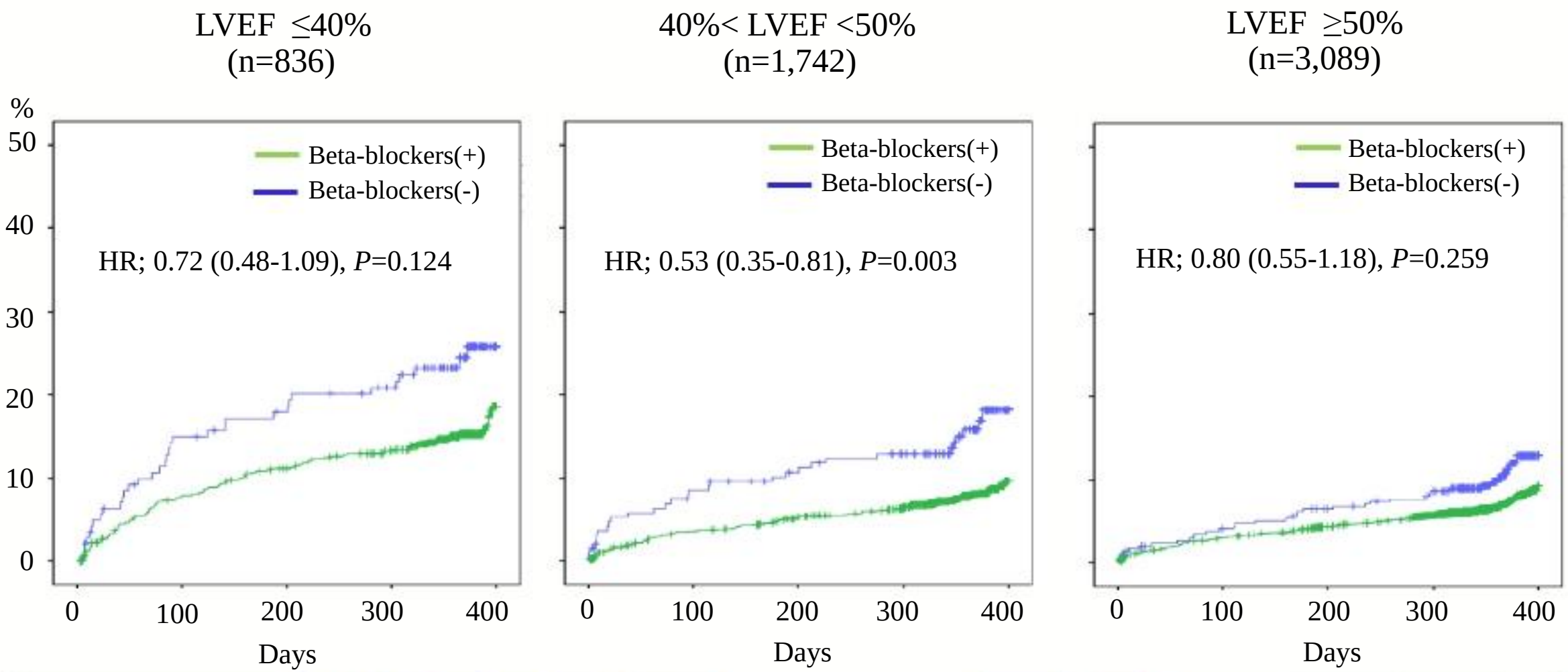
Beta-blockers reduced cardiac death and re-hospitalization due to heart failure



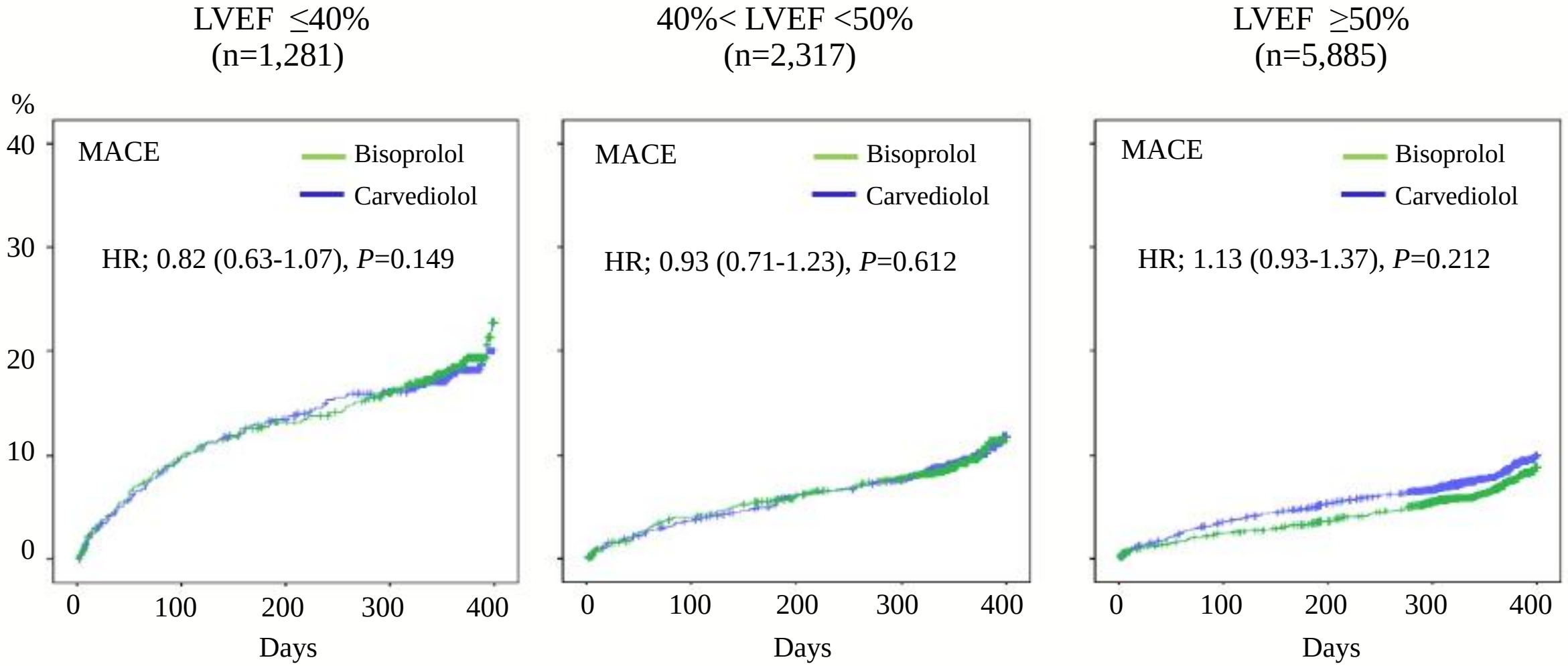
Beta-blockers did not reduce MACE in patients with LVEF ≥50%



Effect of Beta-Blockers on MACE in Patients with STEMI and Successful Coronary Reperfusion



Comparison of Beta-blockers; Bisoprolol vs. Carvedilol



Summaries

- Beta-blockers were prescribed in 84% of patients at discharge.
- Beta-blockers reduced MACE, cardiac death and re-hospitalization due to heart failure at 1-year.
- Beta-blockers were more effective in patients with chronic kidney disease, not taking inhibitors of renin-angiotensin system, or LVEF<50%.
- Beta-blockers did not reduce MACE in patients with LVEF ≥50%.
- Beta-blockers were still effective in STEMI patients with LVEF <50% after successful coronary reperfusion.
- Bisoprolol and carvedilol showed comparable clinical effects.

Conclusions and Clinical Implications

- Beta-blockers reduced the clinical events in patients with reduced left ventricular systolic function, but not with preserved systolic function after AMI who survived the initial attack.
- Beta-blockers need not be prescribed in all patients with AMI if their left ventricular systolic function is preserved.

Can beta-blockers be stopped in patients with preserved left ventricular function after acute myocardial infarction?

Five-year follow-up of FAST-MI 2005

N. Danchin [1], **E. Puymirat** [1], G. Ducrocq [2], R. Sader [3], X. De Boisqelin [4], C. Boureux [5], N. Delarche [6], J. Ferrieres [7], F. Schiele [8], T. Simon [9]

(1) AP-HP, HEGP, Paris; (2) AP-HP, Hôpital Bichat, Paris; (3) CH de Laon; (4) Clinique La Valette, Montpellier; (5) CH de Perpignan; (6) CH de Pau; (7) CHU Rangueil, Toulouse; (8) CHU Jean Minjoz, Besançon; (9) AP-HP, Hospital Saint-Antoine, Paris, France

Fees for lectures and/or consulting: Astra-Zeneca, Bayer, MSD, Eli-Lilly, Servier

Background and Aim

- **Background**

✓ Most RCTs of beta-blockers after AMI were led before the era of reperfusion therapy and modern secondary prevention.

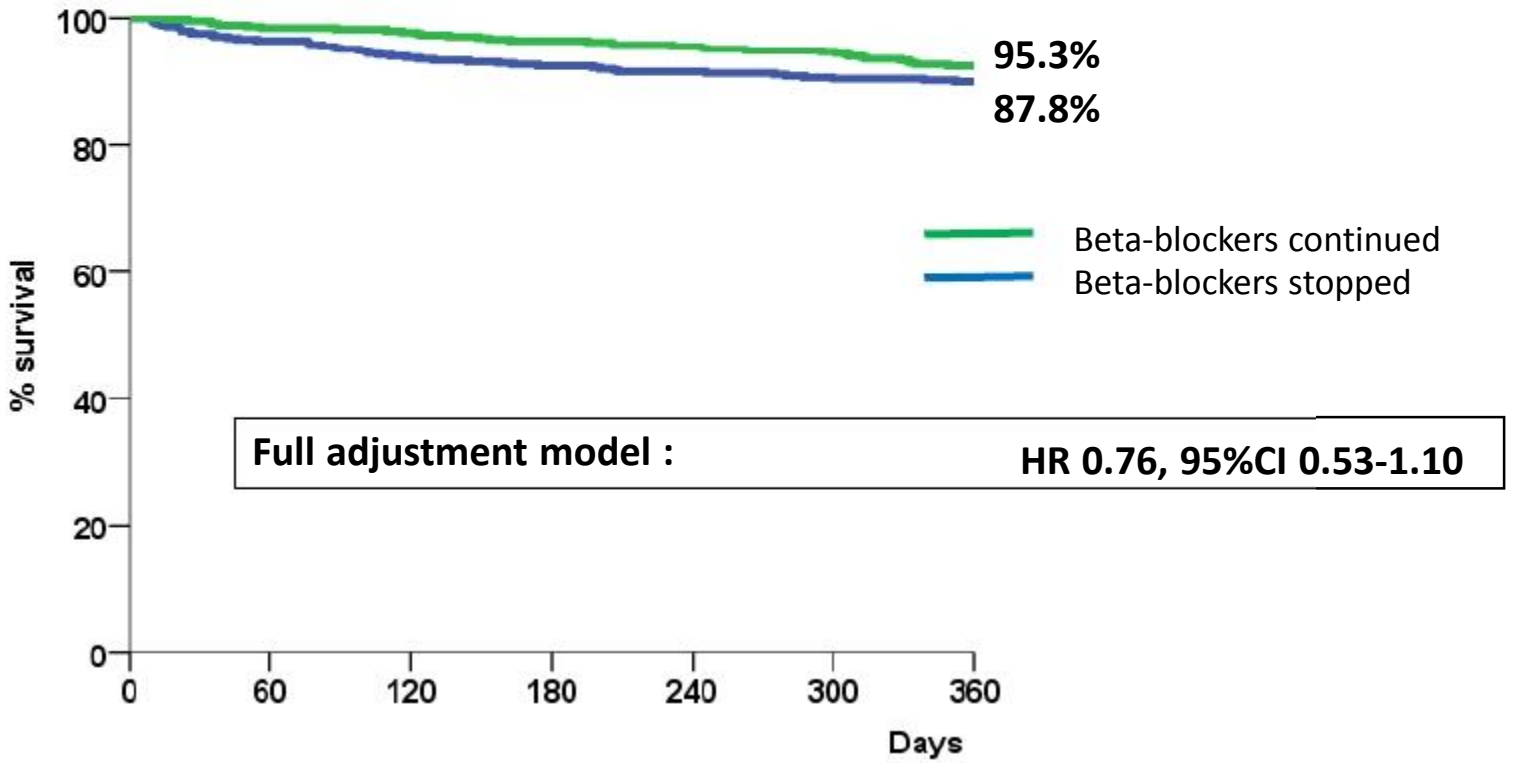
✓ Their usefulness in patients currently treated for AMI with preserved LV function is debated, leading to divergences between European and American guidelines.

	ACC/AHA	ESC
STEMI	IA	I→IIaB
NSTEMI	IA	-

- **Aim**

✓ To assess the impact of beta-blocker discontinuation on 5-year mortality in the FAST-MI 2005 cohort.

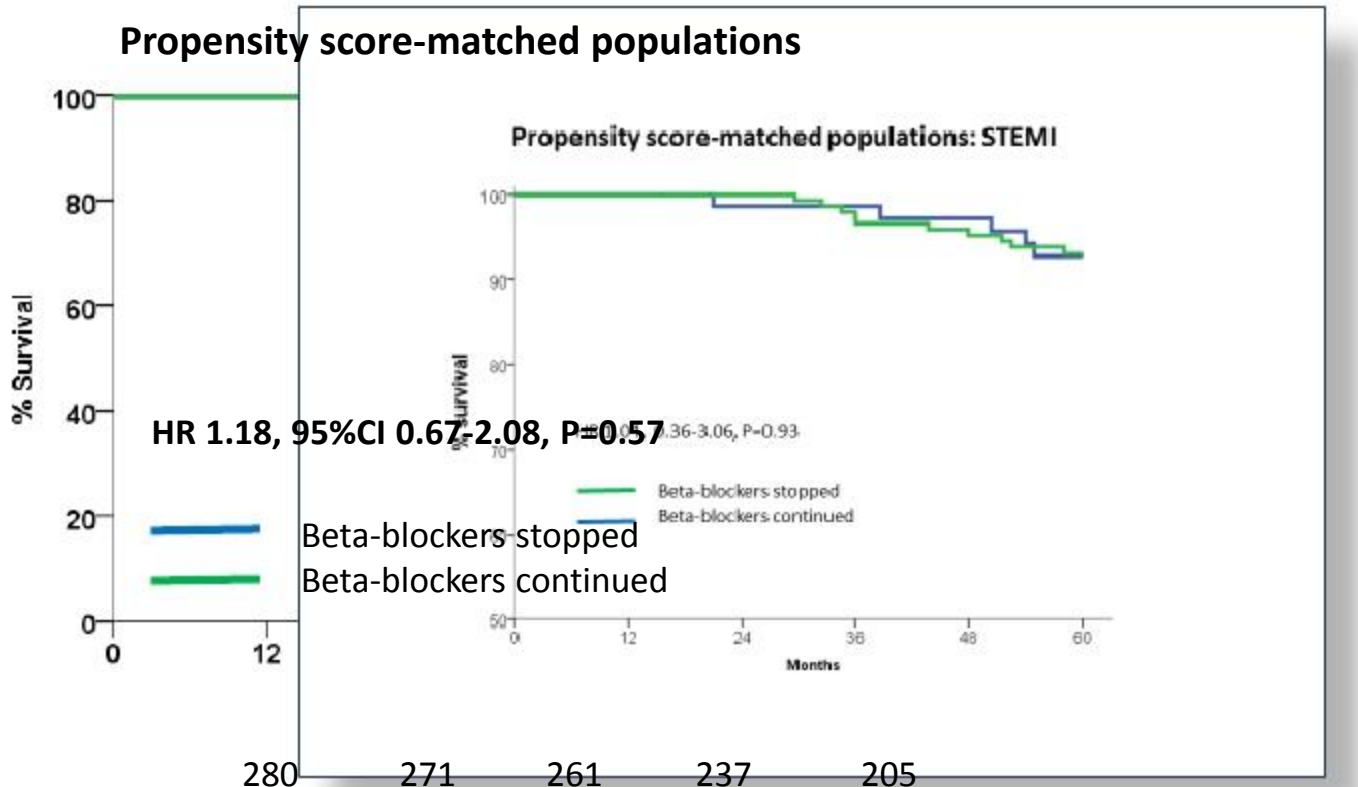
One-year survival



→ **Beta-blockers might be useful during the first year in AMI patients with preserved LV function and no history of heart failure**

Five-year outcome

	Beta-blockers ongoing	Beta-blockers stopped	CrudeHR (95%CI)	AdjustedHR (95%CI)
Five-yeardeath	8.8%	13.0%	0.63(0.40-0.97)	1.01(0.59-1.73)



# at risk					
With β-blockers	280	271	261	237	205
Without β-blockers	142	133	128	123	106

Conclusion

- In acute myocardial infarction patients with preserved LV function and no history of heart failure:

✓ early β-blocker treatment might be beneficial;

✓ stopping β-blockers during the first year after discharge was not associated with increased mortality at five years.

- These results support the changes adopted in the most recent ESC guidelines.

Class effect of beta-blockers in survivors of ST-elevation myocardial infarction : A nationwide cohort study using insurance claims database

Ting-Tse Lin[1]; K. Arnold Chan, Sc.D.,[2] Ho-Min Chen,[3] Mei-Shu Lai,[3,4] Chao-Lun Lai,[1]

[1]Department of Internal Medicine, National Taiwan University Hospital Hsin-Chu Branch, Hsin-Chu, Taiwan [2]Department of Medical Research, National Taiwan University Hospital, Taipei, Taiwan
[3]Center for Comparative Effectiveness Research, National Center of Excellence for Clinical Trial and Research, National Taiwan University Hospital, Taipei, Taiwan
[4]Graduate Institute of Epidemiology and Preventive Medicine, College of Public Health, National Taiwan University, Taipei, Taiwan

Abstract 89200

Background

Beta-blocker therapy is the standard treatment for **ST-elevation myocardial infarction (STEMI).** The evidence supporting the benefit of beta-blockers has been obtained primarily from pre-dating randomized trials. However, *whether* beta-blockers exert a **class effect** remains controversial in the modern PCI era.

Methods

We identified all patients who had the first ST-elevation MI through 2003 to 2010 from the NHI claims database in Taiwan. We compared patients prescribed with **carvedilol, bisoprolol or propranolol.** The study outcome included **all-cause death, cardiovascular death and recurrence of MI.** Treating the carvedilol group as the reference, simultaneous three-group comparison approach using **Cox regression model** with adjustment for age, sex and **the propensity score** was used to compare the relative risks of different outcomes.

Declaration of Interest

There is no conflict of interest or financial support concerning this presentation.

Results

Table 1. Basic characteristics

Variable	Carvedilol	Bisoprolo l	SD*	Propranolol	SD*
Patients (n)	7591	5934		3311	
Female (%)	21.7	19.7	0.05	20.8	0.02
Age (years, Mean)	62.1	60.7	0.10	60.6	0.11
Comorbidities (%)					
Congestive Heart failure	6.9	5.2	0.07	4.3	0.12
Cerebrovascular disease	9.7	8.8	0.03	8.2	0.06
Chronic pulmonary disease	8.6	7.7	0.03	7.7	0.03
Dementia	1.4	1.1	0.03	1.3	<0.01
Diabetes without chronic complication	24.7	23.8	0.02	20.9	0.09
Diabetes with chronic complication	8.4	6.1	0.09	5.5	0.12
Liver disease	5.2	5.0	0.01	5.5	0.01
Pepticulcer disease	9.6	9.6	<0.01	10.2	0.02
Renal disease	5.6	4.4	0.06	4.1	0.07
Prescriptions at discharge (%)					
Aspirin	96.7	97.5	0.05	96.3	0.02
Clopidogrel	88.7	92.7	0.14	78.1	0.29
Warfarin	3.6	2.3	0.08	2.7	0.05
CCBs	23.1	24.3	0.03	24.6	0.04
ACEIs	75.6	72.6	0.07	72.4	0.07
ARBs	20.1	23.3	0.08	13.1	0.19
Loop diuretics	44.5	33.0	0.24	26.9	0.37
Spironolactone	13.6	9.6	0.13	5.5	0.28
Statins	53.9	63.4	0.19	46.0	0.16
Amiodarone	16.2	12.4	0.11	10.0	0.18

Table 2. Clinical outcomes in different beta-blocker groups

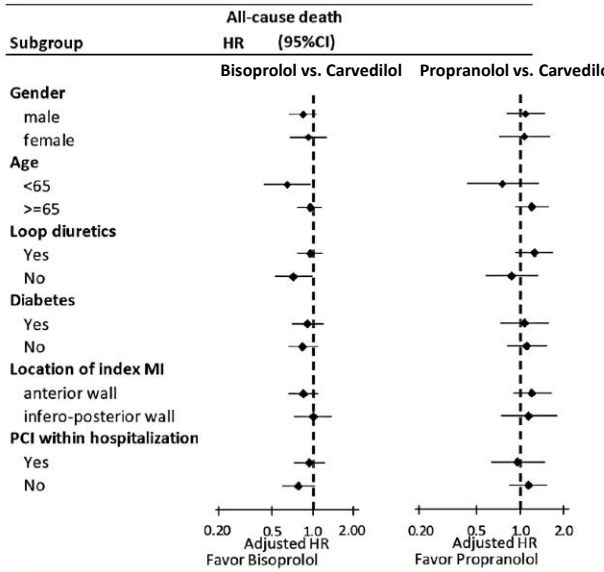
	Total	Carvedilol	Bisoprolol	Propranolol
n	16836	7591	5934	3311
Follow-uptime(years) Mean(SD)	1.0(1.3)	1.0(1.3)	1.0(1.3)	0.8(1.0)
All-causedeath,n(%)	624 (3.7%)	345 (4.5%)	193 (3.2%)	86 (2.6%)
CVdeath,n(%)	309 (1.8%)	174 (2.3%)	99 (1.7%)	36 (1.1%)
RecurrenceofMI,n(%)	1229 (7.3%)	564 (7.4%)	442 (7.5%)	223 (6.7%)

Abbreviations:CV,cardiovascular;MI,myocardialinfarction;SD,standarddeviation

Table 3. Relative risks of different clinical outcomes between three beta-blocker groups.

	All-cause death			CV death			Recurrence of MI		
Crude results									
Drug	HR	95% CI	p	HR	95% CI	p	HR	95% CI	p
Carvedilol	1			1			1		
Bisoprolol	0.62	(0.52-0.74)	<0.001	0.64	(0.50-0.82)	<0.001	0.92	(0.81-1.04)	0.18
Propranolol	0.81	(0.64-1.03)	0.08	0.66	(0.46-0.95)	0.024	1.12	(0.96-1.31)	0.16
*Simultaneous three-group comparison approach with adjustment for the propensity score**									
Drug	HR	95% CI	p	HR	95% CI	p	HR	95% CI	p
Carvedilol	1			1			1		
Bisoprolol	0.87	(0.72-1.05)	0.14	0.87	(0.68-1.13)	0.30	0.97	(0.85-1.10)	0.63
Propranolol	1.07	(0.84-1.36)	0.58	0.92	(0.64-1.32)	0.64	1.14	(0.97-1.33)	0.12
Pairwise contrast approach with adjustment for the propensity score†									
HR	95% CI	p	HR	95% CI	p	HR	95% CI	p	
Carvedilol	1			1			1		
Bisoprolol	0.88	(0.73-1.06)	0.17	0.88	(0.68-1.13)	0.31	0.98	(0.86-1.12)	0.76
Propranolol	1.06	(0.83-1.36)	0.62	0.90	(0.62-1.31)	0.58	1.12	(0.95-1.31)	0.18
Pairwise contrast approach with stratification on the quintiles of the propensity score‡									
Drug	HR	95% CI	p	HR	95% CI	p	HR	95% CI	p
Carvedilol	1			1			1		
Bisoprolol	0.86	(0.72-1.04)	0.11	0.87	(0.67-1.13)	0.29	0.98	(0.86-1.12)	0.77
Propranolol	1.04	(0.81-1.33)	0.77	0.89	(0.61-1.29)	0.53	1.13	(0.96-1.33)	0.14

Figure 1. Subgroup analyses



Conclusion

After adjustment for baseline characteristics, there was **no** difference in risks of **all-cause death, cardiovascular death and recurrence of MI** between ~~carvedilol, bisoprolol and propranolol~~.

In a ~~real-world population~~-based setting in Taiwan, the present study suggests that the choosing a specific beta-blocker for STEMI patients will have little influence on clinical outcomes, supporting the concept of **class effect** of **beta-blockers**.

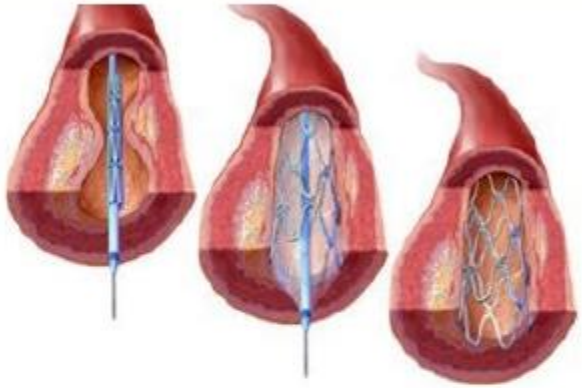
Intravenous Beta-Blocker Therapy in ST-Segment Elevation Myocardial Infarction

Dworeck C, Redfors B, Haraldsson I, Angerås O, Odenstedt J, Ioanes D, Petursson P, Völz S, Albertsson P, Råmunddal T,Omerovic E

Department of Cardiology, Sahlgrenska University Hospital, Gothenburg, Sweden

Background

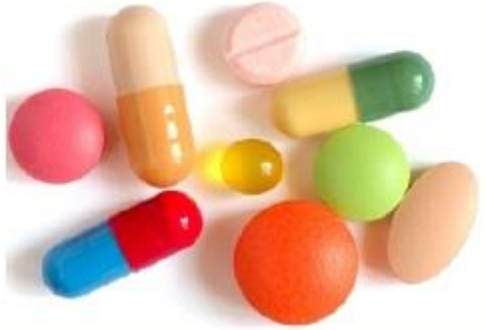
Benefits and danger of i.v. pretreatment with beta blockers with STEMI



- Reduce infarct size
- Reduce malignant ventricular arrhythmias
- Improve LV finction
- Improve survival

Potential benefits

IV beta blockade → reperfusion



- Higher risk for cardiogenic shock
- Higher risk for mortality

Potential danger

What is SWEDEHEART?

Swedish **W**eb-system for **E**nhancement and **D**evelopment of **E**vidence-based care in **H**eart disease **E**valuated **A**ccording to **R**ecommended **T**herapies

- **National registry** of coronary artery disease care and valvular interventions
- **Effects:**

  Improves **quality of care**

  Improves **outcome**

  Powerful **tool for research**

  Improves **cost-effectiveness**

SWEDEHEART

SCAAR
Angiography and PCI
1998

RIKS HIA
Acute coronary care
1995

Thoracic surgery
1992

SEPHIA
Secondary prevention
2005

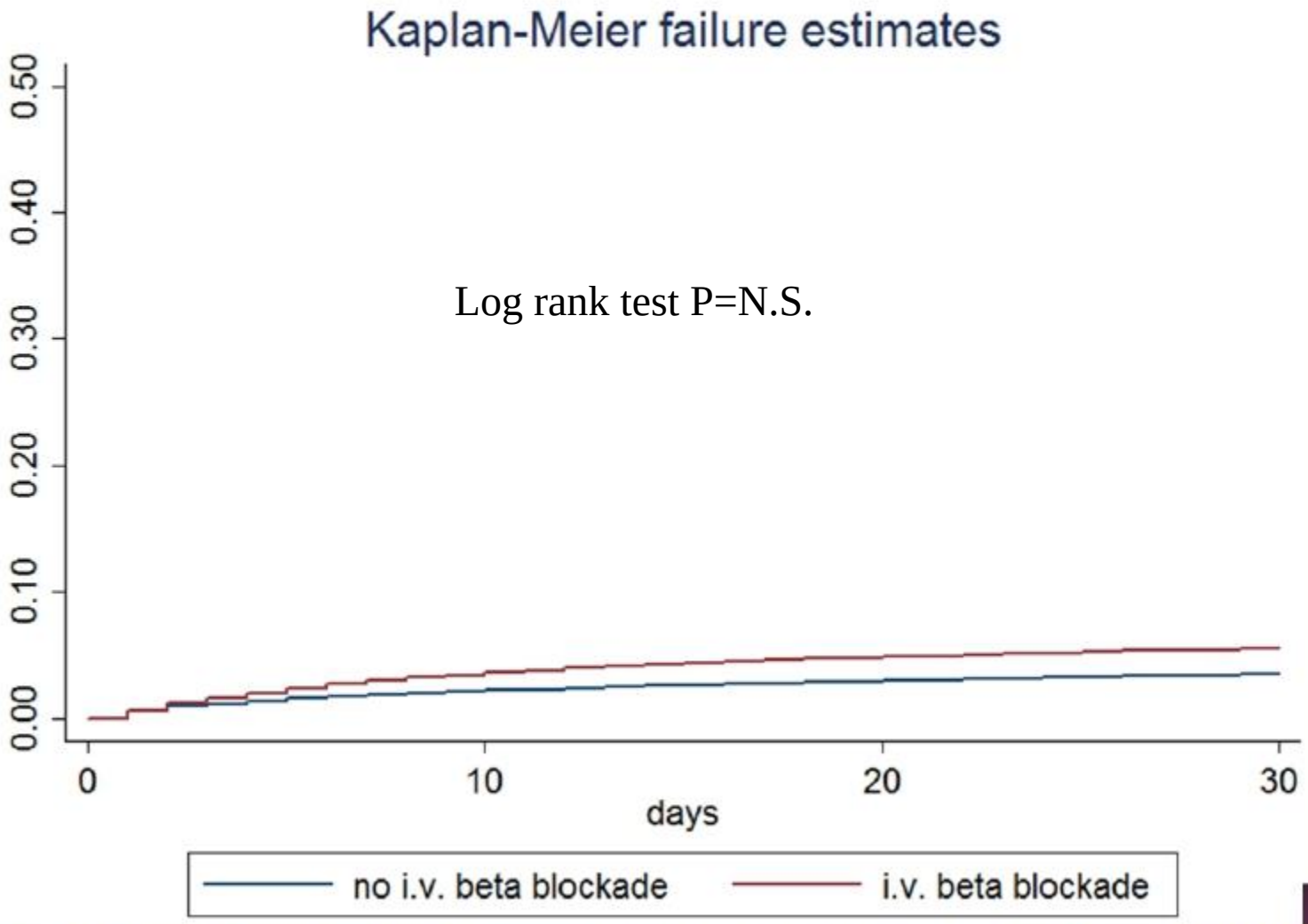
TAVI
Transcatheter Aortic Valve Implantation
2010

SWEDEHEART

- Annual enrolment: 80 000 cases
  - 20 000 myocardial infarctions
  - 10 000 unstable angina
  - 25 000 with other causes to their symptoms

  } RIKS-HIA
  - 40 000 coronary angiography or angioplasty — SCAAR
  - 7 000 Heart surgery — Heart surgery registry
  - 6 000 secondary prevention — SEPHIA
- 1000 variables
- 2737 users (mainly doctors and nurses)
- At a given time: ~ 60 simultaneous users

Results



Log rank test P=N.S.

Conclusions

- In our study, the use of IV beta-blockade in patients with STEMI was not associated with
  - increased risk of death at 30-days
  - increased risk of in-hospital cardiogenic shock.

2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

ESC European Society of Cardiology

The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology

Chairpersons: Borja Ibanez (Spain), Stefan James (Sweden).

Authors/Task Force Members: Stefan Agewall (Norway), Manuel J. Antunes (Portugal), Chiara Bucciarelli-Ducci (UK), Héctor Bueno (Spain), Alida L. P. Caforio (Italy), Filippo Crea (Italy), John A. Goudevenos (Greece), Sigrun Halvorsen (Norway), Gerhard Hindricks (Germany), Adnan Kastrati (Germany), Mattie J. Lenzen (The Netherlands), Eva Prescott (Denmark), Marco Roffi (Switzerland), Marco Valgimigli (Switzerland), Christoph Varenhorst (Sweden), Pascal Vranckx (Belgium), Petr Widimský (Czech Republic).

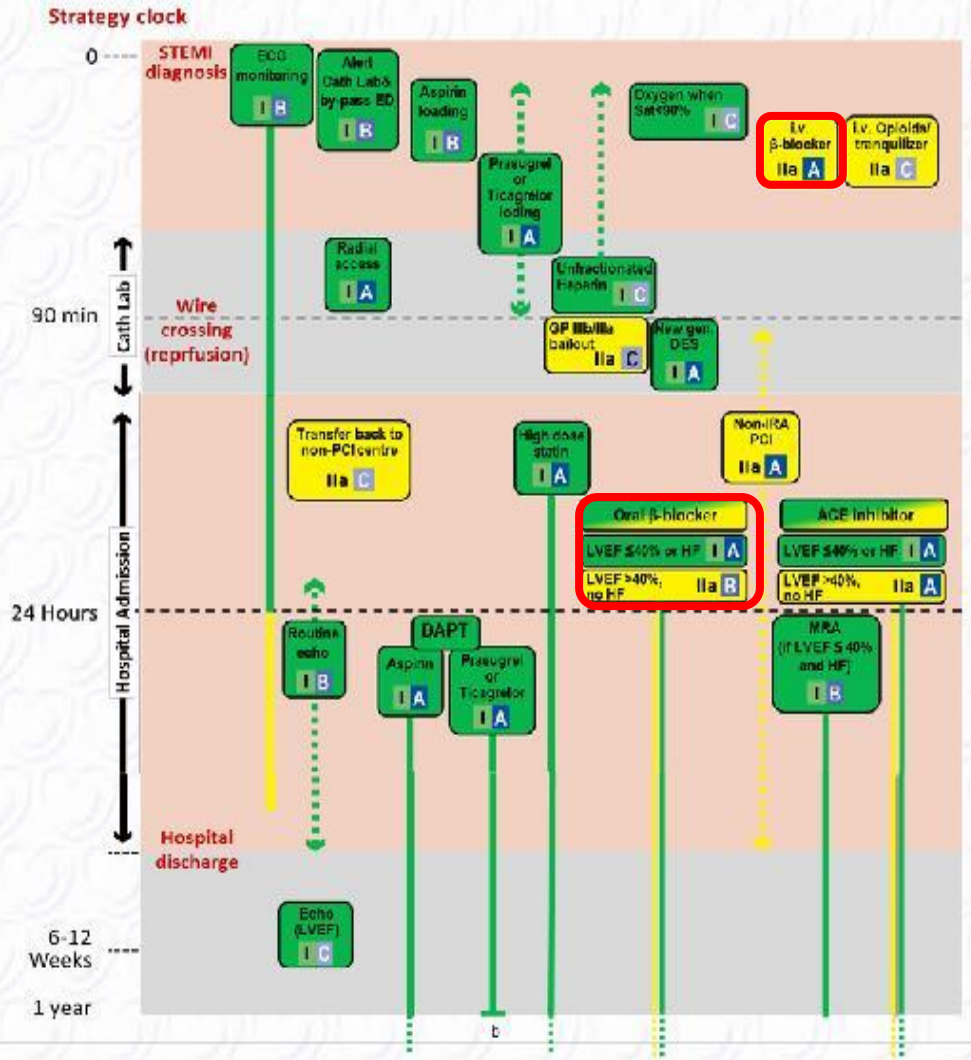
Routine therapies in the acute, subacute and long-term phases

ESC European Society of Cardiology

Recommendations	Class	Level
Beta-blockers		
Oral treatment with beta-blockers is indicated in patients with heart failure or LVEF ≤40% unless contra-indicated.	I	A
Intravenous beta-blockers should be considered at the time of presentation in patients undergoing primary PCI without contra-indications, with no signs of acute heart failure, and with an SBP >120 mmHg.	IIa	A
Routine oral treatment with beta-blockers should be considered during hospital stay and continued thereafter in all patients without Contra-indications.	IIa	B
Intravenous beta-blockers must be avoided in patients with hypotension, acute heart failure or AV block or severe bradycardia.	III	B

www.escardio.org/guidelines 2017 ESC Guidelines for the Management of AMI-STEMI (European Heart Journal 2017 - doi:10.1093/eurheartj/ehx095)

"Do not forget" interventions in STEMI patients undergoing a primary PCI strategy



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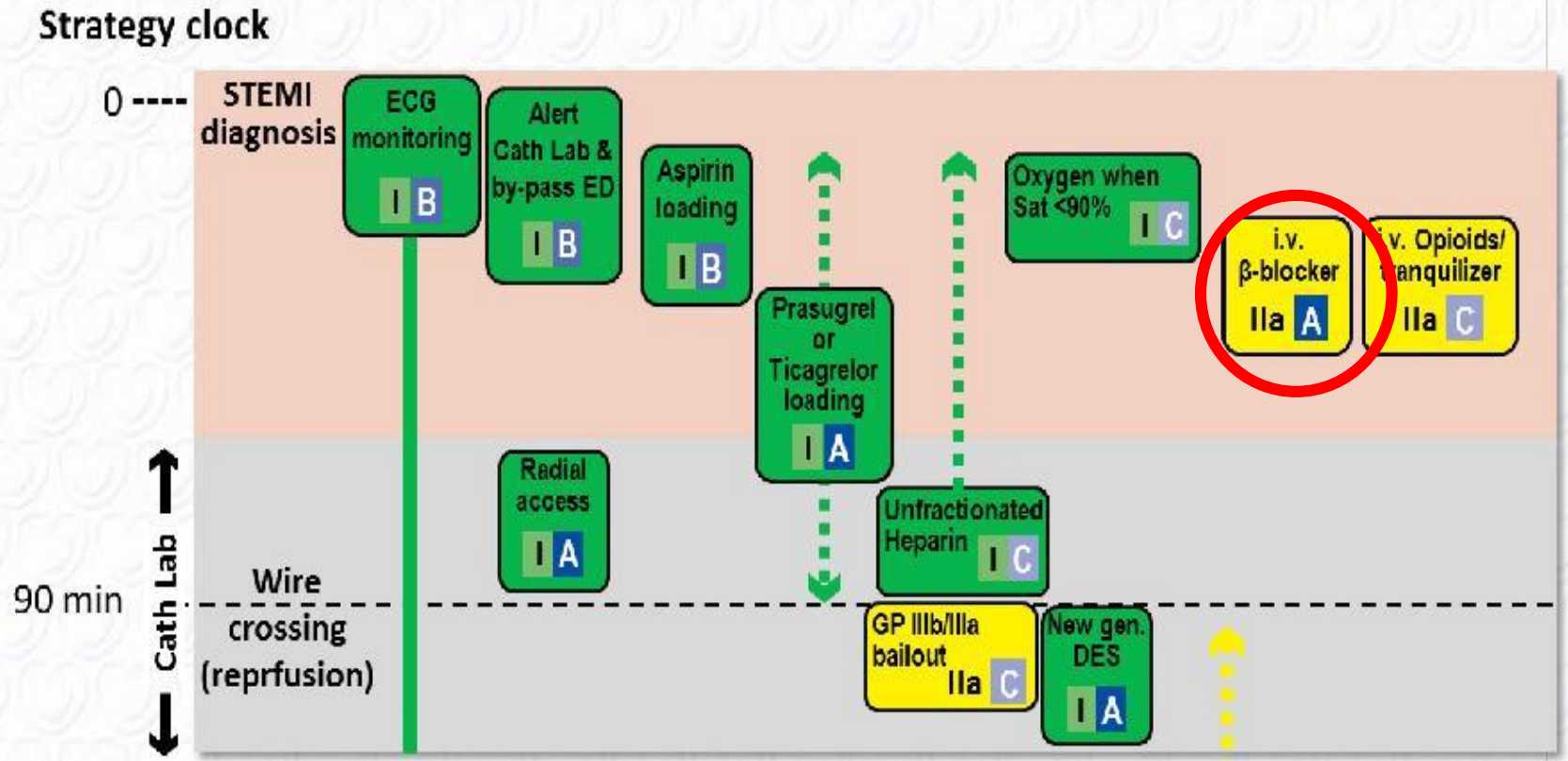

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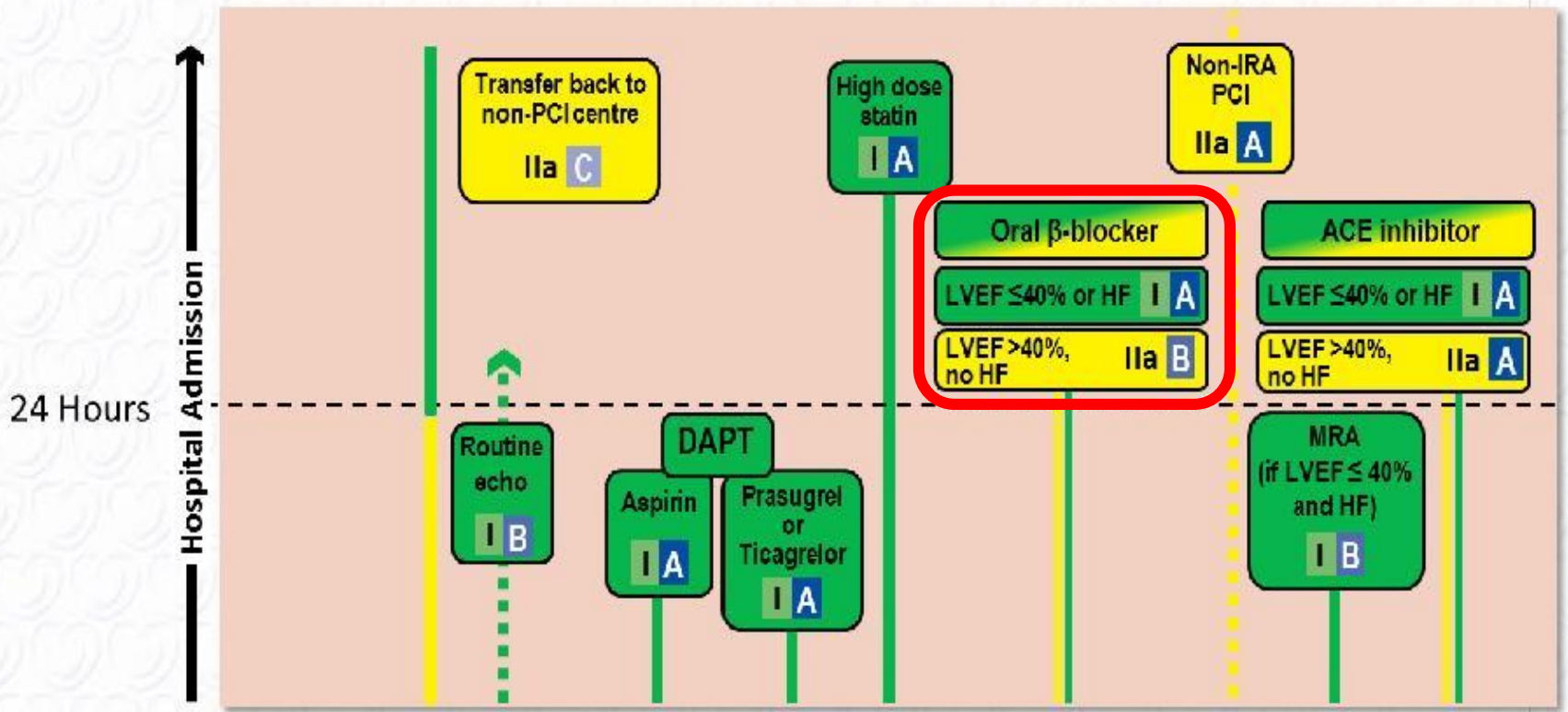

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"Do not forget" interventions in STEMI patients undergoing a primary PCI strategy

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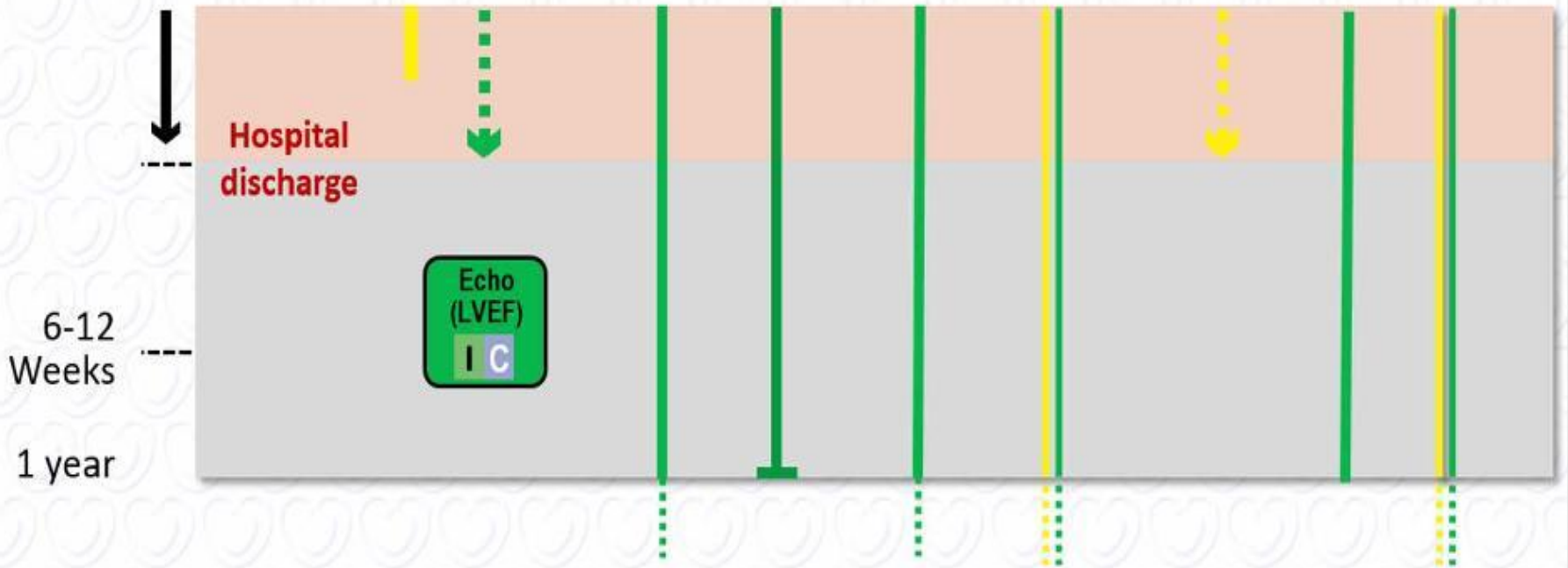
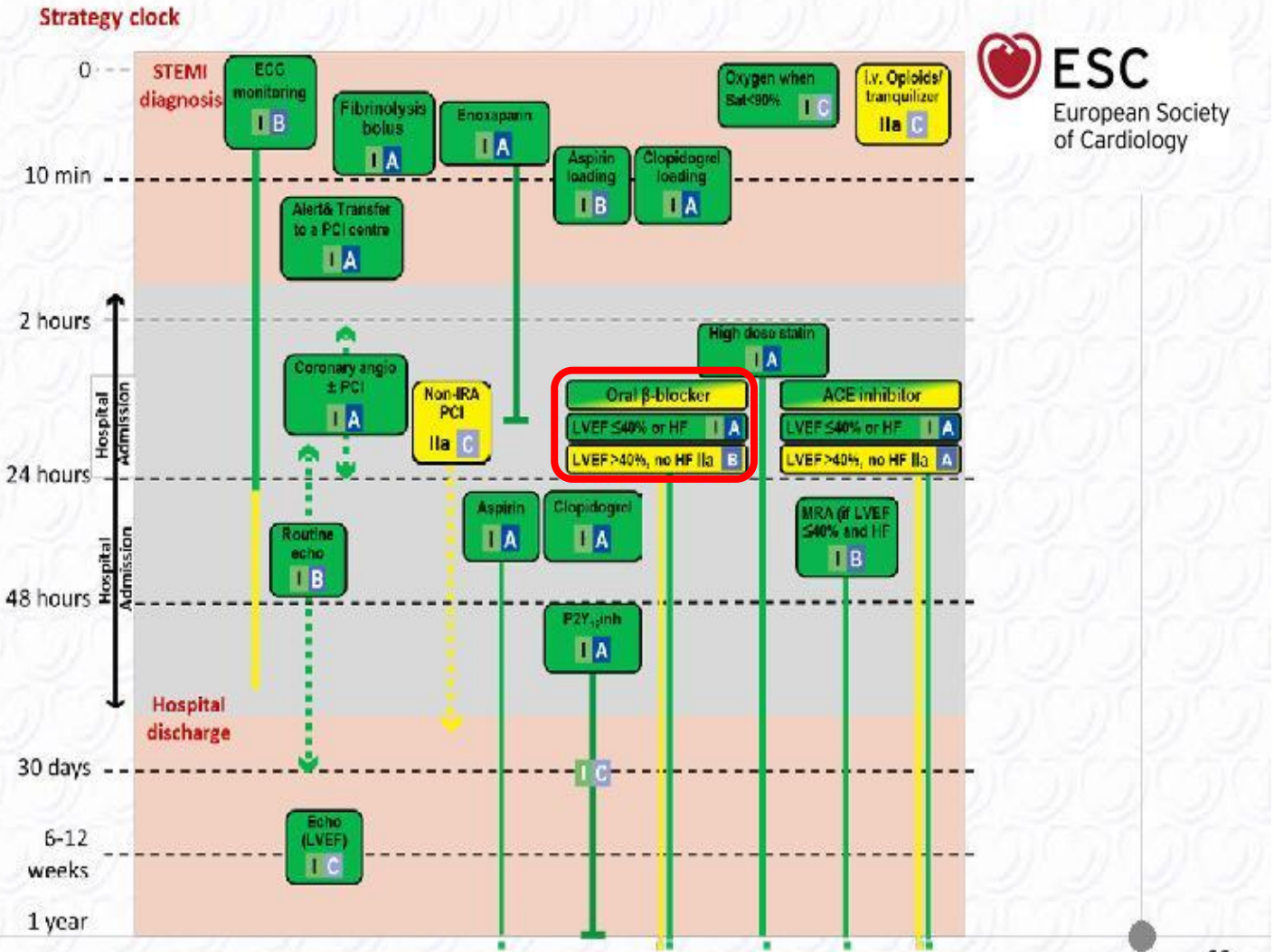


"Do not forget" interventions in STEMI patients undergoing a successful fibrinolysis strategy



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"Do not forget" interventions in STEMI patients undergoing a successful fibrinolysis strategy

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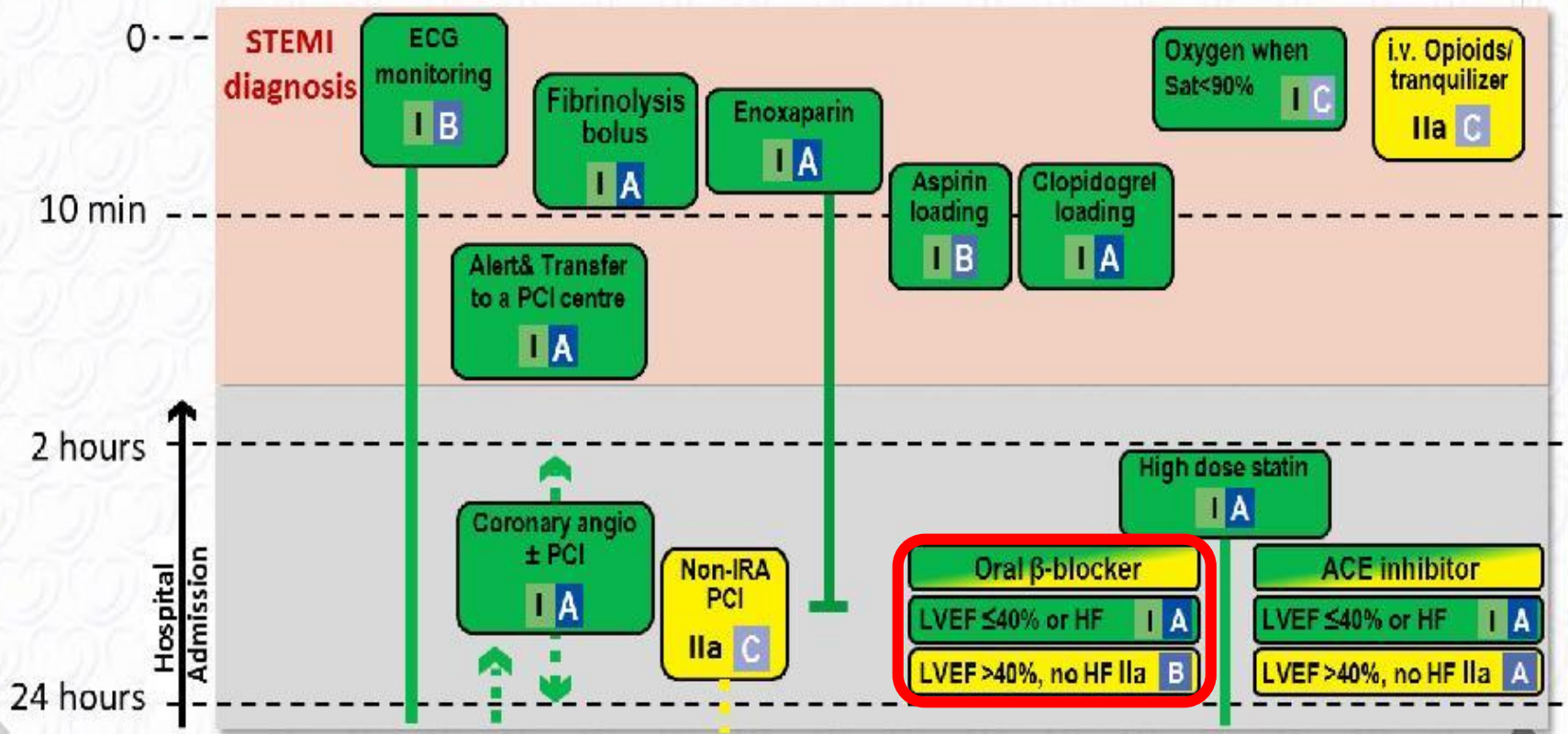
Strategy clock



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