



## Background

Immediate inhalation of hydrogen (H<sub>2</sub>) has been demonstrated to improve post-resuscitation (PR) neurological dysfunction. However, applying inhaled H<sub>2</sub> early is not practical, especially in out of hospital cardiac arrest because of safety issues. In the present study, we investigated the effects of delayed treatments with H<sub>2</sub> on post resuscitation neurological function in a porcine model of prolonged cardiac arrest (CA). We hypothesized that delayed inhalation of H<sub>2</sub> mitigates neurological dysfunction after resuscitation in a CA porcine model.

## Methods

### Animal Model

Eighteen male domestic pigs weighing 39 ± 2 kg were utilized. Ventricular fibrillation (VF) was induced electrically and CPR was initiated after 10 minutes of untreated VF. All the animals were resuscitated successfully and randomized into two groups immediately following resuscitation: delayed inhalation of H<sub>2</sub> (DH group, N=9) or inhalation of room air (C group, N=9). Animals in the DH group were ventilated with 2% H<sub>2</sub>/21% oxygen from 2h post resuscitation (PR) to PR 4h. Serum levels of S100B and neuron-specific enolase (NSE) were measured by ELISA at baseline and PR 360 minutes. The neurological deficit score (NDS) and survival were evaluated daily for a total of 72 hours.

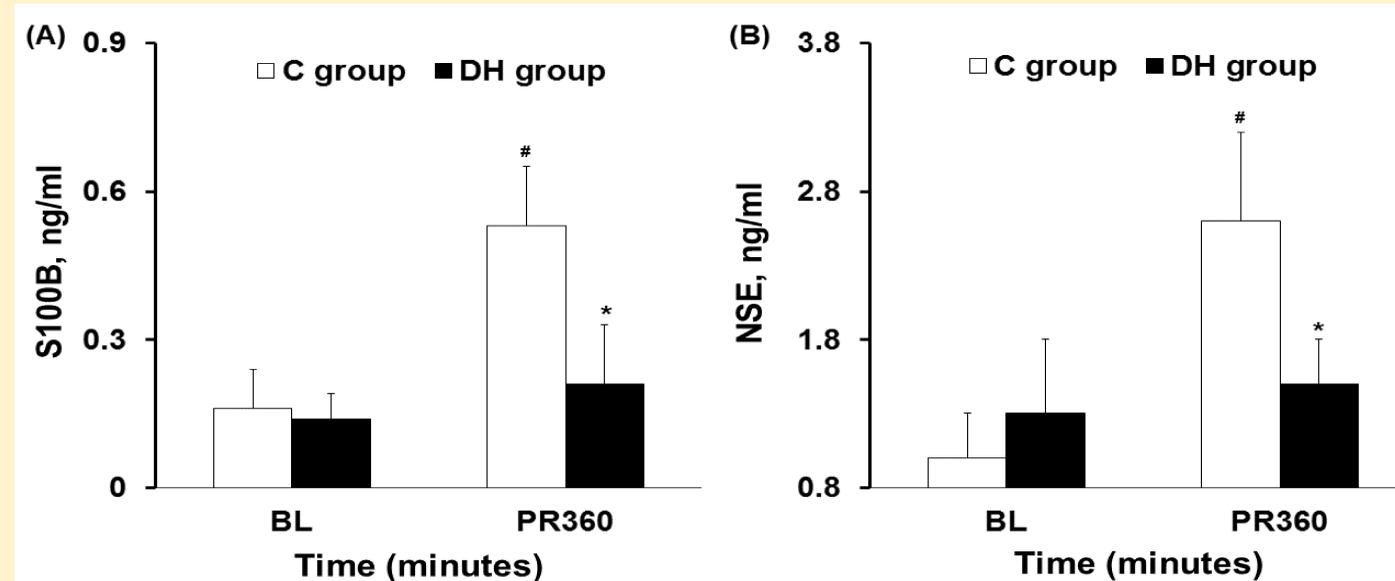
## Results

Table 1. Survival Outcomes

	NDS			Survival duration, hours
	At 24h	At 48h	At 72h	
<b>C group</b>	<b>380 ± 40</b>	<b>387 ± 38</b>	<b>386 ± 42</b>	<b>23.3 ± 28.3</b>
<b>DH group</b>	<b>270 ± 122 *</b>	<b>224 ± 168*</b>	<b>211 ± 181*</b>	<b>61.7 ± 41.7*</b>

Values are presented as mean ± SD. NDS, neurological deficit score; C group, control group; DH group, two hours delayed inhalation of H<sub>2</sub> group. \* *p* < .05 vs. the C group

Figure 1. Changes in serum concentration of S100B and NSE.



The level of: (A) S100B; (B) NSE; NSE, neuron-specific enolase; BL, baseline; PR, post-resuscitation; C group, control group; DH group, two hours delayed inhalation of H<sub>2</sub> group. # *p* < .05 vs. BL. \* *p* < .05 vs. the C group.

Better survival duration and NDS at 24h, 48h and 72h were observed in the DH group animals compared with those of the C group (Table 1). The serum levels of S100B and NSE were significantly lower in the DH group when compared with the C group (Figure 1).

## Conclusions

Delayed treatment of H<sub>2</sub> mitigates neurological injury and reduces the severity of neurological dysfunction after resuscitation.

## References

- Hayashida K, Sano M, Kamimura N, et al. J Am Heart Assoc. 2012; 1: e003459.
- Wang P, Jia L, Chen B, et al. Shock. 2016;46(3):312-8.

## Disclosure

None