Response: Evaluation of Quadrox-i® Adult Hollow Fiber Oxygenator with Integrated Arterial Filter

To the Editor,

We greatly appreciate Drs. Simons and Weerwind’s interest and comments on our recent article entitled Evaluation of Quadrox-i® Adult Hollow Fiber Oxygenator with Integrated Arterial Filter (1).

Regarding comments on different emboli counts and volume at the venous site between the two groups, we would clarify that the duration of bolus air injection was 15 seconds and the duration of data collection was 5 minutes. As we stated in the discussion section of the article, in this particular in-vitro design, we specifically selected the amount of air and duration of data collection based on our previous experiences with this novel device (2–4). Once we injected the bolus air in the venous site, only a fraction of air can be captured at the first pass through the circuit via a membrane oxygenator, tubing, and the pseudo patient. It takes about 3–4 minutes to clear all the air after several passes through the closed circuit. This is the rationale behind the delay of 5 minutes prior to subsequent bolus air injection. Since we have identical circuit components and conditions (pressures, flows, etc.), it is logical to have less emboli and volume at the venous site when the purge line of the integrated arterial filter is open because of emboli capture with the open purge line during 5 minutes of circulation. Not all the bolus air can be captured during the first pass after injection.

We have not investigated the impact of a separate arterial filter on gaseous microemboli. To make that particular comparison, experimental conditions (flow rate, circuit pressure, etc.) must be identical but this is not possible due to significant diverted flow (stolen blood flow) via the arterial filter purge line. Even though the stolen blood flow will be less in the adult model compared to the neonatal circuit, this will be a significant limitation across groups because one of the major factors for microemboli delivery is the flow rate (5).

The Emboli Detection and Classification Quantifier is the only FDA approved device in the United States that can measure and classify air emboli as small as 10 microns compared to 40 microns with traditional transcranial Doppler devices (6). We have also compared roller pumps versus centrifugal pumps in addition to evaluating several oxygenators in terms of microemboli capture under cardiopulmonary bypass conditions (3,4).

We are pleased to learn that Drs. Simons and Weerwind have similar clinical experiences in terms of measured microemboli diameter compared to our study. Recently we also published our clinical results (7) and more clinical data are under preparation for publication.

Once again, we thank Drs. Simons and Weerwind for their comments and we hope that we were adequately able to respond to their comments.

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