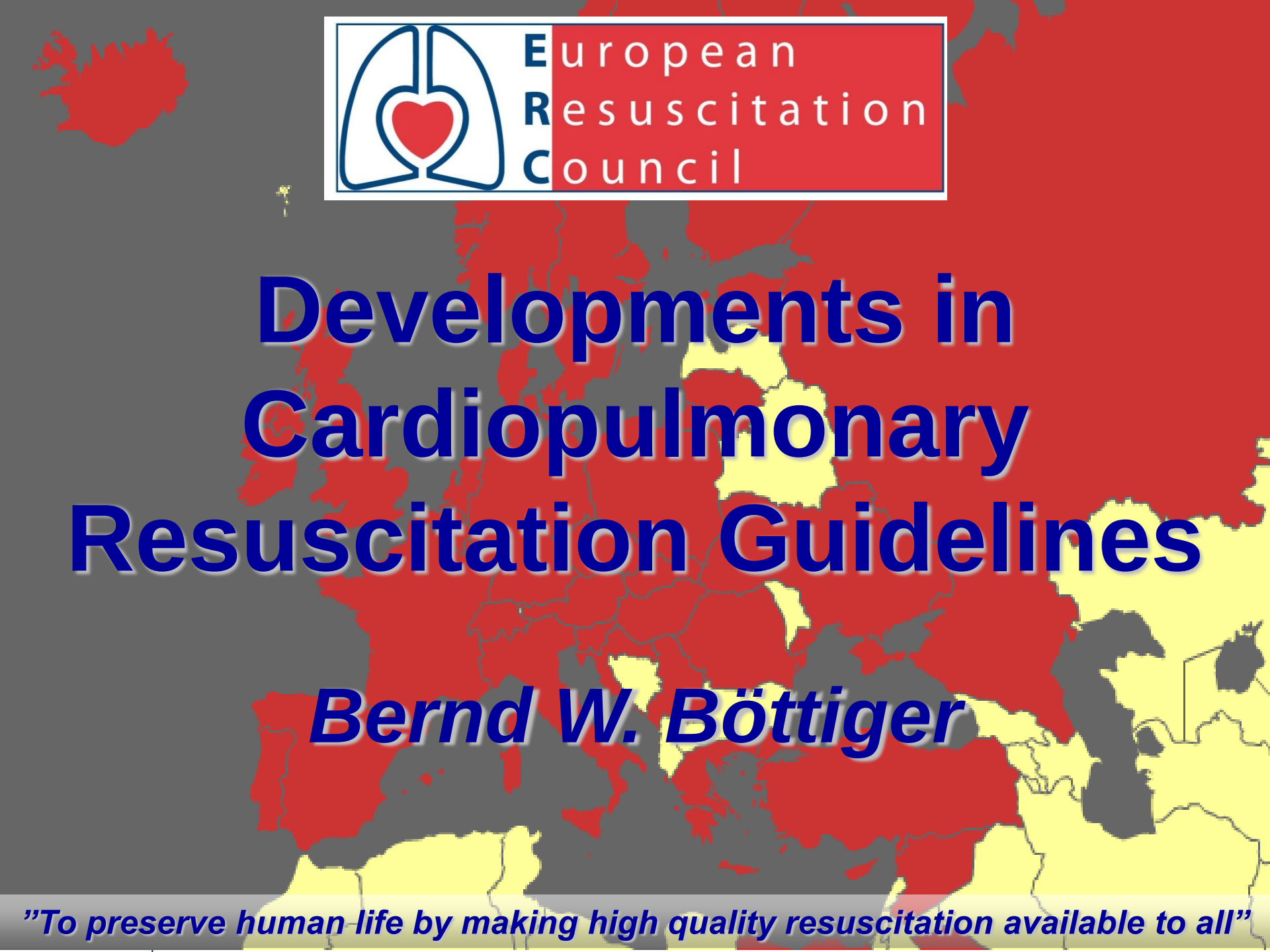
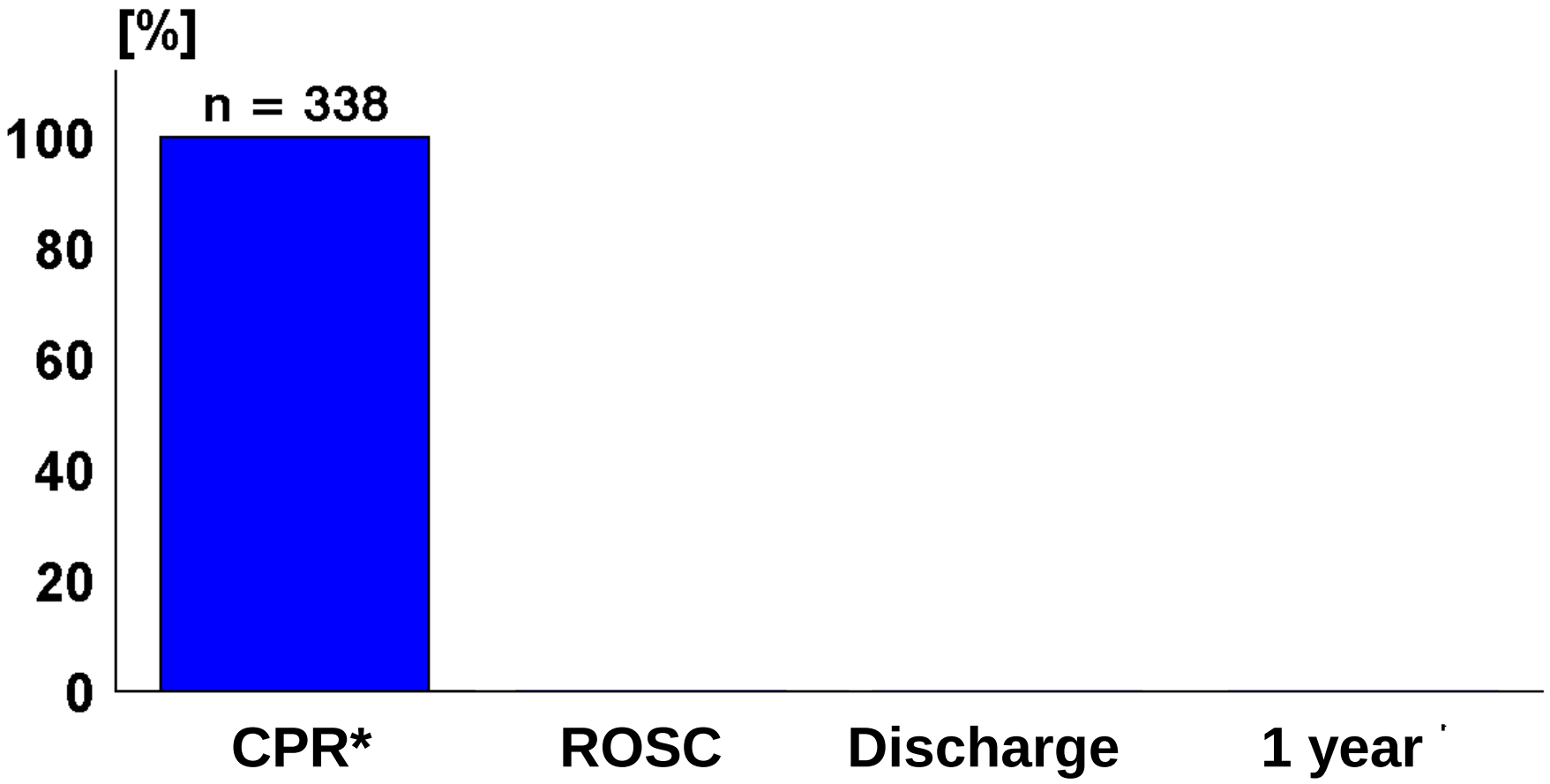


Developments in Cardiopulmonary Resuscitation Guidelines

Bernd W. Böttiger

"To preserve human life by making high quality resuscitation available to all"

Outcome after CPR in Germany



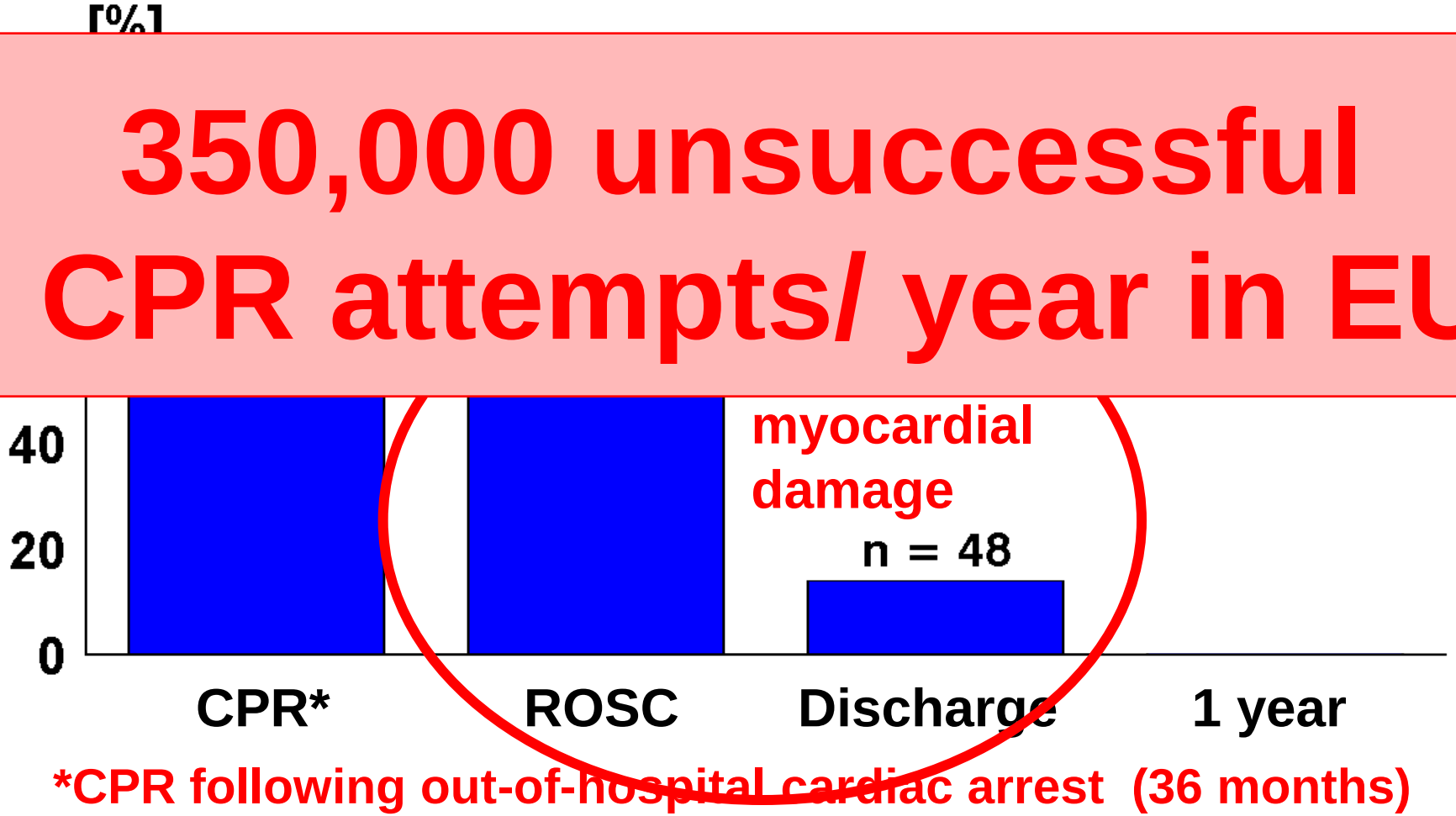
***CPR following out-of-hospital cardiac arrest (36 months)**

Böttiger BW et al., Heart 82:674-9, 1999

What is the hospital discharge rate following cardiac arrest of cardiac aethiology in Germany?

- 15 - 25 %
- 10 - 15 %
- 5 - 10 %

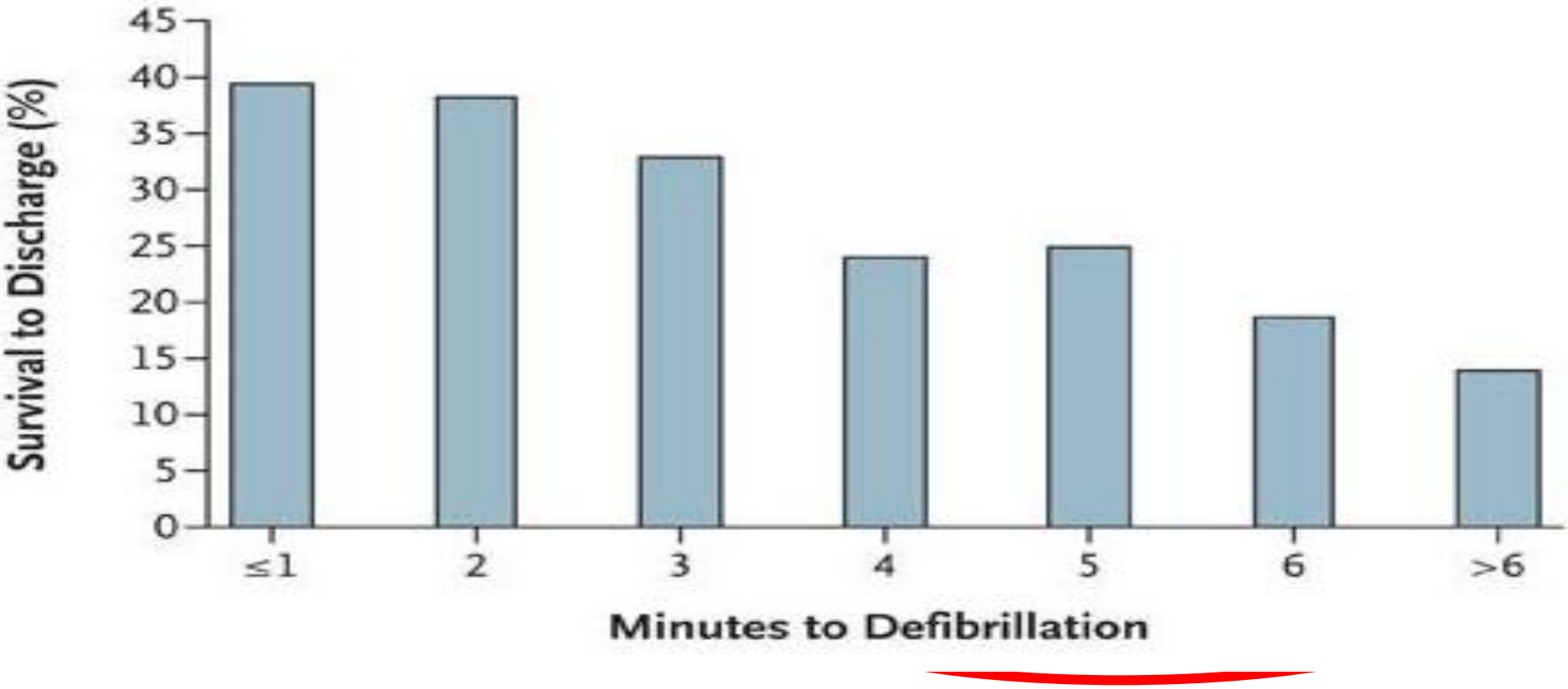
Outcome after CPR in Germany



350,000 unsuccessful CPR attempts/ year in EU

Böttiger BW et al., Heart 82:674-9, 1999

In-hospital CPR
Prospective US-study



Peberdy, Resuscitation 2003; Nadkarni, JAMA 2006

Table 2. Number of Research Projects Funded by the National Heart, Lung, and Blood Institute From 1985 to 2009[25]

Terms Searched	Funded Studies, n	Deaths per Year, n	Funded Studies per 10 000 Deaths per Year, n
Myocardial infarction	6886	157 000	439
Stroke	4403	150 000	294
Heart failure	9919	284 000	349

Ornato J et al. Circulation 2010

Table 2. Number of Research Projects Funded by the National Heart, Lung, and Blood Institute From 1985 to 2009[25]

SCIENCE + RESEARCH in cardiac arrest and CPR must be developed …

Heart arrest and resuscitation	257	310 000	8

Ornato J et al. Circulation 2010

JAMA®
The Journal of the American Medical Association

CLOSED - CHEST CARDIAC MASSAGE

cardiac arrest. Using their newly discovered technique of closed chest compression, they successfully resuscitated 14 of the 20 patients. The authors write in their article: "Anyone, anywhere, can now initiate cardiac resuscitative procedures. All that is needed is two hands."[1] Two months later at the annual meeting of the Maryland Medical Society, Kouwenhoven and Jude demonstrated the technique of chest compression and Peter Safar, MD, shared his data supporting the benefit of mouth-to-mouth ventilation. The 2 techniques were combined at that meeting, and modern CPR was born.

W. er

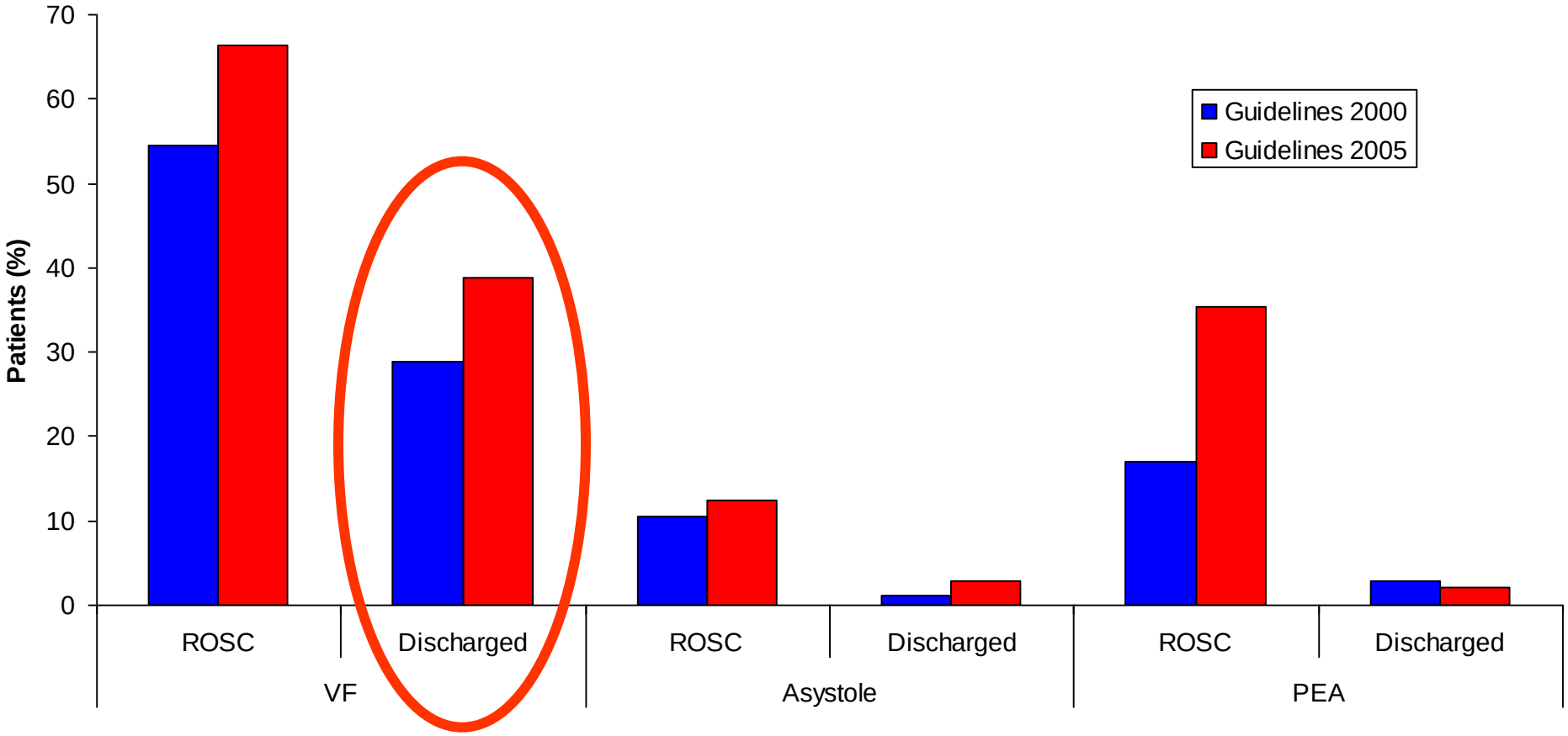
ERC 2005: „*Main Issue: Compressions*“

… to give ALL is the intervention that helps.

*** Quality makes the difference**

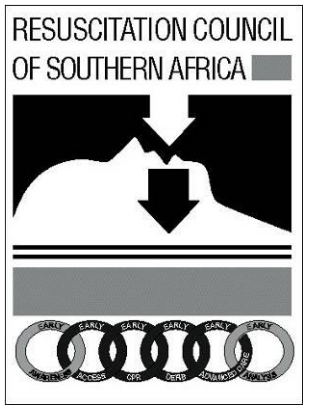
ERC, Resuscitation 67 Suppl 1:S1-S189, 2005
ILCOR, Resuscitation 67:181-341, 2005
www.erc.edu

Guidelines 2000 vs. Guidelines 2005

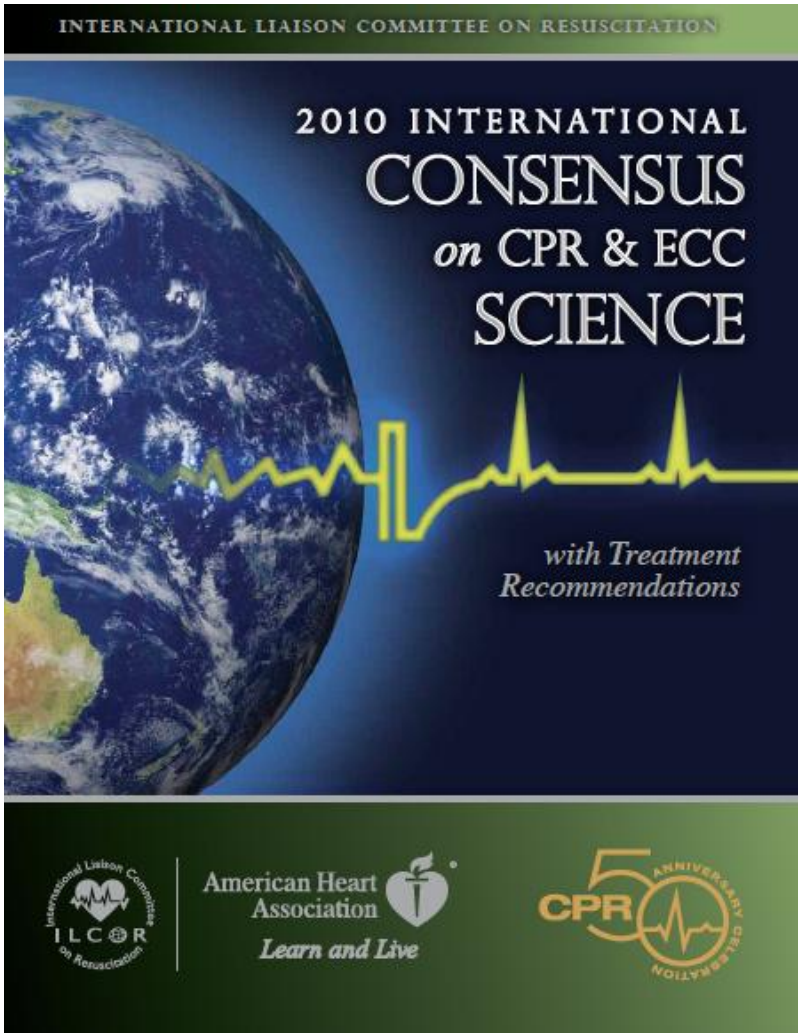


Steinmetz et al., Acta Anaesthesiol Scand 2008

Australian Resuscitation Council



www.lilcor.org



2010 - The Process:

International Consensus on Science & Treatment Recommendations *(4 years)*

277 questions / Worksheets

313 delegates / 30 countries

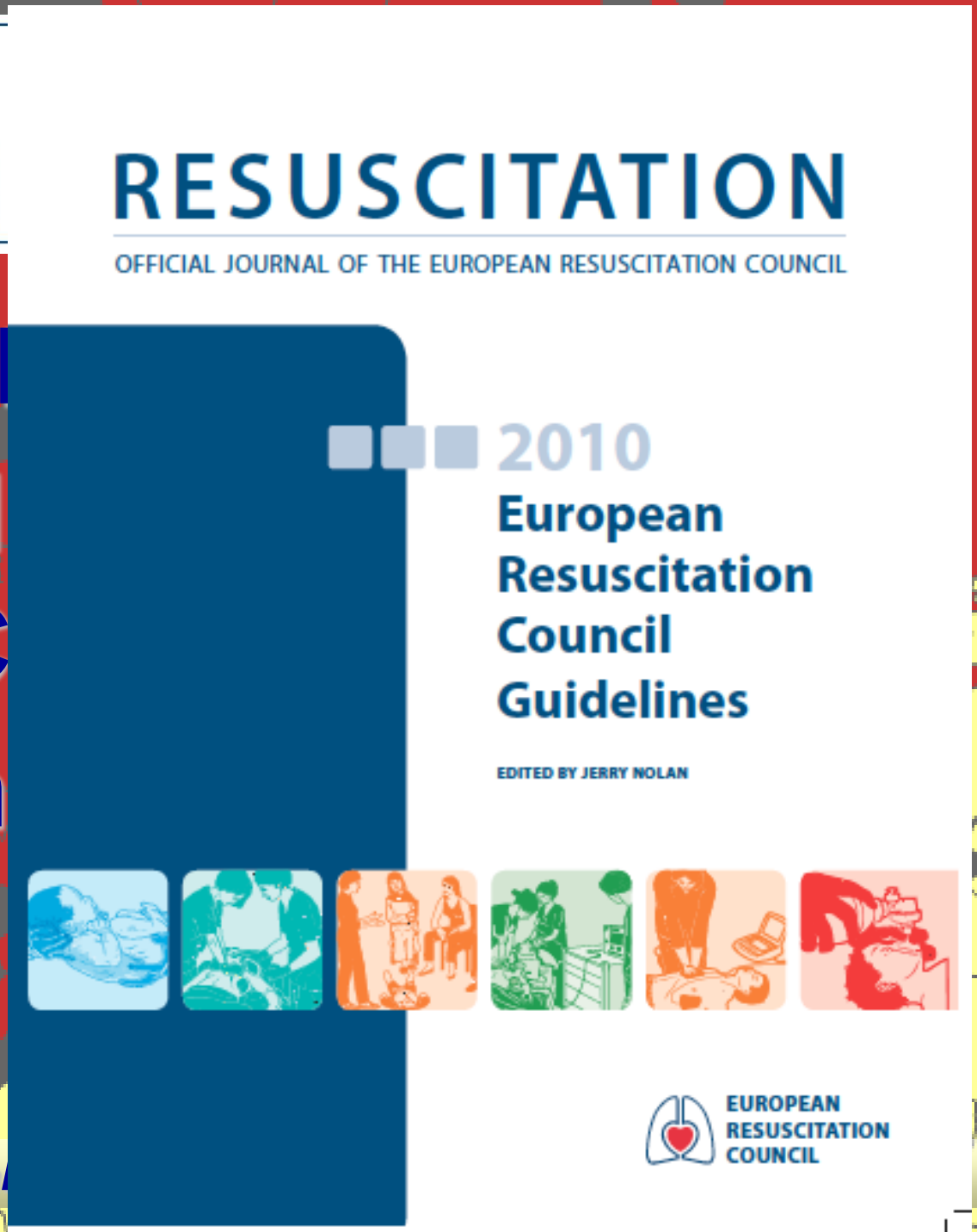
1. **ILCOR Consensus**
2. **ERC Guidelines 2010**

18. October 2010

www.lilcor.org
www.erc.edu

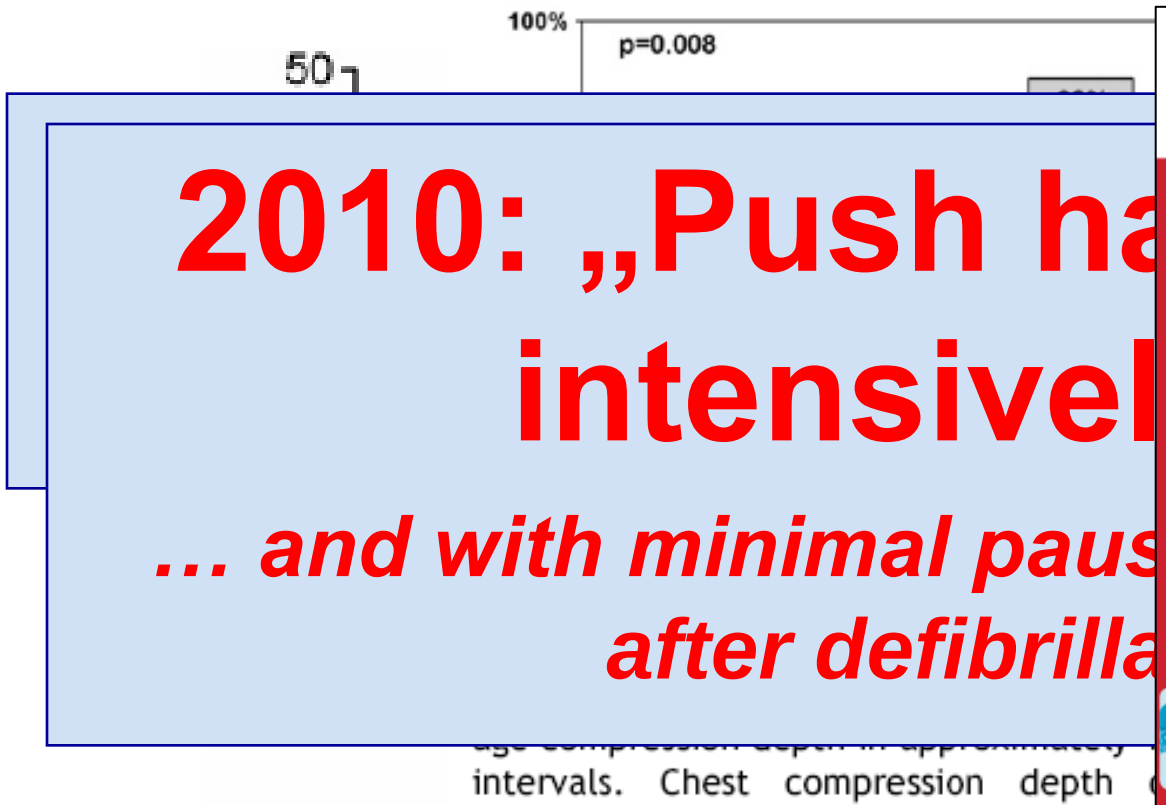
The
National
C
in

”To preserve human life by ma



Key Studies for 2010

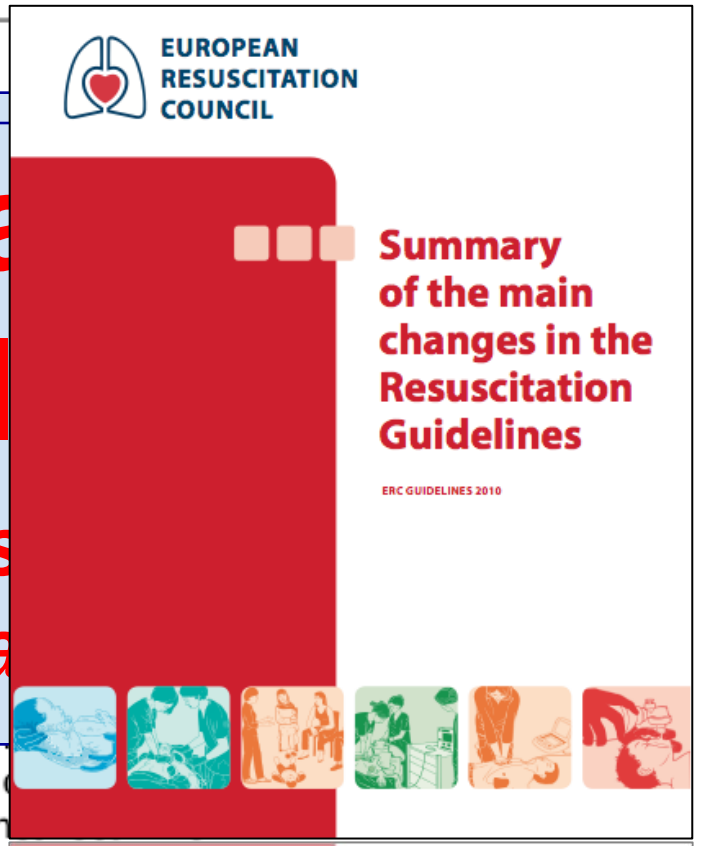
Compression Depth and Primary Outcome



2010: „Push ha
intensivel

… and with minimal paus
after defibrilla

intervals. Chest compression depth
(1.5–2 in.) represents current CPR guidelin
dations. Deeper chest compressions are significantly asso-
ciated with increased probability of shock success.



Resuscitation 71:283-92, 2006

Key Studies for 2010

Relationship of Compressions and Ventilation ?

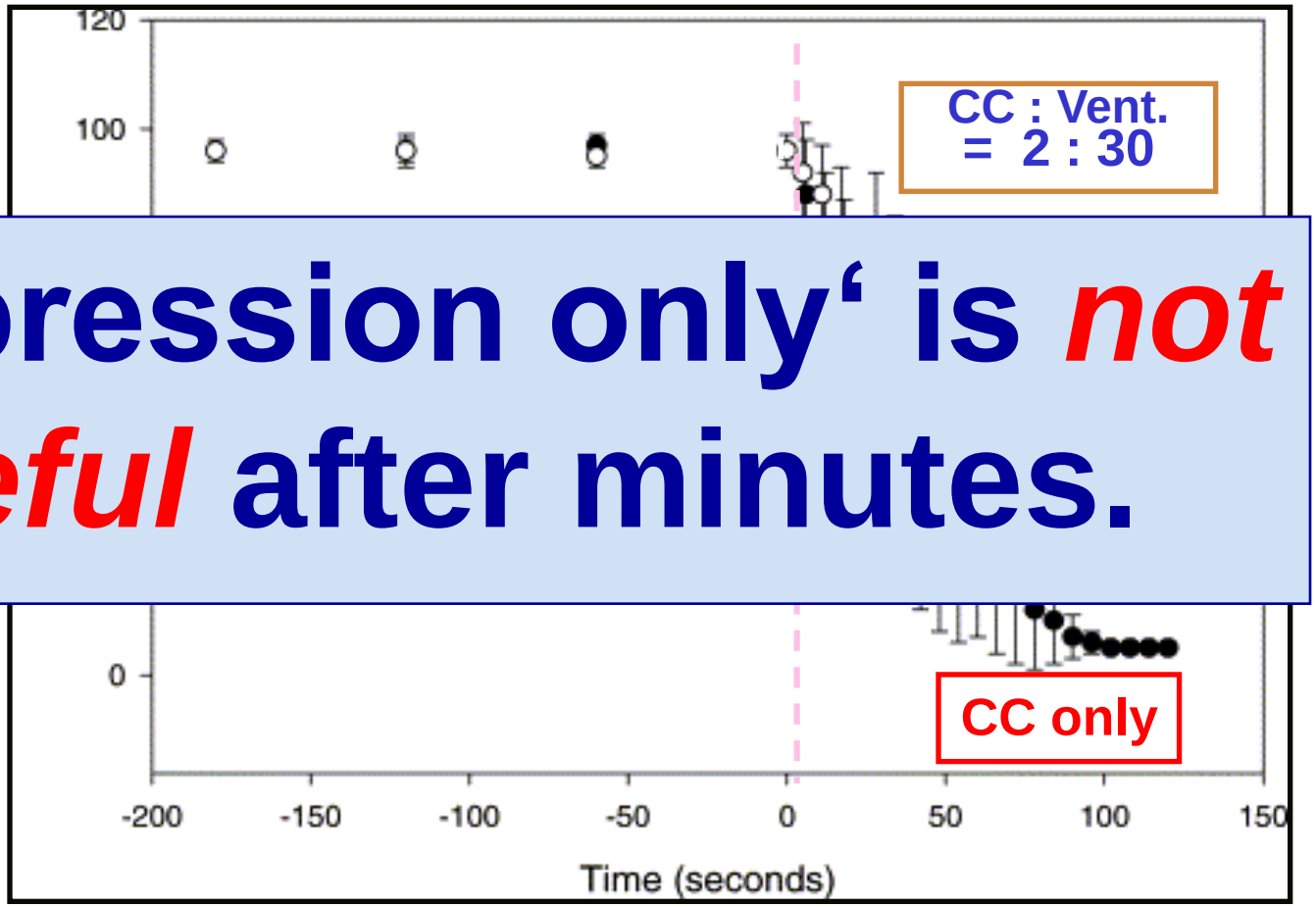
Is effective CPR possible without ventilation?

Is ventilation interferring with cardiac output during CPR?

Key Studies for 2010

Compression (CC) + Ventilation vs. 'Compression Only'

3 min untreated VF + 10 min

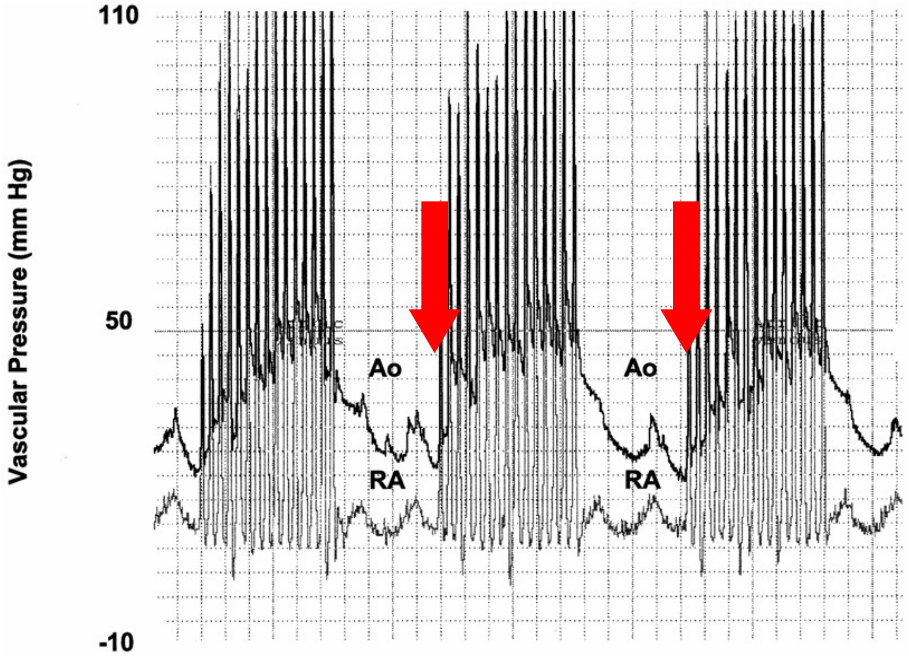


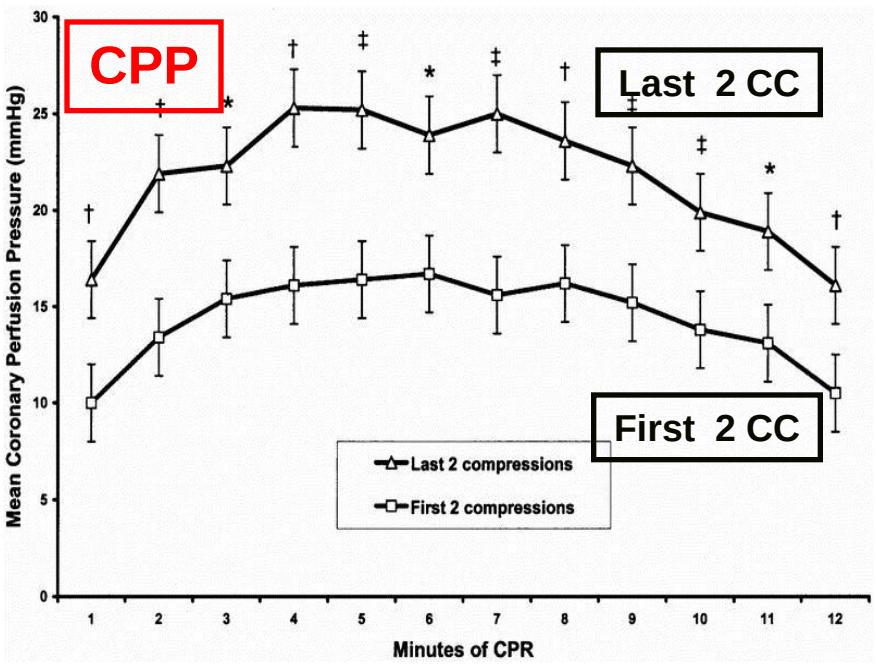
‚Compression only' is *not useful* after minutes.

Dorph E, Wik L et al., Resuscitation 60:309, 2004

Key Studies for 2010

Interruption of CPR for Ventilation:
Negative Haemodynamic Effects of Pauses on CPP
…





Berg R, Sanders A, et al. Circulation 104:2465, 2001

BLS in Adults (ERC 2010)

‚Compression only' fatal in case of: longer CPR, asphyxia, children …

Compressions : ventilation = 30 : 2 + AED

→ "Main Issue: Hard Compressions"

European Resuscitation Council

www.erc.edu

ALS in Adults (ERC 2010)

Start with 30 compressions

Compression : ventilation = 30 : 2

Compression depth 5 - 6 cm / 100 (- 120) / min

CPR until defibrillator is in place + charged

Avoid any interruptions + change every 2 min

→ "Main Issue: Hard Compressions"

European Resuscitation Council

www.erc.edu

ALS in Adults (ERC 2010)

Intubation of the trachea, if trained + alternatives

CapnoGRAPHY

Ventricular fibrillation (VF): 1x defibrillation

- Series of 3 defibrillations only if
  - during
  - during / after cardiac surgery
  - witnessed and defibrillator immediately available

→ **"Main Issue: Hard Compressions"**

European Resuscitation Council

www.erc.edu

ALS in Adults – D

i.v. line, alternatively

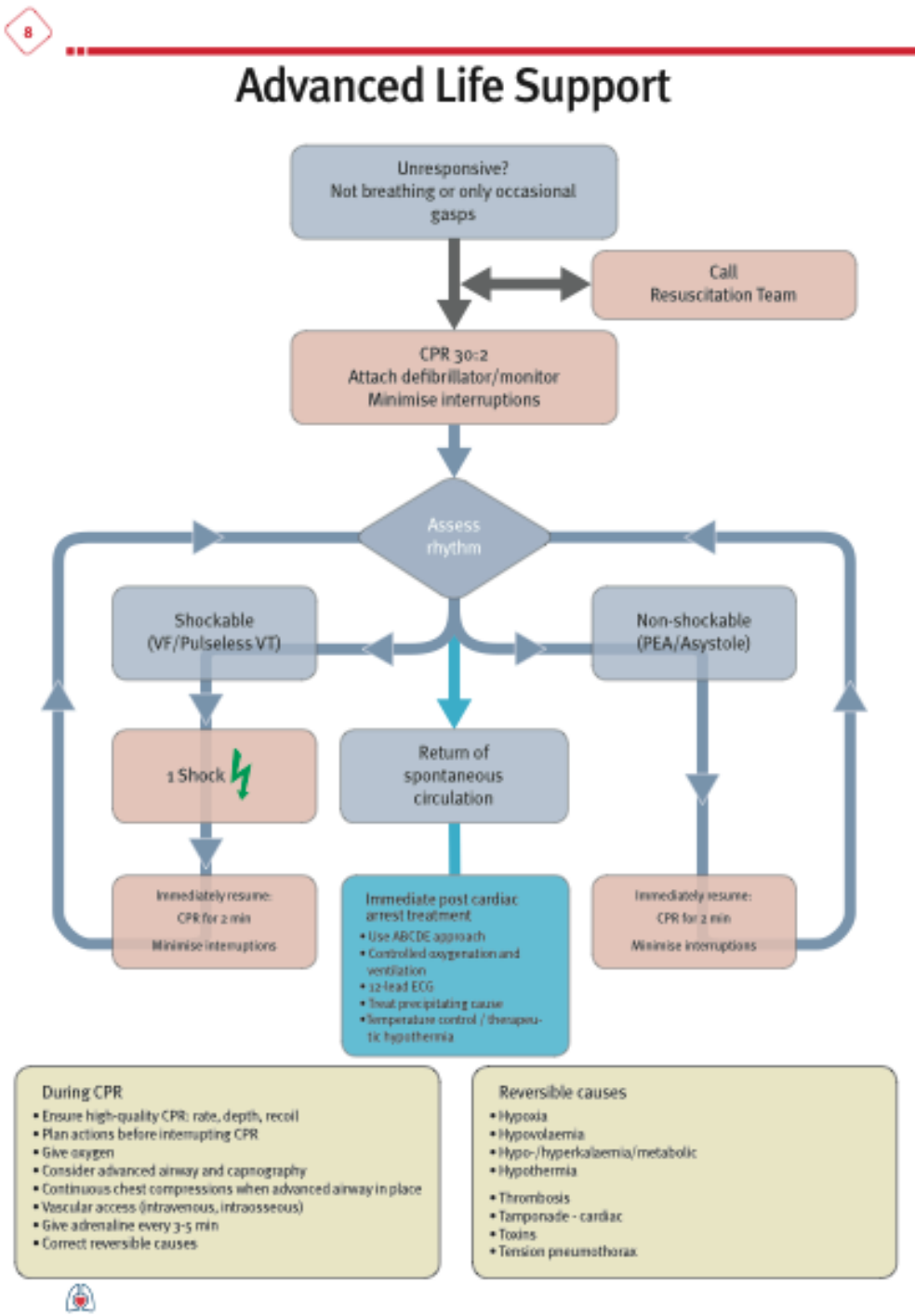
Adrenaline 1 mg / 3

Amiodarone 300 mg

Thrombolysis in sus

„Lipid Resuscitation

→ "Main Issu




NNT = 6

ILCOR Advisory Statement

Therapeutic Hypothermia After Cardiac Arrest

ERC 2010: „… many of the accepted predictors of poor outcome … *are unreliable* … if the patient has been treated with hypothermia.“

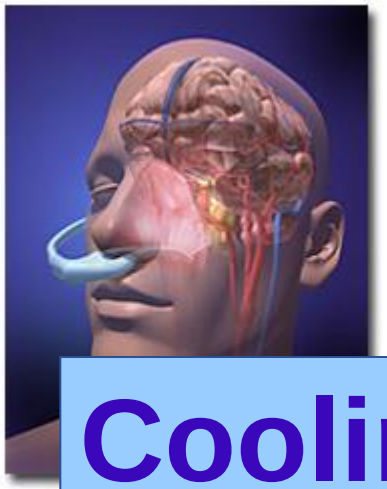
ERC 2005: „… and children …“

ERC 2010: „… and newborns …“

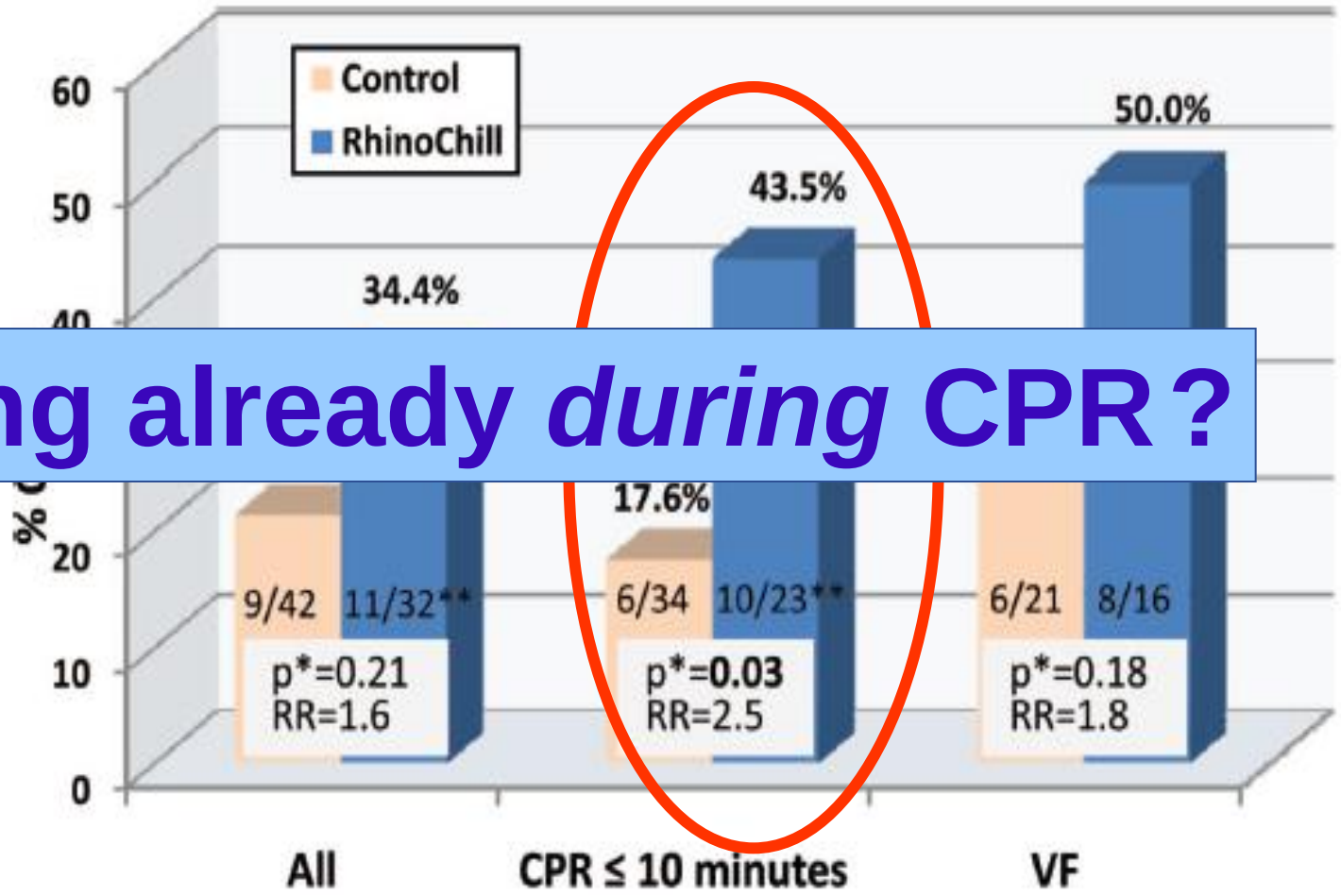
www.erc.edu

Circulation 108:118-21, 2003

The post-arrest treatment
should start a.s.a.p.



Cooling already *during* CPR?



Survival rat
Good neurc

Target temperatur with RhinoChill 207 min earlier …

Castren M et al. Circulation 122:729-736, 2010

Prognostic Factor PCI

Table 5
Multivariate logistic regression analysis of prognostic factors for survival.

Prognostic factors	Adjusted odds ratio	95% CI	*p*-Value
Age (per additional year)	0.96	0.94, 0.98	0.000
Response time (per additional min)	0.90	0.82, 0.99	0.027
Angiography/PCI	10.07	5.17, 19.61	0.000
Ambulance witnessed	5.06	1.21, 21.13	0.026
Initial VF	4.25	2.01, 8.98	0.000
Therapeutic hypothermia	4.11	2.14, 7.88	0.000
Cardiac aetiology	2.24	0.92, 5.44	0.074
Bystander witnessed	2.05	0.71, 5.90	0.182
Implementation of 2005 Guidelines	1.42	0.79, 2.57	0.244
Public location	1.11	0.59, 2.07	0.751

Prognostic factors that were found to be significant in preliminary univariate and bivariate analyses were included in this multivariate logistic regression analysis to detect independent factors potentially affecting survival in the shockable vs. non-shockable group. 95% CI: confidence interval. PEA: pulseless electrical activity. PCI: percutaneous coronary intervention.

Olasveengen et al. Resuscitation 2009

Hypo-therma & PCI

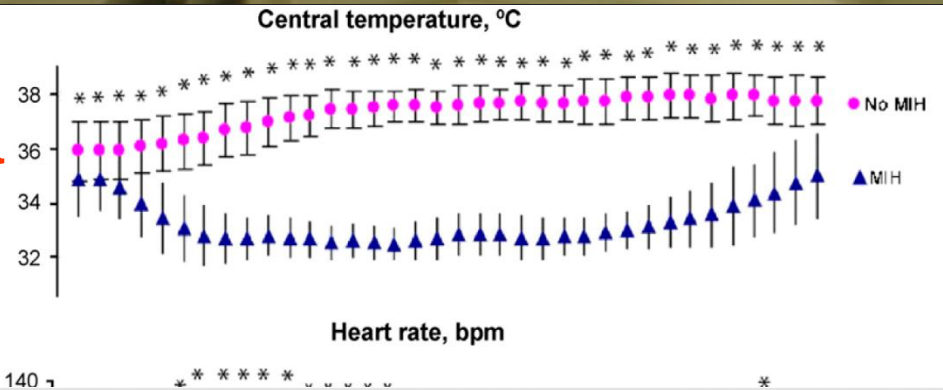
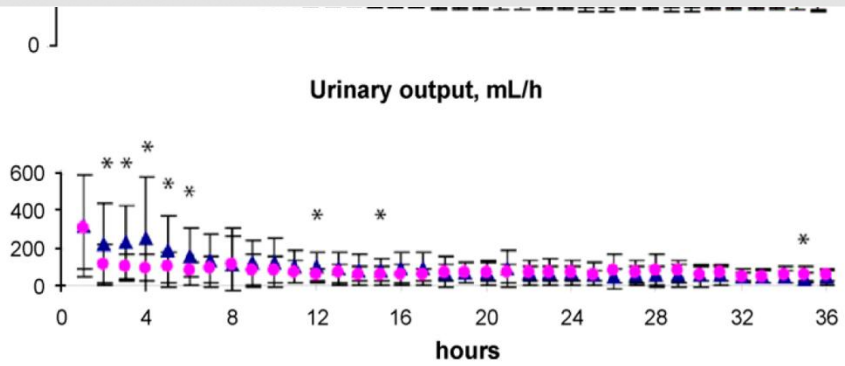


Table 4 Outcome and adverse events in hypothermia and no hypothermia groups of patients

	Hypothermia ($n = 40$)	No hypothermia ($n = 32$)	p
In-hospital			
Reinfarction	1	0	1.00
Survival with CPC 1 or 2 (%)	22 (55)	5 (16)	0.001
At 6 months			
Survival (%)	27 (68)	12 (38)	0.021
Survival with CPC 1 or 2 (%)	21 (53)	6 (19)	0.007

TVR = target vessel revascularisation; CPC = cerebral performance category.

The Combination is the Success



72 Patienten

Knafelj et al. Resus. 2007

ALS in Adults –

Compressions : ve

Comp ssion dept

Capn raphi /

KARDIOPULMONA EANIMATIO

Hauptsache nei

Die neuen Leitlinien des European R
tiefe und die Frequenz der Herzmass
ausschließlich intravenös oder intrao

HHH

Genoplivning med tryk uden pust

De nye retningslinjer for livreddende førstehjælp ved bevidstløshed lægger stor vægt på god hjertemassage. Kunstigt åndedræt kan du springe over, hvis du ikke tør eller vil.

Tre faktorer spiller ind for kvaliteten af hjertemassage:

HURTIGT

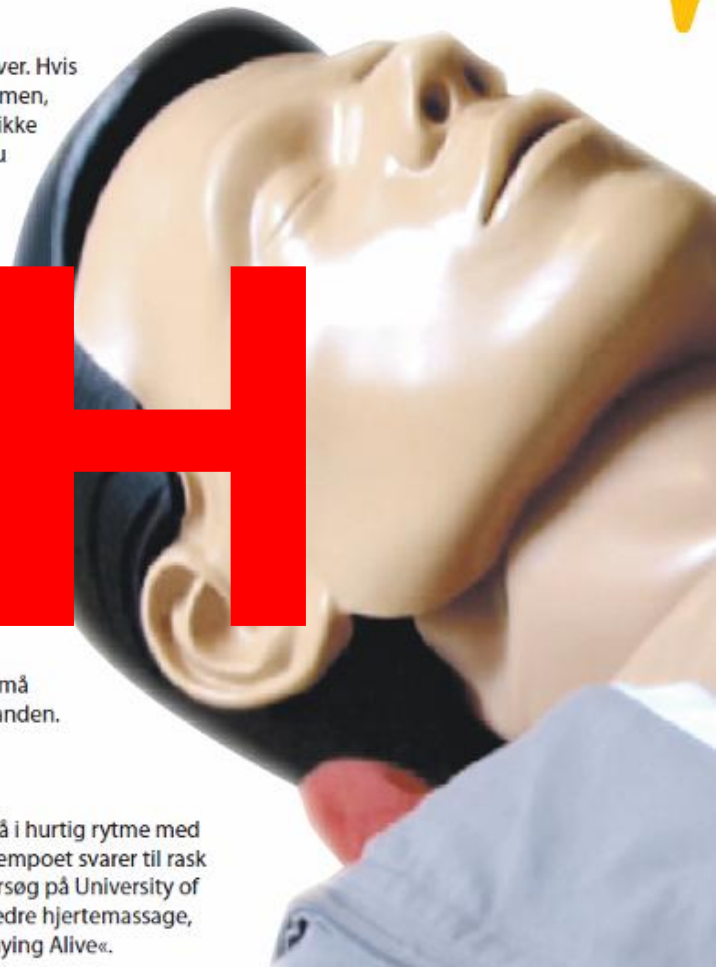
Sekunderne tikker, mens du tøver. Hvis en person pludselig falder sammen, er uden for normal kontakt og ikke trækker vejret normalt, skal du gå i gang med hjertemassage med det samme. Det er ikke nødvendigt at tjekke puls. Hvis du er alene, skal du ringe 1-1-2 først

HÅRD

mindst 5 cm ne vert
tryk og hæve si
nden næste try midt
på brystet, tag d så
høje med placer
God hjertemassage er hårdt arbejde. Efter to minutter bør man være så udmattet, at man må holde pause eller afløses af en anden.

HASTIGT

God hjertemassage skal foregå i hurtig rytme med 100 tryk i minuttet eller mere. Tempoet svarer til rask gang - eller til diskomusik. Et forsøg på University of Illinois har vist, at man giver bedre hjertemassage, hvis man lytter til Bee Gees »Staying Alive«.



European Resuscitation Council

www.erc.edu


lorrylorry

We can safe 100,000 lifes per year in Europe