

Prognózovanie po KPR



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Colours of sepsis, Ostrava 2014



EUROPEAN PARLIAMENT

12.3.2012

WRITTEN DECLARATION

pursuant to Rule 123 of the Rules of Procedure
on establishing a European cardiac arrest awareness week

**Antigoni Papadopoulou, João Ferreira, Jim Higgins, Antonia Parvanova, Raül Romeva
i Rueda**

Lapse date: 14.6.2012

0011/2012

Written declaration on establishing a European cardiac arrest awareness week
The European Parliament,

– having regard to Rule 123 of its Rules of Procedure,

A. **whereas in Europe approximately 400 000 people suffer an out-of-hospital sudden cardiac arrest every year, with a survival rate of less than 10%;**

– systematic data collection for feedback and quality management in every programme;



#RESTARTAHEART
YOUR HANDS CAN SAVE LIVES!



EUROPEAN
RESTART A HEART
— DAY —
2.162.792
people learned CPR so far in 2013 and can now save a life!

Ceská resuscitační rada
Czech Resuscitation Council

VAŠE RUCE MOHOU ZACHRÁNIT ŽIVOT!

16. ŘÍJEN

EVROPSKÝ
— DEN —
ZÁCHRANY ŽIVOTA

NAUČME SE POMOCI PŘI SRDEČNÍ ZÁSTAVĚ

WWW.RESTARTAHEART.EU WWW.RESUSCITACE.CZ

16 October 2013 = European restart a heart day

Let's save more than 100,000

The very first 'European Restart a Heart Day'-to teach members of the public how to help restart the heart of someone who has suffered a cardiac arrest-will be held this autumn, organised by the European Resuscitation Council (ERC). The initiative, which takes place on October 16, is aimed particularly at Europe's younger people. aims to improve the very low numbers of people surviving

To put these numbers in context, there are 100 deaths per day every day of 100 survivors each and every day. By comparison, 28,000 people die across Europe each year in road accidents, but despite this the figure invested in road and car safety each year is much higher than that invested in CPR

XX
 ČSARIM 2013
 Brno

Česká resuscitační rada, partner European Resuscitation Council

ve spolupráci s
 Českou společností anesteziologie, resuscitace a intenzivní medicíny,
 Zdravotnickou záchrannou službou Královéhradeckého kraje,
 Zdravotnickou záchrannou službou Jihomoravského kraje
 a Odborem školství, mládeže a tělovýchovy Magistrátu města Brna

pořádají v rámci XX. kongresu ČSARIM
 a celoevropské osvětové kampaně RESTART A HEART DAY

**HROMADNÝ NÁCVIK RESUSCITACE
 PRO ŽÁKY ZÁKLADNÍCH ŠKOL**

DĚTI ZACHRAŇUJÍ ŽIVOTY

VE SPORTOVNÍ HALE VODOVA BRNO
 20. ZÁŘÍ 2013 OD 8:00 DO 12:00

Výuka dětí
 Soutěž
 a pak
 www.crrr.cz



Ciel' KPR

- Obnovenie funkčného stavu ⇒ pred zastavením obehu



Kongres ERC 2012, Viedeň



Admitted to hospital alive

EuReCa 2012

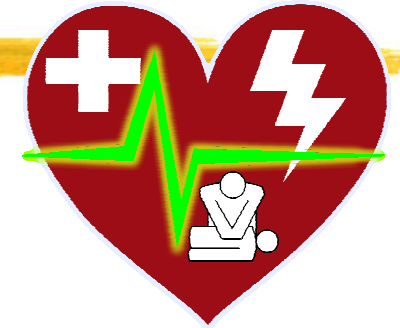


30 day survival

EuReCa 2012



Zastavenie obehu - problém



- Úspešnosť liečby \approx 10 %
- Pacienti v kóme po KPR (ROSC)
- Verejné zdravie – finančné limity ...
- Zát'áž pre rodinu, personál ...
- Dôstojnosť pacienta
- Poresuscitačná liečba = márna liečba – kedy?
- Aká je prognóza pacienta quod vitam?

Prognóza

1. Na mieste

- nezačať/ukončiť KPR
- ROSC

2. Pri prijatí

- potresuscitačná choroba
- použiť náročné metódy?

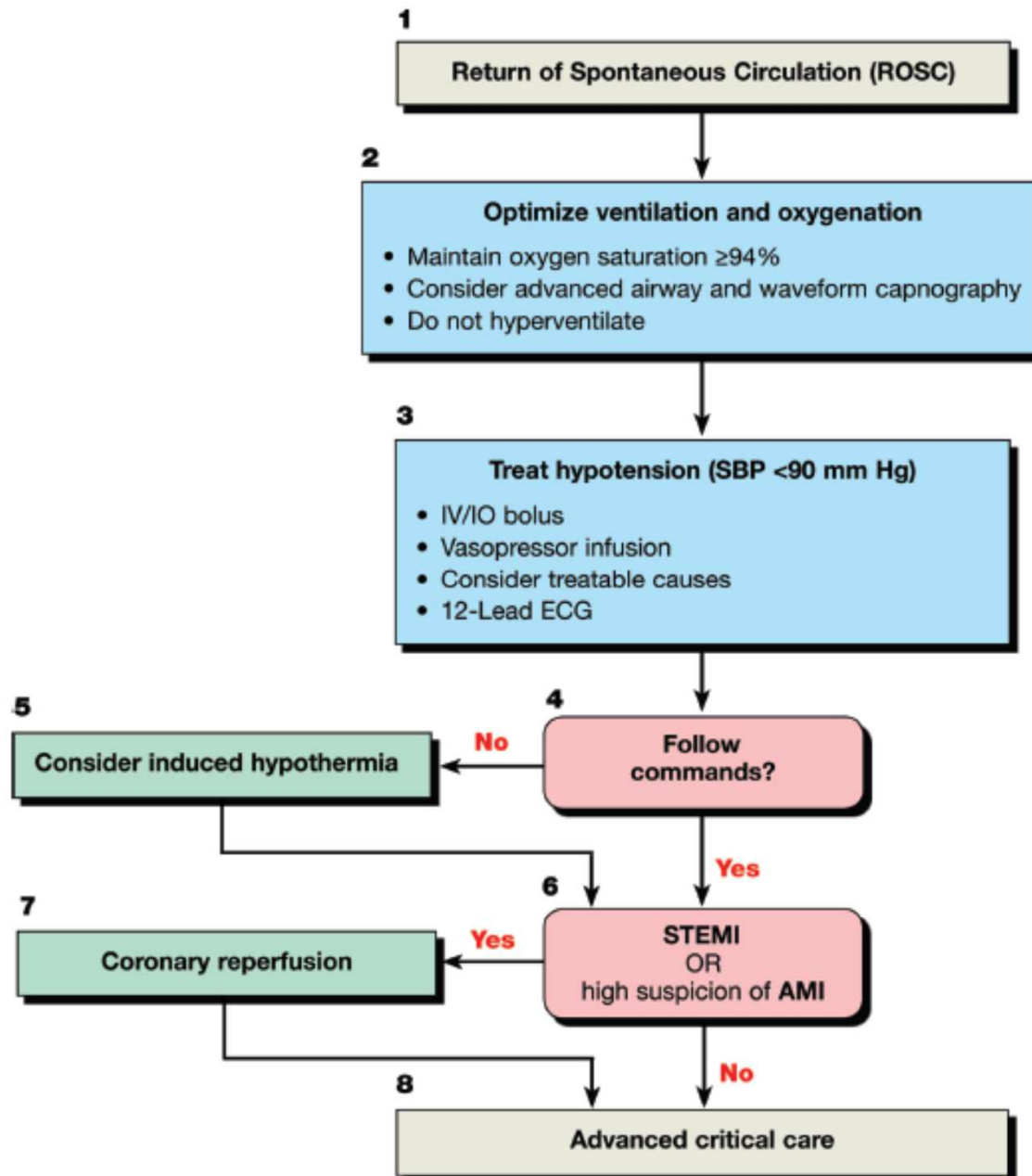
3. Počas hospitalizácie

- klinický výsledok, príbuzní ...

- KPR 2010: „... aby sa znížila neprimeraná záťaž pre pacienta, rodinných príslušníkov a zdravotnícky systém a obmedzilo sa neprimerané použitie zdrojov“.



Adult Immediate Post-Cardiac Arrest Care



Doses/Details

Ventilation/Oxygenation

Avoid excessive ventilation. Start at 10-12 breaths/min and titrate to target PETCO₂ of 35-40 mm Hg. When feasible, titrate FIO₂ to minimum necessary to achieve SpO₂ $\geq 94\%$.

IV Bolus

1-2 L normal saline or lactated Ringer's. If inducing hypothermia, may use 4°C fluid.

Epinephrine IV Infusion:

0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)

Dopamine IV Infusion:

5-10 mcg/kg per minute

Norepinephrine

IV Infusion:

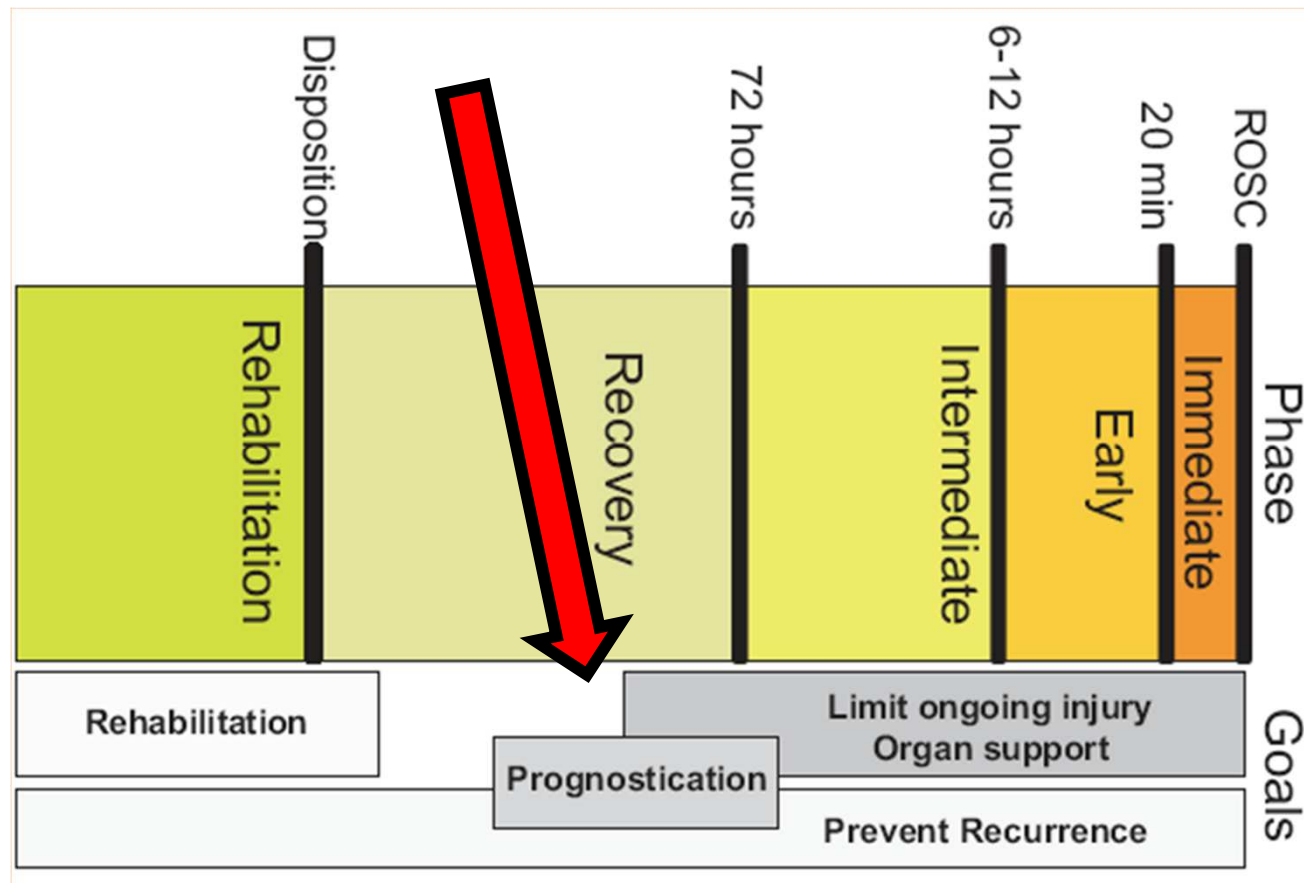
0.1-0.5 mcg/kg per minute (in 70-kg adult: 7-35 mcg per minute)

Reversible Causes

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

Poresuscitačná starostlivosť

Prognózovanie je súčasťou manažmentu



Prognóza – čo máme k dispozícii

- Multiorgánové zlyhanie ⇒ srdce, obličky, pľúca ...
- Aktuálny stav/funkcia mozgu
 - klinické vyšetrenie
 - neurofyziológické vyšetrenie
 - markery (krv, likvor)
 - zobrazovacie metódy
- Aký výsledný klinický ukazovateľ zvolit'?
 - morbidita, mortalita, kvalita života



Cerebral Performance Score (CPC)

1. Návrat do normálneho života
2. Dostatočná funkčnosť na nezávislý život
3. Závažná invalidizácia, odkázanosť
4. Kóma, vegetatívny stav
5. Úmrtie

- Nepriaznivý výsledok: 4-5 vz. 3-5
- Kedy: pri prepustení, po 1, 6, 12 mes.





Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation



Review article

Systematic review of quality of life and other patient-centred outcomes after cardiac arrest survival[☆]

Vanessa J. Elliott^{a,*}, David L. Rodgers^b, Stephen J. Brett^a

^a Centre for Perioperative Medicine and Critical Care Research, Imperial College Healthcare NHS Trust, London, United Kingdom

^b Center for Simulation, Advanced Education and Innovation, The Children's Hospital of Philadelphia, Philadelphia, PA, United States

70 publikácií, kvalita života:

46x dobrá

17x neutrálna

7x nedostatočná



Problémy: metodológia, vylučovanie nízkych CPC, ...

Záver: potrebujeme jednotnú metodiku – kedy, ako, ako dlho

História prognózovania po KPR

The history of neurologic prognostication after CPR.

Year	Authors ^a	Prognostic importance
1965	Hockaday et al. ³	Suppressed to flattened EEG
1974	Willoughby and Leach ⁴	Absent motor response
1974	Bell and Hodgson ⁵	Duration of coma
1977	Snyder et al. ¹⁴	Abnormal brainstem reflexes
1978	Caronna and Finkelstein ²⁵	Duration of coma and abnormal flexor or extensor responses
1978	Jørgensen and Malchow-Møller ²⁶	Pattern of improvement
1985	Levy et al. ¹¹	Combination of 3 waiting days, abnormal motor responses or
1988	Krumholz et al. ²⁷	Status epilepticus and myoclonus status
1997	Fogel et al. ²⁸	Increased serum neuron specific enolase
2000	Madl et al. ²⁹	Absent cortical SSEP
2004	Johkura et al. ³⁰	Forced vertical gaze

EEG = electroencephalogram; SSEP = somatosensory evoked potentials.

^a Observations by neurologists.



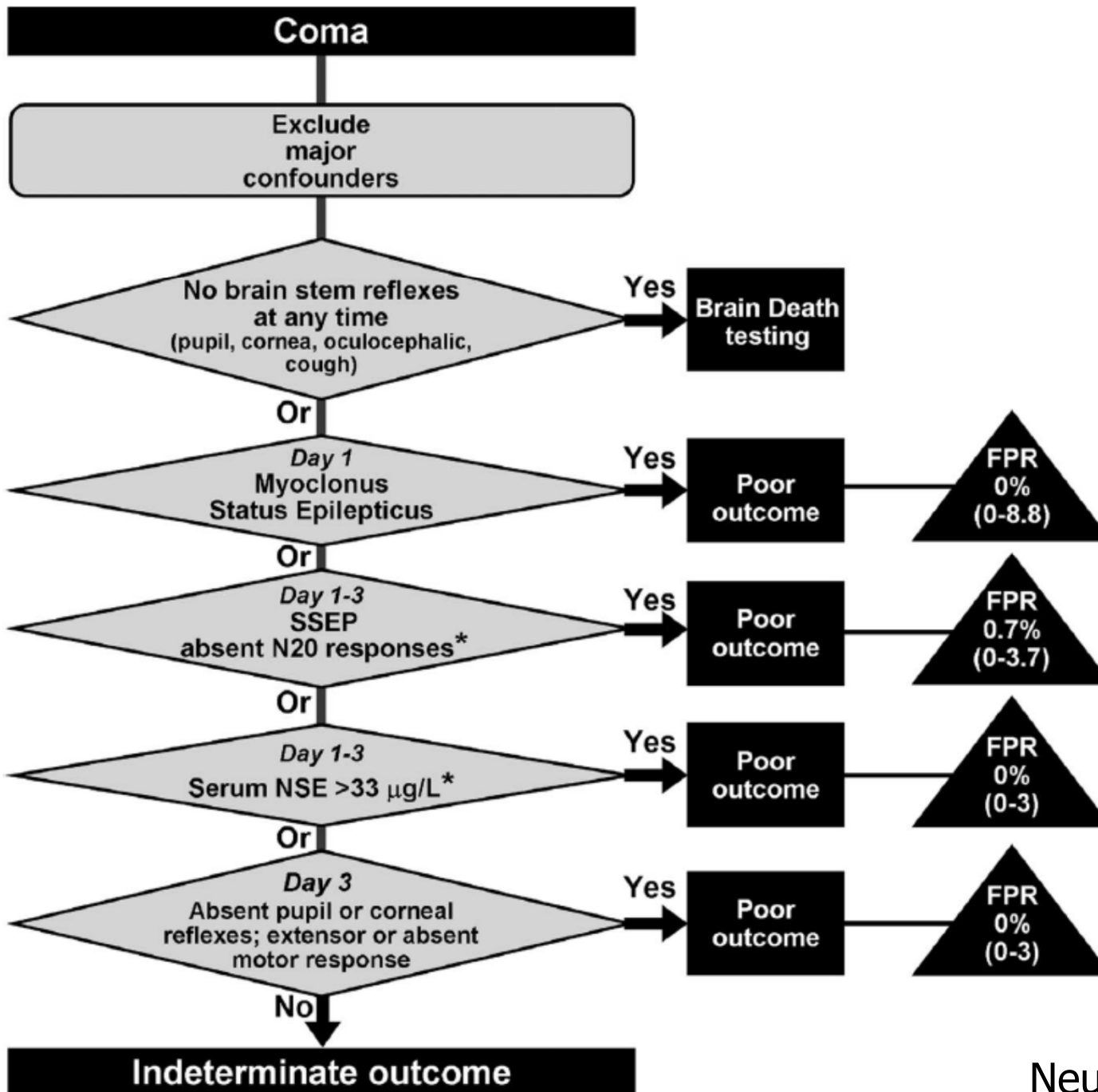
**Practice Parameter: Prediction of
outcome in comatose survivors after
cardiopulmonary resuscitation
(an evidence-based review)**

**Report of the Quality Standards Subcommittee of the
American Academy of Neurology**

E.F.M. Wijdicks, MD; A. Hijdra, MD; G.B. Young, MD; C.L. Bassetti, MD; and S. Wiebe, MD

NEUROLOGY 2006;67:203–210





Randomized controlled trials

The New England Journal of Medicine

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VOLUME 346

FEBRUARY 21, 2002



MILD THERAPEUTIC HYPOTHERMIA TO IMPROVE THE NEUROLOGIC OUTCOME AFTER CARDIAC ARREST

THE HYPOTHERMIA AFTER CARDIAC ARREST STUDY GROUP*

INDUCED HYPOTHERMIA AFTER OUT-OF-HOSPITAL CARDIAC ARREST

TREATMENT OF COMATOSE SURVIVORS OF OUT-OF-HOSPITAL CARDIAC ARREST WITH INDUCED HYPOTHERMIA

STEPHEN A. BERNARD, M.B., B.S., TIMOTHY W. GRAY, M.B., B.S., MICHAEL D. BUIST, M.B., B.S.,
BRUCE M. JONES, M.B., B.S., WILLIAM SILVESTER, M.B., B.S., GEOFF GUTTERIDGE, M.B., B.S., AND KAREN SMITH, B.Sc.

Terapeutická hypotermia

- 12 - 24 hod, 32 - 34 °C
- Použitie opioidov, sedatív a relaxancií
- Spomalený metabolizmus liekov
- Vplyv na neurologické parametre
- klinické, EEG, SSPE, biomarkery
- Nové štúdie?





Prognostic value of current indicators of poor prognosis in prediction of neurologic outcome in comatose survivors after cardiopulmonary resuscitation (an evidence-based review)

Report of the Quality Standards Subcommittee of the American Academy of Neurology

E.F.M. Wijdicks, MD; A. Hijdra, MD; G.B. Young, MD; C.L. Bassetti, MD; and S. Wiebe, MD

NEUROLOGY 2006;67:203–210

„Current indicators of poor prognosis.. are derived from patients *not treated with hypothermia*. If this treatment becomes standard of care, these indicators may need revision“.

ČD máme k dispozícii



1. Okolnosti na mieste zastavenia obehu
2. Klinické vyšetrenie
3. Elektrofyziologicalké štúdie
4. Biomarkery
5. Zobrazovacie metódy

PDjmy



- FPR (false positive rate) ($1 - \text{špecificita}$): aký podiel pacientov bude mať dobrý výsledok napriek prítomnosti nepriaznivého príznaku
Cieľ: 0 %; príznak = 100% nepriaznivý výsledok
- Intervaly spoľahlivosti (CI 95 %): pod 5-10 %
- Problémy štúdií: malý počet pacientov
- Sebanaplňujúce proroctvo

1. OkDInDsti zastavenia Dbehu



- Svedok okoloidúci
- Svedok posádka
- KF/BKT
- Základná neodkladná resuscitácia + AED
- ROSC pred príchodom do nemocnice

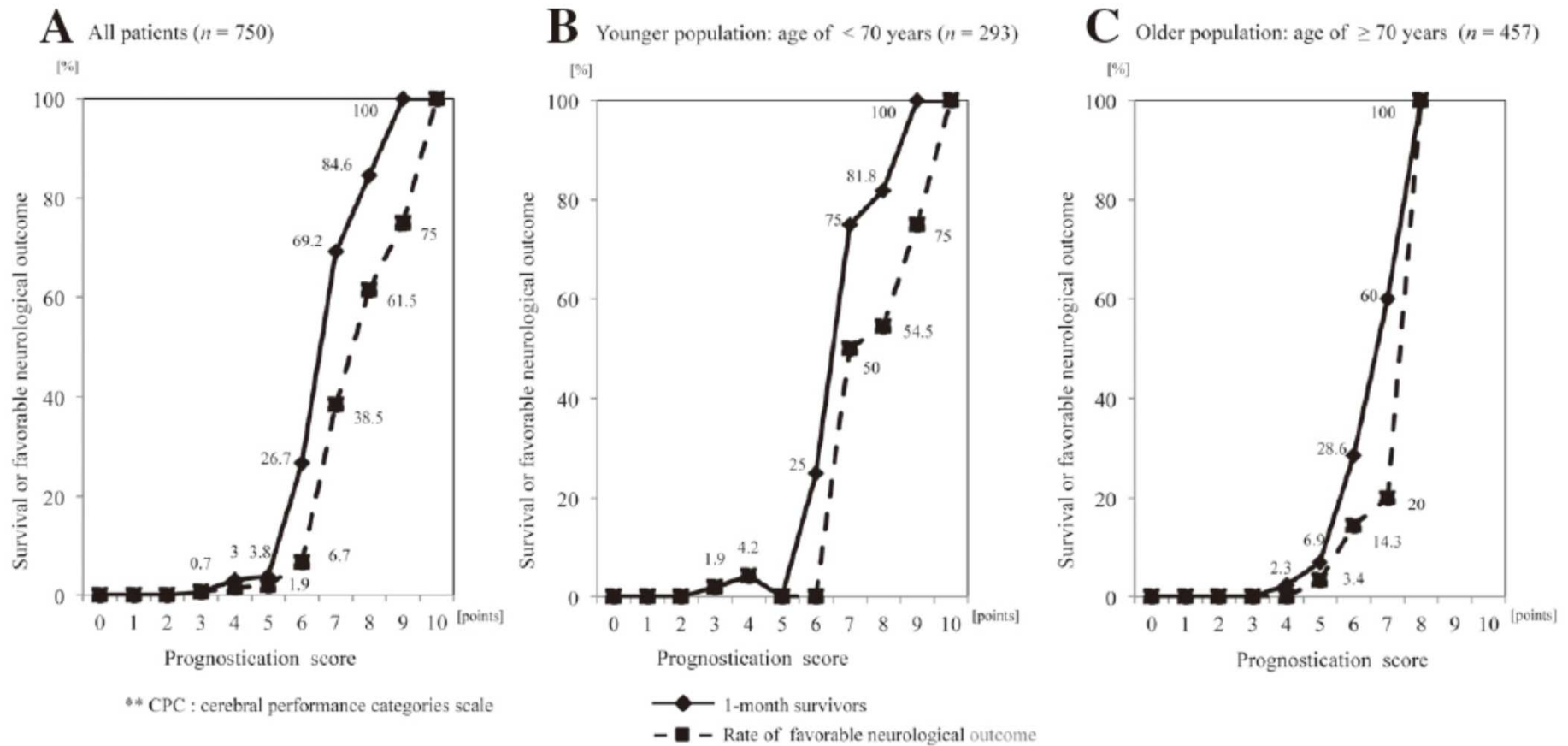
PrDgnóza pri prijatí



- 750 pacientov, OHCA, 1-mes. mortalita
- 10 faktorov prežívania
 - svedok, BLS+AED, KF/BKT, ROSC na mieste, reakcia na svetlo, kard. príčina
 - $GCS \geq 5$, $pH \geq 7$, $K \leq 5$ mmol/l, $CRP \leq 0,3$ mg/dl.
- Hodnota $\geq 6 \approx$ lepšia prognóza
- Závislosť od veku

Skóre prežívania pri prijatí z 10 parametrDv

modifikácia vekom



EuReCa – European Cardiac Arrest Registry

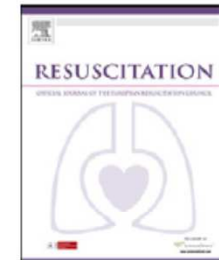
Resuscitation 82 (2011) 989–994



Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation



Clinical paper

Quality management in resuscitation – Towards a European Cardiac Arrest Registry (EuReCa)[☆]

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^a Department of Anesthesiology and Intensive Care Medicine, University Hospital Schleswig-Holstein, Schwannenweg 21, 24105 Kiel, Germany

^b Division of Cardiology, Sahlgrenska University Hospital, SE-413 45 Göteborg, Sweden

^c afd. Cardiologie, Kamer F3-239, Academisch Medisch Centrum, Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands

^d Empresa Pública de Emergencias (Public Utility for Health Emergencies), Sanitarias, Almería, Spain

^e Department of Emergency Medicine CHU Tivoli, ULB, La Louvière, Belgium

^f University of Antwerp, Faculty of Medicine Universitetisplein 1, B2610 Antwerp, Belgium

ROSC after cardiac arrest—the RACA score to predict outcome after out-of-hospital cardiac arrest

Jan-Thorsten Gräsner^{1*†}, Patrick Meybohm^{1†}, Rolf Lefering², Jan Wnent¹, Jan Bahr³, Martin Messelken⁴, Tanja Jantzen⁵, Rüdiger Franz⁶, Jens Scholz¹, Alexander Schleppers⁷, Bernd W. Böttiger⁸, Berthold Bein¹, and Matthias Fischer⁹, the German Resuscitation Registry Study Group

¹Department of Anaesthesiology and Intensive Care Medicine, University Hospital Schleswig-Holstein, Schwannenweg 21, Campus Kiel, 24105 Kiel, Germany; ²Faculty of Health, Institute for Research in Operative Medicine, University Witten/Herdecke, Köln, Germany; ³Department of Anaesthesiology, Emergency and Intensive Care Medicine, University Medical Centre, University of Goettingen, Goettingen, Germany; ⁴Department of Anaesthesiology and Intensive Care, Klinikum am Eichert, Göppingen, Germany; ⁵Interhospital-Transfer-Service Mecklenburg-Vorpommern, German Red Cross, Parchim, Germany; ⁶Department of Anaesthesiology and Intensive Care Medicine, St.-Marien-Hospital, Lünen, Germany; ⁷German Society of Anaesthesiology and Intensive Care Medicine, Nürnberg, Germany; ⁸Department of Anaesthesiology and Postoperative Intensive Care Medicine, University Hospital, Köln, Germany; and ⁹Department of Anaesthesiology and Intensive Care (DGAI), Klinik am Eichert, Göppingen, Germany

Received 21 October 2010; revised 10 March 2011; accepted 20 March 2011

Table 3 Equation of the ROSC after cardiac arrest score

$$\begin{aligned} X = & \\ & 0.3 \text{ (constant)} \\ & + (-0.2 \times \text{male}) \\ & + (-0.2 \times \text{age} \geq 80 \text{ years}) \\ & + (-0.6 \times \text{trauma}) + (0.7 \times \text{hypoxia}) + (0.5 \times \text{intoxication}) \\ & + (0.6 \times \text{witnessed by lay people}) + (0.5 \times \text{witnessed by professionals}) \\ & + (-0.3 \times \text{nursing home}) + (1.2 \times \text{doctor's office}) + (0.3 \times \text{public place}) + (0.5 \times \text{medical institution}) \\ & + (-0.8 \times \text{PEA}) + (-1.1 \times \text{asystole}) \\ & + (0.2 \times \text{bystander CPR}) \\ & + (-0.04 \times \text{minutes until EMS arrival}) \\ \text{Probability of ROSC} = & 1 / (1 + e^{-X}) \end{aligned}$$

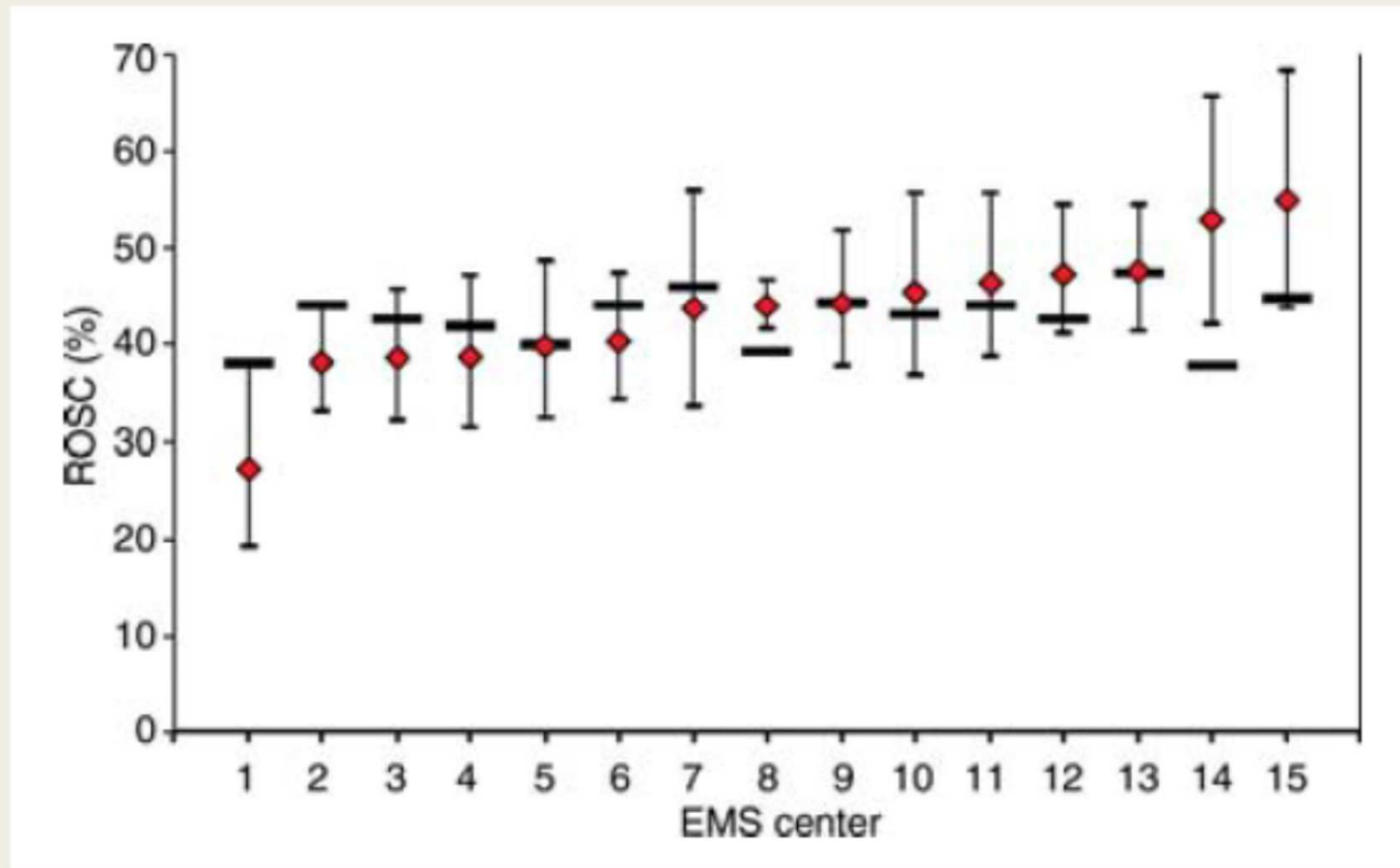


Figure 2 Overview of 15 individual emergency medical services (EMS) centres with more than 100 registered CPR attempts with the observed and predicted return of spontaneous circulation (ROSC) rate, respectively. Mean observed return of spontaneous circulation (95% confidence interval) is compared with predicted return of spontaneous circulation rate (black bar).

KDhD transpDrtDvat' dD nemDcnice



- Zastavenie obehu zo svedkom
- BLS + AED
- Šokovateľný rytmus
- ROSC

Verbeek 2002
Morrison 2007

2. Klinické vyšetrenie

- GCS motorické skóre (<2)
- Kmeňové reflexy (-)
 - Reakcia zreníc na svetlo
 - Okulovestibulárny reflex ...
 - Korneálny reflex
- Myoklonus, status myoklonus (+)



PrDblémy



- Vyžaduje sa svalová reakcia
- výnimka: reakcia na svetlo
- Sedácia/myorelaxancia
- Napriek nepriaznivej prognóze pozitívne

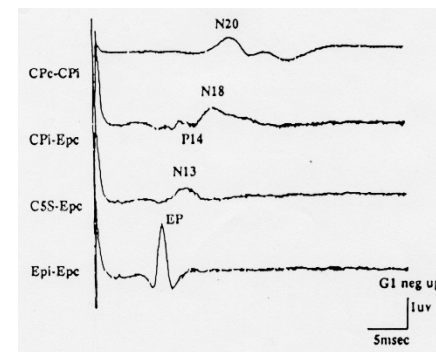
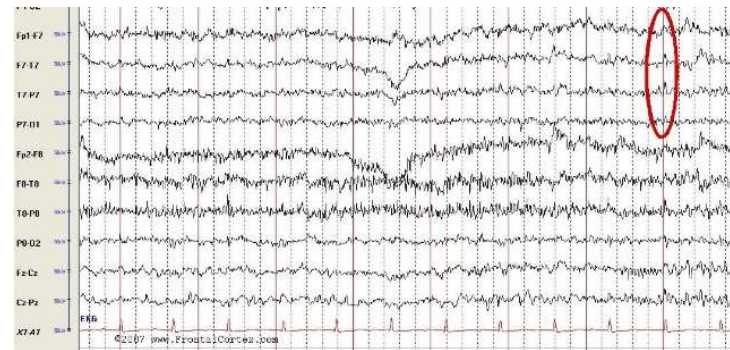
Perinatálny myoklonický syndróm



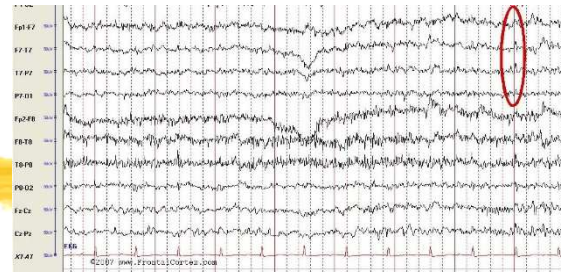
- Kľúčová aktivita prvých 24 hodín; pri TH potlačená
- Kortikálne výboje z odtlmených kortikálnych jadier i z kmeňa
- Multifokálne/generalizované; ustúpia
- Myoklonické pohyby +/- EEG bursts
- EEG: burst suppression, difúzna pomalá aktivita, alfa rytmus, polyspiky (kombinácia – zlá prognóza)
- Rozsiahla strata neurónov – kortex, bazálne gangliá, talamus, mozoček
- Lance-Adams syndróm: po respiračnej asfyxii, „benígny“
- Zlá prognóza, ale nie 100%

3. ElektrDfyziDlógia

- EEG
 - klasické
 - pokračujúce
 - BIS ...
- SSEP
 - N20
 - N35, N70



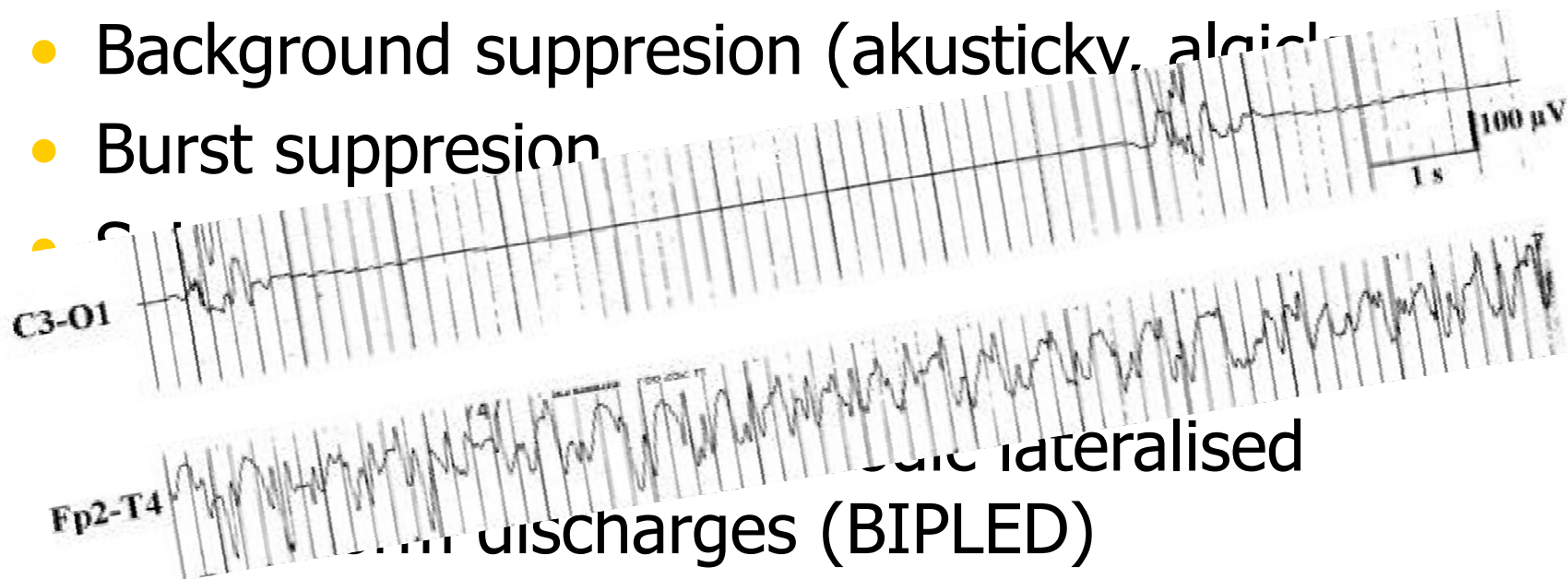
EEG



- Problémy so záznamom
- Štandardné vz. kontinuálne vz. spracované (BIS)
- Definície – chýba konsenzus
- Interpretácia - nekvantitatívne, chýba štandardizácia
- Vplyv liekov, TH

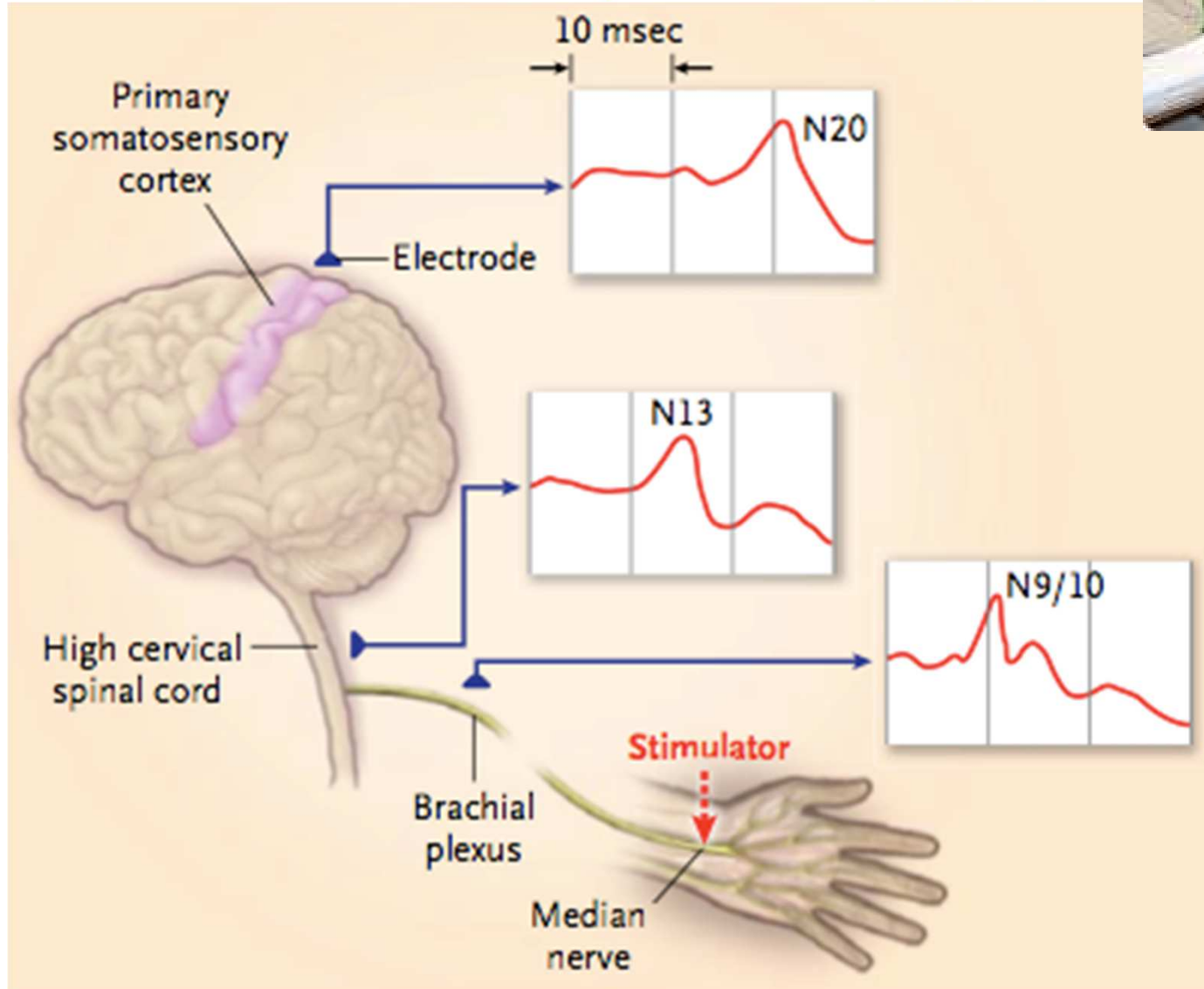
Patologické formy EEG

- Epileptiformní aktivita
- Background suppression (akusticky, algická)
- Burst suppression

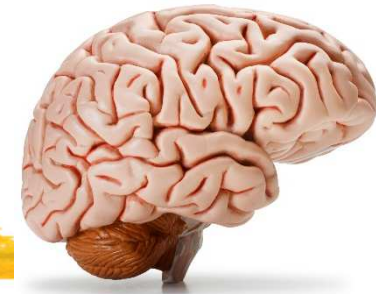


- Užitocné, ale náročné
 - ... lateralised
 - ... discharges (BIPLED)

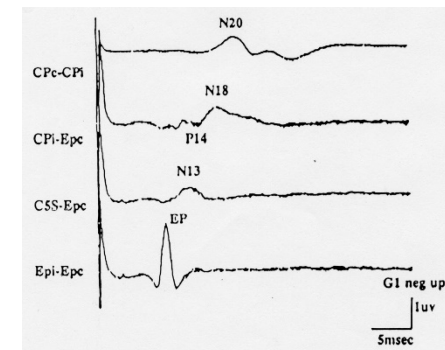
SSEP N20



SSEP (N20, N35, N70)



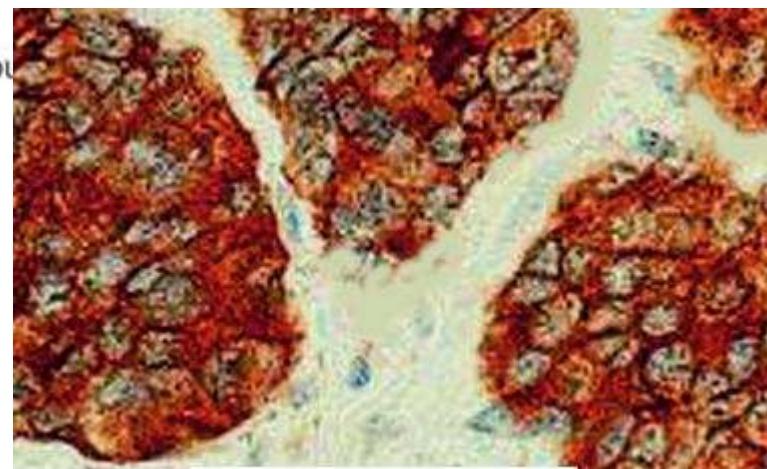
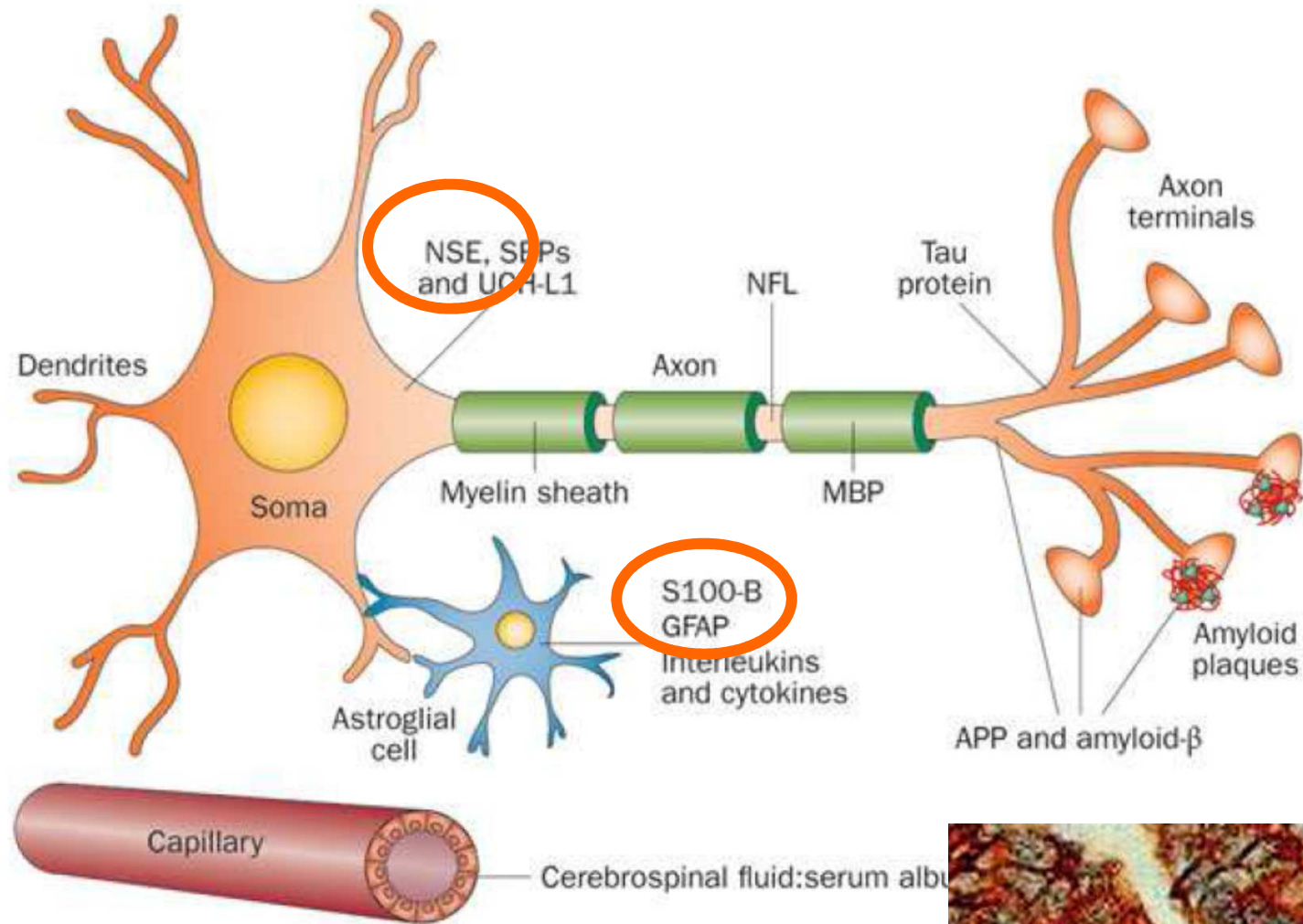
- Bilaterálna neprítomnosť N20: silný prediktor
- Bez vplyvu medikácie, metabolizmu
- Intaktné dráhy (miecha, hypotalamus)
- Pri posteli; technické vybavenie
- Problémy so záznamom
- Interpretácia
- Časovanie, vývoj príznakov
- Prítomnosť: neznamená vždy dobrú prognózu
- TH: predĺženie latencie



4. BiDmarkery



- Indikátory poškodenia nervových buniek
- **NSE** (neurošpecifická enoláza)
 - glykolytický enzým
 - v neurónoch
 - aj v Ery a malignitách
- **S-100B**
 - astroglia
 - aj v tuku a svaloch



Neuron Specific Enolase

BiDmarkery

- Jednoduchosť vyšetrenia, kvantitatívnosť
- Sedácia bez vplyvu
- Štandardizácia setov
- Iné zdroje (Ery, malignity)
- Prahová hodnota?
 - vplyv TH
- Dostupnosť vyšetrenia



5. ZDobrazDvacie metódy



- Poškodenie sivej hmoty - závažné
- CT – strata rozdielu S/B hmota
 - dostupné
 - transport
- MRI - ischemie
 - dostupnosť
 - trvanie vyšetrenia
- Interpretácia





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Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation



Review article

Predictors of poor neurological outcome in adult comatose survivors of cardiac arrest: A systematic review and meta-analysis. Part 1: Patients not treated with therapeutic hypothermia[☆]

Claudio Sandroni^{a,*}, Fabio Cavallaro^a, Clifton W. Callaway^b, Tommaso Sanna^c, Sonia D'Arrigo^a, Michael Kuiper^d, Giacomo Della Marca^e, Jerry P. Nolan^f

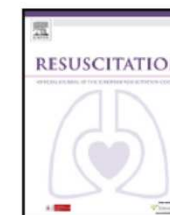
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Claudio Sandroni^{a,*}, Fabio Cavallaro^a, Clifton W. Callaway^b, Sonia D'Arrigo^a, Tommaso Sanna^c, Michael A. Kuiper^d, Matteo Biancone^a, Giacomo Della Marca^e, Alessio Farcomeni^f, Jerry P. Nolan^g



MetDdDlógia



- Nový systematický prehľad + meta-analýza
- Nové štúdie; iné vynechané
- Podľa protokolu PRISMA
- Zohľadnené limitácie štúdií
 - sebanaplňujúce proroctvo (zaslepenie)
- GRADE odporúčania

I Bez terapeutickéj hypDtermie



- 50 štúdií, 2828 pacientov
- GRADE: nízka kvalita štúdií, malé populácie
- Senzitivita; FPR (1- špecificita)
- 95% CI < 10 %

Table 3

Predictors of poor outcome with 0% CPC and <10%...

Timing	Index	Sensitivity % [95% CI]	FPR % [95% CI]	LR+ [95% CI]	No. of patients (studies)	Quality of evidence
<i>CPC 4-5 vs. 1-3</i>						
At 24 h	Myoclonus			20 [1-532]	471 (2)	Moderate
	SSEPs N20 wave absent			21 [3-142]	295 (3)	Moderate
	NSE 33 µg l ⁻¹ ^a	48 [42-55]	0 [0-8]	36 [2-563]	272 (1)	Moderate
At 48 h	Myoclonus			4 [0-72]	464 (2)	Low
	SSEPs N20 wave absent			11 [3-43]	328 (4)	Moderate
	NSE 33 µg l ⁻¹	62 [47-76]	0 [0-8]	45 [3-709]	241 (1)	Low
	NSE 65 µg l ⁻¹	62 [47-76]	0 [0-8]	29 [8-2062]	156 (1)	High
At 72 h	PLR absent	18 [15-21]	0 [0-3]	10 [1-71]	382 (2)	Low
	SSEPs N20 wave absent ^b	46 [40-52]	0 [0-3]	18 [3-122]	293 (2)	Low
	NSE 80 µg l ⁻¹	43 [29-58]	0 [0-3]	89 [6-1447]	152 (1)	High
	S-100 0.7 µg l ⁻¹	42 [34-50]	0 [0-3]			Low
At ≤72 h	EEG voltage ≤20-21 µV	38 [23-54]	0 [0-6]			Low
<i>CPC 3-5 vs. 1-2</i>						
At 24 h	SSEPs N20 wave absent			27 [2-424]	159 (1)	Low

Myoclonus 24-48 h

N20 24-72 h

NSE > 33 µg/l

Fotorekcia (-)

NSE > 80 µg/l

S-100 > 0,7 µg/l

EEG < 20 µV

Abbreviations: CI = Confidence Interval; CPC = Cerebral Performance Categories; EEG = Electroencephalogram; FPR = False Positive Rate; No = Number; NSE = Neuron Specific Enolase; PLR = Pupillary Light Response; SSEPs = Somatosensory Evoked Potentials.

^a In another study, the NSE threshold was 47.6 µg/L (95%CI 0-26).
^b In a pooled series of three papers on SSEPs at ≤72 h (408 patients) there was one false positive (FPR 1 [0-6]).

Assessing Prognosis Following Cardiopulmonary Resuscitation and Therapeutic Hypothermia—a Critical Discussion of Recent Studies

Frank Thömke

Dtsch Arztebl Int 2013; 110(9): 137–43.

Prognózu je možné stanoviť rovnako ako bez TH
Spoločné známky zlej prognózy:

1. Moclonus, chýbanie pupilárneho a korneálneho reflexu
2. N20 (- bilat)
3. EEG - burst-suppression
4. *NSE >97 µg/l*

Nízka senzitivita – opak nie je príznakom zotavenia
Cave sedácia/relaxácia; časový odstup

II. S terapeutickDu hypDtermiDu



- 37 štúdií
- 2403 pacientov
- PICOS: dospelí pacienti – v kóme po KPR ROSC – terapeutická hypotermia – prediktory (4 skupiny) – predikcia zlého výsledku
- Vplyv sedácie, relaxácie na väčšinu parametrov
- Integrácia parametrov

Table 3

Predictors of poor outcome with 0% FPR and upper 95% CI limit <10% (for comments see text).

Timing	Index	Sensitivity	FPR % [95% CI]	LR+ [95% CI]	No. of patients with positive test	No. of studies	Used for WLST	Quality of evidence
CPC 4-5 vs. 1-3								
During TH	Burst-suppression	42 [22-54]	0 [0-5]	42 [3-678]	14	1	No	Low
After RW	Burst-suppression	42 [22-54]	0 [0-5]	42 [3-678]	7	1	No	Low
Any time	SB-ESE ^a	42 [22-54]	0 [0-5]	49 [3-794]	16	1	No	Low
CPC 3-5 vs. 1-2								
During TH	Bilaterally absent N20	63 [53-70]	0 [0-5]	63 [3-909]	63	4	Yes (2/4)	Moderate
During TH (at 24 h)	S-100B \geq 0.18-0.21 mcg/L	65 [53-70]	0 [0-5]	65 [3-909]	17	3	N/A	Very low
After RW	Bilaterally absent N20 ^b	42 [36-48]	0 [0-5]	42 [3-678]	100	3	Yes (4/5) ^c	Low
After RW	Nonreactive background	62 [53-70]	0 [0-5]	62 [3-909]	100	3	Yes (4/5) ^c	Low
After RW (at 48 h)	NSE \geq 81.8 $\mu\text{g l}^{-1}$	18 [13-25]	0 [0-2]	56 [3-909]	29	1	No	Moderate
	S-100B \geq 0.3 $\mu\text{g l}^{-1}$	21 [9-38]	0 [0-7]	18 [1-304]	7	1	N/A	Very low
After RW (at 72 h)	NSE \geq 78.9 $\mu\text{g l}^{-1}$	48 [32-63]	0 [0-7]	48 [3-909]	21	1	Yes	Very low
	M \leq 2 and no PLR and no CR	15 [7-26]	0 [0-7]	15 [1-304]	10	1	Yes	Very low

N20 (- bilat)

S-100B >0,2 $\mu\text{g/l}$

N20 (- bilat)

Ploché EEG bez reakcie

NSE >82 $\mu\text{g/l}$, S-100B >0,3 $\mu\text{g/l}$ NSE >79 $\mu\text{g/l}$

Bez motoriky (... PR)

Neurological prognostication after cardiac arrest—Recommendations from the Swedish Resuscitation Council

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Resuscitation 84 (2013) 867–872



Table 3

Positive and negative predictors in an early and a late phase.

Early positive

- Reaction to pain GCS-M ≥ 5 (2)
- Normal brainstem reflexes (2)
- Continuous EEG background (2)
- Reactive EEG background (2)
- Normal cranial CT (3)
- Low levels of biomarkers (3)

Late positive

- Reaction to pain GCS-M ≥ 5 (2)
- Continuous EEG background (2)
- Reactive EEG background (2)
- Normal cranial CT (3)
- Normal MRI brain diffusion (2)
- Low levels of biomarkers (3)

Early negative

- Clinical myoclonic status (1)
- Loss of cranial nerve reflexes (2)
- EEG: Burst-suppression pattern or status epilepticus (2)
- Cerebral CT: Generally decreased contrast between grey and white matter (2)
- High levels of biomarkers (3)

Late negative

- Reaction to pain GCS-M 1–2 (2)
- Bilateral lack of pupillary reflex (1)
- Bilateral lack of corneal reflex (2)
- SSEP: Bilateral lack of N20 (1)
- EEG: Burst-suppression, electro-cerebral inactivity or status epilepticus without a
- Widespread bilateral ischaemia in cerebral CT scan (2) or MRI brain diffusion (2)
- High levels of biomarkers (3)

Early: During the first 24 h or before onset of rewarming (24 h). Late: After the first 24 h or after rewarming has been initiated. 1: Good support i reliability. 2: Good support in the literature, but moderate reliability. 3: Some support in the literature and limited reliability.

Table 2

Methods of prognostication.

(1) The following basic methods should be available at all hospitals in which cardiac arrest patients are treated

- Neurological examination including level of consciousness and brainstem functions
- Conventional EEG
- Cerebral CT scan

(2) Desirable methods for reliable assessment of an unfavourable outcome

- SSEP

(3) Methods that may add useful information and that have not yet been developed

- Continuous, simplified EEG registration
 - Cerebral MRI with diffusion-weighted sequences
 - Biomarkers
-

C. Sandroni:

SSEP

Biomarkery

EEG

Klinické vyšetrenie

Závery

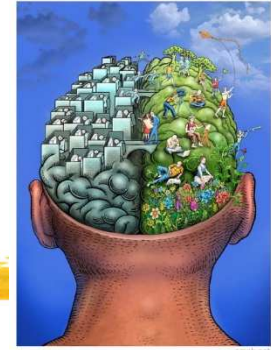


Švédska resuscitačná rada, 2013



- Komplexný proces
- Aj prolongovaná kóma s dobrým výsledkom
- Treba včas identifikovať pacientov so zlou prognózou
- Nevieme zostaviť algoritmus podobný AAN 2006
- Použiť viacero nezávislých prognostických metód
- Hodnotiť => 72 hod od ohriatia; event. opakovať
 Výnimka: včasný myoklonus + chýbanie N20 bilat
- Pacientov hospitalizovať vo vybavených KPR centrách

Záver



- Prognóza za účelom ukončenia márnej liečby
- Komplexný proces, EOLD
- Multimodálny prístup
- Spravidla po 72 hod od ukončenia hypotermie
- Aj po 24 hod možné
- Chladenie - vplyv sedácie/relaxácie
- CSIM: odporúčania pre prognózovanie po KPR, 2014

Ďakujem za pDzDrnDst'



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