Brain CT and prognostication after cardiac arrest

Christoph Leithner

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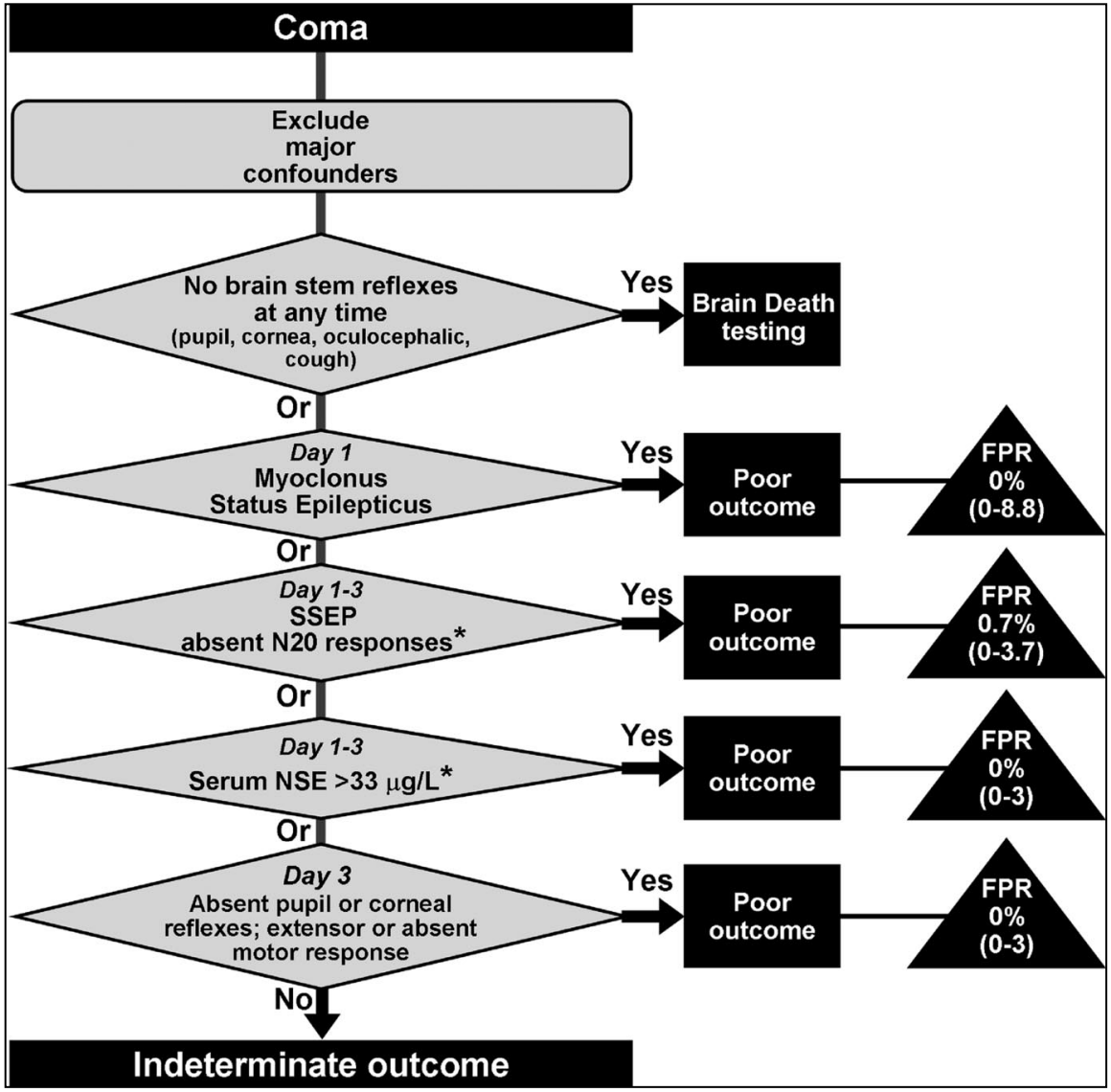
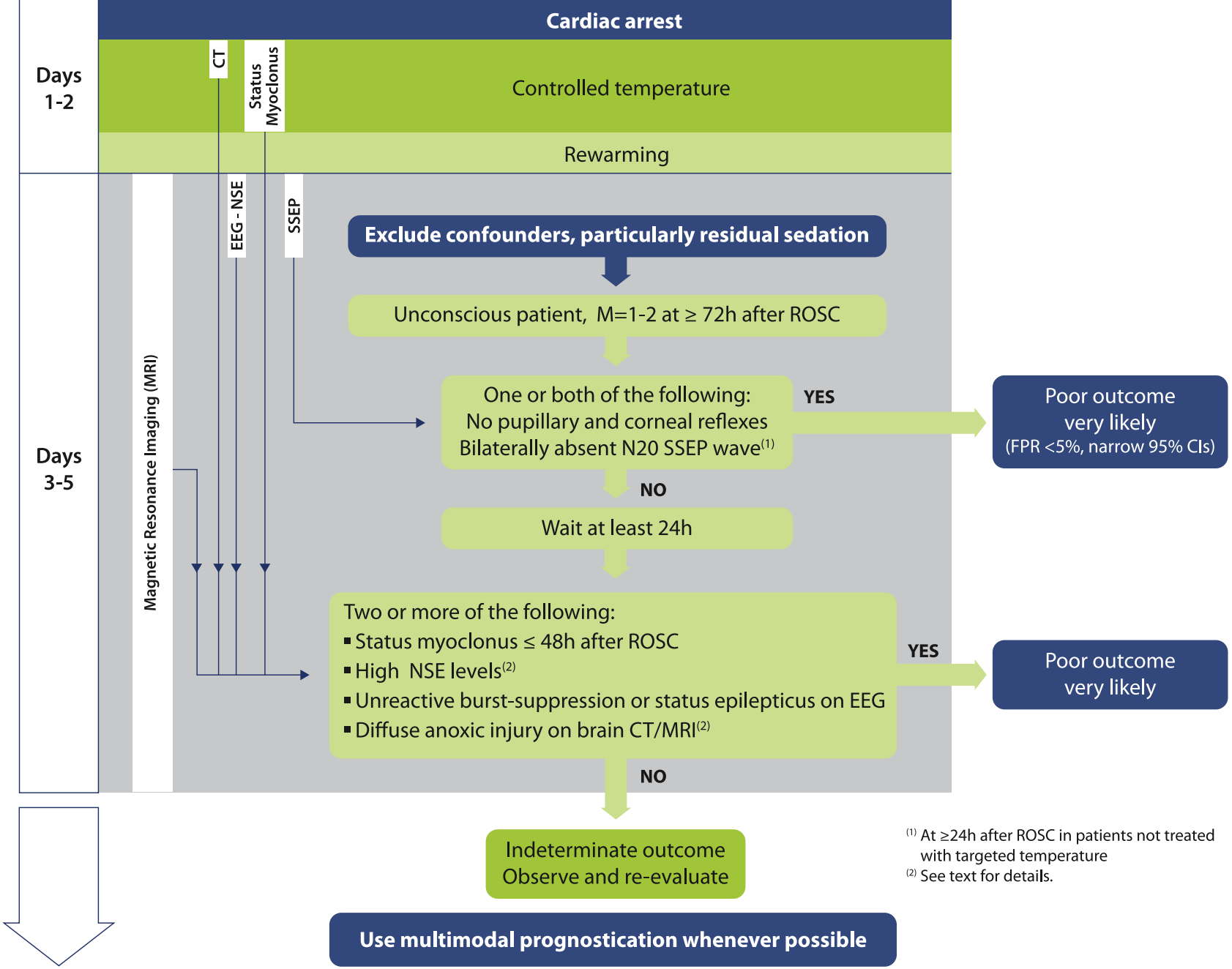
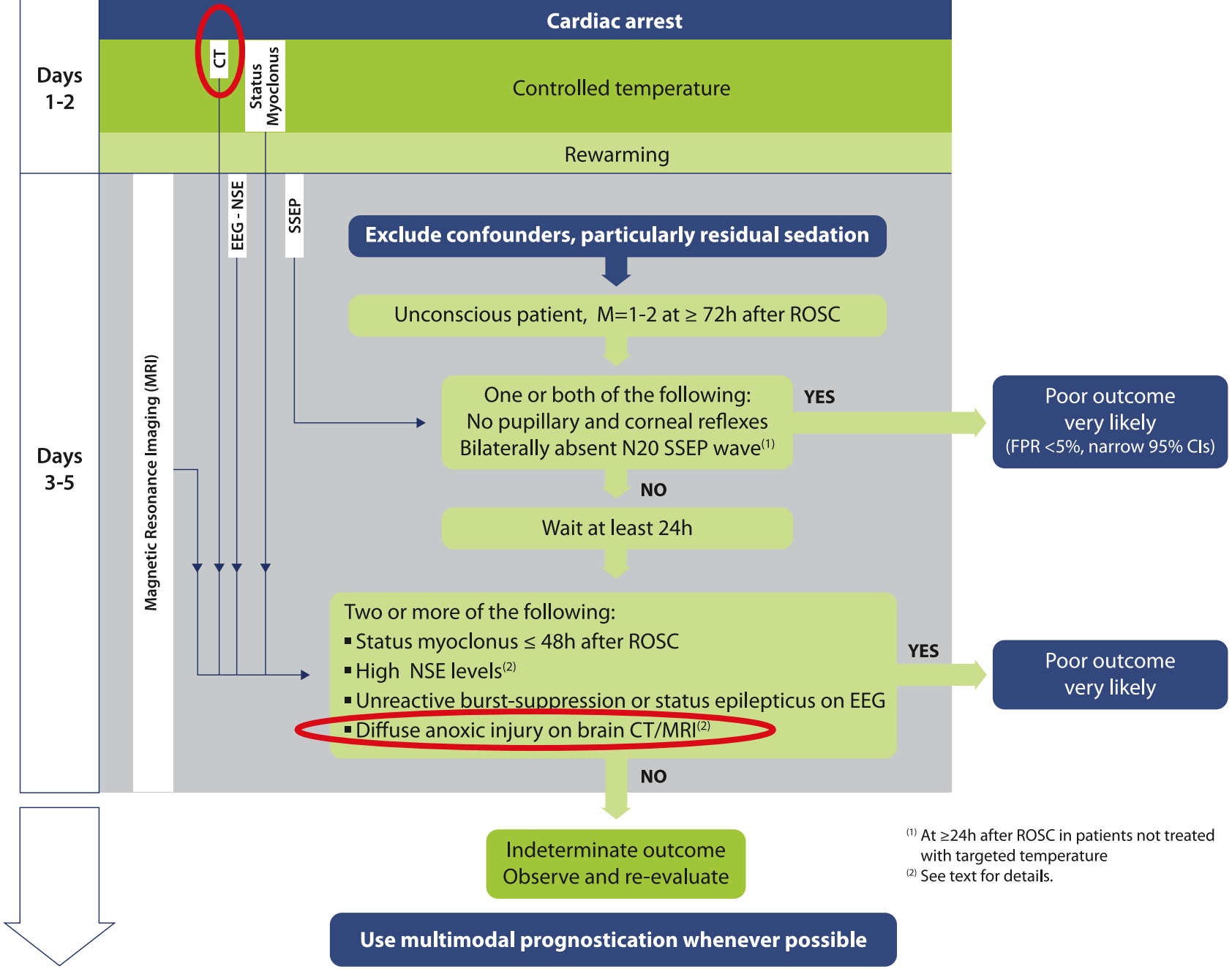


Wijdicks et al. AAN Guidelines, Neurology 2006

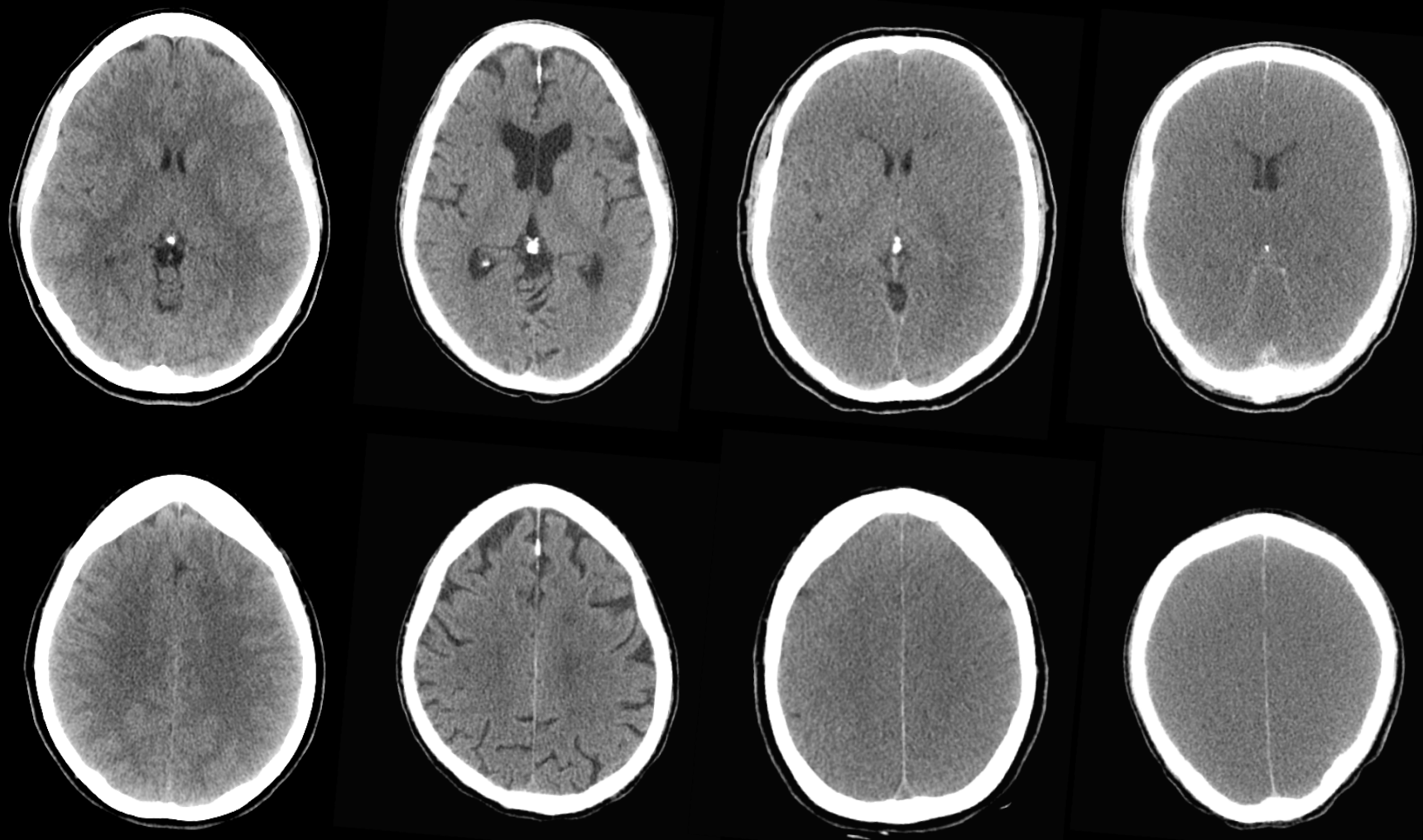


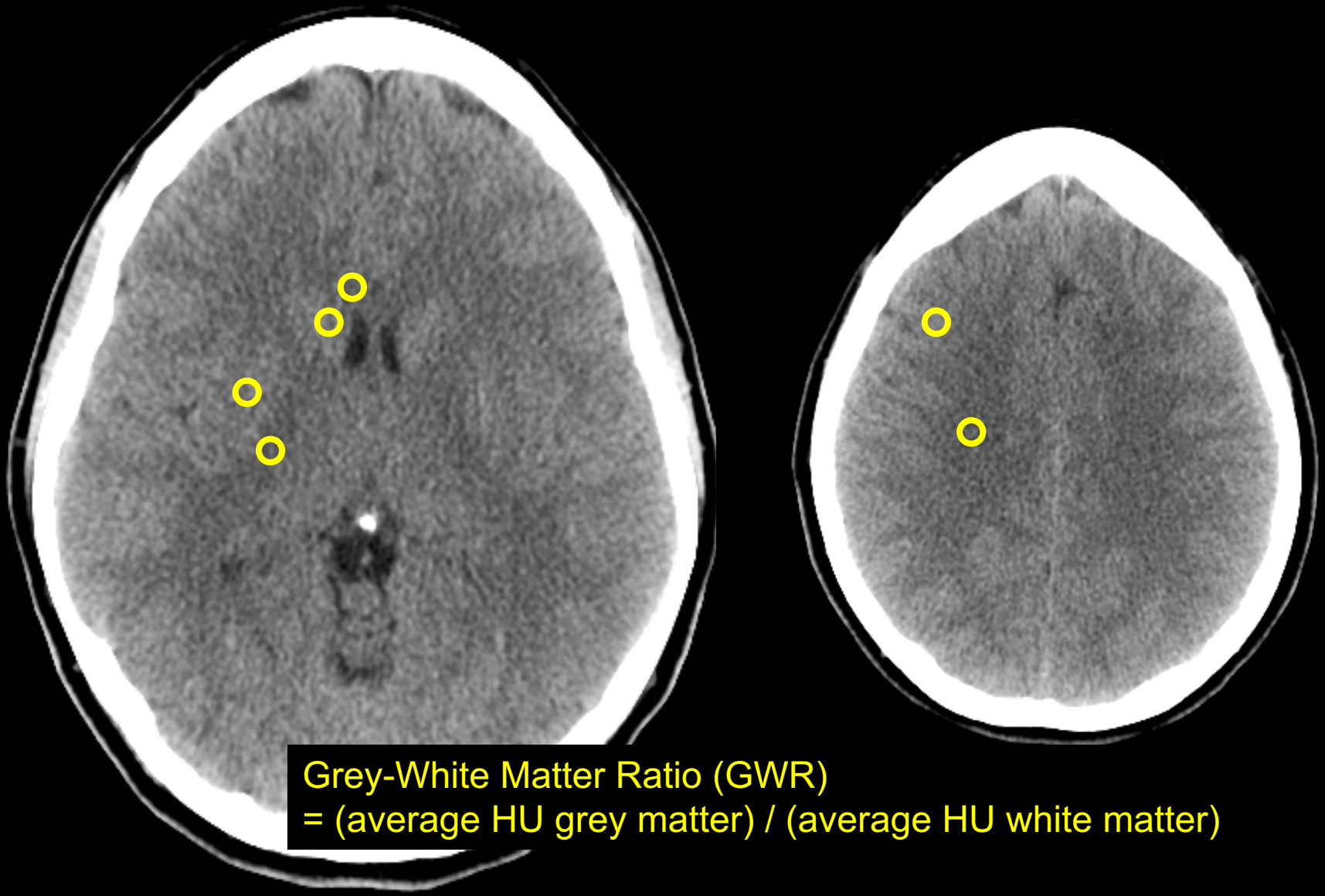
Sandroni et al., Int Care Med 2014

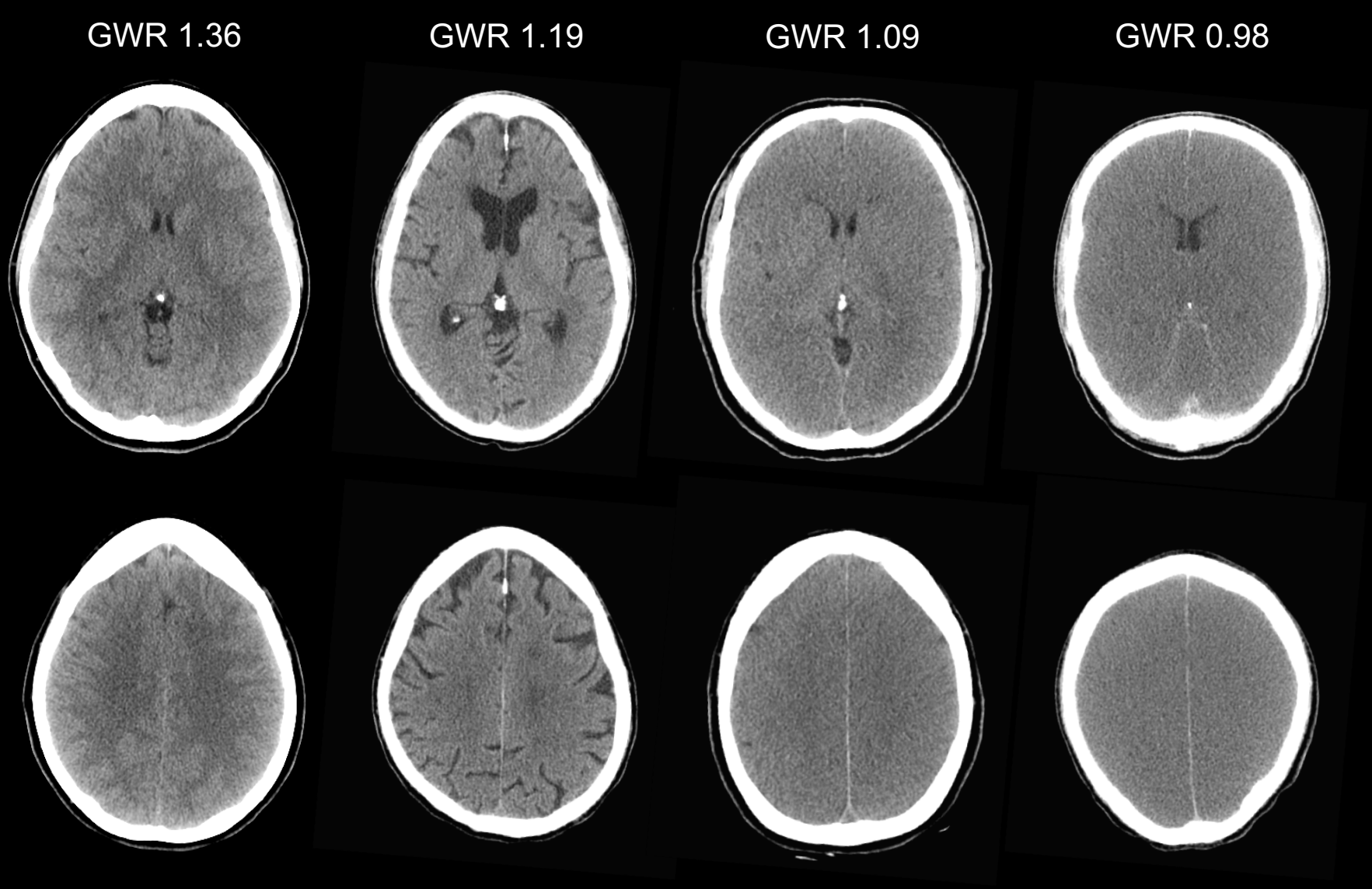


Sandroni et al., Int Care Med 2014

diffuse anoxic brain injury on brain CT




Grey-White Matter Ratio (GWR)
= (average HU grey matter) / (average HU white matter)

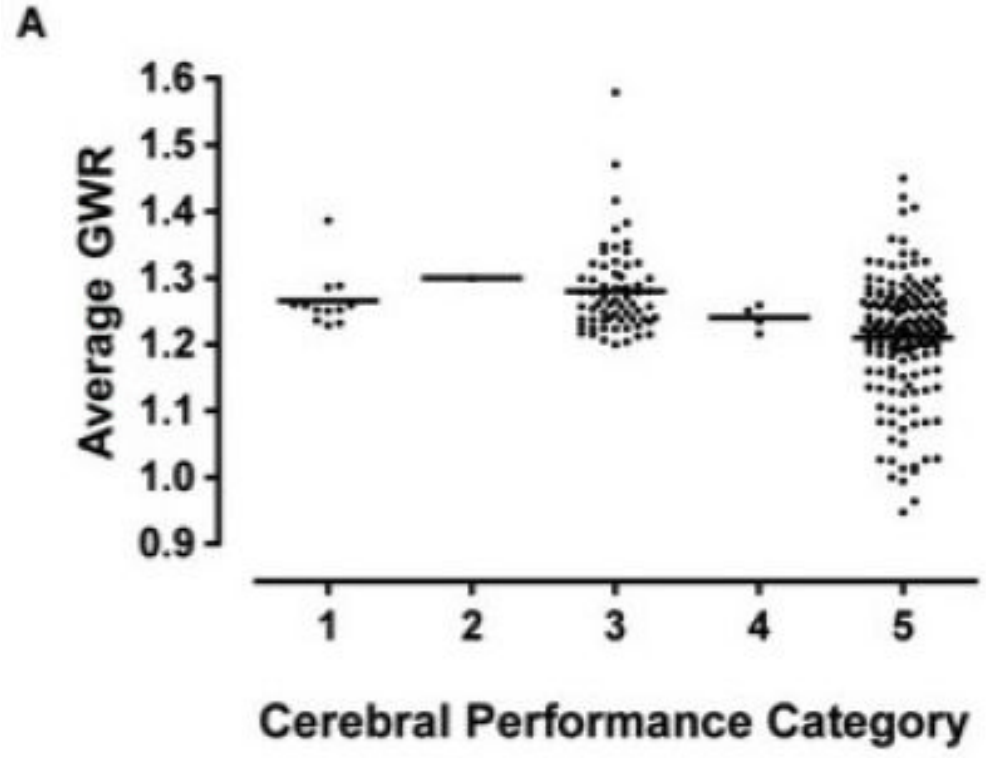

GWR 1.36
GWR 1.19
GWR 1.09
GWR 0.98

Association Between a Quantitative CT Scan Measure of Brain Edema and Outcome After Cardiac Arrest

Robert B. Metter[*], **Jon C. Rittenberger**[*], **Francis X. Guyette**[*], and **Clifton W. Callaway**[*,**]

[*]Department of Emergency Medicine, University of Pittsburgh, Pittsburgh, PA

[**]Department of Pharmacology & Chemical Biology, University of Pittsburgh, Pittsburgh, PA



Metter et al., Resuscitation 2011

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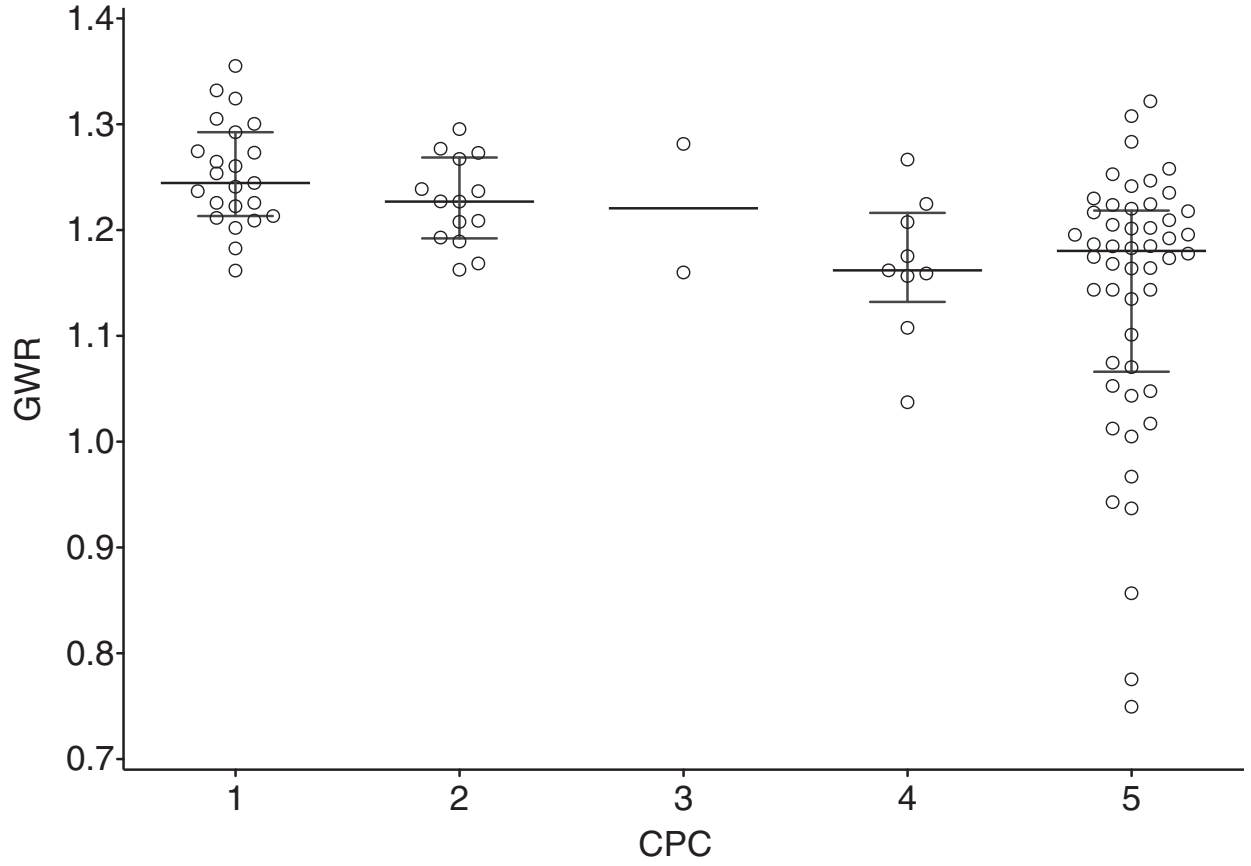
Conclusions—Subjects with severe cerebral edema, defined by GWR<1.20, have very low survival with conventional care, including hypothermia. GWR estimates pre-treatment likelihood of survival after cardiac arrest.

Metter et al., Resuscitation 2011



Scheel et al., Scand. J. Trauma. 2013

Timing of brain CT and prognostication after CA

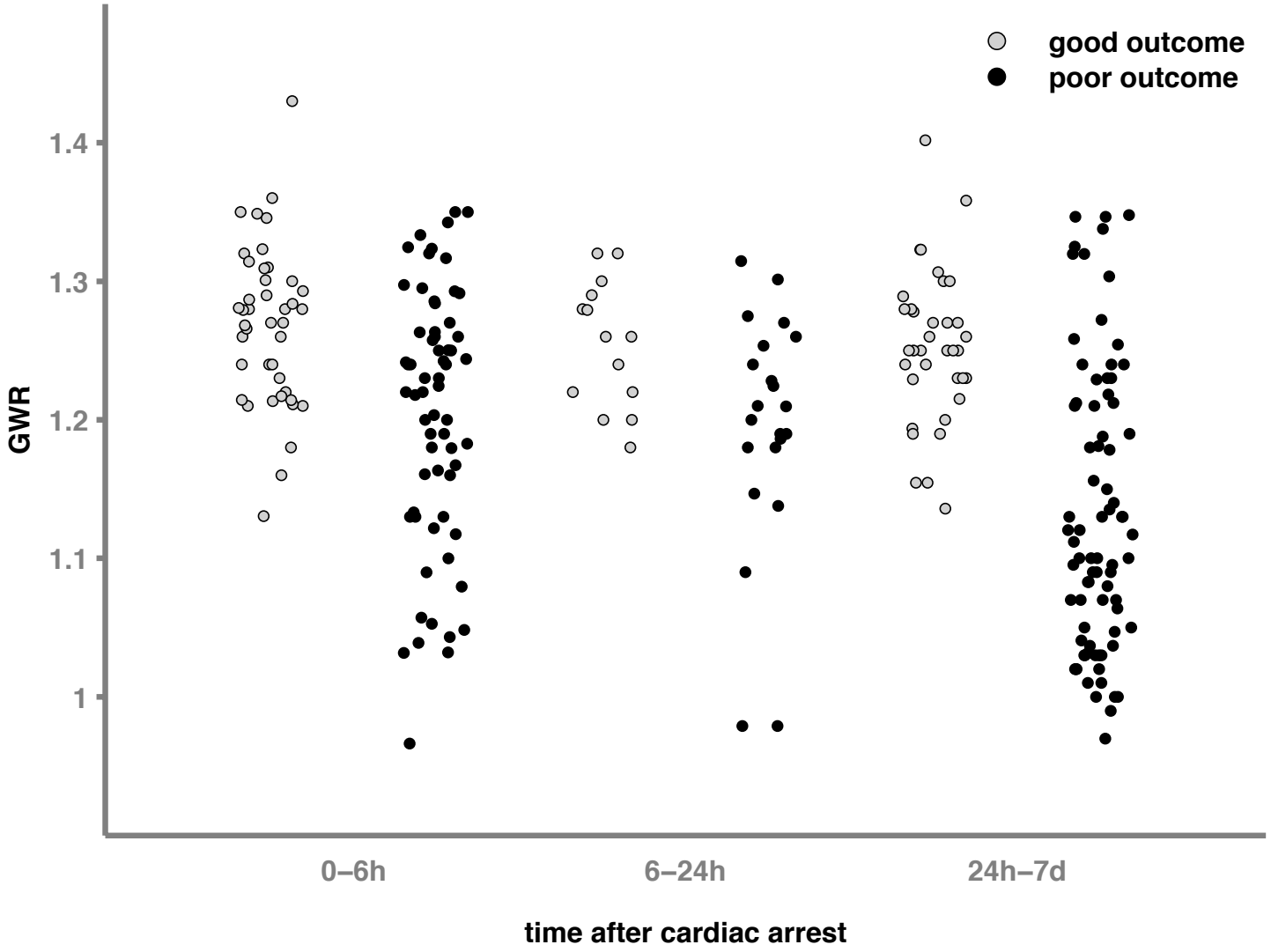
preliminary data

- Retrospective mono-center study

- 195 patients after cardiac arrest
- 33C for 24h

- brain CT at different time points
- 50 patients with repeat-CT (early+late)

- Manual GWR determination (16 ROI)


good outcome
poor outcome
GWR
1.4
1.3
1.2
1.1
1
0–6h
6–24h
24h–7d
time after cardiac arrest

GWR threshold 1.10

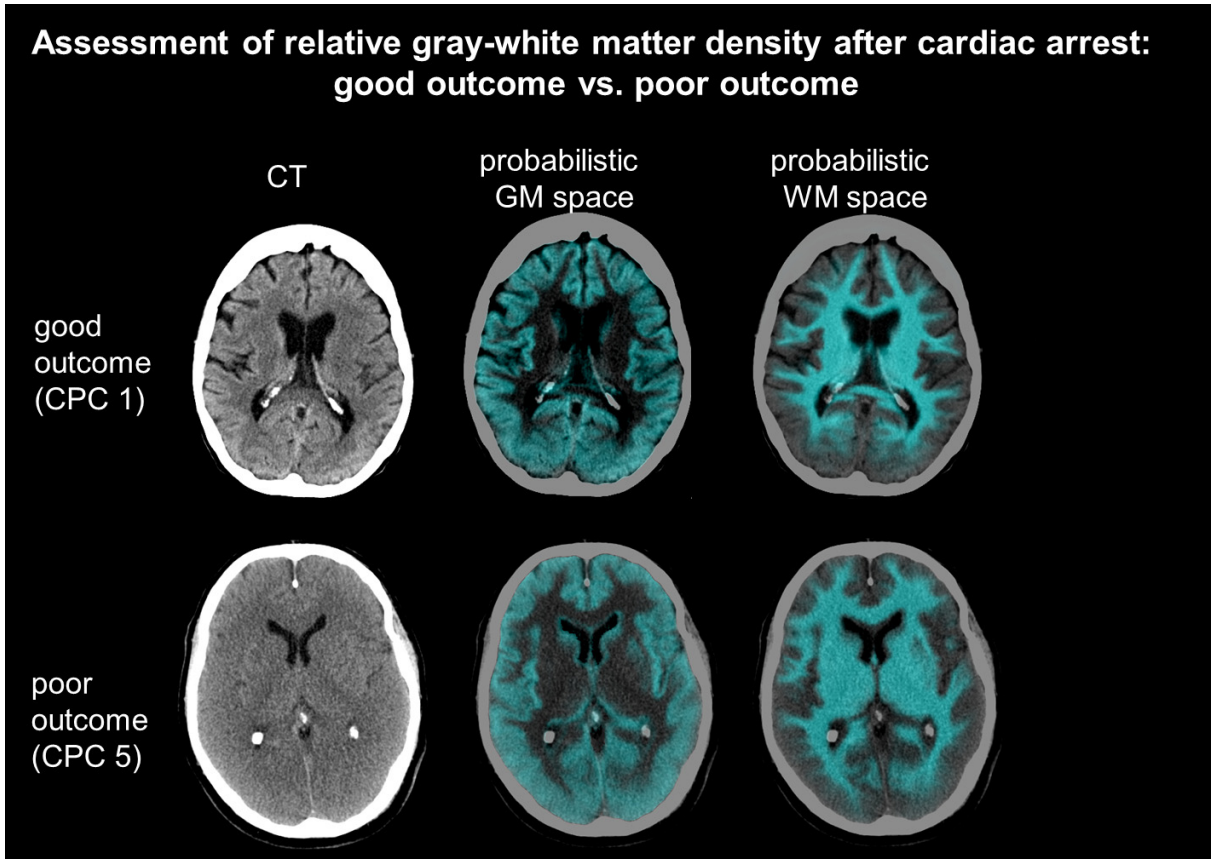
	< 6h (n=106)	6-24h (n=31)	>24h (n=108)
sensitivity	0.17	0.1	0.39
specificity	1	1	1

- 50 patients with both, early and late CT
- 17 good outcome, 33 poor outcome
- GWR threshold 1.10

	Early CT (<6h)	Late CT (>24h)
sensitivity	0.12	0.48
specificity	1	1

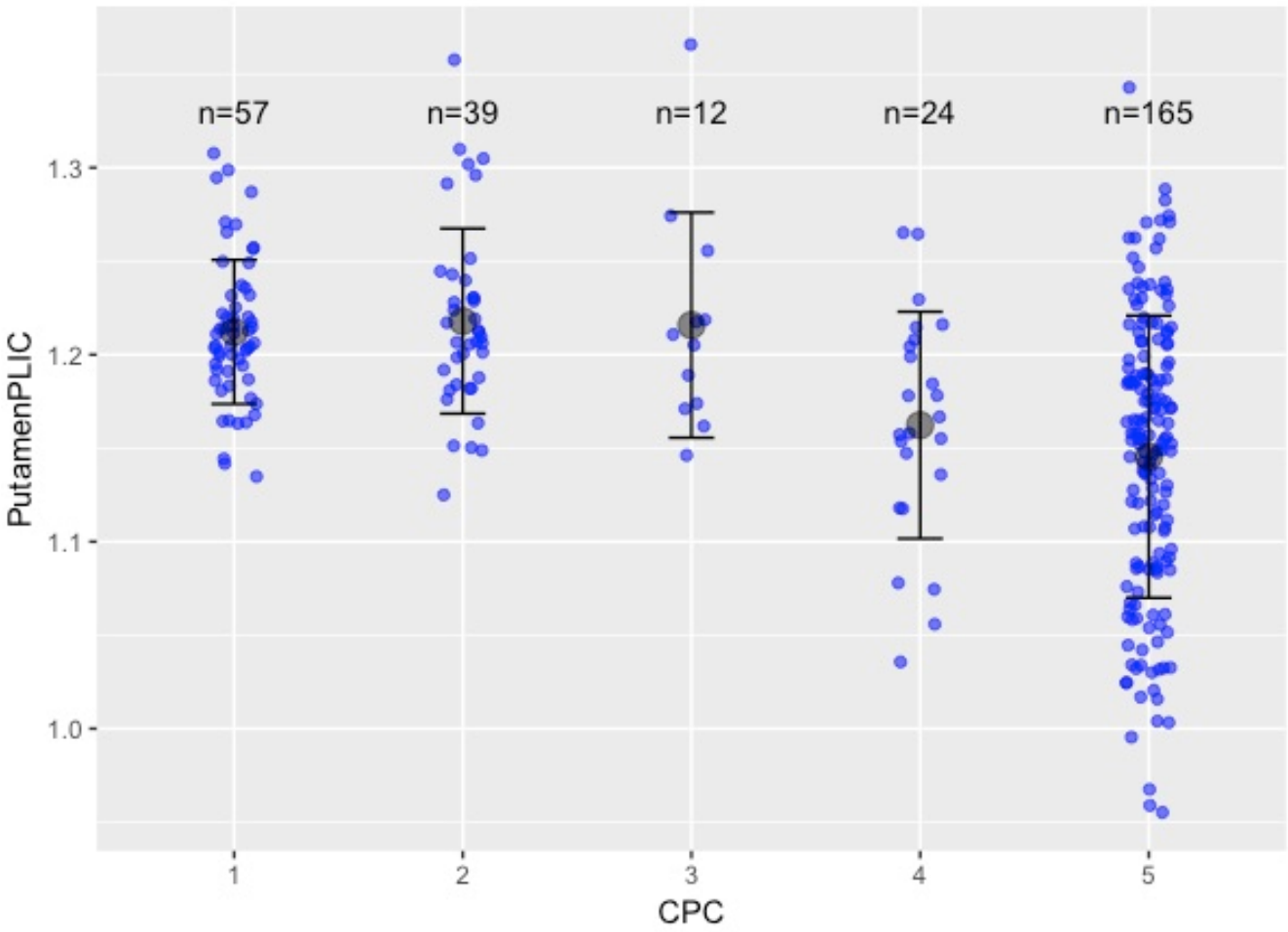
Automated assessment of early hypoxic brain edema in non-enhanced CT predicts outcome in patients after cardiac arrest☆

Uta Hanning[a,b,1], Peter Bernhard Sporns[a,1], Pia Lebiedz[c], Thomas Niederstadt[a], Tarek Zoubi[a], Rene Schmidt[d], Stefan Knecht[e], Walter Heindel[a], André Kemmling[f,g,*]



Hanning et al., Resuscitation 2016

automated determination of GWR/ co-registration of brain CT to atlas



Martin Kenda, preliminary data

Conclusions

GWR <1.10 -> high specificity for poor outcome (CPC4/5)

GWR decreases over the first hours/days after CA in severe HIE

Sensitivity higher for late as compared to early CTs (around 40%)

normal GWR / brain CT does not exclude severe HIE

Automated GWR determination eliminates rater bias