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The Hemodynamics of Total Cavo-Pulmonary Connection Anatomies[1] CHANG WANG, Georgia Institute of Technology, ANVAR GILMANOV, LIANG GE, FOTIS SOTIROPOULOS, AJIT YOGANATHAN — The single ventricle is a congenital heart defect in which the right side of the heart is hypoplastic or totally absent. This anomaly results in mixing of the oxygenated and deoxygenated blood in the single ventricle, reducing the amount of oxygen transferred to the body. In U.S. two in 1000 babies are born with a single ventricle heart defect. Palliative surgical treatments are performed in stages as the child grows. The last stage is the total cavo-pulmonary connection (TCPC), which bypasses the right side of the heart and the single ventricle drives blood throughout the pulmonary and systemic circulations. We simulate the flow in two TCPC anatomies using a sharp-interface, hybrid Cartesian/Immersed Boundary approach. The computed solutions are compared with PIV in-vitro experiments and analyzed in detail to elucidate the richness of the hemodynamics in the surgically create pouch region where the inferior and superior vena cava flows collide and bifurcate into the left and right pulmonary arteries. The effect of the connection anatomy on the flow dynamics will also be discussed.

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