

# Preliminary observations in systemic oxygen consumption during targeted temperature management after cardiac arrest

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## Aim

Limited data suggests low oxygen consumption ( $VO_2$ ), driven by mitochondrial injury, is associated with mortality after cardiac arrest. Due to the challenges of measurement in the critically ill, post-arrest metabolism remains poorly characterized. We monitored  $VO_2$ , carbon dioxide production ( $VCO_2$ ) and the respiratory quotient (RQ) in post-arrest patients and explored associations with outcome.

## Methods

Using a gas exchange monitor, we measured continuous  $VO_2$  and  $VCO_2$  in post-arrest patients treated with targeted temperature management. We used area under the curve and medians over time to evaluate the association between  $VO_2$ ,  $VCO_2$ , RQ and the  $VO_2$ :lactate ratio with survival.

## Results

In 17 patients,  $VO_2$  in the first 12 h after return of spontaneous circulation (ROSC) was associated with survival (median in survivors 3.35 mL/kg/min [2.98,3.88] vs. non-survivors 2.61 mL/kg/min [2.21,2.94],  $p = .039$ ). This did not persist over 24 h. The  $VO_2$ :lactate ratio was associated with survival (median in survivors 1.4 [IQR: 1.1,1.7] vs. non-survivors 0.8 [IQR: 0.6,1.2]  $p < 0.001$ ). Median RQ was 0.66 (IQR 0.63,0.70) and 71% of RQ measurements were  $< 0.7$ . Patients with initial RQ  $< 0.7$  had 17% survival versus 64% with initial RQ  $> 0.7$  ( $p = .131$ ).  $VCO_2$  was not associated with survival.

## Conclusions

There was a significant association between  $VO_2$  and mortality in the first 12 h after ROSC, but not over 24 h. Lower  $VO_2$ :lactate ratio was associated with mortality. A large percentage of patients had RQs below physiologic norms. Further research is needed to explore whether these parameters could have true prognostic value or be a potential treatment target.

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