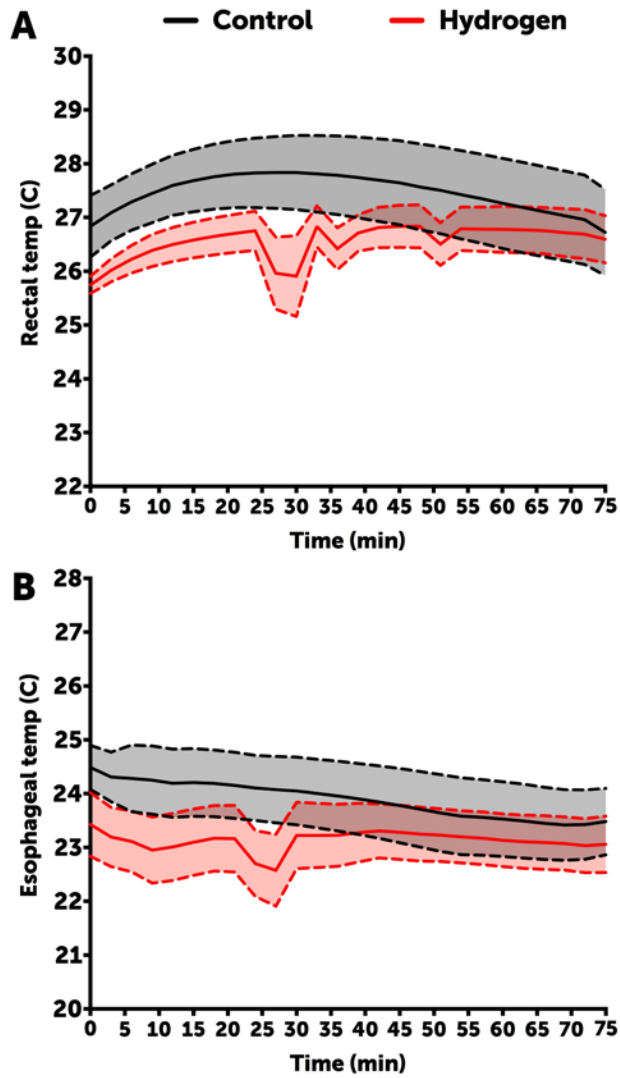


Online Figures

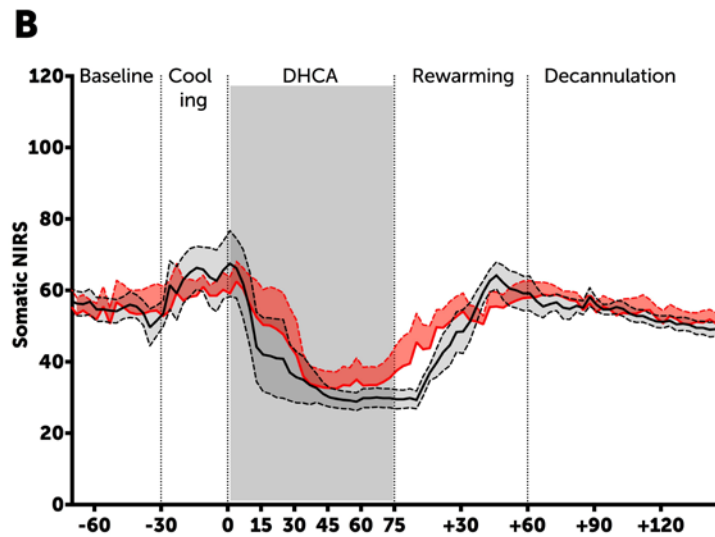
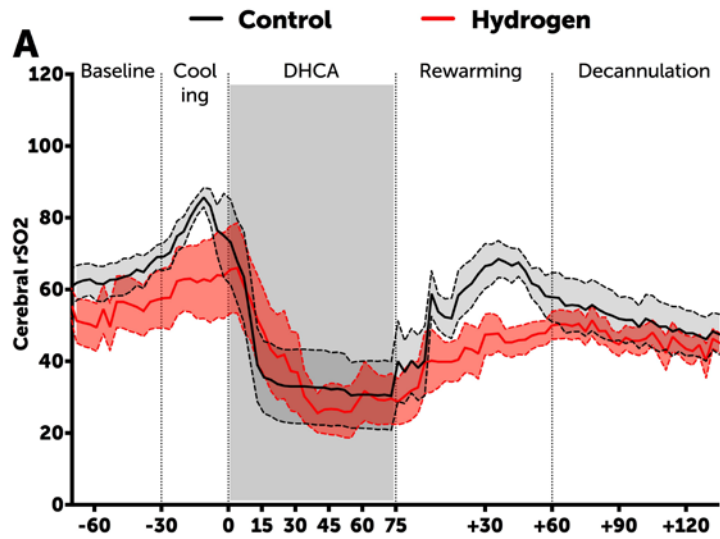


Supplemental Figure S1. (A) Certified, non-flammable mixtures of 2.40% hydrogen gas mixed in either medical air or oxygen were used for this experiment. These tanks were attached to a gas regulator (High Purity 2012 Series regulator by ProStar Platinum, part number PRS20122301)

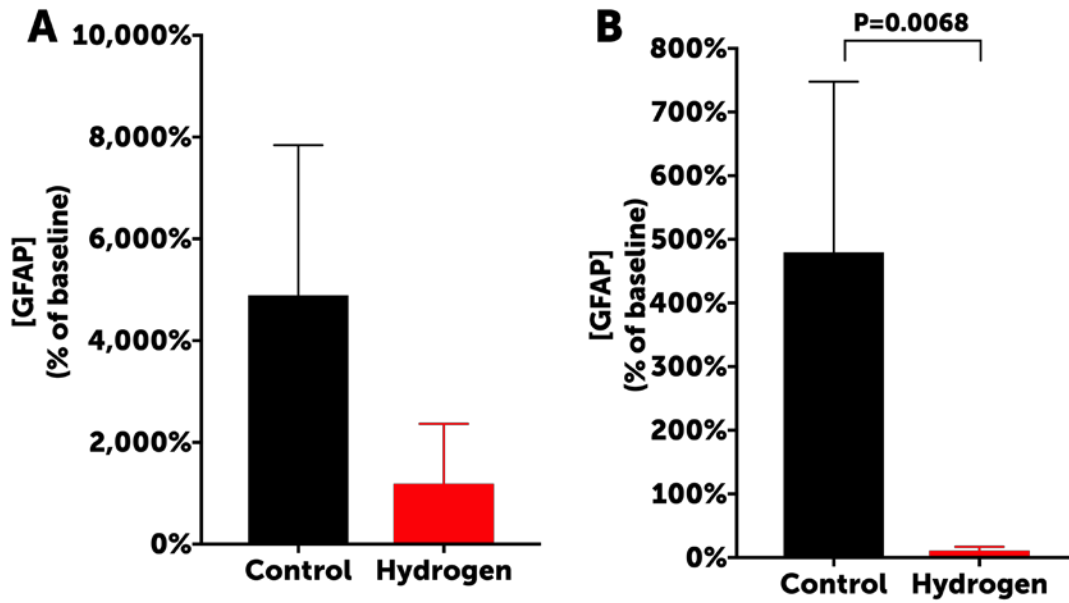
set to 50 PSI, followed by a flash arrestor and check valve (SGD, Inc, model 8491-F), then directly to the oxygen and air inlet (respectively) of the ventilator or anesthesia machine. **(B)** Hydrogen-oxygen-carbon dioxide mixtures were also obtained with 0, 4, 6, and 8% carbon dioxide for perfusion under deep hypothermia using a pH stat strategy.



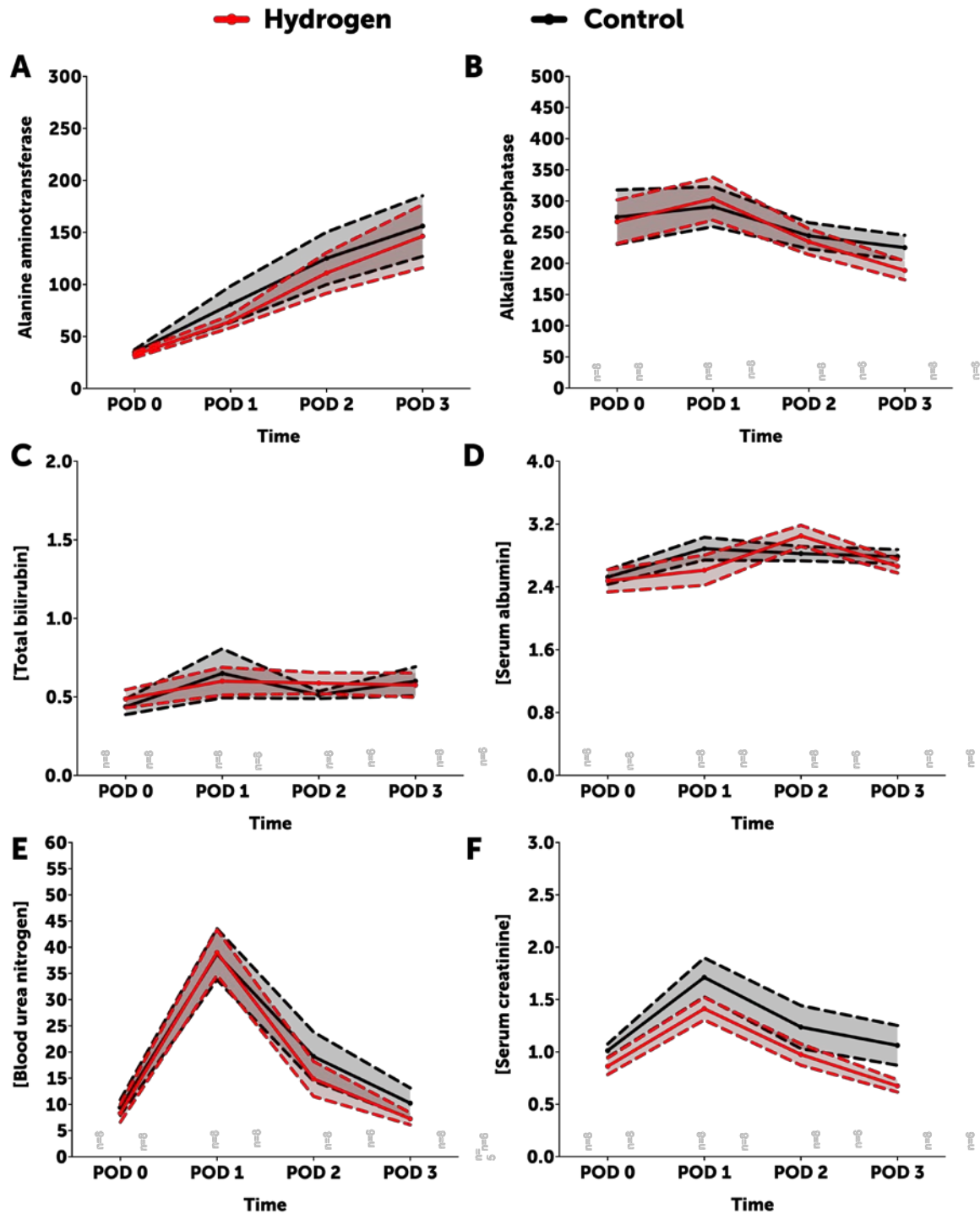
Supplemental Figure S2. There were no significant differences in rectal (**A**, $P=0.2367$, 2 way repeated measures ANOVA) or esophageal (**B**, $P= 0.3541$) temperatures throughout the duration of DHCA.



Supplemental Figure S3. There were no significant differences in cerebral (C, $P=0.2079$) or somatic (D, $P=0.8484$) near infrared spectroscopy (NIRS) values between groups. For **A-D**, data are means, error is SEM.

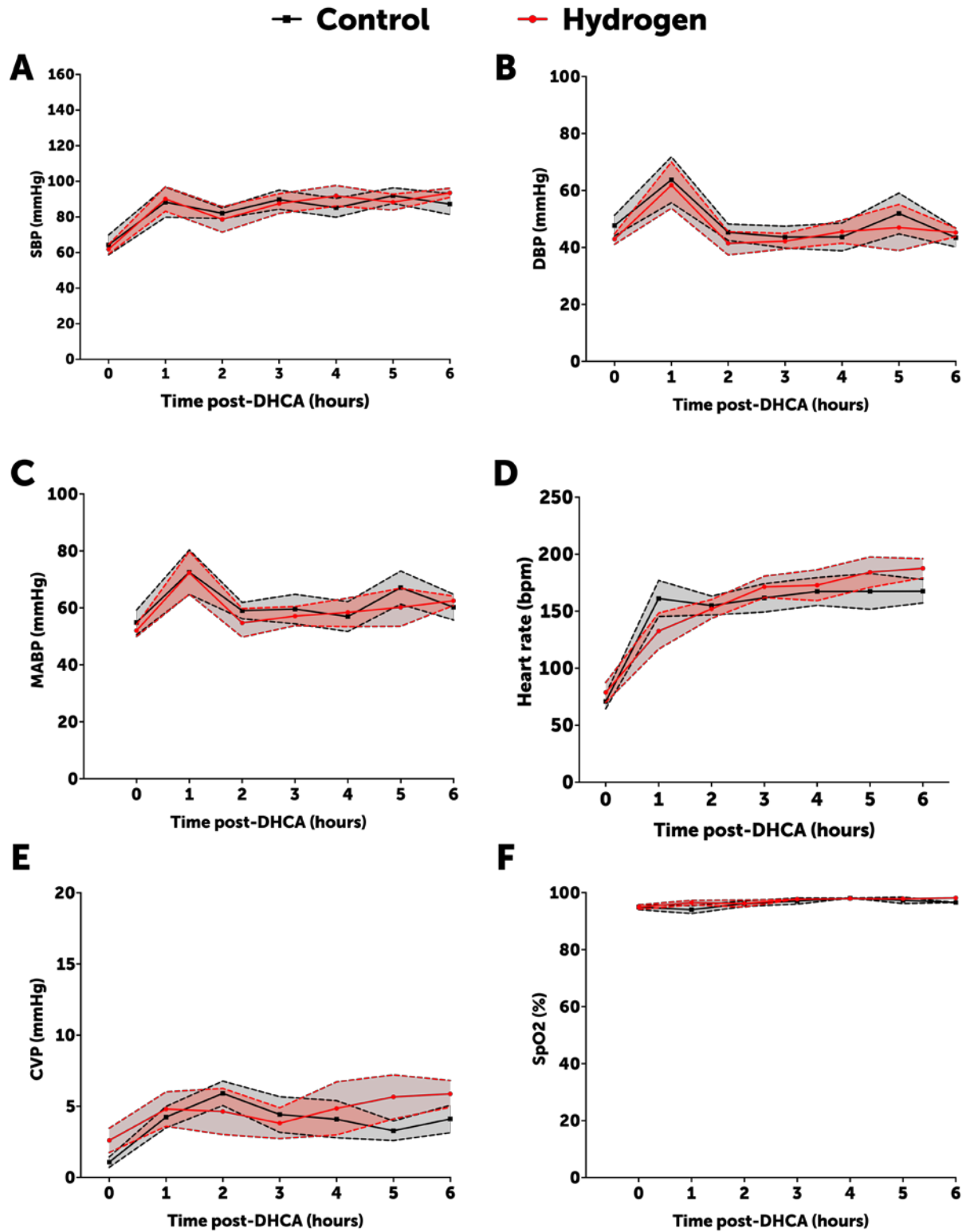


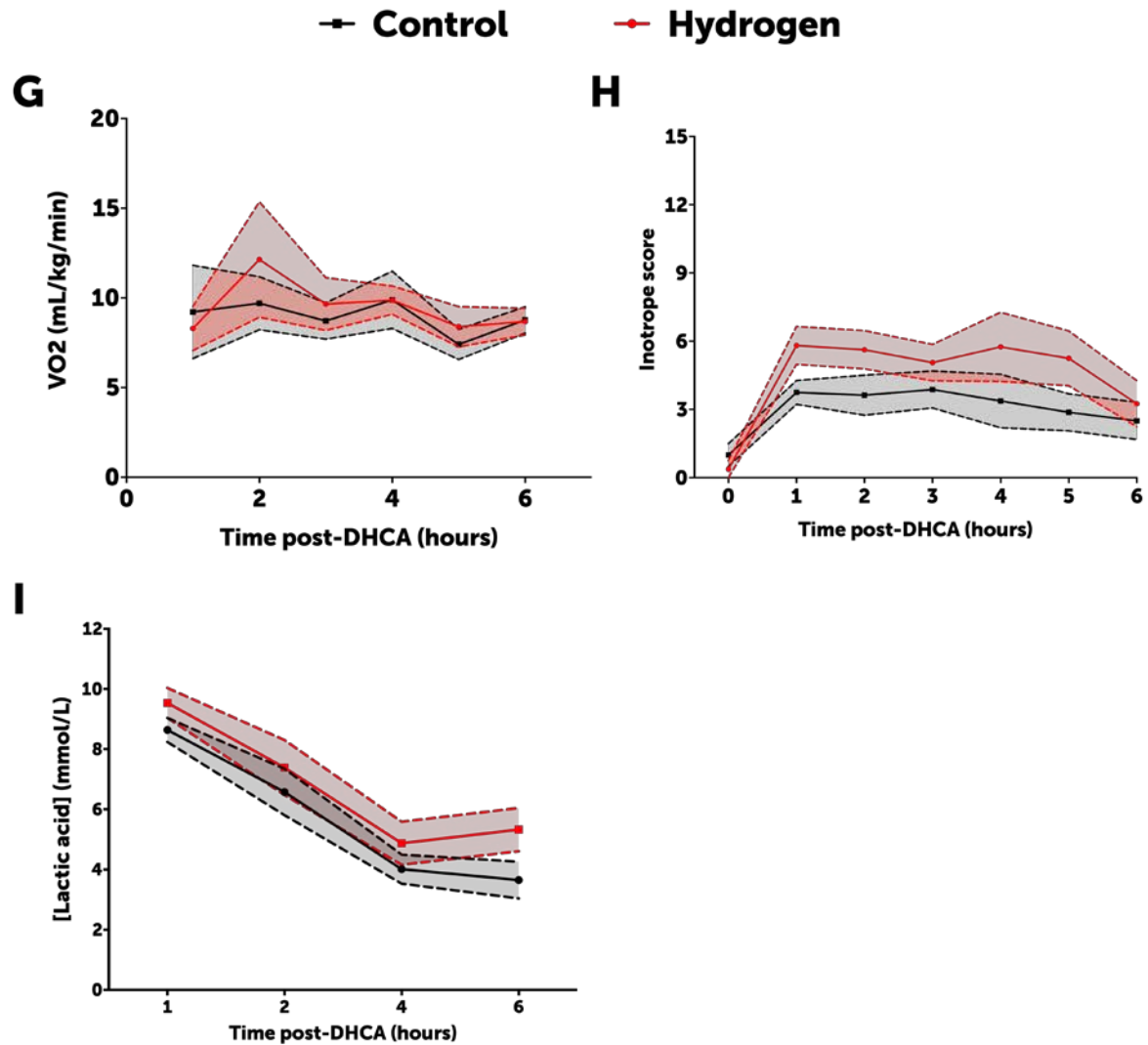
Supplemental Figure S4. The change from baseline concentration of glial fibrillary acidic protein ([GFAP], an acute serum marker of neuronal injury) at 30 (**A**, $P=0.06$) and 60 (**B**, $P=0.0068$) minutes post-bypass. Groups compared by Mann-Whitney test. Data shown are means, error is SEM.



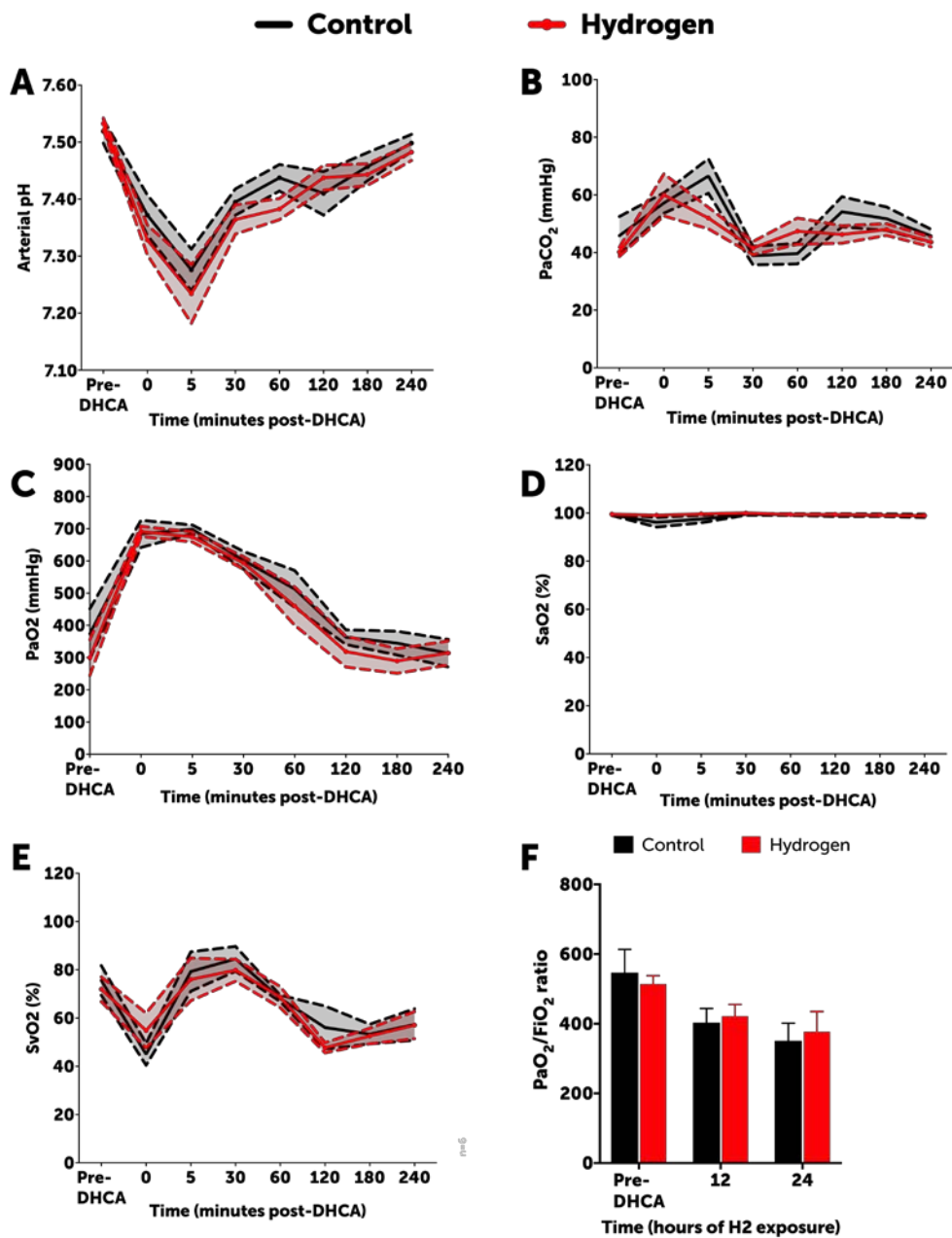
Supplemental Figure S5. There were no significant differences between groups in alanine aminotransferase (A, $P=0.56$), alkaline phosphatase (B, $P=0.75$), total bilirubin (C, $P=0.88$), serum albumin (D, $P=0.57$), or blood urea nitrogen concentration (E, $P=0.52$). H_2 -treated swine

exhibited a significantly lower serum creatinine over time (**F**, $P=0.0152$). For A-F, data are means, error are SEM, groups compared over time by repeated measures 2-way ANOVA.



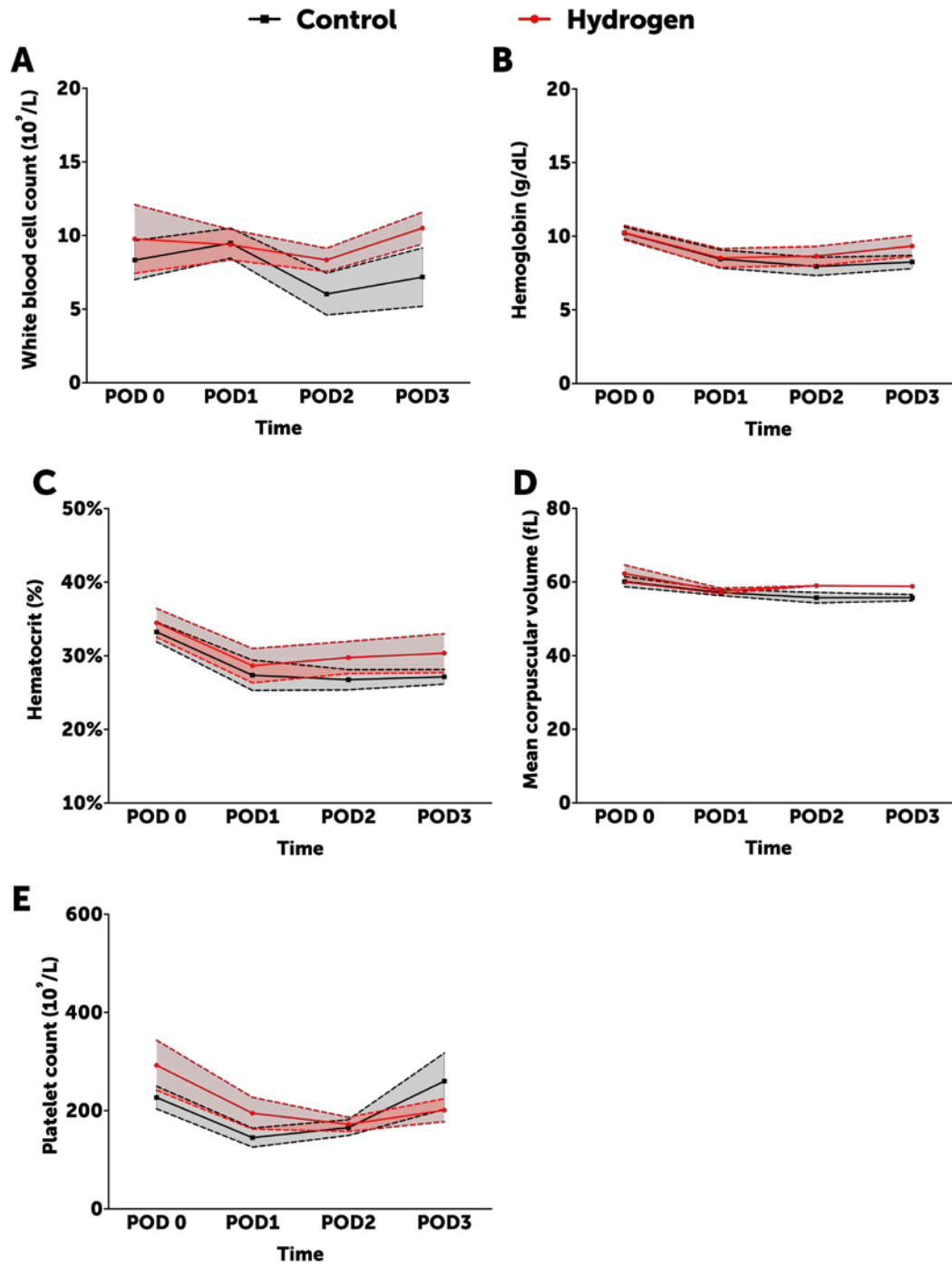


Supplemental Figure S6. There were no significant differences between groups in systolic (**A**, $P=0.92$), diastolic (**B**, $P=0.56$), or mean arterial blood pressure (**C**, $P=0.61$), heart rate (**D**, $P=0.73$), central venous pressure (**E**, $P=0.57$), pulse oximetry (SpO₂, **F**, $P=0.23$), oxygen consumption (**G**, $P=0.63$), inotrope score (**H**, $P=0.18$), or in serum lactic acid concentration (**I**, $P=0.16$) in the first 6 hours postoperatively. For A-I, data are means, error are SEM, groups compared over time by repeated measures 2-way ANOVA.



Supplemental Figure S7. There were no significant differences between groups in arterial pH (A, $P=0.23$), arterial tension of carbon dioxide (B, PaCO₂, $P=0.21$), or arterial oxygen tension (C, PaO₂, $P=0.24$), arterial oxyhemoglobin saturation (D, SaO₂, $P=0.30$), venous oxyhemoglobin saturation (E, SvO₂, $P=0.75$) in the first 6 hours postoperatively. There was also no difference in the ratio between arterial oxygen tension and inspired oxygen fraction (F, PaO₂/FiO₂ ratio,

P=0.91) For A-F, data are means, error are SEM, groups compared over time by repeated measures 2-way ANOVA.



Online Figure 8. There were no significant differences between groups in white blood cell count (A, $P=0.32$), hemoglobin (B, $P=0.46$), hematocrit (C, $P=0.34$), mean corpuscular volume

(**D**, $P=0.11$), or platelet count (**E**, $P=0.69$). For A-E, data are means, error are SEM, groups compared over time by repeated measures 2 way ANOVA.

Supplemental Table

Behavior	Laterality	Normal	Weak	Absent
Cranial nerve examination				
Pupil size	Right	0	2	5
	Left	0	2	5
Light reflex	Right	0	2	5
	Left	0	2	5
Eye position	Right	0	2	5
	Left	0	2	5
Lid reflex	Right	0	2	5
	Left	0	2	5
Corneal reflex	Right	0	2	5
	Left	0	2	5
Cilio-spinal reflex	Right	0	2	5
	Left	0	2	5
Oculocephalic reflex		0	2	5
Auditory reflex		0	2	10
Gag reflex		0	5	10
Carinal reflex		0	5	15
Respiratory Pattern				
Normal				0
Hyperventilation				25
Abnormal spontaneous breathing (e.g. irregular)				50
Apnea				100
Motor and Sensory Function				
Stretch reflex		0	10	25
Motor response to pain		0	10	25
Positioning		0	10	25
Muscle tone		0	10	25
Level of consciousness				
Normal				0
Cloudy				30
Delirium				45
Stupor				60
Coma				100
Behavior				
Drinking		0		15
Chewing		0		15
Sitting		0		15
Standing		0		15

Walking	0	20	40
Total possible score (worst score) = 500; normal (best score) = 0			

Online Table 1. Details of the swine neurologic deficit score. The oculocephalic and ciliospinal reflexes were not performed in any animals.