NEURON-SPECIFIC ENOLASE AND PROTEIN S100β ARE NOT AFFECTED BY DIFFERENT TARGET TEMPERATURE MANAGEMENT PROTOCOLS IN A CLINICALLY RELEVANT MODEL

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Purpose of the Study:

Neuron-specific enolase (NSE) and protein S100β are robust predictors of neurological outcome after cardiac arrest. However, the role of both biomarkers in the context of target temperature management (TTM) after cardiac arrest has not been fully studied. Here, we aimed to study serum levels of NSE and protein S100β in a porcine model of cardiac arrest and TTM at 34 °C and 37 °C.

Methods:

Sixteen female Landrace x Large-White pigs underwent a 5 minute cardiac arrest by ventricular fibrillation (CAxVF) followed by advanced life support until return of spontaneous circulation (ROSC). Animals presenting ROSC were randomized to TTM at 34 °C (n=8) or 37 °C (n=8) for 30 h. 37-38 °C is considered normal core temperature in pigs. Serum samples from arterial blood were collected to determine NSE and S100β levels, at 24 h and 30 h after ROSC. NSE was quantified by electro-chemiluminescence immunoassay and S100β by ELISA. At 30h, brains were obtained by craniotomy and fixed in formaldehyde for histological analysis. Hematoxylin-eosin stains of six specific regions were selected and assessed for morphological ischaemic alterations.

Results

Seven animals per group were resuscitated after 11.14 ± 5.2 minutes in TTM 34 °C and 13.4 ± 9.6 minutes in TTM 37 °C. Animals underwent similar administration of adrenaline and number of defibrillations. Time to ROSC was similar in both groups.

Table 1 shows that NSE and S100β concentrations were not statistically different between TTM groups, either at 24 or 30 hours after ROSC. Histological analyses showed similar neuronal death in both groups at 30 hours.

	TTM 34 °C	TTM 37 °C	
NSE 24 h	1.71 ± 0.76 ng/mL	1.86 ± 0.69 ng/mL	p=0.72
NSE 30 h	1 ± 0.58 ng/mL	0.71 ± 0.76 ng/ml	p=0.44
S100β 24 h	0.13 ± 0.024 µg/L	0.14 ± 0.023 µg/L	p=0.66
S100β 30 h	0.13 ± 0.027 µg/L	0.11 ± 0.031 µg/L	p=0.13

Table 1: Mean and standard deviation concentrations of NSE and S100β

Figure 1: Histological Analysis

Conclusions

- In a porcine model of CAxVF and TTM, NSE and S100β peak concentrations were lower than reported in humans.
- Levels of NSE and S100β were not significantly affected by TTM at 34 °C compared with 37 °C.