

Print

Close

**A862**

October 26, 2005

9:00:00 AM - 11:00:00 AM

Hall C4

**USCOM, Non-Invasive Doppler - An Accurate Measurement of Cardiac Output?**

Peter R. Lichtenhal, M.D., Rob A. Phillips, M.S., Julie A. Sloniger, M.S., Copeland A. Jack, M.D.  
Department of Anesthesiology, University of Arizona, Tucson, Arizona, United States

---

**Introduction:** The acquisition of non-invasive cardiac output (CO) has long been a goal of clinical medicine. Although numerous, "non-invasive" devices vary in invasiveness and reliability and have not proven their worth. The USCOM device (USCOM Ltd, Sydney, Australia) is a novel non-invasive CW Doppler device for measurement of right and left sided CO. The aim of this study was to validate USCOM CO measurements by this device in humans. Measurements were made in patients with an implanted CardioWest (Cwest) device (Syncardia, Tucson, Arizona), which consists of a pneumatic blood pump which delivers measured pulsatile flow to an implanted artificial heart and the native circulation, and displays the delivered hemodynamic parameters. As it is not feasible to place Flow probes chronically in humans, the CardioWest patients were chosen because the circulation could be mechanically controlled and accurately measured. Additionally, in these patients, it is still possible to measure Doppler outputs accessing their native vessels.

**Method:** In an IRB approved protocol, 461 paired measurements were analysed from 11 examinations of 4 adults, in whom the CWest pump was mechanically varied to create a range of COs. Right and left sided CO, SV and HR values were measured by the USCOM system and compared with contemporaneous averaged values recorded on the CWest. Mean values, Pearson's correlation coefficients and Bland-Altman analysis were used to compare results.

**Results:** Mean CO, SV and HR values by USCOM and CWest were  $7.26 \pm 0.66$  and  $7.23 \pm 0.57$  l/min,  $55.0 \pm 4.6$  and  $54.6 \pm 3.7$  ml and  $132 \pm 5$  and  $132 \pm 4$  bpm respectively. CO varied from 5.2 to 8.9 l/min, SV 44 to 71 ml, and HR 115 to 143 bpm. The mean differences between methods for CO, SV and HR were  $0.03 \pm 0.49$  l/min,  $0.42 \pm 3.66$  ml, and  $-0.38 \pm 3.7$  bpm respectively, with mean errors between measures of 0.34%, 0.64% and -0.38%. Mean difference between methods and 95% CIs for all examinations are illustrated in figure 1. There was good correlation of CO, SV and HR measures by both methods without significant difference (all  $p < 0.005$ ). [figure1] **Conclusion:** This study confirms the accuracy of the USCOM CW Doppler hemodynamic measurements and the feasibility of obtaining reliable non-invasive cardiac output measurements in adults.

Anesthesiology 2005; 103: A862

**Figure 1**