

## Intraoperative Hypothermia and Blood Loss: Are Antifibrinolytic Exposure and Variations in Anesthetic Technique Possible Confounders?

*To the Editor:*—I read with great interest the excellent article by Dr. Rajagopalan *et al.*<sup>1</sup> detailing their meta-analysis to investigate the relation between mild perioperative hypothermia, blood loss, and transfusion. Their analysis demonstrated that mild hypothermia increases blood loss by approximately 16% and increases the risk for transfusion by approximately 22%.

My first question to the authors is whether perioperative antifibrinolytic exposure has confounded the results of the meta-analysis. For example, tranexamic acid was used in the one cardiac study that did not show increased blood loss or transfusion due to hypothermia.<sup>2</sup> Was antifibrinolytic therapy a major confounder across studies included in the meta-analysis? Does antifibrinolytic exposure explain the studies that documented no increased bleeding or transfusion risk due to mild hypothermia?

My second question to the authors is whether these negative studies are confounded by hemostatic variations in anesthetic technique, such as induced hypotension and/or regional anesthesia.<sup>3,4</sup>

I congratulate Dr. Rajagopalan *et al.* on their excellent article that has further highlighted the importance of perioperative euthermia. I look forward to their comments.

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*In Reply:*—Dr. Augoustides asks whether antifibrinolytic use confounded our conclusion that even mild hypothermia significantly increases blood loss and transfusion requirement.<sup>1</sup> Among the studies included in our meta-analysis and as specified in the original publications, antifibrinolytic therapy was used in but one. Specifically, Nathan *et al.*<sup>2</sup> gave a 1-g bolus of tranexamic acid after induction, followed by 2 mg · kg<sup>-1</sup> · h<sup>-1</sup> intraoperatively. Because identical doses were used in the normothermic and hypothermic groups, antifibrinolytic use was not a confounding factor.

Similarly, all studies included in our meta-analysis were prospective trials in which thermal management was randomized. Analysis was based on group assignment rather than actual core temperature. Clinical management, whether with regional or general anesthesia, was thus comparable in the randomized groups within each study—again, as specified in the original publications. Induced hypotension was used in only one study, and again, management was comparable in the hypothermic and normothermic groups.<sup>3</sup> Consequently, anesthetic management was not a confounding factor either.

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## Monitoring of the Sublingual Microcirculation in Cardiac Surgery Using Two-dimensional Imaging

*To the Editor:*—With great interest, we read the article by Bauer *et al.*<sup>1</sup> on sublingual microvascular perfusion in 47 patients who underwent hypothermic cardiopulmonary bypass surgery. The authors report a 10% decrease in functional capillary density during cardiopulmonary bypass without changes in microvascular diameter or erythrocyte velocity. These results are partly in contrast with our recent findings in a comparable setting.<sup>2</sup>

Although both studies evaluated the sublingual microcirculation by a two-dimensional imaging technique, several differences do exist, of

which the imaging technique itself and the subsequent way of analysis are most important. To understand the different results more comprehensively, we would like to comment on several aspects of the study by Bauer *et al.*

First, we used side-stream dark-field imaging, a novel technology based on the orthogonal polarization spectral imaging technique used by the authors. Side-stream dark-field imaging differs from orthogonal polarization spectral technology in terms of magnification and capillary contrast. These differences between the two-dimensional imaging