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Reply to the Editor:

We appreciate the letter by Xu and colleagues regarding our article, and we are delighted with their thoughtful insights into our results.¹ They insist on the importance of routine measurement of pulmonary artery index (PAI) or Nakata index before bidirectional cavopulmonary shunt (BCPS) and Fontan operation, based on their clinical evidence that no significant pulmonary arterial growth can be expected after BCPS. Although there have been several reports that small pulmonary arterial size does not affect midterm results after Fontan,² there have not been sufficient clinical data about patients with PAI around 100 mm²/m² or

smaller; therefore, it is difficult to define lower limit of the PAI based only on statistics or on clinical experiences. We created numerical models of extremely small pulmonary arterial size and discussed the lower limit from a hemodynamic point of view.

As they describe, the cutoff value could be higher with the increase in the patient's body size if the pulmonary arterial size would not change once a cavopulmonary circulation has been instituted. Our cutoff value 110 mm²/m² was derived using the computational fluid dynamic (CFD) models based on 17 Fontan patients whose ages were 36.0 ± 32.0 months old and body surface areas 0.53 ± 0.16 m².¹ Because it is difficult to consider body growth or tissue generation in CFD models, cutoff value estimation in older patients requires additional models of larger body size. However, as Xu and colleagues pointed out, if pulmonary arterial size will not change drastically after BCPS, and because conduit size does not change, the shape of the anastomosis site would not change other than superior vena cava (SVC) diameter, and hemodynamics will depend on the total venous flow amount and flow distribution between the SVC and inferior vena cava (IVC). From our results, drastic increase of the venous pressure and energy loss was observed if the PAI dropped lower than 100 mm²/m², and this tendency did not change even if IVC flow increased exercise models.¹ We could conclude that the patient with a PAI less than 120 to 140 mm²/m² at the time of Fontan procedure would be problematic in long-term follow-up periods.

As Tan and colleagues³ pointed out, BCPS represents a selection process in the Fontan pathway, and small pulmonary arterial size would be paid attention to, despite the recent controversial evidences to PAI.² Surgical strategies to patients with extremely small pulmonary arteries (PAI under 100 mm²/m²), including complete pulmonary arterial augmentation

to the right and left pulmonary upper lobe branches with patch material,² or interstage additional flow for the purpose of pulmonary arterial augmentation warrants further study.

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THE SELECTED SEGMENTAL INFLATION TECHNIQUE FOR PULMONARY SEGMENTECTOMY: PROS AND CONS

To the Editor:

We read with interest the article titled, "Extremely rare but potential complication of diffuse brain edema due to air embolism during lung segmentectomy with selected segmental inflation technique by syringe needle during video-assisted thoracoscopic surgery," by Otsuka and colleagues¹ in the November issue of the *Journal of Thoracic and Cardiovascular Surgery*. We are interested in their experience and would like to make some comments.

We have been using the selected segmental inflation technique with a butterfly needle.² Japanese authors have written articles on identifying the intersegmental plane. Interestingly, the

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