FFR在急诊PCI的应用

广东省人民医院

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- 急诊术中使用FFR安全吗？

急诊术中FFR的安全性

- Safety of FFR in patients with acute or recent MI

Results: 648 patients (n = 298 STEMI patients in 1 hospital; mean time to reperfusion 253 min; n = 350 NSTEMI in 6 hospitals; median time to angiography from index chest pain episode 3 (2, 5) days) were included between March 2011 and May 2013. Two NSTEMI patients (0.3% overall) experienced a coronary dissection related to the guidewire. No guidewire dissections occurred in the STEMI patients. Chest symptoms were reported in the majority (86%) of patient's symptoms during the adenosine infusion. No serious adverse events occurred during infusion of adenosine and all of the symptoms resolved after the infusion ceased.

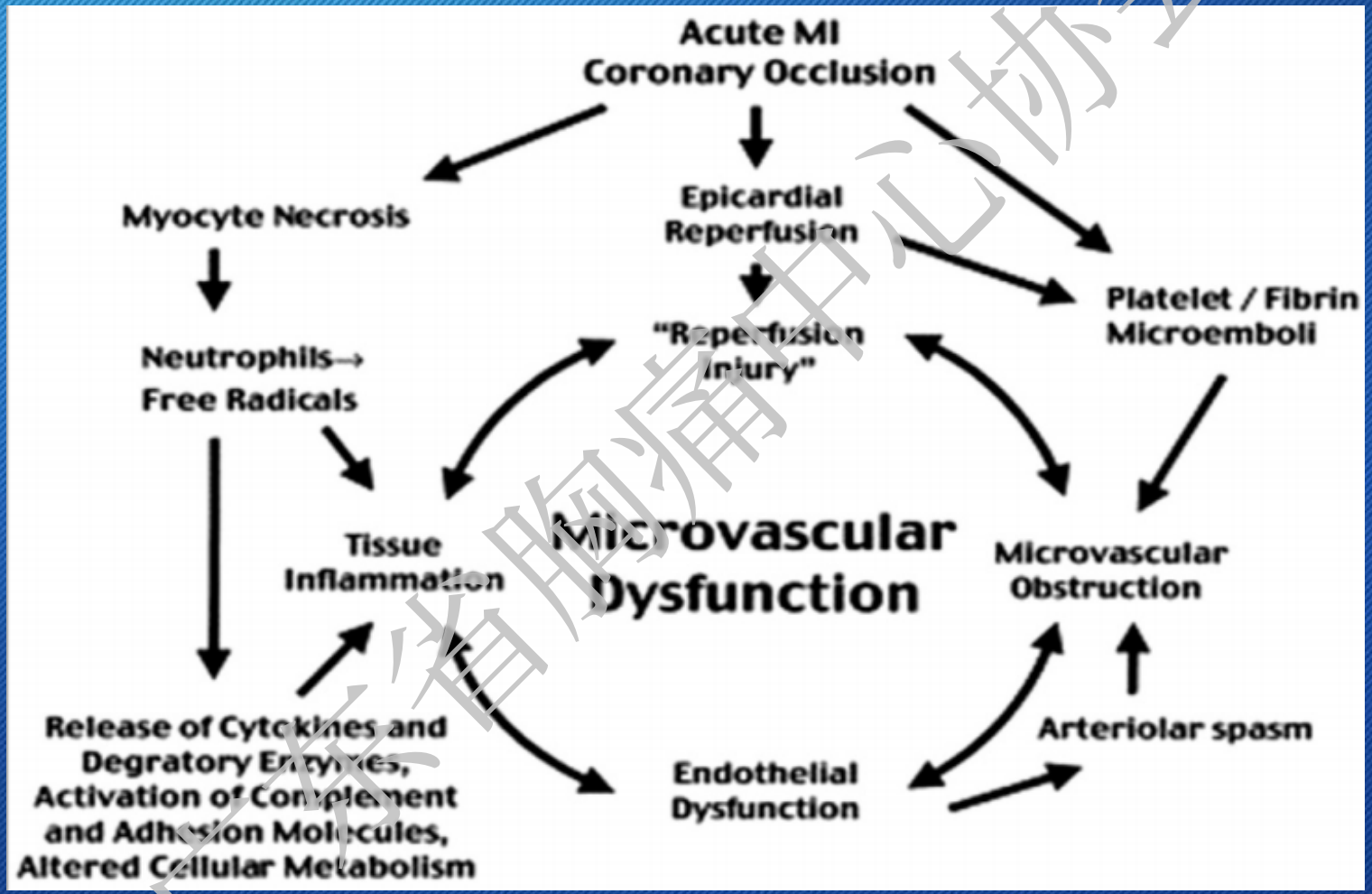
Conclusions: In this multicenter analysis, guidewire-based measurement of FFR and IMR using intravenous adenosine was safe in patients following STEMI or NSTEMI. Self-limiting symptoms were common but not associated with serious adverse events. Finally, coronary dissection in STEMI and NSTEMI patients was noted to be a rare phenomenon.

The exclusion criteria for administration of intravenous adenosine included evidence of 2nd or 3rd degree heart block on the ECG, long QT syndrome, cardiogenic shock, or a history of asthma concurrently treated with bronchodilators [22]. The exclusion criteria for both studies are provided in Supplementary Tables 1 and 2. The study was approved by the UK National Research Ethics Service and all participants provided written informed consent.

Nadeem Ahmed, et al. International Journal of Cardiology 202 (2016) 305–310

- 急诊术中使用FFR安全吗？
- ACS患者测量FFR准确吗？
  - ACS患者微循环

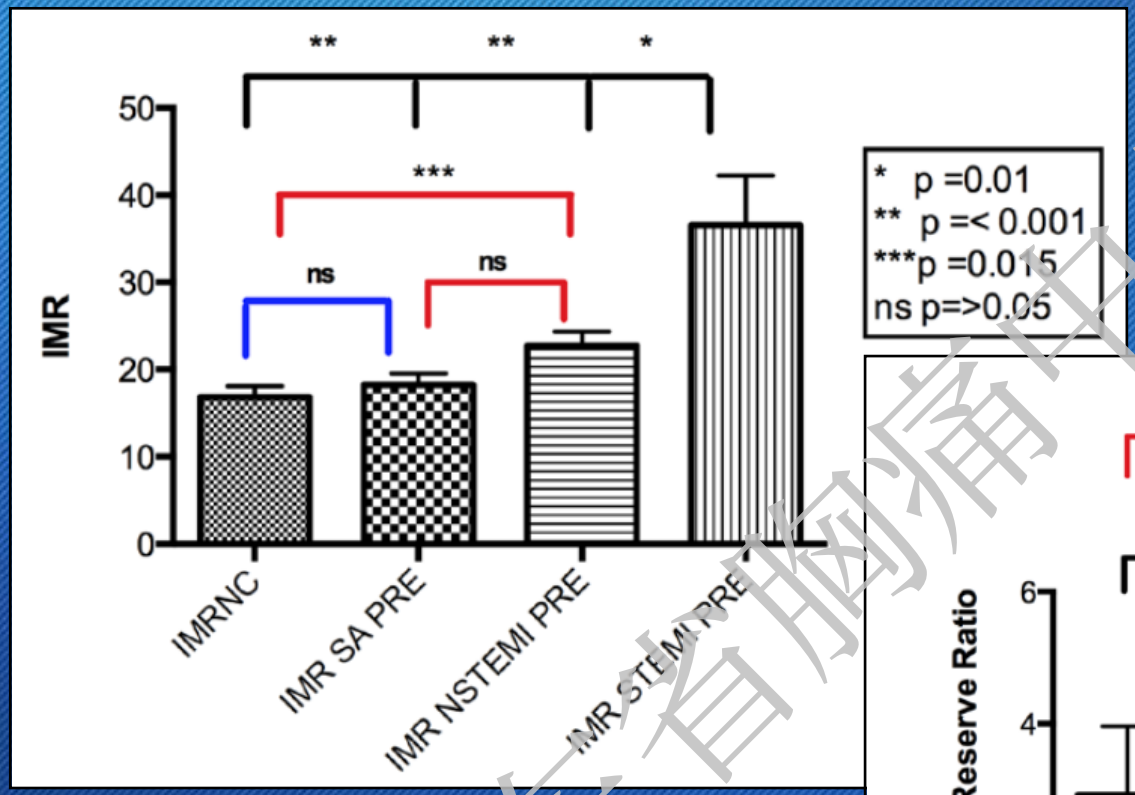
心梗急性期微循环

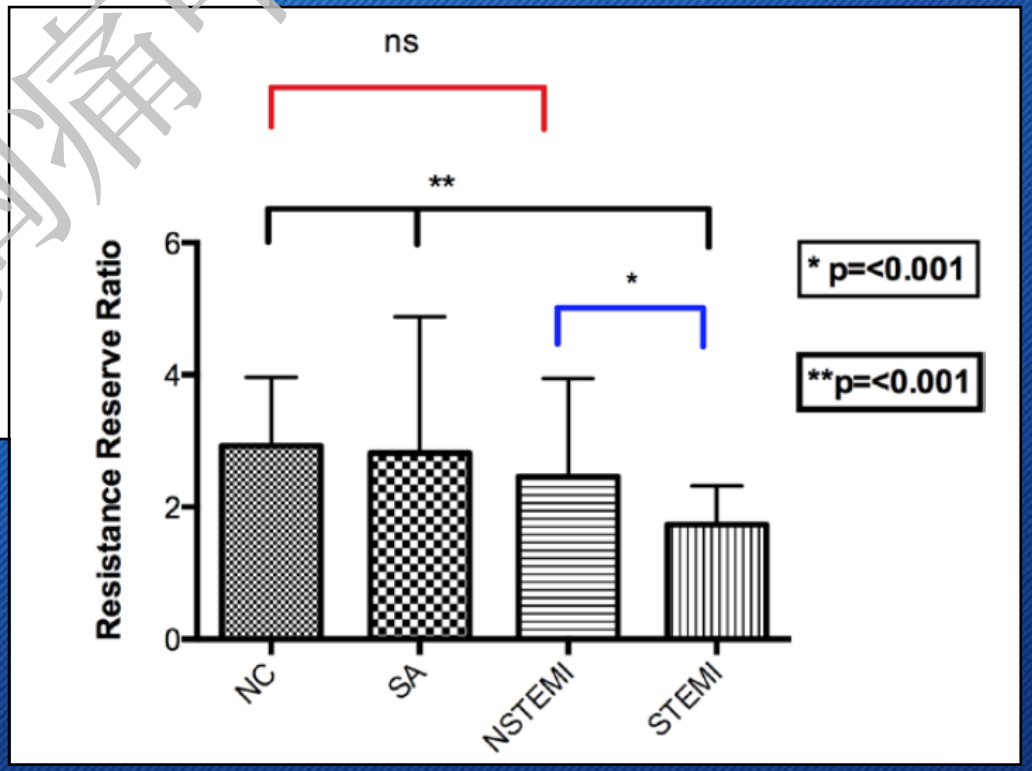


N.R. Shah et al. IJC Heart & Vasculature 5 (2014) 20–25

Vasodilatory Capacity Microcirculation

Patient N = 50 stable angina, 50 NSTEMI, and 40 STEMI.





Jamie Layland, et al. Circ Cardiovasc Interv. 2013;6:231-236.

- 急诊术中使用FFR安全吗？
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  - ACS患者微循环
  - 心梗罪犯血管

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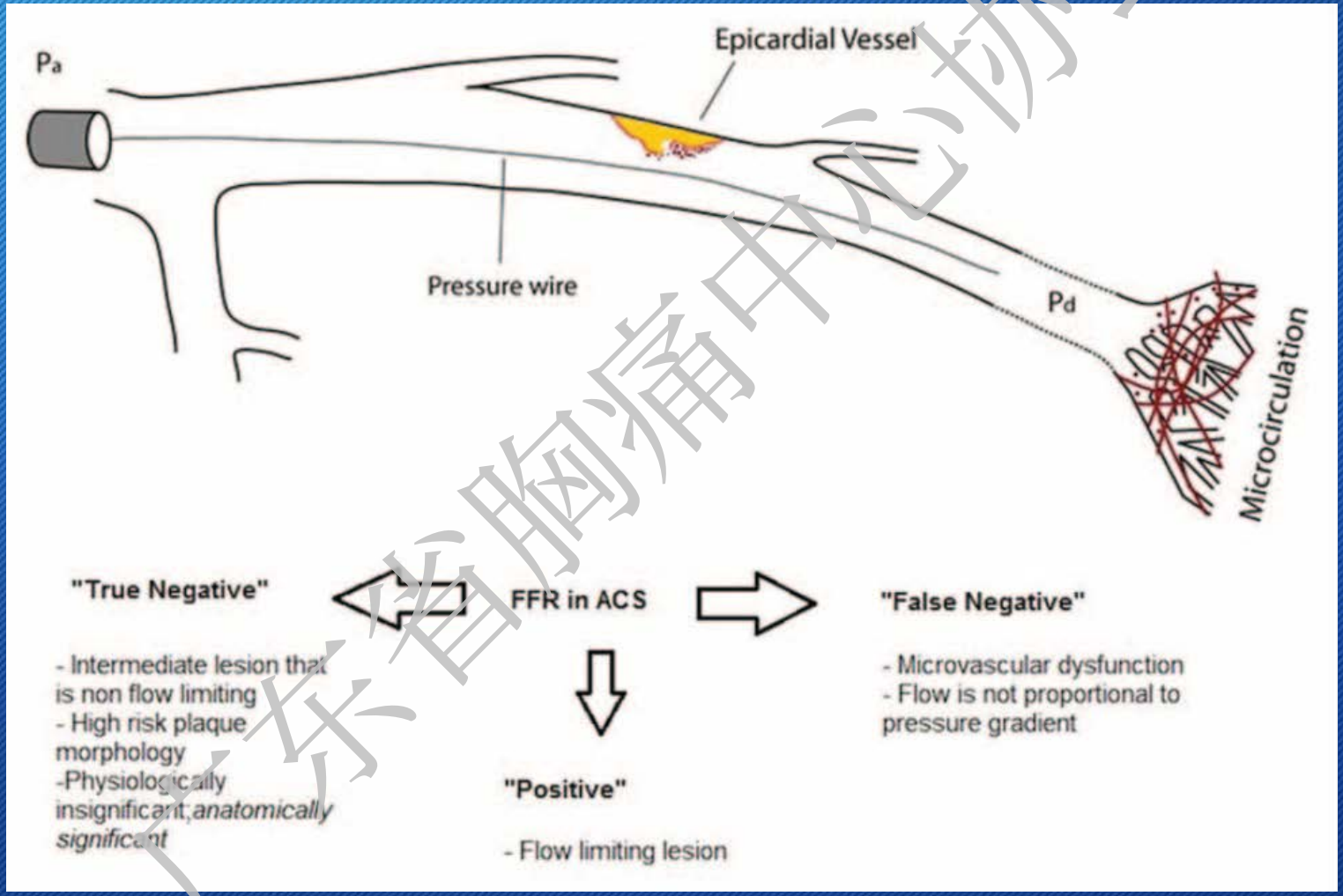
  - 心梗罪犯血管
    - 急性期

心梗急性期罪犯支FFR



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  - 心梗罪犯血管
    - 急性期
    - 亚急性期

心梗罪犯支亚急性期FFR

- In 57 patients who had sustained a MI ≥6 days, before and after angioplasty

	MIBI + n = 47	MIBI - n = 67
FFR≥0.75 n = 66	8	58
FFR<0.75 n = 48	39	9

Concordance = 85%

κ = 0.66; P<0.0001

Whole population

	MIBI + n = 40	MIBI - n = 40
FFR≥0.75 n = 45	5	40
FFR<0.75 n = 35	35	0

Concordance = 94%

κ = 0.87; P<0.0001

With truly SPECT result

Bernard De Bruyne, et al. Circulation. 2001;104:157-162

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  - 心梗非罪犯血管

心梗非罪犯血管FFR

N = 75 with STEMI, and N = 26 NSTEMI

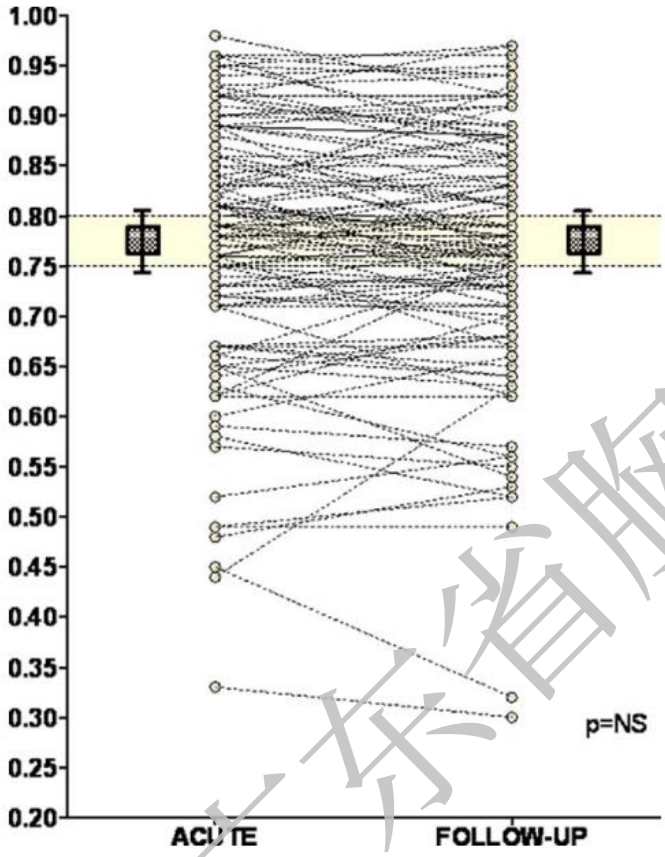

Figure 1. Plot of FFR Values of Nonculprit Coronary Artery Stenoses During the Acute Phase and at Follow-Up

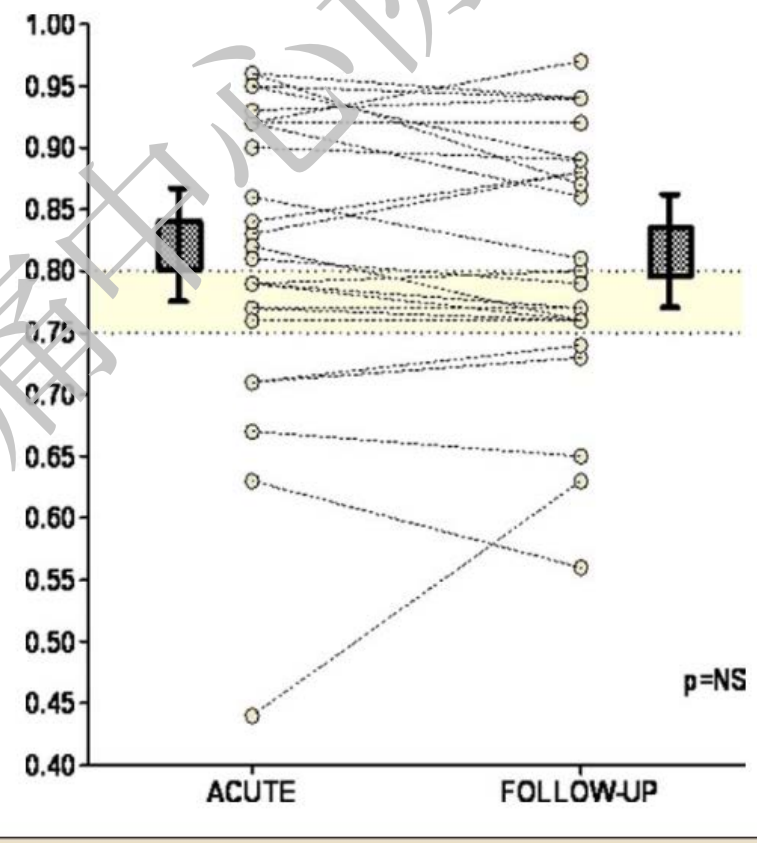

Figure 2. Plot of FFR Values of Nonculprit Coronary Artery Stenoses During the Acute Phase and at Follow-Up in Patients on the Lowest LVEF Quartile

Argyrios Ntalianis, et al. J Am Coll Cardiol Intv. 2010;3:1274–81

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  - STEMI非罪犯血管

CHANGE IN RECOMMENDATIONS

2012 → 2017

Radial access[a]
MATRIX[143]

DES over BMS
EXAMINATION[150, 151]
COMFORTABLE-AMI[149], NORSTENT[152]

Complete Revascularization[b]
PRAMI[168], DANAMI-3-PRIMULTI[170], CVLPRIT[169], Compare-Acute[171]

Oxygen when SaO2 <95% — AVOID[64], DETO2X[66] — Oxygen when SaO2 <90%

Dose i.V. TNK-tPA same in all patients — STREAM[121] — Dose i.V. TNK-tPA half in Pts ≥75 years

2017 NEW RECOMMENDATIONS

- Additional lipid lowering therapy if LDL >1.8 mmol/L (70 mg/dL) despite on maximum tolerated statins
  IMPROVE-IT[376], FOURIER[382]
- Complete revascularization during index primary PCI in STEMI patients in shock
  Expert opinion
- Cangrelor if $P2Y_{12}$ inhibitors have not been given
  CHAMPION[193]
- Switch to potent $P2Y_{12}$ inhibitors 48 hours after fibrinolysis

Complete Revascularization[b]
PRAMI[168], DANAMI-3-PRIMULTI[170], CVLPRIT[169], Compare-Acute[171]

I IIa IIb III

2017 NEW / REVISED CONCEPTS

MINOCA AND QUALITY INDICATORS:
- New chapters dedicated to these topics.

STRATEGY SELECTION AND TIME DELAYS:
- Clear definition of first medical contact (FMC).
- Definition of "time 0" to choose reperfusion strategy (i.e. the strategy clock starts at the time of "STEMI diagnosis").
- Selection of PCI over fibrinolysis: when anticipated delay from "STEMI diagnosis" to wire crossing is ≤120 min.
- Maximum delay time from "STEMI diagnosis" to bolus of fibrinolysis agent is set in 10 min.
- "Door-to-Ballon" term eliminated from guidelines.

TIME LIMITS FOR ROUTINE OPENING OF AN IRA[c]**:**
- 0–12h (Class I); 12–48h (Class IIa); >48h (Class III).

ELECTROCARDIOGRAM AT PRESENTATION:
- Left and right bundle branch block considered equal for recommending urgent angiography if ischemic symptoms.

TIME TO ANGIOGRAPHY AFTER FIBRINOLYSIS:
- Timeframe is set in 2–24h after successful fibrinolysis.

PATIENTS TAKING ANTICOAGULANTS:
- Acute and chronic management presented.

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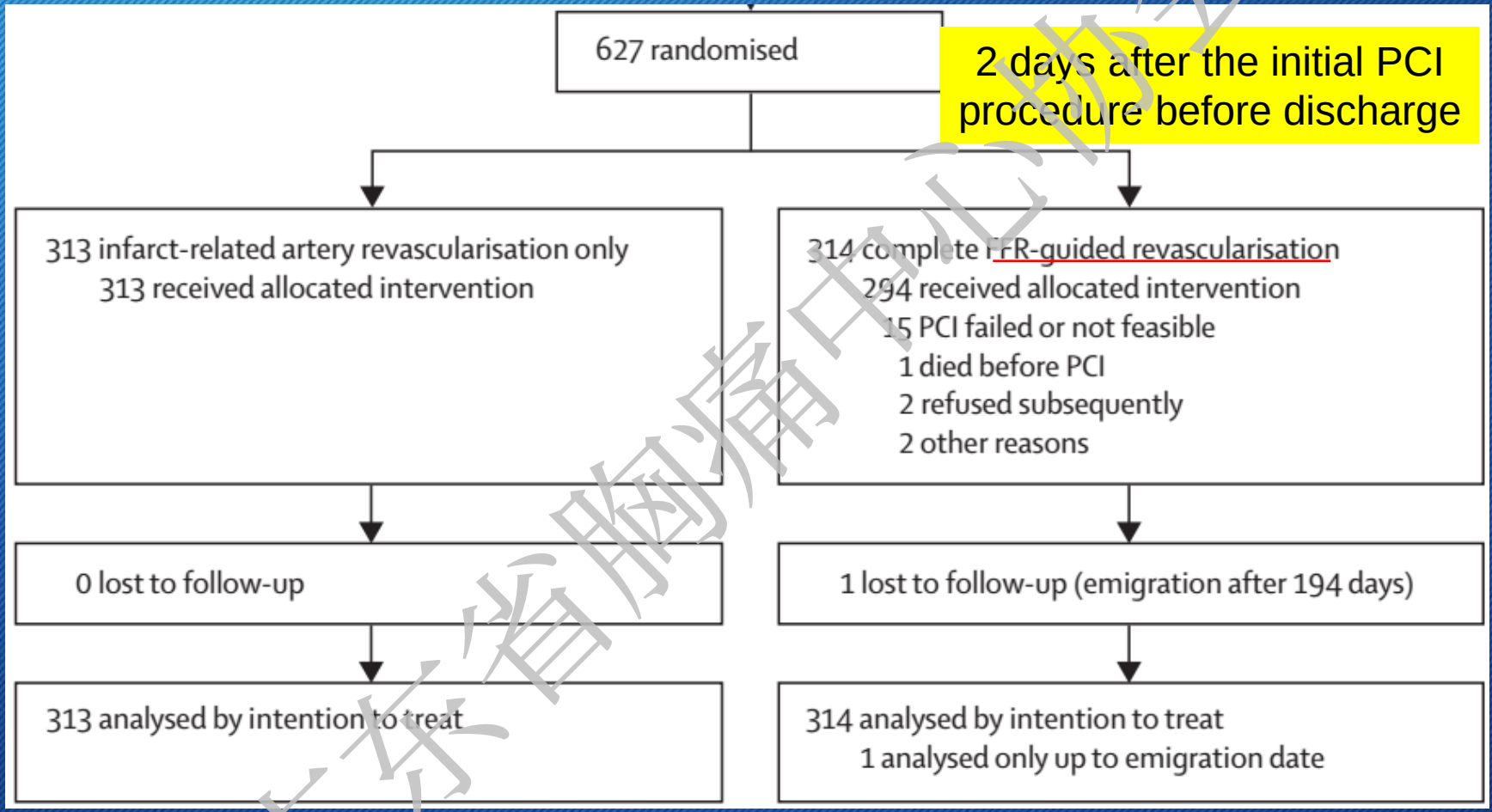
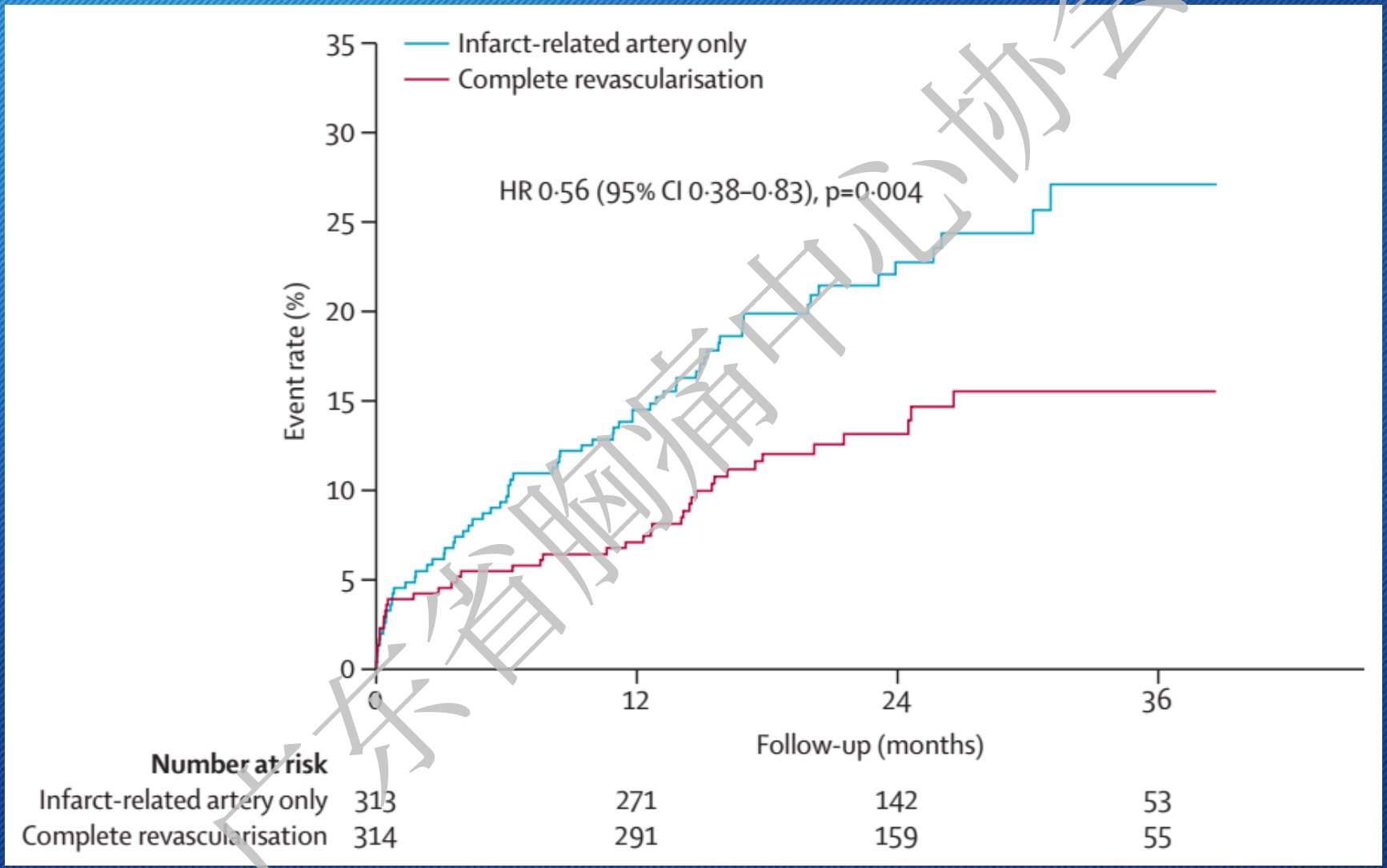
    - 亚急性期

DANAMI-3-PRIMULTI



Thomas Engstrøm, et al. Lancet 2015; 386: 665–71

DANAMI-3-PRIMULTI



Thomas Engstrøm, et al. Lancet 2015; 386: 665–71

DANAMI-3-PRIMULTI

	Infarct-related artery only (n=313)	Complete revascularisation (n=314)	Hazard ratio (95% CI)	p
Primary endpoint*	68 (22%)	40 (13%)	0·56 (0·38–0·83)	0·004
All-cause mortality	11 (4%)	15 (5%)	1·40 (0·63–3·00)	0·43
Non-fatal reinfarction	16 (5%)	15 (5%)	0·94 (0·47–1·90)	0·87
Ischaemia-driven revascularisation	52 (17%)	17 (5%)	0·31 (0·18–0·53)	<0·0001
Secondary endpoints				
Cardiac death	9 (3%)	5 (2%)	0·56 (0·19–1·70)	0·29
Cardiac death or non-fatal myocardial infarction	25 (8%)	20 (6%)	0·80 (0·45–1·45)	0·47
Urgent percutaneous coronary intervention	18 (6%)	7 (2%)†	0·38 (0·16–0·92)	0·03
Non-urgent percutaneous coronary intervention	27 (9%)	8 (3%)	0·29 (0·13–0·63)	0·002
Unplanned coronary-artery bypass graft surgery	7 (2%)	3 (1%)	0·43 (0·11–1·70)	0·22

Data are number of events (%). *The first event per patient is listed. †One patient had both urgent and non-urgent percutaneous coronary intervention.

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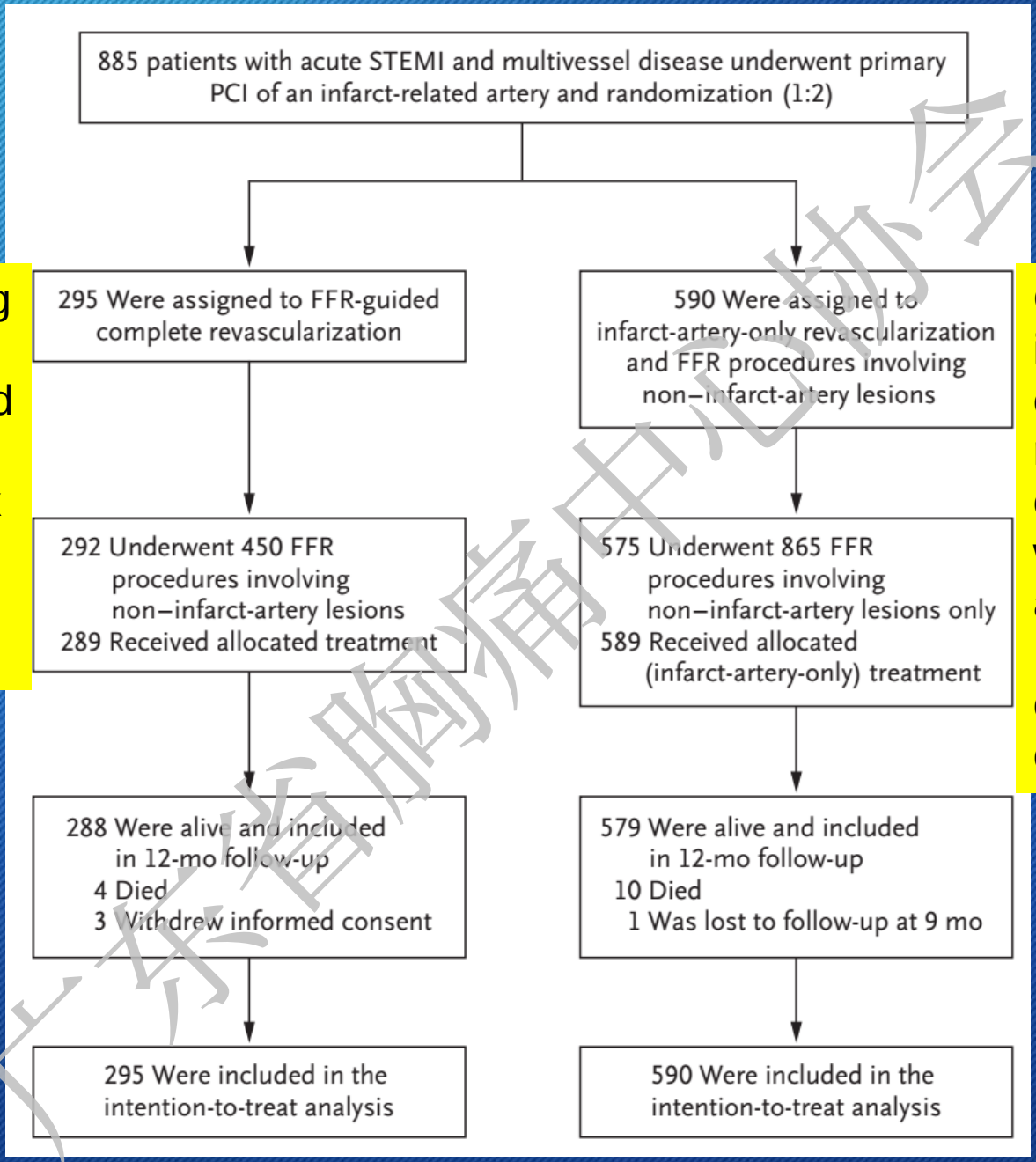
COMPAR E-ACUTE

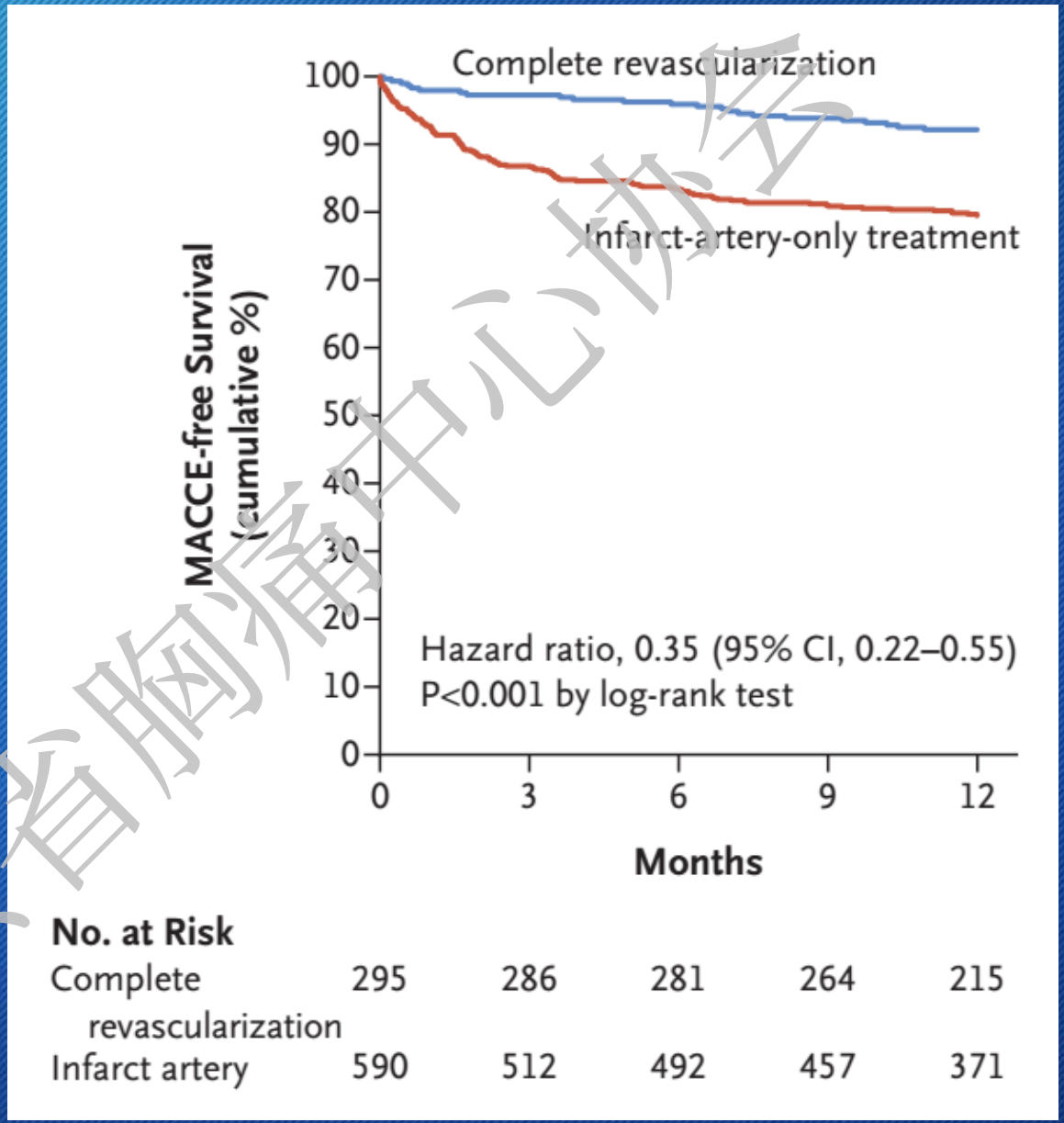
Generally during the same intervention; had to be performed during the index hospitalization and preferably within 72 hours.



Clinically indicated elective revascularizations performed within 45 days after primary PCI were not counted as events.

Pieter C. Smits, et al. N Engl J Med. 2017;376(13):1234–1244.

COMPARE-ACUTE



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End Point	Complete Revascularization (N=295)	Infarct-Artery-Only Treatment (N=590)	Hazard Ratio (95% CI)	P Value
	number (percent)			
Primary				
MACCE*	23 (7.8)	121 (20.5)	0.35 (0.22–0.55)	<0.001
Death from any cause	4 (1.4)	10 (1.7)	0.80 (0.25–2.56)	0.70
Cardiac event	3 (1.0)	6 (1.0)	1.00 (0.25–4.01)	1.00
Myocardial infarction	7 (2.4)	28 (4.7)	0.50 (0.22–1.13)	0.10
Spontaneous event	5 (1.7)	17 (2.9)	0.59 (0.22–1.59)	0.29
Periprocedural event	2 (0.7)	11 (1.9)	0.36 (0.08–1.64)	0.19
Revascularization	18 (6.1)	103 (17.5)	0.32 (0.20–0.54)	<0.001
PCI	15 (5.1)	98 (16.6)	0.37 (0.24–0.57)	<0.001
Coronary-artery bypass graft	3 (1.0)	5 (0.8)	1.20 (0.29–5.02)	0.80
Cerebrovascular event	0	4 (0.7)	NA	NA
Secondary				
NACE (any first event)	25 (8.5)	174 (29.5)	0.25 (0.16–0.38)	<0.001
Death from any cause) or myocardial infarction	11 (3.7)	38 (6.4)	0.57 (0.29–1.12)	0.10
Major bleeding	3 (1.0)	8 (1.4)	0.75 (0.20–2.84)	0.67
Any bleeding				
At 12 mo	9 (3.1)	28 (4.7)	0.64 (0.30–1.36)	0.25
At 48 hr	5 (1.7)	8 (1.4)	1.25 (0.41–3.83)	0.69
Hospitalization for heart failure, unstable angina, or chest pain	13 (4.4)	47 (8.0)	0.54 (0.29–0.99)	0.04
Any revascularization†	19 (6.4)	161 (27.3)	0.47 (0.29–0.76)	0.002
Stent thrombosis	2 (0.7)	1 (0.2)	0.58 (0.12–2.80)	0.50

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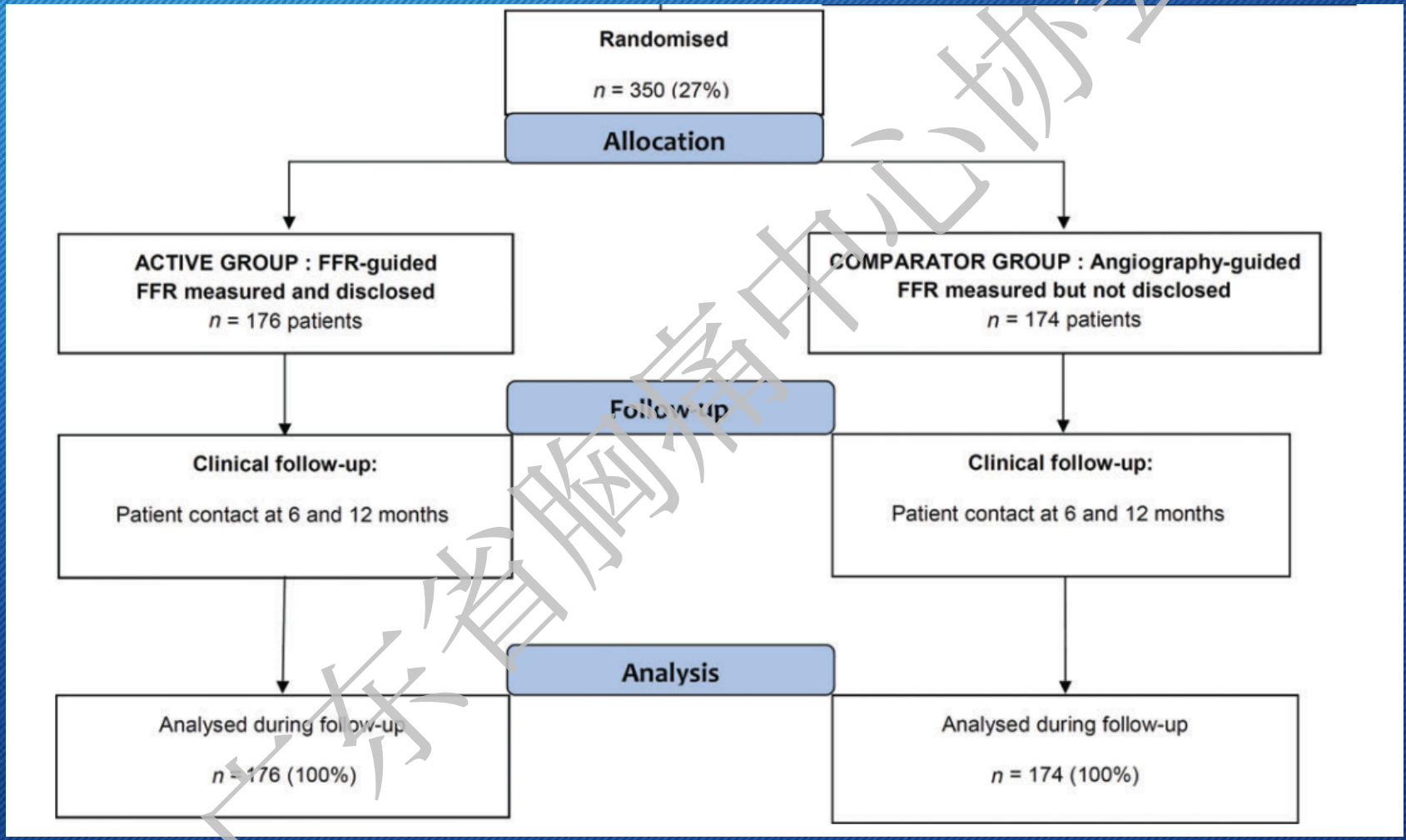
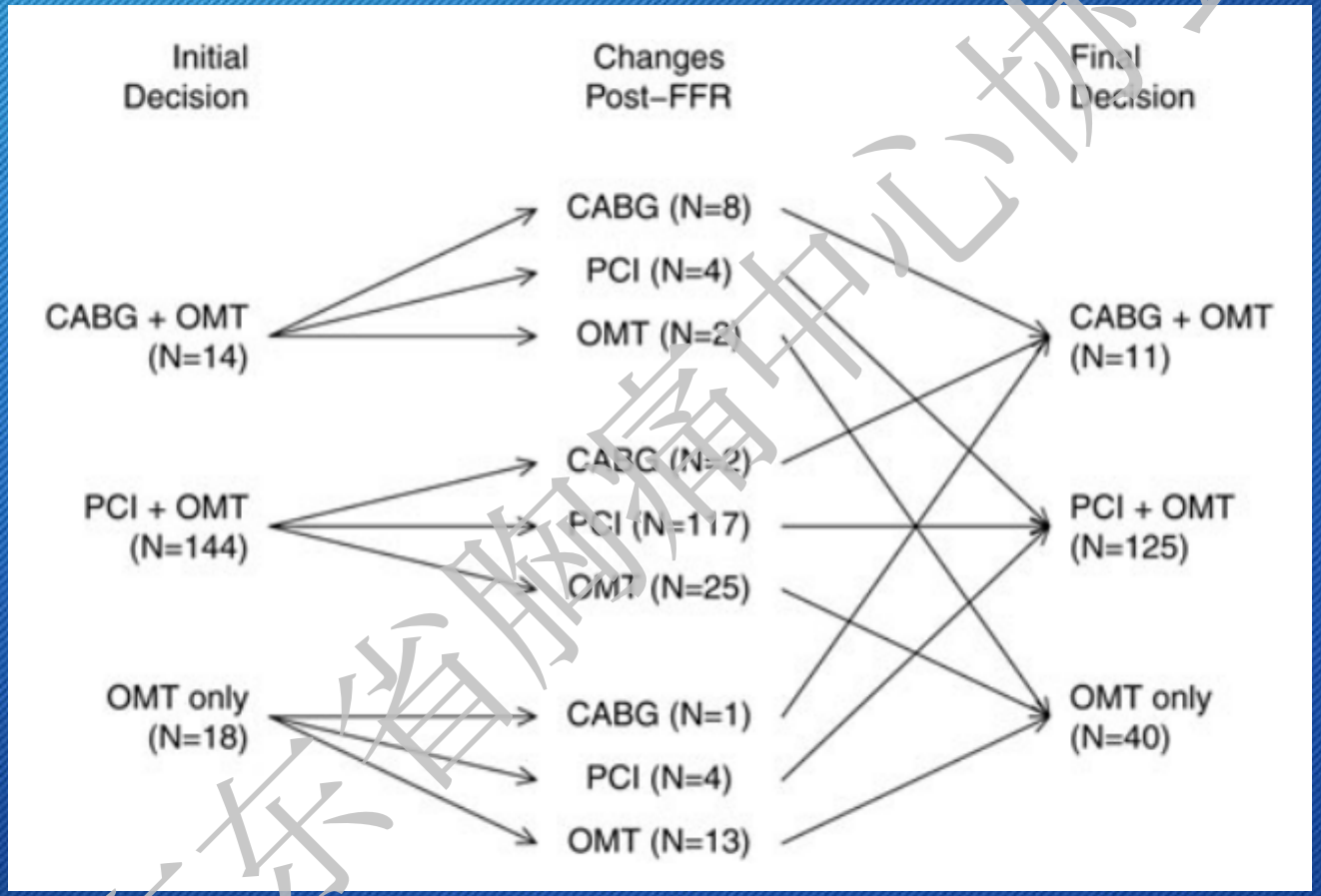
    - 亚急性期
    - 急性期
  - NSTEACS患者

FAMOUS–NSTEMI



Layland J, et al. Eur Heart J. 2015; 36:100–111



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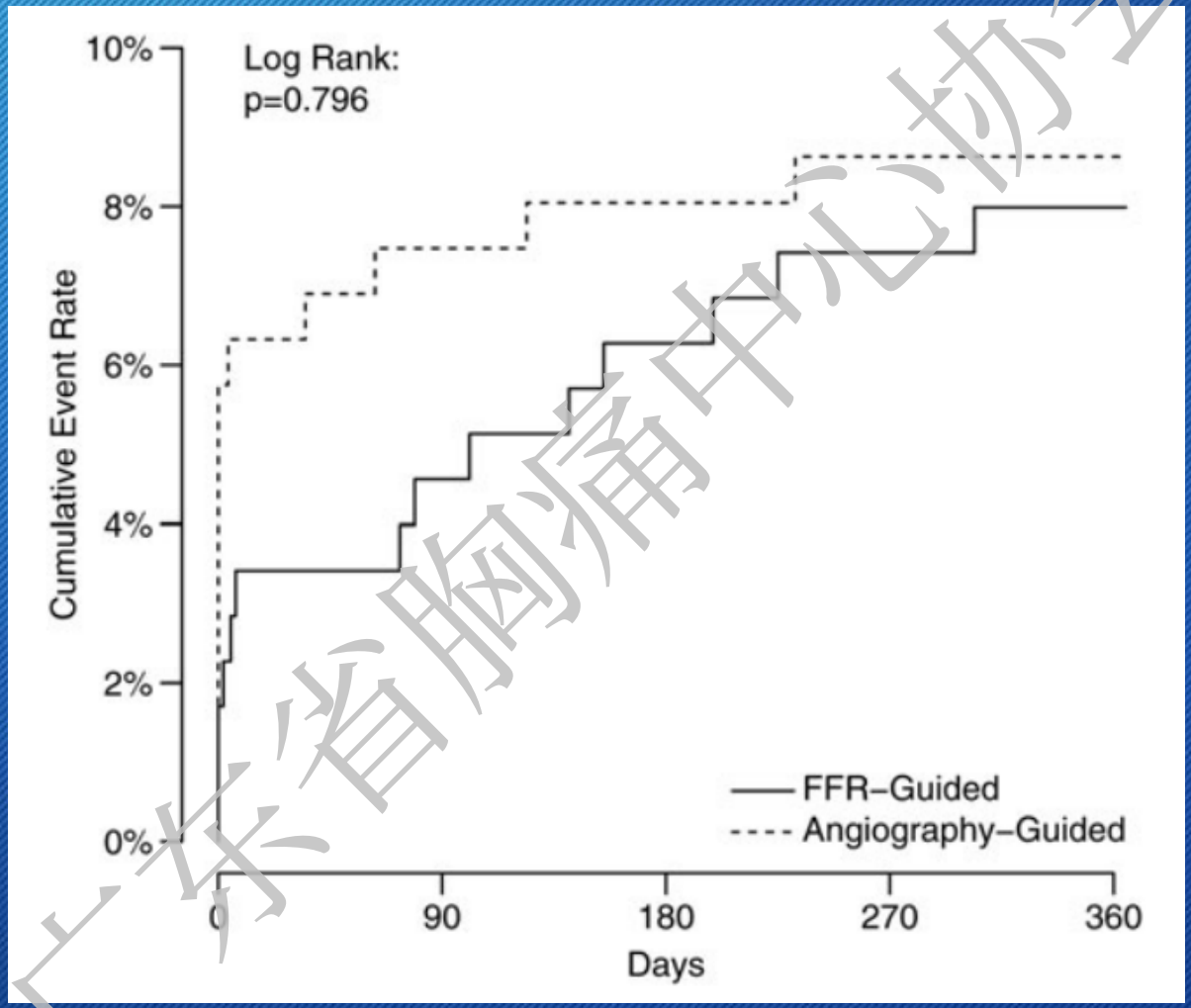

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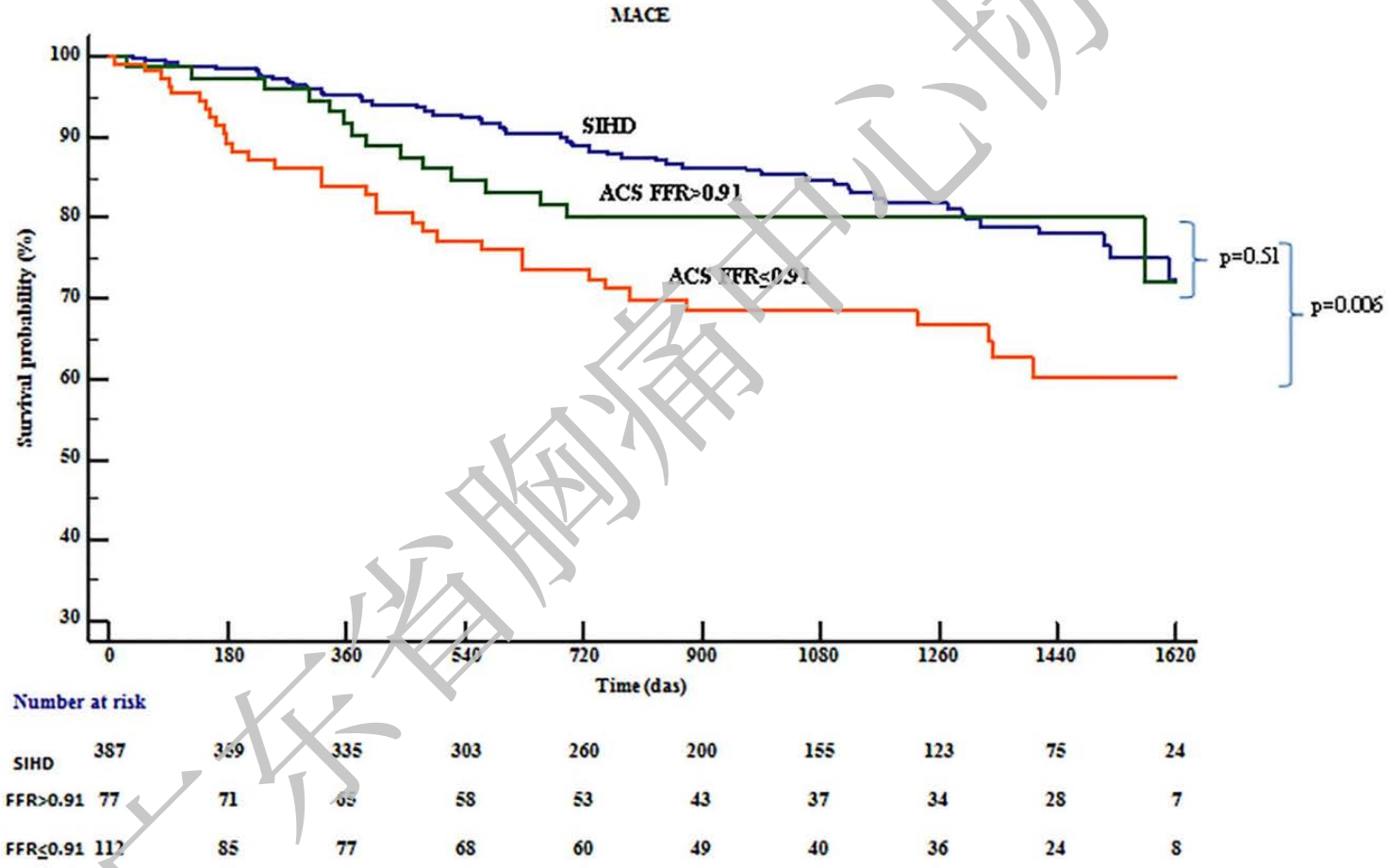
ACS患者支架术后FFR的预后价值



Srikanth Kasula, et al. Heart. 2016;102:1988–1994.

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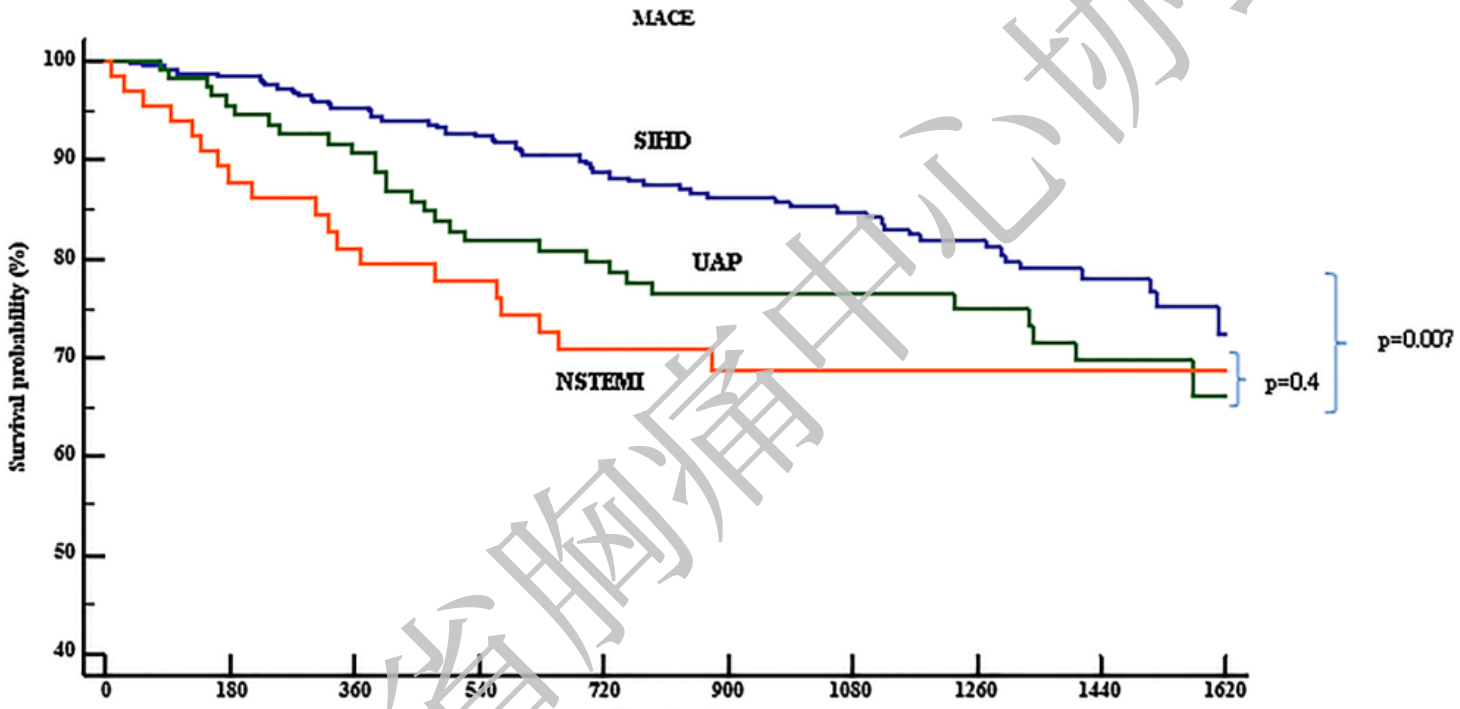
- 急诊术中测量FFR有效吗？
- 除了FFR还什么影响预后？

疾病类型影响预后



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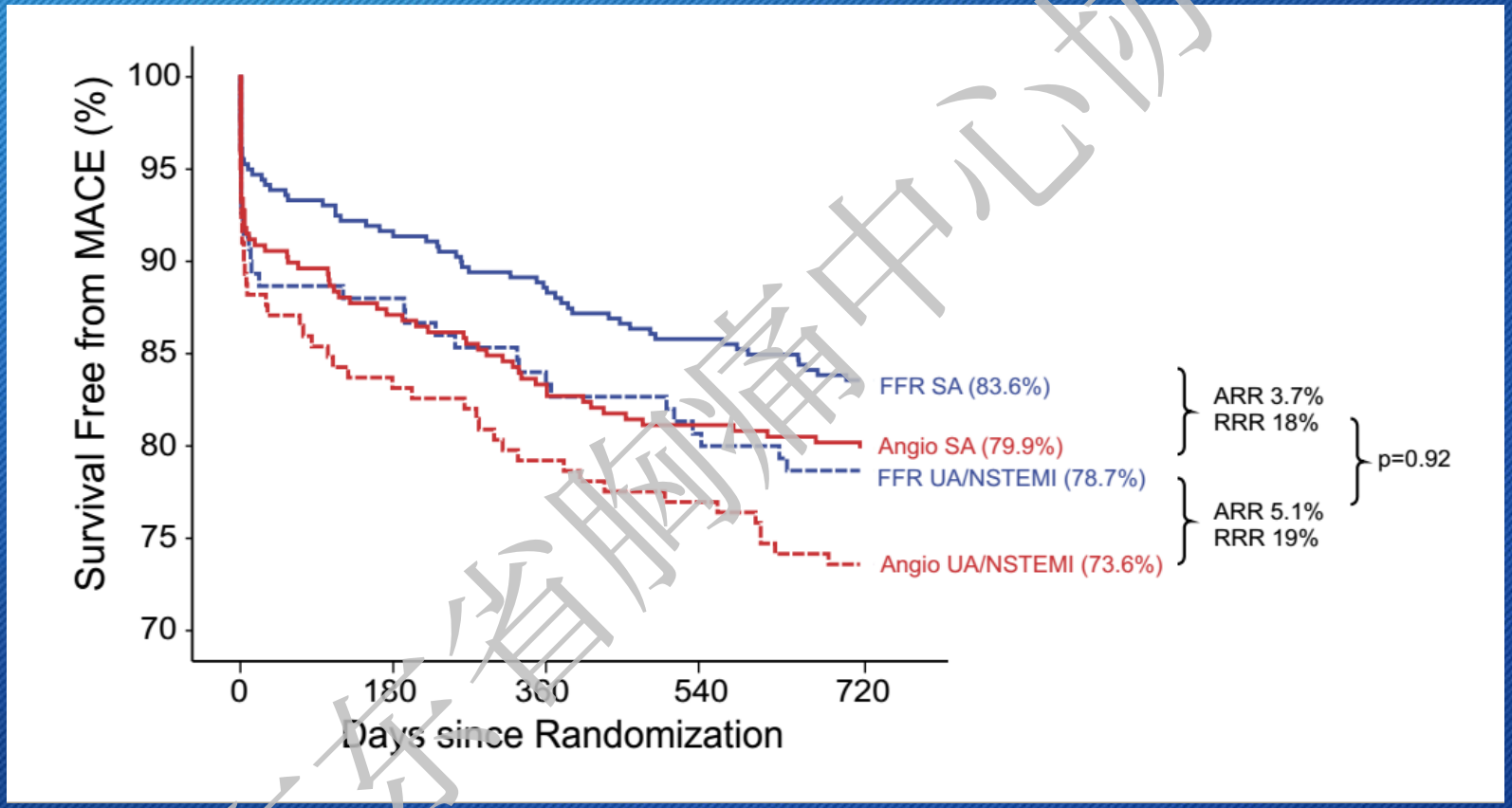
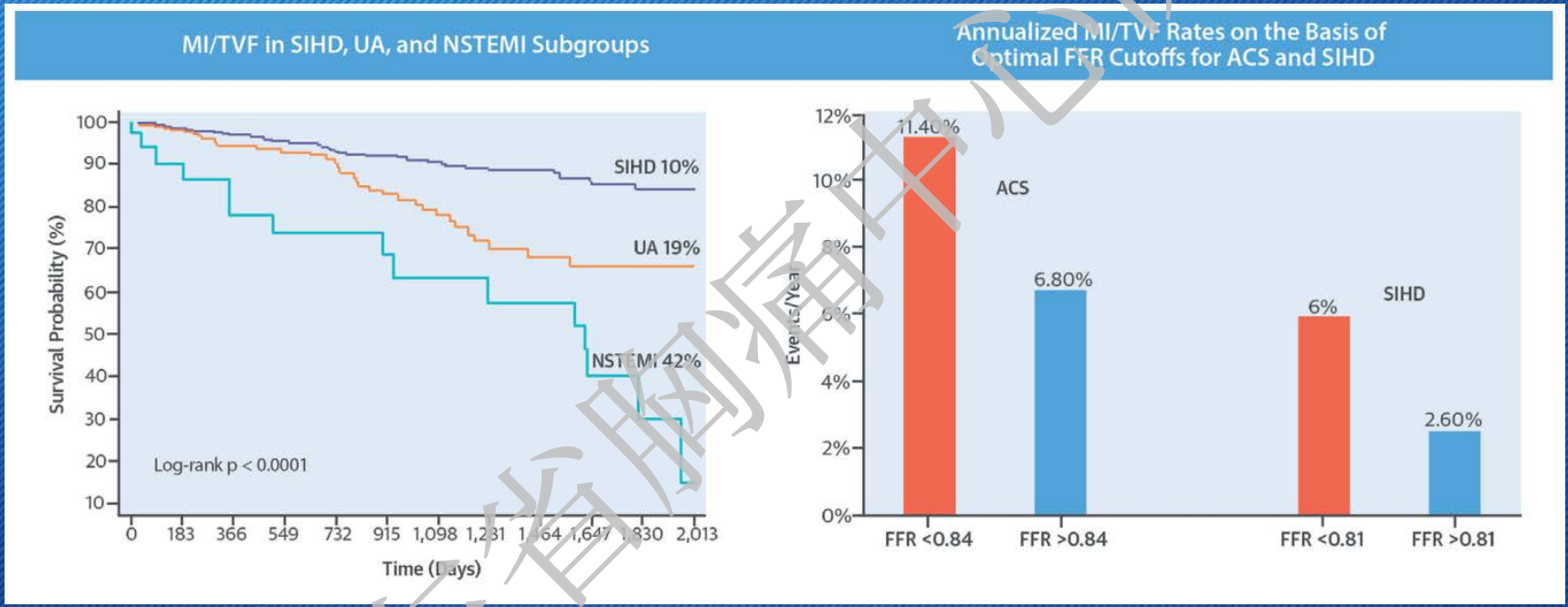
疾病类型与FFR值影响预后



J Am Coll Cardiol Intv 2011;4:1183–9

疾病类型与FFR值影响预后



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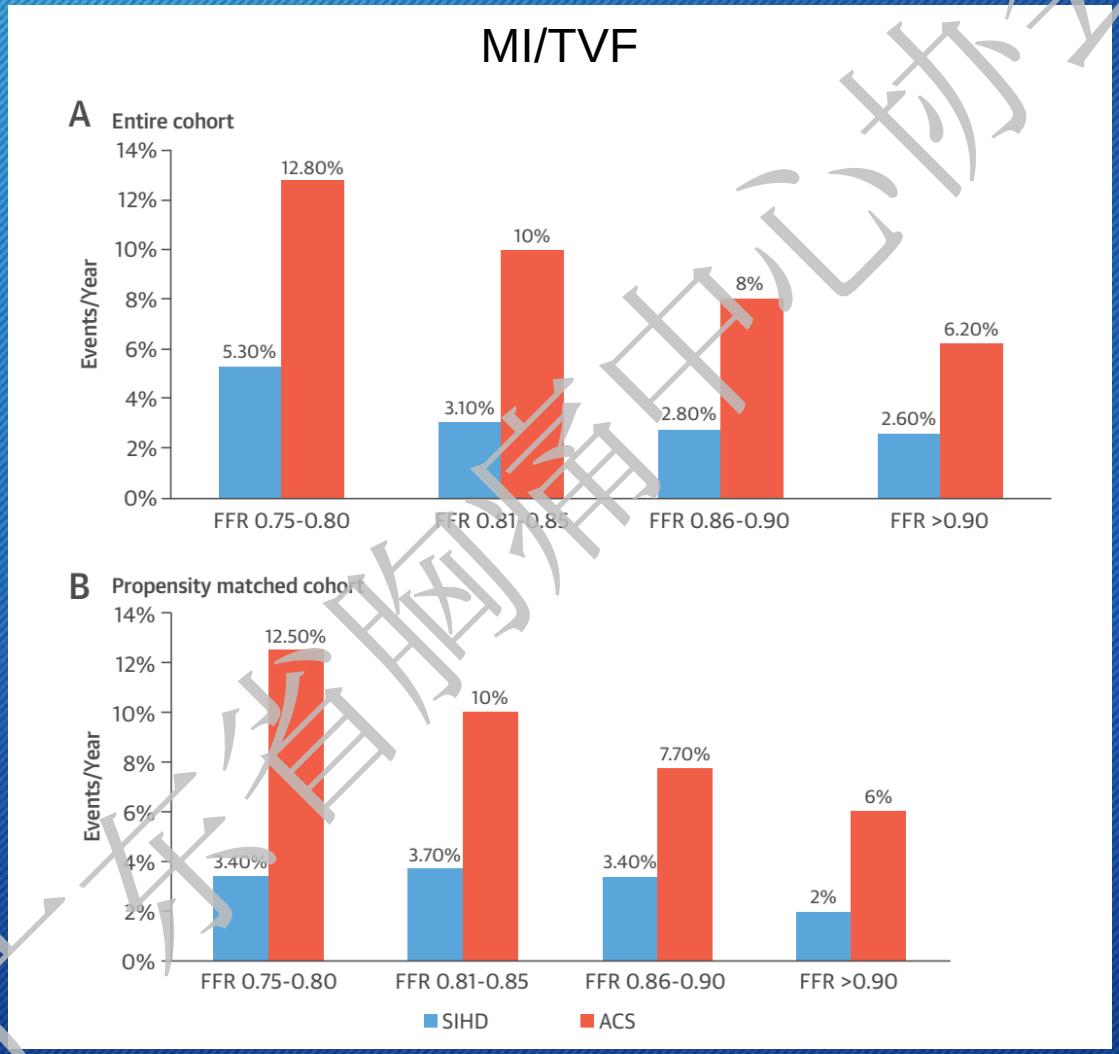

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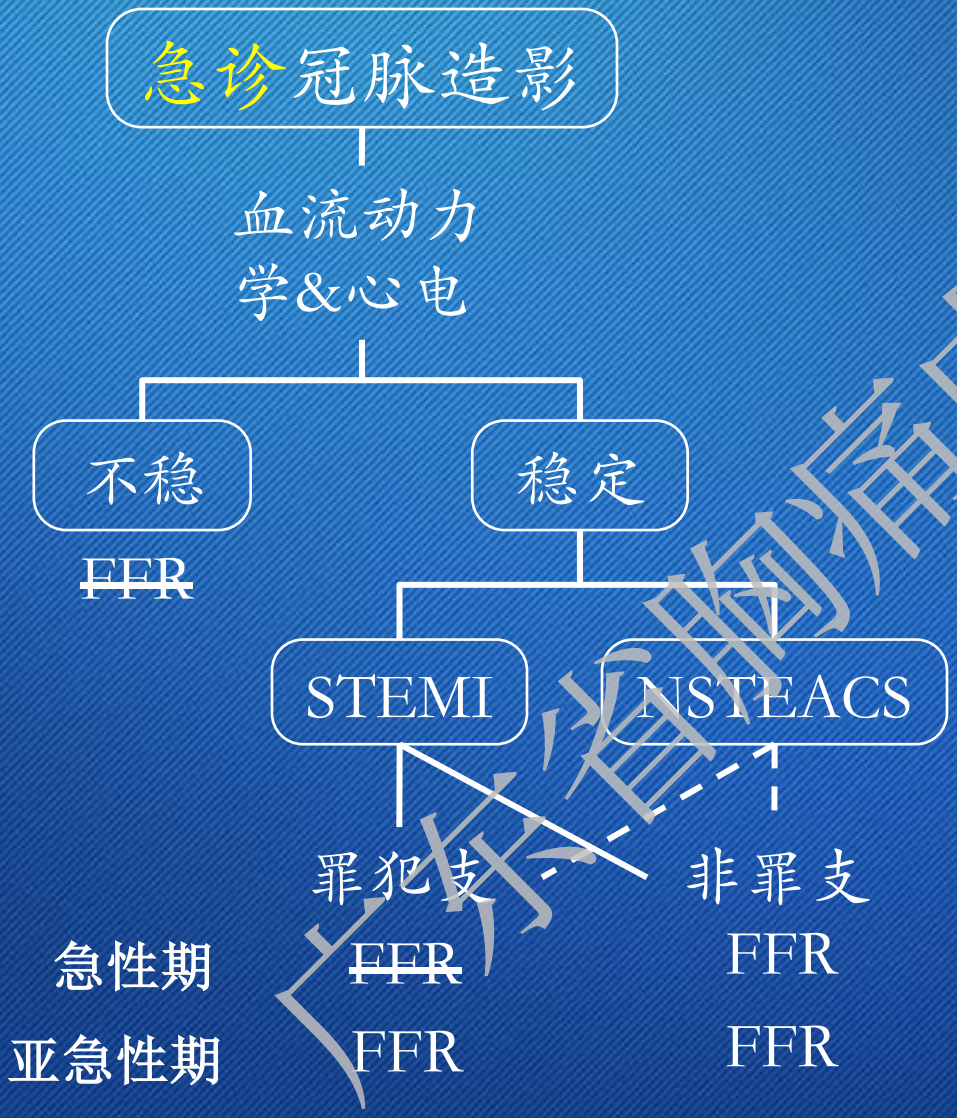
小 结



- 决定FFR的使用
  - ✓ 安全性
  - ✓ 有效性
- 决定患者预后
  - ✓ FFR指导策略
  - ✓ FFR测值
  - ✓ 疾病类型

谢谢！