

中国胸痛中心的培训与 教育职能

广东省人民医院

广东省心血管病研究所

陈纪言

胸痛的常见疾病

危重疾病

- STEMI/ACS
- 主动脉夹层分离
- 肺栓塞
- 张力性气胸

非危重疾病

- 胆囊炎
- 胃肠道疾病
- 其他

CPC的组织构成

院内系统

- 急诊科
- 心内科
- 导管室
- CCU
- 心外科/血管外科
- 呼吸科
- 影像学科（CT/MR/超声）

院外系统

- 120系统
- 二级医院
- 社区医院

胸痛中心的协调机制

- 牵涉多学科的症状，多学科参与
- 无缝连接
- 建立一个配合良好的团队
- 建立胸痛诊断和鉴别诊断流程
- 急诊室建立危险分层制度
- ‘快速诊断、及时治疗、降低死亡率’
- 建立目标管理制度

我国CPC认证内容

- 急诊科与急救医疗系统整合
- 对出现ACS症状的病人进行急救评估（及时诊断和治疗）
- 对低危病人及无法确定病因的胸痛病人进行评估
- 流程改进
- 人员、资质和培训、组织机构和承诺、机构职能规划
- 认证精髓：**持续性改进**

胸痛中心的管理机制

- 强的领导管理团队

院长/付院长直接领导，医务处参与，多科共建

- 资料收集和资料管理

胸痛-FMC

FMC-D/ECG

D-ECG

ECG-N/ECG-B

- 24/7 导管室

- 资料分析

- 多团队定期会议/改进措施

急诊室医生/护士的培训内容

- 胸痛诊断和鉴别诊断流程
- **STEMI/ACS/主动脉夹层/肺栓塞**的现代诊治
- 相关指南/流程
- 培训形式
 - 授课
 - 病例讨论
- 培训时间/培训次数
 - 每年**2-4**次，
 - 每次**1-2**小时

急诊室医生的培训内容

STEMI培训内容

- ECG检查（10分钟以内）
- 胸痛伴相邻两个导联ST段弓背向上抬高即可诊断
- 新发BBB也可同等看待
- 不必等酶学检查结果
- 一旦诊断立刻使用DAPT
- 时间窗内立刻进行再灌注治疗决策
 - PPCI？绕行急诊/CCU，直送导管室
 - 溶栓？转院PCI/造影检查

急诊室护士的培训内容

STEMI培训：

- 相关知识培训
- 迅速心电图检查
- 确保DAPT的使用（没有因呕吐而没有实际应用）
- 时间流程的记录
- 病人安慰
- CPR的训练
- 导管室热线电话的通畅

导管室护士/技师培训

- **STEMI的治疗指南**
- **PPCI的手术过程及相关器械支持**
- **流程学习**
 - 确认DAPT的使用
 - 抢救设施的准备（IABP，气管插管, ECMO）
- **7/24导管室**
- **建立热线电话/保持通畅**
- **护士长导管室门口迎接病人**

心内科医生的培训

- STEMI的治疗指南
- 流程学习
- 住院总医生的热线电话建立/全天候使用
- 技术要点（吸血栓、2b3a）
- 并发症处理
- 支持器械的应用（IABP，气管插管，ECMO）
- 二线医生支持制度

CCU的培训

- STEMI的治疗指南
- 流程学习
- 技术要点（吸血栓、2b3a）
- 支持器械的应用（IABP，气管插管，ECMO）
- 二线医生支持制度

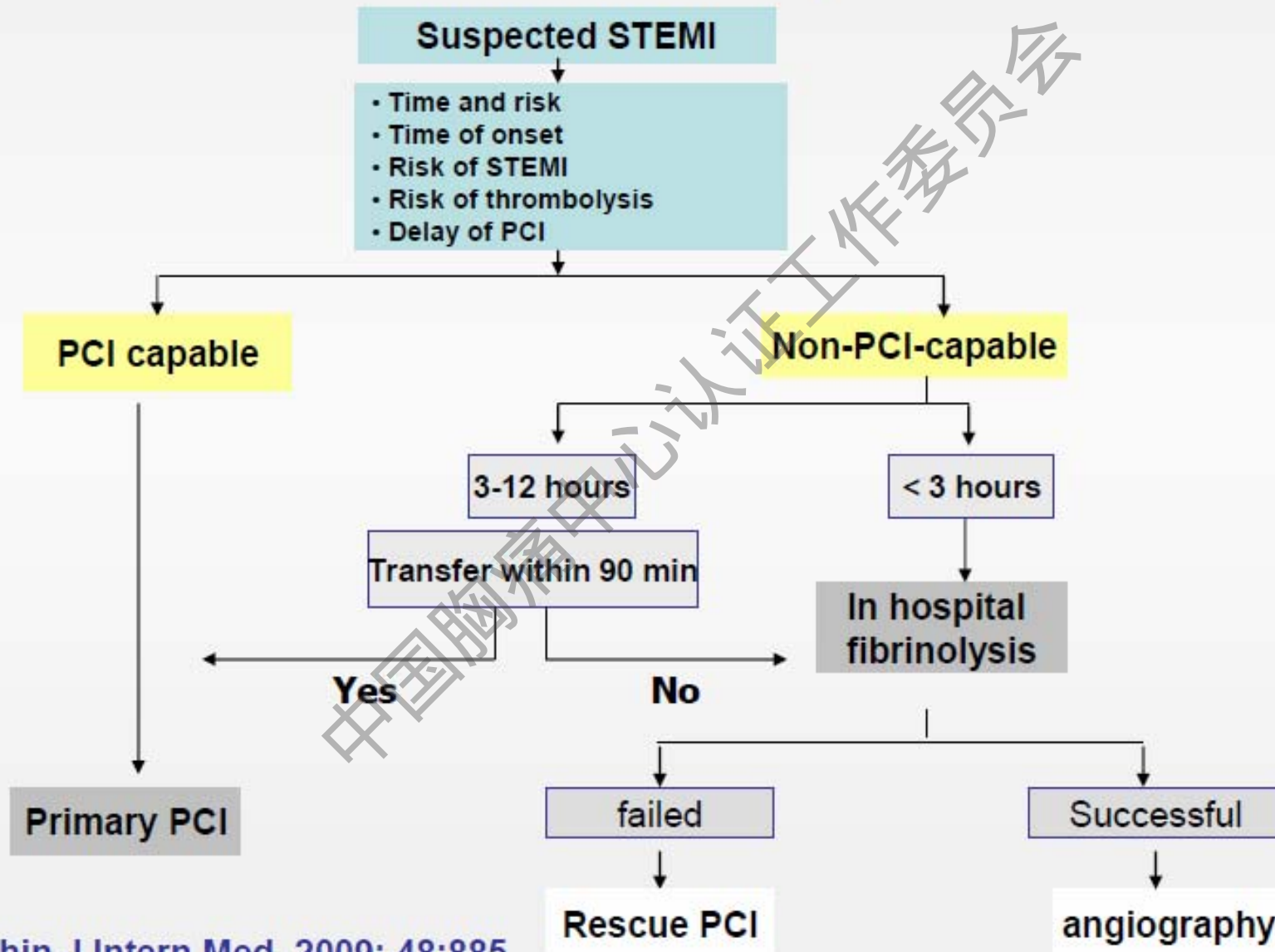
120系统的培训

- STEMI相关知识
 - 对疑STEMI病人应分诊到PCI中心
- 对120除车系统：
- 救护车上配备心电图机/除颤仪
 - 及时ECG检查，基本读图学习
 - ECG传输
 - 现场使用抗栓药物（DAPT，抗凝药）
 - 现场再灌注治疗决策
 - 送到附近医院（非PCI医院）
 - 送PCI医院
 - 绕行急诊室/CCU，直送导管室

非PCI医院的培训

- **STEMI**相关知识
- 建立与**PCI**医院的热线联系
- 及时**ECG**检查，基本读图学习
- 胸痛伴相邻两个导联**ST**段弓背向上抬高即可诊断
- 新发**BBB**也可同等看待
- 不必等酶学检查结果
- 一旦诊断立刻使用**DAPT**
- 时间窗内立刻进行再灌注治疗决策（运送时间？）
 - PPCI**？转院，绕行急诊/**CCU**，直送导管室
 - 溶栓？24小时内转院**PCI**/造影检查

Triage of Reperfusion strategy in hospital (Chinese Consensus)



基层/社区医生的培训

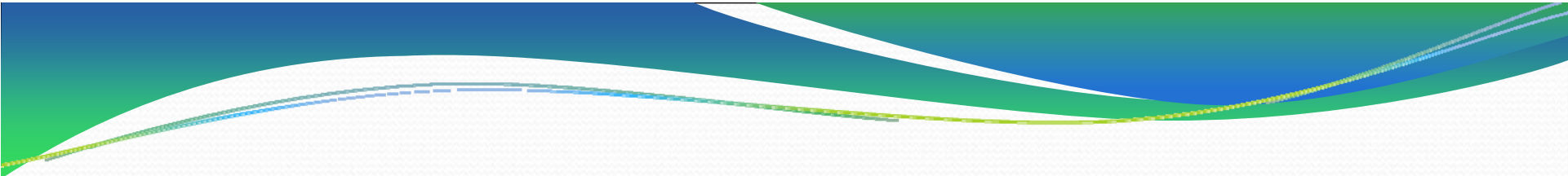
- **STEMI**相关知识
- 建立与**PCI**医院的热线联系
- 及时**ECG**检查，基本读图学习
- 胸痛伴相邻两个导联**ST**段弓背向上抬高即可诊断
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 - PPCI**？转院，绕行急诊/**CCU**，直送导管室
 - 溶栓？**24**小时内转院**PCI**/造影检查

公众教育

- 动脉硬化预防教育
- 胸痛及时就医教育
- 多种形式
 - 电视/报纸/网络/公益广告
- 响亮的口号
- **LOGO**

小结

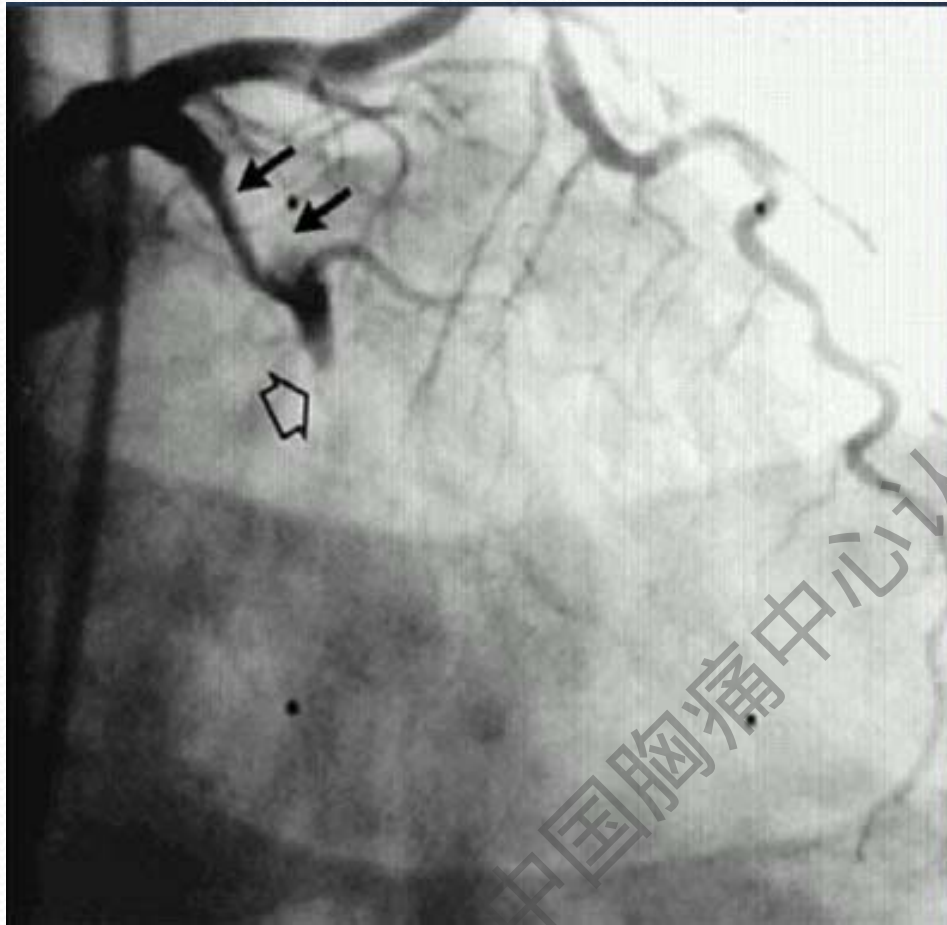
- **CPC**肩负极其重要的教育/培训职能
- 全方位的培训/教育
 - 各个岗位的员工清晰自己的职责/流程
- 定期的质量控制会议/结果分析是关键
- 持续性改进是最终目标
- 公众教育是长期和艰苦/极具意义的工作



中国胸痛中心认证工作委员会

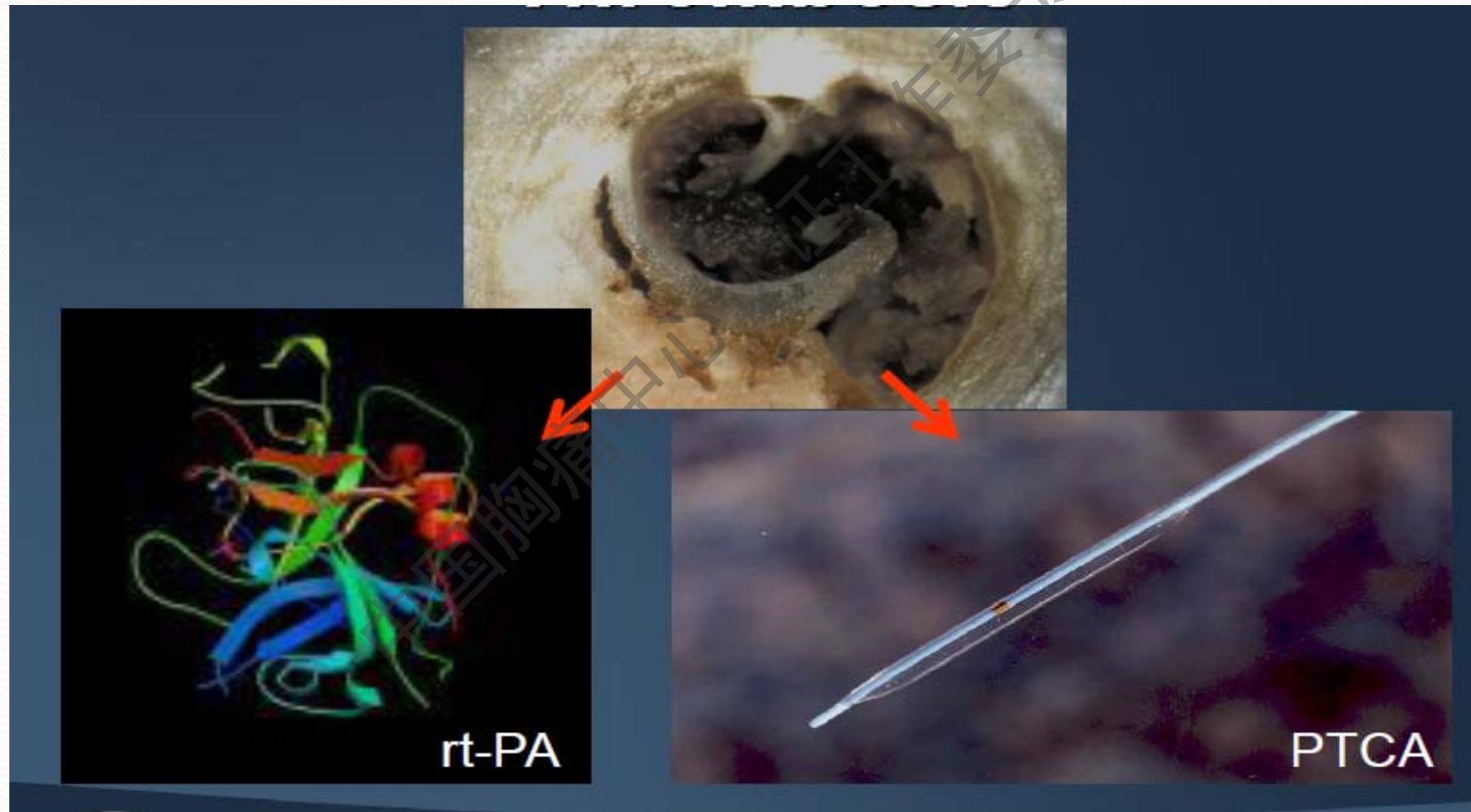
谢谢！

AMI: Pathophysiology



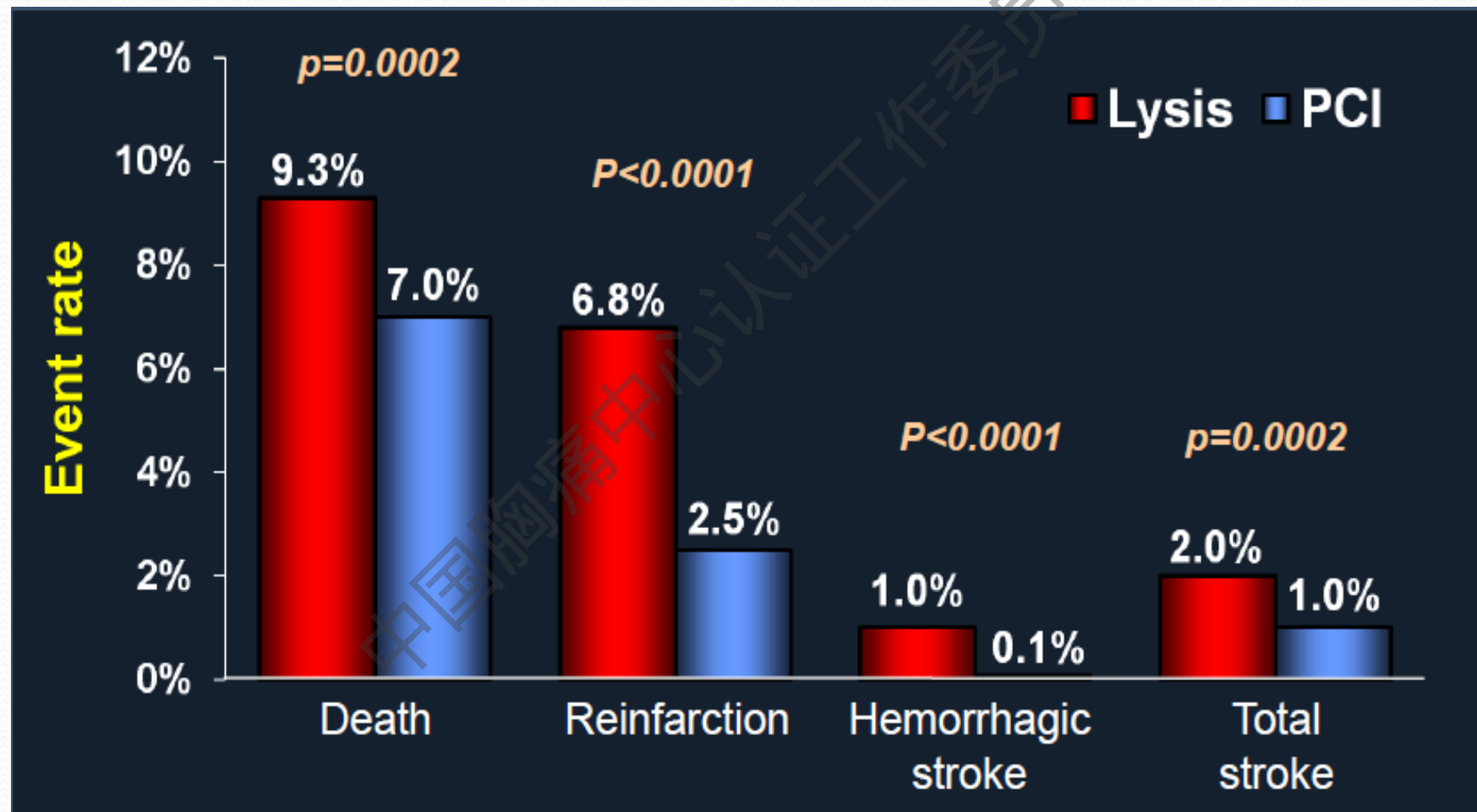
Ruptured plaque with occlusive thrombus

Treatment of Acute Coronary Thrombosis



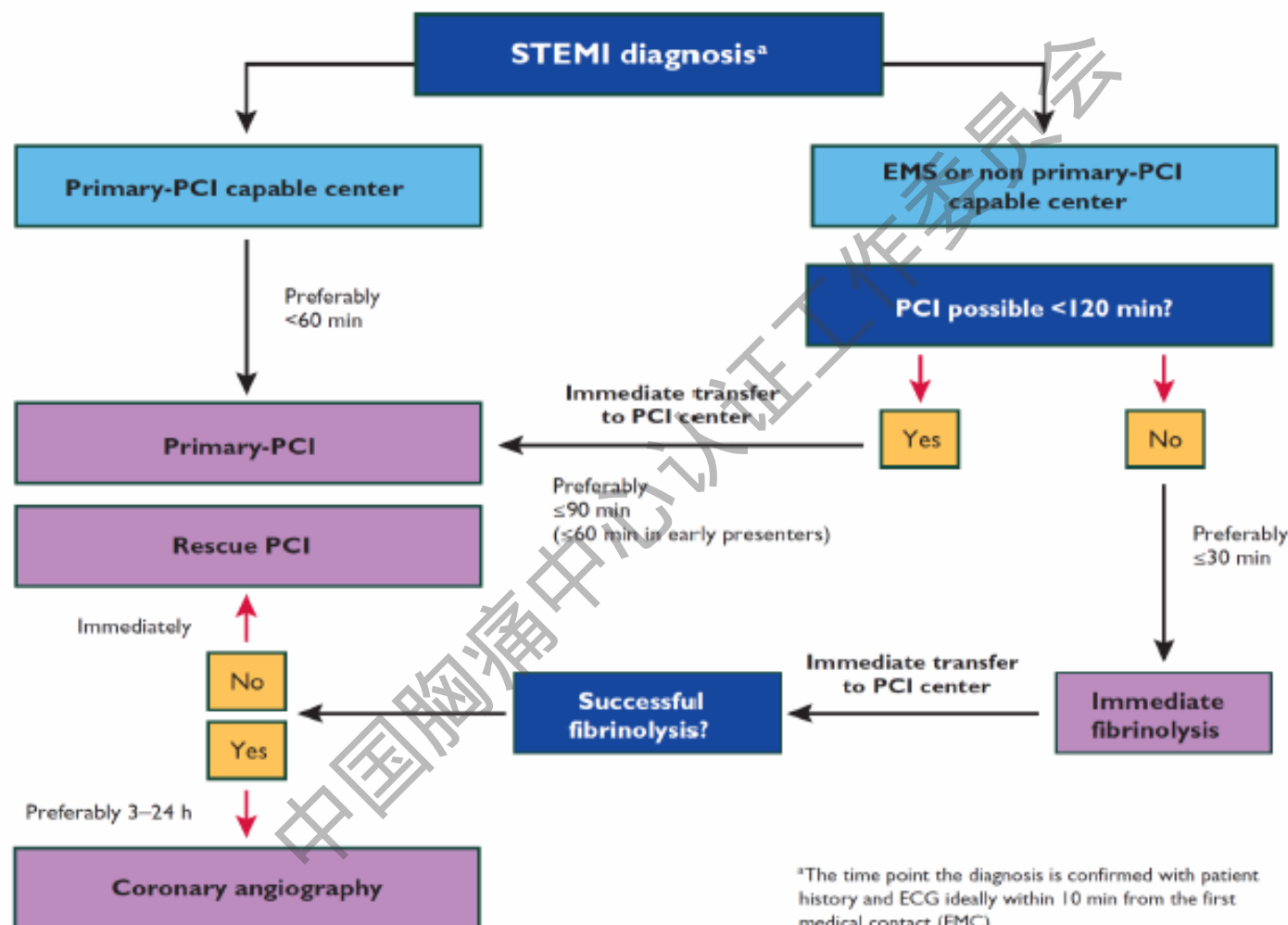
From PAMI to 23 RCTs of PCI vs. Lysis

N = 7,739



Keeley, Grines. *Lancet* 2003;361:13-20

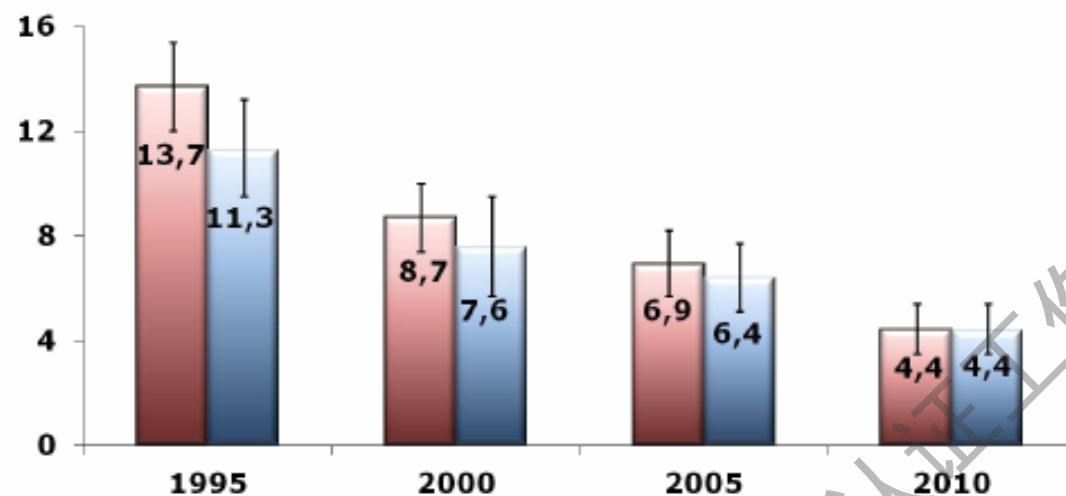
Prehospital and in-hospital management, and reperfusion strategies within 24 h of FMC



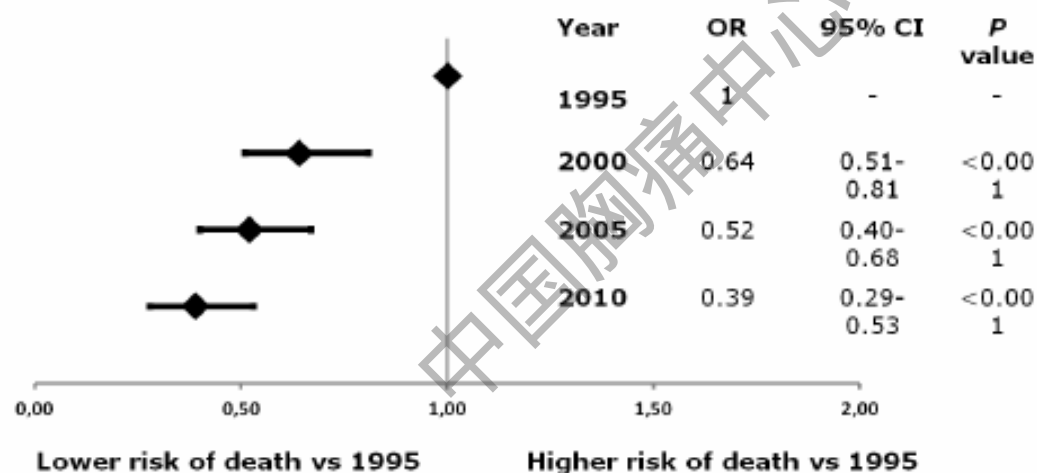
^aThe time point the diagnosis is confirmed with patient history and ECG ideally within 10 min from the first medical contact (FMC).
All delays are related to FMC (first medical contact).

Cath = catheterization laboratory; EMS = emergency medical system; FMC = first medical contact; PCI = percutaneous coronary intervention; STEMI = ST-segment elevation myocardial infarction.

30-d Mortality (changes over time)



Evolution



Multivariable-adjusted risk
Adjusted for age, sex, BMI,
risk factors, previous history,
and use and type of
reperfusion therapy

N. Danchin | FR | 2170

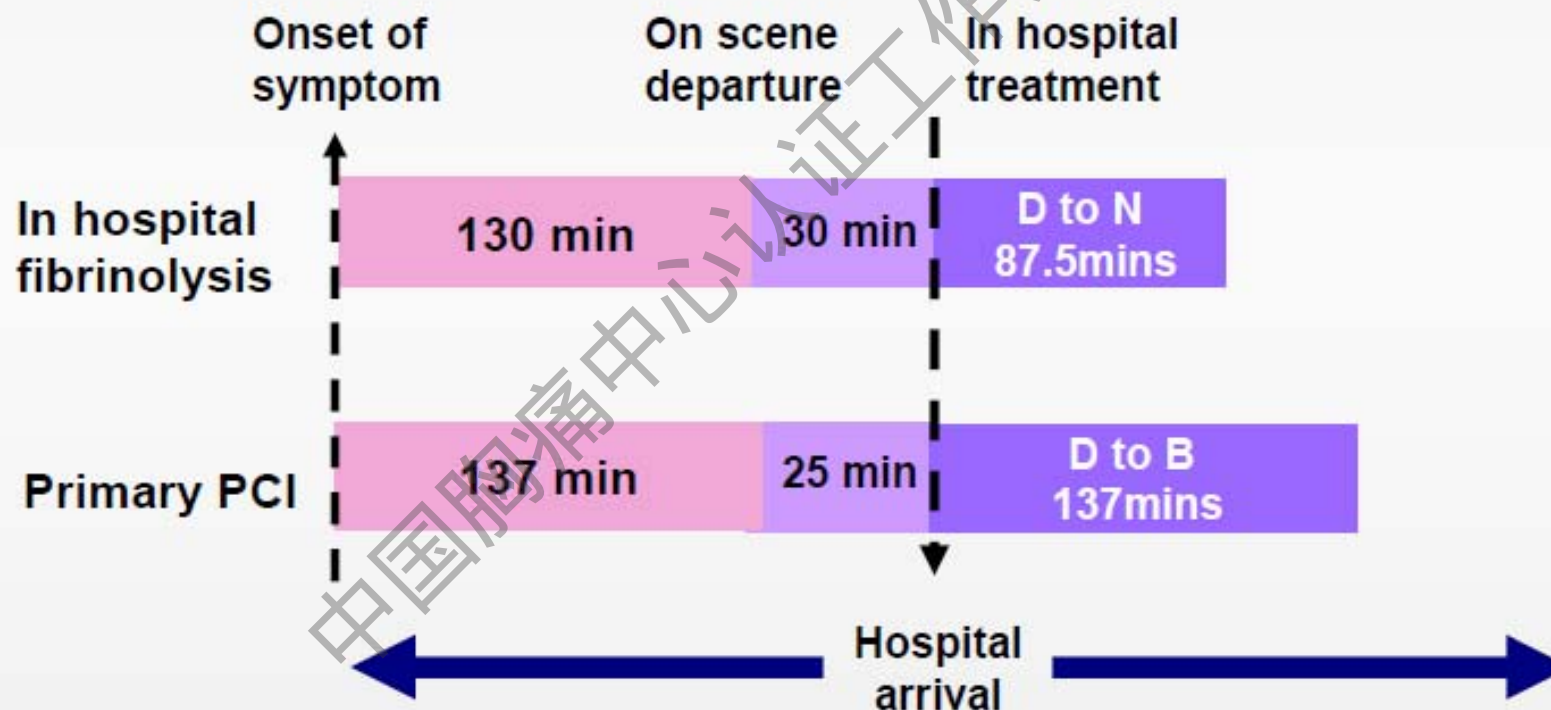
The Registry of Reperfusion Therapy in Patients with STEMI in Beijing

- 18 million residents
- 19 hospitals with capability of primary PCI
 - 16 centers in urban
 - 3 centers in rural area
- From Nov 2005 to Dec 2006



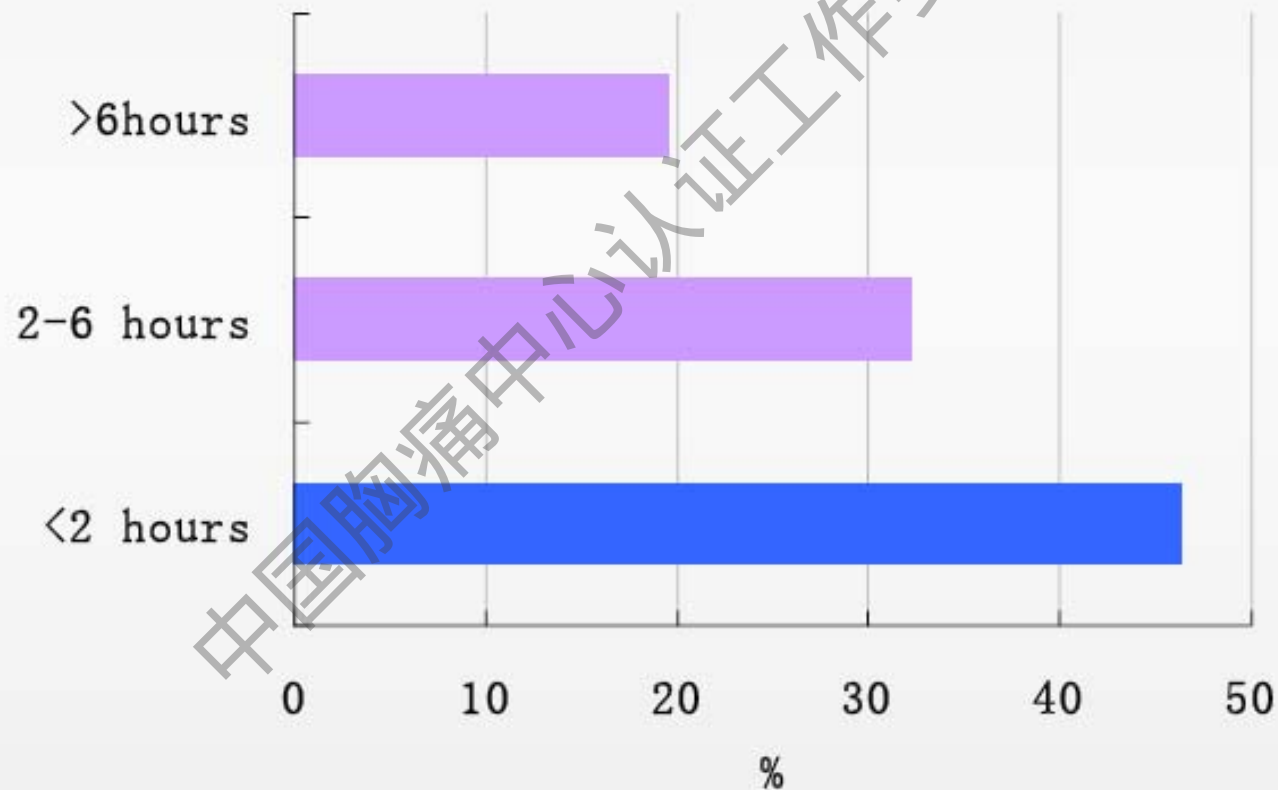
Time from onset of symptoms to Treatment

Data of Beijing Registry 2006

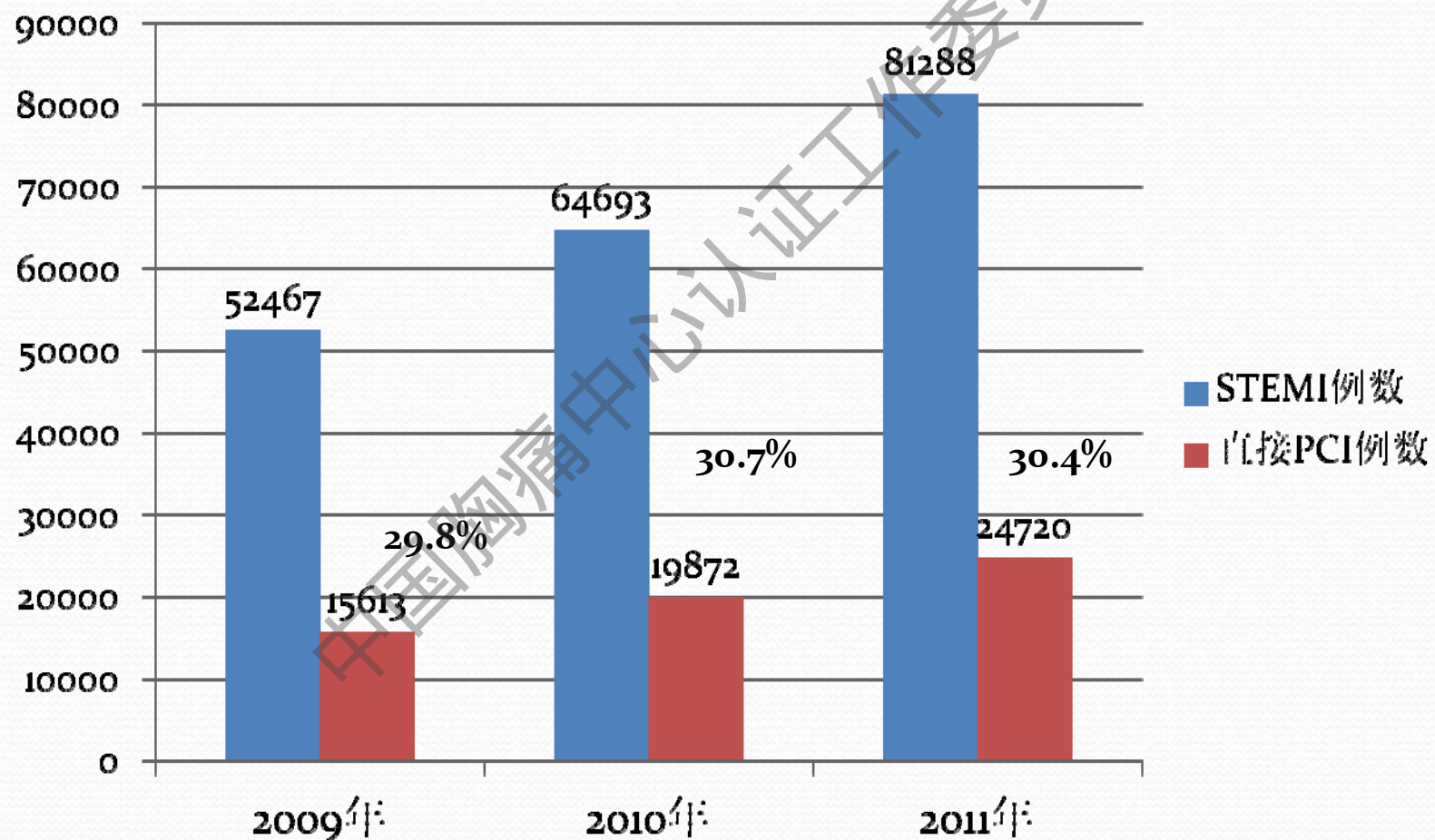


Pre-hospital Delay (symptom onset to hospital arrival)

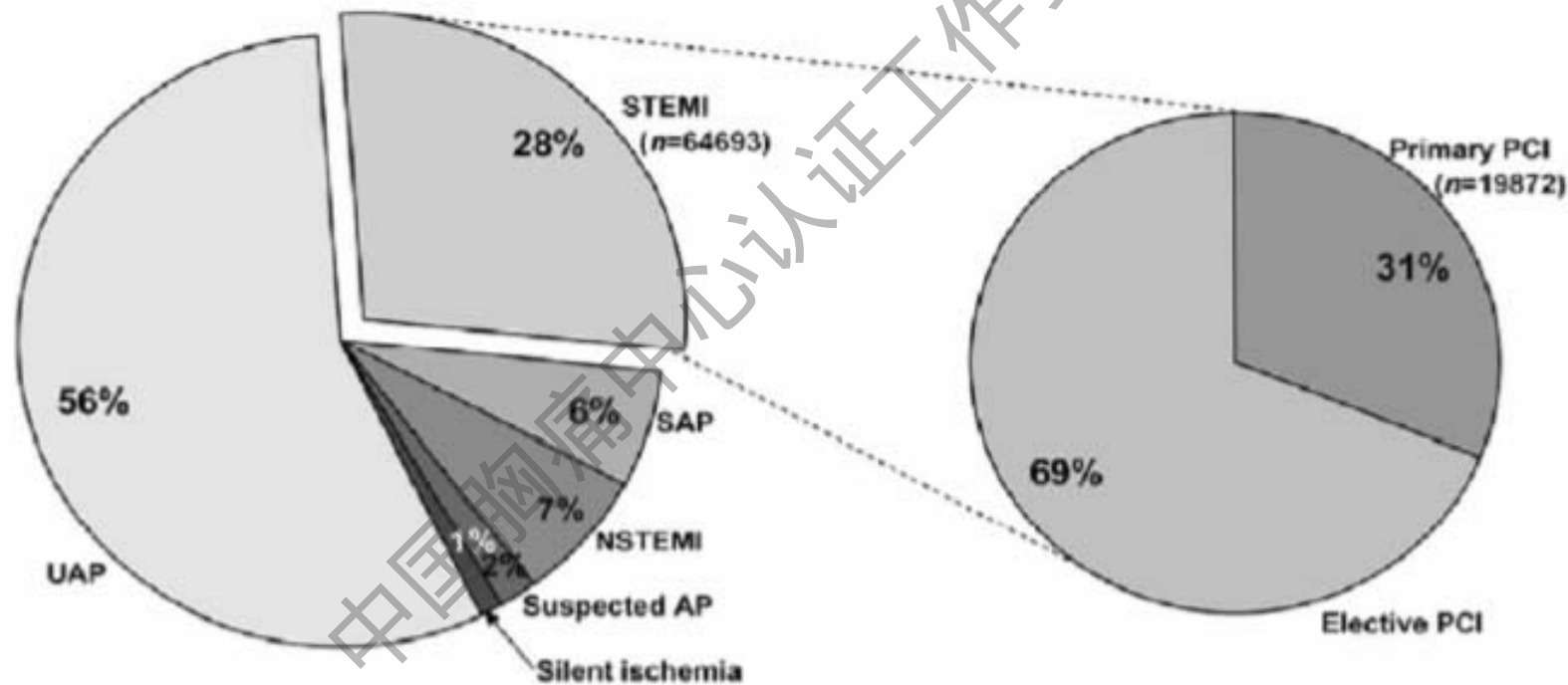
Data of Beijing Registry 2006



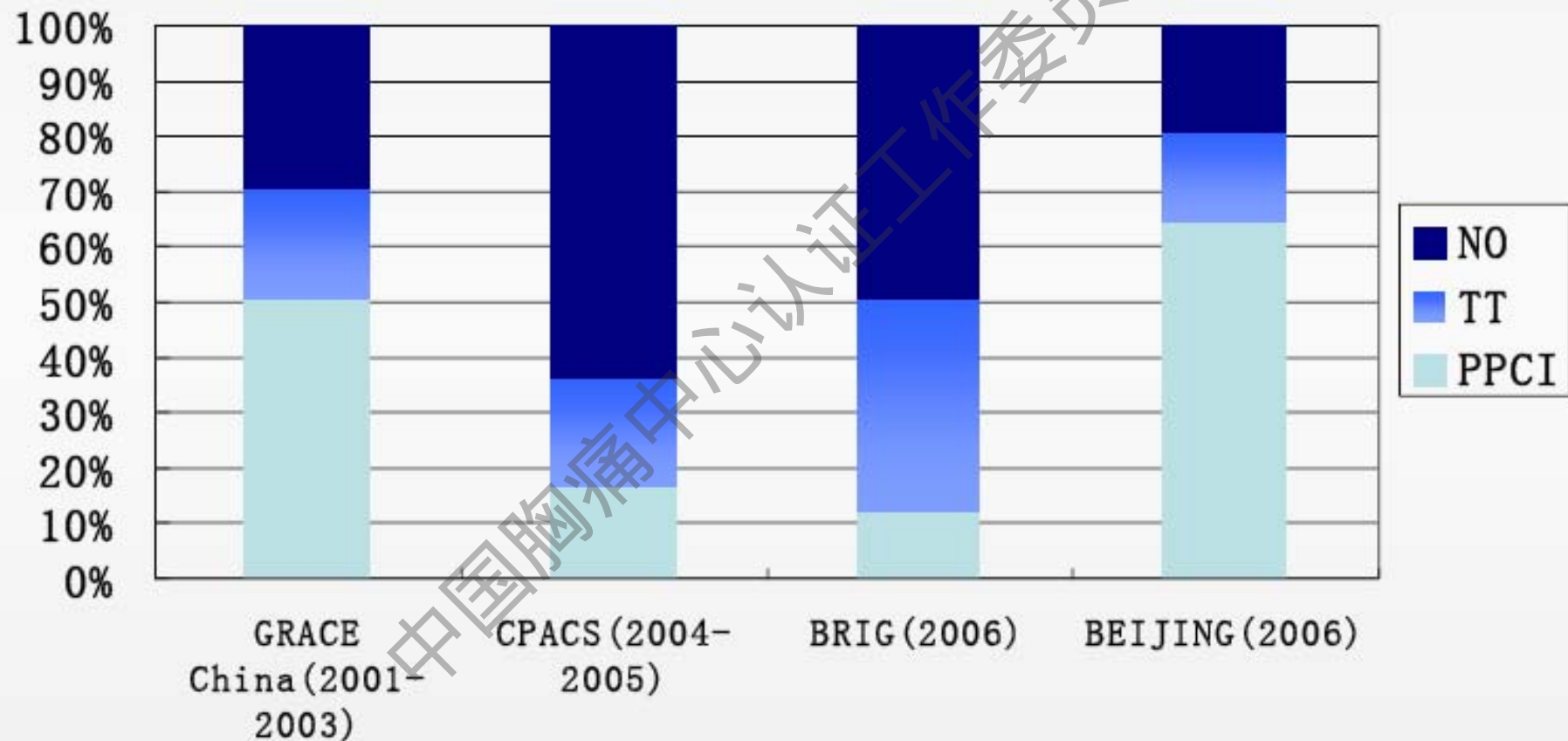
STEMI and PPCI in China 2009-2011



Numbers of patients receiving PCI in China in 2010



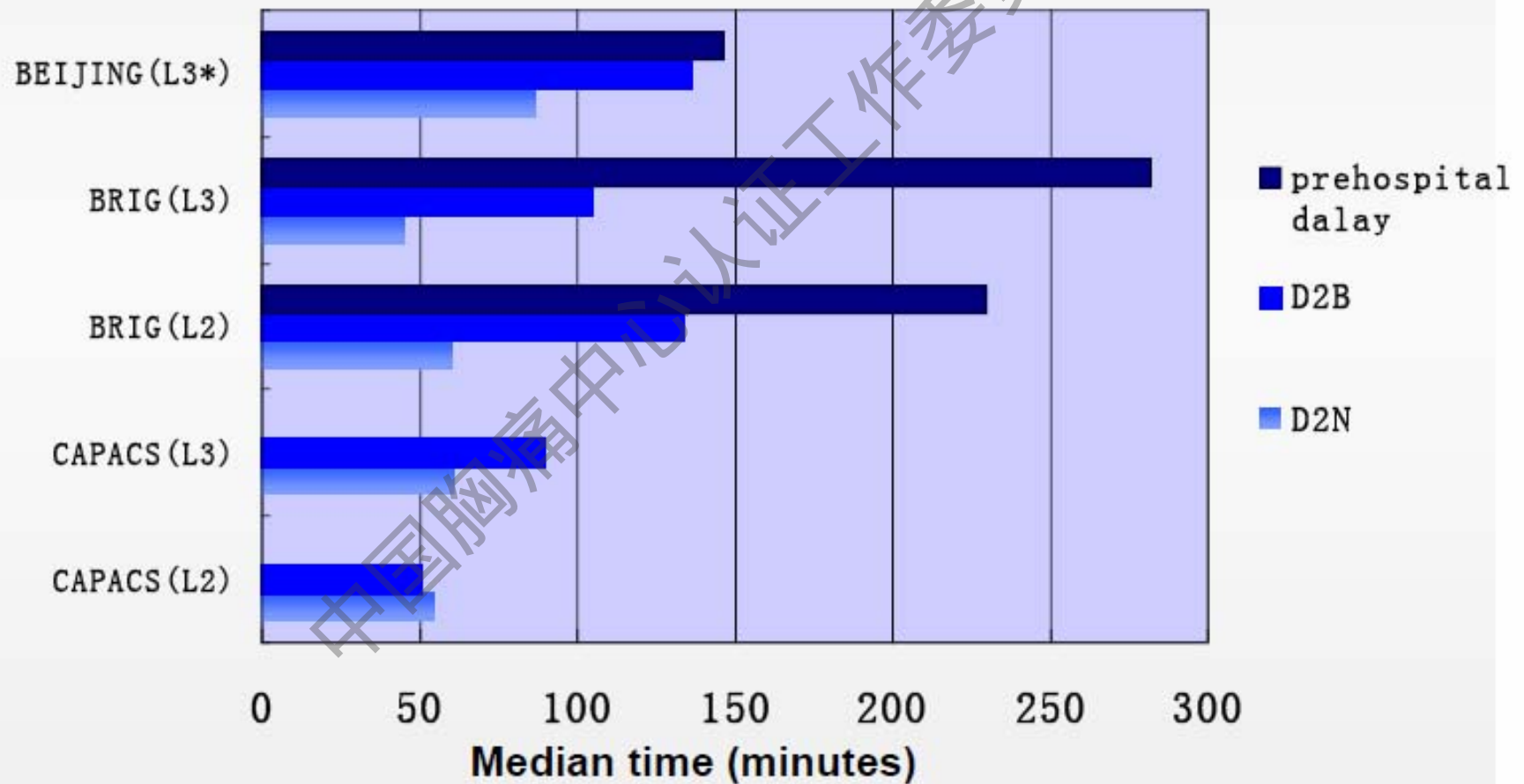
Reperfusion Therapy of STEMI in China



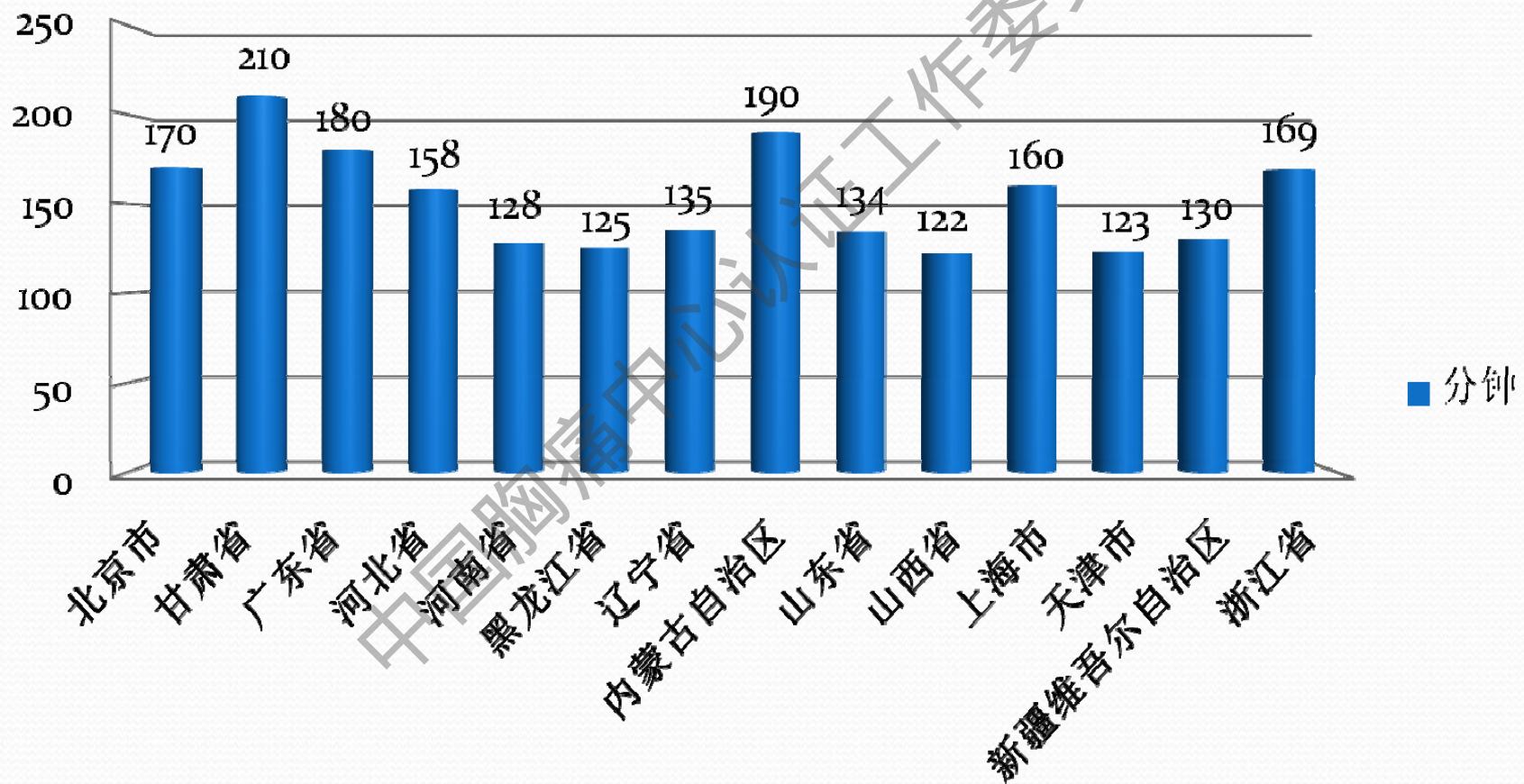
Gao, et al. Heart 2008;94:554-560 Zhao, et al. Chin J Cardiol, 2009;37:213-217

Hu, et al. Clin Invest Med 2008;31:e189-97 Lv, et al. Chin J Cardiol, 2005,33,789-82

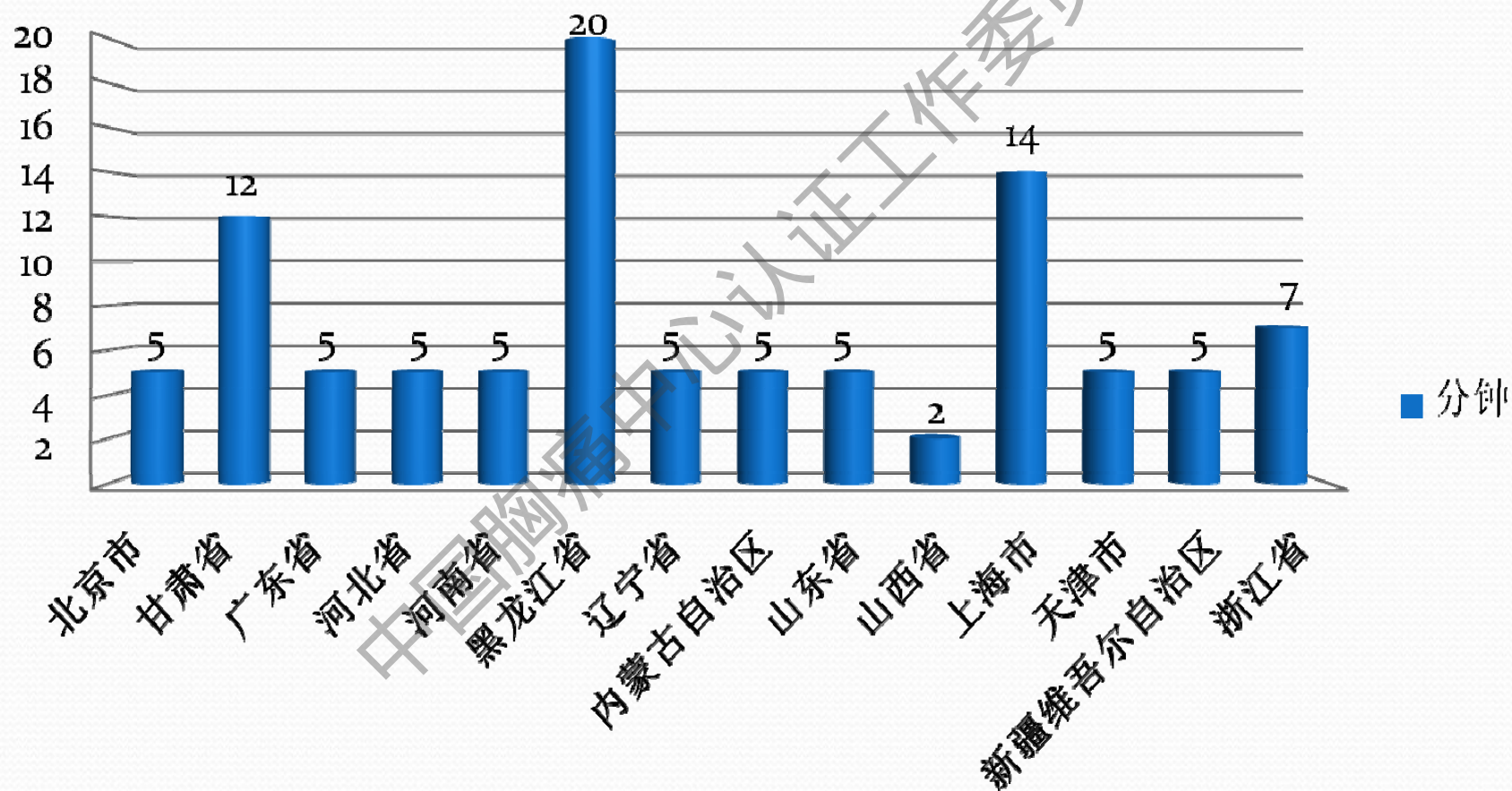
Time Delay of Reperfusion Therapy of STEMI in China



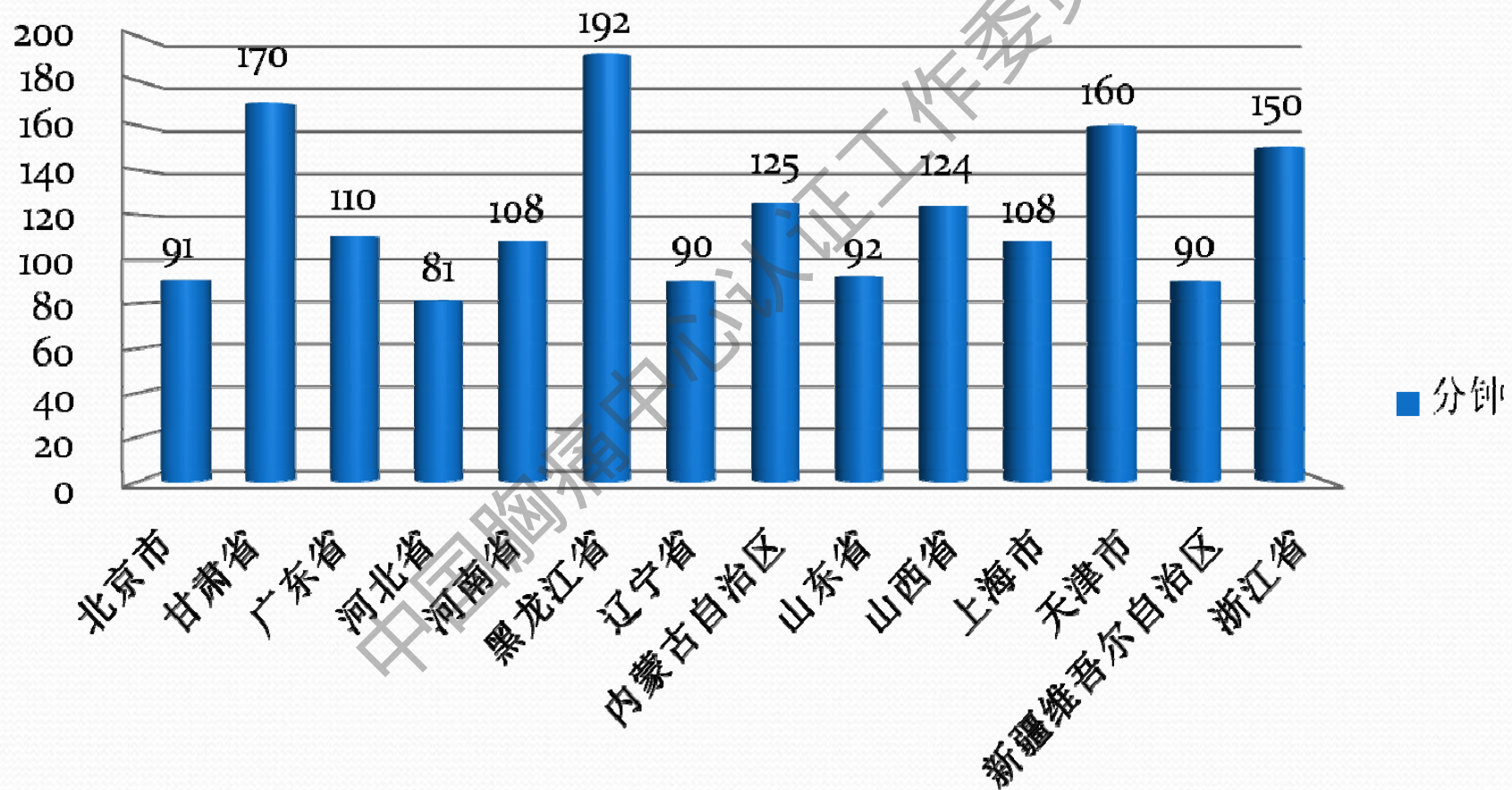
Time From symptom onset to hospital in different Province



Time FMC to ECG



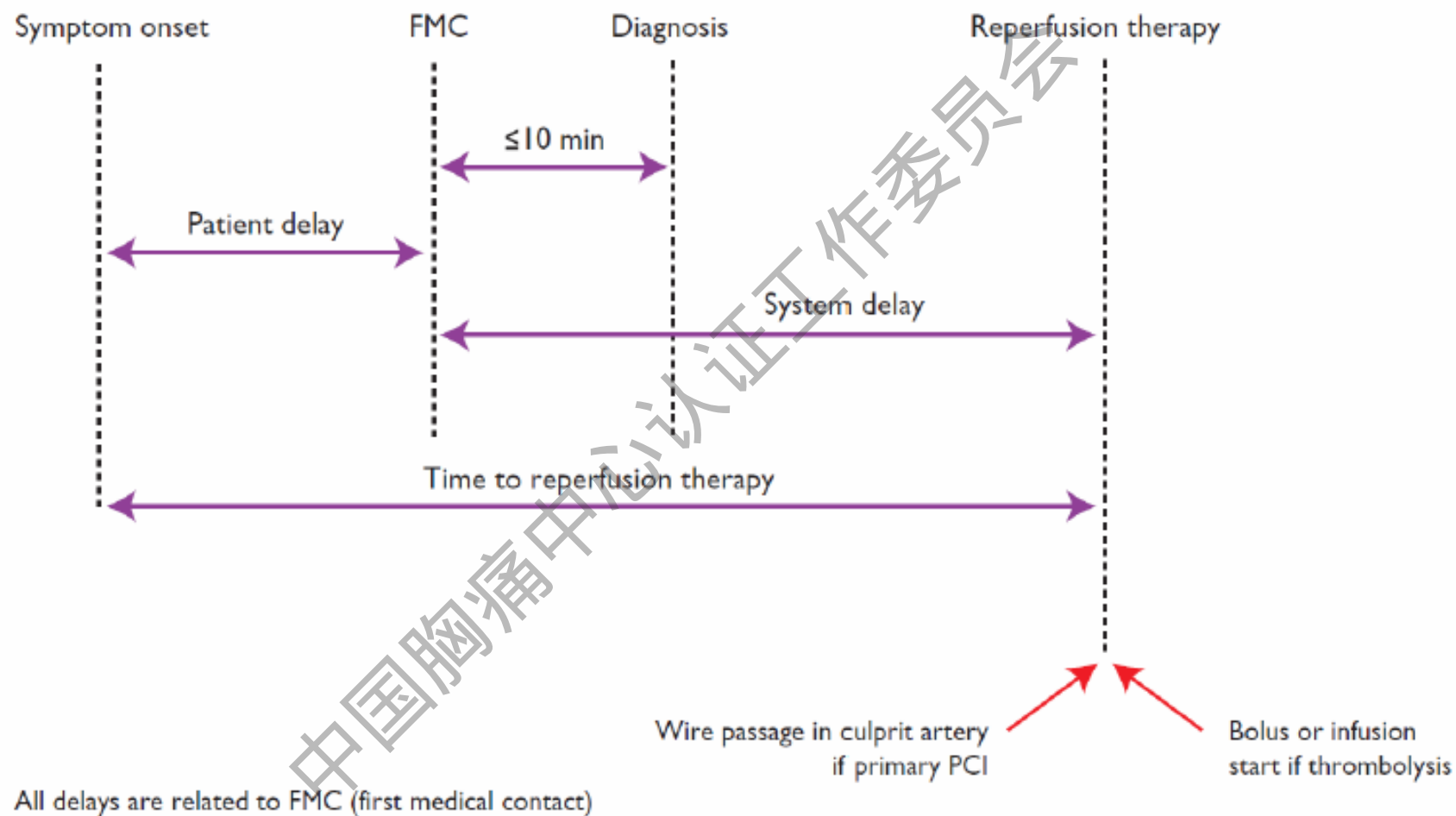
D2B in different Province



STEMI救治：我们存在的问题

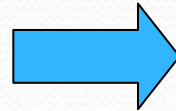
- 症状出现-FMC时间长；
- 缺乏社会/社区救治网络；
- 再灌注治疗比例低下；
- 院前诊断/院前决策少；
- 院内环节问题
 - 进门-ECG
 - ECG-决策
 - 决策-球囊开通/打针时间
- 二级预防

Components of delay in STEMI and ideal time intervals for intervention



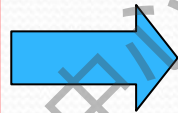
How to improve ?

To shorten D-to-B(N)



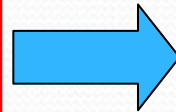
In-hospital green channel

To shorten FMC-to-B



- In-hospital green channel
- Training community hospitals
- Rapid transfer

To shorten Symp-to-B



- In-hospital green channel
- Training community hospitals
- Rapid transfer
- Health education in communities

胸痛中心的协调机制

- 牵涉多学科的症状，多学科参与
- 无缝连接
- 打破利益驱动模式
 - 一个配合良好的团队
- 急诊室建立危险分层制度
- 初步诊断和鉴别诊断——分诊到专科进一步诊治

胸痛中心的管理机制

- 强的领导管理团队

院长/付院长直接领导，医务处参与，多科共建

- 资料收集和资料管理

胸痛-FMC

FMC-D/ECG

D-ECG

ECG-N/ECG-B

- 24/7 导管室

- 资料分析

- 多团队定期会议/改进措施

胸痛中心的管理机制

- 硬件设施的完善
- 根据指南进行流程制定
- 流程管理和流程改良
- 建立目标管理制度

CPC现状

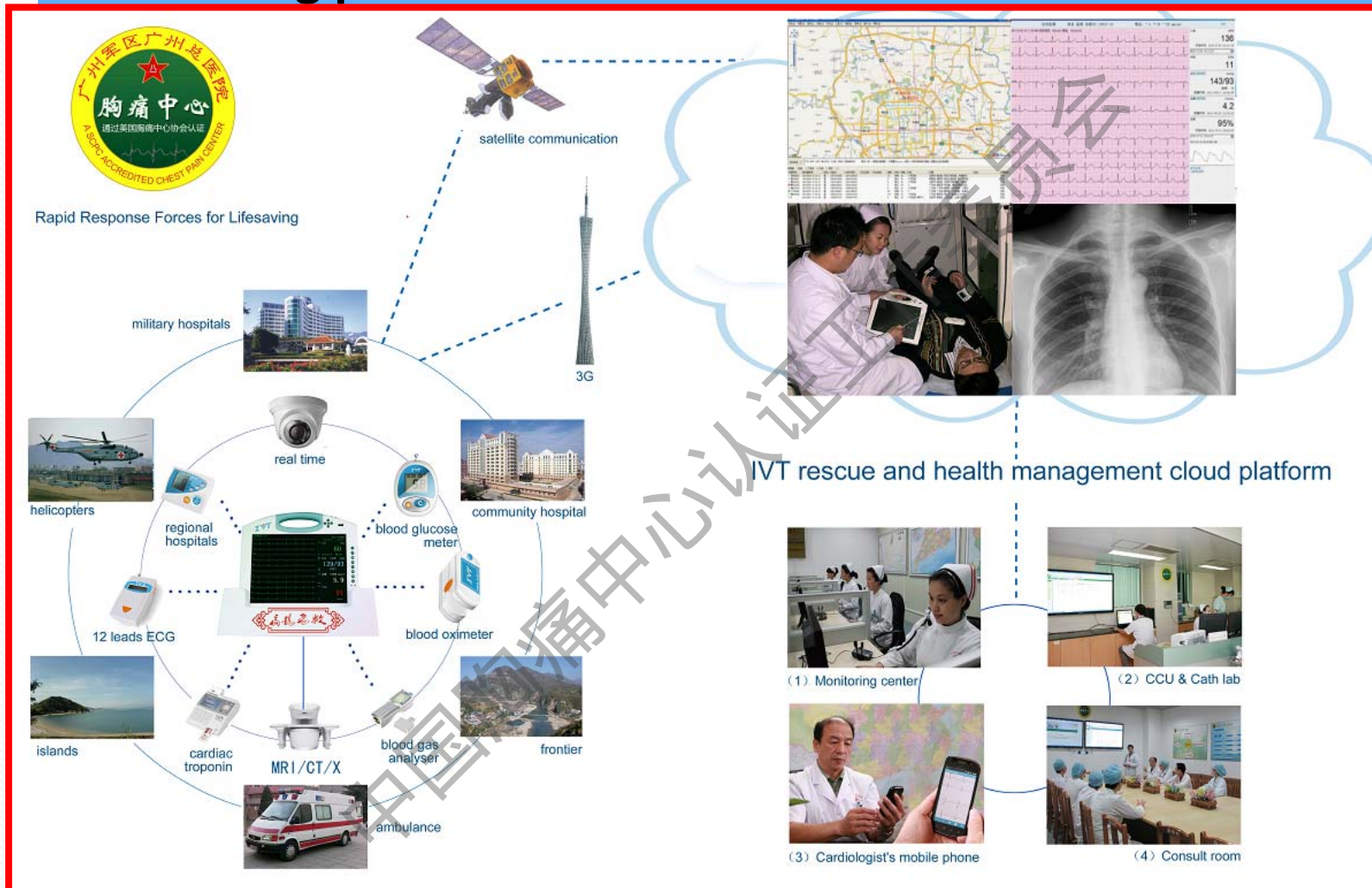
- The 1st Chest pain unit in Qilu Hospital of Shandong University in 2002.
- 2005–2006, Green channels of AMI: Chaoyang Hospital in Beijing and Ruijin Hospital in Shanghai
- Three CPCs were established in 2010.
- Chinese Consensus on Chest Pain Centers was aligned and released during the Greatwall Convention in 2010
- Four new CPCs in 2011
- The First Summit Forum of CPC in China on Oct 22, 2011
- Six newborns of CPCs in 2012

CPC现状（2012）

- 两家医院通过美国CPC认证
- 广东省胸痛中心协会成立

中国胸痛中心认证工作委员会

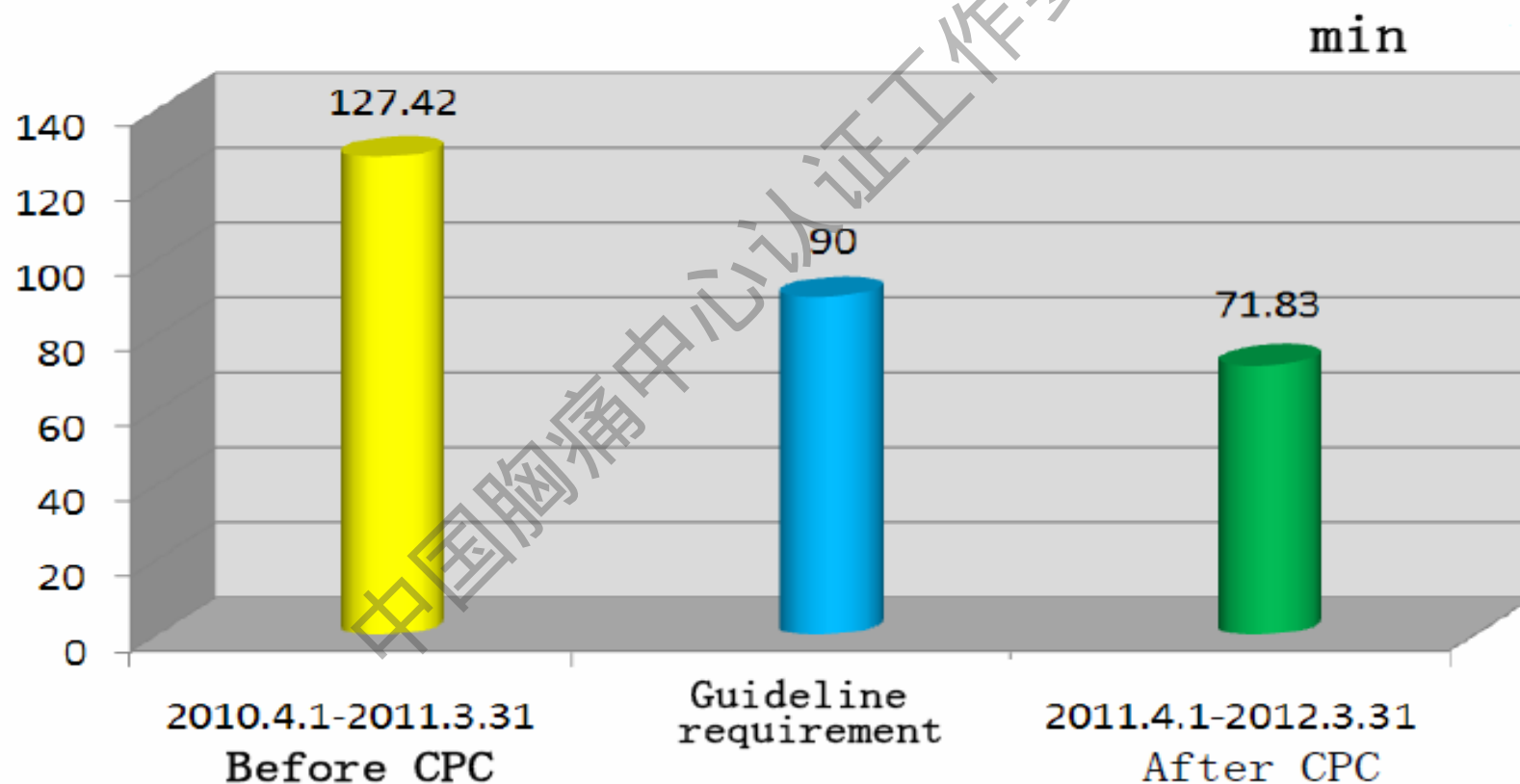
The working process of rescue network of CPC



The 12-lead ECG, blood pressure, blood oxygen saturation, TnI, BNP, and D-dimer, images were real-timely transmitted to CPC through a special 3G channel.

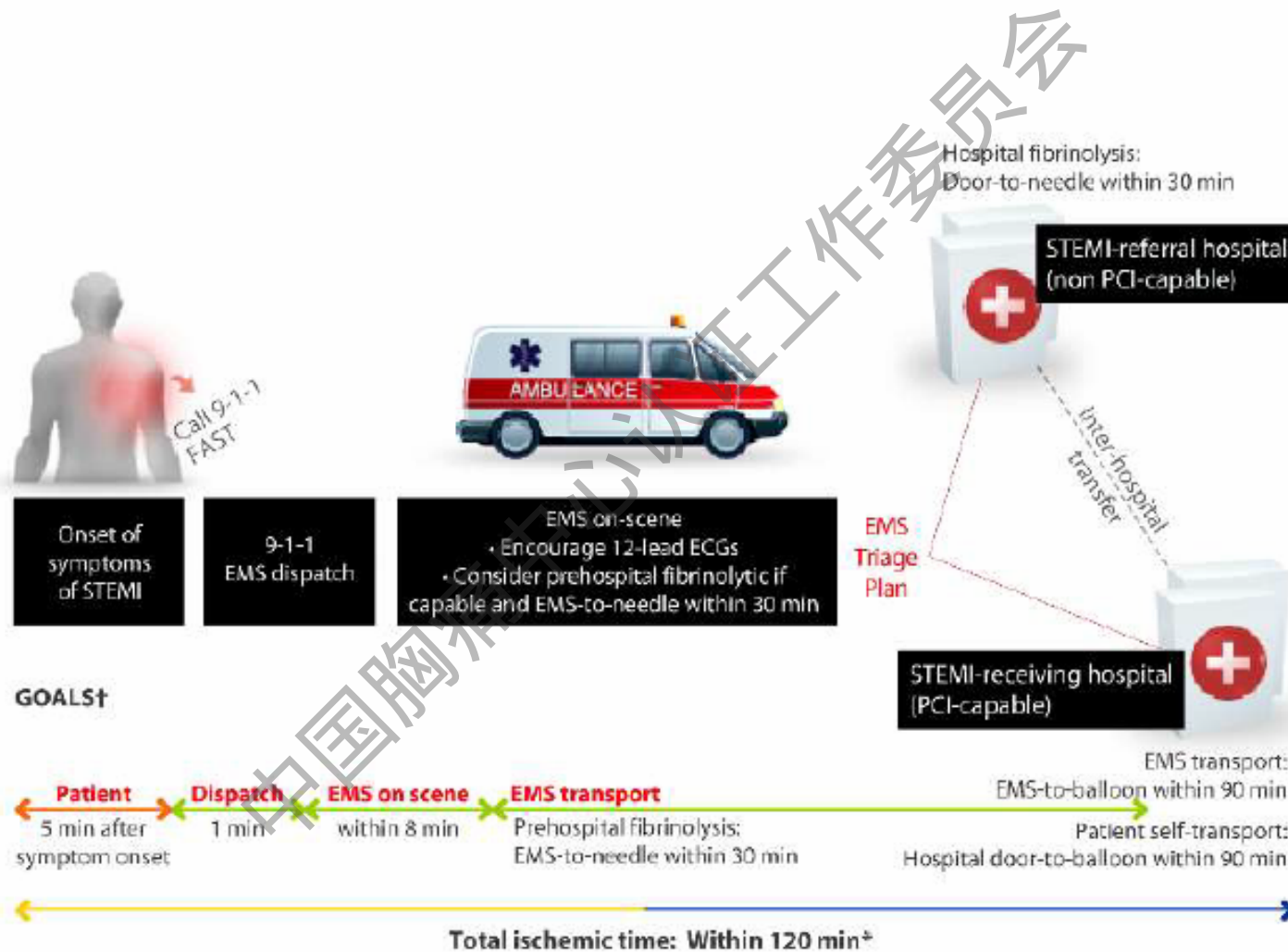
广州军区总医院的资料

D2B before & after the establishment of
CPC



Mission: Lifeline

Point-Of-Entry (POE) Protocol



* **Golden Hour = First 60 minutes**

STEMI Guangdong

- Part of national STEMI programed
- More focusing on
 - pre-hospital management
 - local STEMI network establishment
 - patient education

中国胸痛中心认证工作委员会

STEMI广东

- 第一期
 - 院内CPC及STEMI快速通道，24/7导管室，D₂B<60'
 - 院前系统建立
 - 局部网络建立，覆盖部分非PCI医院
- 第二期 建立区域STEMI救治系统
在条件好的地区率先建立
目标医院/运转流程
- 第三期 全省STEMI网络的建立

Do whatever it takes to reduce time from symptom onset to ER arrival and time from ER arrival to PCI!



- ↑ Public awareness of MI Sx
- Chest pain centers of excellence with lower DBTs and excellent outcomes
- Regional coordination
- Ambulance ECG telemetry
- Ambulance/ER CCL activation
- ICs sleep in hospital
- Continual QI

厦门胸痛救治网络

- 市政府、卫生局支持
- 多家医院的参与
- 科技部的科技惠民计划

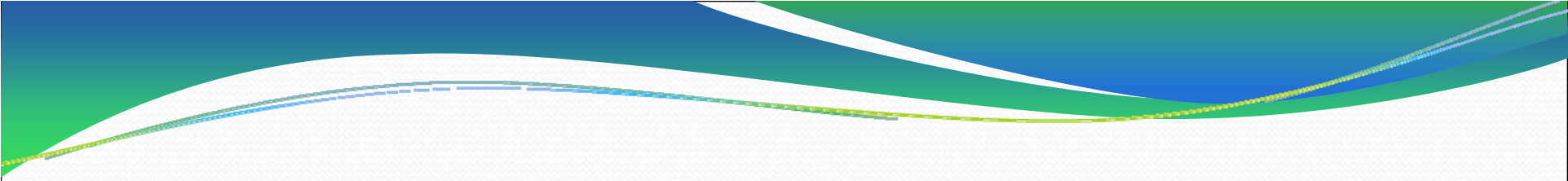
中国胸痛中心认证工作委员会

未来的展望

- 卫生部（卫计委）**STEMI**救治项目
- 中国胸痛中心资格认证
- 大量**PCI**中心建立胸痛中心
- 越来越重视院前救治
- 区域性心梗网络建立
- **STEMI**救治专款（基金）

小结

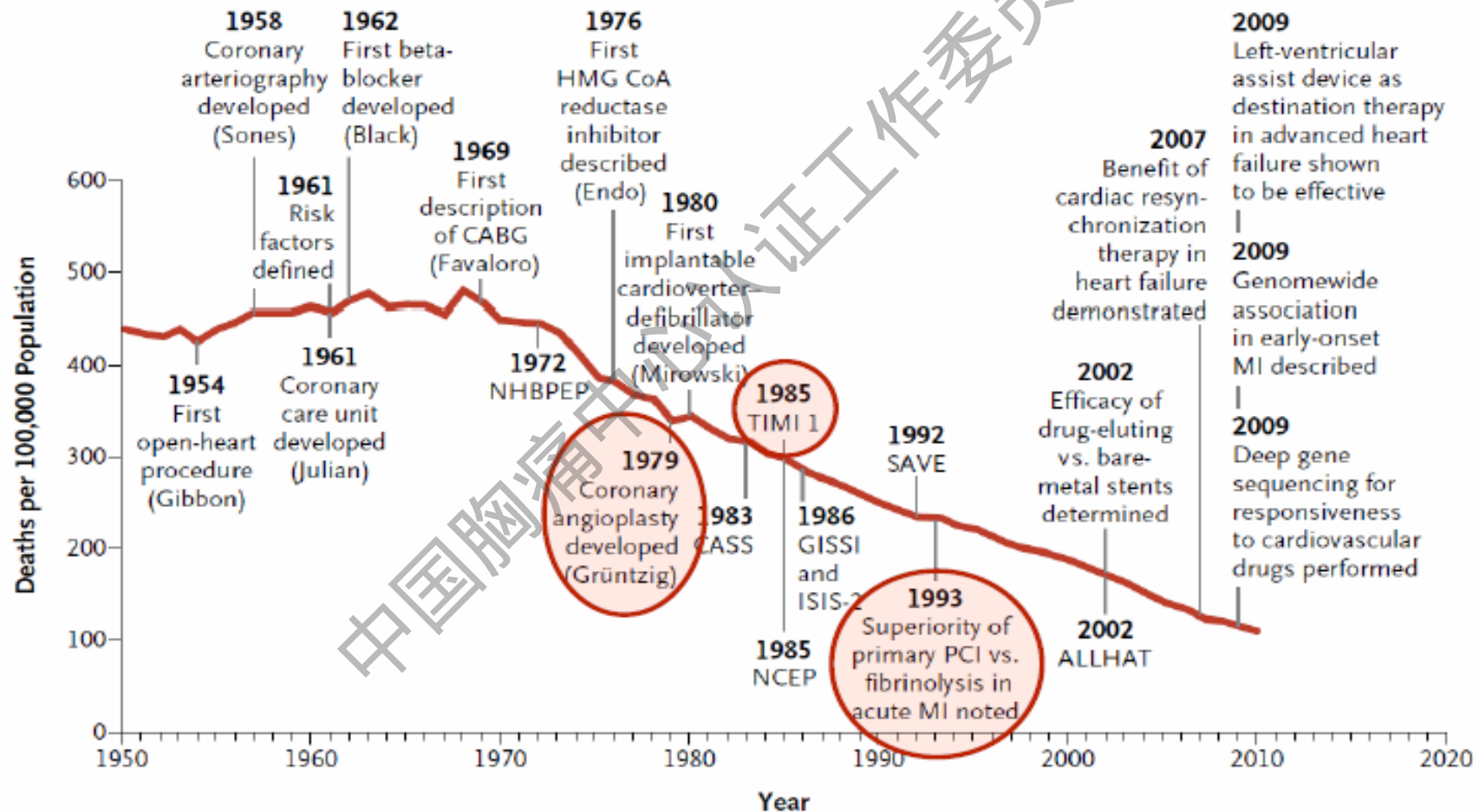
- 再灌注治疗是STEMI的关键治疗；
 - PPCI优于溶栓治疗（高危、晚到病人）；
- 时间越早越好；
- 区域性STEMI网络至关重要！
 - 从单兵作战向协同作战转变
 - 尽早就医、高的直接PCI率、短的症状-球囊时间、短的D2B是预后关键
- 溶栓治疗后常规运送到有条件医院常规PCI占优势；尤其是高危病人
- 需要通过各种方式降低病人延误及系统延误。



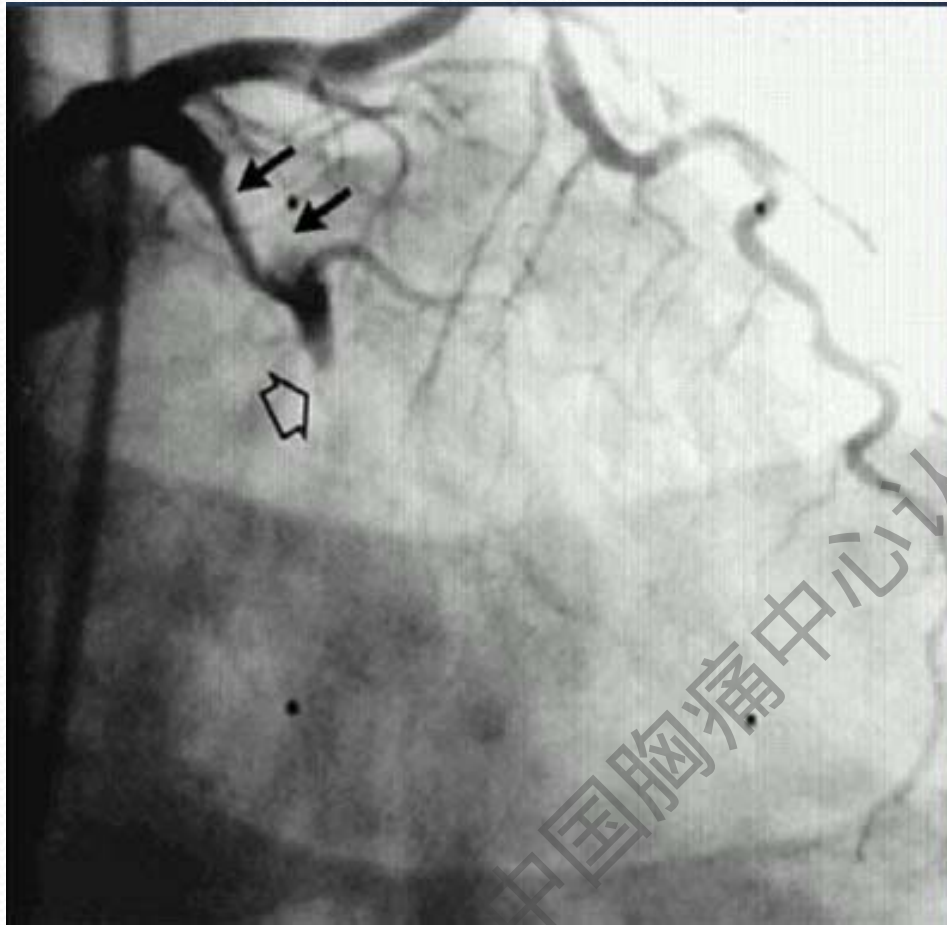
Thank you very much for you attention!

中国胸痛中心认证工作委员会

Decline in Deaths from Cardiovascular Disease in Relation to Scientific Advances

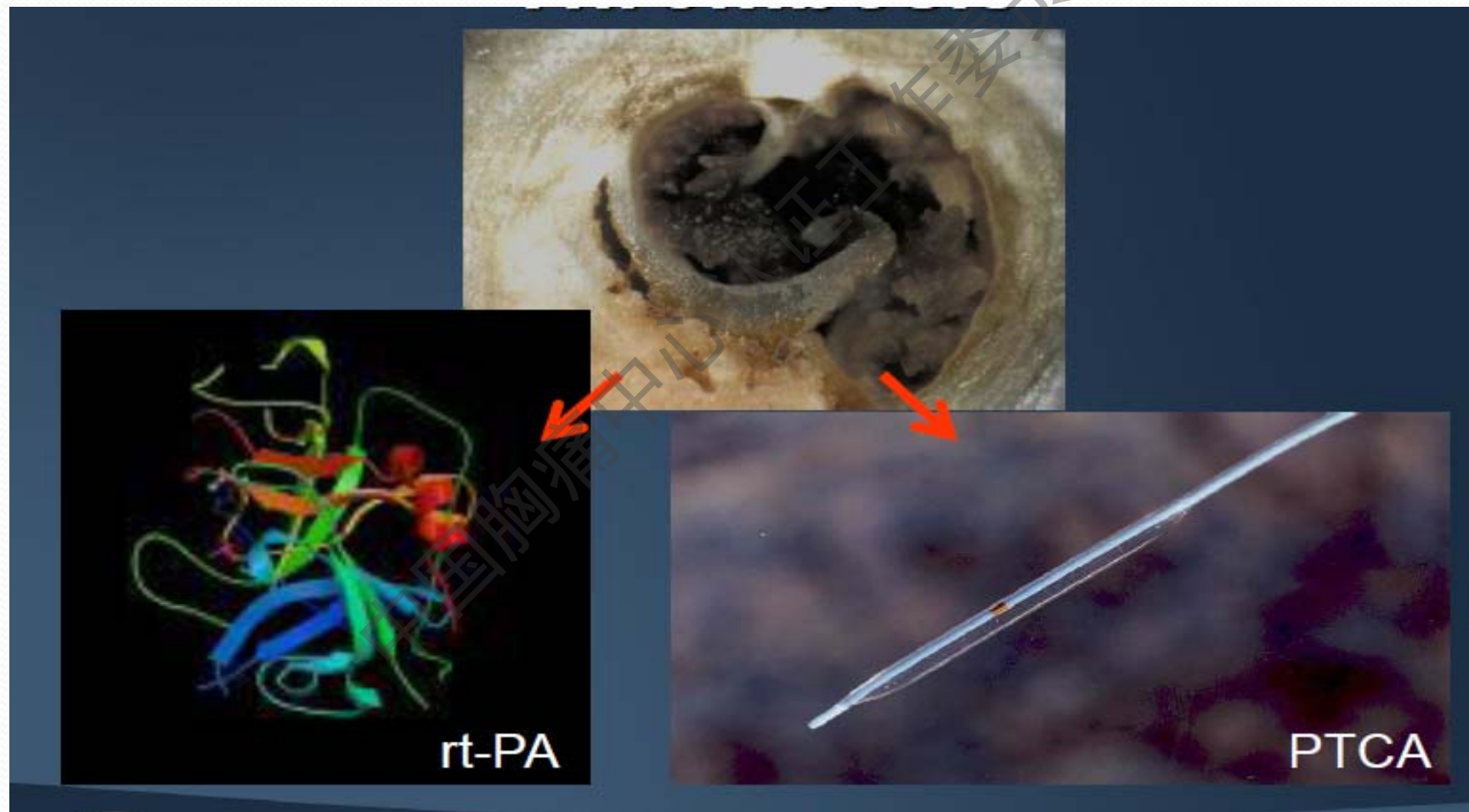


AMI: Pathophysiology



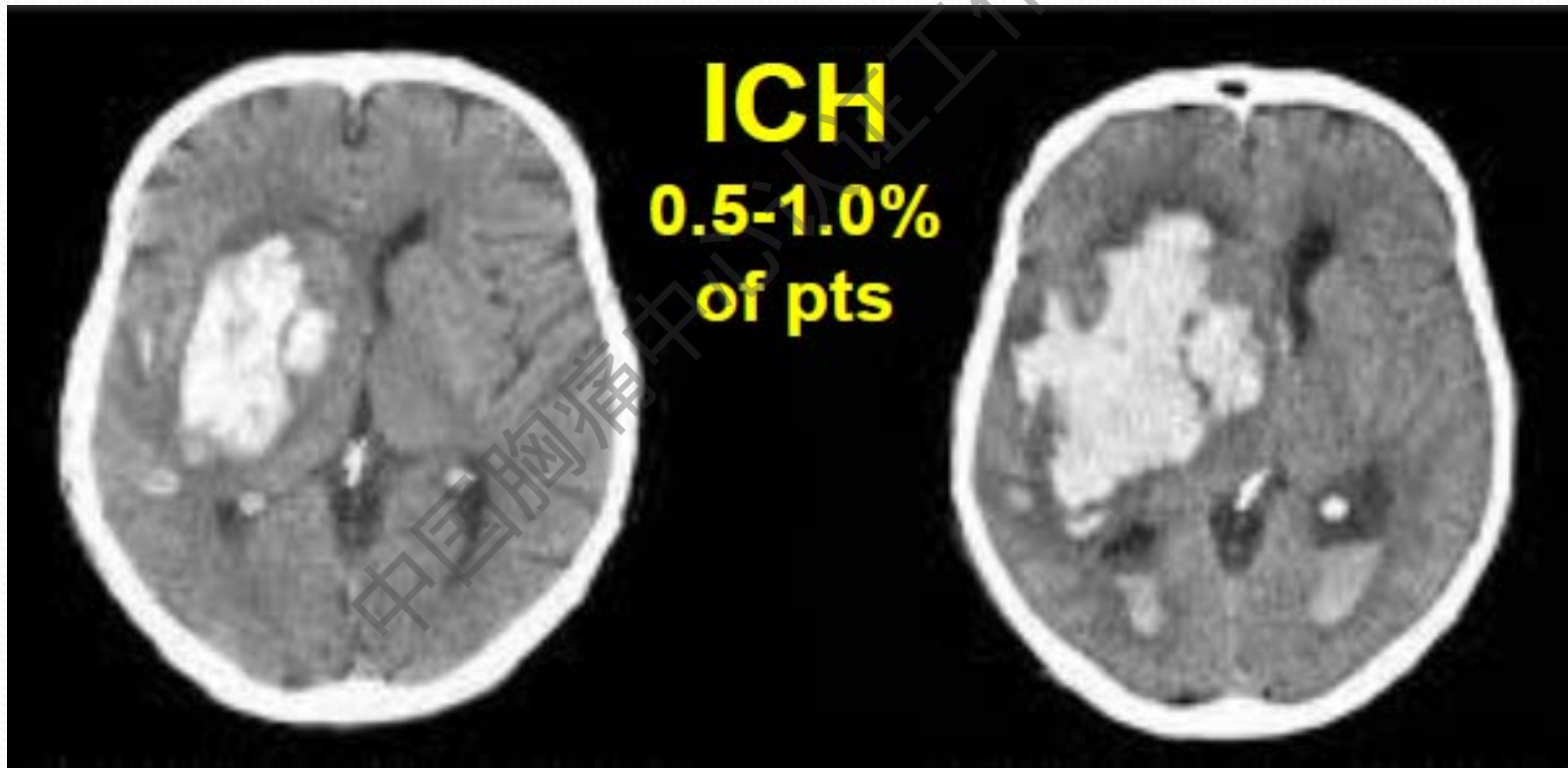
Ruptured plaque with occlusive thrombus

Treatment of Acute Coronary Thrombosis



Fibrinolytic therapy

- Did save lives compared to placebo, BUT
- At best, restored TIMI 3 flow in 55% (rt-PA), +
- Incidence of recurrent ischemia and reinfarction



2 hours
after t-PA

6 hours
after t-PA +

Geoffrey Hartzler, M.D.

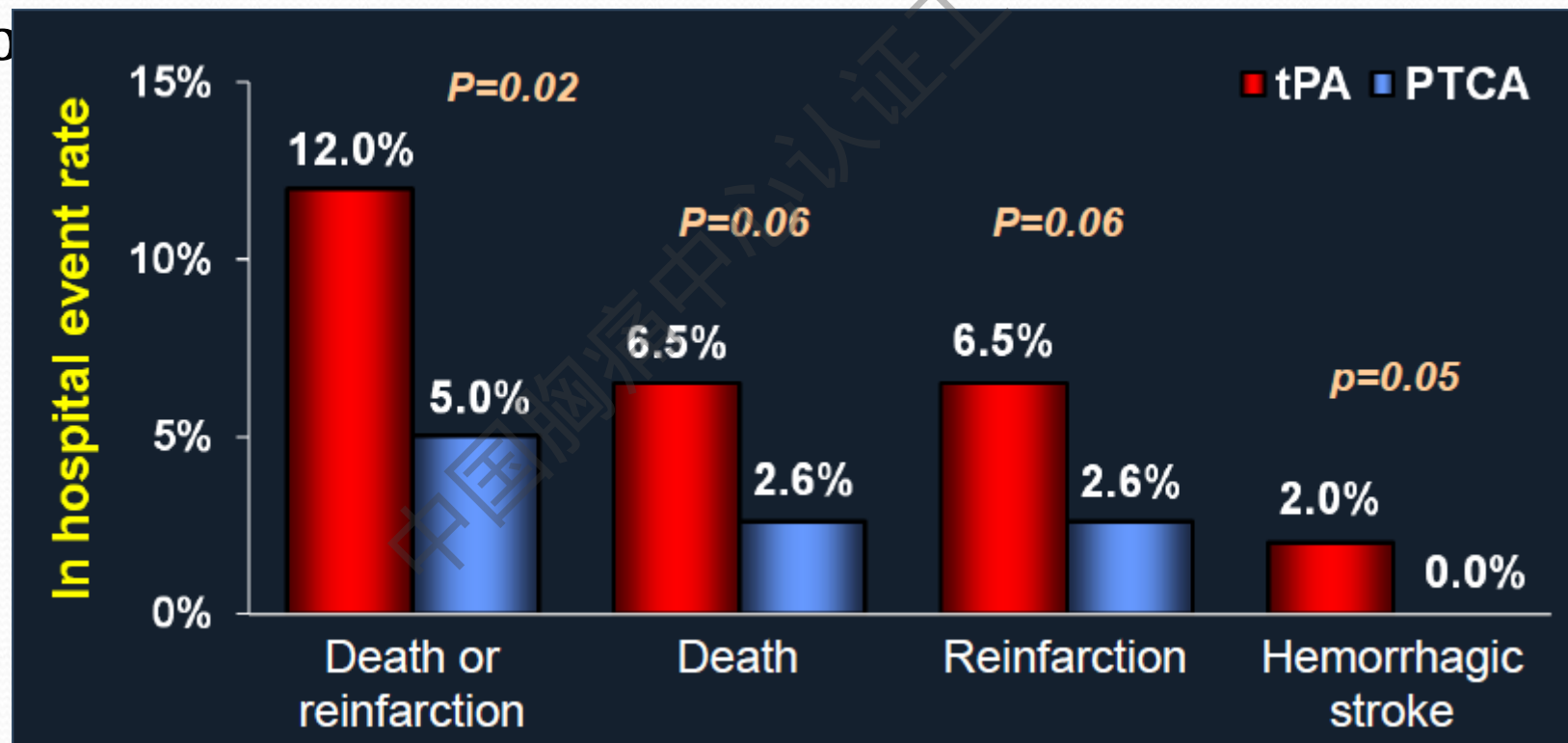
First Primary Angioplasty in AMI, 1979



1946 - 2012

The PAMI (Primary Angioplasty in Myocardial Infarction) Trial

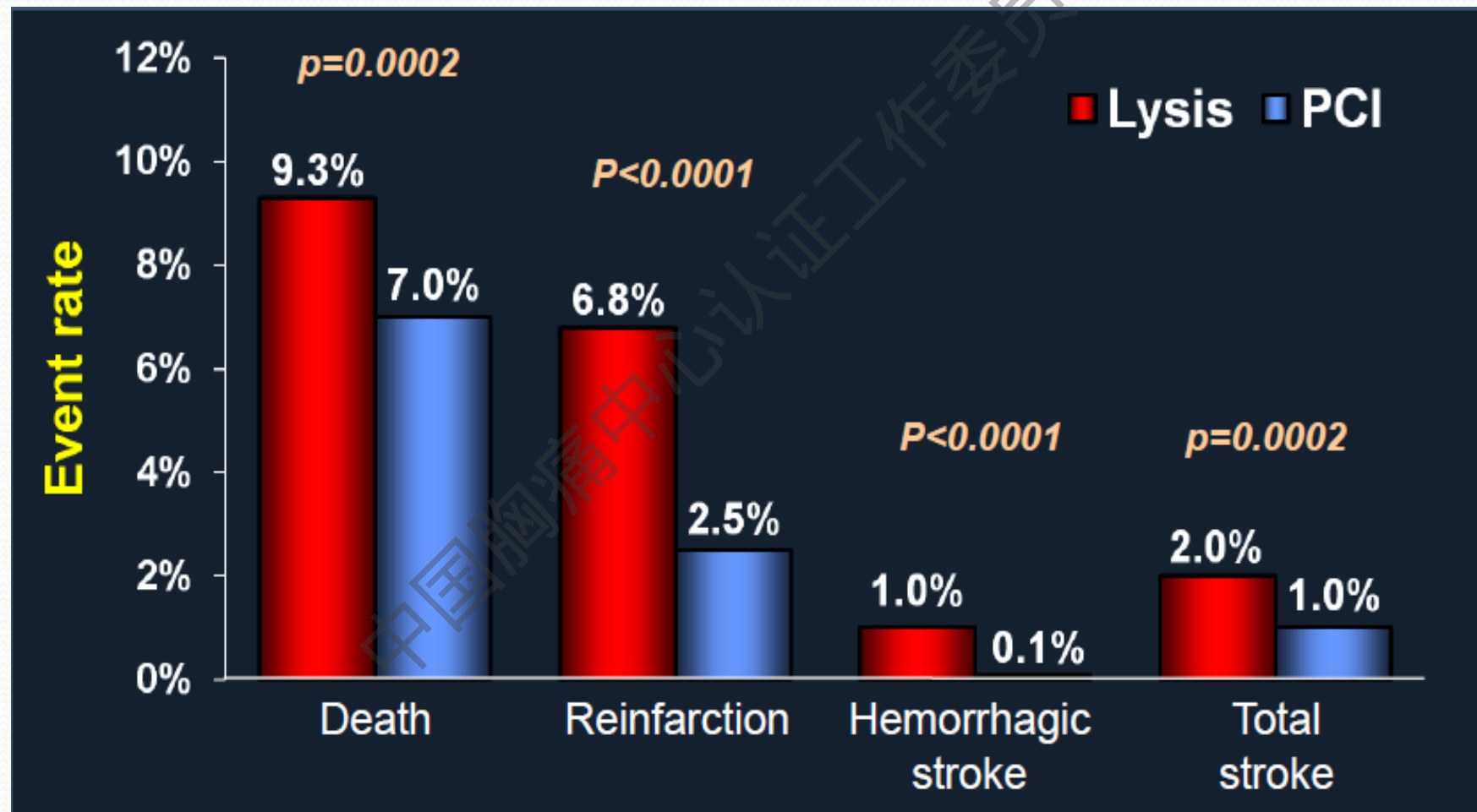
395 pts of any age with AMI <12h duration were prospectively randomized at 12 international centers to primary PTCA vs. a 3 h 100 mg t-PA infusion: 93% TIMI-3 flow



Grines CL et al. NEJM. 1993;328:673-9

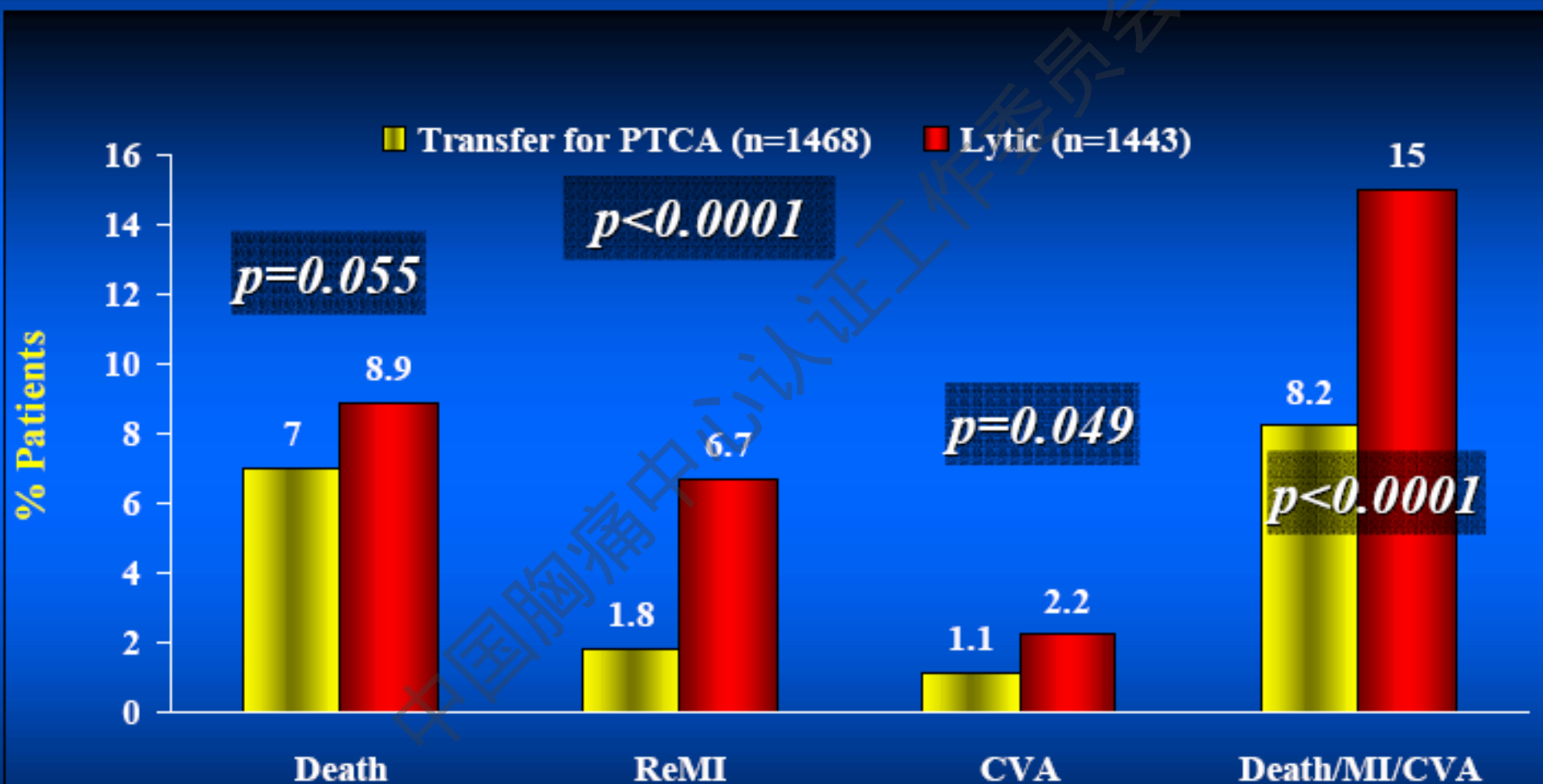
From PAMI to 23 RCTs of PCI vs. Lysis

N = 7,739



Keeley, Grines. *Lancet* 2003;361:13-20

Transfer for Primary PTCA vs On-Site Lytics (Pooled Data from 5 Randomized Trials*)



*LIMI, Prague I & II, Air PAMI, DANAMI-II trials

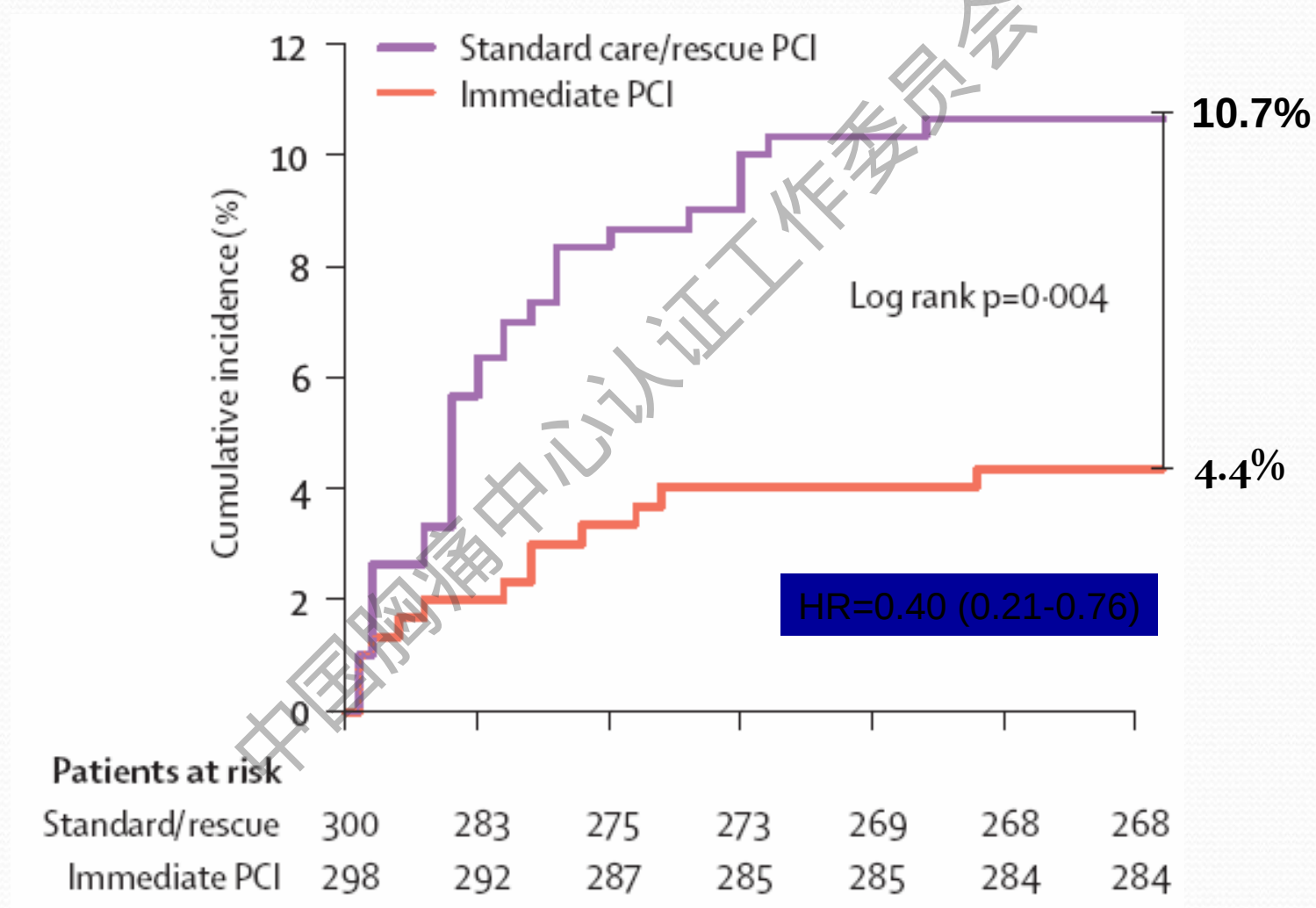
Keeley & Grines, Lancet 2003

Fibrinolytic therapy for STEMI

- STEMI pts **best suited** for fibrinolytic therapy are those presenting **early** after symptom onset with **low bleeding risk**
- After fibrinolytic therapy, if not high risk, transfer to a PCI-capable facility may be considered, especially **if symptoms persist and failure to reperfuse** is suspected.

CARESS-IN-AMI: Primary Outcome

primary outcome (composite of all cause mortality, reinfarction, & refractory MI within 30 days) occurred significantly less often in the immediate PCI group vs. standard care/rescue PCI group



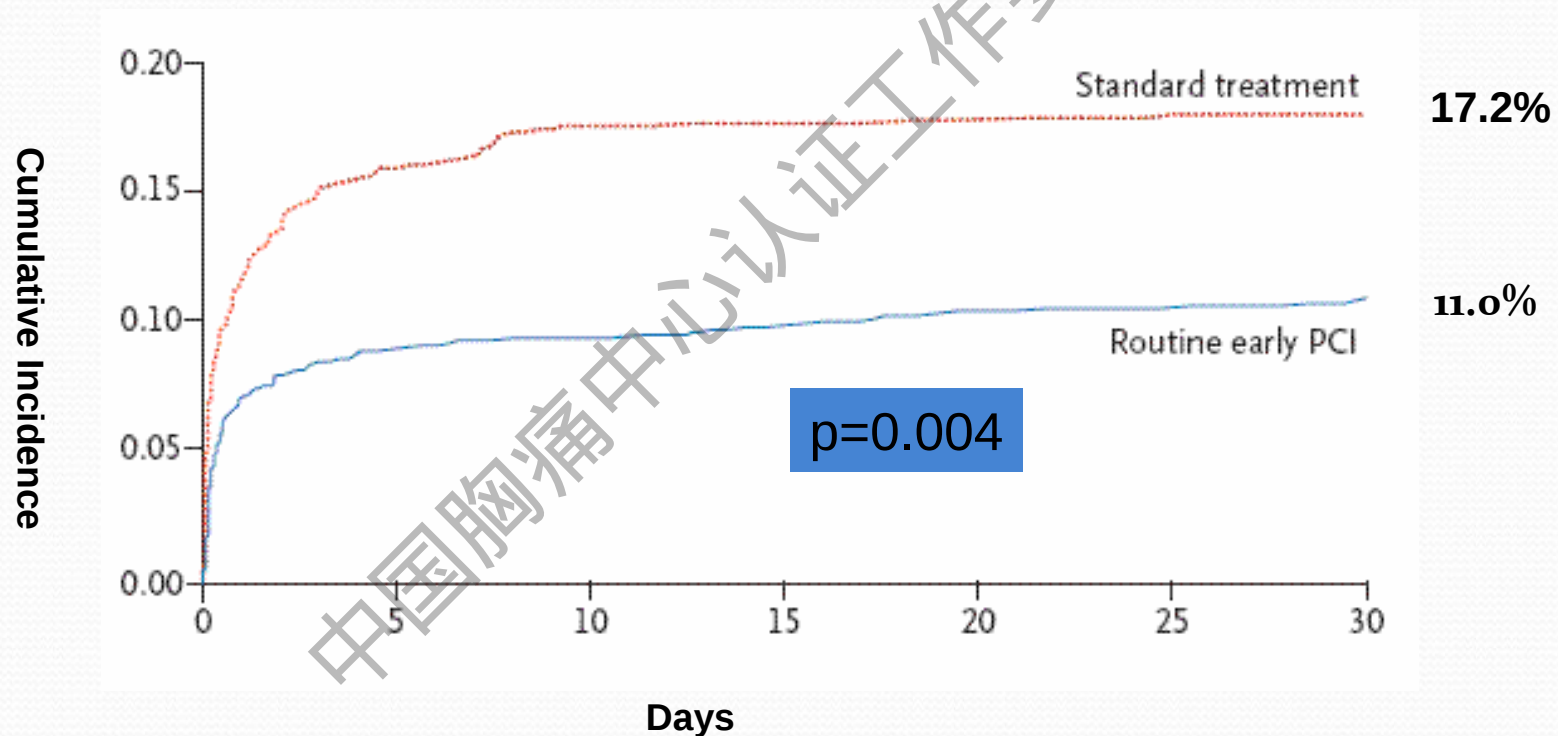
Di Mario et al. Lancet 2008;371.

TRANSFER-AMI: Efficacy

Kaplan Meier Curves for Primary Endpoint

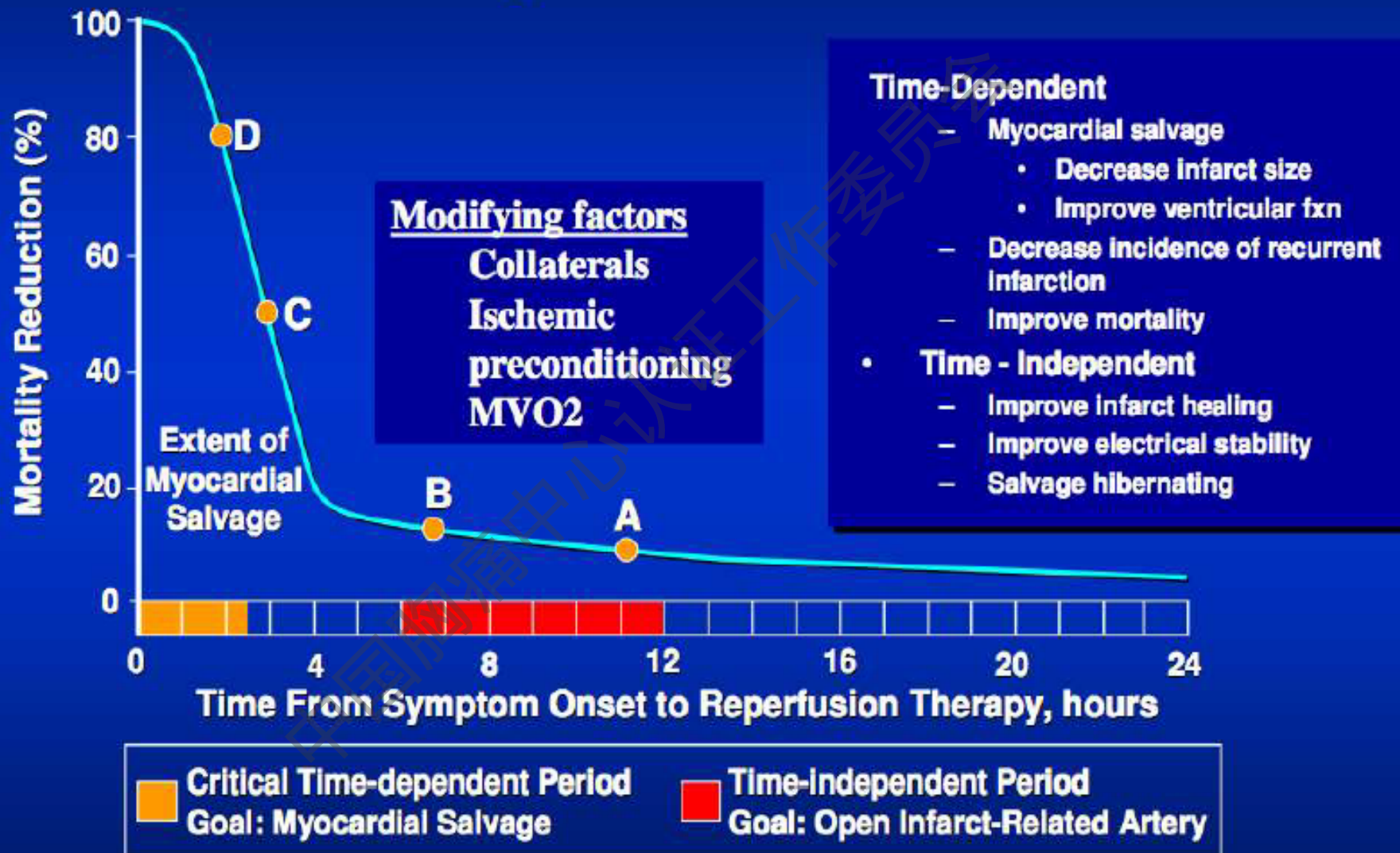
primary end point: composite of death, reinfarction, recurrent ischemia, new or worsening CHF, or shock within 30 days

pharmaco-invasive group=11.0% vs. standard treatment group=17.2%



RR= 0.64, 95 CI% (0.47-0.87)

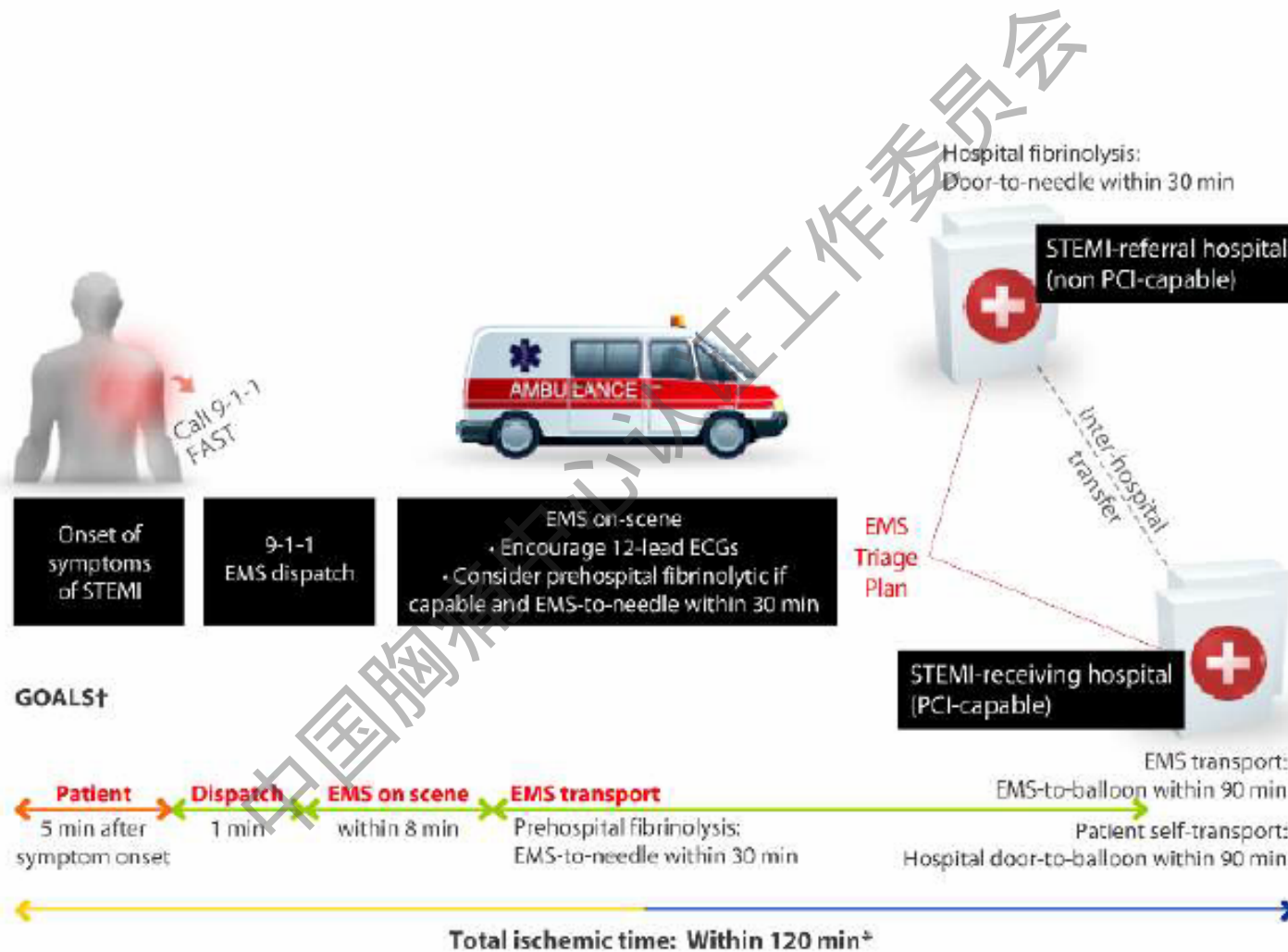
Relationship Between Myocardial Salvage and Survival



Greatest mortality reduction with reperfusion in the first 2-3 hrs. of symptoms.

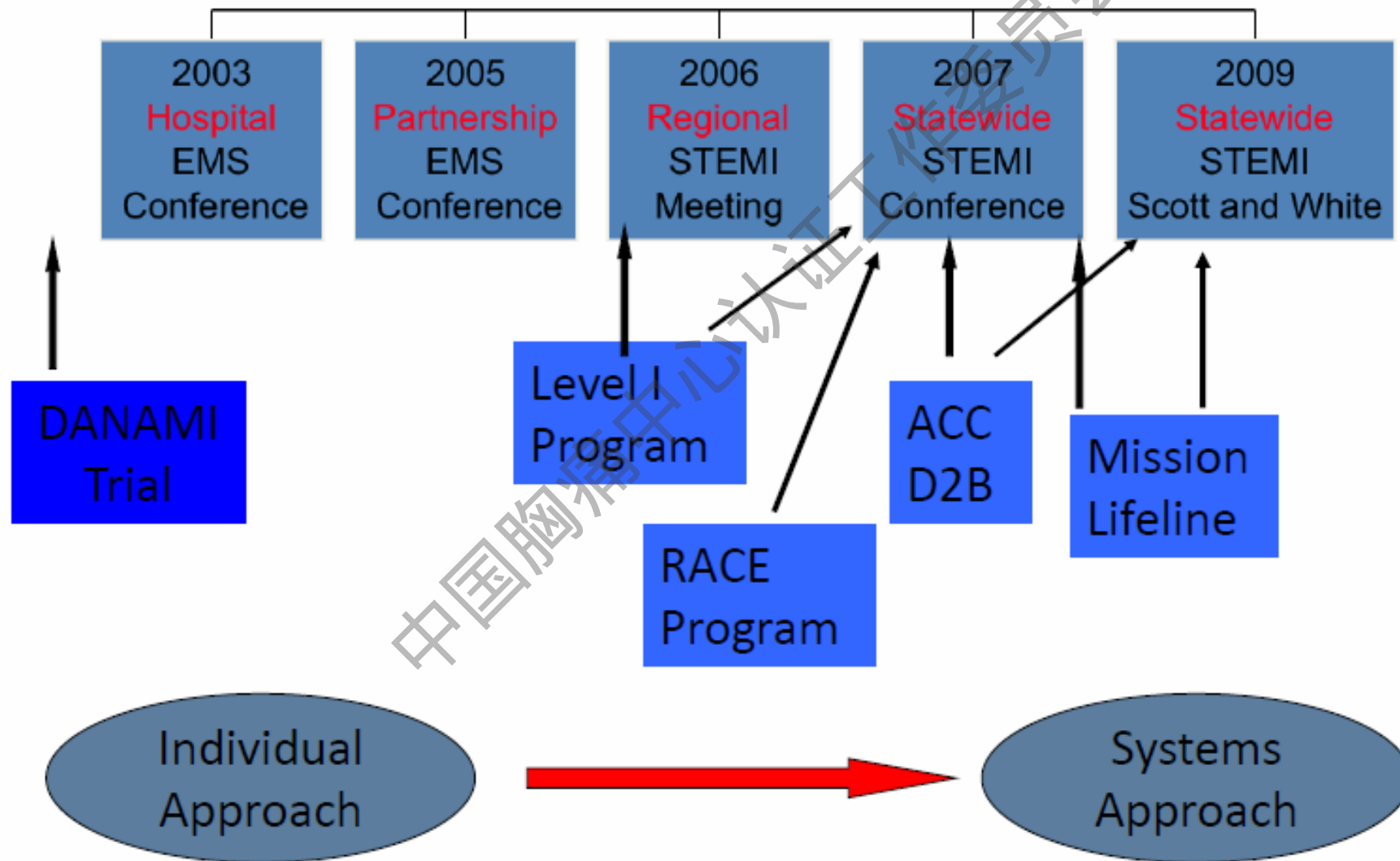
Mission: Lifeline

Point-Of-Entry (POE) Protocol



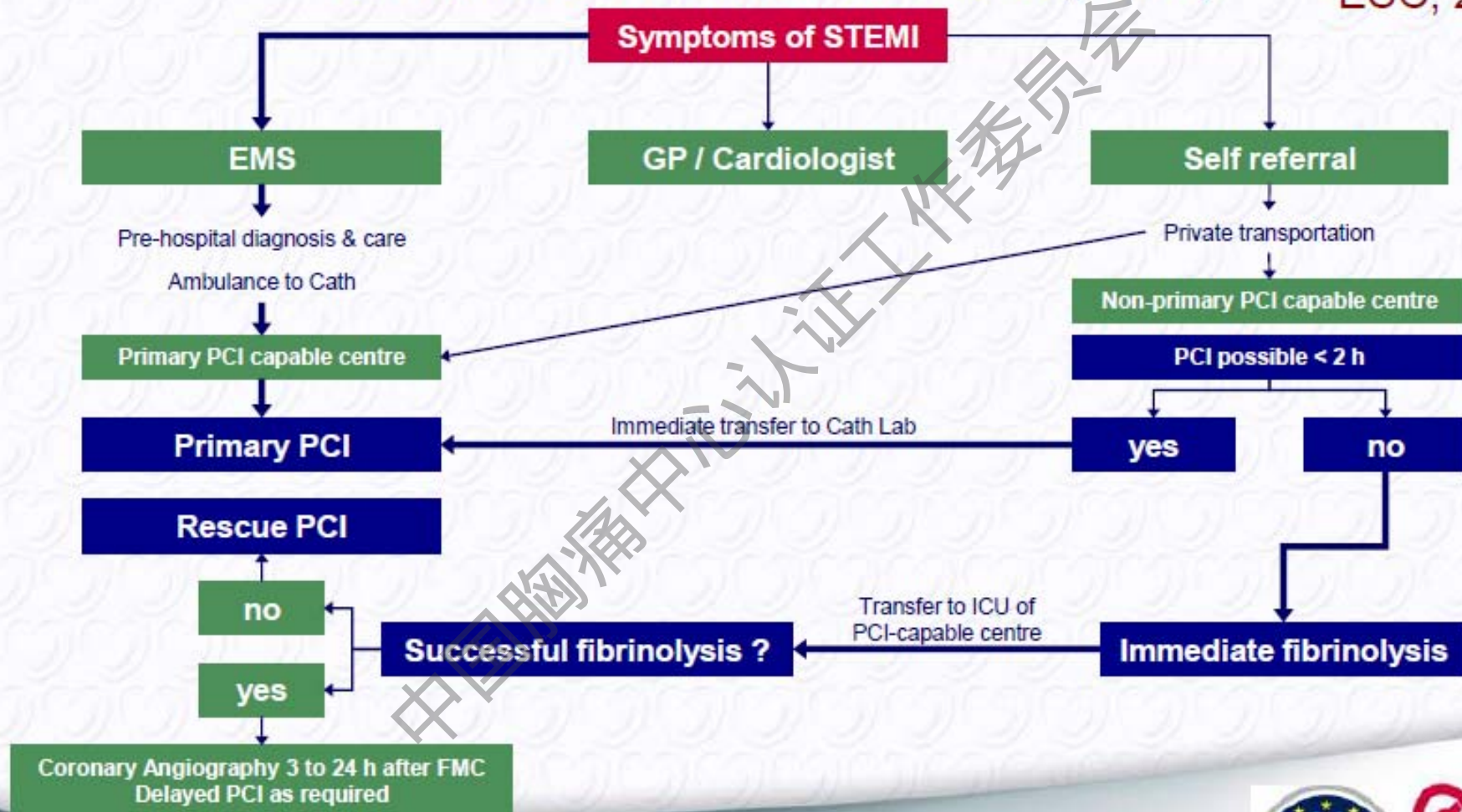
* **Golden Hour = First 60 minutes**

STEMI in My Life



Organization of STEMI patient disposal describing pre- and in-hospital management, and reperfusion strategies within 12 h of First Medical Contact (FMC)

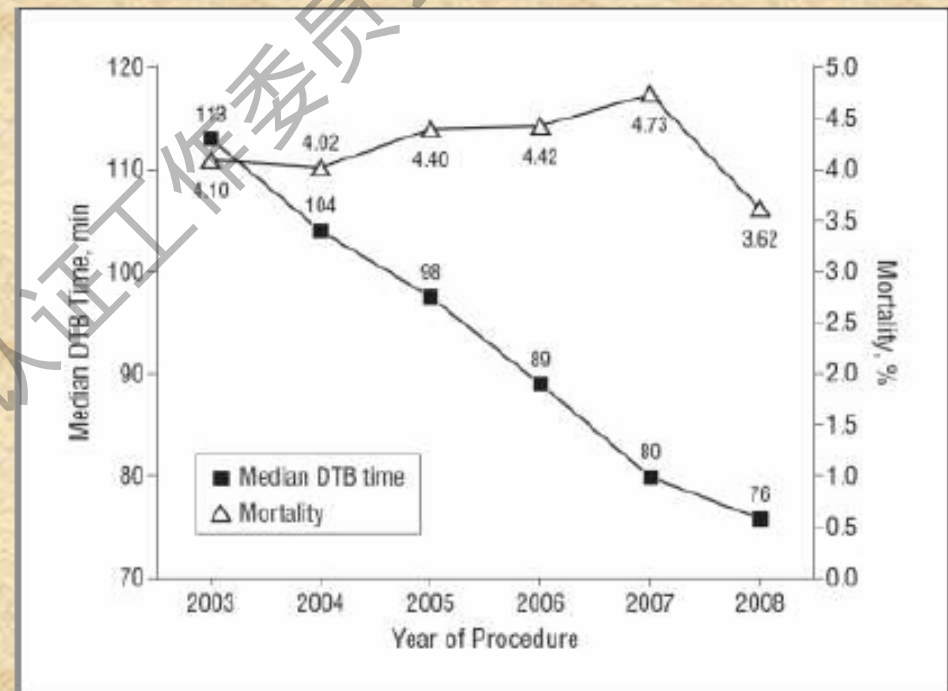
ESC, 2010



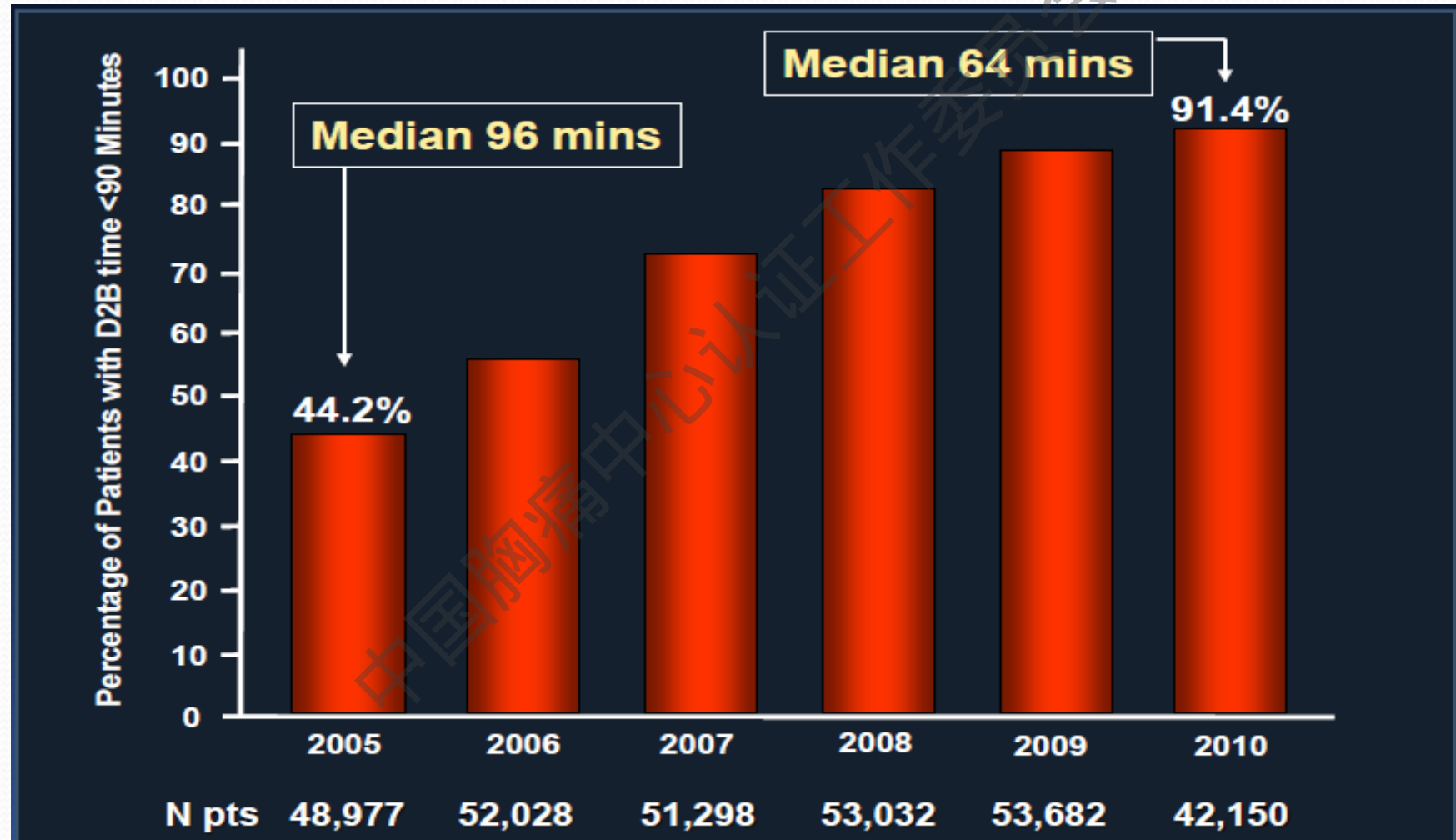
Does D2B Correlate with Mortality?

BCBS of Michigan CV Consortium

- Observational Study
8771 pts.
- Risk of death stratified
using mortality model.
- highest-risk patients
were responsible for
most deaths each year.



Door-to-balloon Time <90 Mins at US Hospitals



Krumholz HM et al. *Circulation* 2011;124:1038-1045

ESC Guide myocardia with ST-se

The Task Force
myocardial infarction

Table 10 A summary of important delays and treatment goals in the management of acute ST-segment elevation myocardial infarction

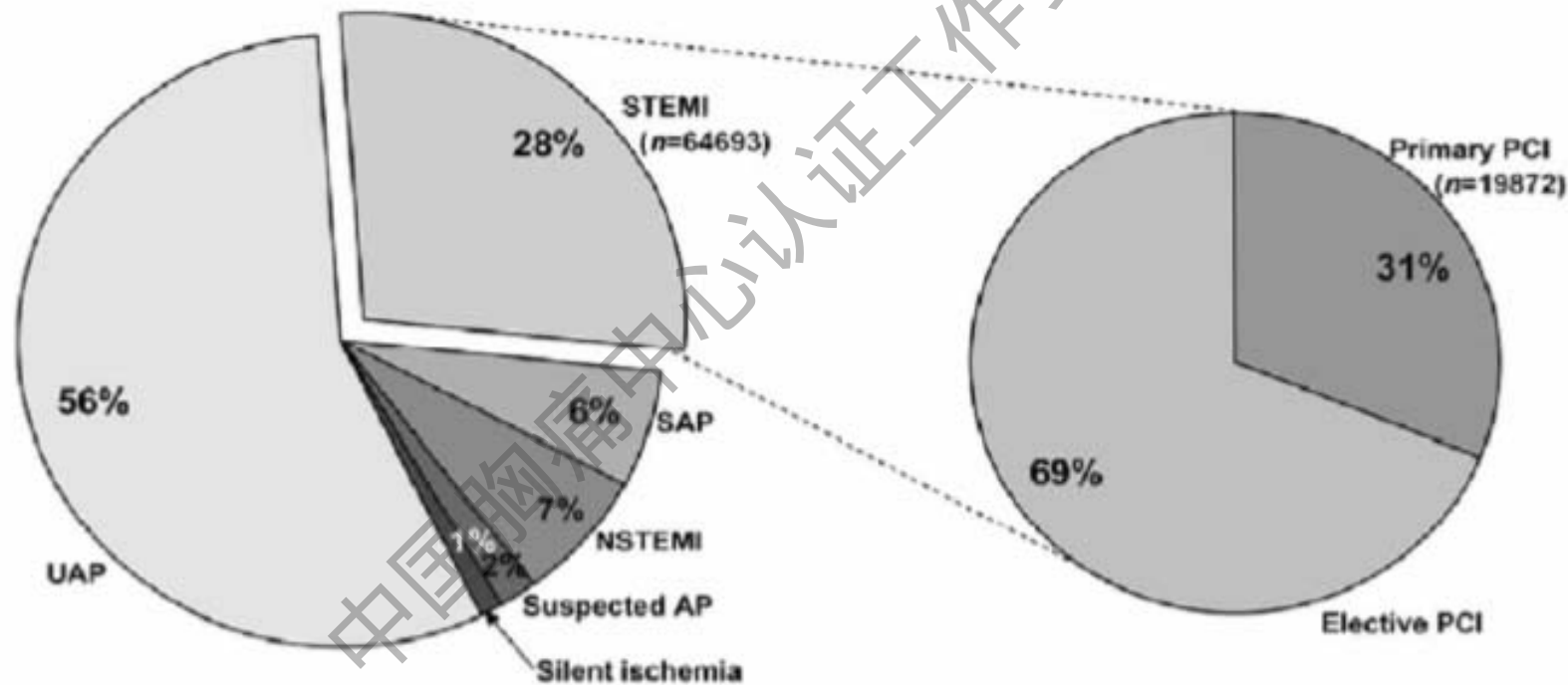
Delay	Target
Preferred for FMC to ECG and diagnosis	≤10 min
Preferred for FMC to fibrinolysis ('FMC to needle')	≤30 min
Preferred for FMC to primary PCI ('door to balloon') in primary PCI hospitals	≤60 min
Preferred for FMC to primary PCI	≤90 min (≤60 min if early presenter with large area at risk)
Acceptable for primary PCI rather than fibrinolysis	≤120 min (≤90 min if early presenter with large area at risk) if this target cannot be met, consider fibrinolysis.
Preferred for successful fibrinolysis to angiography	3–24 h

FMC = first medical contact; PCI = percutaneous coronary intervention.

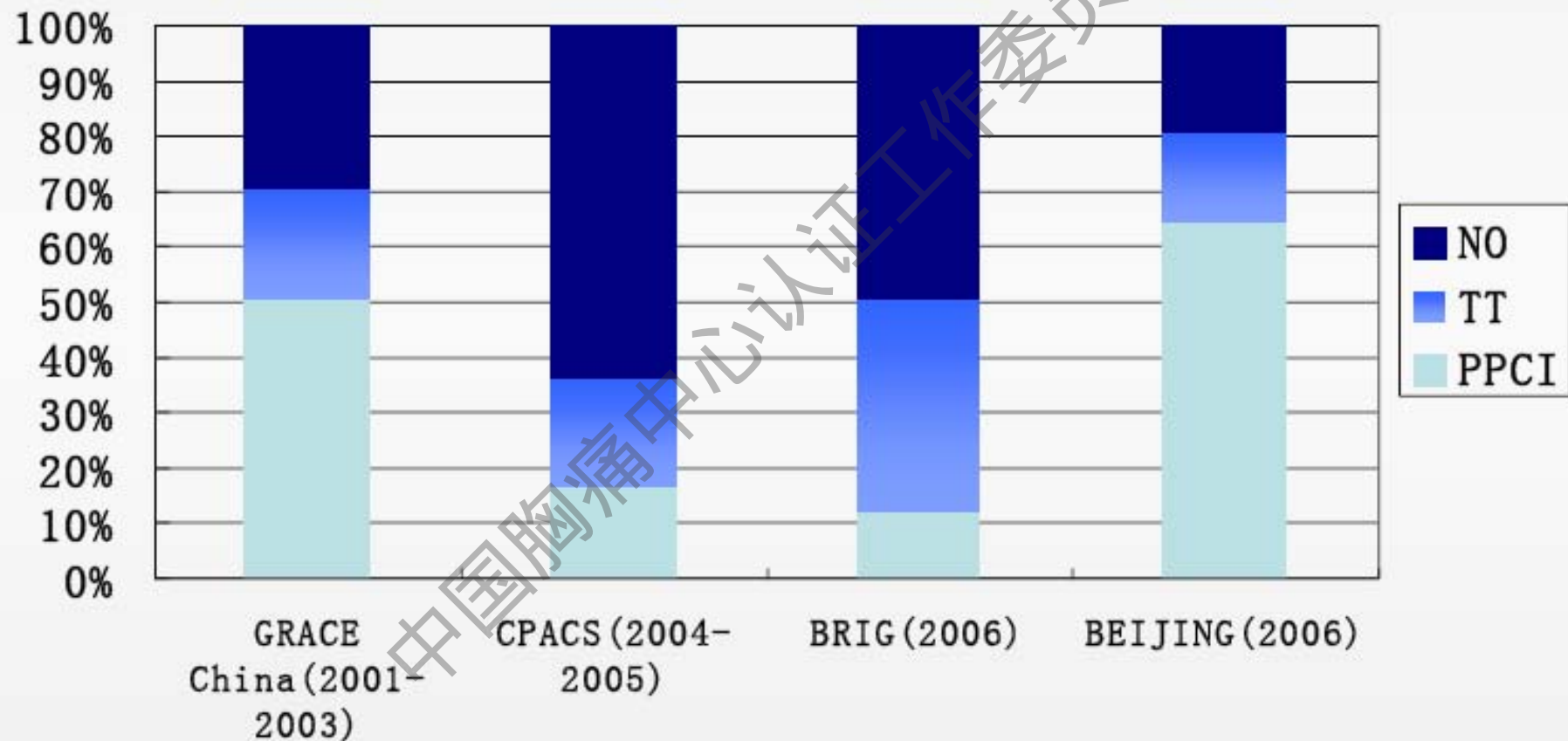
t of acute
senting

nt elevation acute
Cardiology (ESC)

Numbers of patients receiving PCI in China in 2010



Reperfusion Therapy of STEMI in China



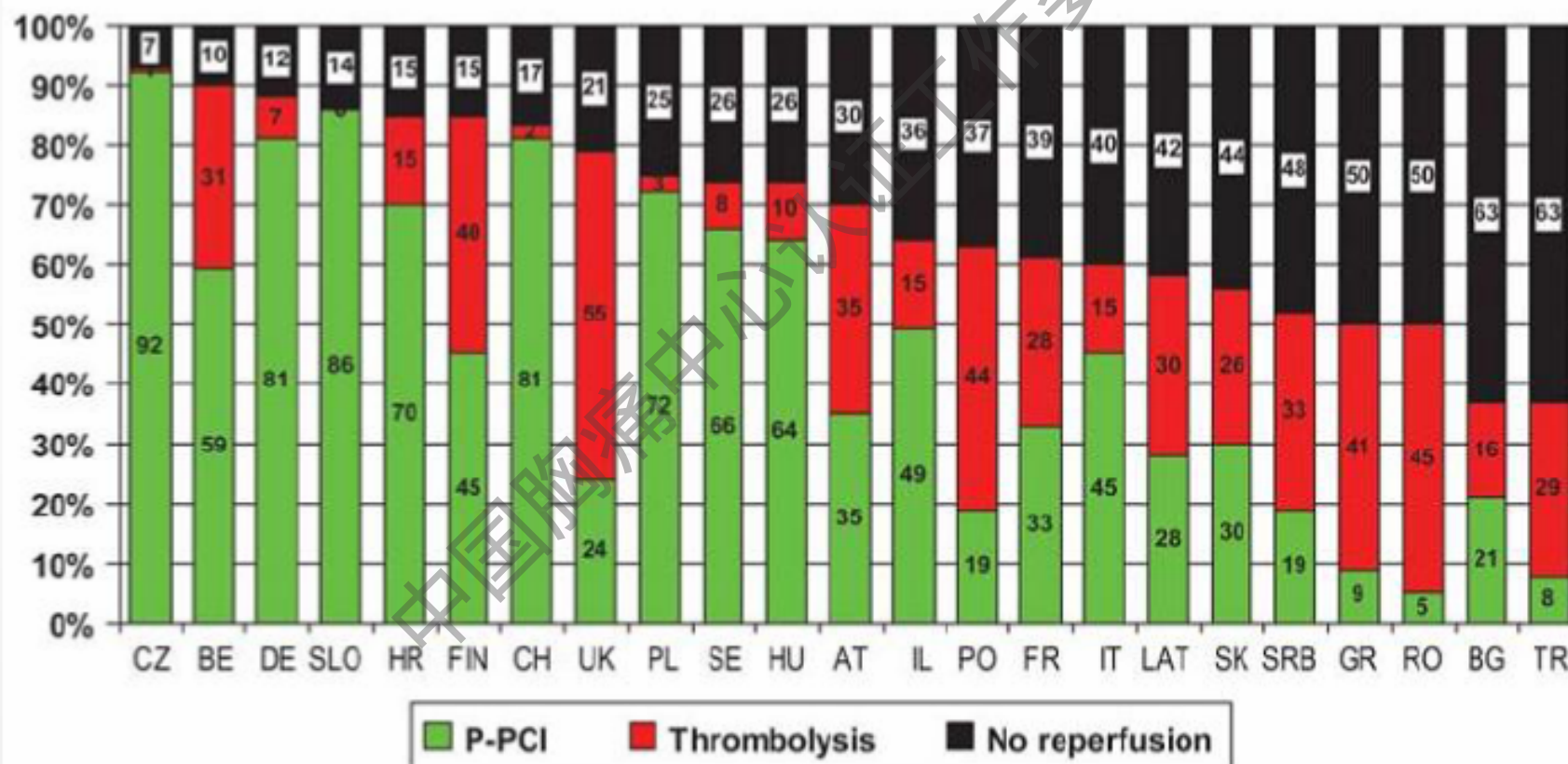
Gao, et al. Heart 2008;94:554-560 Zhao, et al. Chin J Cardiol, 2009;37:213-217

Hu, et al. Clin Invest Med 2008;31:e189-97 Lv, et al. Chin J Cardiol, 2005,33,789-82

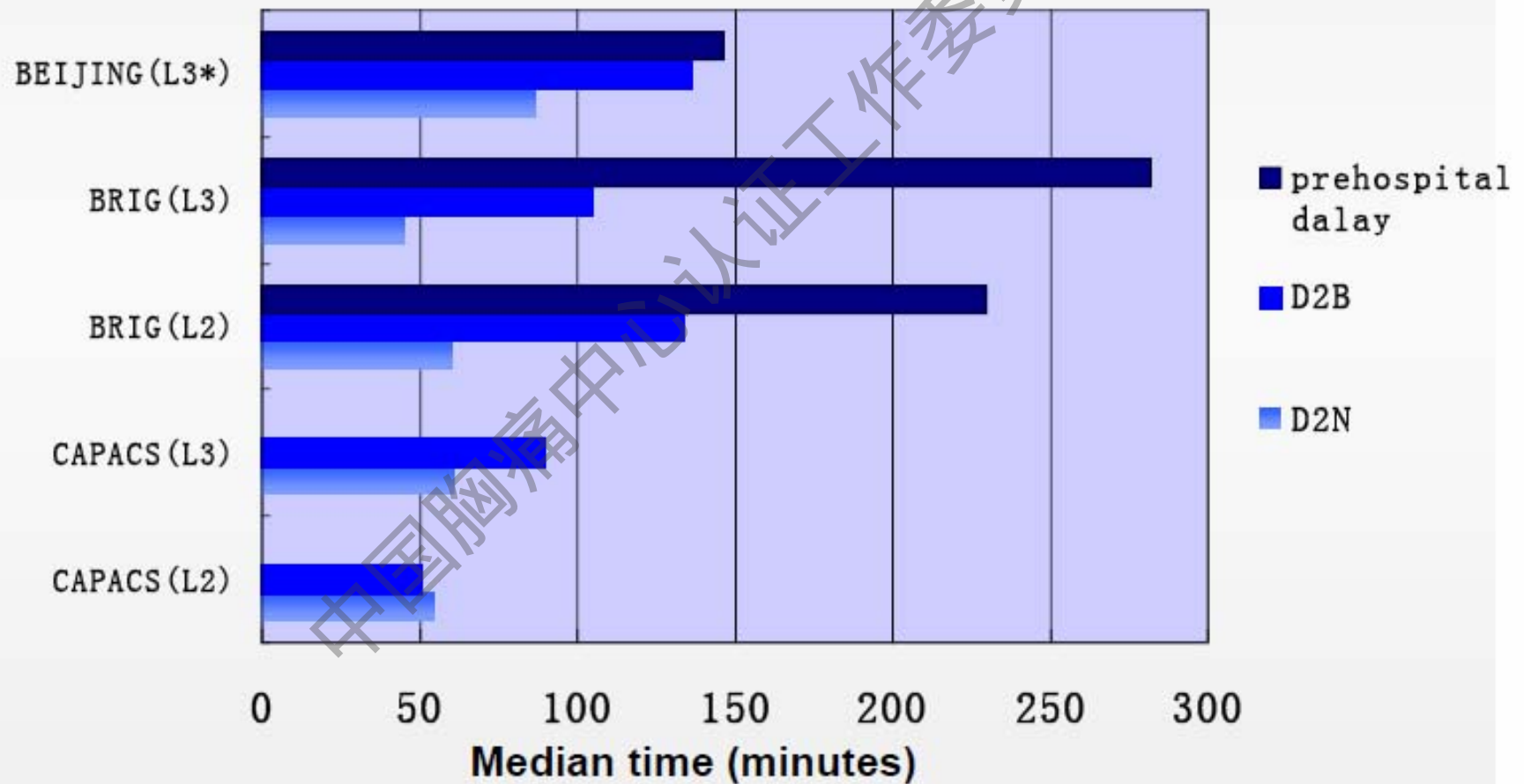
Hospitalized STEMI Treatment in Europe

Data from National Registries or Surveys (2007-2008)

In-hospital Mortality: 4.2-13.5%



Time Delay of Reperfusion Therapy of STEMI in China



The Registry of Reperfusion Therapy in Patients with STEMI in Beijing

- 18 million residents
- 19 hospitals with capability of primary PCI
 - 16 centers in urban
 - 3 centers in rural area
- From Nov 2005 to Dec 2006



Patient Characteristics by Reperfusion Strategy

Data of Beijing Registry 2006

	Total N=809	PPCI n=521	TT n=133	No n=155	p
Age (years)	60.9±12.7	60.1±12.4	58.5±11.3	65.3±13.6	<0.001
Age >75	135(16.9)	74(14.2)	9(7.2)	52(33.5)	<0.001
Female	178(22.3)	105(20.2)	26(20.8)	47(30.5)	0.02
Smoking	446(56.5)	304(59.5)	81(65.9)	61(39.45)	<0.001
Diabetes	158(19.9)	92(17.9)	25(20.2)	41(26.5)	0.18
Hypertension	414(51.9)	226(51.3)	60(48.0)	88(57.1)	0.04
hypercholestoremia	162(20.4)	102(19.8)	26(20.8)	34(22.4)	0.63
Prior MI	74(9.3)	31(6.0)	19(15.2)	24(15.6)	<0.001
CKD	14(1.8)	8(1.5)	0(0)	6(3.9)	0.006
Prior stroke	81(10.2)	50(9.7)	9(7.3)	22(14.2)	0.10
Prior HF	10(1.3)	4(0.8)	2(1.6)	4(2.6)	0.09

Patient Characteristics by Reperfusion Strategy

Data of Beijing Registry 2006

	Total N=809	PPCI n=521	TT n=133	No n=155	p
Off-hour presentation	520(64.9)	333(63.9)	86(68.8)	101(65.2)	0.59
Pre-hospital ECG	291(35.9)	205(41.5)	42(34.4)	44(30.3)	0.03
EMS transport	310(38.7)	221(42.4)	43 (34.4)	46(29.7)	0.01
Pre-hospital delay >3h	351(44.2)	223(43.1)	41(33.3)	87(56.1)	<0.001

Evidence Based Medication in Hospital

Data of Beijing Registry 2006

	Total N=809	PPCI n=521	TT n=133	No n=155	p
Aspirin	774(98.1)	503(97.7)	121(99.2)	150(98.7)	0.46
Clopidogrel	701(90.0)	496(96.9)	96(81.4)	109(73.2)	<0.001
UFH	211(27.5)	127(25.4)	63(52.9)	21(14.3)	<0.001
LMWH	717(91.8)	481(94.5)	103(85.1)	133(88.1)	0.001
B-blocker	593(76.1)	397(77.7)	85(71.4)	111(74.5)	0.31
ACEI	559(72.5)	368(73.3)	88(72.2)	103(69.6)	0.67
Statin	716(91.6)	484(94.7)	102(85.0)	130(86.1)	<0.001

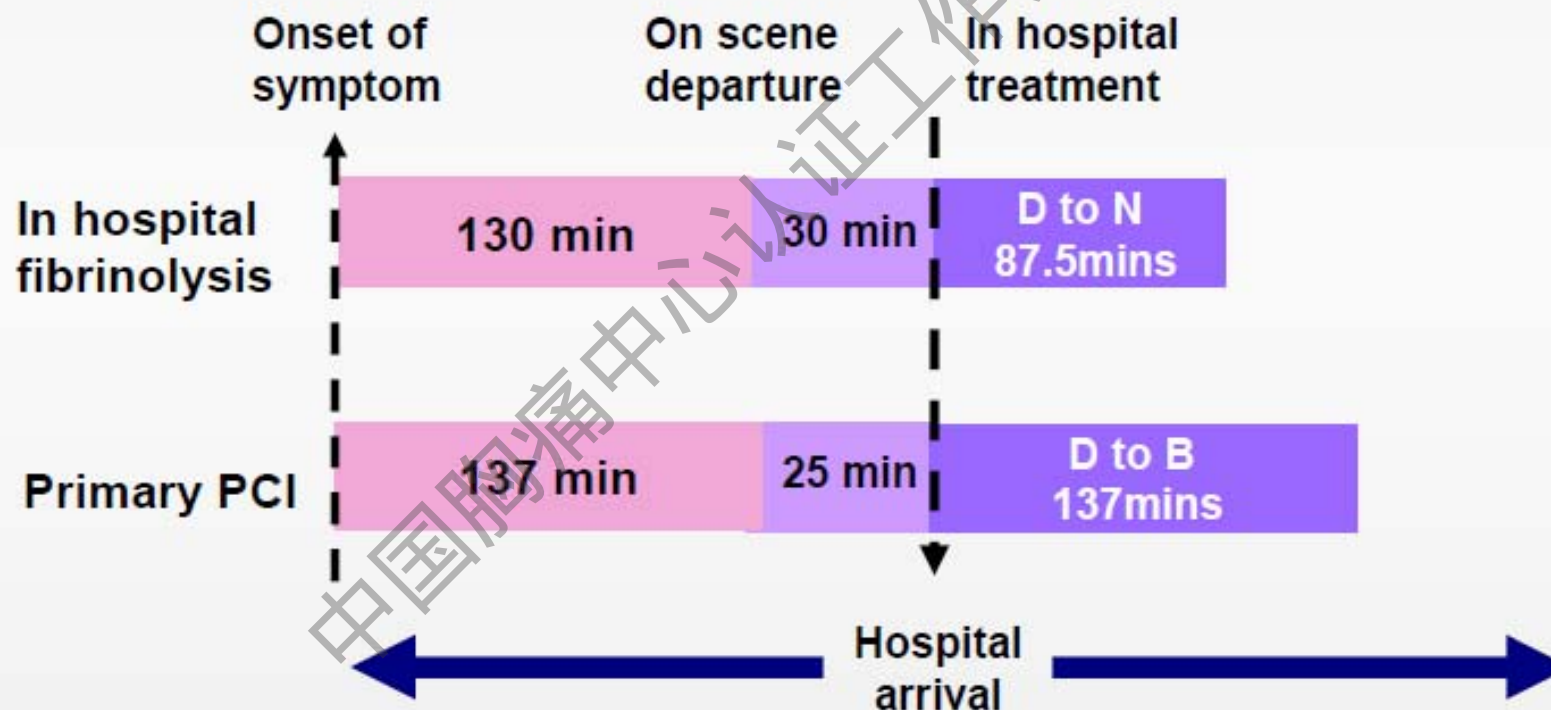
In Hospital Outcomes by Reperfusion Strategy

Data of Beijing Registry 2006

	Total N=809	PPCI n=521	TT n=133	No n=155	p
Death	37(4.6)	16(3.1)	7(5.6)	14(9.0)	0.001
Re-infarction	13(1.7)	8(1.6)	3(2.7)	2(1.4)	0.71
Stroke	3(0.4)	1(0.2)	1(0.9)	1(0.7)	0.47
New Heart failure	114(15.0)	68(13.5)	22(19.3)	24(16.9)	0.22
Severe Bleeding	17(2.3)	12(2.4)	2(1.8)	3(2.2)	0.91

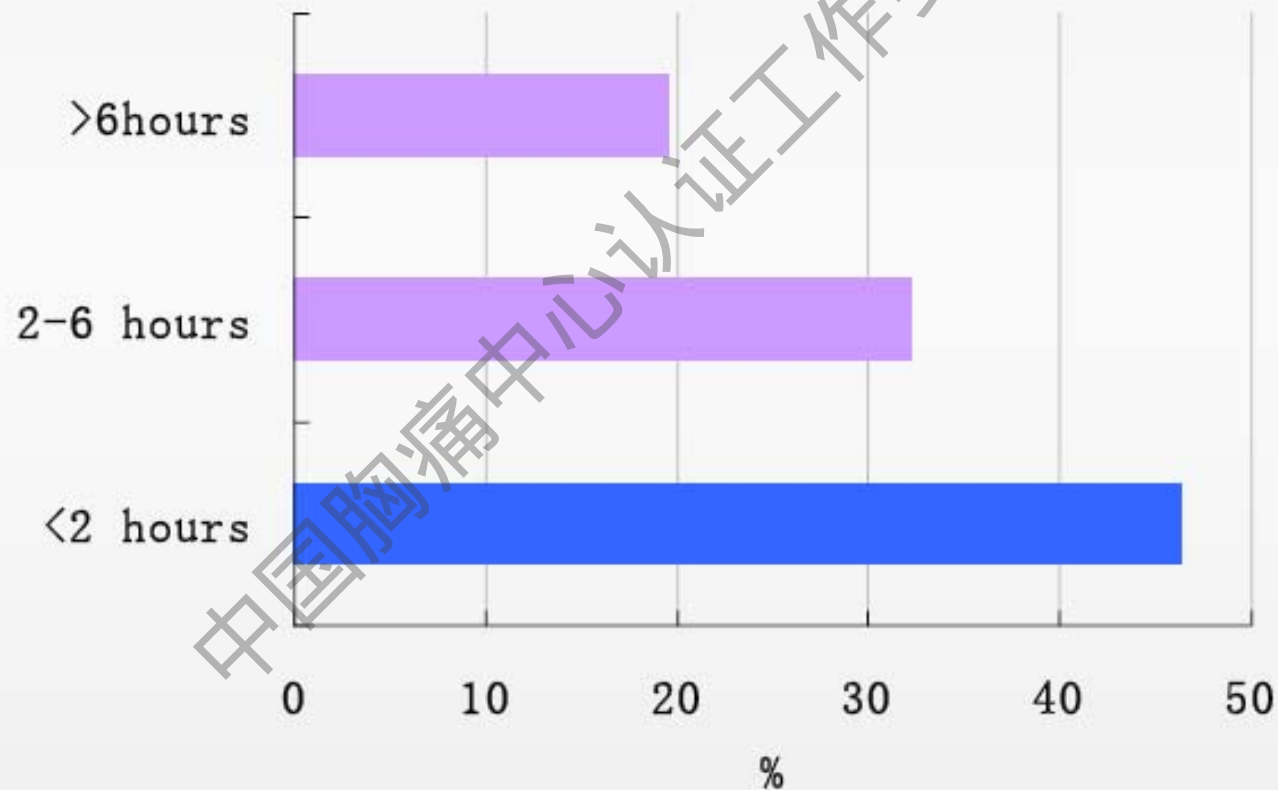
Time from onset of symptoms to Treatment

Data of Beijing Registry 2006



Pre-hospital Delay (symptom onset to hospital arrival)

Data of Beijing Registry 2006



The social-economic factors associated with Pre-hospital Delay

Data of Beijing Registry 2006

Variable	Pre-hospital delay ≤2h N=364	Pre-hospital delay >2h N=445	P
Age (mean, y)	59.40 ± 12.51	62.35 ± 12.48	0.001
Age ≥65 y	128 (35.16)	189 (42.47)	0.034
Female	74 (20.73)	108 (25.35)	0.127
Health insurance	224(61.5)	294(66.1)	0.039
Education	167(45.9)	245(55.1)	0.403
Income >2000RMB/M	73(20.1)	123(27.6)	0.447

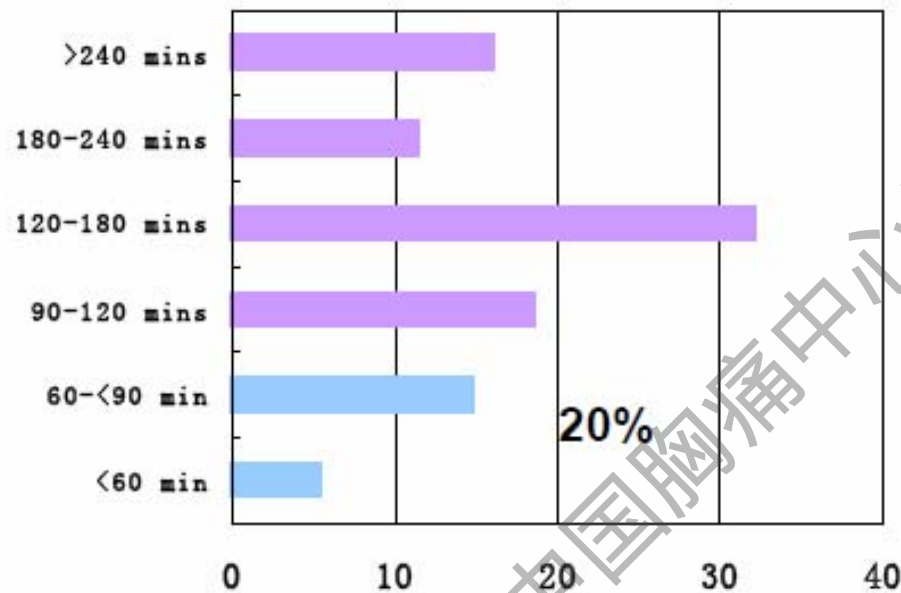
The risk factors associated with Pre-hospital Delay

Data of Beijing Registry 2006

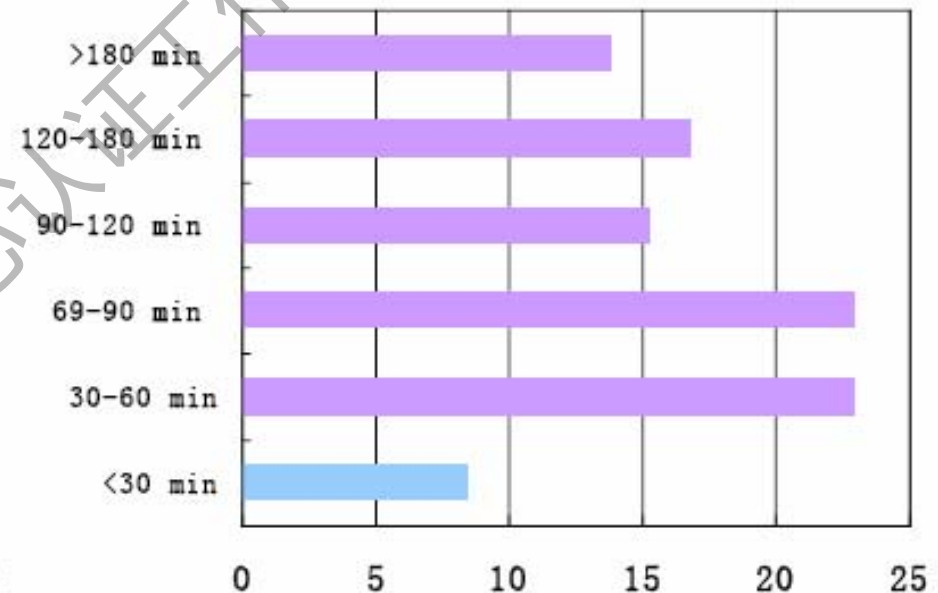
Variable	OR	95% CI	P
Nitrate on symptom onset	8.666	2.312, 32.476	0.0071
No severe symptom	2.132	1.264, 3.597	0.0045
Symptom persist <30mins	25.0	1.786, 595.2	0.0281
Self transport	2.62	1.57, 4.37	0.0002

The Delay of Door to reperfusion Time

Data of Beijing Registry 2006



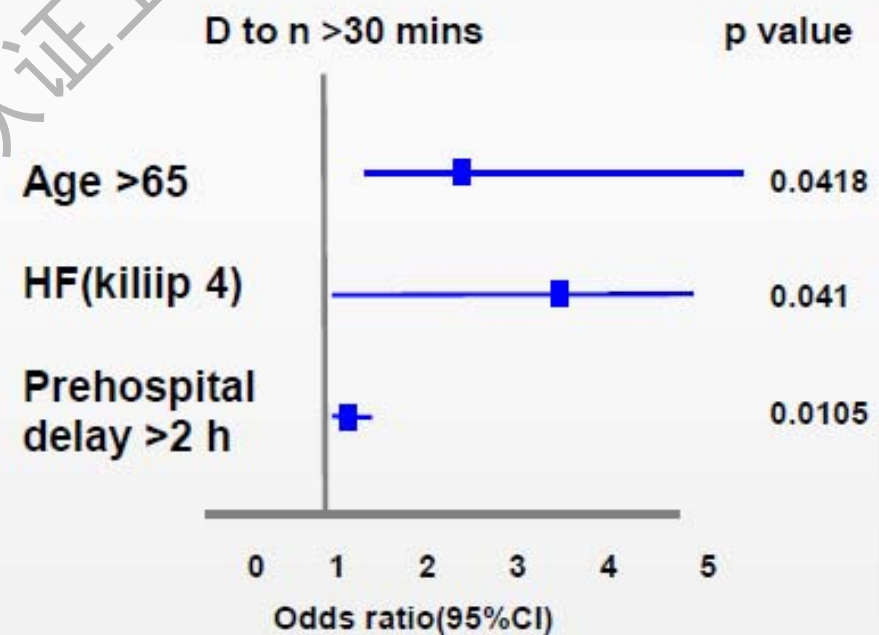
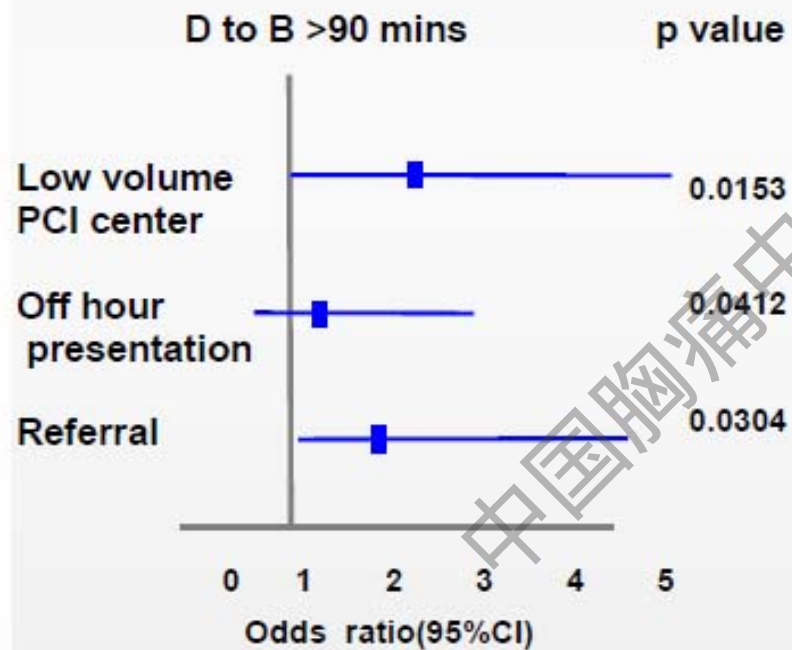
D to B



D to N

The Delay of Door to reperfusion Time

Data of Beijing Registry 2006



Clin Invest Med. 2008,31(4):E189-97

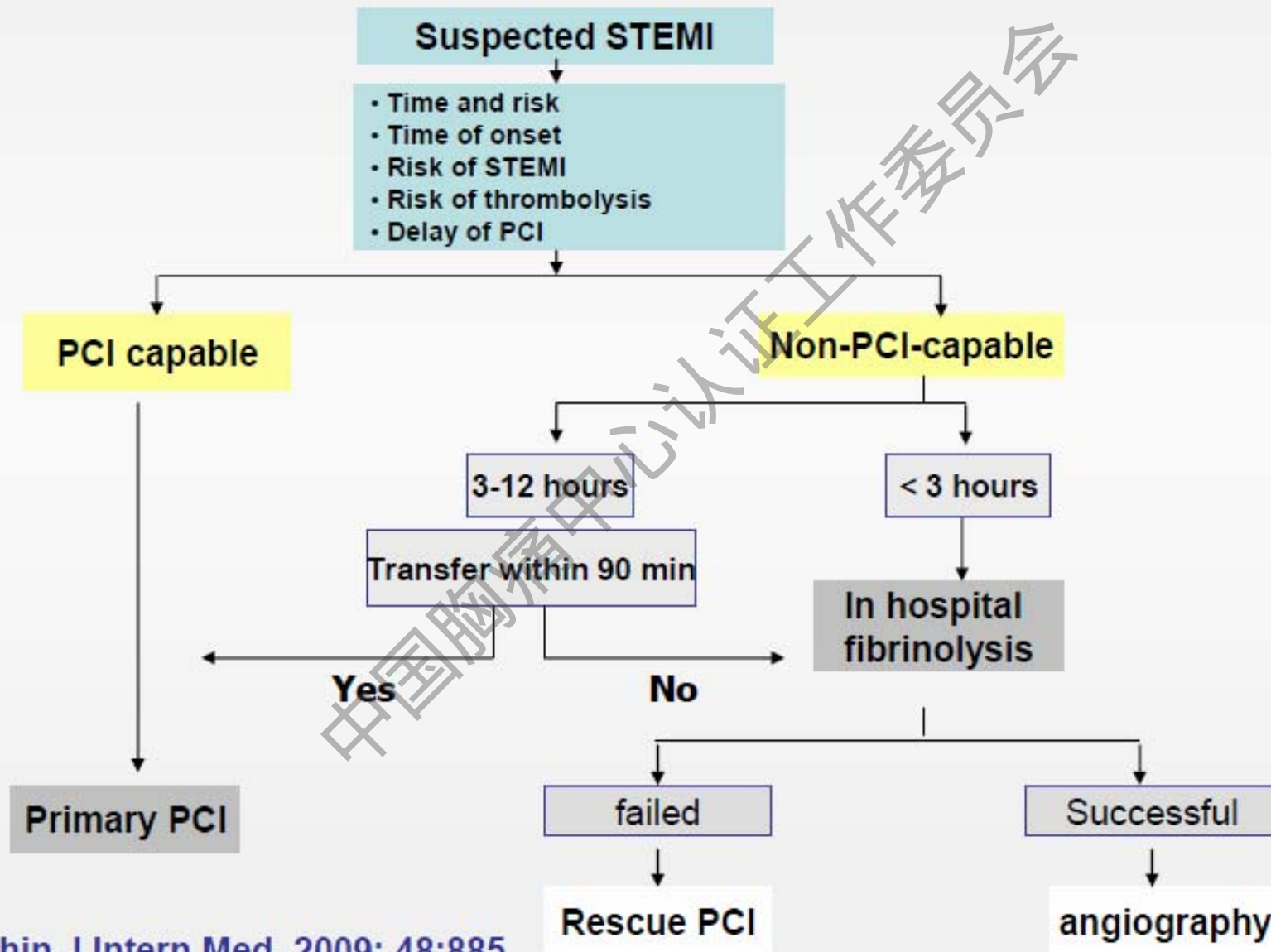
In-hospital Pathway of Thrombolysis

Data of Beijing Registry 2006



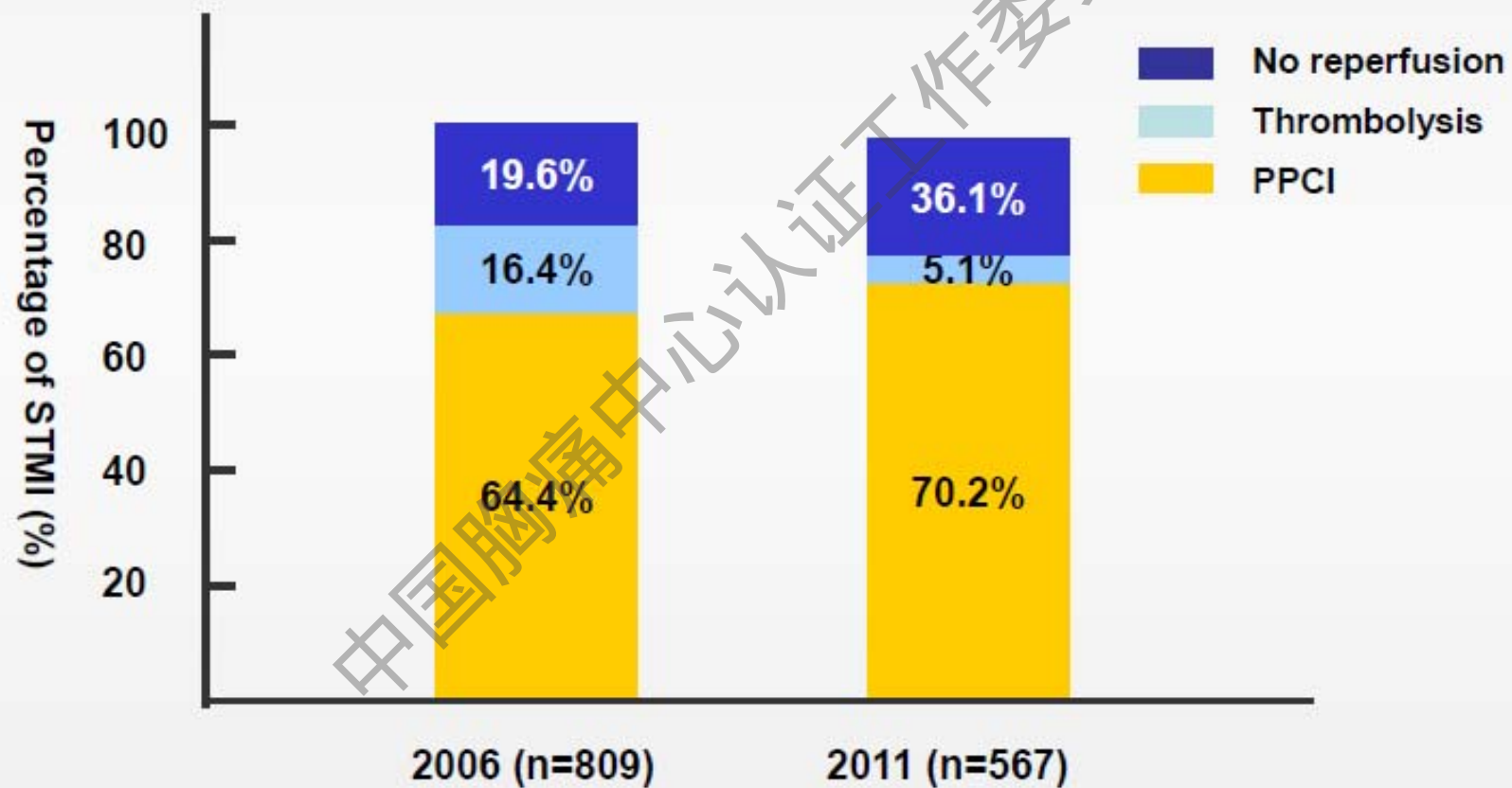
EM (71min)	6 mins	40 mins	15 mins
CCU (112min)	7 mins	50mins	20 mins
Total (83min)	6 mins	43 mins	17 mins

Triage of Reperfusion strategy in hospital (Chinese Consensus)



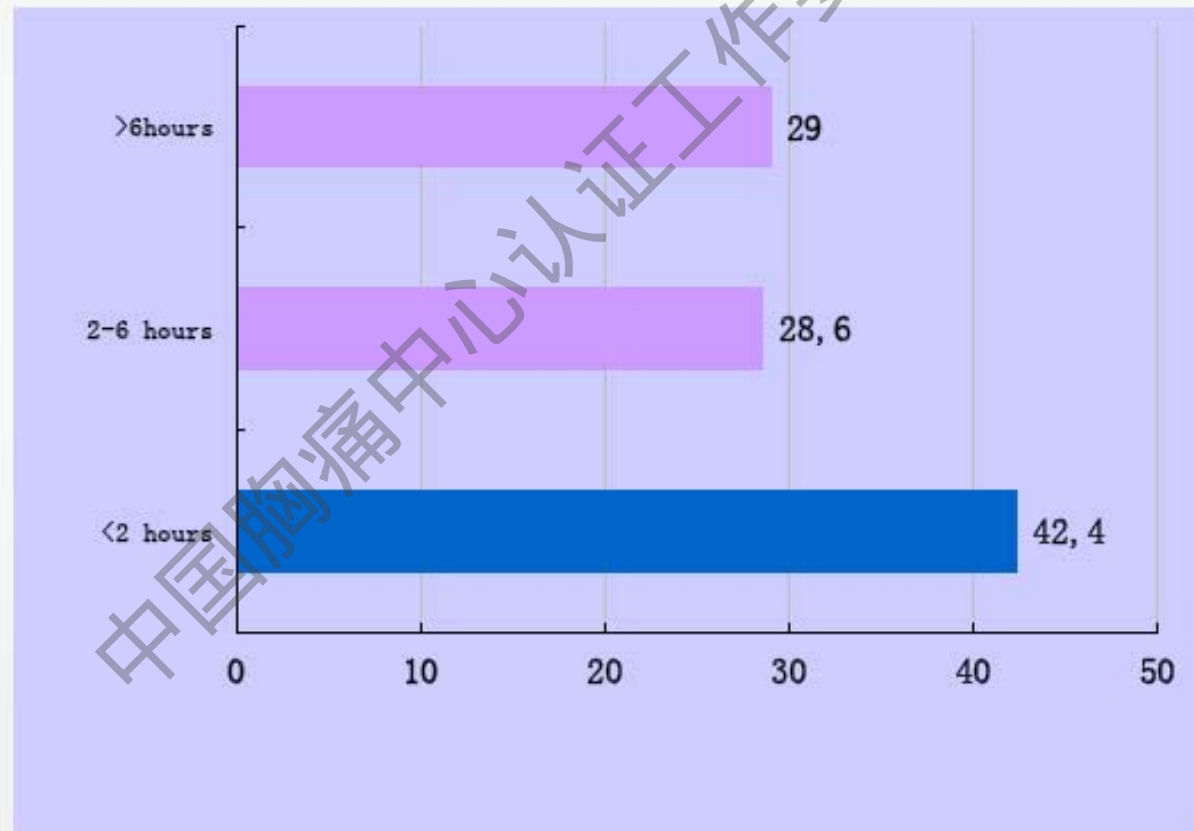
Reperfusion Treatment by Gender

Preliminary analysis of Beijing ACS Registry 2012



Pre-hospital Delay (symptom onset to hospital arrival)

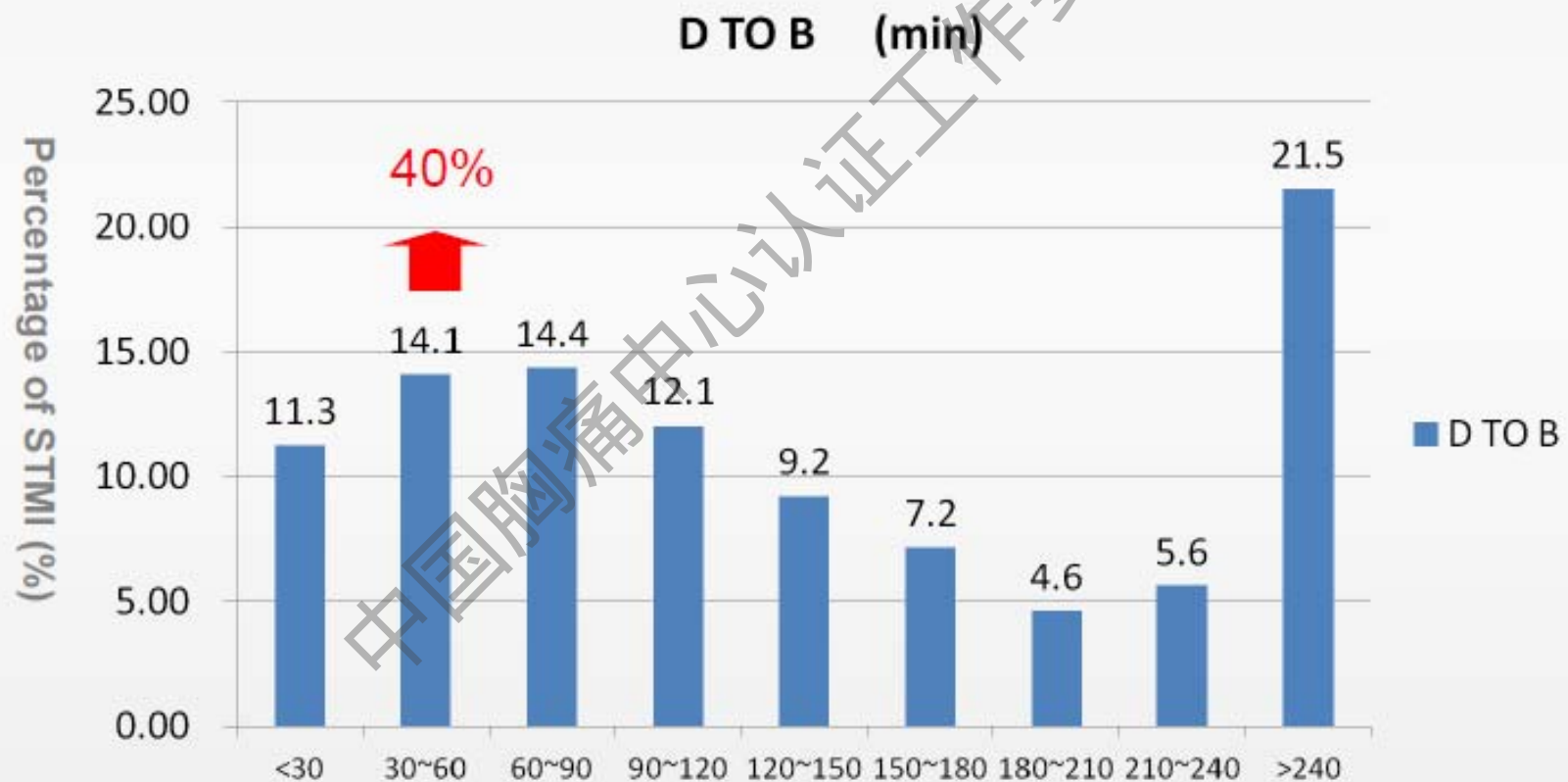
Preliminary analysis of Beijing ACS Registry 2012



Data not published

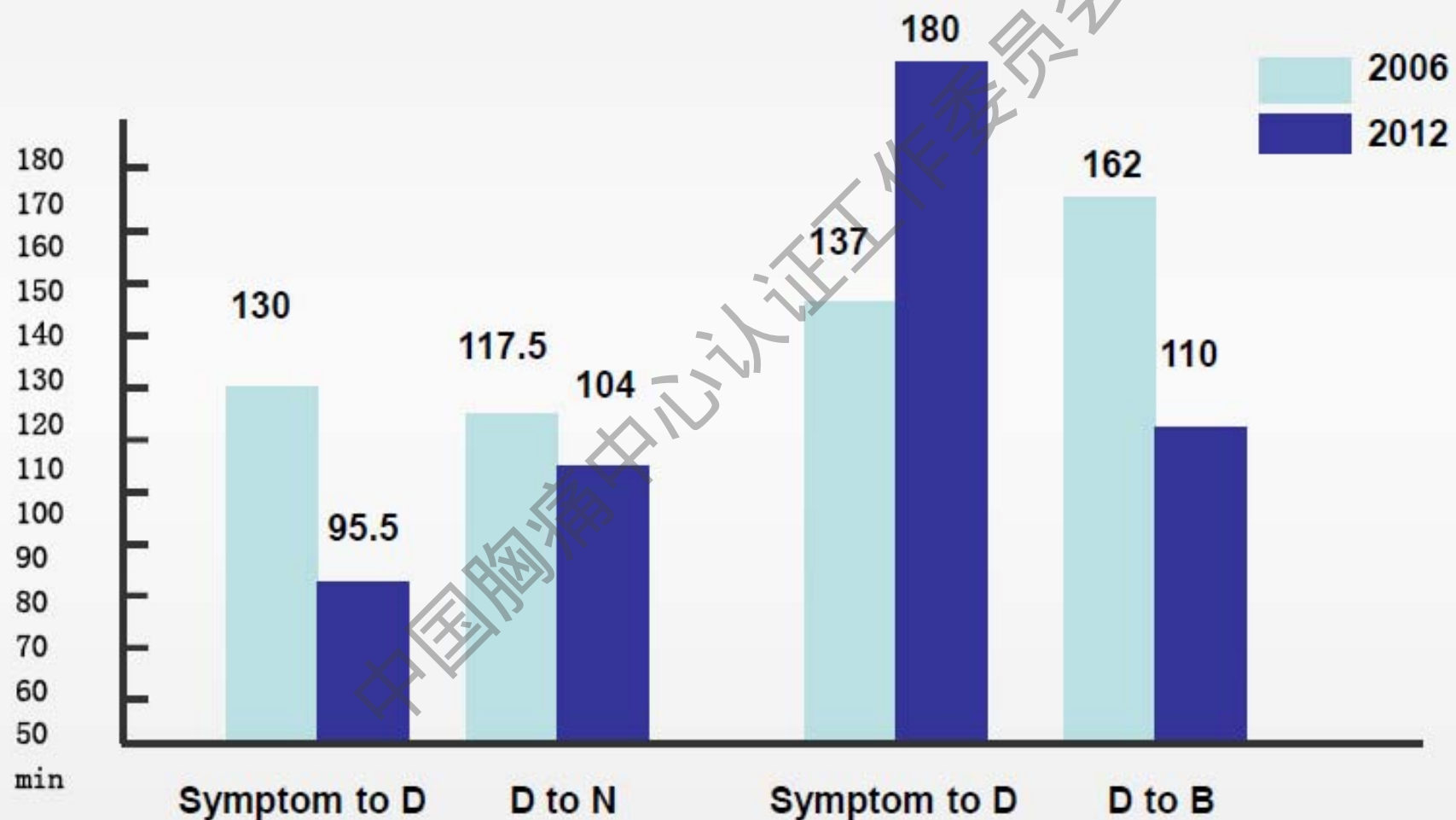
Delay of D to B in PPCI

Preliminary analysis of Beijing ACS Registry 2012



Data not published

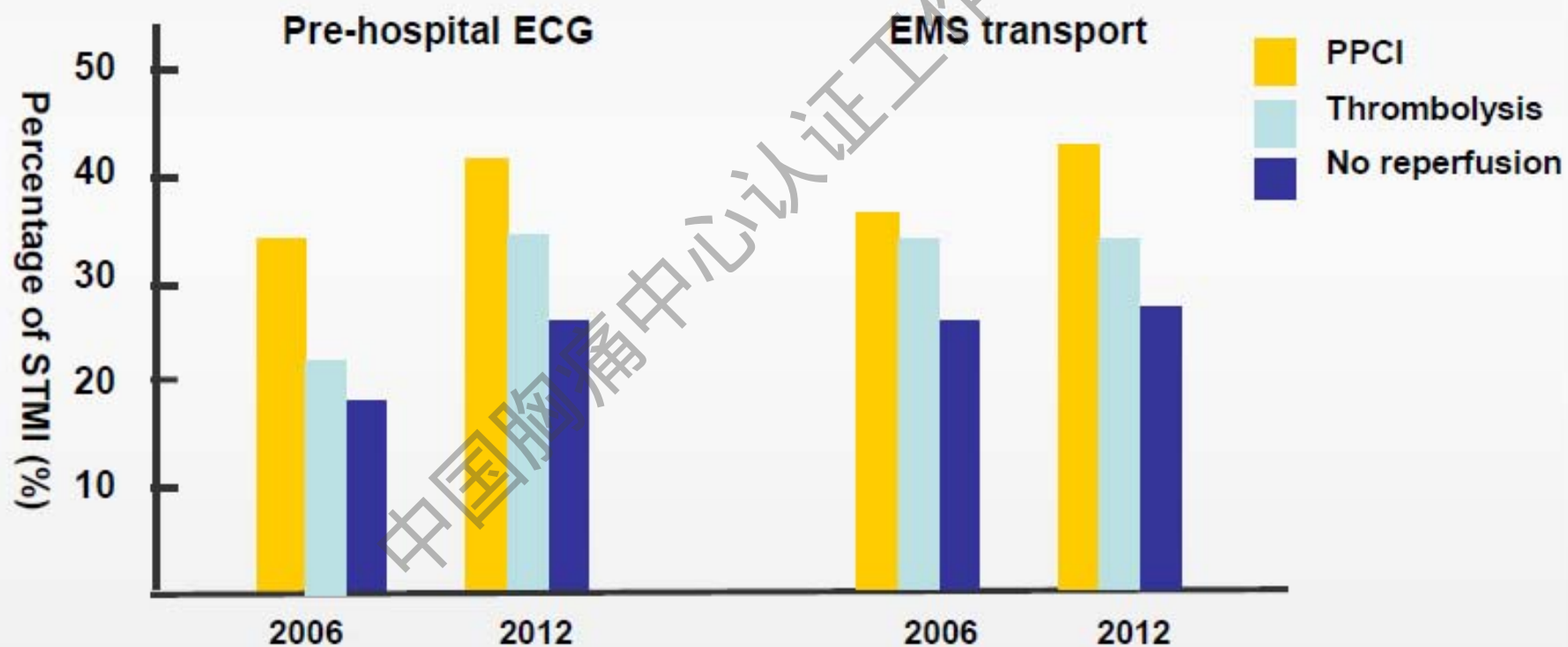
Trends of time delay in PPCI and Thrombolysis



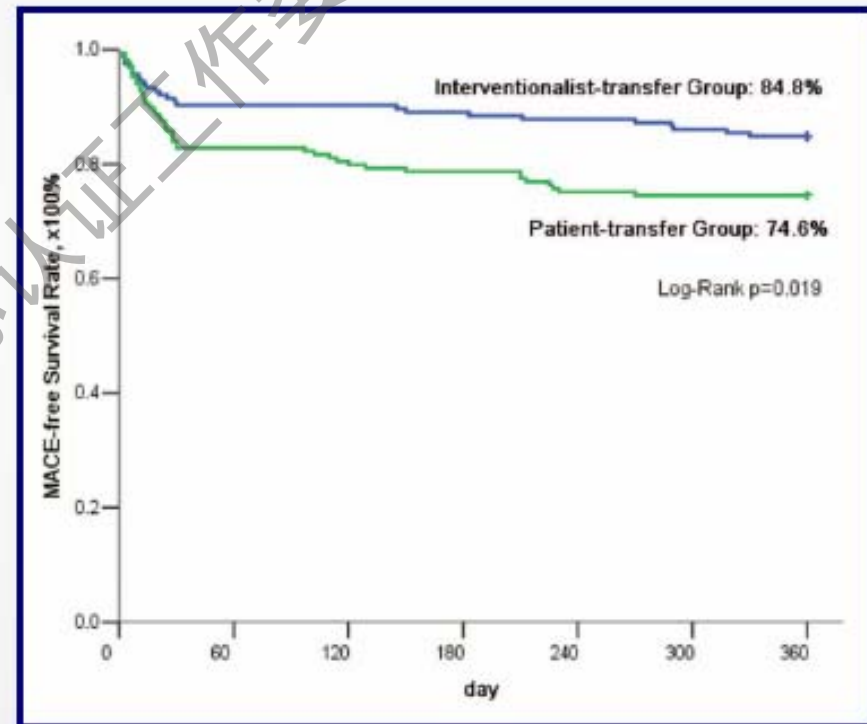
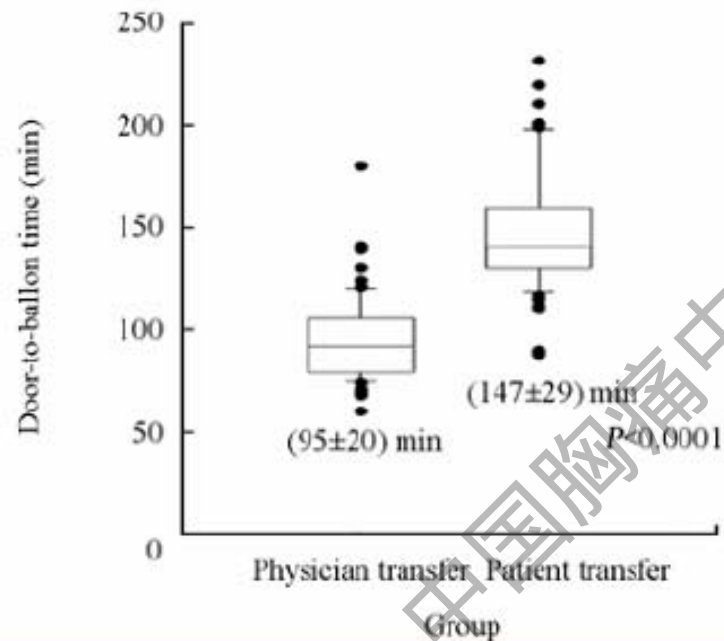
Data not published

The rate of Pre-hospital ECG and EMS transport

Preliminary analysis of Beijing ACS Registry 2012



Transfer for primary percutaneous coronary intervention in STEMI in Single PCI center in Shanghai



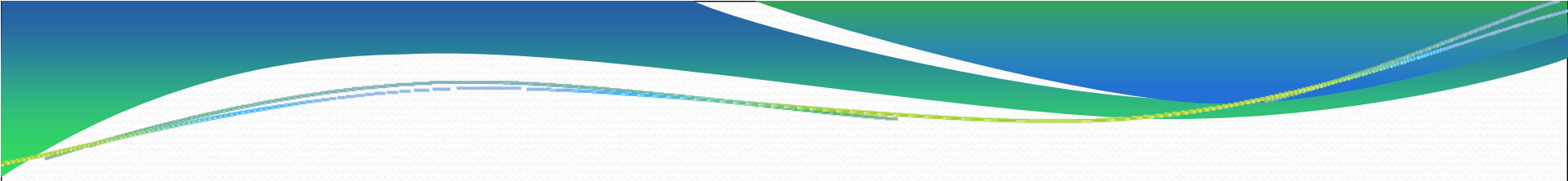
STEMI救治：我们存在的问题

- 症状出现-FMC时间长；
- 缺乏社会/社区救治网络；
- 再灌注治疗比例低下；
- 院前诊断/院前决策少；
- 院内环节问题
 - 进门-ECG
 - ECG-决策
 - 决策-球囊开通/打针时间
- 二级预防

Do whatever it takes to reduce time from symptom onset to ER arrival and time from ER arrival to PCI!



- ↑ Public awareness of MI Sx
- Chest pain centers of excellence with lower DBTs and excellent outcomes
- Regional coordination
- Ambulance ECG telemetry
- Ambulance/ER CCL activation
- ICs sleep in hospital
- Continual QI



Thank you very much for you attention!

中国胸痛中心认证工作委员会