

IRC 2021

CONGRESSO
NAZIONALE

16•17•18 DICEMBRE

NUOVE LINEE GUIDA 2021:
RIANIMAZIONE CARDIOPOLMONARE
POST-LOCKDOWN



Italian
Resuscitation
Council



Rimini

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POST-LOCKDOWN

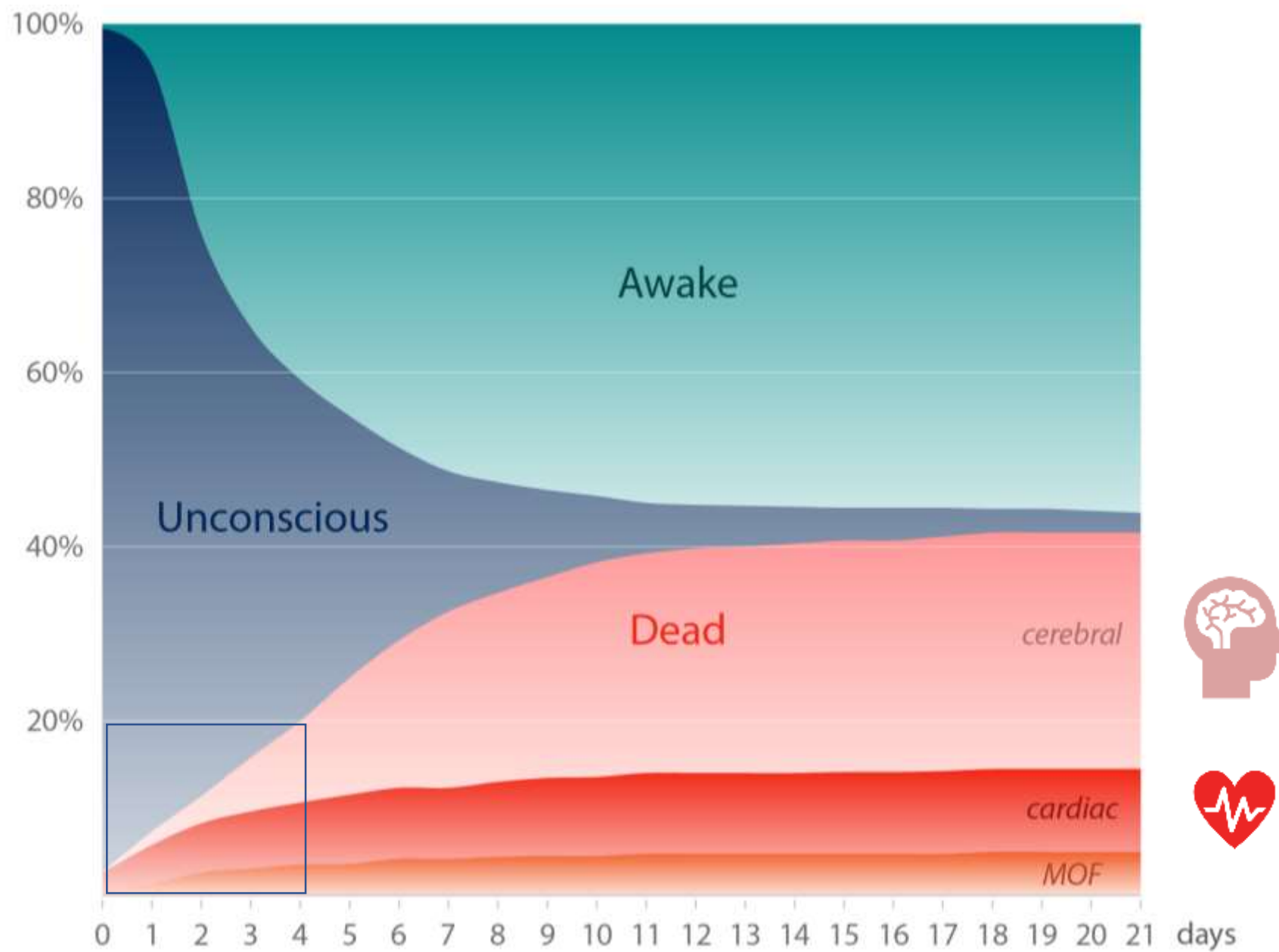


Esiti neurologici post-arresto

Claudio Sandroni

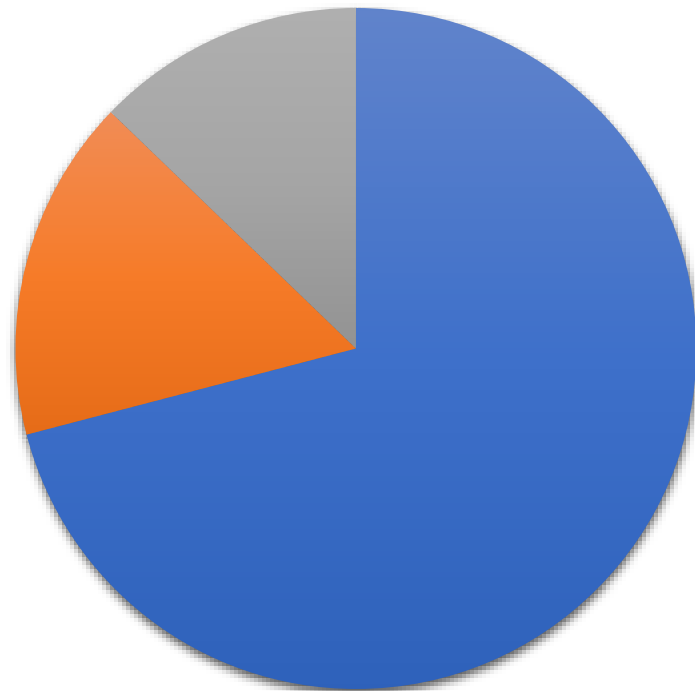
Department of Intensive Care, Emergency Medicine and Anaesthesiology
Fondazione Policlinico Universitario "Agostino Gemelli"-IRCCS, Rome, Italy

$n = 939$



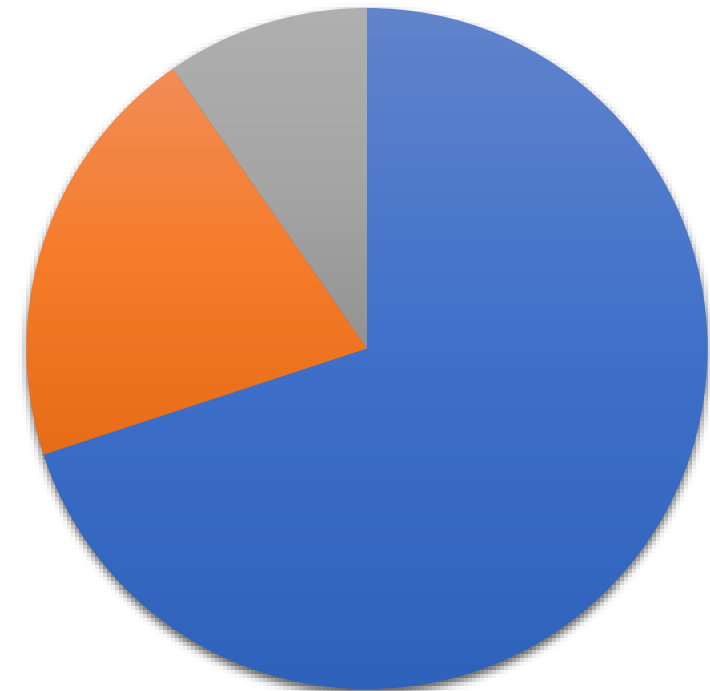
Causes of death

Dragancea 2013, Sweden



■ Neurological ■ Cardiac ■ Other

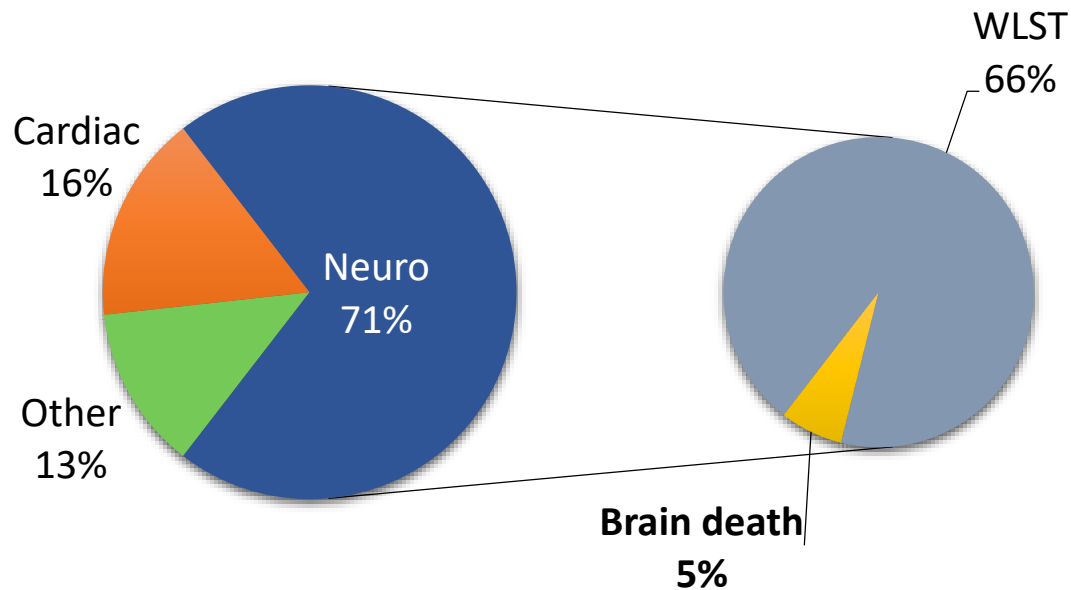
Elmer 2016, USA



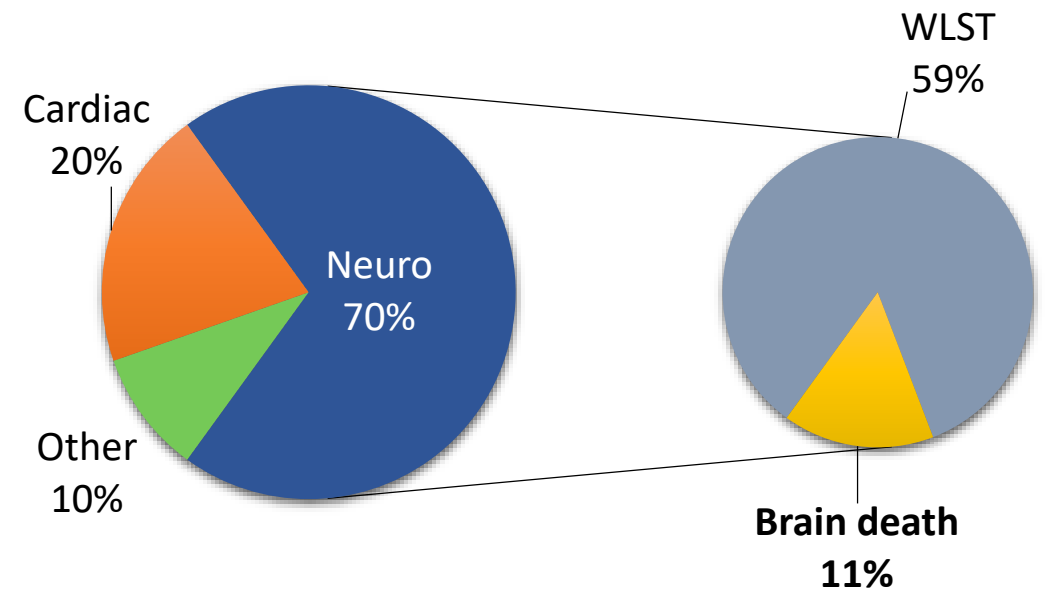
■ Neurological ■ Cardiac ■ Other

Causes of death

Dragancea 2013, Sweden



Elmer 2016, USA



Maximise safety in prognostication

- Choose the most specific predictors (lowest FPRs)
- Combine predictors
- Optimise implementation



Quantitative versus standard pupillary light reflex for early prognostication in comatose cardiac arrest patients: an international prospective multicenter double-blinded study

Mauro Oddo^{1*}, Claudio Sandroni², Giuseppe Citerio^{3,4}, John-Paul Miroz¹, Janneke Horn⁵,



- 456 comatose resuscitated patients
- Standard pupillary light reflex assessment:
 - 5 false positive results (FPR 6%)
- Automated pupillometry:
 - 0% FPR

Quantitative versus standard pupillary light reflex for early prognostication in comatose cardiac arrest patients: an international prospective multicenter double-blinded study

Mauro Oddo^{1*}, Claudio Sandroni², Giuseppe Citerio^{3,4}, John-Paul Miroz¹, Janneke Horn⁵,



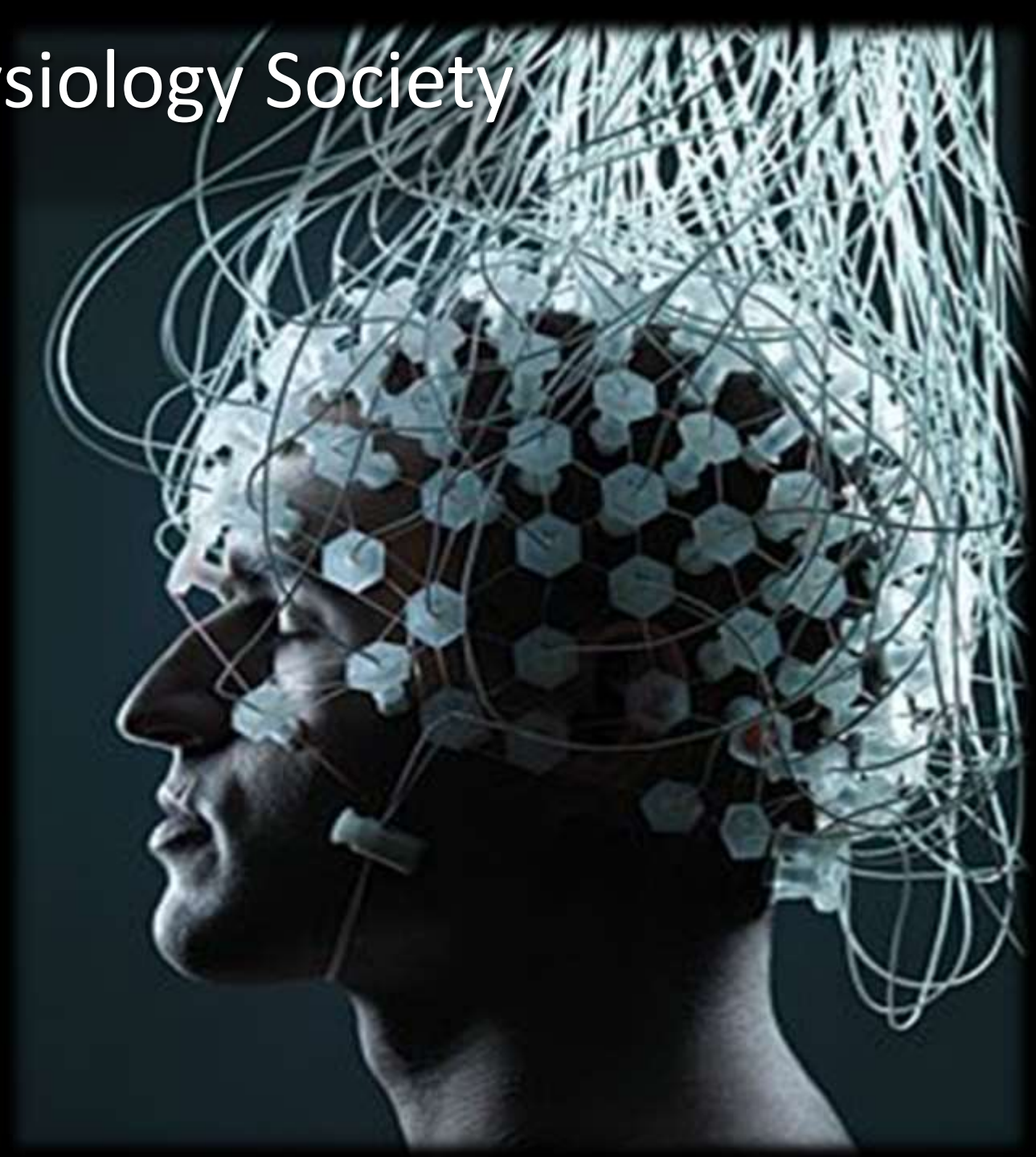
- Pupillary constriction to light may be invisible to the naked eye if pupil size is <2 mm
- Automated pupillometry:
 - Detects even minimal changes in pupil size
 - Is quantitative and reproducible

American Clinical Neurophysiology Society (ACNS) terminology

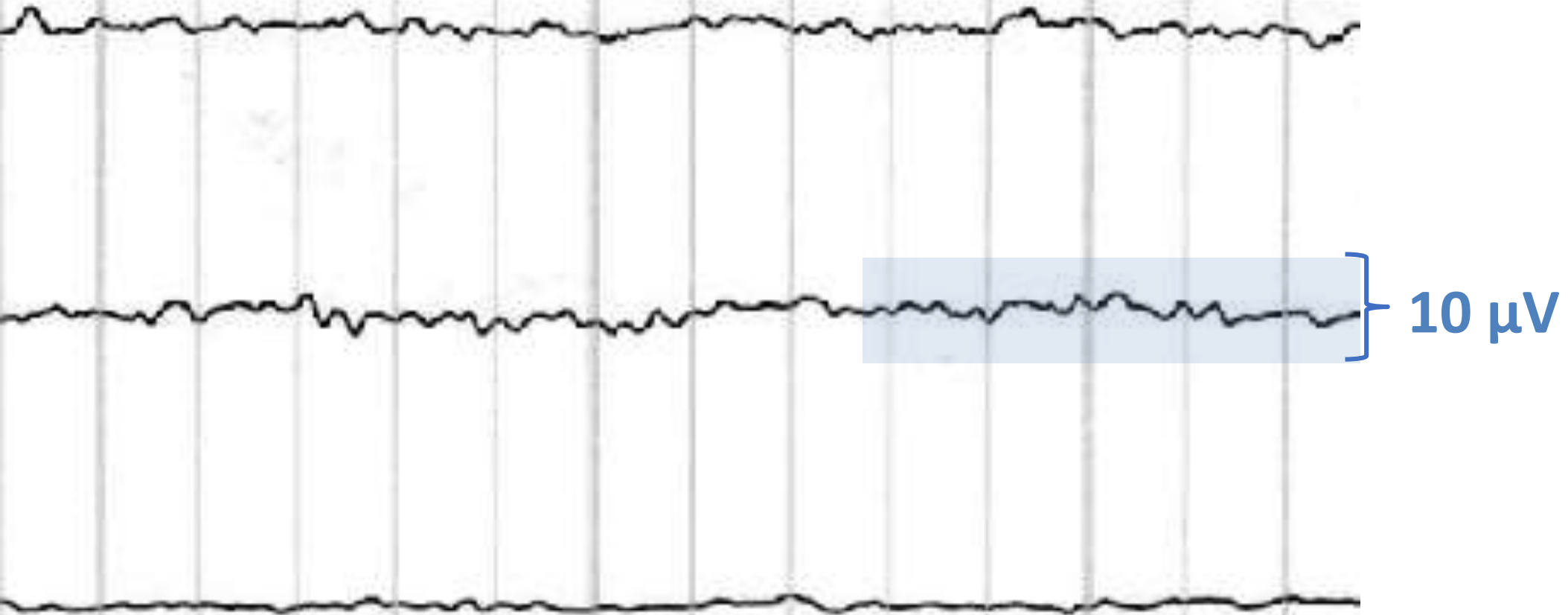
For use in Critical Care

Standard definitions:

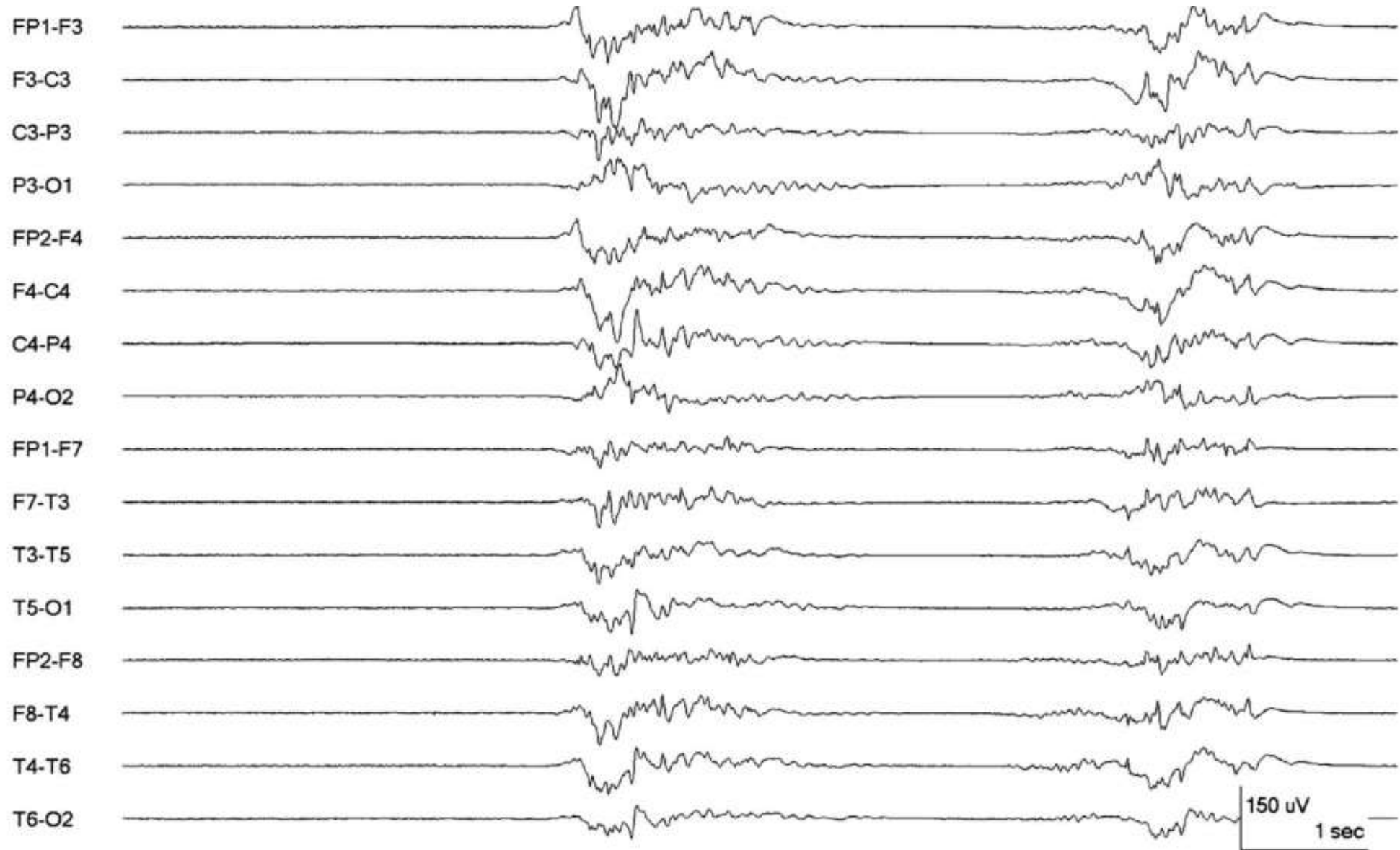
- Suppression
- Burst-suppression



Suppression



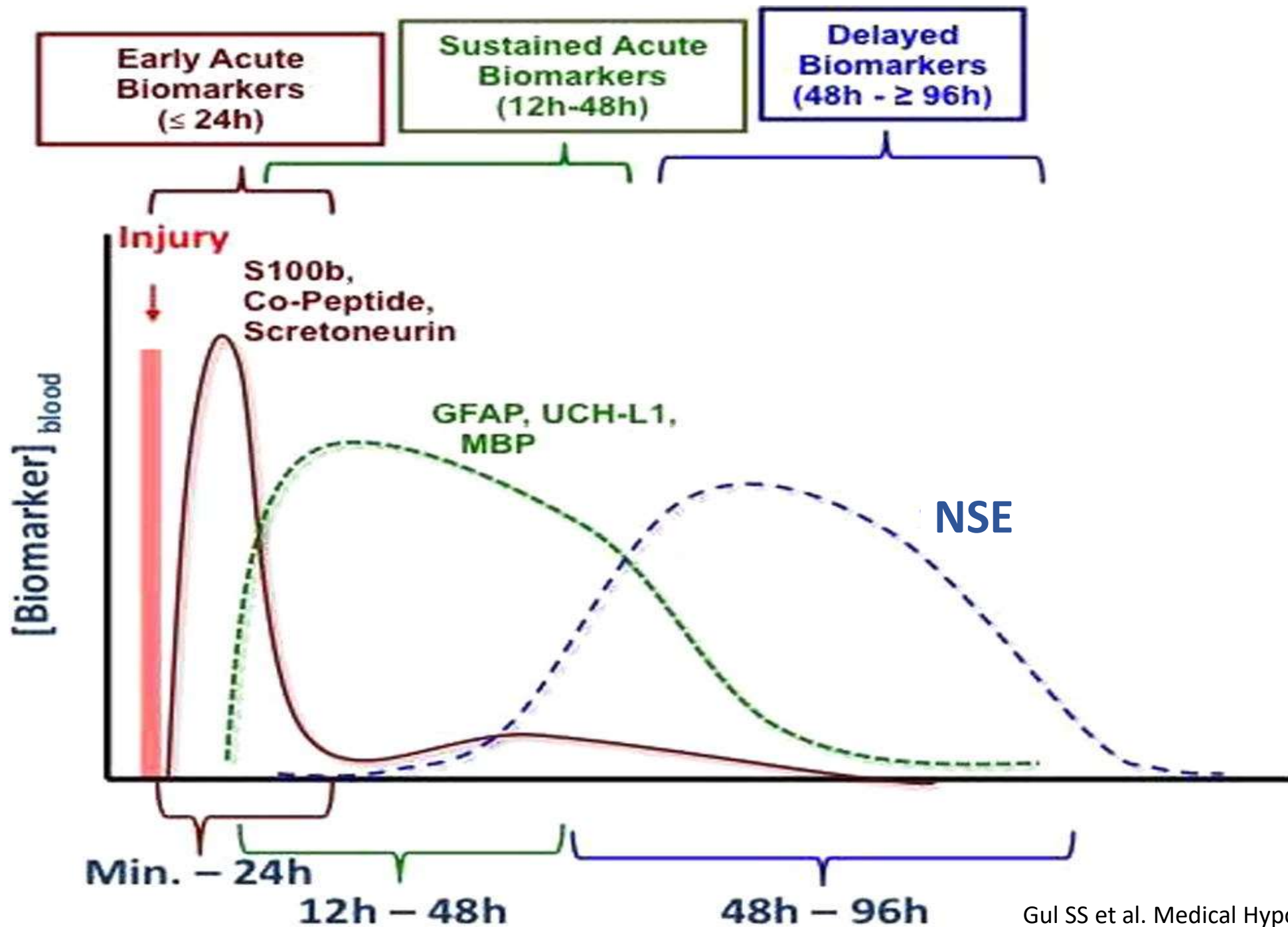
Burst-suppression



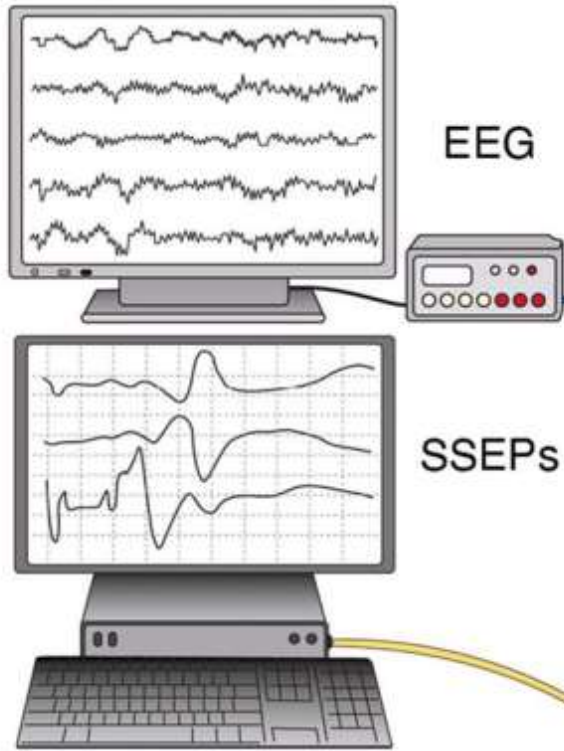


Time-dependency of EEG

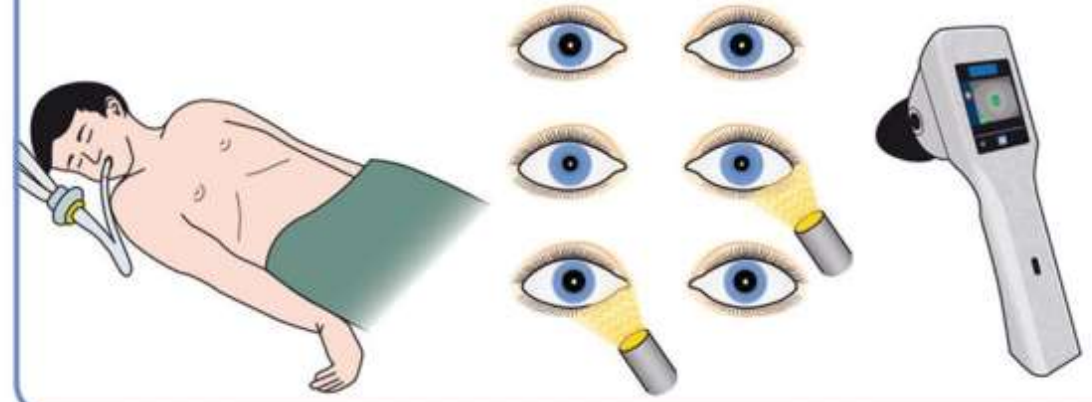
	Sensitive	Specific
12-24h	✓	✗
24-48h	✓	✓
>48h	✗	✓



Neurophysiology



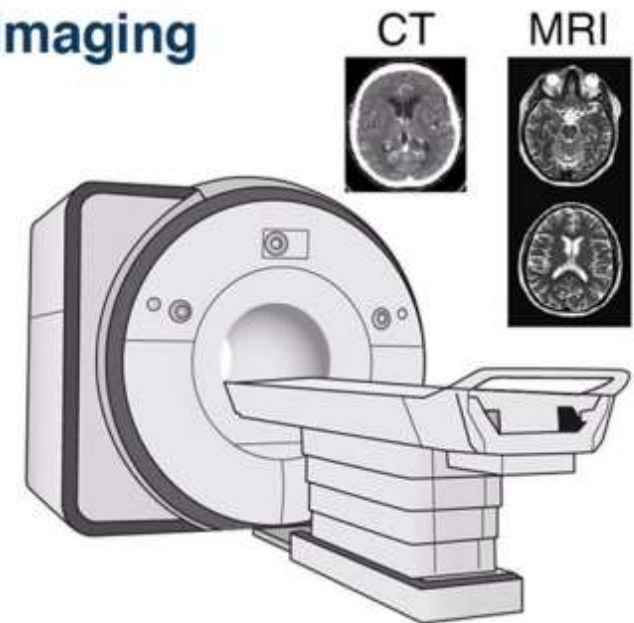
Clinical examination



Biomarkers



Imaging



Targeted temperature management and rewarming

Unconscious patient, $M \leq 3$ at $\geq 72h$ without confounders ⁽¹⁾

Yes

At least TWO of:

- No pupillary ⁽²⁾ and corneal reflexes at $\geq 72h$
- Status myoclonus ⁽⁵⁾ $\leq 72h$
- Bilaterally absent N20 SSEP wave
- Highly malignant ⁽³⁾ EEG at $>24h$
- NSE $>60 \mu g/L$ ⁽⁴⁾ at 48h and/or 72h
- Diffuse and extensive anoxic injury on brain CT/MRI

Yes

**Poor
outcome
likely**

No

Observe and re-evaluate

Targeted temperature management and rewarming

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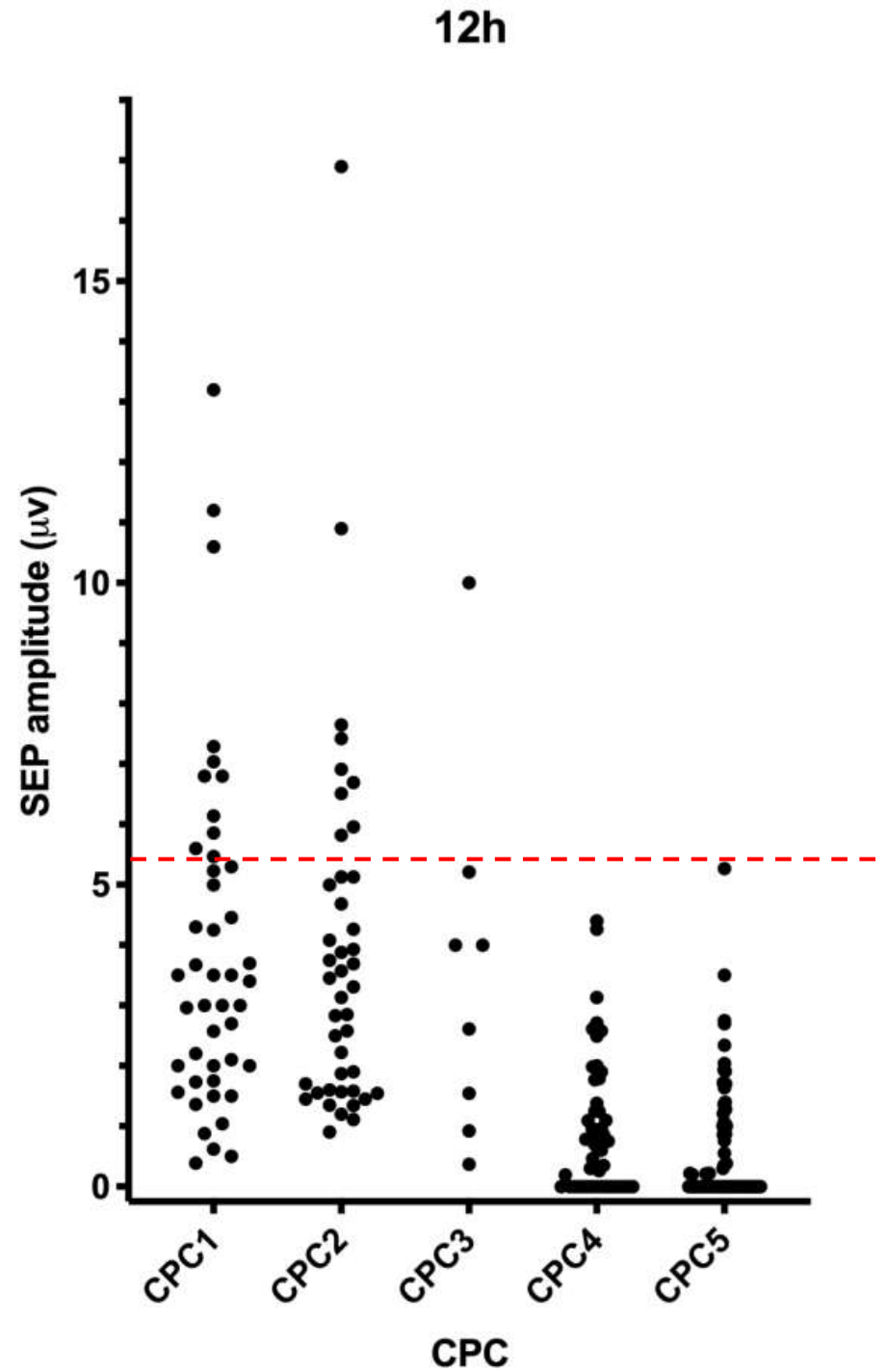
Observe and re-evaluate

(*) Signs of good neurological outcome

- Continuous, normal voltage, reactive EEG
- Low/decreasing levels of biomarkers (NSE, NFL)
- Normal MRI

Caution if discordant signals are present

SSEP N20 amplitude

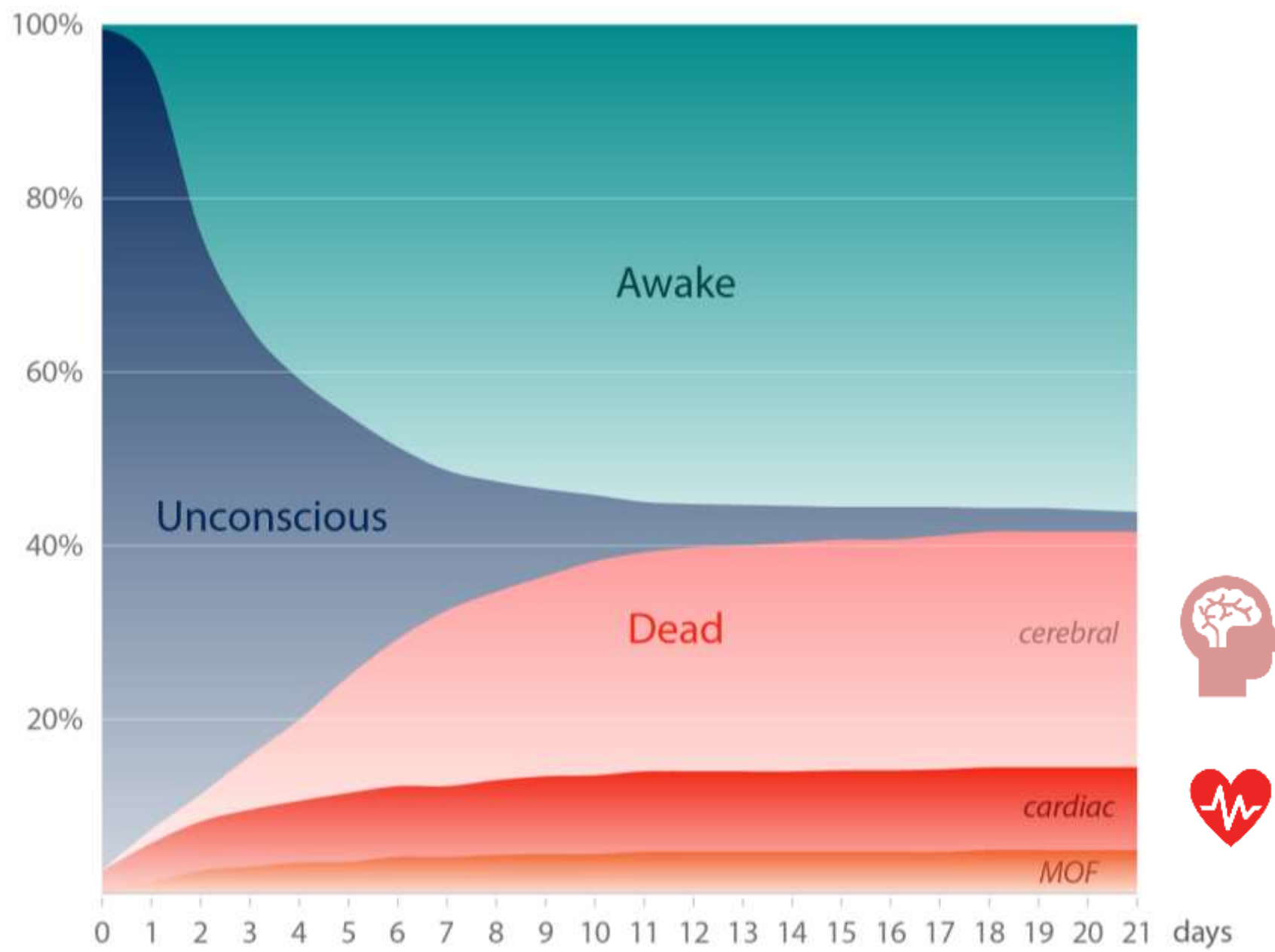


Predictors of good neurological outcome after cardiac arrest: a systematic review

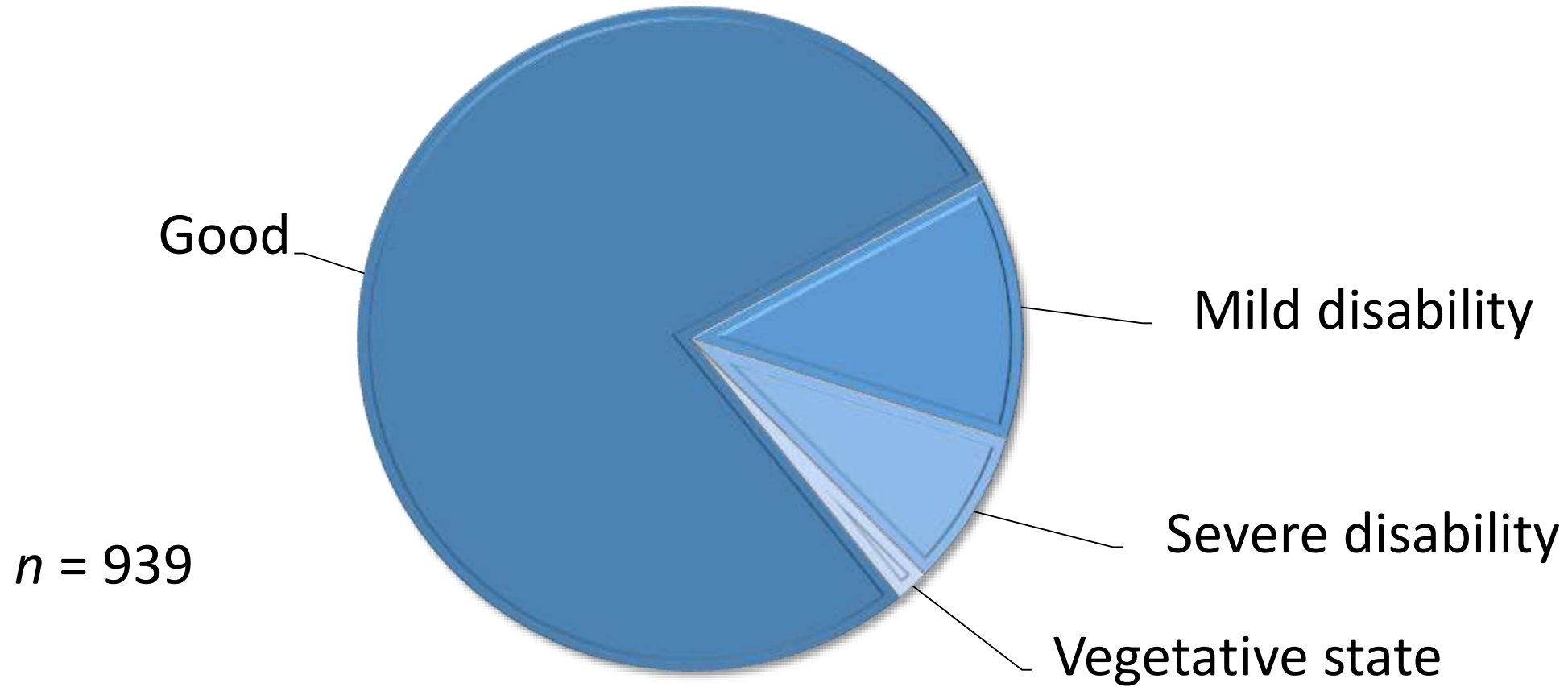


All predictor categories used for predicting poor outcome can also be used to predict **good** outcome

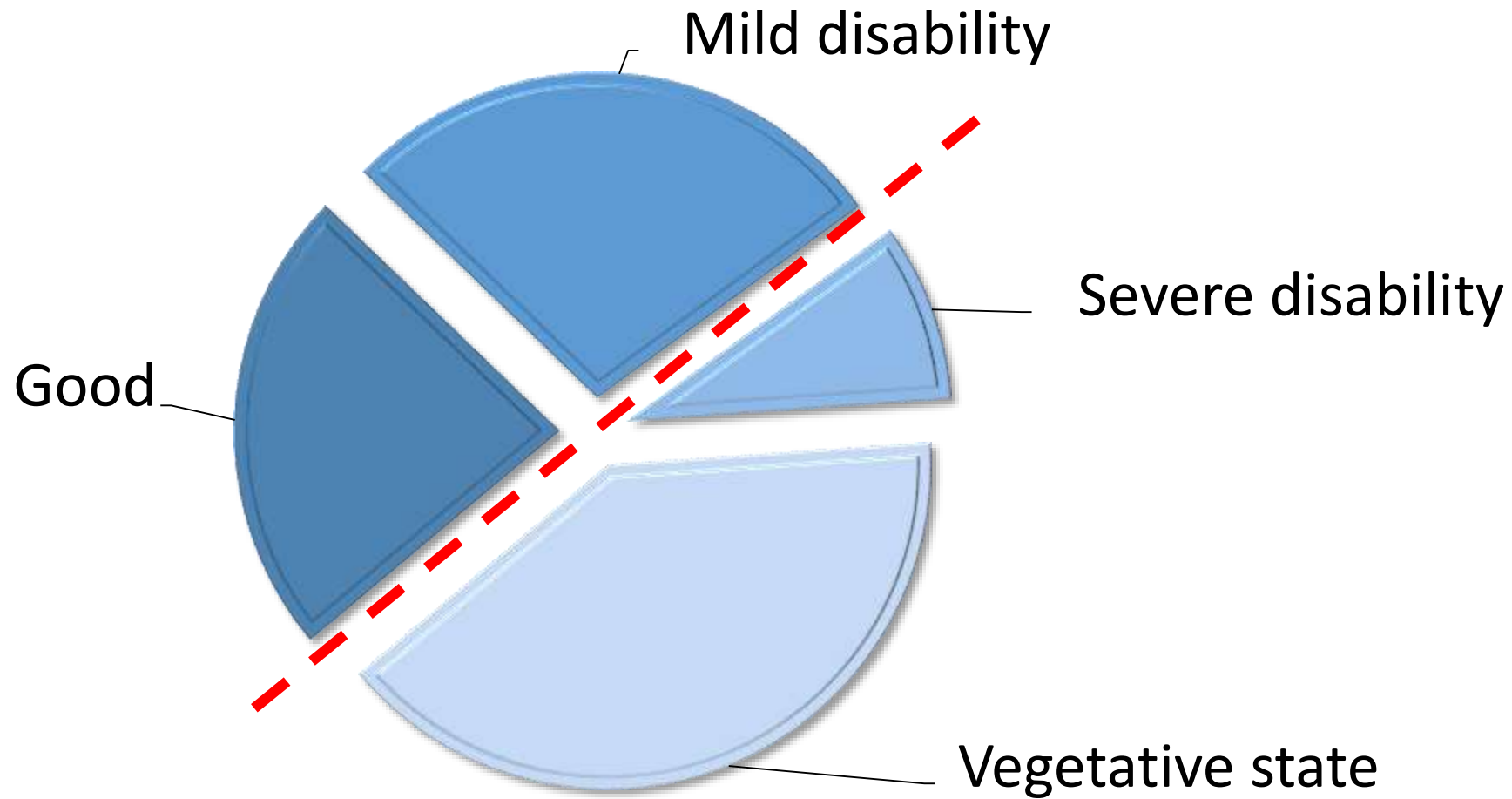
n = 939



6-month neurological function, TTM trial



6-months neurological function, ProNeCa



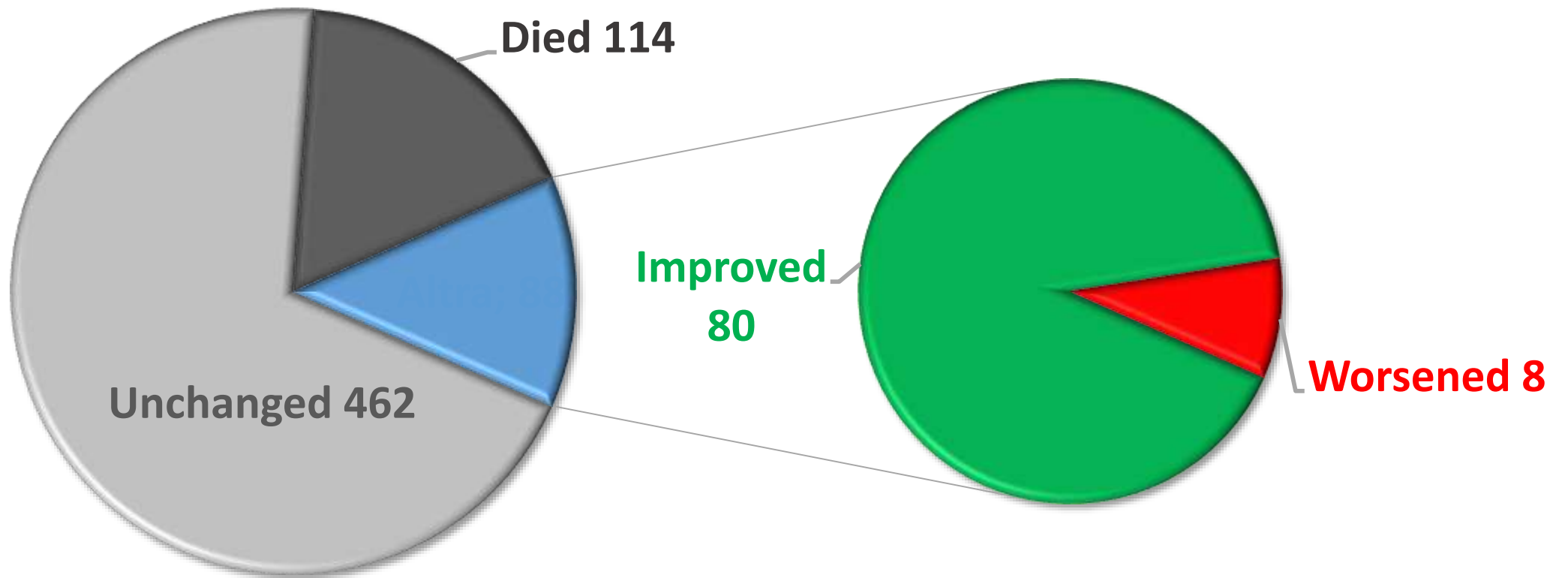
n = 445



Cerebral Performance Categories (CPC)

CPC	Disability	Conscious	Independent	Compatible features
1	No, or minor	✓	✓	Mild dysphasia or psychological issues
2	Moderate	✓	✓	Able to work part-time, dress, travel by public transportation; may have memory or mental changes
3	Severe	✓	✗	Limited cognition, dementia, dependent from others for daily support
4	Unconscious	✗	✗	Persistent vegetative state
5	Dead	-	-	Dead

Change in CPC from 1 to 6 months



One month

Six months

CPC1 402 (59)

CPC1 377 (94)

CPC2 2 (0.5)

CPC3 1 (0.2)

Died 17 (4)

CPC2 67 (10)

CPC1 35 (52)

CPC2 19 (28)

CPC3 5 (7)

Died 8 (12)

CPC3 78 (11)

CPC1 8 (10)

CPC2 23 (28)

CPC3 27 (35)

Died 21 (27)

CPC4 114 (17)

CPC1 0 (0)

CPC2 2 (2)

CPC3 13 (11)

CPC4 39 (34)

Died 60 (53)

CPC3 78 (11)

CPC1 8 (10)

CPC2 23 (28)

CPC3 27 (35)

Died 21 (27)

Standards for Studies of Neurological Prognostication in Comatose Survivors of Cardiac Arrest

Assessment of neurological function

Timing	Neurological Outcome
Hospital discharge/1 mo	✓
3 mo	✓
6 mo	✓
1 y	Optional

Modified Rankin Score (mRS)

mRS	Disability	Dependence
0	None, no symptoms	Independent
1	None significant	Able to carry out all usual activities
2	Slight	Able to look after own affairs, unable to carry out all previous activities
3	Moderate	Requires some help for bodily needs Able to walk unassisted.
4	Moderately severe	Unable to attend to own bodily needs Unable to walk unassisted
5	Severe	Requires constant nursing care, bedridden
6	Dead	Dead

Domains and measures

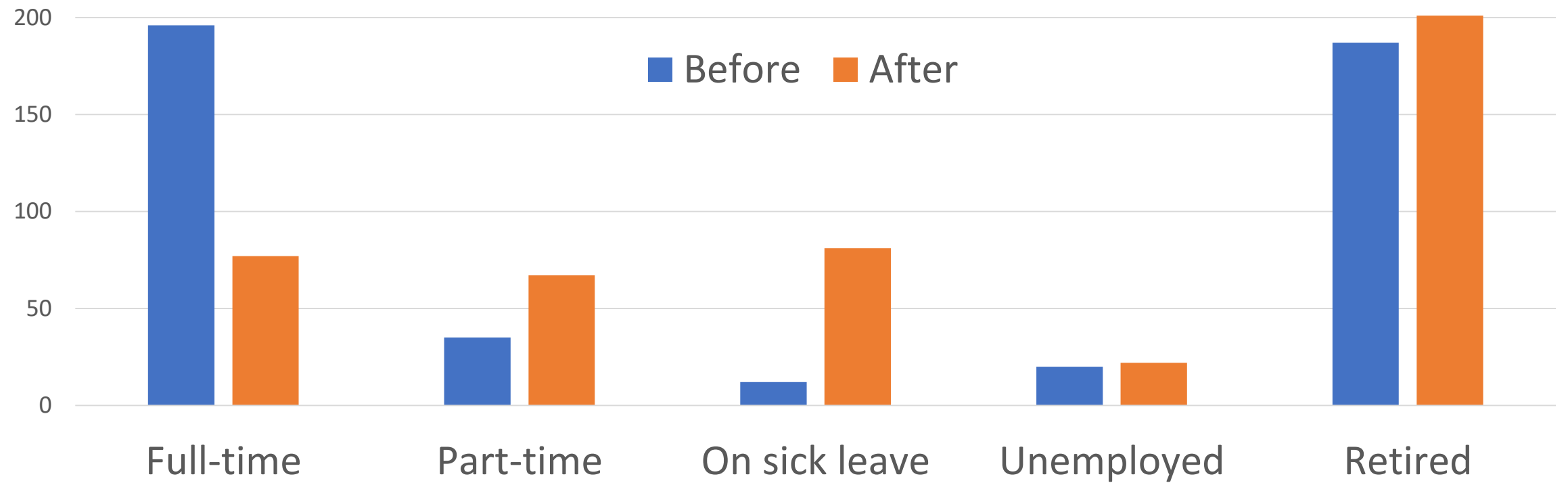
	Neurological function	Cognition	HRQOL
Measures	CPC, mRS	MMSE IQCODE 2 Simple Questions (2SQ)	EuroQOL HUI SF-36

Neurologic Function and Health-Related Quality of Life in Patients Following Targeted Temperature Management at 33°C vs 36°C After Out-of-Hospital Cardiac Arrest

Score	Value	Normal value
MMSE	26.6 ± 4.5	≥27
IQCODE	106 ± 24.5	≤78
Q.1 - Increased need for help for activities of daily living?	Yes (17.9%)	No
Q.2 - Complete mental recovery?	Yes (64.2%)	Yes
SF-36 (mental)	48.3 ± 13	≥ 47
SF-36 (physical)	46 ± 10.9	≥ 47

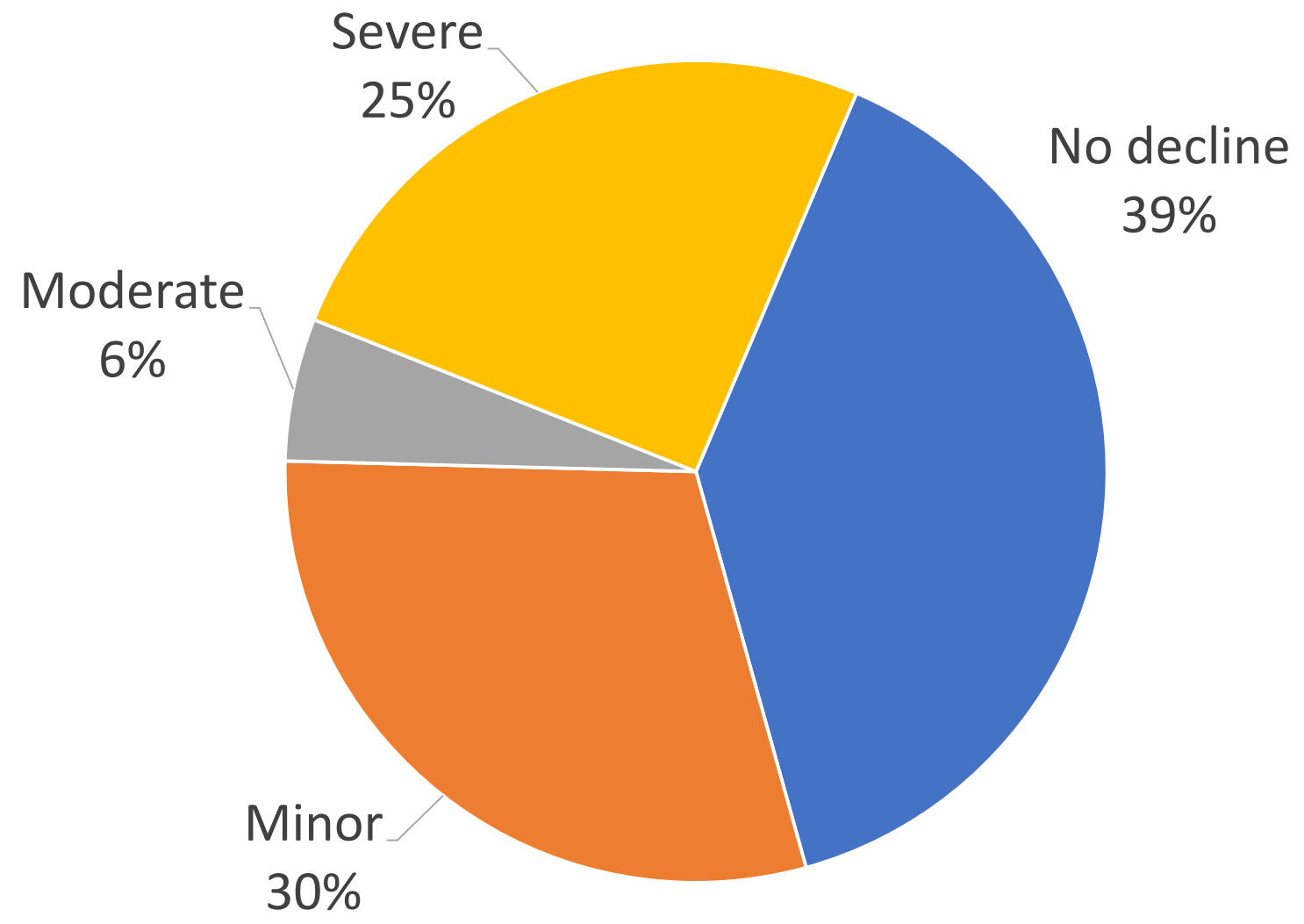
Neurologic Function and Health-Related Quality of Life in Patients Following Targeted Temperature Management at 33°C vs 36°C After Out-of-Hospital Cardiac Arrest

Occupational status



Neurologic Function and Health-Related Quality of Life in Patients Following Targeted Temperature Management at 33°C vs 36°C After Out-of-Hospital Cardiac Arrest

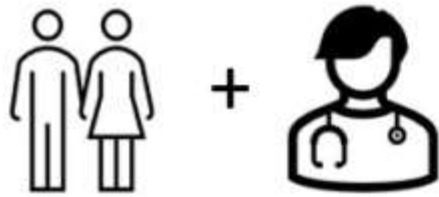
Cognition: results of QICODE



Cognition



Cognitive impairment is common and often subtle, not directly visible to the clinician



Screening requires a combination of objective measures with subjective patient reports



Memory, attention, and executive functioning are the most affected

Gender differences



Women have **50% lower** adjusted odds to achieve a good quality of life one year after arrest



Women are less likely than men to return to work after arrest

BEFORE HOSPITAL DISCHARGE

Perform functional assessments
of physical and non-physical impairments



Refer to rehabilitation **if necessary**

AT FOLLOW UP

Within 3 months from hospital discharge

Perform screening
for cognitive
problems

Perform screening
for emotional problems
and fatigue

Provide information
and support to the survivor
and their family



Consider referral to further specialised care **if indicated**



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