



Content from Quarterly Updates in
Optimizing Cardiac Surgery®

Where product, protocol and information intersect.



Why Air Bubble Removal is Important

A number of studies indicate that the presence of gaseous microemboli (GME) in the extracorporeal circuit is a clinical concern and some demonstrate an association between GME and neurological damage or other organ failure after cardiac surgery.

Barak M, et al. *Microbubbles: Pathophysiology and Clinical Implications*. Chest 2005;128:2918-2932.

The authors review evidence of the biological and clinical detrimental effects of microbubbles, and discuss management of the microbubble problem with regard to detection, prevention, and treatment.

Dickinson TA, et al. *In vitro Evaluation of the Air Separation Ability of Four Cardiovascular Manufacturer Extracorporeal Circuit Designs*. JECT 2006; 38:206-213.

Acknowledging that neurologic impairment is a common complication of cardiac surgery and that cerebral GME are associated with cognitive impairment after cardiac surgery, the authors studied and compared the ability of four extracorporeal circuits to eliminate air. They concluded that there are substantial and significant air handling differences between the four circuits.

Kurusz M, et al. *Bubbles and Bypass: an Update* Perfusion 2004;19:S49-S55.

The authors provide a review of the literature related to embolic air, both large and microscopic, in the blood stream. They conclude that although an awareness of etiologies and technological advances have nearly eliminated gross air embolism in the bloodstream, microscopic air remains a concern.

Stump DA. *Triad of Organ Protection*. Heart Surgery Forum Reviews Vol 4; Issue 2:7-12 clinical and surgical

The author summarizes the findings of the Wake Forest University Cardiovascular Neuroprotection Study Team that combined research, and clinical and surgical expertise to develop ways to minimize negative outcomes from cardiac surgery, specifically brain injury. The team focused on minimizing sources of microemboli including: return of shed blood, temperature management, and minimizing manipulation of the aorta.

Stump DA, et al. *How Effective are Cardiopulmonary Bypass Circuits at Removing Gaseous Microemboli?* JECT 2002;34:34-39.

The authors conclude that air introduced into the venous line during CPB results in the formation of GME (gaseous microemboli) that are able to pass through all the circuit components including the arterial filter. The quantity of GME detected in the arterial line is influenced by the design of the circuit components and varies between manufacturers.