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NEUROCRITICAL CARE SOCIETY 5TH ANNUAL MEETING NOVEMBER 2-NOVEMBER 3, 2007

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Rio Suite Hotel & Casino Las Vegas, Nevada

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ENHANCING THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST WITH IMMEDIATE INITIATION AND NEUROPHYSIOLOGIC MONITORING IN A RODENT MODEL

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Introduction:

Therapeutic hypothermia (TH) after cardiac arrest (CA) improves outcomes in a fraction of patients. To enhance the administration of TH, we studied brain electrophysiologic monitoring in determining the benefit of early initiation of TH compared to conventional administration in a rat model.

Methods:

Using an asphyxial CA model, we compared the benefit of immediate hypothermia (IH, T=33^{o}C, immediately post-resuscitation, maintained 6 hours) to conventional hypothermia (CH, T=33^{o}C, starting 1 hour post-resuscitation, maintained 12 hours) via surface cooling. We tracked quantitative EEG using relative entropy (qEEG) with outcome verification by serial Neurological Deficit Score (NDS) and quantitative brain histopathological damage scoring (HDS). Thirty-two rats were divided into 4 groups based on CH/IH and 7/9-minute duration of asphyxial CA. Four sham rats were included for evaluation of the effect of hypothermia on qEEG.

Results:

The 72-hour NDS of the IH group was significantly better than the CH group for both 7-minute (74/63; Median, IH/CH, $p<0.001$) and 9-minute (54/47, $p=0.022$) groups. qEEG showed greater recovery with IH ($p<0.001$) and significantly less neuronal cortical injury by HDS (IH: 18.9±2.5% versus CH: 33.2±4.4%, $p=0.006$). The 1-hour post-resuscitation qEEG correlated well with 72-hour NDS ($p<0.05$) and 72-hour behavioral subgroup of NDS ($p<0.01$). No differences in qEEG were noted in the sham group.

Conclusions:

Immediate but shorter hypothermia compared to CH leads to better functional outcome in rats after 7- and 9- minute CA. The beneficial effect of IH was readily detected by neuro-electrophysiologic monitoring and histological changes supported the utility of this observation.

References:

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