Publication Brief

Application of the Ultrasound Dilution Technology for Cardiac Output Measurement: Cerebral and Systemic Hemodynamic Consequences in a Juvenile Animal Model

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OBJECTIVE
To analyze cerebral and systemic hemodynamic consequences of ultrasound dilution cardiac output measurements by evaluating their effect on cerebral and systemic circulation and oxygenation in piglets.

STUDY
- COstatus® ultrasound dilution cardiac output measurements were performed in nine ventilated, anesthetized piglets.
- Interventions required for ultrasound dilution cardiac output measurement were evaluated for their effect on cerebral and systemic circulation and oxygenation.

RESULTS
- Starting and/or stopping blood flowing through the AV loop did not cause relevant hemodynamic changes.
- Quick isotonic saline injections resulted in a biphasic change in ΔtHbD and ΔtHb. After injection of 0.5 mL/kg, the mean (sd) increase in ΔtHbD and ΔtHb was 0.175 (0.213) mumol/L and 0.122 (0.148) mumol/L, respectively, with a subsequent mean decrease of -0.191 (0.299) mumol/L and -0.312 (0.266) mumol/L.
- 1.0 mL/kg injections caused a mean increase in ΔtHbD and ΔtHb of 0.237 (0.203) mumol/L and 0.179 (0.162) followed by a mean decrease of -0.334 (0.407) mumol/L and -0.523 (0.335)mumol/L, respectively.
- Q and Q changed shortly with a mean increase of 5.9 (3.0) mL/kg/min and 0.23 (0.10) mL/kg/min after injection of 0.5 mL/kg and with 12.0 (4.2) mL/kg/min and 0.44 (0.18) mL/kg/min after injection of 1.0 mL/kg, respectively. The observed changes were more profound after an injection volume of 1.0 mL/kg compared with 0.5 mL/kg for ΔtHbD (p = .06), ΔtHb (p = .09), Q, and Q (p < .01).
- The indicator injection caused no relevant changes in mean arterial blood pressure or heart rate.

STUDY’S CONCLUSIONS
Cardiac output measurement by COstatus® ultrasound dilution does not cause clinically relevant changes in cerebral and systemic circulation and oxygenation in a piglet model.

COSTATUS® OBSERVATIONS
COstatus® measurements can be safely performed in a juvenile model without interfering with other vital signs.

REFERENCES
(Transonic Reference # LCO8002A)