cally and statistically is robust and reliable.

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Reply to the Editor:

We are grateful for the opportunity to respond to the letter by Dr Shuhaiber. We appreciate the comments on our recent article reporting moderate hypothermic lower body circulatory arrest with selective cerebral perfusion.¹ His comments can be summarized as follows: (1) the propensity score analysis was not applied properly in our study; (2) too many patients were excluded after matching when using propensity score analysis; and (3) therefore it cannot be concluded that the moderate hypothermic circulatory arrest is safe for aortic arch surgery, and more data should be accumulated for this conclusion.

Regarding the first point, Dr Shuhaiber pointed out that the propensity score simply took the place of the full set of covariates in our study; therefore, it was an inferior approach, and our conclusions were questionable. As Blackstone² described, the propensity score analysis is not the best method of comparison because it cannot account for unknown variables affecting outcome that are not correlated strongly with measured

variables. Weitzen and associates³ demonstrated a limitation of propensity score analysis in their systematic literature review and described that many researchers are uncertain as to which criteria for logistic regression modeling used to generate predictions or for estimating adjusted treatment effect estimates are important with respect to estimating a propensity score. We agree with the mentioned limitation of the propensity score analysis and should admit that the factors involved in our study to generate the propensity score might not be all factors that can affect outcome. However, almost all known factors that can affect outcomes of aortic arch surgery were involved in modeling of the propensity score in our study, and we therefore consider that propensity score analysis was properly performed.

Regarding the second point, Dr Shuhaiber stated that the validity of the conclusions are questionable because approximately 50% of patients were excluded from the propensity score analysis in our study. However, Weitzen and associates³ reviewed 47 studies using propensity score analysis and found that more than 50% of patients were unexposed to the propensity score analysis in 38 studies. Thus we disagree with his statement. Moreover, not only the propensity score analysis but also an analysis of the entire study cohort without matching was performed in our study to avoid small study samples of patients.

Regarding the third point, we should emphasize that our study was designed as a retrospective study. We did not change our intraoperative strategy to write an article; on the contrary, the moderate hypothermic circulatory arrest strategy with selective cerebral perfusion is our ongoing concept, with favorable results at Hannover Medical School.^{1,4} When and how our concept should be presented is a philosophical question, and we could wait until the number of patients operated

on according to our current strategy would become 1000 instead of 252, as in our article. The number of patients might be too little and the timing of presentation might be too early, as mentioned by Dr Shuhaiber. However, we presented our institutional experience with an analysis using propensity scores because there has been no comparative study of moderate hypothermic circulatory arrest with reasonable control groups in the literature. Here we have obtained evidence by use of propensity score analysis that moderate hypothermic lower body circulatory arrest with selective cerebral perfusion might represent a safe technique.

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