

## Author's Reply

To the Editor,

We thank the author for their interest in our studies and results and for bringing up this point. As the author has mentioned, shunt operations are challenging procedures in congenital patients because it is difficult, if not impossible, to predict short- and long-term performance in specific patients (1-3). Thus, patient-specific surgical planning and decision making for shunt configuration (location, diameter, and type) are crucial for the success of surgery (3-6). In our study (7), we have investigated in detail the performance of shunt configurations in terms of pulmonary flow rates, energy (pressure) loss, and blood damage (hemolysis). Moreover, we have studied the effect of pulmonary artery diameter and pulmonary vascular resistance on pulmonary flow rates. Tables 2 and 6 present the right, left, and total pulmonary artery perfusion calculations. In the "Flow splits" subsection of the Results section, flow preference has been discussed on the basis of shunt configuration, pulmonary artery diameters, and pulmonary vascular resistance.

In the Discussion section, flow preferences have been discussed on the basis of pulmonary resistance, shunt anastomosis angle, and pulmonary artery sizes.

Furthermore, in the Conclusion section, we have suggested that the anastomosis angle between the shunt and pulmonary artery has a crucial effect on flow splits directed to the pulmonary arteries. The shunt angle should not be directed toward the narrow pulmonary artery (right or left) since total pulmonary flow rates decrease. Furthermore, vertical anastomosis configurations increase total pulmonary perfusion; thus, these configurations are preferable compared with leaned anastomosis shunt configurations.

We, hereby, thank again the author for their fruitful discussions. They have summarized shunt surgery planning based on previous literature and our current paper. They have also emphasized the importance of the topic and remarked the place of our current paper among the surgical planning literature.

 Ahmet Arnaz,  Şenol Pişkin<sup>1,2</sup>

Department of Cardiovascular Surgery, Faculty of Medicine,  
Acıbadem Mehmet Ali Aydınlar University; Istanbul-Turkey

<sup>1</sup>Department of Mechanical Engineering, Koç University; Istanbul-Turkey

<sup>2</sup>Department of Mechanical Engineering, University of Texas at San Antonio; San Antonio-TX-USA

- simple palliative procedure. *Eur J Cardiothorac Surg* 2013; 44: 1096-102.
2. Piskin S, Unal G, Arnaz A, Sarioglu T, Pekkan K. Tetralogy of Fallot Surgical Repair: Shunt Configurations, Ductus Arteriosus and the Circle of Willis. *Cardiovasc Eng Technol* 2017; 8: 107-19.
3. Piskin S, Altin HF, Yildiz O, Bakir I, Pekkan K. Hemodynamics of patient-specific aorta-pulmonary shunt configurations. *J Biomech* 2017; 50: 166-71.
4. Agematsu K, Okamura T, Takiguchi Y, Yoneyama F, Harada Y. Rapid growth of pulmonary artery after intrapulmonary artery septation. *Asian Cardiovasc Thorac Ann* 2018; 26: 479-81.
5. Lashkarinia SS, Piskin S, Bozkaya TA, Salihoglu E, Yerebakan C, Pekkan K. Computational Pre-surgical Planning of Arterial Patch Reconstruction: Parametric Limits and In Vitro Validation. *Ann Biomed Eng* 2018; May 14. [Epub ahead of print]
6. Piskin S, Ündar A, Pekkan K. Computational Modeling of Neonatal Cardiopulmonary Bypass Hemodynamics with Full Circle of Willis Anatomy. *Artif Organs* 2015; 39: E164-75.
7. Arnaz A, Pişkin Ş, Oğuz GN, Yalçınbaş Y, Pekkan K, Sarioglu T. Effect of modified Blalock-Taussig shunt anastomosis angle and pulmonary artery diameter on pulmonary flow. *Anatol J Cardiol* 2018; 20: 2-8.

**Address for Correspondence:** Dr. Ahmet Arnaz,  
Acıbadem Mehmet Ali Aydınlar Üniversitesi Tıp Fakültesi,  
Kalp ve Damar Cerrahisi Anabilim Dalı,  
Halit Ziya Uşaklıgil Caddesi  
No:1, 34140,  
İstanbul- Türkiye  
Phone: +90 212 414 45 16  
Fax: +90 212 414 44 90  
E-mail: ahmetarnaz@yahoo.com  
©Copyright 2018 by Turkish Society of Cardiology - Available online  
at [www.anatoljcardiol.com](http://www.anatoljcardiol.com)

## References

1. Dirks V, Prêtre R, Knirsch W, Valsangiacomo Buechel ER, Seifert B, Schweiger M, et al. Modified Blalock Taussig shunt: a not-so-